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Does Commitment or Feedback Influence Myopic Loss Aversion? An Experimental Analysis

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Abstract

Empirical research has demonstrated that a lower feedback frequency combined with a longer period of commitment decreases myopia and thereby increases the willingness to invest in a risky asset. In an experimental study, we disentangle the intertwined manipulation of feed-back frequency and commitment to analyze how each individual variable contributes to the change in myopia and how they interact. We find that the period of commitment exerts a sub-stantial impact and the feedback frequency a far less pronounced impact. There is a strong interaction between both variables. The results have significant implications for real world intertemporal decision making.

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

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, that is, how long he is bound to his initial choice. Consider the stock market as an example of intertemporal decision making. Suppose you own some cash and want to make an investment in some risky asset, given some fixed planning horizon (e.g. your year of retirement). Does the amount you invest in the risky asset depend on the time you are committed to your investment? For example, does the decision depend on whether you can change the amount invested each month or only each year? The second feature studied is the feedback frequency. Using the stock market context again, the question arises as to whether the frequency of feedback influences the amount invested in the risky asset. Take, for example, a (risky) investment fund that provides information about its current value each year versus another fund that provides similar information each quarter. Does the difference in frequency make people invest more or less into such funds? In addition to the impact of each of these individual variables, one should consider whether there is any interaction between length of commitment and feedback frequency. Knowing the answers to the above questions is essential. The sheer volume of long-term investments in the stock market makes it worth studying factors that influence these investments.

In addition to the practical relevance of our study, our results are important for interpreting previous work. It will be shown that one cannot interpret previous results effectively 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 behind MLA is that, because of loss aversion, a sequence of risky investments looks less attractive in a 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 with different levels of risk. In both studies, a manipulation of the degree of myopia systematically influenced the willingness to invest in the riskier alternative. 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.

Subsequently, these original results on the impact of myopia on risk taking have been confirmed and extended in many ways. Haigh and List (2005) 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 et al. 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 (2005) 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 that of Gneezy and Potters. Summing up, all the evidence on MLA suggests that the willingness to invest in the risky asset is influenced by a simultaneous manipulation of feedback frequency and period of commitment.[1] However, we

[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 exclude a myopic evaluation by displaying the aggregated distribution of the sequence instead of the repeated trial format.

know almost nothing about each factor's individual influence or about a possible interaction effect.[2]

In our study, we find three main results. First, binding decisions cause people to be less myopic, perhaps because they must to think through the implications of a longer time horizon. Participants invest more in the risky asset in the binding condition than in the non-binding condition. This tendency does not disappear 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 no simple main effect from combining commitment and feedback, but an interaction between these two variables. The strongest effect is observed when participants are committed to their decisions, but receive frequent feedback. The effect is even stronger than the combination of a long period of commitment and less frequent feedback. It seems that if people are committed to their decisions, more frequent feedback is helpful because over time it becomes more salient that occasional losses are outweighed by ultimate gains.

In Section 2, we will present some conceptual thoughts on MLA and introduce both hypotheses and our study design. The results are presented in Section 3. The paper concludes with a short discussion (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 evaluating a risky alternative, individuals tend to

[2] In a recent study, however, Bellemare et al. (2005) address similar questions. Their findings are different from our results, which might be due the fact that we implement a multiplicative scenario instead of the additive approach commonly used in the literature. This issue will be discussed later.

weight losses more heavily than gains.[3] Myopia is the short-sightedness that induces a decision maker to evaluate each alternative within 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 in the risky asset (i.e. myopia leads to decreased willingness to take risk). The question addressed in this paper is to what degree myopia (and thus the attitude to risk) is influenced by commitment and by feedback, and how these two variables interact.

