

## Online Appendix

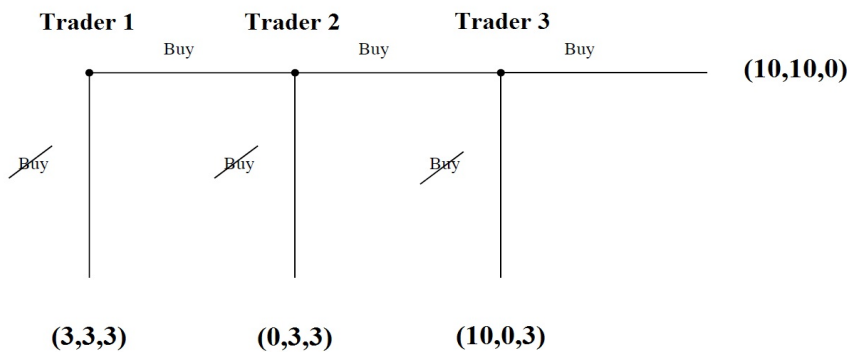
This document provides additional information for the article *Individual speculative behavior and overpricing in experimental asset markets* by Dirk-Jan Janssen, Sascha Füllbrunn, and Utz Weitzel published in *Experimental Economics*.

### A Instructions: SET & Comprehension Questionnaire

#### A.1 SET instructions

##### 1. The Exchange Process

To play this game, the computer creates groups of three traders. Each trader is endowed with one euro which can be used to buy an asset. Your task during the game is thus to choose whether you want to buy or not the asset. This asset does not generate any dividend. If the asset price exceeds one euro, you can still buy the asset. We indeed consider that a financial partner (who is not part of the game) provides you with the additional capital and shares profits with you according to the respective capital invested. The market proceeds sequentially. The first trader is proposed to buy at a price  $P_1$ . If he buys, he proposes to sell the asset to the second trader at a price which is ten times higher,  $P_2 = 10 \cdot P_1$ . If the second trader accepts to buy, the first trader ends up the game with 10 euros. The second trader then proposes to sell the asset to the third trader at a price  $P_3 = 10 \cdot P_2 = 100 \cdot P_1$ . If the third trader buys the asset, the second trader ends up the game with 10 euros. The third trader does not find anybody to whom he can sell the asset as he is last. Since this asset does not generate any dividend, he ends up the game with 0 euro. If you do not or cannot buy the asset – respectively because you choose not to buy or because the person before you in line does not offer you the asset – you end the game with 3 euros. This game is summarized in the following figure:



At the beginning of the game, traders do not know their position in the market sequence. Positions are randomly determined with one chance out of three for each trader to be first, second or third.

##### 2. Proposed prices

The price  $P_1$  that is proposed to the first trader is random. This price is a power of 10 and is determined as follows:

traders decisions are made simultaneously and privately. For example, if the first price  $P_1 = 1$  has been drawn, the prices that are simultaneously proposed to the three traders are:  $P_1 = 1$  for the first trader,  $P_2 = 10$  for the second trader, and  $P_3 = 100$  for the third trader. Identically, if the first price  $P_1 = 10.000$  has been drawn, the prices that are simultaneously proposed to the three traders are:  $P_1 = 10.000$  for the first trader,  $P_2 = 100.000$  for the second trader, and  $P_3 = 1.000.000$  for the third trader. The prices that are being proposed to you can give you the following information regarding your position in the market sequence:

P1	Probability that this P1 is realized
1	15 %
10	20 %
100	30 %
1.000	20 %
10.000	15 %

- If you are proposed to buy at a price of 1, you are sure to be first;
- If you are proposed to buy at a price of 10, you have a 6/10 chance of being first, and a 4/10 chance of being second in the sequence;
- If you are proposed to buy at a price of 100, you have a 5/10 chance of being first, a 3/10 chance of being second and a 2/10 chance of being last in the sequence;
- If you are proposed to buy at a price of 1.000, you have a 3/10 chance of being first, a 4/10 chance of being second and a 3/10 chance of being last;
- If you are proposed to buy at a price of 10.000, you have a 2/10 chance of being first, a 3/10 chance of being second and a 5/10 chance of being last in the sequence;
- If you are proposed to buy at a price of 100.000, you have a 4/10 chance of being second and a 6/10 chance of being last in the sequence;
- If you are proposed to buy at a price of 1.000.000, you are sure to be last in the sequence.

Please note that all your decisions are completely anonymous as we do not work with names but with numbers.

**Are there any questions?**

## A.2 SET test questions

- 1) What is the probability of being third in line when you have not been offered a price yet?
  - Options: (with correct option in bold): 100%, 75%, 10%, **33.33%**
- 2) What is the probability of the first price ( $P_1$ ) being 1.000?
  - Options: (with correct option in bold): 0%, 15%, **20%**, 30%
- 3) What is the probability of the first price ( $P_1$ ) being 100.000?
  - Options: (with correct option in bold): **0%**, 15%, 20%, 30%
- 4) If you are offered a price of 1.000, what is the probability of not being last in line?
  - Options: (with correct option in bold): **70%**, 40%, 10%, 30%
- 5) What is your profit when you are first in line and buy but the person next in line does not buy?
  - Options: (with correct option in bold): **0€**, 3€, 10€
- 6) What is your profit if you are second in line and the person before and after you in line buy, but you do not buy?
  - Options: (with correct option in bold): 0€, **3€**, 10€
- 7) What is your profit when you are first in line, you decide to buy and the trader next in line also buys?
  - Options: (with correct option in bold): 0€, 3€, **10€**

## A.3 Further SET instructions (shown on screen)

In this experiment we will ask you for every possible price (1, 10, 100, 1.000, 10.000, 100.000, 1.000.000) whether you would want to buy or not the asset if this price were offered to you in the game that was just explained. You thus basically play the game not once, but for every possible price. After you have made a decision (buy or not buy) for every possible price, there are three further steps performed by the computer to determine your final profit from this game:

- The computer will randomly pick one of the 7 possible prices, each one is equally likely. Your choice (buy or not buy) at this price will be used to determine your profit.
- Then the computer will give you a place in line, either first, second or third by using the probabilities of being first, second or third in line at the chosen price from step 1. You can find these probabilities for all possible prices in the instructions.
- The computer will couple you to two other traders to complete the trading sequence. As was explained, your profit also depends on the actions of these two other traders.

