Investor regret: The role of expectation in comparing what is to what might have been

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Abstract

Investors, like any decision maker, feel regret when they compare the outcome of an investment with what the outcome would have been had they invested differently. We argue and show that this counterfactual comparison process is most likely to take place when the decision maker's expectations are violated. Across five scenario experiments we found that decision makers were influenced only by forgone investment outcomes when the realized investment fell short of the expected result. However, when their investments exceeded prior expectations, the effect of foregone investment on regret disappeared. In addition, Experiment 4 found that individual differences in the need to maximize further moderated the effects of their expectations, such that maximizers always take into account the forgone investment. The final experiment found that when probed to make counterfactual comparisons, also investments that exceed expectations may lead to regret. Together these experiments reveal insights into the comparative processes leading to decision regret.

Keywords: regret, expectation, disappointment, counterfactual thinking, maximization.

1 Introduction

Regret is a negative emotion that most of us are familiar with. It is a highly relevant emotion in the context of decision making and has been widely studied by psychologists, economists and consumer behavior researchers. Regret is an unpleasant feeling, associated with the wish to undo the regretted event, a strong tendency to metaphorically kick oneself and wanting to get a second chance (Zeelenberg et al., 1998a). This makes regret uniquely linked to decisions made and it has been shown to be a powerful predictor of behavior. Zeelenberg and Pieters (2006, 2007, 2008) summarized the scattered findings and theories concerning regret and its impact on decision making and proposed an integrative theory of regret regulation (see also, Inman, 2007; Pieters & Zeelenberg, 2007; Roese et al., 2007). In their proposition 2 (p. 6), they state that "Regret is a comparison-based emotion of self-blame, experienced when people realize or imagine that their present situation would have been better had they decided differently in the past." An investor who thinks, for example, "If only I had bought Google stock, I would have earned much more" feels regret. The theory of regret regulation was developed to understand how consumers deal with regret and it proposes strategies

used to regulate it (for recent research examining regret regulation see, Morrison & Roese, 2011; Västfjäll et al., 2011). To fully understand the impact of regret, it is important to further develop insights into the psychology of this emotion and the processes that may moderate it. We discuss here how prior expectations about the outcomes of decisions can play such a moderating role.

Let us start with the fact that regret is a counterfactual emotion (Kahneman & Miller, 1986; Roese & Olson, 1997; Zeelenberg & Van Dijk, 2005). To feel regret, one needs to run a mental simulation of what happened and what could have happened instead, then compare the two. Hence, the forgone outcome becomes the reference point against which regret is computed. This is how regret has been conceptualized in the early economic regret theories (Bell, 1985; Loomes & Sugden, 1987) and has also been well established empirically (e.g., Mandel, 2003; Zeelenberg et al., 1998b; Van Dijk & Zeelenberg, 2005). This comparing of decision outcomes in regret (and in rejoicing) may by itself be consequential, as the comparative mind-set may actually carry-over to subsequent decisions (Raeva et al., 2011).

Interestingly, Lin, Huang, and Zeelenberg (2006) found that the experience of regret can also be affected by other standards of comparison. That research revealed that not only counterfactual comparisons feed into regret, but also comparisons of the obtained outcome with prior held expectations. Through an online survey, they interviewed 227 stock investors from a security company. These investors answered several questions concerning their chosen and forgone investments. The results showed

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that forgone outcomes (of considered but non-chosen investments) indeed influenced the intensity of the regret felt over their investment. But, and this is relevant here, the a-priori expectations concerning the chosen investment were also significantly related to the regret these investors felt over their financial decisions. The larger the difference between the return on investment and these expectations, the more intense the regret. Huang and Tseng (2007) found similar effects in an experimental field study with 372 managers.

