Myopic risk-taking in tournaments[*]

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Abstract

There is a common notion that incentive schemes in the financial industry trigger myopia and risk-taking. In some sense this contrasts with the concept of myopic loss aversion (MLA), which implies that myopia mitigates risk-taking. A number of experimental studies support the MLA-hypothesis by showing that people take less risk the more frequently their investments are evaluated. In this paper we show experimentally that if subjects are exposed to tournament incentives, they take *more* risk the more frequently investments are evaluated.

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1 Introduction

An interesting aspect with the analyses of the 2007/2008 financial crisis is the notion that incentive schemes in the finance industry trigger both myopia and risk-taking. For instance, Tabellini (2008) argues that management compensation schemes "reward myopic risk-taking behavior" and Buiter (2008) states that "One of the key drivers of the excesses of the most recent (and earlier) financial crisis has been the myopic and asymmetric reward structure in many financial institutions. (...) Poorly structured reward systems encourage excessive risk-taking and the pursuit of short term profits."

There are indeed several incentive models that separately can account for both excessive risk-taking and myopic behavior. It is well known that option contracts and tournament incentives may trigger risk (see Haugen and Senbet, 1981, and Bronars, 1986, respectively), and of course, if incentive contracts are short-term, they may also create a myopic "pursuit of short-term profits". Hence, incentives may clearly create a positive correlation between myopia and risk-taking. But could it also be a casual relationship?

In the outset, one should not expect so. In fact, from the concepts of loss aversion and mental accounting, we have learned that myopia mitigates risk-taking. Loss aversion implies that the disutility from suffering a loss is higher than the utility from receiving an equally high gain (see Kahneman and Tversky, 1979, and Tversky and Kahneman, 1992), while mental accounting implies that people evaluate their investments frequently and independently (see Kahneman and Tversky, 1984, and Thaler, 1985). By combining these two behavioral hypotheses, Benartzi and Thaler (1995) introduced the concept of myopic loss aversion (MLA). MLA's clear implication is that people take less risk the more often they evaluate their investments. In other words, myopia reduces risk-taking. Behavior consistent with MLA is supported by a number of experiments, see Gneezy and Potters (1997), Thaler, Tversky, Kahneman and Schwartz (1997), Gneezy, Kapteyn and Potters (2003), Haigh and List (2005), Sutter (2007), Langer and Weber (2008), Fellner and Sutter (2009). But in all these experiments,

subjects are exposed to simple individual piece-rate incentives. Could it be that under some incentive regimes, myopia triggers risk-taking?

In this paper we investigate experimentally how myopia - or narrow framing - affects risk-taking when subjects are exposed to incentives commonly used in finance. In particular, we adopt tournament incentives in which subjects are evaluated and rewarded on the basis of their relative performance (relative performance evaluation - RPE). It is well documented that money managers have relative performance objectives, not only since bonuses are partly based on relative performance, but more importantly because investors allocate money into funds according to their past relative performance (see e.g. Goriaev, Palomino and Prat, 2003). Both theoretically and empirically it is shown that RPE schemes may increase risk-taking (Bonars, 1986, Hvide, 2002), but we do not know how this relates to myopia. The notion that incentives in the financial industry create "myopic risk-taking behavior" calls for an experimental study into whether myopia can increase risk-taking if subjects are exposed to tournament incentives.

Our results support this conjecture: In contrast to standard experimental results on myopic loss aversion, we find that if subjects are exposed to tournament-incentives, they take more risk the more frequently they evaluate their investment returns. Moreover, we find that tournament incentives - compared to independent incentives[1] - increase risk-taking when investments are evaluated frequently, while they reduce risk-taking when investments are evaluated infrequently.

Our experimental design is based on Gneezy and Potters (1997). Subjects participated in a simple investment game which was played for nine rounds. In the "frequent treatment" subjects had the opportunity to choose how much of their endowment they wanted to invest in a risky lottery in each round, and they also received information about the returns after each round. In the "infrequent treatment" the same game was played for nine rounds, but here subjects had to choose their investment amount in blocks of three rounds. After each block they then received information of their

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[1] With "independent incentives" we here mean incentives that do not depend on the performance of peers or competitors.

aggregated returns.