Most experimental research on MLA uses the feedback frequency and the period of commitment simultaneously to manipulate myopia. Less frequent feedback delivers distributional information at a more aggregated level and a longer period of commitment induces investors to think in terms of several periods into the future. The experimental finding that these manipulations lead to a higher willingness to invest in a lottery sequence (Gneezy and Potters 1997, Haigh and List 2005, Gneezy et al. 2003) shows that the feedback frequency and the period of commitment in fact influence the degree of myopia in the evaluation. The results obtained by Langer and Weber, though questioning the robustness of MLA, provide additional support for this mechanism. The study extends 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 with respect to most sequences of alternatives but results in lower risk aversion for sequences based on alternatives with small loss probabilities and high loss magnitudes. 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 period of commitment seems to be robust.

[3] For a review of loss aversion see Kahneman et al. (1991) and Tversky and Kahneman (1992).

In this paper, we are interested only 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 predictions about the impact of myopia on the attractiveness of the gambling sequence are unique. For a prospect that offers a 40% chance of gaining 7% on the invested amount and a 60% chance of losing 3%, as used in our experiment, a less myopic evaluation of multiple plays should generally (i.e. in MLA and MPT) be more attractive.

In addition to the separate consideration of commitment and feedback, our design differs from most used in the literature (e.g. Gneezy and Potters 1997) in one important respect. 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, $\alpha(t)$ is the proportion of endowment invested into the risky asset in period t with $0 \le \alpha(t) \le 1$, r(t) is the return on the risky asset in period t, and T the planning horizon.[4]

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:

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

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

where FW' is the final wealth, Y is the initial endowment, $\alpha(t)$ 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 more closely resembles the accrual of returns in real asset markets. On the other hand, it might lead to weaker results in terms of 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 less myopically, even in conditions that support myopic thinking in the additive case. It is useful to examine how strong the effects of MLA remain in this more realistic multiplicative setting.

In the following section we present the hypotheses and then explain which design is used to test them.

2.2 Hypotheses

This paper deals with the effect of commitment and feedback on myopia, which itself influences the amount invested in the risky asset. As described in formula (2), $\alpha(t)$ is the percentage of current wealth a person invests in the risky asset in period t. Thus $\alpha(t)$, or just α if the specific period is of no relevance, is the key variable for which hypotheses should be derived. We use the notation α^* for the average percentage invested over the full planning horizon. There will be two conditions for commitment: "c" for single period commitment and "C" for multiple period commitment, and two conditions for feedback: "f" for frequent feedback which will be given each period and "F" for less frequent feedback. Thus, the variable $\alpha_{Cf}(t)$ denotes, for example, the percentage of wealth invested in 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.[5]

The first hypothesis states that we can extend the results presented in the literature for the additive case to the multiplicative case: A longer period of commitment and simultaneously less feedback will increase the amount invested in the risky asset.[6]

Hypothesis 1: $\alpha_{cf}* < \alpha_{CF}*$.

The second hypothesis states that both commitment and feedback frequency will individually influence the amount invested in the risky asset. Section 2.1 has demonstrated that the degree of myopia influences α. Therefore, both more commitment and a lower feedback frequency should reduce myopia. This is the rationale behind Hypothesis 2.

Hypothesis 2: $\alpha_{c\bullet}* < \alpha_{C\bullet}*$ and $\alpha_{\bullet f}* < \alpha_{\bullet F}*$.

Ex ante, we see no reason to hypothesize any interaction effect between both variables (even if we did in fact find one subsequently).

Thus far, we have considered the average allocation over time. Next, we will present some refined hypotheses with respect to allocation patterns over time. Previous experimental research has shown that allocations to risky assets will generally increase over time, independent of the specific treatment. Langer and Weber 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 learning plays an important role in these asset allocation experiments. Over time, as subjects learn to cope with the risky situation in the experiments, ambiguity about the process as a whole diminishes. This results in increased risk taking.

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5 We will denote $\alpha_{\bullet f}$ (t) and $\alpha_{\bullet F}$ (t) if we consider the average amount invested for "f" and "F" for both commitment conditions. Note that $\alpha C\bullet$ (t) cannot change for those periods in which the decision is binding.

6 It should be clear that decreasing the decision making flexibility is not just a framing issue, but a marginal change in the decision problem even from a normative point of view. As Gneezy and Potters (1997) argue, however, the effect on the risk taking behavior should be minor.

