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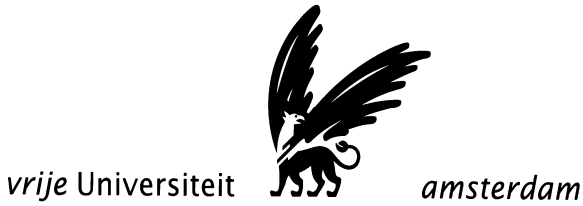

The Effect of Anticipated and Experienced Regret and Pride on Investors' Future Selling Decisions

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Abstract

Shefrin and Statman (1985) suggest that avoiding *(anticipated)* regret and seeking *(anticipated)* pride explains why investors tend to hold losing investments too long and sell winning investments too soon. In practice, investing is a chain of decisions, besides anticipated emotions, investors also experience emotional feedback from their previous decisions. However, little research has been conducted to test how emotions, both *anticipated (prior-decision) and experienced (post-decision),* affect investors' decisions to hold or sell an investment. We conduct two studies. In study 1, we first assess the appropriateness of using a specific emotions approach in a financial domain. We measure *experienced emotions* in terms of general (dis)satisfaction and a specific emotion (i.e. regret) and test how they predict investors' subsequent selling decision in a dynamic experiment. Our results indicate that in the loss domain, experienced regret has a direct positive effect on selling probability, but dissatisfaction does not. This supports the use of the specific emotions approach. In study 2, we investigate how *experienced* and *anticipated specific* emotions (i.e. regret and pride) may simultaneously influence investors' hold/sell decisions in the loss and gain domain, respectively. Our findings show that both *high experienced pride* and *experienced regret* predict a larger probability to sell the investment. As for anticipated emotions, *high anticipated pride* and *low anticipated regret* predict a larger probability to sell. Implications for examining investors' decisions making process and the role of emotions are discussed.

JEL Classifications: C91, D00, D81.

Keywords: investments; capitulation; selling decisions; disposition effect; financial markets; emotions.

I. INTRODUCTION

The disposition effect postulates that individuals hold losing investments (losers) too long, and sell winning investments (winners) too soon (Shefrin and Statman, 1985). This has been confirmed in laboratory settings (Weber and Camerer, 1998), in an online setting (Lee, Park, Lee, and Wyer, 2008), in trading done by individual investors (Odean, 1998), and by professional investors (Garvey and Murphy, 2004). Several explanations have been proposed, including mental accounting, seeking pride (in the domain of gain) and avoiding regret (in the domain of loss), self-control, and prospect theory.

Prospect theory (Kahneman and Tversky, 1979) has been the most prominent explanation for the disposition effect. However, recently, other proposed explanations have received attention. For instance, Dhar and Zhu (2006) have looked into the influences of individual differences on the disposition effect. Muermann and Volkman (2007) have developed a theoretical portfolio choice model that incorporates anticipated regret and pride but has not been empirically tested. The reasoning of Muermann and Volkman (2007) is based on Shefrin and Statman (1985), who suggest that investors can take pride in making profit with their investment. Therefore investors are likely to sell a winner in order to feel proud. On the other hand, selling a loser confirms that "wrong decisions" have been made previously, because ex-post knowledge suggests that a forgone alternative decision would have led to better outcome than the chosen decision. In order to avoid the resulting feeling of regret, investors are likely to hold on to their losers. In two experimental studies, Summers and Duxbury (2007) manipulated the presence and absence of responsibility, and find that merely experiencing gains or losses does not lead to emergence of the disposition effect. They propose that investors have to feel responsible for their buying or selling decisions, in order to feel regret or rejoice about their decisions, which then ultimately generates the disposition effect. Although the role of emotions in these experiments was theoretically argued for, it was not explicitly measured and tested. O'Curry Fogel and Berry (2006) find that people's previous investment decisions and the thoughts of counterfactual alternatives influence how much satisfaction/regret they subsequently experience. Their study examines how previous decisions influence subsequent experienced emotions, but not how experienced emotions may potentially affect investors' *future* decisions. In sum, recent research evidence suggests responsibility influence investors' holding or selling decisions, and previous

chosen decisions and counterfactual thoughts of alternative decisions influence the emotions that investors subsequently experience.

Despite recent research efforts, three issues remained unaddressed. First, although the link between anticipated emotions and the disposition effect was briefly proposed by Shefrin and Statman (1985), the proposed effects of anticipated regret and pride on investors' hold/sell decisions have not been directly measured and empirically tested. Second, the investment process in practice is a chain of decisions. Thus, apart of anticipated emotions, investors also experience emotional feedback from their previous decisions. However, the link between *experienced* emotions and investors' subsequent hold/sell decisions has not been addressed previously. Studies of consumer behaviors, including switching service suppliers, complaints, etc., have indicated that consumers' experienced emotions are linked to their subsequent behaviors (e.g. Zeelenberg and Pieters, 2004). Finally, recent developments in the study of emotions have highlighted the importance of looking into the effects of specific emotions (e.g. regret, pride), next to general valence (e.g. good/bad, dis/satisfaction) see, for instance, DeSteno, Petty, Wegener, and Rucker, 2000; and Lerner and Keltner, 2000. The valence-based emotion approach summarizes the positivity and negativity of different emotions to arrive at an overall judgment of (dis)satisfaction. The specific emotions approach focus on the idiosyncratic element of each emotions, including their specific antecedents, appraisal and behavioral responses (DeSteno et al., 2000). Shefrin and Statman (1985) did not specify the reason for their choice of specific emotions over general valence. It is unclear which of these two approaches is more relevant in financial decision-making.

In this paper, we investigate the link between *experienced* and *anticipated* emotions and investors' hold/sell decisions of losers and winners in two experiments. In study 1, we first focus on testing whether the valence-based emotion approach or the specific emotions approach is more appropriate to use in a financial decision setting. We test how *experienced* emotions, in terms of general valence (i.e. (dis)satisfaction) and specific emotions (i.e. regret) affect investors' subsequent hold or sell decisions. In study 2, we further investigate how *anticipated* and *experienced* emotions simultaneously influence investors' subsequent hold/sell decisions.

The remainder of this paper is organized as follows. Section 2 reviews literature related to emotions and decision making. Sections 3 and 4 present our experimental design and results of study 1 and 2. Section 5 concludes and provides implications for future research.

