

Online Appendix for “Subjective Expectations, Experiences, and Stock Market Participation: Evidence From the Lab”

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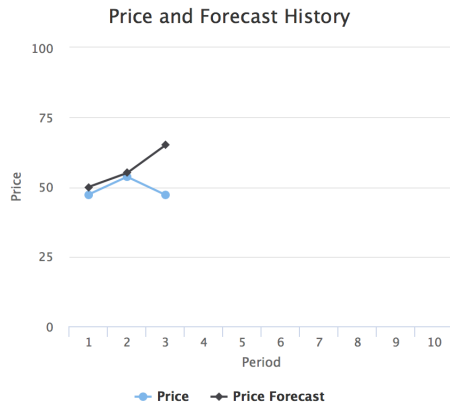
1 Introduction

The Online Appendix is organized as follows. Section 2 provides experimental screens. Section 3 provides alternative measures to the summary statistics. Section 4 provides robustness checks for the regressions. Section 5 provides a description of the risk elicitation task. Section 6 provides the experimental instructions. Section 7 provides the references.

2 Experimental Screens

Figures 1 and 2 provide screens of the experiment.

Forecast Price - Round 4



Round	Expected Price	Price	Participation Rate	Entry Payoff	Forecast Payoff
1	50.00	47.3	100%	0.00	3.40
2	55.00	53.65	100%	5.00	1.65
3	65.00	47.14	67%	0.00	0.70

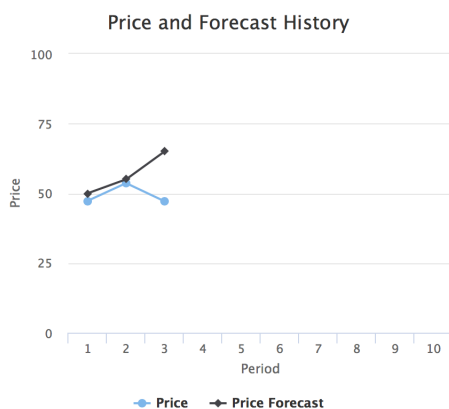
Predict the price in this round (your last prediction for this round was 54.00):

Predict the price in the next round:

Next

Figure 1. Experimental Screen: Forecasting Prices (Subjective Expected Returns)

Participation - Round 4



Round	Expected Price	Price	Participation Rate	Entry Payoff	Forecast Payoff
1	50.00	47.3	100%	0.00	3.40
2	55.00	53.65	100%	5.00	1.65
3	65.00	47.14	67%	0.00	0.70

Do you want to participate this period? (Your cost of participating is 2.0. Your prediction for this round is 50.00 and next round is 55.00. You expect the manager's profits to be 4.5). :

- No
 Yes

Next

Figure 2. Experimental Screen: Participation Decision

3 Additional Summary Statistics

Here I list additional summary statistics for prices and participation rates per session. In particular, I list the median, 2nd half mean, and a time-series fit. The time-series fit which is called AR(1) in Table 1, is a time-series regression on each session's price and participation series to estimate the constant and AR(1) coefficients. Then I take the implied unconditional average of the series using the estimated values. The additional summary statistics show that in general the different measures of average behavior are all very similar.

4 Robustness Checks

I perform robustness checks. Table 2 shows the results for the linear probability model for individual participation. Table 3 shows the results for the logit model for

Treatment	Session	Med. Price	Med. Part.	AR(1) Price	AR(1) Part.
1	1	45.52	N/A	45.85	N/A
1	2	42.45	N/A	39.88	N/A
1	3	41.84	N/A	42.28	N/A
1	4	43.66	N/A	42.05	N/A
2	5	41.32	77.78%	40.82	74.2%
2	6	43.38	66.67%	42.5	58.22%
2	7	45.64	77.78%	46.32	78.59%
2	8	39.84	88.89%	40.15	81.7%
3	9	43.79	44.44%	45.29	49%
3	10	48.77	66.67%	50.74	63.83%
3	11	52.07	66.67%	51.73	65.9%
3	12	40.25	44.44%	40.24	46.4%
4	13	28.46	66.67%	27.52	64.79%
4	14	25.46	66.67%	22.32	59.14%
4	15	23.76	55.56%	23.42	54.92%
4	16	29.26	77.78%	27.22	66.67%

Table 1: Additional Summary Statistics

individual participation. Table 4 shows the results for the linear probability model for positive subjective expected returns. Table 5 shows the results for the logit model for positive subjective expected returns.