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

Thus far, we have not considered a possible difference between the effect of commitment and that of feedback. Clearly, it should make a difference at the beginning of the experiment. Commitment should have an immediate effect, as if comitted subjects immediately become less myopic. By contrast, feedback should influence subjects only over time (and not have any effect in period 1).

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

2.3 Experimental Design

In our computerized experiment, participants were confronted with 30 independent draws of the same gamble. At the beginning of the experiment, each individual received an initial endowment of 25 € that could be invested totally or partially 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 overall 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, thus not invested in period t: $Y(t + 1) = Y(t)\,[\alpha(t)\,[1 + r(t)] + [1-\alpha(t)]]$. Each allocation decision had to be stated in percentage terms, so we explicitly asked for the proportion α, not the absolute investment amount.[7] Participants were fully informed about the return distribution of the asset and the fact that asset returns of different periods were stochastically independent.

[7] Percentage allocations seem to be more natural for real world stock/bond allocation decisions. It should be noted that Gneezy and Potters asked for amounts and not for percentages in their original work in the additive framework. However, since Langer and Weber replicated the results of Gneezy and Potters while asking for percentages, it does not look like this design difference has a major impact on the results.

Two factors, the period of commitment and the feedback frequency, were varied within the experiment, resulting in a 2x2 design. Short term commitment (condition c) was for one period; longer term commitment was for three periods (condition C). Frequent feedback was provided in each period (condition f), and infrequent feedback was after each third period (condition F) .

In design cf, 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 experimental condition cf.