In these baseline treatments, subjects were exposed to independent incentives and we attained the standard result with lower risk-taking in the frequent treatment. In addition we had two treatments where subjects were exposed to tournament incentives. In the tournament treatments subjects were exposed to the same manipulation of feedback frequency as our baseline treatments, but here subjects were randomly matched into groups of three, and only the one with the highest payoff after nine rounds received a prize. Average investments in the risky lottery were then higher in the frequent treatment than in the infrequent treatment.

We also study how risk-taking is affected by whether subjects are trailing or leading the tournament. Tournament theory conjectures that front runners should reduce risk-taking, while trailing parties should "gamble for resurrection". In the empirical literature on mutual funds' investment strategies, there is mixed evidence on whether funds that underperform during the first part of the year actually increase risk in the second part of the year in order to try to catch up (see Brown, Harlow and Starks, 1996, Koski and Pontiff, 1999, and Busse 2001). Our controlled experiment supports the catching-up hypothesis. Trailing subjects take significantly more risk than the front runners, and distance to front runner has a significant positive effect on risk-taking.

In addition to the literature on myopic loss aversion, our paper is related to the extensive literature on tournaments. Since the seminal article of Lazear and Rosen (1981), most tournament papers have focused on optimal effort choices. However, the recognition of relative performance objectives in the finance industry has increased focus on risk-taking in tournaments. Starting with Bronars (1986), more recent theoretical papers include Hvide (2002), Hvide and Kristiansen (2003), Taylor (2003) and Kräkel and Sliwka (2004). There is also an extensive empirical literature on tournament incentives in finance, e.g. Brown, Harlow and Starks (1996), Cevalier and Ellison (1997) and Goriaev, Palomino and Prat (2003). Tournaments have been investigated in laboratory experiments as well (e.g. Bull, Schotter, Weigelt, 1987; Harbring and Ihlenbush 2003, and Eriksen, Kvaløy and Olsen, 2011),

but except for recent papers by Nieken (2010) and Nieken and Sliwka (2010), all the existing contributions focus on effort rather than risk-taking. And no one considers the effect of myopia and feedback frequency under tournament incentives, which is the main focus of our paper.

2   Experimental design and procedure

While there exist different experimental designs aimed at testing whether people behave according to the MLA-hypothesis, the design in Gneezy and Potter (1997) is the most well-known. Their idea is not to try to estimate the period over which subjects evaluate financial outcomes, but rather to use the strength of the experimental method and manipulate subjects' evaluation period. In our baseline treatments, which we denote IPE (independent performance evaluation), we replicated Gneezy and Potter's (GP) design and subjects participated in either a frequent evaluation treatment (F^{IPE}) or an infrequent evaluation treatment (I^{IPE}). Treatment F^{IPE} consisted of nine identical and independent rounds of a risky investment game (lottery),and in each round subjects decided how much of their round endowment they wanted to invest in the lottery. With a probability equal to 2/3 subjects would lose their invested amount, and with a probability of 1/3 they would win 2.5 times the amount invested. The lottery drawings were independent both between rounds and subjects. At the start of each round subjects received an endowment of 100 EK[2] and decided how much they wanted to invest in the lottery. The total earnings in each round were given by the invested amount and the outcome of the lottery, plus the residual EK not invested. After each round, and before the next round, subjects got to know the return on their investment and their accumulated earnings.