Table 2: Dependent Variable: Individual Participation (LPM)

Variable	Benchmark	Experience Dummies
Positive Subj. Expected Returns _t	0.413*** (0.035)	0.382*** (0.035)
Participation Cost	-0.066* (0.037)	-0.041* (0.025)
Actual Returns _{t-1}	0.021*** (0.004)	
Forecasting Payoff _{t-1}	0.01* (0.005)	-0.01 (0.006)
Risk Aversion	0.033 (0.021)	0.021 (0.014)
Past Low Return _{t-1} No Participation		-0.065* (0.034)
Past High Return _{t-1} Participation		0.374*** (0.046)
Past Low Return _{t-1} Participation		0.214*** (0.049)
N	4800	4704
Pseudo R ²	0.194	0.308

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: Dependent Variable: Individual Participation (Logit)

Variable	Benchmark	Experience Dummies
Positive Subj. Expected Returns _t	0.446*** (0.032)	0.422*** (0.030)
Participation Cost	-0.066 (0.042)	-0.059 (0.038)
Actual Returns _{t-1}	0.022*** (0.004)	
Forecasting Payoff _{t-1}	0.01* (0.006)	0.006 (0.006)
Risk Aversion	0.044* (0.025)	0.041* (0.023)
Past Low Return _{t-1} No Participation		-0.092*** (0.027)
Past High Return _{t-1} Participation		0.134*** (0.024)
Past Low Return _{t-1} Participation		-0.058* (0.030)
N	4800	4704
Pseudo R ²	0.206	0.243

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4: Dependent Variable: Positive Subj. Expected Returns (LPM)

Variable	Full Sample	Before Learning	After Learning
Past Low Return _{t-1} No Participation	-0.141*** (0.031)	-0.202*** (0.04)	-0.091*** (0.033)
Past High Return _{t-1} Participation	0.02 (0.02)	0.014 (0.027)	0.007 (0.024)
Past Low Return _{t-1} Participation	-0.159*** (0.031)	-0.177*** (0.036)	-0.169*** (0.039)
Before Round 25	Yes	Yes	No
After Round 25	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes
N	4800	2112	2592
R ²	0.118	0.109	0.138

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: Dependent Variable: Positive Subj. Expected Returns (Logit)

Variable	Full Sample	Before Learning	After Learning
Past Low Return _{t-1} No Participation	-0.131*** (0.031)	-0.199*** (0.04)	-0.081*** (0.031)
Past High Return _{t-1} Participation	0.019 (0.025)	0.011 (0.038)	0.007 (0.028)
Past Low Return _{t-1} Participation	-0.142*** (0.029)	-0.179*** (0.039)	-0.135*** (0.033)
Before Round 25	Yes	Yes	No
After Round 25	Yes	No	Yes
Other Controls	Yes	Yes	Yes
N	4800	2112	2592
Pseudo R ²	0.14	0.179	0.12

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

5 Risk Elicitation

I elicit risk aversion using a multiple-price list (MPL) as in Holt and Laury (2002) and Drichoutis and Lusk (2016). A MPL provides a list of safe and risky lotteries to subjects and asks them to choose between them. After the survey, the experimenter utilizes a randomization device and one lottery on the list is played. Subjects receive a payment based on their choice for that lottery. The number of safe choices provides an estimate of their risk aversion parameter. Csermely and Rabas (2016) shows that the most reliable risk elicitation surveys are in the form proposed by Drichoutis and Lusk (2016). Their criterion was based on predictability and consistency. For more details please see their paper.

6 Instructions

Overview

Welcome to this experiment in economic decision-making. Please read the instructions carefully as they explain how you earn money from the decisions you make in today's experiment. We ask that you not talk with one another and that you silence your phones. If you have questions at any time please raise your hand and it will be answered in private. There will be a short quiz following the reading of the instructions which you will all need to complete before we can begin the session. **Also, at the end of the last round, we will give you a survey that pays you cash.**

Today's session will involve "rounds". Each round will have 2 "tasks": forecasting and entry advice. For each task you will view some information and make decisions. You will receive points for each task in each round. At the end of the session, we will randomly select 1 task. Your points from this task will be converted into dollars at 15 points = \$1. Your earnings from the task, the survey, and your \$7 show-up payment will be given privately in cash at the end of the session.

General Information

You are a **financial advisor** to an investment fund manager. The manager has 2 investment options: a risk-free investment and a risky investment. The risk-free investment is putting all the money into a bank account paying a fixed interest rate. The risky investment is holding stocks which requires a *transaction fee* to buy. Your 2 tasks are:

- 1) **Forecast the stock market price as accurately as possible and**
- 2) **Provide entry advice to the manager (*hold the stock or not*).**

To make the best decision, the manager needs to know what the stock price will be. As the advisor, you have to predict the stock price (in francs) during 51 rounds and tell the manager if he should buy the stock or not in each round.

Each manager has a different transaction fee for holding stocks. The transaction fees are fixed per manager (e.g. each manager's fee does not change in all rounds) and ranges evenly from 0 to 4 francs per round (with no manager having a fee of 0). The manager makes profits each round. If the manager does not buy stocks he makes 3 francs that round. If he buys the stock, he makes uncertain profit: dividends which are 3 francs per round plus a capital gain from stocks (which can be negative). Therefore good entry advice depends on good forecasts. Your points depend on forecasting accuracy and the manager's profits.