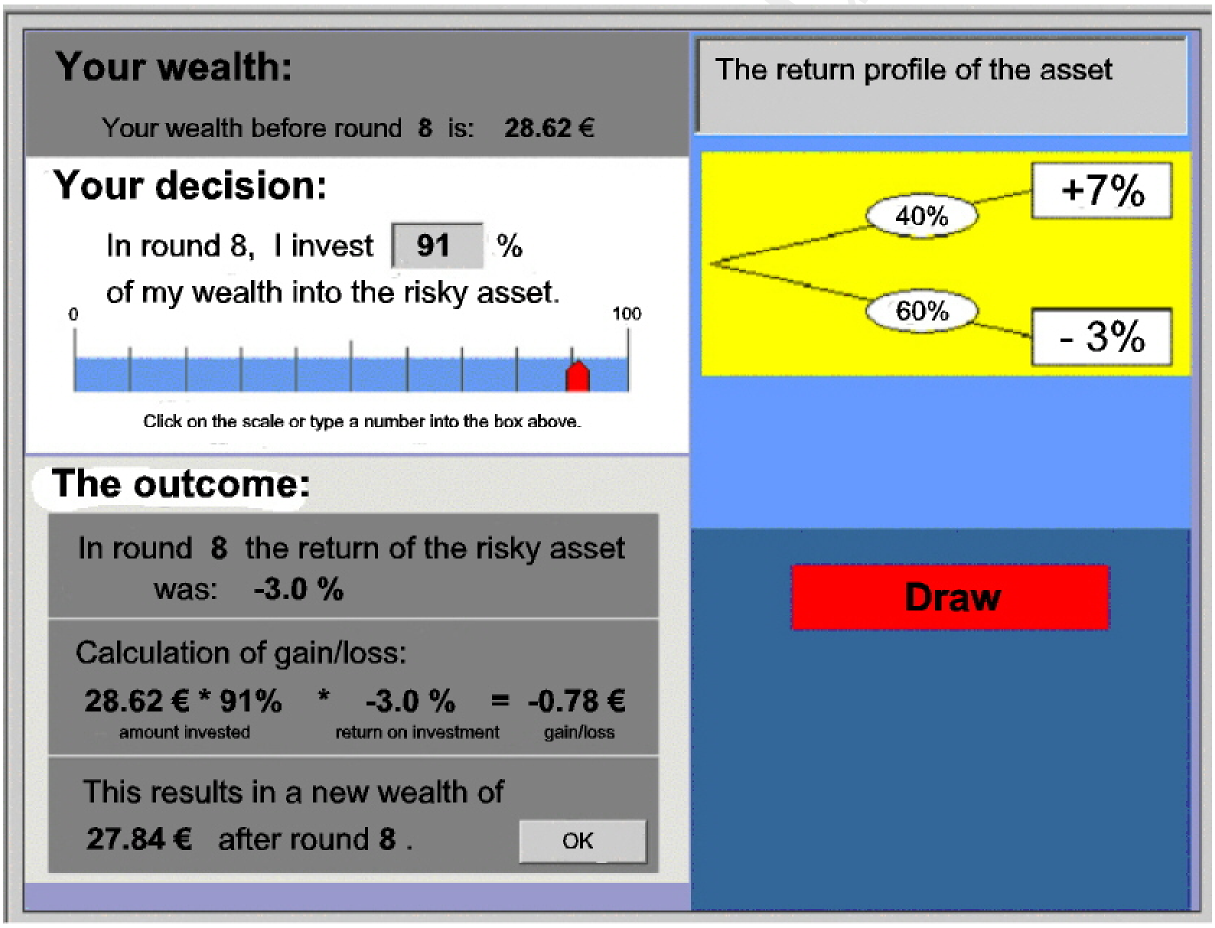

Fig. 1: Screenshot from condition”bf” (translated).

On the top left side of the screen, current wealth (here 28.62 €) is displayed. Below, the allocation decision is made either by 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 level of wealth (here 27.84 €).

In design Cf, participants' allocation decisions were binding for three rounds. Therefore, although the gambles were played out and feedback was presented in each round, participants could only adjust their allocation after each third round. In design cF, feedback about the outcome of the investments was presented at a more aggregated level. 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 individual round.[8] In design CF, participants made binding decisions for three rounds and obtained feedback information only about the aggregate change of wealth over the three periods.

The experimental subjects were masters students from Mannheim University, recruited in an advanced finance class. Overall, 107 students took part in the experiment, 26 in treatment CF and 27 in each of the other treatments. [9] They entered the computer lab individually 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 then started the experiment independently.[10] The outcomes of the gambles were generated randomly 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 Cf and CF) or 30 (in treatments cf and cF) allocation decisions. All

[8] Undoubtedly, this is a rather strange investment condition. We included it nevertheless to cover the complete 2x2 design.

[9] Somewhat reflecting the typical gender distribution in advanced finance classes in Germany, there were only 14 female students taking part in the study (13%). That explains why we cannot present any second order results on gender differences in the following.

[10] The complete instructions can be downloaded from the journal webpage.

participants received a flat fee of € 3 for showing up and had a 10 % chance of being selected by the computer for real payment according to their final level of wealth in the experiment. The twelve selected individuals earned an additional € 30.19 on average. The payment procedure was made known to participants *ex ante*.

3 Results[11]

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

	$\alpha_{c\bullet}$*	$\alpha_{C\bullet}$*	$\alpha_{\bullet f}$*	$\alpha_{\bullet F}$*
	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

Table 1 indicates that we found a main effect for commitment ($\alpha_{c\bullet}* < \alpha_{C\bullet}*$, $p < 0.01$, 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 explain the surprising result. It clearly demonstrates that there is a significant interaction effect (ANOVA, $p < .05$) between both the commitment and feedback frequency variables. Either manipulation on its own increases the percentage invested in the risky asset ($\alpha_{cf}* < \alpha_{Cf}*$, $p < .01$ and $\alpha_{cf}* < \alpha_{cF}*$, $p < .05$) as the dotted lines illustrate. However, the joint effect is reversed ($\alpha_{Cf}* > \alpha_{CF}*$, n.s) or non-existent ($\alpha_{cF}* \approx \alpha_{CF}*$) at best. The data indicate that the effect of a longer period of commitment is stronger when the feedback frequency is greater. We will discuss this finding in more detail below. Nevertheless, we can confirm hypothesis 1 and thus replicate the earlier findings in a multiplicative setting ($\alpha_{cf}* < \alpha_{CF}*$, $p < .05$).