Treatment I^{IPE} was identical to Treatment F^{IPE}, except that subjects invested money and received feedback in blocks of three rounds. The amount invested was fixed within each block of three rounds. That is, at the start of rounds 1, 4 and 7, subjects were first endowed with 100 EK for each of the

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[2] *Experimental currency:* EK = Experimental kroner. 100 EK = 25 NOK (Norwegian kroner) = $4.50 at the time of the experiment.

next three rounds (a total of 300 EK) and then asked to decide on the (fixed) amount of EK that they wanted to invest for the following three rounds. After rounds 3, 6 and 9, the subjects learned the aggregated outcome for the three preceding rounds, as well as single-round earnings.[3]

In our tournament treatments, which we denote RPE (relative performance evaluation), subjects were randomly matched into groups of three, and only the one with the highest payoff after 9 rounds received a prize (if payoffs were equal, the winner was chosen by drawing lots).[4]The subjects were confronted with the same lottery as under IPE, and the drawings of the lottery were random and independent both between rounds and subjects. Subjects were endowed with 100 EK each round, and the one with most EK after nine rounds received a prize of NOK 600. In addition each subject received a participation fee of NOK 50. So expected payoff was $50 + \frac{1}{3}600 =$ NOK $250 \approx \$$ 45, approximately the same as under IPE. As under IPE, we ran one treatment (F^{RPE}) where subjects made investments each round, and one treatment (I^{RPE}) where subjects made investments for blocks of three rounds. In Treatment F^{RPE}, the subjects could also observe the outcome of their opponents every round, while in Treatment I^{RPE} they could observe the outcome of their opponents every third round.

The 2 x 2 design is illustrated in Table I.

Table I. Experimental design

	Frequent Evaluation	Infrequent Evaluation
IPE	Treatment F^{IPE}	Treatment I^{IPE}
RPE	Treatment F^{RPE}	Treatment I^{RPE}

Altogether 280 undergraduate students from the University of Stavanger,

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[3]GP also had three additional rounds (10-12) where subjects invested money they had earned in rounds 1-9.

[4]This is, of course, a starker RPE scheme than what we observe in practice, but we implement it here in order to highlight the difference between tournament incentives and independent incentives.

Norway participated in the experiment. The recruitment was done by E-mail inviting students to participate in an economic experiment where they could earn a some money. The experiment was computerized using Z-tree (Fischbacher, 2007). We had 160 subjects in IPE (80 in Treatment F^{IPE} and 80 in Treatment I^{IPE}), and 120 subjects in RPE (60 in Treatment F^{rPE} and 60 in Treatment I^{RPE}). All instructions were given both written and verbally.

3   Theoretical predictions

Now, what treatment effects should we expect? Let us first examine predictions under individual performance evaluation, IPE. Assume that subjects have prospect theory preferences, given by the value function

$$U(\omega) = \omega^\alpha \quad \text{if } \omega \geq 0 \tag{1}$$
$$U(\omega) = -\lambda(-\omega)^\beta \quad \text{if } \omega < 0 \tag{2}$$

where ω is the difference in wealth with respect to the last time wealth was evaluated. When investing an amount $x \in [0, 100]$ in the lottery just once, a gain then yields $\omega = 2.5x$, while a loss yields $\omega = -x$. Let S^n denote the value of the aggregated distribution of n independent draws of the lottery, and let p_k^n denote the probability that player i wins k times in the lottery with n independent draws.[5] Under IPE an individual then obtains

$$S^1 = p_1^1(2.5x)^\alpha - p_0^1 \lambda x^\beta \tag{3}$$
$$S^3 = p_3^3(7.5x)^\alpha + p_2^3(4x)^\alpha + p_1^3(0.5x)^\alpha - p_0^3 \lambda(3x)^\beta \tag{4}$$

from investing x in the lottery for one (S^1) and three (S^3) rounds, respectively. Prospect theory preferences imply loss aversion ($\lambda > 1$), risk

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[5] Hence, in the experiment we have $p_1^1 = \frac{1}{3}$, $p_0^1 = \frac{2}{3}$, $p_3^3 = \frac{1}{27}$, $p_2^3 = \frac{6}{27}$, $p_1^3 = \frac{12}{27}$, $p_0^3 = \frac{8}{27}$.

aversion in gain domain ($\alpha < 1$) and risk loving in loss domain ($\beta < 1$). With $\alpha = \beta = 0.88$ (as the average estimate by Kahneman and Tversky) then a low risk strategy $x = 0$ maximizes S^1 for $\lambda > 1.1$, while a high risk strategy $x = 100$ maximizes S^3 for $\lambda < 1.56$. If subjects frame narrowly, i.e. if they care about S^1 in Treatment F and S^3 in Treatment 3 (rather than S^9), we should expect lower average investments in Treatment F^{IPE} than in Treatment I^{IPE}, which is what Gneezy and Potters (and several others) find.