Please note: If you decide to buy for a price, we automatically assume you would also want to buy for all lower prices as these are in fact less risky. Because of this you will see a screen after you have decided to buy on which we tell you that we assume you automatically also want to buy for all lower prices. If this is indeed the case, simply click on "continue". However if you want to change your previous decision you can always go back to that decision by clicking on "change".

Your previous choice(s):

- 1.000.000  Buy  Not buy
- 100.000  Buy  Not buy
- 10.000  Buy  Not buy

Offered price: **1.000**

Would you like to buy the asset for this price?  Buy  Not buy.

**Continue**

**Fig. A.1:** Screenshot of the SET decision environment.

#### A.4 Belief elicitation task instructions (shown on screen)

You have just played a game where you had to decide for 7 different prices whether or not you wanted to buy the asset. Could you indicate below for which price you think the other participants STARTED to buy? Please do so by assigning the number of participants who you think STARTED buying at a particular price and then pressing the "assign" button. For example: if you think 12 participants started buying at a price of 1.000 (which of course means they also bought for all lower prices) you fill in 12 next the the price of 1.000 and press assign. If you think some people never bought the asset, you should assign them to the "never" category. Make sure you assign ALL other participants to a category (you can check this on the right side of your screen). You can always change your choices by typing a different number and pressing on the "assign" button once more. Once you have assigned all the other participants, please click the "continue" button. You will earn 3 euros if you predict the prices at which the others STARTED buying correctly for more than 90% of the participants, 2 euros if you predict them correctly for between 75%-90% of the participants and 1 euro if you predict them correctly for between 50%-75% of the participants. REMINDER: You yourself started buying at a price of : <insert price at which a subject started buying in the SET>

**REMINDER:** You started buying at a price of: 10.000

Assign the participants:	Assigned per category:	
1.000.000 € <input style="width: 50px;" type="text"/> <span style="background-color: red; color: white; padding: 2px 5px;">Assign</span>	1.000.000 €    0	
100.000 € <input style="width: 50px;" type="text"/> <span style="background-color: red; color: white; padding: 2px 5px;">Assign</span>	100.000 €    0	
10.000 € <input style="width: 50px;" type="text"/> <span style="background-color: red; color: white; padding: 2px 5px;">Assign</span>	10.000 €    0	Total # of participants to be assigned: 0
1.000 € <input style="width: 50px;" type="text"/> <span style="background-color: red; color: white; padding: 2px 5px;">Assign</span>	1.000 €    0	
100 € <input style="width: 50px;" type="text"/> <span style="background-color: red; color: white; padding: 2px 5px;">Assign</span>	100 €    0	Total # of participants assigned so far: 0
10 € <input style="width: 50px;" type="text"/> <span style="background-color: red; color: white; padding: 2px 5px;">Assign</span>	10 €    0	
1 € <input style="width: 50px;" type="text"/> <span style="background-color: red; color: white; padding: 2px 5px;">Assign</span>	1 €    0	# of participants you still have to assign: 0
Never <input style="width: 50px;" type="text"/> <span style="background-color: red; color: white; padding: 2px 5px;">Assign</span>	Never    0	

Continue

**Fig. A.2:** Screenshot of the belief elicitation task after the SET.

## B Instructions: SSW and LNP Asset Markets

### B.1 Sessions S1-S4 (SSW markets)

#### **1. General instructions**

This is an experiment in the economics of market decision making. If you follow the instructions and make good decisions, you might earn a considerable amount of money, which will be paid to you in cash at the end of the experiment. The experiment will consist of a sequence of trading periods in which you will have the opportunity to buy and sell shares. Money in this experiment is expressed in francs (300 francs = 1 euro).

#### **2. How to use the computerized market**

The goods that can be bought and sold in the market are called Shares. On the top panel of your computer screen you can see the Money you have available to buy shares and the number of shares you currently have.

If you would like to offer to **sell a share**, use the text area entitled "Enter Sell price". In that text area you can enter the price at which you are offering to sell a share, and then select "Submit Sell Price". Please do so now. You will notice that around 30 numbers, one submitted by each participant, now appear in the column entitled "Sell Price". The lowest sell price will always be on the top of that list and will be highlighted. If you press "BUY", you will buy one share for the lowest current sell price. You can also highlight one of the other prices if you wish to buy at a price other than the lowest. Please try to purchase a share now by highlighting a price and selecting "BUY". Since each of you had put a share for sale and attempted to buy a share, if all were successful, you all have the same number of shares you started out with. This is because you bought one share and you sold one share.

