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# Determinants of investor expectations and satisfaction. A study with financial professionals\*

Rene Schwaiger, Michael Kirchler, Florian Lindner, and Utz Weitzel<sup>†</sup>

October 12, 2018

## Abstract

We investigate determinants of price expectations and satisfaction levels of financial professionals and students. In experiments with 150 professionals and 576 students, we systematically vary price paths according to the final return (positive or negative) and the way the final return is achieved (upswing followed by downswing or vice versa). Professionals show the most optimistic price expectations and are most satisfied if assets fall in price first and then recover. In addition, professionals' price expectations are highest after positive returns. Among students, qualitatively similar patterns emerge, but professionals' price expectations are less prone to framing effects.

JEL: G02, G11, D03, C93

Keywords: Investor satisfaction, price expectations, financial professionals, experimental finance, investor behavior.

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# 1 Introduction

Imagine the following investment situation. You held an asset for one year yielding 5%, but ex-post you realize that the stock was up +20% mid-term. At the same time, your friend reports of an investment giving him a return of 5% as well, after a trough of -15% halfway through the year. Although you and your friend ended up with the same returns, the question arises whether both of you will be equally happy about your investments and whether your experience from the past year will influence your price expectations of your stock? In a world full of homines economici (Thaler and Sunstein, 2008), investors will be equally satisfied and focus solely on future cash flows when assessing the future potential of the stocks. In this paper, we will analyze whether experienced and highly skilled financial professionals, but also students, act in such a way.

Following the framework of neoclassical economic theory, decision-makers should exclusively focus on economic outcomes and ignore the way in which these outcomes have been achieved. However, framing effects, which should not influence decisions, are indeed relevant for decision-makers (see, among others, Tversky and Kahneman, 1981; Arrow, 1982; Tversky and Kahneman, 1986; Dreber et al., 2013). Moreover, framing effects also seem to be of importance to investment decisions. In a recent study with student subjects and participants from MTurk (Amazon Mechanical Turk), Grosshans and Zeisberger (2018) find that self-reported satisfaction levels with hypothetical investments are significantly affected by the way in which final returns are achieved. More specifically, participants were exposed to graphical illustrations of different stock price paths over a period of 12 months. The authors demonstrate that investors are significantly more satisfied with stocks exhibiting decreasing and subsequently recovering price paths compared to stocks with an opposite price pattern. Furthermore, the authors report that stocks with down-up paths are associated with more optimistic price expectations compared to stocks with the inverse price pattern.

Nevertheless, the question remains open as to whether the results of Grosshans and Zeisberger (2018) also hold for financial professionals. This question is important, as professionals might be less prone to such framing effects, given years or decades of experience with investment decisions (Kirchler et al., 2018a,b). Moreover, professionals are central to the functioning of financial markets, and hence their behavior has far-reaching consequences for society, as demonstrated by the last financial crisis. In this paper, we shed more light on professionals' behavior by answering the question of whether professionals' price expectations and satisfaction levels are driven by the way (the frame) in which investment returns were achieved.

Consequently, we closely replicate the study of Grosshans and Zeisberger (2018) by conducting lab-in-the-field experiments with 150 professionals from various Northern and Central European countries. Importantly, we only recruited professionals who regularly engage in investment decisions, such as traders, fund managers, portfolio managers, and private bankers. Moreover, we

run laboratory experiments with 576 students from the University of Innsbruck, who serve as a control group and as a proxy for the behavior of laypeople.<sup>1</sup> We decompose price expectations and satisfaction levels of both subject pools to separate the contributions of price path developments and the level of returns, respectively. Specifically, we set up four treatments using a within-subjects design, differing in (i) the final return over the past 12 months (either +10% or -10%) and in (ii) the price paths through which the final returns were achieved (decreasing prices followed by increasing prices or vice versa). As major outcome variables we elicited subjects' price expectations for the upcoming 12 months and investors' satisfaction levels on a 9-point Likert scale. First, we find that professionals and students believe in short-term trend continuation, since their price expectations are significantly more optimistic for stocks with price paths that first dropped and then subsequently recovered, holding final returns constant. Additionally, we show that price expectations of professionals and students are significantly more optimistic after positive returns compared to negative returns. Importantly, when analyzing absolute differences in price expectations between stocks with a down-up path and stocks with an up-down path (when holding final returns constant), we find that professionals' price expectations are more consistent compared to the ones of students. This indicates that professionals' price expectations are less influenced by the frame. Second, we report that the satisfaction levels of professionals and students are affected by the stock price path itself. Specifically, we observe that, for a given return, professionals and students prefer stocks with decreasing and subsequently recovering prices compared to stocks with the opposite pattern. Third, we report that realized returns have a stronger impact on price expectations and satisfaction levels for both subject pools than the shape of the stock price paths. Hence, our study shows that preferences for stock price paths are relevant determinants for price expectations and investment satisfaction even for well-trained and experienced professionals and it also shows that professionals' behavior only differs moderately from the one of inexperienced students.

Our study contributes to the literature in three ways. First, we contribute to the literature on sequential preferences. For example, Loewenstein and Prelec (1993) find that individuals prefer higher utility levels later in time when focusing on series of events—a pattern which is referred to as “negative time preferences”. In general, there is a body of literature showing that the order of information has an impact on decision-making in various domains (Haugtvedt and Wegener, 1994; Alexander and Ang, 1998; Bergus et al., 1998). Chapman (1996) explains such preferences with reference point dependency. An ascending series of salaries, wealth, or stock prices is thus perceived as a series of gains, leading to a higher utility compared to a descending series. More generally, Blanchard et al. (2014) argue that preferences over sequences are hardwired into our brain as part of evolutionary processes, by pointing out that sequence dependency also occurs in

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<sup>1</sup> The results in Grosshans and Zeisberger (2018) show no systematic difference in the behavior of laypeople and students, and hence, students can serve as a kind of proxy for laypeople in this setting.

other primates like monkeys.