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

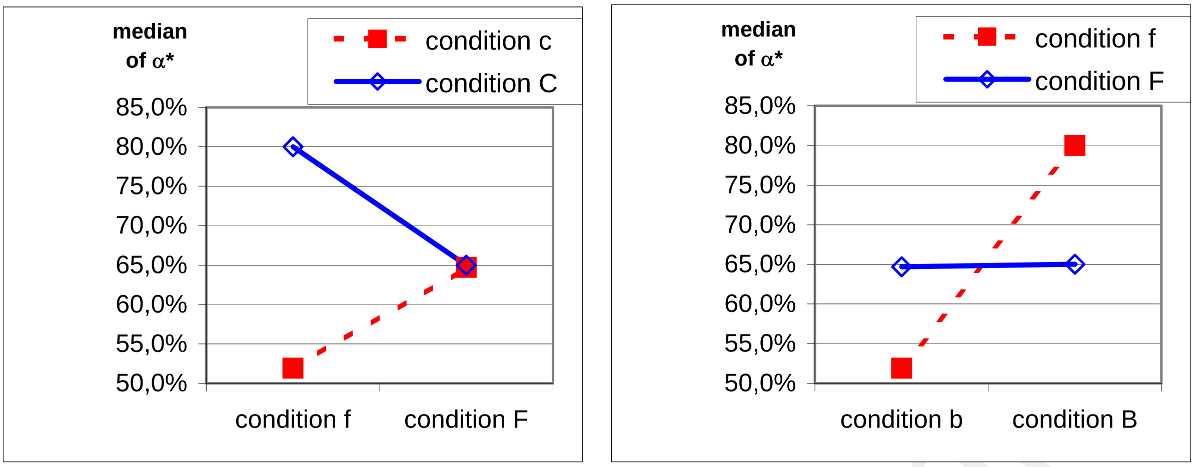

Fig. 2: Interaction of commitment and feedback manipulation

Next, we consider the hypotheses relating to the development of allocations over time. To give an initial 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 seem to increase over time in general, as predicted in hypothesis 3, though the effect is far from being monotonic.