II. THEORETICAL BACKGROUND

2.1. Valence-based vs. Specific Emotions Approach

Psychology and consumer behavior studies provide ample evidence that emotions influence behavior (see Bagozzi, Baumgartner, Pieters, and Zeelenberg, 2000 for a review). There are two main approaches for modeling the interaction between emotions and subsequent behaviors: the valence-based approach and the specific emotions approach. In the valence-based approach, all positivity and negativity of different emotions are summed up and indicate the overall level of (dis)satisfaction. Negative emotions, e.g. regret, disappointment, lead to more dissatisfaction; while positive emotions, e.g. joy, pride, lead to more satisfaction. In the context of investment decision making, if the price of a stock decreases, investors may feel disappointed about its performance, regretful about their initial buying decisions, and sad about the paper loss at the same time. As multiple emotions may arise at the same time, the valence approach captures the summation of these emotions. In the marketing literature, Oliver (1980) proposes a model which entails that this overall level of (dis)satisfaction has an impact on consumers' purchase intention. However, Mittal and Kamakura (2001) point out that despite the claim that higher satisfaction should lead to more repurchasing behaviors, little supporting evidence is found. The main drawback of the general valence approach is that it does not capture the specific elements of each specific emotion.

The specific emotions approach includes the idiosyncratic elements of specific emotions. It is based on the appraisal theory of emotions (Bagozzi, Gopinath, and Nyer, 1999), which entails that the cognitive appraisal of the situation plays an essential role in terms of eliciting and differentiating emotions. For example, regret is experienced when a chosen outcome turns out badly, it is usually elicited by the counterfactual thoughts that what the outcome could have been if other forgone alternative options would have been chosen. Although regret and disappointment both are associated with disconfirmed expectations, disappointment is more related to circumstances agency (i.e. bad outcome caused by circumstances outside one's control), whilst regret is more related to self-agency (i.e. a bad outcome caused by oneself). Moreover, each specific emotion may have different action tendencies or action readiness (Frijda, Kuipers, and ter Schure, 1989). For instance, as regret involves the tendency to blame oneself, and the tendency to correct the previous mistakes, regret is associated with attempts to undo the wrong decisions. On the other hand, disappointment involves the tendency that the circumstances are

responsible for the disconfirmed expectation, experiencing disappointment may lead to reluctance in making subsequence decisions, i.e. inertia.

To apply these findings in marketing research into a financial perspective, switching behavior is particularly relevant to our study, as it resembles selling an investment in the financial domain. Switching behavior implies the initial brand or product is not acquired anymore. Instead the consumers will acquire an alternative. Selling an investment can be regarded as not buying the financial products anymore. Similarly, holding an investment is similar to a repurchase decision. As such, studies concerning switching and repurchasing behaviors are of interest here. Assessing how emotions in the general valence approach and the specific emotions approach influence consumers' behaviors, Zeelenberg and Pieters (2004) find that regret and disappointment have a direct impact on consumer behaviors, e.g. switching, complains and word-of-month communication, over and above the effect of dissatisfaction. Tsiros and Mittal (2000) find satisfaction directly influences repurchase and complaint intentions, while regret directly influences repurchase intentions only, the effect of regret on complaint intentions is fully mediated via satisfaction. Thus, investigating the effects of each specific emotion provides more insights in terms of predicting investors' holding or selling decisions and the process underlying these behaviors.

This paper aims to test the effects of general (dis)satisfaction and specific emotions on investors' subsequent investment decisions. (Dis)satisfaction arises from the overall evaluation of the investment outcome (i.e. a positive/negative feeling about the outcome of the investment). We concentrate on "regret" as a specific emotion. Regret stems from the investor's counterfactual thoughts about his or her prior decisions (i.e. the outcome would have been better/worse if I would have hold/sold the investment). An empirical study has yet to be conducted to test whether general (dis)satisfaction or a specific emotion such as regret is more influential in a financial setting. However, recent research has shown that examining specific emotions provides more insights in consumer behaviors. We expect that this also applies to investment decision-making. In study 1, we first focus on testing whether the specific emotion "regret" is more relevant for investment decision-making. We focus our test on the loss domain, and regret is the relevant specific emotion for this domain. We choose to focus on the loss domain and regret because there seems to be a consensus that regret is the relevant emotion in this domain (Shefrin and Statman, 1985; O'Curry Fogel and Berry, 2006; Summers and

Duxbury, 2007), while such consensus does not seem to apply to the gain domain. For example, Summers and Duxbury (2007) suggest rejoice as the positive specific emotion, while Shefrin and Statman (1985) find pride more relevant for the gain domain.

In a recent study, O'Curry Fogel and Berry (2006) use a satisfaction/regret measure to investigate the relation between regret, satisfaction, and the disposition effect. The satisfaction/regret measure is based on an 11-point scale with "regret very much" on the low end, and "very satisfied" on the high end. With this practice, they essentially equal "not regret at all" to "very satisfied", and "regret very much" to "very dissatisfied". Although "not regret at all" and "very satisfied" are both in the positive valence, and both "regret very much" and "very dissatisfied" are in the negative valence, the authors do not differentiate whether the emotion is specific or general. Zeelenberg and Pieters (2004) argue against including emotions such as regret and disappointment into general (dis)satisfaction measures, because their findings suggest that specific emotions have direct effect on consumers' behavioral response, after controlling for the effects of (dis)satisfaction. Thus, we use separate measures for regret and (dis)satisfaction in our studies. We expect that a specific emotion (i.e. regret) is more important than general valence (i.e. dissatisfaction) in terms of predicting investors' hold/sell decisions of a losing investment. Therefore, we hypothesize that:

> ***H1:*** *Specific emotions have more effects on the hold/sell decision than general valence in the domain for which specific emotions are relevant.*

2.2. Anticipated Regret and Pride

In terms of specific emotions, we focus here on regret for the loss domain and pride for the gain domain. We understand that investors may experience or anticipate other specific emotions during the course of their investment decision-making. For instance, investors may feel sad or shameful when facing losses, and joyful when facing gains. The first reason for investigating the role of regret in the loss domain and pride in the gain domain is that we aim to test the general valence approach verses the specific emotions approach in the setting of investment decision-making. Testing one specific emotion (i.e. regret and pride) for each of the loss and gain domains respectively is sufficient for this purpose. The second reason for focusing on regret and pride is that they are both associated with a sense of self-agency, i.e., investors feel responsible and attribute the cause of the outcome (gain/loss) to their own decisions. In the following, we first

review anticipated regret/pride and decision-making, and then move on to experienced regret/pride.

2.2.1. Regret

According to regret theories, regret originates in counterfactual thinking; it stems from a comparison between the obtained outcome and what might have occurred (Bell, 1982; Loomes and Sugden, 1982). Shefrin and Statman (1985) propose that investors may resist realizing losses, because it then stands as proof that some wrong decisions have been made. Ex-post knowledge indicates that the forgone alternative decisions would have led to better outcomes. If investors close an investment account at a loss, they do not only have to realize the loss, but also experience the feeling of regret associated with their previous non-optimal decisions. In order to avoid this feeling of regret, investors tend to postpone selling the loser. Recent research by Reb (2008) also suggests that regret aversion play an important role in decision-making and finds that salience of regret increases the time and information search before a decision maker reaches his or her decision. Lemon, White and Winer (2002) find that anticipated regret and expected future use influence consumers' decisions to discontinue a service relationship. As this type of switching decision highly resembles investors' financial selling decisions, we expect that anticipated regret also affects investors' hold/sell decisions.