Second, we add to the strand of literature analyzing trend-chasing behavior. For private investors, [Sirri and Tufano \(1998\)](#) and [Choi et al. \(2010\)](#), among others, show that the past performance of mutual fund managers is a predictor of fund inflows in the upcoming year (i.e., fund inflows are a convex function of past performance compared to peers). More specifically, a substantial body of literature directly investigates trends in price expectations and in investment behavior either with empirical data (e.g., [Greenwood and Shleifer, 2014](#)), or by applying heterogeneous agent models (see, e.g., [Hommes, 2006](#); [Hommes and in 't Veld, 2017](#)). A significant fraction of heterogeneous models applies a chartist/fundamentalist approach, allowing agents to switch between trend-following behavior (chartist) and fundamentalist strategy. We add to this line of literature by showing that not only laypeople (students), but even high-skilled and well-trained financial professionals believe in short-term trend continuation, as their price expectations are higher following down-up price paths compared to up-down paths (when final returns are held constant).<sup>2</sup>

Third, we add to the literature dealing with the behavior of financial professionals, which is still in its infancy. Some studies attribute deviations from neoclassical theory to a lack of market experience (e.g., [List, 2004](#)), while other studies (e.g., [Cherian and Jarrow, 1998](#); [Ferraro et al., 2005](#)) argue that economic theory might become self-fulfilling when economically more advanced individuals adopt the theory as a normative benchmark. Results of studies analyzing the role of professionals' experience on their behavior are at best mixed, as professionals' behavior is not systematically closer to theoretical optima than the behavior of laypeople. For instance, professionals exhibit a high degree of myopic loss aversion ([Haigh and List, 2005](#)), react strongly to rank incentives ([Kirchler et al., 2018b](#)), show herd behavior similar to student subjects ([Cipriani and Guarino, 2009](#)), apply behavior in line with prospect theory ([Abdellaoui et al., 2013](#)), and are overconfident with respect to their forecasting abilities ([Deaves et al., 2010](#); [Menkhoff and Schmeling, 2013](#); [Pikulina et al., 2017](#)). However, professionals are apparently less prone to anchoring than students ([Kaustia et al., 2008](#)), can better discern the quality of public signals in information cascades ([Alevy et al., 2007](#)), and produce price bubbles less likely and with lower magnitude in laboratory asset markets ([Weitzel et al., 2018](#)). Turning to framing effects, it appears that such effects are not only present in non-finance-related domains ([Druckman, 2001](#); [Gächter et al., 2009](#)) or in individuals with little financial experience ([Benartzi and Thaler, 1999](#); [Bosman et al., 2015](#)), but also among financial planners ([Roszkowski and Snelbecker, 1990](#)). To the best of our knowledge, evidence for framing effects in investment decisions among investment professionals is scarce and our study tries to narrow this gap.

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<sup>2</sup> In a loosely related study, [Cohn et al. \(2015\)](#) provide evidence that risk attitudes of professionals are influenced by past price paths. The authors find that professionals' risk taking is significantly enhanced in a financial boom prime and reduced in a financial bust prime. Nevertheless, [König and Trautmann \(2018\)](#) do not report these effects for students.

## 2 Study Design

In this experiment, we confronted subjects with different stocks price paths. Subjects were asked to imagine that they had purchased the stocks for themselves one year ago.<sup>3</sup> More specifically, we presented the four price paths in a within-subjects design, where the subjects were exposed to the paths (see Figure 1) in a quasi-randomized way. Specifically, we implemented 8 unique pre-defined sequences, which differed in the ordering of the four stocks. Participants were allocated randomly to one of the 8 sequences. The price paths were based on Grosshans and Zeisberger (2018).<sup>4</sup> The treatments, named DUP, DUN, UDP, and UDN, indicate the unique combinations of pathways and final returns of the stocks; “down-up-positive,” “down-up-negative,” “up-down-positive,” and “up-down-negative,” respectively.

All price paths are normalized to a starting price of 61, with the maximum and minimum prices at +30% and -30% of the starting price, respectively. As in Grosshans and Zeisberger (2018), extreme values are reached after seven months, and the prices of each of the four stocks change 2520 times in total, with final returns being either +10% or -10%. As outlined in Figure 1, there exist two pairs of stocks that are vertically mirrored versions of each other, characterized by identical levels of volatility. To guarantee that the participants were not aware of the partial symmetry of the stocks, the 8 pre-defined sequences were designed in a way to ensure that symmetric pairs were never successive. For each price path, the subjects were asked about forecasts of the stock prices in one year to capture future price expectations and, additionally, they had to state individual satisfaction levels ranging from -4 (“very unsatisfied”) to 4 (“very satisfied”). See the instructions in the Appendix for the exact wording in the experiment.<sup>5</sup> Furthermore, we implemented a modified three-question cognitive reflection test (CRT), which was applied as a potential explanatory variable for patterns in price expectations and satisfaction levels (see Kirchler et al. (2018b) and the Appendix for further details).