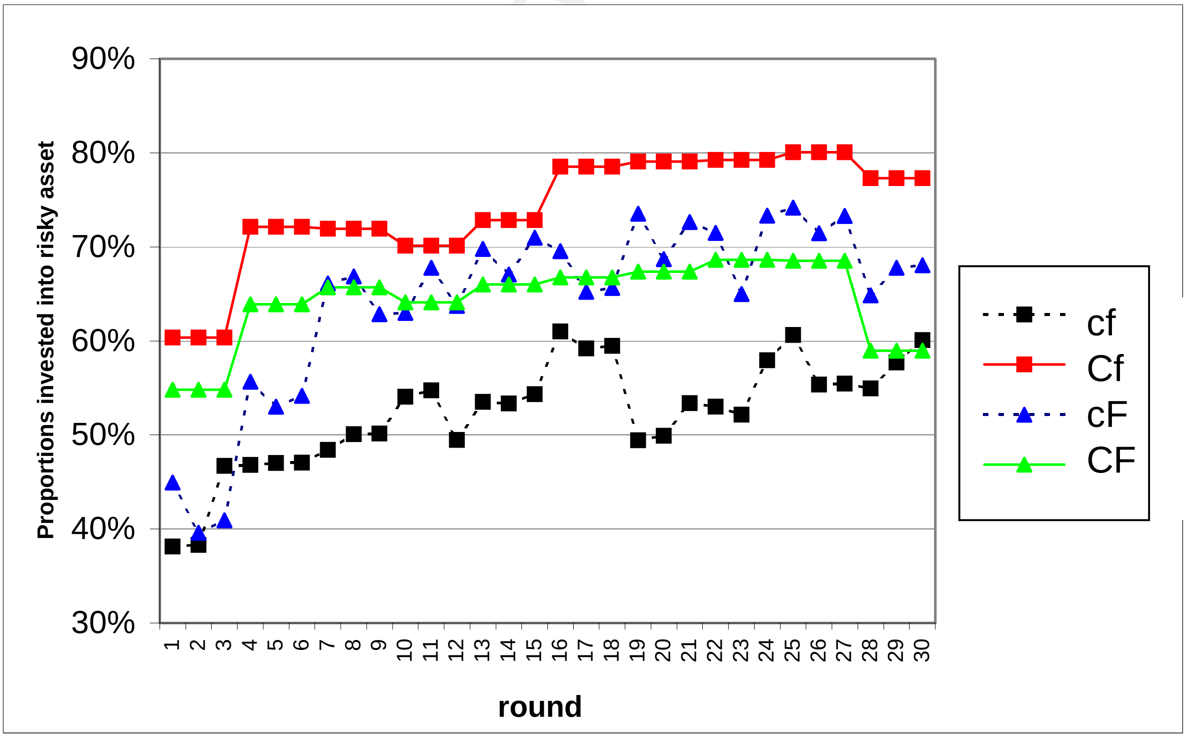

Fig. 3: Average allocation to the risky asset for each period and each treatment

For a first simple test of Hypothesis 3, we compute the average allocation for both individual 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 treatment cF (11%) and lowest in treatment CF (0%). Using a Wilcoxon signed rank test, the trend is significantly positive at a 1% level for treatments Cf and cF and on a 5% level for treatment cf. In treatment CF, the effect is insignificant; we even observe more participants with a negative (11) than a positive (9) trend.

Design	cf	Cf	cF	CF
	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 in average allocation in first half (rounds 1-15) to average allocation in second half (rounds 16-30) of the experiment.

Hypothesis 4 states that the allocation in Period 1 is the same both for low and high feedback frequencies and that it is greater in the case where subjects make binding decisions for three periods. Calculating the medians (means) we obtain

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

$$\alpha_{c\bullet}(1) = 36.5\% \ (41.5\%), \qquad \alpha_{C\bullet}(1) = 50.0\% \ (57.6\%)\ .$$

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

In our examination of Hypotheses 1-3, we considered average allocations over the complete course of the experiment. We now investigate how much subjects will allocate to the risky investment in the long run. This seems especially important in light of the applications mentioned 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 $t \rightarrow \infty$. More explicitly, we consider a partial adjustment model,

$$\alpha'(t) = b + c \cdot \alpha'(t-1), \tag{3}$$

and estimate the parameters b, c, and $\alpha'(1)$ to minimize the quadratic deviation of α' from α.[12]

Because of the interfering end effects in the data (see Figure 3), we exclude the allocations of the final three rounds from the fitting procedure.[13] We further impose the natural restriction on the allocation function $\alpha'(t)$ to remain within 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 $t \rightarrow \infty$.

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 $\alpha'(t)$ increases in all four treatments (providing further support for hypothesis 3). The values of b, c, $\alpha'(1)$, and $\alpha(\infty) = \frac{b}{(1-c)}$ are summarized in Table 3. Again, the interaction effect is shown in the data as $\alpha_{Cf}(\infty)$ and $\alpha_{cF}(\infty)$ are both larger than $\alpha_{CF}(\infty)$. In the long run, the combined manipulation of feedback frequency and period of commitment thus seems to have less impact on the willingness to invest in the risky asset than each manipulation alone.

[12] This process is used in market experiments to estimate equilibrium prices (see, e.g. Camerer et al., 1989).

[13] Such end-effects are also found in other similar experiments such as Weber and Camerer. We believe that these experiments reflect the conventional wisdom that one should lower the exposure to risk at the end of the planning horizon.