Comparisons of obtained outcomes to prior held expectancies have been linked in the literature to the emotional response of disappointment (Marcatto & Ferrante, 2008; Mellers et al., 1997; Van Dijk & Van der Pligt, 1997; Van Dijk et al., 1999), but not yet to regret (with the exception of Lin et al., 2006 and Huang & Tseng, 2007). This is interesting because regret and disappointment are in many ways related, though clearly distinct emotions, that both serve a role in decision making (Zeelenberg et al., 1998a). Ample research, also reviewed in Zeelenberg and Pieters (2007; p. 6–7), and their proposition 3 (p. 7) reads "Regret is distinct from related other specific emotions such as anger, disappointment, envy, guilt, sadness and shame, and from general negative affect on the basis of its appraisals, experiential content and behavioral consequences." It may well be the case that regret resembles disappointment in the sense that the experience is sensitive to expectancy violations. Whether both emotions respond similarly to comparisons with expectations and with forgone alternatives will be examined in Experiment 5.

These two studies (Huang & Tseng, 2007; Lin et al., 2006) are, to the best of our knowledge, the first to highlight the fact that expectations may impact feelings of regret, but note that this research remains mute with respect to the underlying psychological processes. Also, the data collected in these studies were primarily correlational, precluding strong causal conclusions. In the present study we thus take stock of the apparent discrepancy between the findings of Huang and Tseng and Lin et al. and the prior work on regret. To do this, we investigate experimentally the impact of expected outcomes and violations of these expectancies on investor regret (and disappointment), in hope to shed some light on the psychological processes involved. Five experiments are used to expand our understanding of the comparison processes that instigates post-decisional investment regret.

1.1 Expectation violation as a moderator

An expectation is an "anticipation of future consequences based on prior experience, current circumstances, or other sources of information" (Oliver, 1996, p.68). Expectations play a role in many different psychological pro-

cesses, including comparisons (Ritov, 2000). Theoretical models of comparisons sometimes include a surprisingness weight (i.e., a measure of expectancy disconfirmation) that augments the emotional reaction to the comparison (e.g., Mellers et al., 1997; Ritov, 2000). Empirically, self-derived expectations can act as a reference point in the evaluation of outcomes (e.g., Cherry et al., 2003; Oliver, 1996; Ordóñez et al., 2000). Bridges (1993), for example, indicated that consumers' expectations regarding a product or service selected for a particular situation may determine a reference point that affects how they judge the products or services they plan to use in that situation.

Indeed, decision makers usually have some expectations as to how likely the different outcomes are. Investors, for example, may invest in a stock because they predict (and expect and hope) that it will go up in price, and thus that it will perform well. Oliver (1996) suggested that investors use this price expectation as a basis for comparing performance outcomes. An interesting question is: What happens when the obtained outcome performs better than the expectation, but worse than a forgone outcome? Or more specifically for our current purposes, what happens to regret when two reference points (the counterfactual outcome and the expected outcome) produce different and conflicting evaluations? The current literature remains mute with respect to this question. The tradeoff between using these two reference points to evaluate an obtained outcome may determine the overall regret experienced by the decision maker. We assume that, in the case of regret, expectation will serve as a moderator influencing the impact of the better-forgone outcome on the experience of regret. When the obtained outcome exceeds the expectation, the investor will be satisfied (Oliver, 1996) and he or she will not engage much further in comparisons of the obtained outcome with potential alternatives. The decision maker will thus feel less regret about an unfavorable investment (the obtained outcome is worse than the forgone one) that is above expectations than when that same outcome would fall below expectations. Put differently, we expect investors to be most sensitive to forgone outcomes when the obtained outcome negatively violates their expectations.

This reasoning is consistent with two studies that examined how expectation affects counterfactual thinking. First, Sanna and Turley (1996) found that expectancy violations influence the number of spontaneously generated counterfactual thoughts. In their Study 2, for example, they assessed the generation of counterfactuals after students' real-life exam performances. The results indicated that more counterfactual thoughts were generated after unexpected than expected outcomes, particularly unexpected failures. Conversely, when outcomes went as expected, people were less motivated to generate counter-

factuals and to think through the consequences of what could have been which may in turn prevent them from experiencing regret.

Second, McGraw, Mellers, and Tetlock (2005) demonstrated the powerful effects of expectation-based counterfactuals on happiness. In their Study 1, McGraw et al. used television footage of the 2000 Olympics. They found that athletes compared their achievements to their expectations, and these comparisons influenced their happiness. Bronze medalists who had not expected to receive a medal were happier than silver medalists that initially expected gold. McGraw et al. also showed that their happiness was more influenced by expectation-based counterfactuals than by category-based counterfactuals (e.g., silver medalists make upward comparisons and bronze medalists make downward comparisons).