For the experiments with the professionals, we booked a conference room on location, set up our mobile laboratory, and invited the professionals. Our mobile laboratory is similar to the EconLab at the University of Innsbruck (see the Appendix for sample pictures of both labs). It consists of laptops and partitions surrounding each participant, which guarantees the same conditions as in regular experimental laboratories. We mainly recruited members of professional associations and societies, ensuring that most sessions were populated with professionals from different institutions. The experiment was programmed and conducted using z-Tree (Fischbacher,

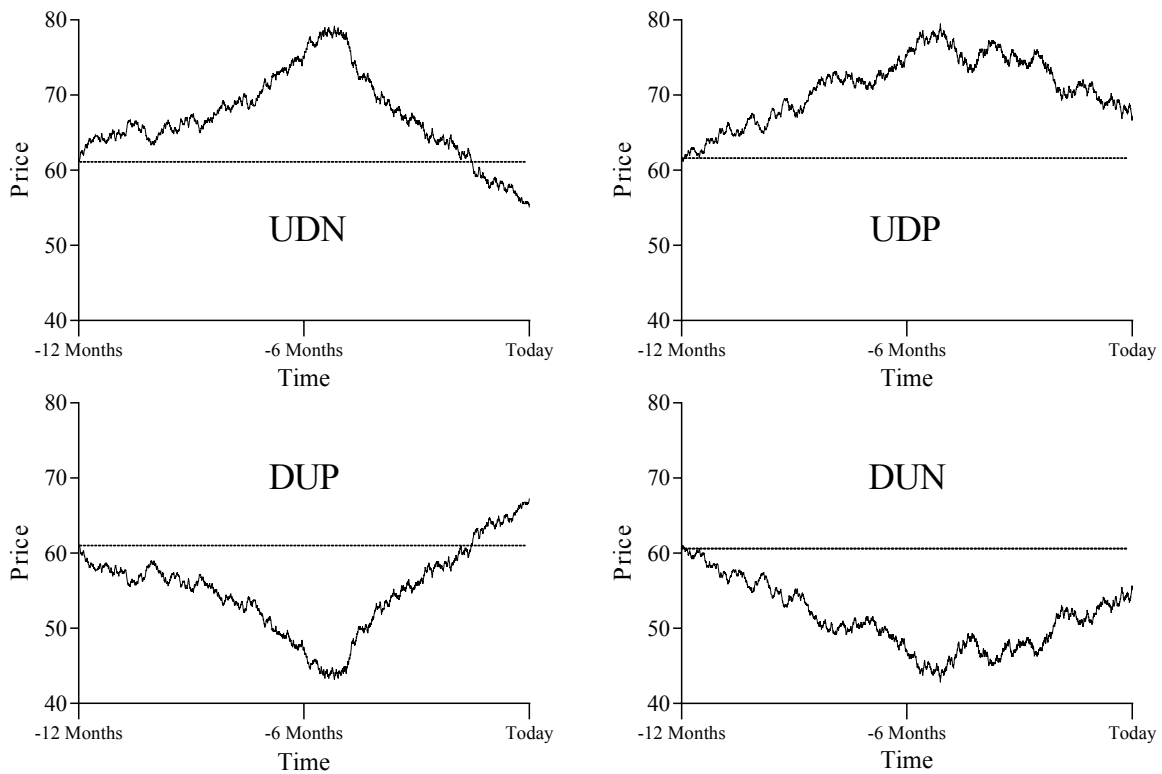
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<sup>3</sup> Detailed instructions can be found in the Appendix.

<sup>4</sup> Because of time constraints when running lab-in-the-field experiments with professionals, we applied four out of the six price paths of Grosshans and Zeisberger (2018).

<sup>5</sup> In addition, subjects had to state the 95% confidence intervals for their price expectations, a recommendation on whether to hold or sell the stock (4-point Likert scale ranging from very likely sell to very likely hold), and the price at which they felt neutral about selling their stocks. These three variables are of secondary importance and were primarily used as control variables to check for consistency in the subjects’ answers.





**Figure 1:** This figure shows all four stock price paths (treatments). Each price path has a starting value of 61. The price paths were presented to the subjects in sequential order. The chart on the top left shows the up-down price pattern with negative final return (UDN), the chart on the top right indicates the up-down price pattern with positive final return (UDP), and both charts in the bottom panels represent the mirrored versions, exhibiting a down-up price pattern (DUP and DUN, respectively).

2007). Experimental sessions with students were carried out in the EconLab at the University of Innsbruck. As outlined in the top panel of Table 1, the average age of the professionals was 39.0, and they have been working in the industry for an average of 13.2 years, mainly in the areas of financial analyses, asset management, and risk management. A substantial part (86%) of professionals in our subject pool were male. In terms of our sample compositions, we aimed at roughly matching the gender ratio of the professional sample to our student sample, and therefore, our student sample consisted of 77% male subjects. On average, students were 23 years of age and from various fields of studies such as natural sciences, medical sciences, and social sciences, whereby 36% of all students were enrolled in programs in management and economics. Professionals (students) received an appearance fee of 18 (6) Euro for their participation. Overall, the participants took on average 10 minutes to complete the experiment.

## 3 Results

### 3.1 Investor Expectations

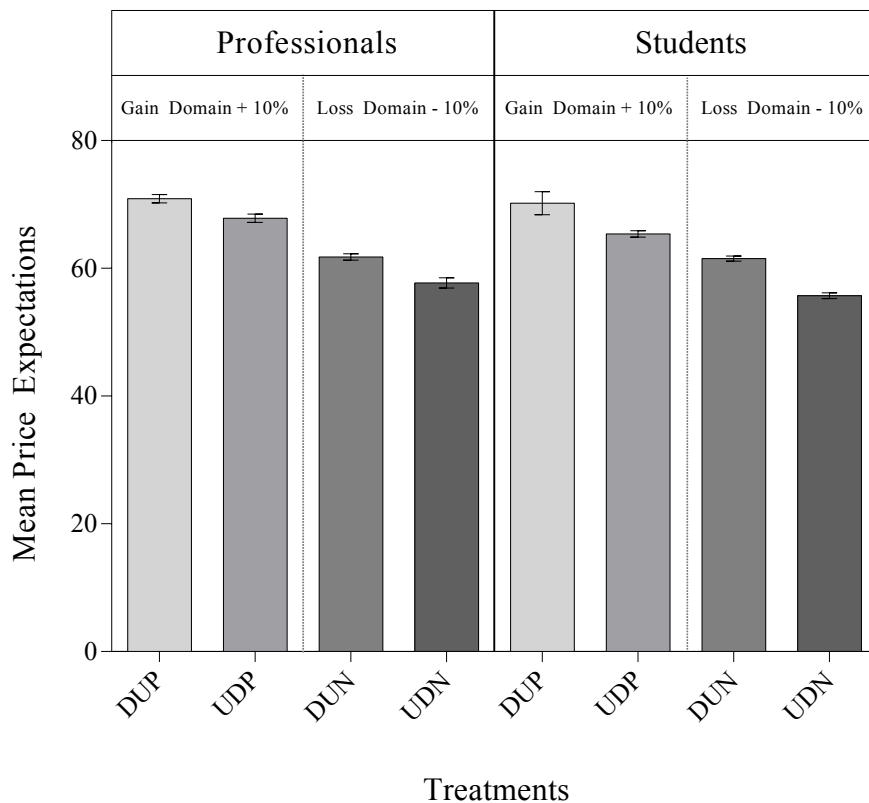
**Table 1:** Summary statistics of both subject pools. Treatment DUP indicates the down-up price pattern with positive final return, while UDP stands for the treatment with an up-down price pattern with positive final return. Treatments DUN and UDN represent the mirrored versions, exhibiting negative final returns, respectively. For each price path, subjects were asked about expectations of the stock prices in one year (variable EXPECTATIONS) and they had to state individual satisfaction levels (variable SATISFACTION) ranging from  $-4$  (“very unsatisfied”) to  $4$  (“very satisfied”).