If you would like to offer to **buy a share**, use the text area entitled "Enter Buy price". In that text area you can enter the price at which you are offering to buy a share, and then select "Submit Buy Price". Please do so now. You will notice that again around 30 numbers, one submitted by each participant, now appear in the column entitled "Buy Price". The highest price will always be on the top of that list and will be highlighted. If you press "SELL", you will sell one share for the highest current buy price. You can also highlight one of the other prices if you wish to sell at a price other than the highest. Please sell a share now by highlighting a price and selecting "SELL". Since each of you had put a share for purchase and attempted to sell a share, if all were successful, you all have the same number of shares you started out with. This is because you sold one share and you bought one share.

**There are 2 ways to sell a share: Choose a buy price and press "SELL" or submit a Sell offer yourself.**

**There are 2 ways to buy a share: Choose a sell price and press "BUY" or submit a buy offer yourself.**

When you buy a share, your Money decreases by the price of the purchase, but your number of shares increase by one. When you sell a share, your Money increases by the price of the sale, but your number of shares decrease by one. Purchase prices are displayed in the middle section of your screen and are ranked by price. You will now have a practice period. Your actions in the practice period do not count toward your earnings and do not influence your position later in the experiment. The goal of the practice period is only to master the use of the interface. Please be sure that you have successfully submitted buy prices and sell prices. Also be sure that you have accepted both buy and sell prices. You are free to ask questions, by raising your hand during the practice period.

#### **3. Specific instructions for this experiment**

The experiment will consist of 15 trading periods, you will receive 2500 francs in money as well as two shares at the beginning of the experiment. Each period lasts for 180 seconds, in which you may buy and sell shares. Shares are assets with a life of 15 periods, and your inventory of shares carries over from one trading period to the next. You may receive dividends for each share in your inventory at the end of each of the 15 trading periods.

At the end of each trading period, including period 15 the computer randomly draws a dividend for the period. Each period, each share you hold at the end of the period:

- earns you a dividend of 0 francs with a probability of 25%
- earns you a dividend of 8 francs with a probability of 25%
- earns you a dividend of 28 francs with a probability of 25%
- earns you a dividend of 60 francs with a probability of 25%

Each of the four numbers is equally likely. The average expected dividend in each period is 24. The dividend is added to your cash balance automatically. After the last dividend is paid at the end of period 15, there will be no further earnings possible from shares.

#### 4. Average Holding Value Table

You can use the following Table to help you make decisions:

Ending Period	Current Period	Number of Holding Periods	×	Average Dividend per Period	=	Average Value per Share in Inventory
15	1	15	×	24	=	360
15	2	14	×	24	=	336
15	3	13	×	24	=	312
15	4	12	×	24	=	288
15	5	11	×	24	=	264
15	6	10	×	24	=	240
15	7	9	×	24	=	216
15	8	8	×	24	=	192
15	9	7	×	24	=	168
15	10	6	×	24	=	144
15	11	5	×	24	=	120
15	12	4	×	24	=	96
15	13	3	×	24	=	72
15	14	2	×	24	=	48
15	15	1	×	24	=	24

There are 5 columns in the table. The first column, labeled Ending Period, indicates the last trading period of the experiment. The second column, labeled Current Period, indicates the period during which the average holding value is being calculated. The third column gives the number of holding periods from the period in the second column until the end of the experiment. The fourth column, labeled Average Dividend per Period, gives the average amount that the dividend will be in each period for each unit held in your inventory. The fifth column, labeled Average Holding Value Per Unit of Inventory, gives the average value for each unit held in your inventory from now until the end of the experiment. That is, for each unit you hold in your inventory for the remainder of the experiment, you will earn on average the amount listed in column 5.

Suppose for example that there are 7 periods remaining. Since the dividend on a Share has a 25% chance of being 0, a 25% chance of being 8, a 25% chance of being 28 and a 25% chance of being 60 in any period, the dividend is on average 24 per period for each Share. If you hold a Share for 7 periods, the total dividend for the Share over the 7 periods is on average  $7 \cdot 24 = 168$ . Therefore, the total value of holding a Share over the 7 periods is on average 168.

#### 5. Making predictions

In addition to the money you earn from dividends and trading, you can make money by accurately forecasting the average trading price for the next period. You will indicate your forecasts before each period begins on the computer screen. The money you receive from your forecasts will be calculated in the following manner :

Accuracy	Your Earnings
Within 10% of actual average price	50 francs
Within 25% of actual average price	20 francs
Within 50% of actual average price	10 francs

#### 6. Your earnings

Your earnings for this part of the experiment will equal the amount of cash that you have at the end of period 15, after the last dividend has been paid, plus the money you made with your price predictions. The amount of cash you will have is equal to:

Money you have at the beginning of the experiment (=2500 francs) + Dividends you receive + Money received from sales of shares - Money spent on purchases of shares + Earnings from all price predictions

## B.2 Sessions S5-S7 (LNP markets)

### 5. Specific Instructions for Trading

In the training period you were able to buy and sell. However, in the following 15 periods you are either a buyer OR a seller during the remainder of the experiment (all 15 periods!). This means that you can only buy shares (when you are a buyer) OR only sell shares (when you are a seller). **Thus:**

- If you are a buyer you are able to buy only, meaning you can make an offer to buy a share or you can click the BUY button to buy for the lowest current price. You thus can't sell your shares!

- If you are seller you are able to sell only, meaning you make an offer to sell a share or you can click the SELL button to sell for the highest current price. You thus can't buy shares!

Half of all participants are a buyer and the other half are a seller. If you are a buyer and you buy a share you have to hold it until the end of the experiment (since you cannot sell) and earn the dividends. If you are a seller and sell a share you cannot buy it back (since you cannot buy) and you thus receive no dividends from the sold share for the rest of the experiment.