In brief, Sanna and Turley (1996) and McGraw et al.'s (2005) studies clearly suggest that the tendency to generate counterfactuals is influenced by expectation, such that outcomes below expectation induce counterfactual thinking and produce regret.

Based on the research reviewed above, we expect to find that, when the obtained outcomes exceed the expected outcome, decision makers will feel less regret about a possible better alternative. That is, outcomes that exceed prior expectations may buffer against regret. However, when the obtained outcomes fail to meet prior expectations, decision makers will suffer from regret: the counterfactual investment simply hurts more.

There is also the case in which prior expectations are unknown or absent, when we have not given it much thought. We believe that in these cases investors are also motivated to inspect the forgone outcomes (the unchosen investments) because they need this information to evaluate the obtained outcome. Put differently, we expect that expectation, or maybe more precise, expectation violation, will statistically moderate the effect of alternative outcomes (counterfactuals) on the experience of regret. This would be the case because, in situations in which investors prior expectations are outperformed, investors are not motivated to find out what would have happened otherwise.

2   Experiment 1

In Experiment 1 we put this reasoning to a first test. Subjects read that they had invested in a European Fund. All were informed that their obtained outcomes were worse than the counterfactual ones provided by the unchosen investment (a prerequisite for regret). Some subjects read that the obtained outcome was higher than they initially expected (Above Expectation condition). Others read that the obtained outcome was worse than expected (Below

Expectation condition). We also included a condition in which no expectation information was presented (Control condition). We expected regret to be lowest when the obtained outcome was above expectations, indicating the buffering effect of exceeding expectations.

2.1   Method

Seventy-two on-the-job business students at a large university in Taiwan (32 males, 40 females, $M_{age} = 27$, $SD = 4.01$) received course credit for their participation. On-the-job graduate students were recruited for all our experiments because they had personal experience in investment decisions similar to the one described in our studies. They were randomly assigned to one of three conditions (Above Expectation, Below Expectation, and Control), with 24 subjects per condition. The scenario for the Above [Below] Expectation condition ran as follows (all scenarios were originally in Mandarin Chinese):

> After several years of hard work, you finally have NT$1,000,000 in your bank account. You wish to invest this money in order to earn more. As the interest on a savings deposit account is low and the risk of stock investment is high, you consider investing NT$1,000,000 in the fund market. After narrowing the search, you consider two funds: European Funds A and B and decide to invest in Fund A. You expect Fund A to earn a profit of NT$50,000 [NT$150,000] after one year.
>
> NOW, ONE YEAR LATER...
>
> You have held Fund A investments for over one year and you plan to sell today. After selling you find that Fund A has earned you NT$100,000, which is better [worse] than your expectations. However, you also find that you could have earned NT$200,000 if only you had invested the Fund B.

Subjects in the control condition did not read about the expected profit and were confronted only with the obtained and forgone outcome. After having read the scenario, subjects indicated how much regret they would feel with one item: "I regret choosing Fund A" (1 = *strongly disagree*; 7 = *strongly agree*).

2.2   Results and discussion

The results are shown in Figure 1. One-way ANOVA testing yielded a significant effect ($M_{above} = 2.92$, $SD = 1.41$; $M_{below} = 3.96$, $SD = 1.20$; $M_{control} = 4.46$, $SD = 1.28$), $F(2, 69) = 8.78$, $p < .001$. Posthoc Tukey HSD

Figure 1: Results of Experiment 1.
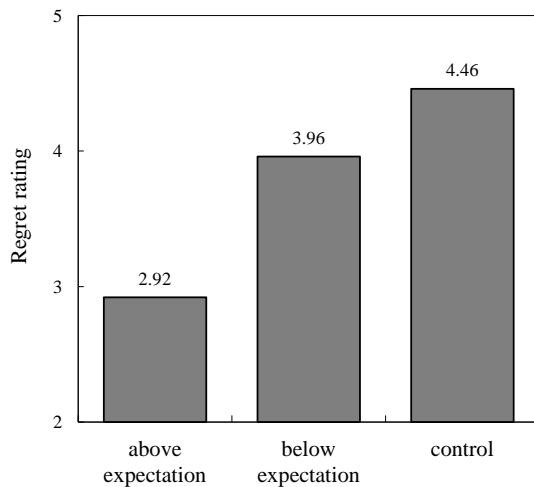
Figure 2: Results of Experiment 2.