Kahneman and Tversky (1982) find that given a negative outcome, people anticipate more regret over action than inaction. Landman (1987) find that this action effect (also known as actor effect or omission bias) also applies to positive outcomes. To put this in the financial context, after the initial acquisition of a financial security, selling resembles the "action" option, and holding resembles the "inaction" option. As such, when facing paper losses, investors are expected to anticipate more regret over selling than over holding due to the action effect. Weber and Camerer (1998) adopt the prospect theory framework to explain their findings on the disposition effect; however, we propose that their findings can be alternatively explained by regret as well. Weber and Camerer turn the "selling equals action, holding equals inaction" associations around by using an "automatic selling" procedure in their experiment: after each investment period, the stock is sold automatically. Therefore, participants in their study were facing a different set of choice options: (1) to repurchase or (2) not to repurchase the investment. In this case, repurchase (equivalent to hold) is the "action" option, not to repurchase (equivalent

to sell) is the "inaction" option. Since their automatic selling procedure flips the action/inaction tendency around, it may have also diminished the anticipated regret associated with selling a losing investment, hence leads to their findings that the disposition effect was greatly reduced.

2.2.2. Pride

Pride is a positive, self-conscious emotion arising from achievements and it is attributed to one's effort or abilities (Tangney, 1999; Tracy and Robins, 2007). Shefrin and Statman (1985) suggest pride is the counterpart emotion of regret, and investors' seeking pride in the gain domain leads to a stronger tendency to sell winners than losers. Investors are expected to take pride in selling the winning investment, because it stands as proofs that they have made good decisions and were able to capture gains in the market. In order to capture the pride associated with making profits, investors are more likely to sell winners. Rejoice and satisfaction have been tested as the positive emotion that affect the emergence of the disposition effect (O'Curry Fogel and Berry, 2006; Summers and Duxbury, 2007). Although both rejoice and satisfaction are of positive valence, they do not possess the characteristic of self-attribution/self-agency. As idiosyncratic elements of specific emotions cannot be overlooked in investment decision-making, we expect that as the self-agency element of regret is important in the loss domain, the self-agency element of pride also has to be crucial in the gain domain.

Summers and Duxbury (2007) research whether regret and rejoice are the underlying emotions that explain the disposition effect in an indirect manner. In their experiment, they manipulate choice and responsibility for gains and losses. They find that merely experiencing gains or losses, without having the responsibility for the outcome, is not sufficient to generate the disposition effect in an experimental setting. They theoretically argue that one has to feel responsible for his or her choices in order to experience the emotions associated with their decisions. Thus by manipulating responsibility, they indirectly test the effect of regret and rejoice on the disposition effect. However, although feeling responsible for a decision is a prerequisite for feeling regretful, feeling responsible does not automatically leads to regret. The effects of emotions in their study are theoretically assumed, instead of directly measured and tested.

The notion that avoiding regrets in the loss domain and seeking pride in the gain domain motivates investors to hold losers for too long and sell winners too early has not been directly

tested. Regarding how anticipated specific emotions affect investors' decision in the gain or loss domain, we hypothesize that:

H2a: *In the loss domain, higher anticipated regret leads to a smaller probability of selling.*

H2b: *In the gain domain, higher anticipated pride leads to a larger probability of selling.*

2.3. Experienced Regret and Pride

Shefrin and Statman (1985) base their reasoning on the assumption that only when a losing (winning) investment is sold, the anticipated regret (pride) associated with that investment would be realized. This perspective implies that investors use their *anticipated* emotions towards an outcome to determine their decisions. Nonetheless, regret regulation theory suggests that regret can be experienced about past (experienced regret) and future (anticipated regret) decisions (Pieters and Zeelenberg, 2007). In fact, investment in practice is a chain of decisions. Besides anticipated emotions, investors also receive emotional feedback from their previous decisions. How anticipated and experienced emotions may simultaneously affect subsequent investment decisions has not yet been tested. While Shefrin and Statman (1985) propose anticipated regret prevents investors from selling, findings in consumer research indicate that experienced regret motivates individuals to switch to other product or service suppliers subsequently (Ratner and Herbst, 2005). It appears that experienced and anticipated regret have opposite directions of effects on investors' selling tendency.

Hart and Mas-Colell (2000) propose a learning rule of regret, known as "regret matching". They argue that in a repeated game, when the players have to decide whether to continue with one strategy or switch to another, based on a regret matching procedure, players change their strategies for an alternative that would give them a higher payoff. To put Hart and Mas-Colell's formulization into our financial investment setting, let U be the total payoff resulting from strategy h (holding the investment), $V(s)$ is the forgone payoff of strategy s (sell the investment), and $V(s)-U$ represent the level of regret (given $V(s)$ is larger than U) of having chosen h (hold) instead of s (sell). In the field of financial decision-making, we expect that anticipated regret prevents investors from choosing to sell off the investment. However, in a dynamic and multiple-decision setting in which regret can be experienced after each decision is made, the probability of holding on to a losing investment decreases as the utility of holding

becomes less positive. Eventually, when the utility from experienced regret matches the expected utility from anticipated regret, investors become likely to sell the losing investment, so we hypothesize that:

H3a: *In the loss domain, higher experienced regret leads to a larger probability of selling.*

Regarding the gains domain, Shefrin and Statman (1985) propose that obtaining pride motivates investors to sell their winners. However, we propose that, just like regret, investors already experience pride before the actual realization of the gains. Pride has started to receive research attention in the past few years (Tracy and Robins, 2007; Williams and DeSteno, 2008), yet little is known if and how pride affects risky decision-making. Williams and DeSteno (2008) find that pride functions as an incentive to persevere on (risk-free) tasks. However, in the context of financial markets, it is difficult to relate perseverance to hold/sell decisions of financial assets. When facing paper gains, investors can either choose to sell (i.e. locking in the gains) or to hold (i.e. pursuing further gains if expected that prices rise further). As risks are involved, holding on to a winner may or may not be the optimal decision. According to standard finance, investors' expected utility of an outcome is a function of (1) their subjective expectation of future increases/decreases of the investment, and (2) their subjective values attached to these increases/decreases. We adopt the standard finance perspective that it is only rational for investors to hold a winning investment if they expect further price increase to off set the corresponding risk. To put this in the context of emotions, first we assume that investors already experience some pride before selling the winner. If the anticipated (stronger) pride does not off set the risks involved in holding the stock further, then it is not rational to hold on further to the winning investment. Therefore, we expect a positive relation between experienced pride and the probability to sell and hypothesize that:

H3b: *In the gain domain, higher experienced pride leads to a larger probability of selling.*

We conducted two experiments to test how emotions affect investors' subsequent hold/sell decisions of financial assets (or stock investments). Figure 1 indicates that hypothesis 1 is tested in study 1, hypotheses 2a, 2b, 3a and 3b are tested in study 2.