	(1)		(2)	
	Professionals		Students	
	$(N = 150)$		$(N = 576)$	
	mean	sd	mean	sd
<i>CHARACTERISTICS</i>				
Age	39.02	9.71	22.89	2.93
Experience	13.15	8.49		
CRT	1.85	1.01	1.82	1.09
<i>EXPECTATIONS</i>				
Down-Up Positive (DUP)	70.91	7.91	70.20	43.21
Up-Down Positive (UDP)	67.84	7.86	65.40	11.80
Down-Up Negative (DUN)	61.79	6.02	61.53	9.91
Up-Down Negative (UDN)	57.71	9.72	55.71	11.14
<i>SATISFACTION</i>				
Down-Up Positive (DUP)	1.99	1.56	2.24	1.49
Up-Down Positive (UDP)	1.05	1.80	1.00	1.73
Down-Up Negative (DUN)	$-0.92$	1.79	$-0.85$	1.89
Up-Down Negative (UDN)	$-2.45$	1.52	$-2.42$	1.69

Age and industry experience are measured in years. The variable EXPECTATIONS is measured in Euro, the variable SATISFACTION ranges from  $-4$  to  $4$ , and CRT ranges from  $0$  to  $3$ .

Table 1 offers descriptive results for both subject pools, and Figure 2 depicts the average price expectations of professionals and students across treatments, split into the gain and loss domains.

Furthermore, results of paired-sample t-tests between the treatments and subject pools are presented in Table A1 in the Appendix.



**Figure 2:** Mean 12-month price expectations (starting price of 61 Euro) of professionals and students across treatments, separated into the gain and loss domains. Bars indicate whiskers of standard error of the mean ( $\pm$  SEM).

With regard to professionals, we find a significant mean price expectation difference between stocks with identical returns and different price paths in the gain domain (average of 3.07, 70.91 vs. 67.84; two-tailed t-test;  $p = 0.000$ ,  $N = 150$ ), and in the loss domain (average of 4.07, 61.79 vs. 57.71; two-tailed t-test;  $p = 0.000$ ,  $N = 150$ ). Henceforth, these differences are referred to as “expectation gaps”. Similarly, we find significant expectation gaps in the gain domain (average of 4.80, 70.20 vs. 65.40; two-tailed t-test;  $p = 0.000$ ,  $N = 576$ ) and in the loss domain (average of 5.82, 61.53 vs. 55.71; two-tailed t-test;  $p = 0.000$ ,  $N = 576$ ) among students.

For a closer inspection of the treatment effects and subject pool differences, we run multivariate OLS-regressions with price expectations as the dependent variable, controlled for autocorrelation, multicollinearity, and heteroscedasticity in the regression model. Following the suggestion in Benjamin et al. (2018), we lower the default p-value threshold for statistical significance to 0.5% in all econometric specifications, leaving us with significance levels of 5%, 1%, and

**Table 2:** OLS-Regression with price expectations of professionals and students as the dependent variable. POS\_RETURN indicates stocks with positive return while DOWN\_UP is a binary dummy for all price paths showing a down-up price pattern. The variables DOWN\_UP x PROF and POS\_RETURN x PROF represent interaction terms between the variable PROF, indicating a binary dummy for professionals and the dummies DOWN\_UP and POS\_RETURN, respectively.

	Professionals		Students		Joint	
	Model (I)	Model (II)	Model (I)	Model (II)	Model (I)	Model (II)
DOWN_UP	3.573*** (0.821)	2.560*** (0.840)	5.310*** (1.134)	4.506*** (1.459)	4.951*** (0.916)	4.426*** (1.384)
POS_RETURN	9.627*** (0.548)	6.795*** (0.896)	9.176*** (0.851)	7.311*** (1.615)	9.269*** (0.684)	7.124*** (1.439)
SATISFACTION		0.858*** (0.215)		0.572* (0.288)		0.630** (0.230)
MALE		0.660 (0.854)		0.057 (1.944)		0.143 (1.668)
DOWN_UP x PROF						-1.587 (1.384)
POS_RETURN x PROF						0.413 (1.085)
PROF						1.973 (1.017)
Constant	57.963*** (0.733)	60.222*** (1.263)	55.969*** (0.585)	57.912*** (0.807)	56.381*** (0.489)	58.035*** (0.722)
Position Controls	No	Yes	No	Yes	No	Yes
Observations	600	600	2304	2304	2904	2904
R <sup>2</sup>	0.294	0.322	0.048	0.050	0.057	0.061
F-Statistic	154.721	49.426	87.867	47.414	138.704	74.064

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.005 represent the 5%, 1%, and 0.5% significance levels. Clustered standard errors on a subject level are presented in parentheses. Dependent variable: EXPECTATIONS.