testing showed that regret in the Above Expectation condition was significantly lower than in the Below Expectation condition ($p < .05$), and in the Control condition ($p < .001$). However, regret in the Below Expectation condition was not significantly different from the Control condition ($p = .38$).[1] These findings corroborate the reasoning that expectation statistically moderates the effect of the forgone outcome on the experienced regret. When the obtained outcome is higher than the expectation, decision makers feel less regret about their unfavorable outcome than when that outcome is below their expectation or when there were no initial expectations.

3 Experiment 2

We continued by testing our hypothesis in the context of losses. Losses are conceptually similar, but not identical to forgone gains. We expect somewhat more intense regret ratings than in Experiment 1, since losses loom larger than gains (Kahneman & Tversky, 1979) and negative outcomes evoke more counterfactual thinking than positive outcomes (Roese & Olson, 1997). However, concerning the differences between the conditions we expect to replicate Experiment 1.

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[1]Readers may wonder if these results only hold for the one-item scale directly asking about regret, or also for the multi-item scale. Hence, we also tested our hypothesis using two-item regret that were borrowed from Lin et al. (2006) and Tsiros and Mittal (2000): "I regret choosing Fund A" and "I feel sorry for choosing Fund A", and the same results were confirmed. The ANOVA on the two-item regret yield a significant main effect ($M_{below} = 3.02$, $SD = 1.40$; $M_{below} = 3.94$, $SD = 1.18$; $M_{control} = 4.42$, $SD = 1.27$), $F(2, 69) = 7.29$, $p < .001$. Post hoc tests showed significant differences between the conditions Above versus Below ($p < .05$) and Above versus Control ($p < .001$), but not Below versus Control ($p = .41$). We will provide these two-item analyses also for experiments 2–4.
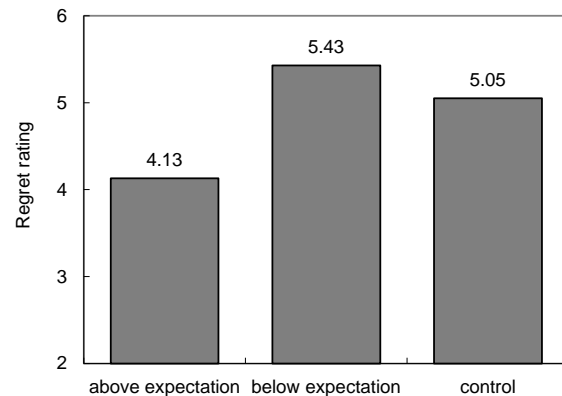
3.1 Method

One hundred and twenty Taiwanese on-job business students (44 males, 76 females, $M_{age} = 30.4$, $SD = 5.43$) received course credit for their participation. They were randomly assigned to one of three conditions (40 per condition). Subjects read the same scenario and regret question as in Experiment 1, but now the scenario ended as follows:

> You have held Fund A investments over one year. You plan to sell it today. During this past year, the international oil price has remained high, there have been terrorist attacks and a sharp plunge in the global economy. Based on news report, you expect you may lose NT\$200,000 [NT\$120,000]. After selling, you find that Fund A has lost NT\$160,000 of its value, which is better [worse] than your expected loss. However, you also find that you would have lost only NT\$100,000 if only you had invested in Fund B.

Subjects in the control condition did not read about the expectation information and were confronted only with the obtained outcome (a loss of NT\$160,000) and forgone outcome (a loss of NT\$100,000).

