Heads we both win, tails you lose: the effect of limited liability on financial investment beliefs *

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Abstract

[Very preliminary version, please do not cite or circulate. Comments welcome.] One of the reasons of the recent crisis is that financial institutions took "too much risk" (Brunnermeier, 2009; Taylor et al., 2010). Why were these institutions taking so much risk is an open question; a recent strand in the literature points towards the "cognitive dissonance" of investors, who, because of the limited liability of their investments, had a distorted view of riskiness (e.g., Barberis (2013); Bénabou (2015)). In a series of laboratory experiments we show how limited liability does not affect the beliefs of investors, but does increase their willing exposure to risk. This results points to a simple explanation for the over-investment of banks and hedge-funds: When incentives are not aligned, investors take advantage of the moral hazard opportunities.

Keywords Moral Hazard · Cognitive Dissonance · Behavioral Finance

JEL Classification C91 · D84 · G11 · G41

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1 Introduction

One of the reasons of the recent financial crisis is that financial institutions took "too much risk" (Brunnermeier, 2009; Taylor et al., 2010). This excessive risk-taking was not due to the use of incorrect models or the lack of data by investors (Gerardi et al., 2008). Rather, it seems like either the limited liability of the financial institutions gave rise to moral hazard (Acharya et al., 2010; Dowd, 2009), or it led to a systemic underestimation of risk due to "cognitive dissonance" (Barberis, 2013; Bénabou, 2015).

Cognitive dissonance is the psychological discomfort that arises when one cannot rationalize two conflicting views or actions (e.g., smoking and knowing that it is unhealthy) (Festinger, 1962). This uneasiness can be reduced by modifying one of the conflicting beliefs (Festinger, 1962). Studies on this phenomena are numerous and range from workers adjusting their beliefs on the riskiness of their job Akerlof and Dickens (1982) to smokers believing that smoking is not that harmful (McMaster and Lee, 1991). In financial markets Goetzmann and Peles (1997) show that investors stay in low performance funds due to their overly optimistic perceptions of past fund performance, and Antoniou et al. (2013) argue that small investors react slowly to bad news during optimistic periods due to cognitive dissonance.

In this paper we use experimental tools to test whether limited liability results in biased perceptions of risk as a result of investors trying to justify their excessive risk taking in a moral hazard setup (Bénabou, 2015; Barberis, 2013). While this idea sounds sensible, our result is clear: Limited liability does not affect in any way the beliefs of our experimental investors, but does significantly increase the level of risk that they are willing to take.

While our paper is not the first to experimentally study cognitive dissonance (e.g., Chang et al. (2016) or Mayraz (2017)) it is the first to study the effects that limited liability has on the beliefs and, separately, on the actions of investors. This is relevant as it contributes to the literature by A) shedding light on the effects that incentives have on the beliefs and actions of investors in a principal-agent setting, and B) by bolstering the hypothesis that there is a direct link between moral hazard and excessive risk-taking.

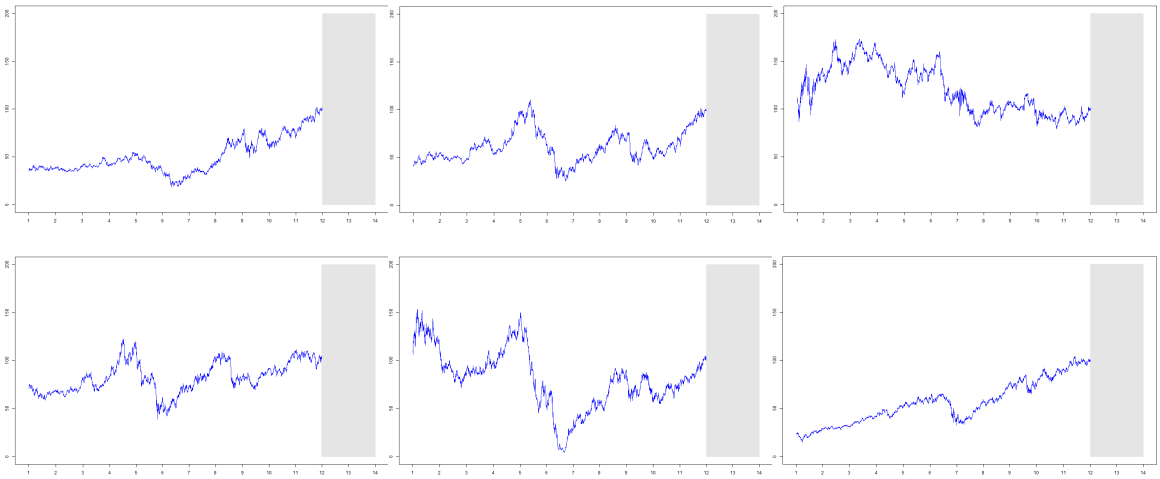


Figure 1: The six time-series presented to subjects (from left to right and from top to bottom): (1) Bayerische Motoren Werke AG, 27-Jun-03 – 27-Jun-16; (2) Daimler AG, 20-Jun-03 – 20-Jun-16; (3) Deutsche Telekom AG, 10-Sep-02 – 10-Sep-15; (4) Siemens AG, 05-Jan-04 – 05-Jan-17; (5) Infineon Technologies AG, 08-Jul-03 – 08-Jul-16; (6) Linde AG, 18-Dec-02 – 18-Dec-15. All data are downloaded from Google Finance