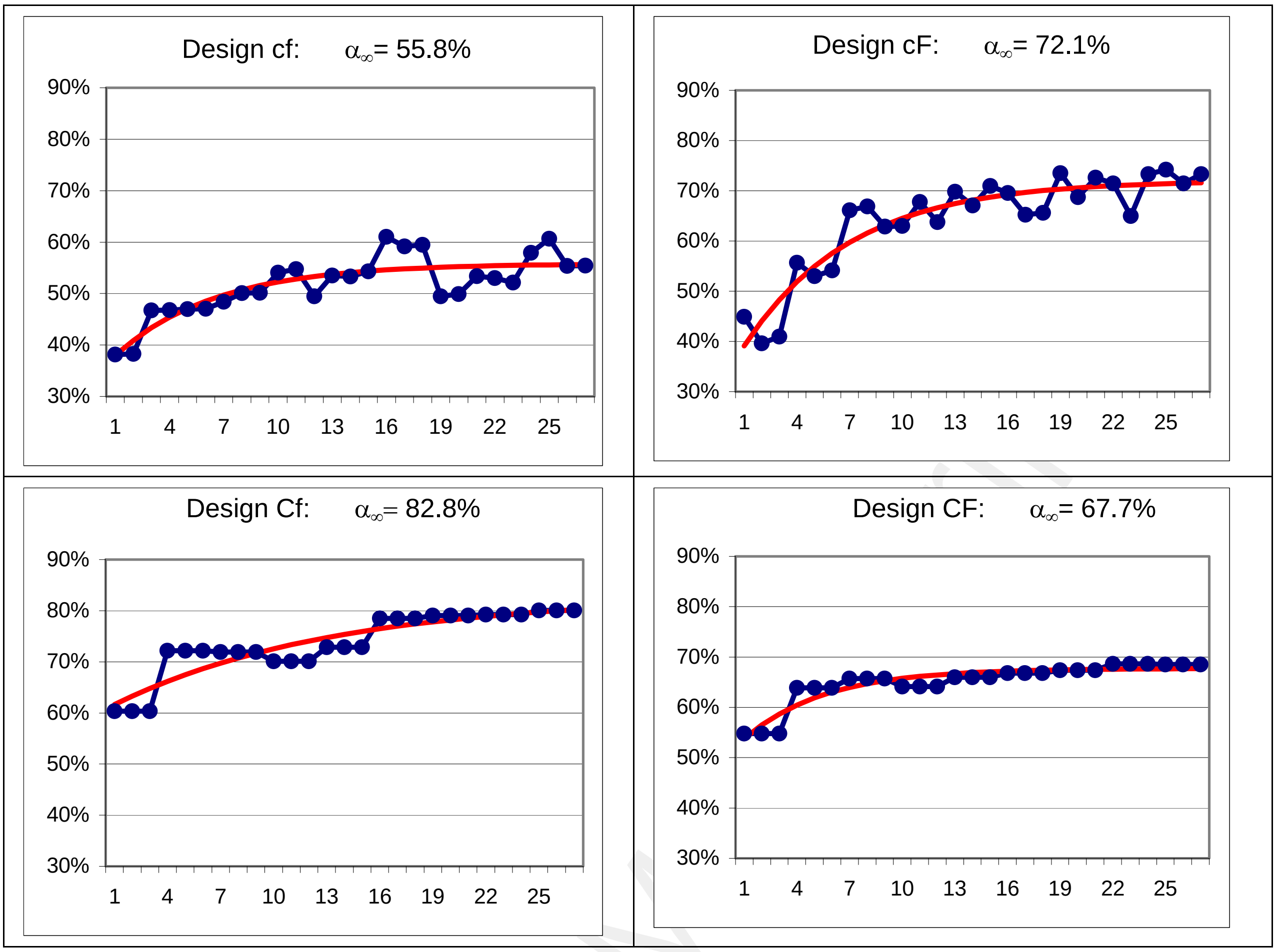

Fig.4: Average allocations in each treatment and fitted process α'(t) = b+c·α'(t-1).

Condition	cf	Cf	cF	CF
α'(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 α'(t) = b+c·α'(t-1) fitted on average allocations in each design.

To test the significance of the long run effects, we use the procedure described above to fit functions α'(t) to each individual's allocations and compare the resulting individual long run allocations α(∞) for the different treatments. The results are summarized in Table 4.