0.5%. As outlined in Table 2, POS\_RETURN indicates stocks with positive return while DOWN\_UP is a binary dummy for all price paths showing a down-up price pattern. The variables DOWN\_UP x PROF and POS\_RETURN x PROF represent interaction terms between the variable PROF, indicating a binary dummy for professionals and the dummies DOWN\_UP and POS\_RETURN, respectively. Moreover, we include position dummies to control for potential order effects within the eight pre-defined path sequences.

We find that the coefficient of DOWN\_UP is significantly positive, implying that down-up sequences of stock prices are associated with more optimistic one-year price expectations in both samples (see columns 1 and 3 in Table 2). This indicates that both professionals and students expect short-term trend continuation, which is in line with the results of Grosshans and

Zeisberger (2018). Beliefs in short-term trend continuation may actually partly be reasonable due to empirically documented excess returns based on momentum trading strategies (Jegadeesh and Titman, 1993, 2001). In addition, professionals and students extrapolate past returns, which is indicated by the significantly positive coefficient of POS\_RETURN in both subject pools. Landier et al. (2017) find that students systematically extrapolate past realizations of a stochastic process into the future. Our findings regarding return extrapolation in both subject pools are in line with their results. Because of the significant correlation between price expectations and satisfaction levels in both subject pools (Spearman correlation coefficients: 0.50 in the professional sample;  $p = 0.000$ ,  $N = 150$ , and 0.42 in the student sample;  $p = 0.000$ ,  $N = 576$ ), Models II in Table 2 control for satisfaction levels by including the corresponding variable SATISFACTION. In particular, we find that the effects of DOWN\_UP and POS\_RETURN remain robust. Moreover, we find a significant and positive relationship between the satisfaction levels of both subjects pools and their price expectations.

Interestingly, the magnitudes of both effects (DOWN\_UP and POS\_RETURN) are fairly large in both subject pools. For instance, price paths that recovered from a trough lead to price expectations that are on average more than 2.5 Euro higher for professionals and 4.5 Euro higher for students compared to price paths with the inverse pattern (see columns 2 and 4 in Table 2). Nevertheless, even though the price expectations of professionals and students are markedly affected by stock price paths, post-estimation Wald tests show that final returns exhibit a significantly stronger impact on price expectations in both subject pools, which can be seen in columns 2 and 4 in Table 2 (professionals: coefficient difference of 4.24, 6.80 vs. 2.56;  $p = 0.000$ ,  $N = 150$ ; students: coefficient difference of 2.81, 7.31 vs. 4.51;  $p = 0.000$ ,  $N = 576$ ).

Finally, results of the joint regression (column 6 in Table 2) show that there is no significant difference in the influence of price paths and final returns on price expectations between professionals and students.

We hypothesize that a lack of cognitive reflection (i.e., lack of “system 2” thinking), which can be attributed to the dominance of the so-called “system 1” thinking (Epstein, 1994; Kahneman, 2013), might be a potential driver of absolute expectation gaps (i.e., price expectation difference between stocks with identical returns, but different price paths: Absolute expectation gaps:  $|DU-UD|$ ).<sup>6</sup> Therefore, we expect to find a relationship between higher absolute expectation gaps and lower cognitive reflection. As outlined in the OLS-regression in Table 3, absolute expectation gaps are in general significantly smaller for professionals than for students (magnitude of -2.27 Euro, see column 3 of Table 3). Regarding the role of cognitive reflection, we find that professionals’ CRT scores significantly explain the absolute expectation gaps. Specifically, absolute expectation gaps decrease by 1.9 Euro with every correct answer in the CRT (see column 1 of Table 3). Although the coefficient of CRT for students goes in the same direction, it is

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<sup>6</sup> DU stands for both stocks with a down-up path and UD stands for both stocks with an up-down path.

**Table 3:** OLS-Regression on absolute expectation gaps across final returns, gender, CRT, and subject pools.

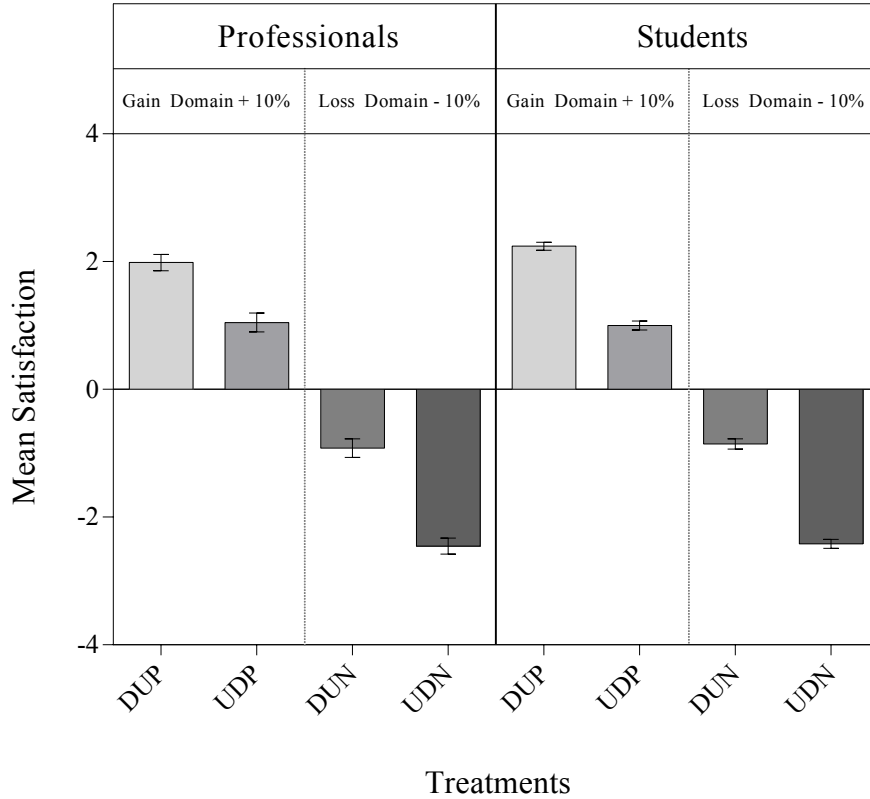
	Professionals	Students	Joint
	Model (I)	Model (I)	Model (I)
POS_RETURN	-0.253 (0.659)	0.866 (1.565)	0.866 (1.565)
MALE	-0.633 (2.309)	-3.111 (4.269)	-2.782 (3.657)
CRT	-1.899*** (0.582)	-1.098 (0.679)	-1.228* (0.547)
POS_RETURN x PROF			-1.120 (1.697)
PROF			-2.271** (0.817)
Constant	12.596*** (2.497)	15.501*** (4.539)	15.484*** (3.845)
Observations	300	1152	1452
$R^2$	0.054	0.004	0.006
F-Statistic	3.633	1.577	4.060