2 Experimental Design

The core of our experiment is divided into two blocks of three rounds. In each round we present subjects with a time series representing the daily prices for twelve consecutive years of a stock from the DAX30[1] (see Figure 1 for the six time-series presented). Subjects know that the data comes from the DAX30, but are not told the exact years for data nor the name of the company. Additionally, they are told that all time-series have been shifted such that the price at the beginning of the 12th year is always € 100. Additionally, they know that they will get any feedback until the end of the experiment, and that the specific instructions for each block will be read immediately before it starts.

In each round, after seeing an animation representing the evolution of prices for the anonymous stock, subjects are presented with the Assessment Screen (see left panel of Figure 2). In this screen they are asked to assess the probability that the price of the stock will be below € 100 by the beginning of the 14th year (i.e., the likelihood of a loss), and to guess the price the stock at that point. Once this is done they move to the Investment Screen.

In the Investment Screen (see right panel of Figure 2) subjects are endowed with € 10 and asked to invest as much as they wanted of this endowment into the stock they just

[1]Germany's prime blue chip stock market index.

assessed. The return (Π_i) to the investment of subject i (I_i) will be the difference between the price at the beginning of the 12th year (€ 100) and that at the beginning of the 14th year ($price_{t=14}$). Any amount that the subject does not invest in the stock is assumed to go into a risk-free asset with no returns. This leaves the payoff for the investment phase as:

$$\Pi_i = I_i * \frac{price_{t=14}}{100} + €10 - I_i. \tag{1}$$

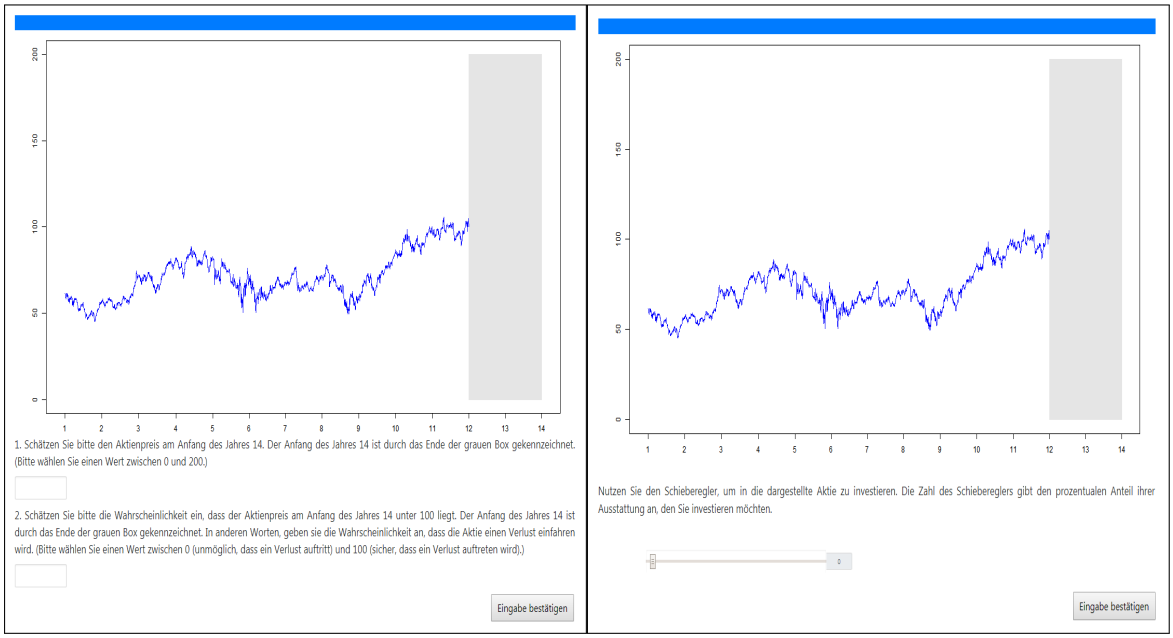
After making their investment decisions subjects are immediately moved to the next round where they are presented with a new Assessment Screen containing a different time-series to asses. This process is repeated three times without until the end of the block, at which point the instructions for the new block are read aloud. In each session one of the blocks is a Control block and the other is a Treatment block. Sessions 1 to 4 start with the Control block while sessions 5 and 6 do so with the Treatment block.