### 6. Your earnings

Your earnings for this part of the experiment will equal the amount of cash that you have at the end of period 15, after the last dividend has been paid, plus the money you made with your price predictions. The amount of cash you will have is equal to:

**When you are a seller:** Money you have at the beginning of the experiment (=2500 francs) + Dividends you receive + Money received from sales of shares

**When you are a buyer:** Money you have at the beginning of the experiment (=2500 francs) + Dividends you receive - Money spent on purchases of shares

## C Instructions: Risk attitudes and CRT

### Risk attitude elicitation instructions (based on Holt and Laury, 2002)

On the left side of the screen you see 10 lines with two lotteries per line: "Lottery A" and "Lottery B". Both lotteries have two potential outcomes. For every one of the 10 lines, either choose lottery A or lottery B, depending on which lottery you would rather participate in. Once you have filled in your choice for all 10 lines, please click on the "Continue" button. Out of the lines will be chosen at random and you will participate automatically in the lottery you chose at that line (either A or B). You will receive the amount of money that will follow from the outcome of your chosen lottery.

Lottery A	Lottery B	Your choice	Explanation
1/10 prob. of €2,00, 9/10 prob. of €1,60	1/10 prob. of €3,85, 9/10 prob. of €0,10	A <input type="radio"/> C <input type="radio"/> B	<p>On the left side of the screen you see 10 lines with two lotteries per line: "Lottery A" and "Lottery B". Both lotteries have two potential outcomes.</p> <p>For every one of the 10 lines, either choose lottery A or lottery B, depending on which lottery you would rather participate in.</p> <p>Once you have filled in your choice for all 10 lines, please click on the "Continue" button.</p> <p>1 out of the lines will be chosen at random and you will participate automatically in the lottery you chose at that line (either A or B). You will receive the amount of money that will follow from the outcome of your chosen lottery.</p>
2/10 prob. of €2,00, 8/10 prob. of €1,60	2/10 prob. of €3,85, 8/10 prob. of €0,10	A <input type="radio"/> C <input type="radio"/> B	
3/10 prob. of €2,00, 7/10 prob. of €1,60	3/10 prob. of €3,85, 7/10 prob. of €0,10	A <input type="radio"/> C <input type="radio"/> B	
4/10 prob. of €2,00, 6/10 prob. of €1,60	4/10 prob. of €3,85, 6/10 prob. of €0,10	A <input type="radio"/> C <input type="radio"/> B	
5/10 prob. of €2,00, 5/10 prob. of €1,60	5/10 prob. of €3,85, 5/10 prob. of €0,10	A <input type="radio"/> C <input type="radio"/> B	
6/10 prob. of €2,00, 4/10 prob. of €1,60	6/10 prob. of €3,85, 4/10 prob. of €0,10	A <input type="radio"/> C <input type="radio"/> B	
7/10 prob. of €2,00, 3/10 prob. of €1,60	7/10 prob. of €3,85, 3/10 prob. of €0,10	A <input type="radio"/> C <input type="radio"/> B	
8/10 prob. of €2,00, 2/10 prob. of €1,60	8/10 prob. of €3,85, 2/10 prob. of €0,10	A <input type="radio"/> C <input type="radio"/> B	
9/10 prob. of €2,00, 1/10 prob. of €1,60	9/10 prob. of €3,85, 1/10 prob. of €0,10	A <input type="radio"/> C <input type="radio"/> B	
10/10 prob. of €2,00, 0/10 prob. of €1,60	10/10 prob. of €3,85, 0/10 prob. of €0,10	A <input type="radio"/> C <input type="radio"/> B	

Fig. A.3: Screenshot of the Holt & Laury task.

### CRT instructions (Frederick, 2005)

Please answer the following three questions. You will receive 1.5 euro per correct answer and you have 3 minutes to answer the questions.

- A bat and a ball cost \$1.10 in total. The bat costs \$1 more than the ball. How much (in whole cents) does the ball cost?
- If it takes five machines five minutes to make five bottles, how long (in minutes) would it take 100 machines to make 100 bottles?
- In a lake, there is an oil stain. Every day, the stain doubles in size. If it takes 48 days for the stain to cover the entire lake, how long (in days) would it take for the stain to cover half the lake?



## D Additional Tables

**Table A.1:** Subject pool descriptives.

	Mean	Median	Min	Max	Std. dev.
<b>CRT-score</b>	1.63	2	0	3	1.08
<b>Risk attitude (Holt and Laury, 2002)</b>	5.75	6	0	10	1.77
<b>General Risk</b>	6.60	7	0	11	1.95
<b>Age</b>	20.85	20	17	29	2.39
<b>Male</b>	56.65%	-	-	-	-
<b>Non-Dutch</b>	17.87%	-	-	-	-
<b>Economics</b>	44.49%	-	-	-	-

**Notes:** N=263. 'Economics' stands for the percentage of economics students in our population. 'Risk attitude (Holt & Laury)' represents the number of the row where a subject first switched from lottery A to lottery B (see appendix, section C). 'General risk' indicates the answer on a Likert scale from 1 to 11 given to the question "In general, are you willing to take risks?" from Dohmen et al. (2005) (the higher the score the higher the willingness to take risks). Finally, 'CRT score' indicates the number of questions correctly answered in the CRT test from Frederick (2005).