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.005$  represent the 5%-, 1%-, and 0.5%-significance levels. Clustered standard errors on a subject level are presented in parentheses. Dependent variable: Absolute expectation gaps:  $|DU-UD|$ .

marginally insignificant.

### 3.2 Investor Satisfaction

Turning to the results on investor satisfaction, Figure 3 shows return-specific treatment differences in the self-reported mean satisfaction levels of professionals and students. Paired-sample t-test results of the treatments and subject pools are provided in Table A2 in the Appendix. In the professional sample, we find significant differences in satisfaction levels between both price paths in the gain domain (average of 0.94, 1.99 vs. 1.05; two-tailed t-test;  $p = 0.000$ ,  $N = 150$ ) and in the loss domain (average of 1.53, -0.92 vs. -2.45; two-tailed t-test;  $p = 0.000$ ,  $N = 150$ ). These differences are henceforth referred to as “satisfaction gaps”. In addition, students exhibit significant satisfaction gaps in both, the gain domain (average of 1.24, 2.24 vs. 1.00; two-tailed t-test;  $p = 0.000$ ,  $N = 576$ ) and the loss domain (average of 1.57, -0.85 vs. -2.42; two-tailed t-test;  $p = 0.000$ ,  $N = 576$ ), which is in line with Grosshans and Zeisberger (2018). This implies that both subject pools are significantly more satisfied with stocks that first decrease in price and then recover compared to stocks with the inverse price pattern, when the final return is held constant.



**Figure 3:** Mean self-reported satisfaction levels of professionals and students across treatments, separated into gain and loss domains. Satisfaction levels range from  $-4$  to  $4$ , where  $0$  indicates neutrality. Bars indicate whiskers of standard error of the mean ( $\pm$  SEM).

In Table 4, we deepen our analyses and report ordered logistic-regression results with self-reported satisfaction levels as the dependent variable. We find that stocks that first decrease and then recover in price yield significantly higher self-reported satisfaction levels compared to stocks with the opposite pattern, which confirms our t-test results. This finding holds for both subject pools and the effects are strong in magnitude (coefficients of DOWN\_UP range between 1.34 and 1.54 in columns 1 and 3, respectively). Similarly, stock price paths with positive returns lead to significantly higher satisfaction levels compared to those with negative returns for both professionals and students. Models II also control for price expectations (EXPECTATIONS) and show that the effects of DOWN\_UP and POS\_RETURN on satisfaction levels remain robust. Moreover, we report a significantly positive association between price expectations and satisfaction levels among professionals. Importantly, the effect sizes of the influence of final returns on investor satisfaction are significantly larger among both pools compared to the effect sizes of the price paths according to post-estimation Wald tests, which can be seen in columns 2

**Table 4:** Ordered logistic-regression with satisfaction levels of professionals and students as the dependent variable. POS\_RETURN indicates stocks with positive return while DOWN\_UP is a binary dummy for all price paths showing a down-up price pattern. The variables DOWN\_UP x PROF and POS\_RETURN x PROF represent interaction terms between the variable PROF, indicating a binary dummy for professionals and the dummies DOWN\_UP and POS\_RETURN, respectively.

	Professionals		Students		Joint	
	Model (I)	Model (II)	Model (I)	Model (II)	Model (I)	Model (II)
DOWN_UP	1.338*** (0.150)	1.255*** (0.153)	1.538*** (0.090)	1.508*** (0.096)	1.496*** (0.078)	1.507*** (0.096)
POS_RETURN	3.238*** (0.191)	2.938*** (0.204)	3.255*** (0.107)	3.206*** (0.123)	3.250*** (0.093)	3.206*** (0.124)
EXPECTATIONS		0.046*** (0.011)		0.007 (0.009)		0.011 (0.010)
MALE		0.013 (0.195)		0.014 (0.098)		0.009 (0.088)
DOWN_UP x PROF						-0.233 (0.175)
POS_RETURN x PROF						-0.116 (0.154)
PROF						0.115 (0.153)
Position Controls	No	Yes	No	Yes	No	Yes
Observations	600	600	2304	2304	2904	2904
Pseudo $R^2$	0.155	0.170	0.159	0.160	0.158	0.161
Prob > $\chi^2$	359.372	388.012	976.711	1011.485	1308.263	1393.854

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.005$  represent the 5%, 1%, and 0.5% significance levels. Clustered standard errors on a subject level are presented in parentheses. Dependent variable: SATISFACTION.



and 4 in Table 4 (professionals: coefficient difference of 1.68, 2.94 vs. 1.26,  $p = 0.000$ ,  $N = 150$ ; students: coefficient difference of 1.70, 3.21 vs. 1.51,  $p = 0.000$ ,  $N = 576$ ). Interestingly, the ratio between the effect sizes of DOWN\_UP and POS\_RETURN is nearly identical in both subject pools.