<INSERT FIGURE 1 ABOUT HERE>

III. EXPERIMENT 1

Study 1 investigates whether the valence-based or specific emotions approach is more appropriate in the financial setting. We focus here on experienced, instead of anticipated, emotions. While we center our test and discussion on the loss domain, we also incorporated the domain of gain in order to provide the possibility of comparison.

3.1. Participants and Procedure

In our experiment, a total of 95 undergraduate students (56 male, 39 female, with average age of M = 23.24 years, and a standard deviation of SD = 1.59) at a university in The Netherlands participated. Their participation rewards depended on the final value of their investment, on average participants received about EUR 4. Participants arrived at the lab and were assigned to individual cubicles. They were presented with the scenario that they recently started investing in a single stock X. The amount initially invested in stock X was predetermined and equal for every participant. We specified up to ten investment periods in the experiment. If participants do not choose to sell at all, the experiment ends after ten periods; if they choose to sell, then the experiment ends after that period. After each period, participants received information on the stock's performance and were asked to hold or to sell the whole invested amount. Before deciding, they answered a short questionnaire on their experienced emotions.

3.2. Price patterns

Participants were randomly assigned into either a gain or loss condition (46 participants in gains, 49 participants in loss). Our focus here is on the loss condition, while we include the gain condition to provide comparison, which will be discussed in the presentation of the results of experiment 1. To make the price patterns appear to be realistic, we want to eliminate the possibility of long runs of gains or losses. Thus some upward (downwards) movements were included in the loss (gain) conditions. Also, we specified two price patterns in each of the gain and loss domain (see figure 2): one is more stable over time, while the other one is more volatile. This enhances the generalizability of our results. Note that within each of the price patterns, once participants are randomly assigned into either receiving losses or gains, although there are intermediate price movements, the participants remain in their winning or losing domain in terms of total gains/losses.

<INSERT FIGURE 2 ABOUT HERE>

Past studies have shown that intermediate prices, such as a historical peak, may play a substantial role in the disposition effect (Gneezy, 2005). However, more recent findings point out that the first and the last price of a time series receive more weights in terms of influencing one's reference point (Kahneman and Tversky, 1979; Baucells, Weber, and Welfens, 2007). Thus, total size of gains/losses (i.e. the difference between first and current price) and size of gains/losses incurred most recently (i.e. difference between last and current price) are expected to be the most influential reference points for investors and should then influence investors' experience of emotions. Thus, in our analysis, we will control for the possible effects of size of total gains/losses, size of gains/losses incurred in the previous time period, and elapsed time on general and specific emotions on the probability to sell an investment.

3.3. Measures of Emotions

We derive regret and (dis)satisfaction measures from Zeelenberg and Pieters (2004). Regret was reflected by two measures: "How good or bad do you judge your decision to hold stock X in the last month?" (1 = very good, 9 = very bad); "How much regret do you feel about holding stock X in the last month?" (1 = none, 9 = very much). Answers to these two items were averaged to form an index of regret (Cronbach's alpha = 0.76). (Dis)satisfaction was reflected by two measures: "How good or bad do you feel about the performance of stock X?" (1 = very bad, 9 = very good); "How satisfied or dissatisfied do you feel?" (1 = very dissatisfied, 9 = very satisfied). Answers to these two items were averaged to form an index of (dis)satisfaction (Cronbach's alpha= 0.97).

We include disappointment and expectation for the stock's future prices as control measures. As such, we adopt the 2-item measures of disappointment from Zeelenberg and Pieters (2004): "How much disappointment did you feel about the performance of stock X?" (1 = none, 9 = very much); "To what extent was the performance of stock X better or worse than you expected beforehand?" (1 = much better, 9 = much worse), with a Cronbach's alpha of 0.60. We employ a measure of expectation of future price changes based on Ayton and Fischer (2004): "How do you think the price of stock X will change in the next period?"; answers were also reported on a 9-point scale (1 = surely decrease, 9 = surely increase). Our final measure indicates whether participants chose to hold on to or to sell their winning/losing investment: "Do you want

to hold or sell stock X now?" To lessen concern that the relations among the variables in this model are affected by individual differences, we employ several control measures, including age, sex, fields of studies, risk aversion, and investment experiences in financial market and particularly in stocks.

3.4. Results

Our experimental results indicate that on average participants report more regret and (dis)satisfaction in the loss condition than in the gain condition. The average of the emotions indexes are: *regret* (loss domain: M = 5.12, SD = 1.71; gain domain: M = 3.29, SD = 1.77) and *(dis)satisfaction* (loss domain: M = 3.62, SD = 1.83; gain domain: M = 5.91, SD = 2.10). Two *t*-tests support the significance of these differences (regret: t = -13.20, p < .001; (dis)satisfaction: t = -14.55, p < .001). We followed the procedure by Zeelenberg and Pieters (2004), which is first regressing disappointment and regret on (dis)satisfaction, in order to check their impact on (dis)satisfaction. Our results indicate that both regret (*beta* = -0.398, p < .001) and disappointment (*beta* = -0.486, p < .001) explain the variance of (dis)satisfaction (R-square= 0.69). This replicates the findings reported in Zeelenberg and Pieters (2004). There are 324 decisions collected in the loss condition (frequency of hold = 290, frequency of capitulate = 34) and 303 decisions collected in the gain condition (frequency of hold = 264, frequency of capitulate = 39). In the gain condition, 85% of the participants sold the winning investment, while in the loss condition, 69% of the participants sold the losing investment. This finding is consistent with the disposition effect. In the next step, we perform two logistic regressions for the gain and the loss domain, respectively. Regret, disappointment and (dis)satisfaction were simultaneously regressed on the hold/sell decisions.