Table A.2: Bubble measures

Market	SET	GD	GAD	RD	RAD	AB	TD	PD	boom	turnover
11	2.50	0.09	0.09	0.08	0.08	16	236	235	10	3.8
12	4.00	0.45	0.57	0.53	0.55	102	1578	1556	11	4.9
13	4.70	0.48	0.48	0.45	0.45	86	1296	1292	12	6.1
21	2.50	0.08	0.25	0.19	0.25	37	713	632	9	3.5
22	3.00	0.06	0.15	0.11	0.15	20	434	368	6	2.8
23	4.20	0.59	0.81	0.69	0.71	132	2040	2012	13	10.6
31	2.00	0.50	0.49	0.50	0.50	96	1444	1444	15	3.4
32	3.70	0.70	0.76	0.81	0.81	155	2346	2339	14	7.4
33	4.20	0.84	0.84	0.94	0.94	181	2711	2711	15	11.1
41	2.50	0.17	0.17	0.17	0.17	32	486	486	15	6.4
42	3.80	1.02	1.05	0.88	0.88	169	2537	2537	15	4.5
43	4.20	1.06	1.10	1.06	1.06	203	3054	3050	13	8.4
51	2.20	-0.12	0.17	-0.03	0.10	-7	279	89	4	2.4
52	3.00	0.18	0.19	0.23	0.24	45	679	674	10	7.0
53	4.60	1.40	1.79	1.65	1.67	317	4799	4777	13	8.6
61	1.40	0.12	0.12	0.09	0.09	17	261	261	14	3.8
62	3.00	0.23	0.34	0.35	0.37	68	1072	1045	10	4.0
63	4.00	0.56	0.60	0.55	0.55	105	1589	1581	14	6.6
Cuziek p	<.000	.003	.002	.002	.002	.002	.002	.002	.494	.002
MWU p	.003	.006	.006	.006	.006	.006	.006	.006	.684	.006

**Notes:** The table reports bubble measures for each market  $lk$  in session  $l$  and market  $k \in (L, M, H)$ . Bubble measures are defined as follows. Geometric Deviation:  $GD = \left(\prod_t \frac{P_t}{FV_t}\right)^{1/15} - 1$ , Geometric Absolute Deviation:  $GAD = \exp\left(\frac{1}{15} \sum_{t=1}^{15} |\ln(\bar{P}_t/FV_t)|\right) - 1$ , Relative Deviation:  $RD = \frac{1}{T} \sum_{t=1}^{15} \frac{(P - FV_t)}{\text{mean}(FV)}$ , Relative Absolute Deviation:  $RAD = \frac{1}{15} \sum_{t=1}^{15} \frac{|\bar{P}_t - FV_t|}{\text{mean}(FV)}$ , Average Bias:  $AB = \frac{1}{15} \sum_{t=1}^{15} (P_t - FV_t)$ , Total Dispersion:  $TD = \sum_{t=1}^{15} |P_t - FV_t|$ ; Positive Deviation:  $PD = \sum_{i=1}^{15} (P_t - FV_t)_{P_t > FV_t}$ ,  $boom$  = greatest number of consecutive periods that median transaction prices are above fundamental values,  $turnover = \sum_{t=1}^{15} \frac{\# \text{ of Trades}_t}{\# \text{ of shares available}}$ .  $SET$  provides the SET-score. Row  $Cuziekp$  provides the p-values of a trend test with six observations in each category. Row  $MWU_p$  provides the p-value of a Mann-Whitney U test comparing the L-markets with the H-markets with six observations in each category.

**Table A.3:** Market dynamics regression

Session	Market	$\hat{a}$	$\hat{b}$	$N$
<b>S1-S6</b>	<b>L</b>	-27.734*** (2.226)	0.197 (0.150)	84
	<b>M</b>	-25.310*** (3.256)	1.449*** (0.323)	84
	<b>H</b>	-22.657** (6.626)	2.558*** (0.500)	84
	<b>ALL</b>	-27.996*** (0.059)	1.628*** (0.301)	252
<b>S7-S9</b>	<b>ALL</b>	-23.638*** (5.295)	0.190 (0.240)	13

**Notes:** Regression with the price change from period  $t - 1$  to period  $t$  in market  $m$  as regressand and a constant ( $\hat{a}$ ) as well as market pressure ( $\hat{b}$ ), defined as the number of bids ( $B_{m,t-1}$ ) minus the number of asks ( $A_{m,t-1}$ ) in period  $t - 1$  in market  $m$ , as the regressor:  $P_{m,t} - P_{m,t-1} = \hat{a} + \hat{b}(B_{m,t-1} - A_{m,t-1})$ . Regression coefficients reported for market L, M and H of S1-S6 were obtained from pooled OLS regressions (due to the low number of observations) with reported standard errors (in parentheses) adjusted for heteroskedasticity and clustering at the session level. The coefficients reported in the ‘ALL’ category of S1-S6 were obtained by running a fixed effects model on all markets from Sessions S1-S4 with reported standard errors (in parentheses) adjusted for heteroskedasticity. Regression coefficients reported in the ‘ALL’ category of S7-S9 were obtained from a pooled OLS regression (due to the low number of observations) including (non-reported) session dummies with reported standard errors (in parentheses) adjusted for heteroskedasticity and clustering at the market level. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

## E Prediction

This section considers the price prediction behaviour of the subjects. Therefore, we look at the median price predictions and the target price (the average price) net of the fundamental value do illustrate overpricing in trading and predicting. To the first we refer to as overprediction, and to the latter as overpricing. Figure A.4 depicts *overprediction* and *overpricing* for each of the six SSW sessions separated by markets. The figure shows a clear pattern for markets with a price bubble, e.g., the H markets in session 4 or 5; the overpricing line has a similar course as the overprediction line, but is shifted roughly one period to the left. Our results thus seem to indicate that predictions follow lag-prices in line with Holt et al. (2017). However, there are no differences across treatments, i.e. when a overpricing occurs, as for example also in the L-market in session 3, the prediction patterns are quite similar independent of the treatment manipulation.