Consider now the RPE treatments: In our design, narrow framing should imply lower average investments under frequent evaluation also when exposed to tournaments incentives. Note that regardless of risk preferences, the subjects should simply maximize the probability of winning, since they earn nothing if they do not win. If subjects are myopic, they care about winning the one round games in Treatment F^{RPE} or the three rounds games in Treatment I^{RPE}.

Observe first that if the three competing subjects are playing the lottery once, then the strategy profile $(0, 0, 0)$ is an equilibrium. i.e. the three competitors invest nothing in the risky lottery. The probability of winning is then $\frac{1}{3}$. No one can do better by deviating and play $x > 0$, since the probability of winning is then still $\frac{1}{3}$. Moreover, observe that $(100, 100, 100)$ is not an equilibrium, since there is a probability $\frac{4}{9} > \frac{1}{3}$ of winning if one deviates and plays $x < 100$.[6]

Next, consider the game in which investments are made for three rounds. Clearly $(0, 0, 0)$ is now not an equilibrium profile, since there is a probability $\frac{19}{27} > \frac{1}{3}$ of winning if one deviates and plays $x > 0$. Moreover, $(100, 100, 100)$ is an equilibrium since for any deviation $x < 100$ the probability of winning is less than $\frac{1}{3}$.[7] In fact, any profile in which at least one player plays less

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[6]For other equlibria, let x_i denote investment level for player i, $i = 1, 2, 3$. One can see that $(x_i, 0, 0)$, where $x_i > 0$, is an equilibrium, but that $(x_i, x_j, 0)$ where $x_i > 0$ and $x_j > 0$ is not: If player i plays $x_i > 0$ while player j and k plays $x_j > x_i > 0$ and $x_k = 0$, respectively, it gives victory to player i with probability $\frac{2}{9} < \frac{1}{3}$. Moreover, playing $x_i > 0$ while the others play $x_j = x_i > 0$ and $x_k = 0$ gives victory to player i with probability $\frac{5}{18} < \frac{1}{3}$.

[7]For the smallest possible deviation, $x = 99$, the probability of winning is 0.22. For $x = 0$, the probability of winning is 0.09.

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than 100 cannot be an equilibrium. Given this simple equilibrium analysis, myopia implies higher investments in Treatment I^{RPE} than in Treatment F^{RPE}.

Let us also briefly consider what happens when the subjects are uneven at the start of a given round. In Treatment F^{RPE} there is no equilibrium in pure strategies if the front runner's lead is sufficiently small. But it is never a best response for the front runner to bet more than the trailing parties, while it may be a best response for a trailing party to bet more than the front runner.[8] Treatment I^{RPE} is less complicated. We have seen that $(100, 100, 100)$ is an equilibrium profile when the players are even, so clearly the trailing players will play $x = 100$. Now, the front runner will still play $x = 100$ if his lead is sufficiently small. Only when the lead is sufficiently large, the front runner will play $x < 100$ in order to secure victory even he loses.

4 Experimental results

In this section we present the main experimental findings. Table II presents the mean and standard deviation for the amount invested in the risky lottery under the four treatments. For Treatment F^{IPE} and F^{RPE} we present average investments by averaging the investments in blocks of three rounds, and then compare these investments with the block investments in Treatment I^{IPE} and I^{RPE}.[9]

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[8] To see this, consider the game between the front runner, player i, and a trailing player j. It cannot be an equilibrium strategy for the latter to play $x_j = 0$. If he plays $x_j = 0$, then the front runner's best response is to play $x_i = 0$. But then the trailing player cannot win and will therefore play $x_j > 0$. The front runner will then raise his bet so that it is sufficiently high, $\widetilde{x}_i$, to secure victory in the tournament if he wins the lottery draw. But he will play $x_i < x_j$ in order to secure victory in the tournament if everyone loses the lottery draw. However, if $\widetilde{x}_i > 0$, then a trailing player's best reponse is to play $x_j < \widetilde{x}_i$ so that he can win the tournament if the front runner loses the lottery draw. The front runner will then respond by lowering his bet, etcetra.