3.4.1 Results in Loss and Gain Domains

In the loss domain, our results indicate that higher levels of regret predict a larger probability to sell the losing investment (B = 0.416, p = .020). No significant effects of disappointment (B =0.111, p = .528) and (dis)satisfaction (B= -0.060, p = .701) on hold/sell decisions are found. It is not surprising that disappointment does not predict hold/sell decisions as this variable is used as a control variable. In the gain domain, our results indicate that a higher level of satisfaction predicts a larger probability to sell the winning investment (B = 0.570, p = .002). No significant

effects of disappointment (B = -0.010, p = .954) and regret (B = 0.249, p = .217) on hold/sell decisions can be found. Satisfaction seems to be related to participants' hold/sell decisions on their financial investment. However, note that the proposed opponent of regret, i.e. pride, was not yet controlled for in this study. It is possible that the results would be different if pride was measured and controlled for, which will be done in study 2.

We also performed two more logistic regressions including the control variables. Apart from *expectation* for the stock's future performance, other controls do not change the results significantly. The effect of expectation is consistent with standard economics theories. More negative expectation predicts a larger probability to sell the investment in both gain (B=-0.669, p < .001) and loss domain (B= -0.483, p < .001). After controlling for expectation, the effects of regret on selling probability in the loss domain (B= 0.416, p = .040) and of satisfaction on selling probability in the gain domain (B= 0.591, p = .003) remain significant. Other effects that were previously insignificant remain insignificant.

3.5. Discussion

The result that both regret and disappointment explain the variance of (dis)satisfaction reflects correlations among low regret, low disappointment, and high satisfaction. Participants seem to experience the emotions, either general or specific, as they would be expected to be on the basis of previous research (Zeelenberg and Pieters, 2004). Our findings show that in the loss domain, only regret and negative expectation predict larger probabilities of selling the losing investment. Thus, hypothesis 1 receives support. Results indicate that after controlling for the effect of regret on selling probability, in the loss domain, dissatisfaction does not significantly predict selling probability. This seems to be related to the differences of psychological appraisal associated with regret and dissatisfaction: feeling negative alone does not lead to selling the losing investment. Feeling regret means that one is still psychologically "holding on" to the losses, and regards the previous holding decisions to the stock as bad decisions, and one may also think of what he or she could have done differently. This feeling may motivate people to take action and cut losses. This finding confirms that although regret is experienced as a negative emotional state, its influence on investors' subsequent decisions is different as compared with general dissatisfaction. More generally, the differences of cognitive appraisal and action tendency associated with each specific emotion are influential to individuals' subsequent actions.

In the gain domain, we find that satisfaction is linked to a high probability to sell the losing investment. However, no specific emotion for the gain domain, e.g. pride, is measured in this study. Thus, the significant effect of satisfaction may simply be due to the lack of control for the corresponding specific emotion.

IV. EXPERIMENT 2

Results from study 1 suggest specific emotions, such as regret, play an important role in its relevant (i.e. loss) domain. However, the effect of satisfaction on hold/sell decisions was significant in the gain domain. A possible explanation might be that the proposed opponent of regret, i.e. pride, was not controlled for in study 1. Thus, explicit measures of pride were administered in study 2. More importantly, study 2 aims to test the complete model proposed in our study (see figure 1). We measure both experienced and anticipated regret and pride in order to test how anticipated and experienced specific emotions may simultaneously influence investors' hold/sell decisions.

4.1. Participants and Procedure

In study 2, a total of 130 undergraduate students (80 male, 50 female, with average age of M = 22.97 years, SD = 3.54) at a university in The Netherlands participated. Their participation rewards depended on the final value of their investment, on average participants received about EUR 7. The procedure is similar to study 1. Participants were randomly assigned into either the gains or losses conditions (64 in gain domain, 66 in loss domain). The major difference as compared to study 1 is that more measures of emotions were administrated in each investment period.

4.2. Price patterns

As in study 1, previous studies on the disposition effect usually employed a limited number of pre-determined price patterns (Weber and Camerer, 1998, Lee et al., 2008). To increase the generalizability of our findings, we generated a wide range of gains or losses and intermediate price dynamics over the (up to) ten investment periods in study 2.

To make the price patterns appear as more realistic and to avoid long runs composed of gains (losses) only, some mild downward (upward) movements were included in the

intermediate stages. To avoid having these mild movements appearing too frequently, we divided the (up to) ten investment periods into three unequally sized blocks. In block 1, with random assignment, participants received a first gain or loss of 5%, 10%, 20%, or 40% roughly evenly spread out over the initial 1, 3, or 5 periods. In block 2, prices stayed relatively stable (up or down stock price movements around 1%) for either 2 or 4 periods. In block 3, a second gain or loss of 5%, 10%, or 15% took place within 1 period. After this the experiment ended (see Table 1). In total, there are 72 possible general price patterns: 4 (first gain/loss: 5%, 10%, 20%, or 40%) x 3 (first winning/losing period: 1 vs. 3 vs. 5 periods) x 2 (stable prices: 2 vs. 4 periods) x 3 (second gain/loss: 5% vs. 10% vs. 15%). Moreover, we randomized the order of presenting each price within blocks 1 and 2. Generally speaking, the price patterns are similar to those depicted in figure 2, i.e. we simply increase variations and number of price patterns with our randomization procedure. Consequently, the level of experienced regret and pride due to price changes vary strongly over respondents. Such a procedure is crucial for the fit between our model and data on financial investments. By eliminating the effect of intermediate prices (Gneezy, 2005), our results can be generalized and applied to real investment markets.

<INSERT TABLE 1 ABOUT HERE>

4.3. Measures

Experienced pride. Measures of experienced pride were adopted from a recent study by Williams and DeSteno (2008). Using a 9-point scale (1 = not at all, 9 = very much), participants indicated how *fulfilled, confident*, and *proud*, they currently felt at each investment period. Answers to the three employed items were averaged to form an index of pride (Cronbach's alpha = 0.86). As a manipulation check of pride (Williams and DeSteno, 2008), participants also answered how well they performed *compared with others* in the investment task (1 = much worse, 9 = much better).

Experienced Regret. We again adopt the measures of experienced regret from Zeelenberg and Pieters (2004) as in study 1. Using a 9-point scale (1 = not at all, 9 = very much), participants indicated how much *regret,* they currently felt, and they also judged their previous decision (1 = very good, 9 = very bad) in each investment period. Answers to these two items were averaged to form an index of regret (Cronbach's alpha = 0.74).

Anticipated pride and regret. We also ask participants to indicate their anticipated regret and pride, which have to be measured before a hold or sell decision is reached. To avoid

cognitive overload for our participants in such a multiple-decision setting, we used single-item measures for anticipated regret and anticipated pride, respectively (similar measures in Kahneman and Tversky, 1982). Participants were asked to imagine if they would sell the investment, how much *regret and pride* they would feel, while their answers were also reported on a 9-point scale (1 = not at all, 9 = very much).