Moreover, in neither treatment are subjects able to predict the crash. In figure A.4, we see that in the period after the peak (highest point of the red line), the blue line exceeds the red line indicating that subjects predict higher prices rather than lower prices in the 'crash period'. To support our observation, we test the Null hypothesis that the price forecasts predict an increase in prices (or no change) in the crash period against the alternative hypothesis that the price forecasts predict a decline in prices in the crash period. Rejecting the Null hypothesis indicates that the subjects do not predict prices to drop, i.e., subjects do not predict the crash. To exclude the effect from different price levels across markets on the analysis, we ran binomial tests for each treatment separately on subject level ( $n_L = 60$ ,  $n_M = 58$ ,  $n_H = 60$ ). Therefore, we count the number of observations in which a subject's prediction in the crash period exceeded the average price of the peak period. We find this number to be significantly greater than under a random assignment for each of the three market types ( $p < 0.001$ ). Hence, we conclude that the crash is not predicted by the subjects in neither treatment.

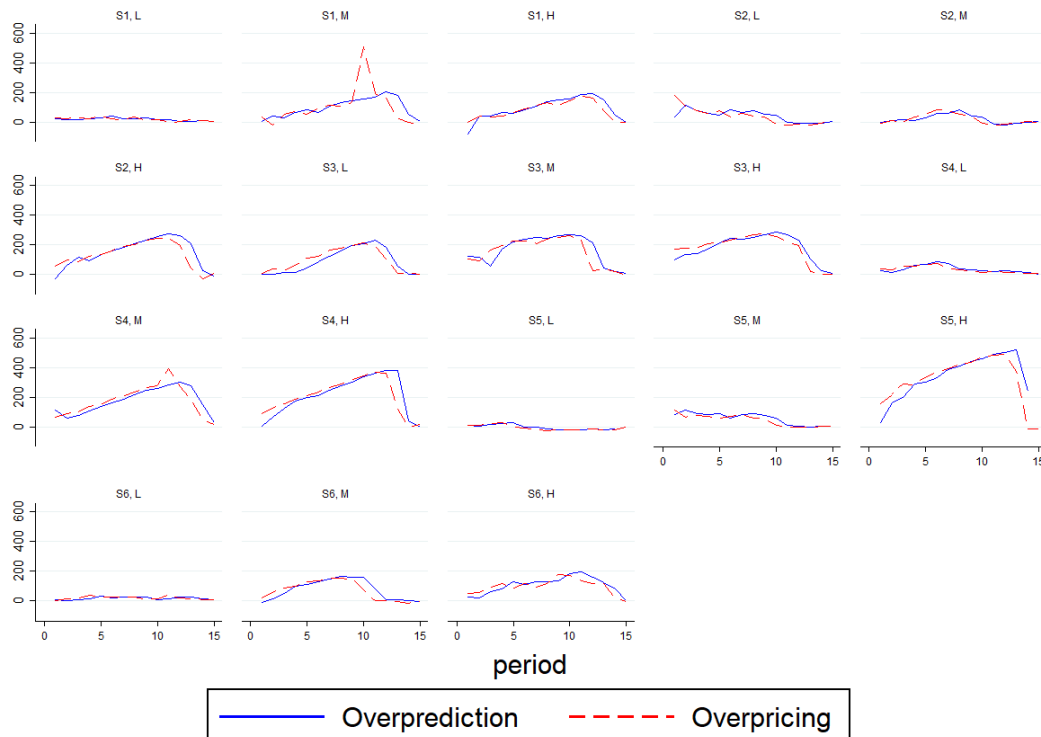


Fig. A.4: Overpricing vs. Overprediction

We also test the influence of adaptive learning on predictions. Table A.4 reports regressions with individual price prediction as the regressand and previous price trends (a) and current fundamental value (b) as regressors. To test the influence of adaptive learning and thus the hypothesis that price predictions are a function of historical price trends, we use an adapted form of the lag-adjustment formula used in Haruvy et al. (2007). Specifically, we model the price prediction for period  $t$  made at the start of that same period in market  $m$  by subject  $i$ , denoted by  $B_{i,m,t}$ , as follows:  $B_{i,m,t} = C_i + \beta \text{periodtrend}$ . The variable 'periodtrend' equals  $P_{m,t-1} + P_{m,t-1} \frac{P_{m,t-1} - P_{m,t-2}}{P_{m,t-2}}$  where  $P_{m,t}$  stands for the median transaction price in market  $m$  at time  $t$ . Note that we have removed the market trend variable from the lag-adjustment formula used in Haruvy et al. (2007). This is done because subjects in our experiment only participate in one market. Finally, to test the influence of anchoring on the fundamental value we use the following formula:  $B_{i,m,t} = C_i + \gamma FV_t$  with  $FV_t$  being the time  $t$  fundamental value.