[9] The findings from the IPE treatments are also reported in Eriksen and Kvaløy (2010a and 2010b).

Table II. Average amount invested

Rounds	Treatment F^{IPE}	Treatment F^{RPE}	Treatment I^{IPE}	Treatment I^{RPE}
1 - 3	46.06 (27.23)	53.06 (36.20)	55.08 (35.11)	43.42 (34.79)
4 - 6	46.61 (30.55)	58.59 (33.59)	58.73 (36.32)	51.00 (37.22)
7 - 9	54.73 (33.33)	68.00 (31.90)	63.39 (35.45)	69.70 (36.28)
1 - 9	49.16 (35.28)	59.89 (39.72)	59.06 (35.66)	54.71 (37.51)
1 - 6	46.38 (33.80)	55.83 (39.39)	56.90 (35.76)	47.21 (36.08)

Notes: The table presents mean (standard deviation) for the amount invested in the four treatments. We present average investments for rounds 1 - 3, 4 - 6 and 7 - 9, as well as the average investments for rounds 1-6 and rounds 1-9.

We start by looking at average investments for rounds 1 - 9. From Table II we see that average amount invested in the risky lottery is *higher* under Treatment F^{RPE} than under Treatment I^{RPE}. This is in stark contrast to the standard result obtained in the IPE treatments, where average investments are lower under Treatment F^{IPE} compared to Treatment I^{IPE}. Breaking the investments into blocks of three rounds, we see that the RPE participants invest more when investments are evaluated frequently in rounds 1 - 3 and rounds 4 - 6, with differences of EK 9.64 and EK 7.73 respectively, while in rounds 7 - 9 the average invested amount is approximately the same. The differences between the incentive regimes are in particularly striking in rounds 1 - 6. Table II illustrates how the classic framing effect that appears under IPE is totally reversed under RPE. We also see that when investments are evaluated frequently, investment levels are higher under RPE than under IPE, while it is the other way around when investments are evaluated infrequently.

To examine the statistical significance of the differences observed in Table II we make use of the Mann-Whitney U-test. The z-values and corresponding two-tailed p-values are presented in Table III.

Table III. Mann-Whitney U-tests of differences in investments across treatments

	Treatment F^{RPE} vs. Treatment I^{RPE}	Treatment F^{IPE} vs. Treatment I^{IPE}	Treatment F^{RPE} vs. Treatment F^{IPE}	Treatment I^{RPE} vs. Treatment I^{IPE}
Round 1	-1.706 [0.088]	1.545 [0.122]	-1.284 [0.199]	1.968 [0.049]
Rounds 1 - 6	-2.121 [0.034]	3.388 [0.001]	-3.428 [0.001]	2.295 [0.022]
Rounds 1 - 9	-1.713 [0.087]	3.885 [<0.001]	-4.982 [<0.001]	1.301 [0.193]

Notes: The table presents z-values and two-tailed p-values for the Mann-Whitney U-test. The tests make use of each investment decision made by the subjects (nine decisions per subject in Treatment F^{RPE} and Treatment F^{IPE}, and three decisions per subject in Treatment I^{RPE} and Treatment I^{IPE}).

By and large, the differences are statistically significant. Importantly, we find the difference between Treatment F^{RPE} and Treatment I^{RPE} to be significant ($p = 0.087$ for rounds 1 - 9, and $p = 0.034$ for rounds 1 - 6). Note also that the difference between the RPE treatments is significant already in round one ($p = 0.088$). Overall the tests indicate that high risk choices are less attractive in Treatment I^{RPE} compared to Treatment F^{RPE}, with the strongest effect in the first six rounds.