When analyzing the coefficients in the joint regression in columns 5 and 6 of Table 4, we find that there is no significant difference between the subject pools regarding the influence of the price path and the return on satisfaction levels.<sup>7</sup>

The presented results on satisfaction levels raise a question about the source of the frame-dependent differences in satisfaction across treatments. To investigate possible explanatory individual characteristics, we utilize the absolute satisfaction gaps  $|DU - UD|$  over both the gain and the loss domains as the dependent variable in an ordered logistic-regression model.

Again, we hypothesize that a lack of cognitive reflection might be a potential driver of the absolute satisfaction gaps (i.e., difference in satisfaction levels between stocks with identical returns but different price paths: Absolute satisfaction gaps:  $|DU-UD|$ ). If subjects evaluated the stocks analytically, they would notice that the only economically relevant variable driving their utility—the final return—is equivalent for treatments UDN and DUN as well as for UDP and DUP, respectively. The regression results are shown in Table 5. In contrast to the the results for price expectations, we find no significant difference in absolute satisfaction gaps between professionals and students (see column 3 of Table 3). Turning to the role of cognitive reflection, we report that the CRT results significantly explain absolute satisfaction gaps. Specifically, the satisfaction gaps decrease by 0.37 (professionals) and 0.11 (students) with every correct answer in the CRT (see columns 1 and 2 of Table 3). Nevertheless, although the level of cognitive reflection reduces absolute satisfaction gaps, professionals and students still exhibit strong frame-dependent preferences influencing their investment satisfaction. Moreover, we find no gender effects with respect to absolute satisfaction gaps in both subject pools.

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<sup>7</sup> Turning to the other control variables, we find internally consistent results. According to the Spearman-correlation coefficient, recommendations about selling the stock on a 4-point Likert scale are significantly correlated with price expectations (Spearman correlation coefficients: 0.38 in the professional sample;  $p = 0.000$ ,  $N = 150$ ; and 0.43 in the student sample;  $p = 0.000$ ,  $N = 576$ ) and with satisfaction levels (Spearman correlation coefficients: 0.18 in the professional sample;  $p = 0.000$ ,  $N = 150$ ; and 0.20 in the student sample;  $p = 0.000$ ,  $N = 576$ ). Additionally, we run our main regressions of Tables 2 and 4 with the neutral selling price and the 95% confidence bounds of price estimates for the upcoming 12 months as dependent variables (for the latter variable *UPPER\_BOUND*–*LOWER\_BOUND* we truncated the data set and excluded the 2.5% of the widest and narrowest bounds). The results reveal that professionals assign a significantly higher minimum selling price to stocks with positive returns compared to those with negative ones. Additionally, we find no clear pattern regarding the 95% confidence bounds of price estimates. Results can be provided upon request.

**Table 5:** Ordered logistic-regression on absolute satisfaction gaps across final returns, gender, CRT, and subject pools.

	Professionals	Students	Joint
	Model (I)	Model (II)	Model (I)
POS_RETURN	-0.060 (0.199)	-0.240** (0.089)	-0.234** (0.088)
MALE	-0.433 (0.365)	-0.135 (0.141)	-0.185 (0.132)
CRT	-0.367*** (0.127)	-0.113* (0.057)	-0.161*** (0.052)
POS_RETURN x PROF			0.167 (0.226)
PROF			-0.246 (0.169)
Observations	300	1152	1452
Pseudo $R^2$	0.015	0.003	0.005
Prob > $\chi^2$	11.367	13.607	24.575

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.005$  represent the 5%, 1%, and 0.5% significance levels. Clustered standard errors on a subject level are presented in parentheses. Dependent variable: Absolute satisfaction gaps: |DU-UD|.

## 4 Conclusion

In this paper we investigated the impact of varying levels of investment returns and different price paths on the price expectations and satisfaction levels of financial professionals and students. In total, we conducted experiments with 150 professionals and 576 students, systematically varying price paths according to the final return (positive or negative) and the way in which the final return is achieved (upswing followed by downswing or vice versa). We found that professionals and students showed the most optimistic price expectations and were most satisfied if assets fell in price first and recovered afterwards. In addition, price expectations and satisfaction levels of professionals and students were highest after positive returns. Finally, we concluded that both professionals and students reacted in a qualitatively similar way across the treatments. However, with respect to absolute expectation gaps, professionals showed more consistent and less frame-dependent behavior, as their absolute expectation gaps were significantly smaller compared to those of students.

Our study has far-reaching implications for real-world decision-making. The fact that professionals are influenced by past returns of the stocks and by the way (the frame) in which these returns were achieved has important consequences for their price expectations on stock markets. It seems that professionals (and to a moderately stronger degree students) show beliefs in short-term trend continuation, which is supported by empirical data (e.g., Greenwood and

Shleifer, 2014) and also applied in heterogeneous agent models (see, e.g., Hommes, 2006; Hommes and in 't Veld, 2017). Our findings are particularly relevant given the importance of professionals' beliefs about future developments of the stock market in general and of individual stocks in particular. In the finance industry, one of the key competences of analysts, traders, and fund managers is the ability to predict future developments better than others. If, as outlined by our study, their expectations are systematically influenced by trivial frames such as price patterns, it might be necessary to think about ways to de-bias professionals in order to reduce their proneness to framing effects. One direction for future research would be to have professionals imagine that they are administering financial products not for themselves but rather for their clients. Such a setting has been shown to mitigate framing effects for students, which is explained by lower levels of emotional involvement, leading to more objectivity (Ziegler and Tunney, 2015).