Market Information

The stock price is determined by equilibrium between the supply and demand of stocks. The supply of stocks is fixed. The demand for stocks is mainly determined by the total demand of a number of investment funds active in the stock market. Some of these funds are advised by a participant in the experiment, others use a fixed strategy.

The more funds there are in the market, the higher the demand for stocks on average. There is also 1 fund who will always enter the market. There is also some uncertain, small demand for stocks by private investors but their effect on the stock

price is small. *Stock prices are determined by equilibrium, that is, the stock price in round t will be the price where total demand equals supply.*

Manager's Investments Information

The exact investment strategy of your manager and the strategies of the other funds are unknown. The risk-free bank account pays a **fixed interest rate of 5% per round**. Stockholders receive a certain **dividend of 3 francs per round**. Stock returns per round are uncertain and depend on dividends and stock price changes.

Based on your stock price forecast and entry decision, your manager will make an optimal investment decision (*e.g. some money into the bank account and some into stocks*). The higher your price forecast, the larger will be the fraction of money invested by your manager in stocks, so the larger will be their demand for stocks. If you tell the manager not to enter, then he invests everything in the risk-free bank account.

Task 1: Forecasting Prices

Your 1st task is to forecast the stock market price in each round as accurately as possible. The stock price will always be between 0 and 100 francs. The stock price has to be predicted both **one** and **two** rounds ahead. So at the start of each round you will make 2 stock price predictions (*e.g. this round and next*). If the manager enters, he will use your **two** round ahead forecast to make his optimal investment decision. Your forecasts can be made up to 2 decimal points.

At the start, you have to predict the stock price in the 1st **two** rounds, that is, you have to give forecasts for rounds 1 and 2. After everyone has given their forecasts for the 1st two rounds, along with their entry advice, the stock price in round 1 will be revealed and based on your forecasting error, your points for round 1 will be given. After that, you have to give your forecast for rounds 2 and 3, along with entry advice for round 2. After everyone has given their forecasts and entry advice in round 2, the stock price in round 2 will be revealed and based on your forecasting error and the manager's profits, your earnings for round 2 will be given. This continues for 51 rounds.

It is important to note that you make 2 forecasts for each round's price after round 1. During round 1, you make a forecast of the stock price in round 2 and in round 2, you make *another* forecast of the stock price in round 2. This is because at the start of round t , you do not know the stock price in round t since it is revealed at the end of the round.

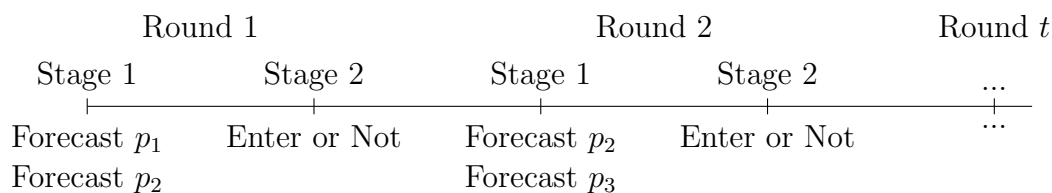
Task 2: Entry Advice for the Manager

Your 2nd task is to give entry advice. Your 2 choices are to **enter** the stock market or **not enter**. The manager will follow your advice completely. The manager makes a profit based on your decision. If the manager does not enter, the manager makes a service fee of 3 francs that round. Otherwise, the manager makes a profit:

$$\text{Price}_{t+1} + 3 - 1.05 * \text{Price}_t - \text{Manager's fee}$$

where price_t is price in round t , 3 is the dividend, and 1.05 is the gross interest rate. Hence his profits depend on the price change after entry (*e.g.* Price_t and Price_{t+1}).

Your job will be to make sure the manager makes the decision that maximizes his per round profits. In each round, you will receive 3 points plus the manager's profits if the manager's profits are positive (up to 5 points) and 3 points minus the manager's profits if they are negative (down to 1 point). If he does not enter, you will receive 3 points. The following is a timeline of your tasks in each round:



Points

Your points will depend on your forecasting accuracy and the manager's profits. For forecasting, the better you predict the stock market price in each round, the more

points you get. Your points for forecasting are:

$$\text{Forecast points in round } t = \frac{16}{2 + |\text{Price in round } t - 1\text{st forecast}| + |\text{Price in round } t - 2\text{nd forecast}|}$$

where $|\cdot|$ is an absolute value (deviation), e.g. $|10 - 13| = 3, |5 - 4| = 1$. **The accuracy of both your 1st and 2nd forecast will matter.** You can earn up to 8 points in each round if you predict the stock price exactly both times.