The difference between the Treatment and Control blocks is that before the start of Treatment blocks half of our subjects are assigned the role of "Bankers" while the other half are "Clients." Subjects are aware of their specific type before the the block starts, and they know they will keep the type for the whole block. The structure and tasks in Treatment blocks are identical to those of Control, except for the investment part. In this part, Bankers will be making investment decisions (I_i^B) not over their endowment, but over the endowment of clients (j). So while both get €10, Bankers are assumed to invest their whole endowment in the risk-free asset, while deciding how much ot invest of the endowment of Client j. If the investment is profitable (i.e., $price_{t=14} \geq$100), then the Banker and Investor split the gains. On the other hand, the investment turns out sour (i.e., $price_{t=14} < 100$), then the client absorbs the whole loss. So the payoffs for Bankers i is:

$$\Pi_i^B = \begin{cases} \left(I_i^B * \frac{price_{t=14}}{100} - I_i^B \right) * 0.5 + €10, & \text{if } p_{t=14} \geq 100 \\ €10, & \text{if } p_{t=14} < 100 \end{cases} \tag{2}$$

The payoff for Client j paired with Banker i is:

$$\Pi_j^i = \begin{cases} \left(I_i^B * \frac{price_{t=14}}{100} - I_i^B \right) * 0.5 + €10, & \text{if } p_{t=14} \geq 100 \\ I_i^B * \frac{price_{t=14}}{100} + €10 - I_i^B, & \text{if } p_{t=14} < 100 \end{cases} \tag{3}$$



(a) First Screen (b) Second Screen

Figure 2: Screen for belief elicitation phase for one of the presented time series. Subjects are asked for the probability that the price of this stock will be below 100 at the beginning of the fourteenth year, and for an exact estimate of this price.

This payoff structure introduces strong moral hazard opportunities for Bankers, and is at the center of our research question: *does limited liability affect the beliefs of Bankers?*

2.1 Details on payoffs

Across both blocks we elicited the probability that the stock will suffer a loss, the expected price, and the investment decision for each subject six times (three times in each block).[2] To incentivize the choices in the Assesment Screen we used the binarized scoring rule (Hossain and Okui, 2013), an incentive compatible scoring rule robust to any risk preferences subjects might have. Additionally, to avoid any hedging, subjects were paid for only one of their six choices for the loss assessments, price predictions, and investment (be it in the Control or Treatment block). The round they were paid for each decision was randomly and independently chosen by the computer, so they might get paid for their accuracy in the price prediction for round three, their investment in round four, and the accuracy of the assessed loss likelihood for round six. This payoff structure not only avoids

[2]Note that in Treatment blocks the payoff for the investment screen of Client subjects depended exclusively on the decisions of Bankers.

hedging, but also makes the moral hazard effect more salient since the (unique) payoff for the investment decision was equally likely to come from the Control or Treatment block.

2.2 Personality Traits

Finally, subjects take part in a third block in which we elicit their personality traits. This block includes tests for risk, ambiguity, and loss aversion through a modification of the multiple price lists used in Rubin et al. (2017). Additionally, subjects answer CRT (Frederick, 2005), CRT2 (Thomson and Oppenheimer, 2016) and eCRT (Toplak et al., 2014) questions, which have been shown to be a good measure for cognitive ability. Subjects also answer the short version of the Big Five personality traits suggested by Rammstedt and John (2007), as well as the three questions on financial literacy that we borrow from Lusardi and Mitchell (2011). At the end of the block are asked about their gender, field of study, and age.

3 Results

A total of 130 subjects were recruited through ORSEE (Greiner, 2004). All sessions lasted two hours and were run at the Experimental Economics Laboratory of the Berlin University of Technology. Subjects made on average 23.04€ and the experiment was programmed and conducted using O-Tree (Chen et al., 2016).

We ran three types os sessions: Type 1 sessions ran first the Control block presenting subjects with graphs 1-3 to then switch into the Treatment block using graphs 4-6. Type 2 sessions started with the Treatment block using graphs 4-6 and then the Control block using graphs 1-3. This allows us to control for the ordering effects of each block. Type 3 sessions, on the other hand, have the same ordering as Type 1 sessions (Control then Treatment), but now the graphs shown are changed, so that now in Control we present subjects with graphs 4-6 and in Treatment graphs 1-3.

Table 1 presents the median value across all subjects for the expected probability of a loss (ProbLoss), the expected price (PriceExp), and the share of the endowment invested in the stock (Investment). The table is divided by types of session (rows) and graph (columns). For the graphs in Control blocks we use the data of all participants, for Treatment blocks we only report the data provided by Bankers.