Table A.4: Price prediction regressions

(a)				(b)			
Market	Period trend ( $\beta$ )	$R^2$	$N$	Market	FV ( $\gamma$ )	$R^2$	$N$
L	0.951*** (0.011)	0.947	762	L	1.069*** (0.025)	0.845	880
M	0.473*** (0.077)	0.471	719	M	1.009*** (0.040)	0.651	831
H	0.838*** (0.020)	0.834	740	H	0.714*** (0.051)	0.333	854

**Notes:** Price prediction regressions obtained using fixed effects models with reported standard errors (in parentheses) adjusted for heteroskedasticity. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

## F Beliefs and calculation of optimal prices

Given the stated beliefs about the buying decisions of others in the SET, we can calculate the optimal buying price. Assuming an expected utility framework with risk neutrality we compute the individually optimal buying price as follows. For each subject, we first determine for each possible buying price  $i$  (with  $i = 1$ , denoting  $P = 1$ ,  $i = 2$ , denoting  $P = 10, \dots, i = 7$ , denoting  $P = 1,000,000$ ) the probability of someone else buying both before and after that subject, denoted by  $Pr(b_i)$  and  $Pr(a_i)$  respectively, given that subject's beliefs about the buying decisions of his  $N - 1$  fellow participants in a session (taking into account the probabilities of being 1st, 2nd and 3rd at that particular price). For instance, to determine the probability of some other participant buying after a price of  $P = 100$ , we first divide the number of participants believed to buy at prices higher than  $P = 100$  by  $N$  and subsequently multiply this number with the probability *not* to be last at this price (which equals 0.8 at  $P = 100$ ).

Now we calculate the expected earnings from buying at price  $i$ , i.e.,  $E(E_i) = 10 Pr(b_i)Pr(a_i) + 3(1 - Pr(b_i))$ . The earnings at each possible buying price  $i$  are equal to  $E(E_i)$ , when the subject buys and equal to 3 when the subject does not buy. Because buying at some price  $i$  automatically implies buying at all prices below  $i$ , the total expected earnings are equal to  $E(TE_i) = \sum_{j=1}^i \frac{1}{7} E(E_j) + (7 - i) \frac{3}{7}$ . The price  $i$  at which  $E(TE_i)$  reaches its maximum,  $E(TE_{i^*})$ , defines the optimal buying price. Let this price equal  $P^*$ .

With these assumptions, we now can test whether subjects actually chose  $P^S = P^*$ . Therefore, we consider the difference between the optimal and the observed buying price, the "SET-score differential". Table A.5 shows the percentage of subjects that bought at a particular number of steps too early/late in the SET task compared to their optimal SET-score. For instance, when a subject has a SET-score of 4 (first bought at a price of 1,000) and the expected earnings ( $E(TE_i)$ ) would have been highest at a SET-score of 3 (first buying at a price of 100), the SET-score differential is this equal to  $(4-3) = 1$ . As shown in table A.5, 84.85 percent (87.08 percent for the first six sessions) of subjects buy at most one step away from their optimal buying price  $P^*$ .

Table A.6 shows the SET-score differential per chosen SET-score, the 'buy ratio', defined as the the expected earnings at the chosen SET-score divided by the earnings at the optimal switch point ( $E(TE_i)/E(TE_{i^*})$ ), the average 'buy premium', defined as the expected earnings at the actual SET-score ( $E(TE_i)$ ) minus 3 euros (the earnings when not buying at any price), and, finally, the 'marginal resale risk' defined as the expected probability of reselling the asset when buying at the maximum buy price belonging to the chosen SET-score given the beliefs about the SET-scores of the other subjects.<sup>28</sup>

The SET-score differential shows an increasing trend in the chosen SET-score indicating that subjects buying at higher prices seem to be further away from their optimal buying price. However, the buy ratio for all SET-scores are relatively high and more importantly rather close to each other indicating that people with higher SET-scores do not -given their beliefs- make considerably worse choices with respect to expected earnings than the lower SET individuals. Moreover, the buy premium is actually mostly increasing in the chosen SET-score due to the fact that high SET individuals expect others to buy at higher prices as well (see table 2). As the expected earnings ( $E(TE_i)$ ) are calculated over all seven possible prices, these more 'optimistic' beliefs about the actions of others in the SET task thus on average translate into a higher buy premium. Finally, although there seems to be little difference in risk taking between high and low SET individuals when looking at the buy ratio, this picture radically changes at the margin as shown by the marginal resale probability: higher SET-score individuals do take a considerable higher risk at their maximum buy price than low SET-score individuals.

Table A.6 shows that the SET-score differential' increases in the chosen SET-score indicating that with higher SET-scores subjects deviate more from optimal behaviour. However, as this result will show up by design due to the way the SET-score differential is calculated it does not point to a lower degree of understanding in the SET of the high SET-score subjects compared to the low SET-score subjects.<sup>29</sup> This is also apparent from the fact that the actual difference in expected earnings in the full SET between high and low SET-score individuals is actually very small. Also, using a permutation test, we find no difference between those subjects with the lowest ( $N = 50$ ) and those with the highest ( $N = 72$ ) CRT-score in terms of the SET-score differential ( $p = 0.23$ ).

Figure A.5 shows the SET-score differentials for each markets over all nine sessions. As discussed above, the slight shift in the distribution across markets is due to the construct of the SET-score differential.