Your points for entry are:

$$\text{Entry points in round } t = \begin{cases} \min\{3 + MP, 5\} & \text{if entered in } t-1 \text{ and } \underbrace{p_t + 3 - 1.05p_{t-1} - k_i}_{\text{manager's profits}} \geq 0 \\ \max\{3 + MP, 1\} & \text{if entered in } t-1 \text{ and } \underbrace{p_t + 3 - 1.05p_{t-1} - k_i}_{\text{manager's profits}} < 0 \\ 3 & \text{if did not enter in } t-1 \end{cases}$$

where MP is the manager's profits, p_t is the price in round t , and k_i is the manager's transaction fee. And where \max chooses the maximum value, e.g. $\max\{3, 5\} = 5$ (\min chooses the minimum value). Hence the maximum points you can make is 5 and the minimum is 1. We will provide you with your manager's expected profits based on your forecasts. *Note that entry points in round t depend on your entry choice in round $t - 1$.* **Remember we will pick 1 task (forecasting or entry) at random to pay you at the end of the experiment.**

Forecasting Example: Suppose the price in round 7 was 70 francs and you guessed 65 in round 6 and 60 in round 7. Then your points:

$$\frac{16}{2 + |70 - 65| + |70 - 60|} = \frac{16}{2 + 5 + 10} = 0.94 \text{ points}$$

Entry Example: Suppose the price in round 8 was 80 francs and the price in round 7 was 70 francs and the manager's transaction fee was 1. Then your points in round 8 if you entered in round 7 would be:

$$80 + 3 - 1.05 * 70 - 1 = 9.5 + 3 = 12.5 \geq 5 \implies 5 \text{ points}$$

If you did not enter, you would get 3 points. If it were negative you get less than 3 points.

The following is a table of possible points for forecasting. It is important to note that the table does not give all values and that points are rounded to 2 decimal points.

		Earnings Table (in points)							
		Error 2 = 0	0.5	1	1.5	2	2.5	3	3.5
Error 1 = 0		8	6.4	5.33	4.57	4	3.56	3.2	2.91
0.5		6.4	5.33	4.57	4	3.56	3.2	2.91	2.67
1		5.33	4.57	4	3.56	3.2	2.91	2.67	2.46
1.5		4.57	4	3.56	3.2	2.91	2.67	2.46	2.29
2		4	3.56	3.2	2.91	2.67	2.46	2.29	2.13
2.5		3.56	3.2	2.91	2.67	2.46	2.29	2.13	2
3		3.2	2.91	2.67	2.46	2.29	2.13	2	1.88
3.5		2.91	2.67	2.46	2.29	2.13	2	1.88	1.78

Now please complete a short quiz. You can use the instructions sheet. Please raise your hand when you are done and we will come around to check your answers. After everyone has finished, we will let you know when you can begin the experiment.

Question 1

What is the smallest and largest prices the stock can be?

Suppose you are at the beginning of round 10. Which rounds' prices do you need to predict?

Question 2

If you advise your manager to enter, which forecast will your manager use to make his investment decision (1 or 2 rounds ahead)?

How much does the stock give in dividends (in francs) per round?

What is the interest rate that the bank account pays per round?

Question 3

What is the range of all manager's transaction fees?

What is the most amount of points you can earn for entry advice? What is the least amount? How many points do you receive if you do not enter?

If you advise the manager to not enter the stock market, will he buy stocks?

Question 4

Suppose the price for round 20 is 50 francs. You guessed 45 in round 19 (for price in round 20) and 50 in round 20 (for price in round 20). How many points would you receive for forecasting the price in round 20?

Suppose your manager's profit in round 6 is 3. How many points would you earn? (Hint: $\min\{3 + MP, 5\}$). Suppose your manager's profit in round 6 is -1. How many points would you earn? (Hint: $\max\{3 + MP, 1\}$)

Suppose the price for round 21 is 55 francs and price for round 20 is 50 francs. Your manager's transaction fee is 1. If you entered in round 20, what is the manager's profits? How many points would you earn at the end of round 21? (Hint: $p_t + 3 - 1.05p_{t-1} - k_i$, where k_i is the manager's transaction fee)

7 References

- [1] **Csermely, T., Rabas, A.** 2016. *How to Reveal People's Preferences: Comparing Time Consistency and Predictive Power of Multiple Price List Risk Elicitation Methods.* Journal of Risk and Uncertainty 53: 107-136.
- [2] **Drichoutis, A., Lusk, J.** 2016. *What Can Multiple Price Lists Really Tell us About Risk Preferences?* Journal of Risk and Uncertainty 53: 89-106.
- [3] **Holt, C., Laury, S.** 2002. *Risk Aversion and Incentive Effects.* American Economic Review 92 (5): 1644-1655.