	Control			Treatment		
	Graph 1	Graph 2	Graph 3	Graph 4	Graph 5	Graph 6
Session type 1:						
ProbLoss	30.0	60.0	47.5	45.0	40.0	35.0
PriceExp	120.0	90.0	102.5	110.0	117.0	120.0
Investment	40.0	12.5	22.5	90.0	100.0	100.0
# observations	42	42	42	21	21	21
Session type 2:						
ProbLoss	37.0	60.0	50.0	60.0	40.0	45.0
PriceExp	120.0	85.0	100.0	99.0	120.0	107.5
Investment	50.0	10.0	20.0	50.5	70.0	67.5
# observations	44	44	44	22	22	22
	Treatment			Control		
	Graph 1	Graph 2	Graph 3	Graph 4	Graph 5	Graph 6
Session type 3:						
ProbLoss	30.0	53.5	47.5	50.0	45.0	35.0
PriceExp	120.0	90.0	105.0	100.0	116.0	115.0
Investment	80.0	40.0	64.5	16.5	30.0	39.5
# observations	22	22	22	44	44	44

Table 1: Median values of loss probability, price expectation, and investment for each of the six graphs in each of the three session types. For Treatment cases only the data of Bankers is taken into consideration considered.

	Graph 1	Graph 2	Graph 3	Graph 4	Graph 5	Graph 6
Prob Loss	0.375	0.649	0.697	0.669	0.304	0.335
Price Exp	0.114	0.757	0.988	0.420	0.762	0.316
Investment	0.002	0.016	0.021	<0.001	<0.001	<0.001

Table 2: p-values resulting from Wilcoxon rank-sum tests comparing Treatment and Control decisions.

It is clear from Table 1 that beliefs and investment decisions differ substantially across graphs. These difference are (in most cases) statistically significant (see Table 4 in the appendix for pairwise comparisons), and go in the direction one would expect from looking at the graphs.[3] Additionally, there is a clear correlation between the expected price and the probability of losses, the more likely a loss is, the lower the expected price. These two results lead us to believe that our graphical interface is understood by our subjects, and that their beliefs respond to the time-series we present them.

The second thing to notice from Table 1 it that there seem to be no ordering effects, as the differences in beliefs and investment between Type 1 sessions and Type 2 sessions are only marginal. We confirm this by using pairwise Wilcoxon rank-sum tests to compare beliefs and investments for the same graph across session types (see Table 5 in the appendix). Consequently, we can pool the data for sessions Type 1 and 2 for our subsequent analysis.

3.1 The Effects of Limited Liability on Beliefs and Investment Behavior

The left (right) panel of Figure 3 presents the probabilities that subjects assign to a loss (expected price) for each of the six time-series we presented subjects with. The red columns are the elicited beliefs of all subjects in Control blocks, while the blue columns only include the beliefs of Bankers in Treatment blocks. It is clear from this figure that while we see different loss probabilities and price expectations across graphs, limited liability seems to have no effect on the belief of subjects. This is confirmed in Table 2 where the first two rows present the p-values of a Wilcoxon rank-sum test comparing the beliefs of subjects between treatment and control. The results confirm what is apparent in Figure 3; limited liability has no impact on the beliefs of investors.

[3]For example, Graph 1, with a clear upward trend, is approximately half as likely to have losses than graph 2, which has a less clear upward trend.