(Dis)satisfaction. In order to control for the effect of valence-based emotion, we derive measures of (dis)satisfaction from Zeelenberg and Pieters (2004). Using a 9-point scale (1 = not at all, 9 = very much), participants indicated how *bad* and *dissatisfied* they currently felt at each investment period. As for the positive opponents of these items, participants also indicated how *good* and *satisfied* they felt. Answers to these four items were averaged to form an index of (dis)satisfaction, where larger number indicate more dissatisfaction (Cronbach's alpha = 0.91).

Control measures. As in study 1, we employ once more a measure of expectation of future price changes (1 = surely decrease, 9 = surely increase). We also include the measures of disappointment as a control variable. To control for individual differences, we also employ the control measures as used in study 1. Finally, participants made decisions to hold on to or to sell their winning/losing investment.

4.4. Results

First, we report some basic descriptive of our measures. There are 351 decisions collected in the loss condition (frequency of hold = 308, frequency of capitulate = 43) and 214 decisions collected in the gain condition (frequency of hold = 155, frequency of capitulate = 59). In the gain condition, 92% of participants eventually sold the winning investment (59 out of 64), in the loss condition, 65% of participants sold the losing investment (43 out of 66). Participants on average have a slightly more positive expectation about the stock future performance in the loss domain than in the gain domain (loss domain: M = 5.99, SD = 1.68; gain domain: M = 5.60, SD = 1.56). A t-test reveals that there is significant difference of expectation between the gain and loss conditions (t = 2.726, p = .007).

Once again, on average participants report more regret and (dis)satisfaction in the loss condition than in the gain condition. The average of the two emotions indexes are: *regret* (loss domain: M = 5.02, SD = 1.73; gain domain: M = 3.08, SD = 1.54), and *(dis)satisfaction* (loss domain: M = 6.06, SD = 1.82; gain domain: M = 3.69, SD = 1.70). Two t-tests support the

significances of the differences (regret: t = -13.48, p < .001; (dis)satisfaction: t = -15.33, p <.001). Pride is higher in the gain than in the loss domain (loss domain: M = 3.77, SD = 1.53; gain domain: M = 5.07, SD = 1.76), a t-test reveals the difference to be statistically significant (t = *8.98*, p < .001). As a manipulation check of pride, participants in the gain condition in fact believed that their performance was better when *compared with others* in the investment task (loss domain: M = 4.31, SD = 1.41; gain domain: M = 5.45, SD = 1.32) than participants in the loss condition. A t-test supports this difference to be significant (t = *9.56*, p < .001). This confirms our expectation that participants in the gain domain in fact believe they have superior performance, which is a prerequisite for pride.

We first regressed pride, disappointment and regret on (dis)satisfaction to check their impact on (dis)satisfaction. Results are consistent with study 1, not only *disappointment* (*beta* = 0.510, p < .001) and *regret* (*beta* = 0.198, p < .001), but also *pride* (*beta* = -0.279, p < .001) explain the variance of (dis)satisfaction (R-square= 0.789). Regarding anticipated emotions, participants report more anticipated regret in the loss than in the gain condition, and more anticipated pride in the gain than in the loss condition. The average of the anticipated emotions are as follows: *anticipated regret* (loss domain: M = 6.48, SD = 1.71; gain domain: M = 5.73, SD = 2.09), *anticipated pride (*loss domain: M = 5.15, SD = 1.88; gain domain: M = 5.50, SD = 2.22). Two t-tests reveal that the difference of anticipate regret in the loss domain and in the gain domain are significant (t = *4.42*, p < .001), and that of anticipate pride is marginally significant (t = *1.91*, p = .057). The participants reported significantly more regret (pride) in the loss (gain) domain. These results support that regret and pride are the relevant emotions for the loss and gain domain respectively.

In the next step, we performed a logistic regression to test hypotheses 2a, 2b, 3a and 3b. A total of 565 hold/sell decisions from both gain and loss conditions was regressed on experienced pride, experienced regret, experienced (dis)satisfaction, anticipate regret, anticipated pride and expectation for future performance simultaneously. The results in table 2 indicate that higher experienced pride (B= 0.286, p = .012) and experienced regret (B= 0.234, p = .048) predicted a larger probability to sell. The effect of (dis)satisfaction on hold/sell decisions of a losing investment proves to be statistically insignificant (B= -0.172, p = .147). Higher anticipated pride predicts a larger probability to sell (B= 0.242, p = .001), higher anticipated regret predicts a

smaller probability to sell (B= -0.335, $p < .001$). More negative expectation also related to a higher probability to sell (B= -0.581, $p < .001$).

<INSERT TABLE 2 ABOUT HERE>

4.5. Discussion

Consistent with study 1, we find that higher experienced regret leads to a higher probability to sell a losing investment. Our results indicate that higher experienced pride predicts a larger probability to sell a winning investment. These results give support to hypotheses 3a and 3b that experienced specific emotions have impact on investors' subsequent decisions to sell or to hold on to an investment. Moreover, our results show that anticipated pride and regret also influence investors' decisions, i.e., higher anticipated pride and lower anticipated regret lead to a larger probability to sell a losing investment. These finding give initial support to Shefrin and Statman's proposition of anticipated regret and pride as explanation of the disposition effect, meaning that our hypotheses 2a and 2b are also supported. In the gain domain, higher experienced pride and anticipated pride are both associated with a larger probability to sell. In the loss domain, both anticipated and experienced regret influence the hold/sell decisions but the directions of these two effects are opposite to each other. While high anticipated regret predicts small probability to sell, high experienced regret predict large probability to sell in the loss domain. In sum, in the gain domain, experienced and anticipated pride motivates selling the winner, while in the loss domain, experienced regret promotes selling the loser, but anticipated regret at the same time discourages selling. The latter is discussed further in the overall discussion of the paper.

In our analysis, (dis)satisfaction does not significantly affect the investors' hold/sell decisions, thus hypotheses 1 is again supported. Nonetheless, the purpose of including (dis)satisfaction in study 2 was to ensure that we control for the possible effect of valence-based emotions on investment decisions, in order to investigate the effects of specific emotions (regret, pride). Moreover, the size effect of anticipated regret is approximately a double of the effect size of anticipated pride. This finding is very much consistent with prospect theory that losses loom larger than equal-sized gains. Shefrin and Statman (1985) originally presented prospect theory and anticipated emotions as two separate explanations for the disposition effect. Perhaps these two explanations share more common grounds than previously expected. If anticipated emotions

are included in the calculation of expected value for subsequent decision, then the doubled size effect of anticipated regret as compared to anticipated pride may give support to the validity and use of the prospect theory s-shaped value function.