3.2 Results and discussion

The results are shown in Figure 2. They clearly replicate the findings of Experiment 1. One-way ANOVA testing yielded a significant effect ($M_{above} = 4.13$, $SD = 1.45$; $M_{below} = 5.43$, $SD = 1.17$; $M_{control} = 5.05$, $SD = 1.13$), $F(2, 117) = 11.26$, $p < .001$. Tukey HSD testing showed that regret in the Above Expectation condition was significantly lower than that in the Below Expectation condition ($p < .001$), and in the Control condition ($p < .01$).

However, the regret in the Below Expectation condition did not differ from that in the Control condition (p = .38).[2]

4 Experiment 3

Here we further investigated the impact of expectation on regret by testing the effect of the difference in size between the obtained and the alternative outcome. This manipulation should influence the intensity of regret, as this emotion is a reflection of this difference. However, on the basis of our theorized assumption and Experiments 1 and 2, we predict that this manipulation will affect regret only when the obtained outcome is below the prior held expectation.
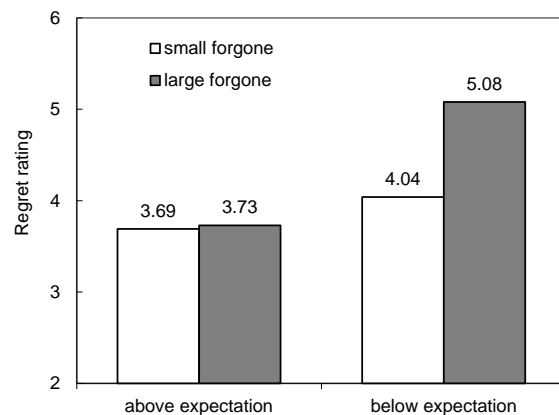
4.1 Method

One hundred and eight Taiwanese on-job business students (28 males, 76 females, M_{age} = 28.7, SD = 3.92) received course credit for their participation. They were randomly assigned to one of four conditions of the following 2 (Expectation: Above vs. Below) × 2 (Forgone Gain: Small vs. Large) design. There were 26 subjects per condition. The scenario and regret question were the same as in Experiment 1, with in the Large Forgone conditions a counterfactual outcome of NT$400,000.

4.2 Results and discussion

The results are shown in Figure 3. A 2 (Expectation) × 2 (Forgone gain) ANOVA on the regret ratings yielded significant main effects of Expectation (M_{above} = 3.71 vs. M_{below} = 4.56, F (1, 100) = 11.67, p < .001) and Forgone gain (M_{small} = 3.87 vs. M_{large} = 4.40, F (1, 100) = 4.73, p < .05), such that outcomes below the expectation as well as large forgone gain resulted in more intense regret. As predicted, the analysis also yielded a significant interaction, F (1, 100) = 4.08, p < .05, such that when the obtained outcome was below expectations, regret was higher in the Large Forgone gain condition (M = 5.08, SD = .89) than the Small Forgone gain condition (M = 4.04, SD = 1.37), t (50) = -3.24, p < .01. Contrarily, when the obtained outcome was above expectation, regret was lower and there was no effect of Forgone gain (M_{small} = 3.69, SD = 1.32; M_{large} = 3.73, SD = 1.40, t (50) = -.10, p = .92). These findings again corroborate the reasoning that expectation

Figure 3: Results of Experiment 3

serves as a moderator to influence the effect of the better-forgone outcome on experiencing regret.[3]

5 Experiment 4

Experiments 1 to 3 supported the idea that decision makers feel less regret when their outcomes outperform their expectations, if, in that case, they do not engage in comparisons with forgone investments. Nevertheless, some people are more likely to make counterfactual comparisons than others, and they may also do this when the outcomes are better than expected. Schwartz, Ward, Monterosso, Lyubomirsky, White and Lehman (2002) have argued that some people are more than others likely to engage in seeking the "best". They refer to this tendency as maximization. They constructed a reliable and validated Maximization scale for measuring these individual differences in the orientation to maximize, and allow for the opportunity to classify people as maximizers or satisficers. The satisficer is looking for something that crosses the threshold of acceptability—something that is good enough; the maximizer is looking for the best outcome. Previous research has shown that maximization is related to trait regret or regret proneness (Schwartz et al., 2002; Zeelenberg & Pieters, 2007), but it has not yet been applied to experience of regret as a state.