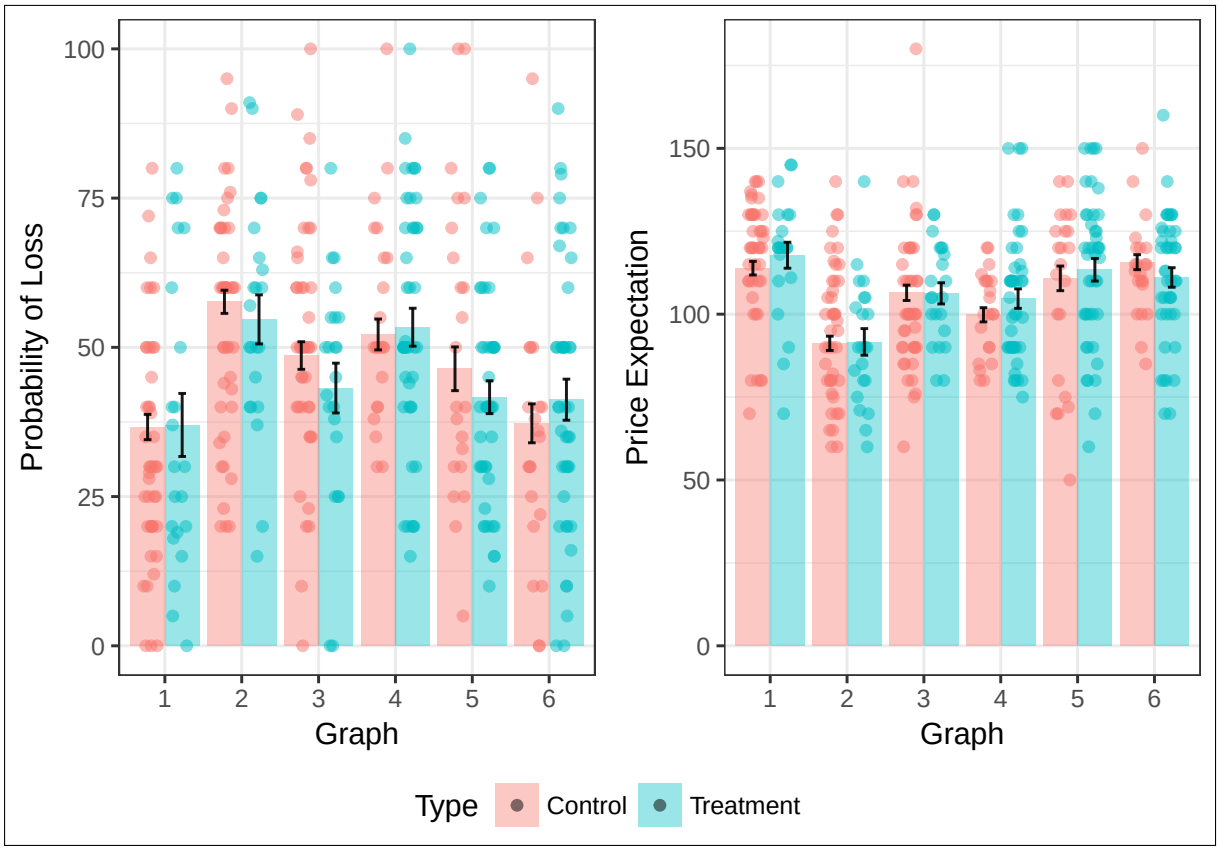


Figure 3: Bar plot of subjects' stated loss probabilities (left panel) and price expectations (right panel) for each of the six time-series. Red columns collect beliefs of all subjects in Control blocks, blue columns collect beliefs of Bankers only in Treatment blocks. The vertical black bars report the standard errors.

Result 1: Limited liability has no effect on the beliefs of subjects.

Analogous to the previous figure, Figure 4 presents the investment decisions of subjects in Control (red bar) and Bankers in Treatment (blue bar) for each of the six time-series. It is clear that limited liability has a strong effect as, for the same Graph, subjects in Treatment blocks invest substantially more than subejcts in Control blocks. This is confirmed by a series of Wilcoxon rank-sum tests comparing the investment in Treatment and Control (last row of Table 2).

Result 2: Limited liability significantly increases the amount invested by subjects.

3.2 Regression Analysis

To quantify the effects of limited liability on beliefs and investment behavior, we run three linear models where the dependent variable is either (1) the probability that subjects