Table IV presents estimates from a Tobit regression where we check the robustness of the results by controlling for gender. The dependent variable is the amount invested in the lottery. The reference group consists of subjects in Treatment I^{IPE}. The independent variables included in the regression are the dummy variables, *RPE, Frequent evaluation*, their interaction *RPE x Frequent evaluation* and a gender variable *Male*.

Table IV: Tobit Regression

Dependent variable:	Model 1		Model 2	
Lottery investment	Coef.	Std. Err.	Coef.	Std. Err.
Constant	58.16***	6.61	52.96***	6.63
RPE	-9.14	8.10	-17.83**	8.73
Frequent evaluation	-15.16**	7.39	-13.91*	7.36
RPE x Frequent evaluation	24.01**	11.44	32.46***	11.94
Male	26.15***	6.18	25.30***	6.63
Pseudo R^2	0.0089		0.0094	
χ^2	7.05***		6.8	
No of observations	1680		1400	
No. of subjects	280		280	
No. uncensored	973		844	
No. left censored	217		186	
No. right censored	490		370	

Note: Model 1: Data from rounds 1 - 9. Model 2: The last decision of each subject is excluded. Standard errors are corrected for clustering at the individual level.

Statistical significance; (***): p<0.01, (**): p<0.05 and *: p<0.10.

Model 1 refers to data from rounds 1 - 9, while in model 2 we exclude the last investment decision for each subject to avoid possible end-effects due to the tournament incentives. The regressions reproduce the differences presented in Table II and Table III. The standard MLA result is obtained for the IPE experiment, as can be seen by the negative and significant coefficient *Frequent evaluation.* Thus we have that subjects invest less in Treatment F^{IPE} than in Treatment I^{IPE} also when controlling for gender differences.

Under RPE the opposite result is obtained for model 2, with subjects investing more in Treatment F^{RPE} than in Treatment I^{RPE}. The difference between Treatment F^{RPE} and Treatment I^{RPE} can be seen by adding together the coefficients Frequent evaluation and RPE x Frequent evaluation. In model 2 this difference is significant, and estimated to be EK 18.55 $(= -13.91 + 32.46)$, while the difference is not significant in model 1. Hence,

controlling for gender differences, we still see than when excluding the last investment decision, investment-levels are higher in Treatment F^{RPE} than in Treatment I^{RPE}.

The variable RPE measures the difference in invested amount between Treatment I^{RPE} and Treatment I^{IPE}. The difference is significant for model 2, where subjects in Treatment I^{RPE} invest a significantly 17.83 less than subjects in I^{IPE}. Also, the positive and significant interaction term shows that the difference between treatments under RPE goes in the opposite direction compared to the difference under IPE, supporting our findings above. Not surprisingly we also find that male subjects take significantly more risk than their female fellows, which is consistent with previous findings (Charness and Gneezy, 2007)

Finally, we studied how risk-taking is affected by whether subjects are trailing or leading the tournament. On average front runners invested only EK 47.2 in Treatment F^{RPE}, while trailing subjects invested EK 68.2. This difference is statistically significant ($Mann - Whitney, z = 5.502, p < 0.001$). In Treatment I^{RPE} we find that front runners invest significantly less than their trailing opponents in rounds 7 - 9 ($54.8 vs. 77.2; Mann - Whitney, z = 2.362, p < 0.018$)), but more, though not significant, in rounds 4 - 6 ($61.9 vs. 45.1; Mann - Whitney, z = -1.557, p < 0.120$).