	$\alpha_{cf}(\infty)$	$\alpha_{Cf}(\infty)$	$\alpha_{cF}(\infty)$	$\alpha_{CF}(\infty)$
mean	62.0 %	83.8 %	78.0 %	67.0 %
median	71.0 %	100.0 %	100.0 %	71.0 %

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

Interestingly, in conditions Cf and cF 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 most the complete endowment can be invested). A Mann-Whitney test shows that $\alpha_{cf}(\infty)$ is significantly smaller than $\alpha_{Cf}(\infty)$ on a 1% level, whereas the difference between $\alpha_{cf}(\infty)$ and $\alpha_{cF}(\infty)$ is only marginally significant.[14] Thus, even in the long run, subjects invest more in the risky asset when they are committed to their decisions or feedback is given more frequently; no such effect is observed if both manipulations are present.[15]

4 Discussion

In this paper, we investigate the effect of commitment and feedback frequency on myopic loss aversion and examine the robustness and determinants of the phenomenon. In contrast to previous studies, our experimental design is based on a multiplicative scenario that more closely resembles the investment process in real asset markets. We further disentangle the intertwined manipulation of feedback frequency and period of commitment, commonly examined in conjunction in previous research, to understand better how each aspect contributes to the change in myopia.

[14] Marginal significance is also given for the difference between $\alpha_{Cf}(\infty)$ and $\alpha_{CF}(\infty)$.

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

We find that each isolated manipulation has an impact on myopia and thereby the willingness to invest, even in a multiplicative scenario. Surprisingly, we find a strong and persistent interaction effect. The effect of the feedback frequency is reversed for the long period of commitment. This is an interesting result, because the manipulation of feedback frequency is usually considered the main driving force behind myopic loss aversion effects in experimental studies. The underlying intuition is that a longer period of commitment induces the decision maker to consider the consequences of the investment decision in a more far-sighted manner, thereby limiting the negative effects of narrow framing (Kahneman and Lovallo 1993). This effect is especially strong if the decision makers receive frequent feedback (i.e. they inevitably learn over time that occasional losses are outweighed by larger gains). Limiting feedback helps people learn not to behave myopically, but this is less the case when decisions entail commitment.

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 several periods could, somewhat counterintuitively, help to increase the investor's willingness to invest in risky assets. Stock funds should advertise the possibility to make, for example, a year long commitment, but should send statements more frequently during the year.

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 (additive or multiplicative) induces stronger effects. Interestingly, in similar research, but in an additive investment scenario, Bellemare et al. do not find the interaction between feedback frequency and period of commitment that we observe. This suggests that it might be worthwhile to examine further the impact of the investment scenario (additive vs. multiplicative) on the determinants of myopia. Furthermore, our explanation of the strong effects of frequent feedback and longer commitment is ex post. It would be worth running replicative studies to gain a greater level of understanding of this important interaction effect. Finally, it is not clear to what degree our results (as well as the results presented in the literature so far) depend on the specific parameters of the experiment. In this first study building on the multiplicative scenario, we intentionally chose a risk profile that was as simple as possible and seemed suitable to produce myopic loss aversion effects.[16] Of course, it can be questioned whether the percentage changes (and incentive sizes) were large enough to induce participants to think carefully about their decisions. Further experimental studies might be able to shed light on such questions.

Even more important, and surely also more challenging, would it be to look for effects of myopic loss aversion in the field. We are not aware of any existing empirical data set that would allow an immediate and clean test of the myopia effects discussed in this paper.[17] However, it might be possible to convince investment companies to provide slightly different investment environments to their customers (e.g. different feedback frequencies) to mimic the manipulations of the existing experimental studies. Finding similar effects of myopia in such real world data would not only eliminate the usual concerns about the insufficient incentives and artifical investment environment underlying the experimental findings, but it could also be extremely helpful to demonstrate to practitioners the relevance of behavioral research.

5 Literature

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[16] Our only other concern was that the risk profile should be somewhat similar to a stock market investment. In this case, the 1% expected return and about 5% standard deviation of returns make our lottery comparable to the monthly return distribution of a stock market index.

[17] Gneezy et al. motivate their research on myopic loss aversion by referring to the Israelian Bank Hapoalim and its intention to send out less frequent feedback to their customers as this was supposed to increase the willingness to hold mutual funds. However, this has to be considered anecdotal evidence, of course, and no information on the customers' reaction to such changes is reported.

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