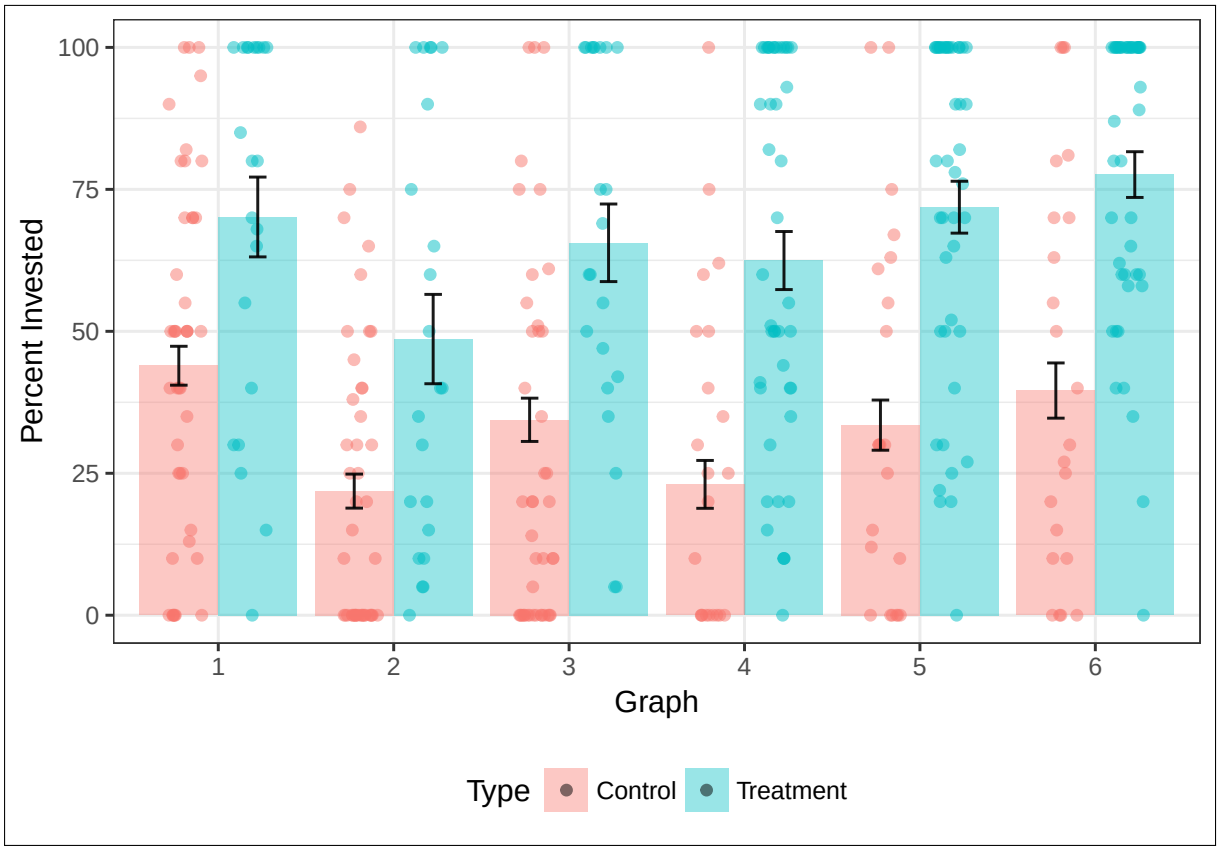


Figure 4: In the vertical axis we plot the percent of endowment invested in each graph. In the vertical axis we seaparate each investment decision by time-series. The bars represent the average investment, the red error bar represents the stadard error. Each dot is an individual investment decision. In light red the Bankers investment decisions in Treatment blocks. In light blue the investment of all subjects in Control blocks.

assign to a loss, (2) the expected stock price, or (3) the investment share in the stock. Our main explanatory variable is "Treatment" which takes value unity if an observation is from a Banker in a Treatment round (i.e. under limited liability), or zero otherwise.[4] We control for graph, gender, attitudes towards risk and ambiguity, cognitive ability, and various personality traits. Table 3 presents the results of the six specifications we use.

Columns [1] and [2] contain the specifications concerning beliefs and each has two different specifications; the left specification [1] studies the effect that our variable of interest (Treatment) has on the beliefs of our subjects, while the right specification [2] does the same, but controlling for investment. When we do not pin down investment limited liability has no effect on beliefs, be it the likelihood that subjects assign to a loss (1) or the expected price (2). On the other hand, once we control for the investment made

[4]All observations for Clients in Treatment blocks are dumped.

by subjects, our treatment variable becomes positive and significant for the likelihood of the stock incurring in a loss [2], and negative and significant for the expected price of the stock. The interpretation of this result is that for the same level of investment those subjects in a limited liability context expect a higher probability of a loss, and a lower price for the stock. This is consistent both with Results 1 and Result 2, as well as with the result of column [5] in which we see how limited liability has a strong effect on the amount invested by subjects. All results carry over, if we conduct this analysis for each graph separately (see Table 6 in the appendix).

	[1] ProbLoss	[2] ProbLoss	[3] ExpPrice	[4] ExpPrice	[5] Investment
Treatment	-1.117	8.375***	1.207	-9.248***	34.09***
	(1.725)	(2.174)	(1.523)	(1.725)	(4.012)
Gender	0.336	0.170	0.603	0.786	-0.597
	(2.571)	(2.508)	(2.227)	(2.090)	(4.515)
Ambiguity Aversion	-0.688**	-0.534	0.317	0.148	0.552
	(0.329)	(0.340)	(0.278)	(0.319)	(0.752)
Risk Aversion	0.220	0.509	0.0983	-0.220	1.039
	(0.396)	(0.405)	(0.359)	(0.433)	(1.064)
Loss Aversion	-0.00541	0.438	-0.270	-0.759*	1.594
	(0.350)	(0.315)	(0.405)	(0.421)	(1.112)
Correct CRT	-1.101**	-0.834*	0.348	0.0542	0.959
	(0.500)	(0.479)	(0.418)	(0.410)	(0.919)
Extraversion	-1.157*	-1.203*	0.0869	0.137	-0.164
	(0.692)	(0.672)	(0.549)	(0.522)	(1.355)
Agreeable	0.563	0.906	-0.758	-1.135*	1.232
	(0.594)	(0.575)	(0.735)	(0.643)	(1.489)
Conscientious	0.00381	-0.0522	-0.182	-0.121	-0.201
	(0.553)	(0.519)	(0.618)	(0.541)	(1.097)
Neurotic	0.230	0.221	0.132	0.142	-0.0335
	(0.530)	(0.496)	(0.584)	(0.499)	(1.373)
Open	0.943**	0.603	-0.595	-0.220	-1.224
	(0.417)	(0.401)	(0.472)	(0.418)	(1.070)
Investment		-0.278***		0.307***	
		(0.0308)		(0.0297)	
Constant	44.40***	49.07***	118.2***	113.0***	16.77
	(9.179)	(8.589)	(10.28)	(9.234)	(22.15)
N	585	585	585	585	585
adj. R^2	0.133	0.288	0.146	0.340	0.279
Group dummies	Yes	Yes	Yes	Yes	Yes
Graph Joint Significance p-value	<0.001	<0.001	<0.001	<0.001	<0.001

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Three linear models and five specifications. The first two columns study the effects of our limited liability on beliefs, the third model studies the effect of limited liability on investment decisions. The first . All errors are clustered at the individual level.