V. CONCLUSION AND DISCUSSION

We investigated how individuals eventually come to the decisions to sell their losing investments, under the influence of emotional factors. We derive hypotheses based on recent literature on regret, disappointment, (dis)satisfaction and decision-making as well as the "regret matching" framework (Hart and Mas-Colell, 2000). We assessed the role of emotions in the disposition effect. Although regret aversion generally prevents people from selling losing investments, many investors do sell eventually. We propose that investors' hold/sell decisions are not only affected by anticipated emotions, but also by experienced emotions. Previous research (Shefrin and Statman, 1985; Summers and Duxbury, 2007) has focused on the role of anticipated emotions on investors' future decisions. This paper provides an initial effort to investigate how experienced emotions and anticipated emotions simultaneously affect selling decisions.

In the two experiments reported in this paper, we investigate the link between *experienced* and *anticipated* emotions and investors' hold/sell decisions of losing and winning investments. In study 1, we conducted a dynamic experiment and measure the extent of experienced emotions in terms of general (i.e. dissatisfaction) and specific (i.e. regret) emotions, and tested which approach is more appropriate in predicting investment decisions. This study focuses on the domain of losses, with incorporation of the domain of gains as comparison. We measure investors' experienced regret and (dis)satisfaction during incurring various sizes of gains or losses over multiple periods, and link these emotions to their subsequent hold/sell decisions. Results indicated that in the loss domain, only regret has significant impact on investors' subsequent hold/sell decisions. This finding points out that it is important to understand the cognitive appraisal and action tendency associated with each specific emotion, as they are influential to individuals' subsequent actions. Overall, our results from study 1 suggest that the specific emotion approach is more appropriate in predicting financial investment decisions than the general valence approach.

In study 2, we further investigate how *anticipated* and *experienced specific* emotions (i.e. regret and pride) simultaneously influence investors' subsequent hold/sell decisions. Results regarding experienced emotions are consistent with study 1. Both high experienced regret and pride are linked to a larger probability to sell. As for anticipated emotions, anticipated pride leads to a larger probability to sell, while anticipated regret links to a smaller probability to sell. That is, both anticipated and experienced regret influenced the hold/sell decisions, but the directions of the effects are opposite to each other.

To the best of our knowledge, this is the first study establishing causal relations between experienced/anticipated emotions and corresponding investors' hold/sell decisions. Our empirical findings demonstrate that investors' subsequent hold/sell decisions are simultaneously affected by their experienced and anticipated emotions.

Shefrin and Statman (1985) suggest anticipated regret causes one to hold on to the losers in the loss domain, and anticipated pride causes one to sell the winners in the gain domain. Our perspective do not contradicts with theirs. Yet, our propositions and findings differ in the sense that even before an account is closed at a loss (gain), regret (pride) has already been experienced by investors, which leads to a larger probability to sell. In the loss domain, the strength of the opposite effects of anticipated and experienced regret may, however, depend on how much regret one has already experienced. If one has experienced little regret, then the anticipated regret for realizing the loss is expected to be relatively higher. If one already feels very regretful over a paper loss, then the anticipated regret over realizing the loss should be relatively lower. Our results are consistent with the regret-matching procedure (Hart and Mas-Colell, 2000), which matches the utility derived from one option with another. That is, if the experienced regret from holding loser equal or more than the anticipated regret from realizing the loss, then this match may motivate investors to choose selling a loser instead of holding on to it further. More research is required into this.

A limitation of our research is that the experiments were conducted within a short time frame, while in reality investors may have more time in-between receiving each piece of information, thus the effect of time cannot be fully examined in such an experimental setting. Future studies should try to replicate these findings with larger samples and adopt natural settings. In addition, as our participants were undergrad students, it may raise questions on the

generalizability of our results. Further studies with participants recruited outside the university environment may increase the validity of our findings.

Our empirical results support that the idiosyncratic elements of specific emotions are important to financial decision-making, thus it is important to investigate the effects of specific emotions, apart from the general valence-based approach. We contribute to the literature by demonstrating that after controlling for the effect of regret and pride, general (dis)satisfaction does not have a significant impact on investors' decisions. As both pride and regret are related to self-agency/self-evaluation, perhaps this element leads to the high relevance of these emotions in financial decision-making. In our experiment, participants made their decisions individually, without any advices or discussion with others. It is expected that they take responsibility for their decisions; therefore, self-agency becomes highly relevant. Perhaps there are individual differences as well. For example, investors who are highly involved with their investment decisions, and who find it important to perform well in the financial markets, are more likely to take pride or regret over their success or failure.

We investigated two specific emotions, regret and pride, in our analysis. It is possible that there are other relevant specific emotions to be investigated as well. For example, in a setting where interpersonal relationships and communication are presented, *shame* and *guilt* might also be a relevant emotion in financial decisions-making. *Shame* is similar to regret in the sense that they are both in the negative valence. However, regret relates to one's counterfactual thoughts about one's previous decisions/behaviors, while shame stems from negative judgment by others. Shame is experienced when there are threats to one's "social self", i.e. one's social esteem, status and social acceptance (Dickerson, Gruenewald and Kemeny, 2004). In our experiments, participants took part in the study with high confidentiality. The experiments were computerized and participants took part in the study in individual cubicles. Thus, in our set-up, the level of social self-threats was relatively low. Nevertheless, in practice, performance of investors may be more transparent. For example, individuals may share investment information with others and they may feel shameful to realize paper losses. In fact, individual may also experience *guilt*, if their investment decision also leads to negative outcome for others (e.g. lose children's college fund in the stock market). In order to gain further insight in the roles of specific emotions in investment decision-making, a more elaborated set of emotions should be investigated in the future.

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Figure 1. **Complete Model.**