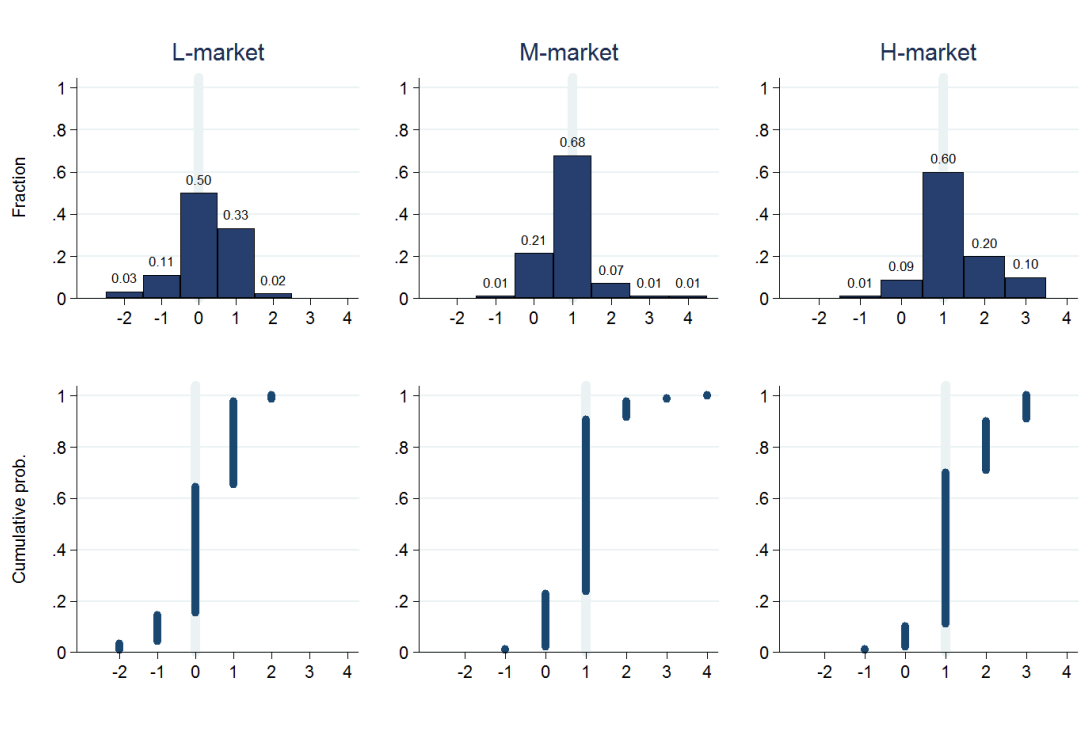
<sup>28</sup> In order to provide an example on the calculation of the marginal resale risk assume subject  $x$  has a SET-score of 4 at which the maximum buying price equals 1,000. Also assume subject  $x$  believes 14 out of his 29 fellow participants bought at a price of 10,000 or higher. His marginal resale risk would then be  $14/29 = 0.48$ .

<sup>29</sup> For example, with a SET-score of 1, there are six possibilities for a negative SET-score differential and only one for a positive SET-score differential. While for a SET-score of 6 it is the other way around. Hence, if subjects make small mistakes leading to a deviation from their optimal SET-scores, then these mistakes lead to negative SET-score differentials for small SET-scores and positive SET-score differentials for high SET-scores.

**Table A.5:** Percentage of subjects per SET-score differential

SET-score diff.	Subjects (%)		Buy ratio	
	ALL	S1-S6	ALL	S1-S6
-2	1.14	0.00	0.85	N/A
-1	4.55	4.49	0.95	0.94
0	26.89	26.97	1	1
1	53.41	55.62	0.96	0.96
2	9.85	8.43	0.91	0.92
3	3.79	4.49	0.85	0.85
4	0.38	0.00	0.61	N/A

**Notes:** The SET-score differential is defined as the actual SET-score minus the optimal SET-score given beliefs. The 'buy ratio' is defined as the expected earnings at the indicated SET-score differential divided by the expected earnings at the optimal SET-score (the SET-score with the highest expected earnings) for those with the indicated SET-score differential. N=264 for all sessions combined ('ALL') and N=178 for the first six sessions ('S1-S6').

**Fig. A.5:** SET-score differential histograms and cumulative densities, S1-S9

**Notes:** Graph shows SET-score differential histograms (top row) and cumulative densities (bottom row) for the three different markets (L, M, H). Data is averaged over all nine sessions (S1-S9). Medians are indicated by the vertical light blue lines.

**Table A.6:** Conditional SET outcomes by SET-score

SET-score	SET-score diff.		Buy ratio		Buy Premium		Marg. resale prob.	
	ALL	S1-S6	ALL	S1-S6	ALL	S1-S6	ALL	S1-S6
0	-0.62	-0.60	0.96	0.96	0.00	0.00	N/A	N/A
1	-0.15	0.00	0.95	0.94	0.34	0.29	0.84	0.82
2	0.32	0.22	0.97	0.98	0.79	0.88	0.77	0.80
3	0.66	0.67	0.98	0.98	1.52	1.60	0.78	0.82
4	1.18	1.13	0.94	0.95	1.77	1.81	0.66	0.68
5	1.59	1.47	0.93	0.93	1.71	1.66	0.39	0.41
6	2.00	2.50	0.95	0.96	1.79	1.21	0.41	0.26
7	-	-	-	-	-	-	-	-

**Notes:** All expected earnings (both at the optimal and at the actual buy price) are calculated as explained in this appendix and are conditional on a subject's own beliefs about the actions of the other subjects. The 'SET-score differential' is defined as the actual SET-score minus the optimal SET-score given beliefs about the SET-scores of the other subjects. The 'buy ratio' is defined as the expected earnings at the chosen SET-score divided by the expected earnings at the optimal SET-score. The 'buy premium' is defined as the expected earnings at the actual SET-score given beliefs about the SET-scores of the other participants minus 3 euros (the earnings when not buying at any price). Finally, the 'marginal resale probability' is defined as the expected probability of reselling the asset when buying at the price belonging to the chosen SET-score given the beliefs about the SET-scores of the other subjects. N=264 for all sessions combined ('ALL') and N=178 for the first six sessions ('S1-S6').