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## Appendix

### A1 Additional Figures and Tables

**Table A1:** Pairwise treatment differences in price expectations of professionals utilizing paired sample t-tests (results of the student sample are shown in parentheses.)

<i>pairwise price expectation differences between treatments</i>					
treatments	obs	difference		std. err.	pr(T > t)
DUP - UDN	150 (576)	13.20***	(14.49***)	1.11 (1.90)	0.000 (0.000)
DUP - DUN	150 (576)	9.12***	(8.66***)	0.68 (1.56)	0.000 (0.000)
UDP - UDN	150 (576)	10.12***	(9.69***)	0.73 (0.56)	0.000 (0.000)
UDP - DUN	150 (576)	6.01***	(3.87***)	0.82 (0.64)	0.000 (0.000)
<i>absolute expectation gaps</i>					
treatments	obs	difference		std. err.	pr(T > t)
DUP - UDP	150 (576)	3.07***	(4.80***)	0.93 (1.86)	0.000 (0.000)
DUN - UDN	150 (576)	4.07***	(5.82***)	0.94 (0.63)	0.000 (0.000)

Note: \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.005 represent the 5%, 1%, and 0.5% significance levels.

**Table A2:** Pairwise treatment differences in satisfaction levels of professionals utilizing paired sample t-tests (results of the student sample are shown in parentheses.)

<i>pairwise satisfaction differences between treatments</i>					
treatments	obs	difference		std. err.	pr(T > t)
DUP - UDN	150 (576)	4.44***	(4.66***)	0.17 (0.10)	0.000 (0.000)
DUP - DUN	150 (576)	2.91***	(3.10***)	0.17 (0.09)	0.000 (0.000)
UDP - UDN	150 (576)	3.50***	(3.42***)	0.17 (0.09)	0.000 (0.000)
UDP - DUN	150 (576)	1.97***	(1.85***)	0.22 (0.11)	0.000 (0.000)
<i>satisfaction gaps</i>					
treatments	obs	difference		std. err.	pr(T > t)
DUP - UDP	150 (576)	0.94***	(1.24***)	0.19 (0.09)	0.000 (0.000)
DUN - UDN	150 (576)	1.53***	(1.57***)	0.17 (0.09)	0.000 (0.000)

Note: \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.005 represent the 5%, 1%, and 0.5% significance levels.



## A2 Experimental Instructions

All instructions in this experiment have been provided through self-explaining screens in z-Tree. The experimental protocol was identical for the professional and the student sample.

Remaining time [sec]: 31

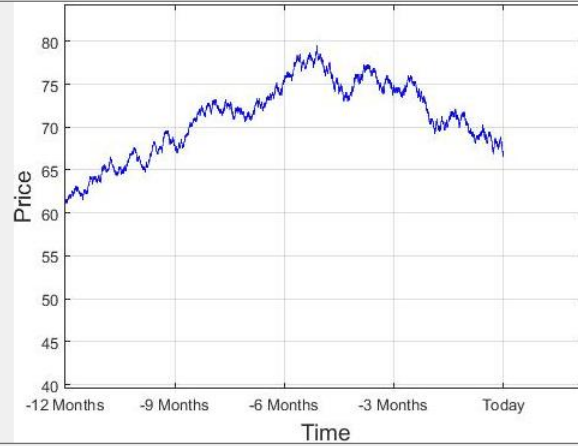
Dear Participant!

In the following you will be presented with four stock price developments. Please imagine for each case that you have bought the respective stock one year ago for your own portfolio and now observe its performance.

The presented performances are not related to the current real world market situation. Furthermore, the performances of all presented stocks are independent of each other.

Please take your time on each stock, imagine this was your own stock which you bought one year ago and ask yourself how you would feel when observing the respective performance.

Overall, this study will take you 5 - 6 minutes.



Please state your satisfaction with the stock on a scale ranging from -4 to 4, where -4 indicates very unsatisfied and 4 indicates very satisfied.

**Satisfaction** (-4, very unsatisfied)           (4, very satisfied)

Please state your opinion on whether to hold or sell the stock, where 0 indicates very likely sell and 3 indicates very likely hold.

**Recommendation** (0, very likely sell)     (3, very likely hold)

At what price would you feel neutral about selling your stock, i.e., be neither satisfied nor unsatisfied about the sale?

What is your estimate of the most likely stock price in 12 months?

What is your pessimistic estimate for the stock price in 12 months? (In 95% of the cases the price of the stock will be above this price.)

What is your optimistic estimate for the stock price in 12 months? (In 95% of the cases the price of the stock will be below this price.)

OK

In the following you will see 3 questions with different levels of difficulty. Answer as many as possible.

An IT-company offers you storage space. Every day your volume of data doubles. If it would need 20 days to max out the provided space, how long would it take to max out half of the space?

Days

A football shoe and a ball cost 110 Euro together. The shoe costs 70 Euro more than the ball. How much costs the ball?

Euro

5 machines need 5 minutes to produce 5 keyboards. How long would 80 machines need for 80 keyboards?

Minutes

How many of the above 3 questions do you think you have answered correctly?

Quantity (from 0 to 3)

OK

### A3 Pictures of the Experimental Laboratories



**Figure A1:** Mobile laboratory and Innsbruck EconLab. Top: Example of the mobile laboratory in the conference room of a financial institution. Bottom: Innsbruck EconLab.

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Determinants of investor expectations and satisfaction. A study with financial professionals

**Abstract**

We investigate determinants of price expectations and satisfaction levels of financial professionals and students. In experiments with 150 professionals and 576 students, we systematically vary price paths according to the final return (positive or negative) and the way the final return is achieved (upswing followed by downswing or vice versa). Professionals show the most optimistic price expectations and are most satisfied if assets fall in price first and then recover. In addition, professionals' price expectations are highest after positive returns. Among students, qualitatively similar patterns emerge, but professionals' price expectations are less prone to framing effects.

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