Table V: Tobit Panel Regression. Lead versus Behind in Treatment F$^{\text{RPE}}$

Dependent variable:	Rounds 1 - 9		Rounds 1 - 8	
Lottery investment	Coef.	Std. Err.	Coef.	Std. Err.
Constant	30.16***	10.43	32.15***	11.00
Lead	-41.00***	7.14	-40.33***	7.75
Behind	0.035**	0.01	0.04**	0.02
Lag Investment	0.70***	0.11	0.63***	0.12
Male	24.30**	11.42	23.21*	12.09
σ_u^2	37.416***	6.629	39.869***	7.001
σ_i^2	45.904***	2.643	43.608***	2.692
ρ	0.399		0.455	
Log likelihood	-1321.1596		-1176.6899	
No of observations	480		420	
No. of subjects	60		60	
No. uncensored	216		194	
No. left censored	70		63	
No. right censored	194		163	

Note: Statistical significance; (***): p<0.01, (**): p<0.05 and *:p<0.10.

Table V presents estimates from a Tobit panel regression using data from Treatment F^{RPE}. The dependent variable is the amount invested in the lottery, and the independent variables include (i) a dummy variable (*Lead*) equal to one if a subject is leading the tournament and zero if a subject is trailing a leader, (ii) a variable (*Behind*) measuring the amount a subject is behind the leader of the tournament, (iii) the invested amount in the previous period (*Lag Investment),* and (iv) a dummy (*Male*) controlling for gender. Table VI presents estimates from a Tobit regression using data from Treatment I^{RPE} and include the same variables as in the regression in Table V.

Table VI: Tobit Regression. Lead versus Behind in Treatment I^{RPE}

Dependent variable:	Rounds 1 - 9		Rounds 1 - 6	
Lottery investment	Coef.	Std. Err.	Coef.	Std. Err.
Constant	-7.03	9.55	-13.86	11.41
Lead	-15.53	12.22	4.50	15.17
Behind	0.12***	0.03	0.08**	0.04
Lag Investment	1.03***	0.14	1.02***	0.19
Male	29.14***	8.88	27.46**	11.41
R^2	0.084		0.091	
χ^2	17.9		10.72	
No of observations	120		60	
No. of subjects	60		60	
No. uncensored	65		37	
No. left censored	14		9	
No. right censored	41		14	

Note: Standard errors are corrected for clustering at the individual level. Statistical
significance; (***): p<0.01, (**): p<0.05 and *:p<0.10.

Controlling for gender and invested amount in the previous round (block of three rounds), we see that subjects both in Treatment F^{RPE} and Treatment I^{RPE} increase their investments if they are behind the leader. From Table V we see that front runners in Treatment F^{RPE} invest 41 less than trailing subjects, keeping everything else constant. Also, subjects who are trailing increase (on average) their investments by a factor of 0.035 the amount they are behind. A similar pattern appears in Treatment I^{RPE} (Table VI). Subjects who are trailing increase their investments by a factor of 0.12 the amount they are behind. Hence, relative position and distance to front runner has a significant effect on risk-taking in both treatments.

5 Discussion

The theory of myopic loss aversion can account for the experimental results in the baseline treatments. But the theory cannot be applied directly to the

RPE treatments since RPE induce strategic behavior. However, if subjects are myopic, which the baseline results suggest, then the game theoretic analysis predicts lower average investments under frequent evaluation also when subjects are exposed to tournament incentives.

The experimental results show the opposite. How can we explain this? A first guess would simply be that subjects are not myopic when playing the tournament game, but there are two reasons why this is not plausible. First, it is hard to see why subjects should frame narrowly in the baseline treatment and not in the RPE treatments. Second and more importantly, absence of myopia can remove the treatment effects under RPE, but will not create the opposite results that we find. If subject are not myopic, the game is far more complicated, but one should obviously not see higher investments in Treatment F^{RPE} than in Treatment I^{RPE}.

One potential explanation for the reversed MLA results is that subjects care about distance to front runner during game of play. Since they learn about their opponents' investments during the experiment, they may also feel losses and gains from comparing themselves with their opponents. Assume for instance that subjects exhibit aversion from trailing, implying that the disutility from trailing is higher than the utility from leading the tournament. If subjects are also myopic, i.e. if they frame their decisions narrowly, then a high risk strategy for three rounds is less attractive than a high risk strategy for one round, since in the former case this can put them too far behind the front runner. Now, trailing aversion should only be relevant in the first rounds of the experiment, where distance to the front runner affects the probability of winning the tournament. Since the winner takes all, it does not matter how far a player is behind the front runner at the end of the game. Interestingly, we find that the investment levels are significantly lower in the infrequent treatment than in the frequent treatment in the first 6 rounds, while in the last 3 rounds, where trailing aversion should not kick in, average investment levels are practically the same in the two treatments.