4 Conclusion

Cognitive dissonance is the discomfort that arises when two conflicting views or actions by the same person cannot be rationalized (Festinger, 1962). Psychological research has shown that a natural reaction in this situations is to modify one's beliefs in a way that they can accommodate this apparent contradiction (Festinger et al., 2017). A good example are smokers, who, in order to continue with their habit convince themselves that smoking isn't that bad (McMaster and Lee, 1991).

In this paper we use experimental tools to test whether limited liability can give rise to cognitive dissonance and an undervaluation of the risks taken by financial investors as is suggested in Bénabou (2015); Barberis (2013). Our result are clear: Limited liability has no effect on the beliefs of our experimental investors, but does significantly increase the level of risk that they are willing to take. This result points towards moral hazard, but not to biased beliefs, as one of the probable reasons behind excessive risk-taking of financial investors.

Our experiment is part of a new trend in belief formation experiments applied to financial markets (Nosić and Weber, 2010; Jiao, 2017; Mayraz, 2017) which is helping to understand how investors make decisions. We contribute to the literature by helping shed light on the effects that incentives have on the beliefs and actions of investors in a principal-agent setup, and by reinforcing the idea that there is a direct link between moral hazard and the mounting risk-taking that took place before the recent financial crisis.

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A Additional Figures and Tables

	1 v 2	1 vs 3	2 vs 3	4 vs 5	4 vs 6	5 vs 6
Session type 1:						
Prob Loss	0.0005	0.0442	0.0258	0.5410	0.0753	0.7223
Price Exp	0.0001	0.1791	0.0024	0.7320	0.4806	0.6666
Investment	0.0006	0.1272	0.0332	0.3074	0.0187	0.2848
Session type 2:						
Prob Loss	0.0000	0.0010	0.0242	0.0053	0.0522	0.8126
Price Exp	0.0000	0.0161	0.0018	0.0066	0.1503	0.4770
Investment	0.0000	0.0053	0.0049	0.0881	0.0176	0.2091
Session type 3:						
Prob Loss	0.0238	0.1725	0.0425	0.2472	0.0010	0.0748
Price Exp	0.0009	0.0383	0.0248	0.0223	0.0000	0.2501
Investment	0.0011	0.2657	0.0082	0.0298	0.0001	0.2200

Table 4: p-values of Wilcoxon signed-rank test for pairwise comparisons of session medians per graph (from Table 1).

	Graph 1	Graph 2	Graph 3	Graph 4	Graph 5	Graph 6
Prob Loss	0.5177	0.1058	0.1330	0.0547	0.5082	0.2169
Price Exp	0.7540	0.4070	0.4260	0.1512	0.5500	0.3349
Investment	0.4955	0.5751	0.6464	0.3422	0.1278	0.2000

Table 5: p-values of Wilcoxon rank sum tests for pairwise comparisons of session medians from session types 1 and 2 per graph (from Table 1).