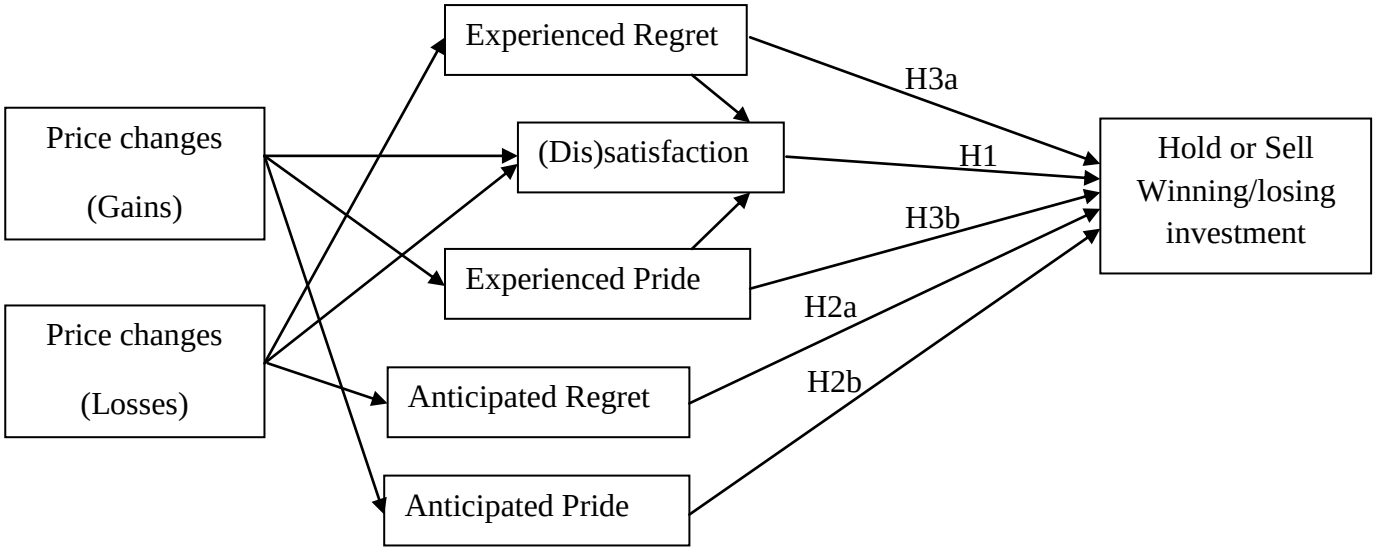

Figure 2. **Experiment 1: Price pattern presented to participants in the gain and loss conditions for up to 10 periods.**

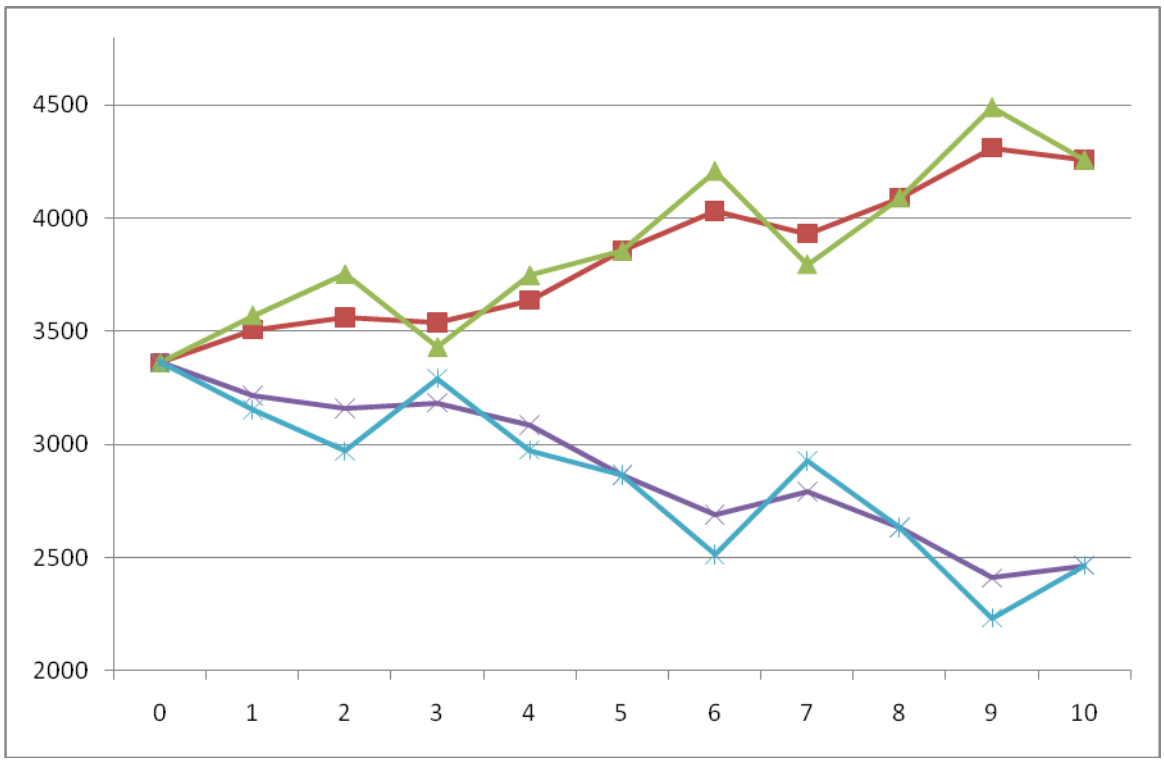

Table 1. **Experiment 2: Price presented to participants in the 3 blocks for up to 10 periods.**

Price change presented in Block 1:

		Loss condition				Gain condition			
	Price change	-5%	-10%	-20%	-40%	5%	10%	20%	40%
No. of periods	1	-165.06	-337.38	-674.76	-1331.36	165.06	337.38	674.76	1331.36
	3	-113.95	-193.24	-386.48	-834.24	113.95	193.24	386.48	834.24
		-89.56	-178.23	-356.46	-698.46	89.56	178.23	356.46	698.46
		38.45	35.36	70.72	201.34	-38.45	-35.36	-70.72	-201.34
	5	-38.27	-99.21	-198.42	-277.33	38.27	99.21	198.42	277.33
		-55.68	-89.43	-178.86	-390.12	55.68	89.43	178.86	390.12
		40.36	40.32	80.64	177.45	-40.36	-40.32	-80.64	-177.45
		-61.49	-109.31	-218.62	-314.05	61.49	109.31	218.62	314.05
		-49.98	-78.47	-156.94	-527.31	49.98	78.47	156.94	527.31

Price change presented in Block 2:

	Price change	+/- ~ 1%
No. of periods	2	-34.78
		39.32
	4	-34.78
		39.32
		46.18
		-33.20

Price change presented in Block 3:

		Loss condition			Gain condition		
	Price change	-5%	-10%	-15%	-5%	-10%	-15%
No. of period	1	-177.23	-345.31	-512.89	-177.23	-345.31	-512.89

Notes. Participants were randomly assigned into the conditions of incurring from 5% to 40% gains or losses in block 1, either 2 or 4 periods of flat prices, and from 5% to 15% of second gains or losses. There are 72 possible combinations (Block1: 12 conditions x Block2: 2 conditions x Block3: 3 conditions) for gain or loss conditions. Besides, the order of presenting each price within Block 1 and 2 was randomized.

Table 2. **Results of Experiment 2.**

		Hypotheses	B	p-value
Experienced emotions	Dissatisfaction	H1	-0.172	.147
	Regret	H3a	0.234	.048
	Pride	H3b	0.286	.012
Anticipated Emotions	Regret	H2a	-0.335	<.001
	Pride	H2b	0.242	.001
Control	Expectation		-0.581	<.001

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