While the game theoretic analysis fails to predict treatment effects, it is more successful in predicting differences between front runners and trailing subjects. This is clearest in Treatment F^{RPE}, but in both RPE treatments

we find that distance to front runner has a significant positive effect on risk-taking.

6   Conclusion

In this paper we present experimental evidence that the classical MLA result, where subjects take less risk if investment decisions are framed narrowly, does not prevail when subjects are exposed to tournament incentives. In fact, the results are turned upside down. Under tournament incentives, those who invest and evaluate outcomes frequently take more risk. This finding has important implications. First, when analyzing how MLA contributes to explaining the equity premium puzzle, one has to take into account that many of the players in the stock market, in particular those who manage other people's money, are exposed to incentive regimes that do not create the classical MLA implications. Second, the notion that myopia triggers risk-taking (a notion that has been especially popular in the aftermath of the financial crisis) may not just be due to a spurious relationship between the variables. Under tournament incentives, which are common in finance, a casual positive relationship may exist between myopia and risk-taking.

There is a large body of literature on incentives and risk-taking, and myopia and risk-taking, but surprisingly little has been done to analyze how these three interact. Our paper suggests that more should be done both experimentally and theoretically in this respect. The interaction between incentives, risk-taking and myopia is important for understanding both incentive design and financial markets.

Appendix: Instructions

Here we present the instructions for the RPE treatments, which have been translated from Norwegian. The instructions for the baseline treatments (IPE) can be found in Eriksen and Kvaløy (2010a and 2010b).

The experiment consists of 9 successive rounds. In each round you will receive 100 EK (experimental currency unit). You must decide how much of this amount you wish to invest in a lottery. The lottery is the same for all rounds and goes as follows:

Assume you choose to invest an amount X in the lottery:

- With a probability of 2/3 (66.7%), you lose the amount X invested in the lottery. Your payoff in the respective round is then 100 - X.

- With a probability of 1/3 (33.3%), you win 2.5 times the amount X invested in the lottery in addition to your initial endowment. Your payoff in the respective round is then 100 + 2.5 X.

You will thus earn 900 EK during the 9 rounds if you never invest in the lottery. If you choose to invest in the lottery during the 9 rounds, you can earn more or less than 900 EK depending on the outcome of the lottery.

The outcome of the lottery depends on a random drawing made by the computer. In each consecutive round the computer will make a new draw, and each draw is random and independent between rounds and participants.

Throughout the 9 rounds, you compete with two other randomly drawn participants. The one with most EK after 9 rounds are paid 600 (Norwegian) kroner in addition to a participation fee of 50 kroner. If there is a tie, the winner is chosen by a random draw. Those of you that end up second or third are only paid the participation fee of 50 kroner.

(Treatment F^{RPE}): In every round you must decide on how much you wish to invest in the lottery, and then you will be informed about the outcome of the lottery for the respective round you and your competitors

(Treatment I^{RPE}): You have to decide on your investment X in blocks of three rounds each: If you choose to invest X in the lottery in round 1, X will also be invested in the lottery in rounds 2 and 3. When round 3 is over

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you will get to see the outcome of the first three rounds for you and your competitors. Then round 4 starts and again you have to decide on how much to invest in the lottery for the next block of three rounds (rounds 4, 5 and 6). You and your competitors will then see the outcome for the preceding rounds (rounds 4, 5 and 6). The same procedure applies for rounds 7, 8 and 9. Note that the computer makes a random draw each round, but that you decide on X for three consecutive rounds.

(Both treatments): During the experiment a history table will keep track of your earlier choices. The history table gives you round number, the amount invested in the lottery, the lottery outcome, your client's earnings for each round and accumulated earnings.

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