	Graph 1			Graph 2			Graph 3			Graph 4			Graph 5			Graph 6		
	ProbLoss	ExpPrice	Invest	ProbLoss	ExpPrice	Invest	ProbLoss	ExpPrice	Invest	ProbLoss	ExpPrice	Invest	ProbLoss	ExpPrice	Invest	ProbLoss	ExpPrice	Invest
Treatment	3.359	1.537	21.34***	-1.564	-1.774	22.12***	-2.383	-0.469	27.03***	0.734	5.496	42.55***	-7.599	4.009	40.99***	0.216	-3.842	39.64***
	(5.164)	(4.825)	(7.300)	(4.664)	(5.120)	(7.410)	(5.488)	(5.262)	(8.296)	(4.424)	(3.917)	(7.023)	(4.568)	(5.118)	(6.839)	(4.808)	(3.862)	(6.843)
1.Gender	-4.076	3.532	-1.499	-1.023	-4.650	4.794	3.474	2.924	-1.971	-4.213	2.170	1.063	0.392	-2.025	-7.487	9.216	-0.998	0.0552
	(4.914)	(4.591)	(6.947)	(4.439)	(4.872)	(7.051)	(5.222)	(5.007)	(7.895)	(5.232)	(4.633)	(8.305)	(5.402)	(6.052)	(8.088)	(5.686)	(4.567)	(8.092)
SwitchAmbigu	-0.974	1.003	2.175**	0.155	0.843	1.342	-1.038	0.408	1.380	-0.367	0.593	0.195	-0.422	-1.406	-0.769	-1.708*	0.456	-0.204
	(0.765)	(0.715)	(1.082)	(0.691)	(0.759)	(1.098)	(0.813)	(0.780)	(1.230)	(0.792)	(0.701)	(1.257)	(0.818)	(0.916)	(1.224)	(0.861)	(0.691)	(1.225)
SwitchRisk	-0.487	0.430	2.876**	0.944	-0.914	1.000	0.828	0.297	1.767	-0.0474	-0.373	0.0310	-1.829*	2.873**	-0.458	1.661	-1.532*	-1.085
	(0.874)	(0.817)	(1.236)	(0.790)	(0.867)	(1.255)	(0.929)	(0.891)	(1.405)	(1.031)	(0.913)	(1.637)	(1.065)	(1.193)	(1.594)	(1.120)	(0.900)	(1.595)
SwitchLoss	0.405	-0.921	1.230	-0.402	-0.404	2.185*	-0.878	0.666	3.846***	-0.163	0.243	1.845	0.316	-0.736	0.523	1.161	-0.631	0.0362
	(0.873)	(0.816)	(1.235)	(0.789)	(0.866)	(1.253)	(0.928)	(0.890)	(1.403)	(0.940)	(0.832)	(1.492)	(0.971)	(1.088)	(1.453)	(1.022)	(0.821)	(1.454)
CorrectCRT	-1.816*	1.484*	1.549	-1.040	-0.164	1.987	-0.314	-1.000	0.0914	-0.743	0.0760	2.065	-2.160**	1.784	1.137	-1.057	0.468	0.883
	(0.918)	(0.858)	(1.298)	(0.829)	(0.910)	(1.317)	(0.976)	(0.936)	(1.475)	(1.006)	(0.891)	(1.597)	(1.039)	(1.164)	(1.555)	(1.093)	(0.878)	(1.556)
Extraver	-1.078	0.938	1.098	-1.814	-0.273	0.443	0.564	-1.626	-1.014	0.705	-1.649	-2.039	-2.513*	1.642	-0.420	-3.626**	1.845	-0.430
	(1.317)	(1.230)	(1.861)	(1.189)	(1.306)	(1.889)	(1.399)	(1.342)	(2.115)	(1.436)	(1.271)	(2.279)	(1.482)	(1.661)	(2.219)	(1.560)	(1.253)	(2.221)
Agreeable	0.312	-0.255	3.107	1.136	-2.402*	1.776	0.979	-1.104	1.324	0.740	-1.089	1.223	-1.696	1.282	-0.383	2.421	-0.715	-1.194
	(1.434)	(1.340)	(2.027)	(1.295)	(1.422)	(2.058)	(1.524)	(1.461)	(2.304)	(1.576)	(1.395)	(2.501)	(1.627)	(1.823)	(2.436)	(1.713)	(1.375)	(2.437)
Consci	0.0574	0.605	2.993	-0.847	1.443	2.233	-0.776	-0.562	0.690	-1.238	0.692	-2.511	2.178	-2.693	-3.050	1.430	-1.268	-3.443
	(1.325)	(1.238)	(1.873)	(1.197)	(1.313)	(1.901)	(1.408)	(1.350)	(2.128)	(1.477)	(1.308)	(2.345)	(1.525)	(1.709)	(2.284)	(1.605)	(1.289)	(2.285)
Neurotic	1.569	0.222	-0.540	0.715	0.550	-0.380	-0.298	-1.139	-1.920	0.566	-0.165	0.0788	0.366	-0.761	1.211	-2.488*	2.688**	1.918
	(1.188)	(1.110)	(1.680)	(1.073)	(1.178)	(1.705)	(1.263)	(1.211)	(1.909)	(1.364)	(1.208)	(2.166)	(1.409)	(1.578)	(2.109)	(1.483)	(1.191)	(2.110)
Open	1.665	-1.167	-3.811***	0.0482	0.371	-2.419*	0.201	0.246	-1.834	1.037	-0.437	2.143	1.992*	-1.098	0.104	1.325	-1.447	-0.0185
	(1.010)	(0.944)	(1.428)	(0.912)	(1.001)	(1.449)	(1.073)	(1.029)	(1.623)	(1.072)	(0.950)	(1.702)	(1.107)	(1.241)	(1.658)	(1.165)	(0.936)	(1.659)
Constant	44.87**	93.77***	-31.01	63.52***	98.99***	-34.02	50.65**	128.2***	5.082	52.08**	111.7***	-1.537	76.89***	99.10***	50.19	39.02	122.1***	64.39
	(20.98)	(19.60)	(29.66)	(18.95)	(20.80)	(30.10)	(22.30)	(21.38)	(33.70)	(25.09)	(22.22)	(39.83)	(25.91)	(29.03)	(38.79)	(27.27)	(21.90)	(38.81)
N	108	108	108	108	108	108	108	108	108	87	87	87	87	87	87	87	87	87
adj. R^2	0.034	-0.003	0.269	-0.013	-0.051	0.150	-0.045	-0.040	0.213	-0.086	-0.059	0.262	0.096	0.049	0.248	0.051	0.010	0.239

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Full Model for Graphs 1- 6