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[2]ANOVA demonstrated a similar main effect on the two item regret scale, F (2, 117) = 8.51, p < .001. For the Above, Below, and Control conditions, the regret ratings were 4.25 (SD = 1.41), 5.34 (SD = 1.04), and 4.84 (SD = 1.05), respectively. Post hoc tests revealed that the differences were between Above versus Below conditions (p < .001) as well as Above versus Control conditions (p = .07). No difference was found between Below and Control conditions (p = .15).

[3]The analysis of the two-item regret measure produced similar results. There were two main effects (Expectation: M_{above} = 3.57 vs. M_{below} = 4.47, F (1, 100) = 17.11, p < .001; Forgone gain: M_{small} = 3.77 vs. M_{large} = 4.27, F (1, 100) = 5.24, p < .05) and an interaction between the Expectation and Forgone gain, F (1, 100) = 4.10, p < .05. When the outcome was Below expectations, subjects reported higher level of regret in the Large Forgone condition than in the Small Forgone gain condition (M_{small} =4.00, SD = 1.22 vs. M_{large} = 4.94, SD = .73, t (50) = -3.39, p < .001. In contrast, no difference was found for subjects in the Above expectation condition (M_{small} = 3.54, SD = 1.28 vs. M_{large} = 3.60, SD = 1.15, t (50) = -.17, p = .87).

In Experiment 4, we used this insight about individual differences in the tendency to maximize to further explore the influence of expectation on regret in the context of social comparison (i.e., the better-performing forgone outcome was obtained by a friend). We propose that the effect of expectation would be moderated by individual differences in maximization, such that satisficers would be less influenced by the better-performing forgone outcomes. With "good enough" rather than the "best" as a criterion, satisficers should be less inclined to experience regret. However, since maximizers desire the best possible results, when they realize that their outcomes would have been better, they will suffer strongly from regret, regardless of the level of expectation. Lastly, regret will not be significantly different between satisficers and maximizers when expectation information is unknown (the better-performing forgone outcomes serve as the only reference point).

5.1   Method

One hundred and five on-job Taiwanese business students (42 males, 63 females, $M_{age} = 29.6$, $SD = 5.01$) received course credit for their participation. They filled in the 13-item Maximization Scale ($\alpha = .77$) (Schwartz et al., 2002). The items were combined and averaged to provide a single composite score, ranging from 2 to 6.6, with a median of 4.2 on the 7-point scale. We then performed a median split on the maximizing scale. We refer to students whose score fell above the median as maximizers ($n = 52$); and those whose score fell below the median as satisficers ($n = 53$).

The subjects were randomly assigned to one of three conditions (Expectation: Above vs. Below vs. Control), with 35 subjects per condition. The scenario in the Above [Below] Expectation condition read as follows:

> After several years hard work, you finally have NT\$1,000,000 in your bank account. You wish to invest this money in order to earn more. As the interest of a savings deposit account is low and the risk of stock investment is high, you consider investing NT\$1,000,000 in the fund market. After narrowing the search, you consider two funds: European Funds A and B. You decide to invest in Fund A. One of your friends also invests NT\$1,000,000 but he invests in European Fund B. You expect that Fund A will earn you a profit of NT\$90,000 [NT\$150,000] after one year.
>
> NOW, ONE YEAR LATER. . .
>
> You have held investments in Fund A for over one year and you plan to sell today. After selling, you find that Fund A has earned you

NT\$120,000, which is better [worse] than your expectation. However, you also note that your friend earned NT\$180,000 when he sold Fund B on the same day.

Subjects in the control condition did not read about the expectation information and were only confronted with their own obtained profit and that obtained by their friend. After this, subjects responded to our regret question.

5.2   Results and discussion

The results are shown in Figure 4. A 3 (Expectation: Above vs. Below vs. Control) × 2 (Maximizers vs. Satisficers) ANOVA on the regret ratings yielded a significant main effect of expectation, $F(2, 99) = 3.26$, $p < .05$, a significant main effect of maximizing orientation, $F(1, 99) = 7.11$, $p < .01$. In agreement with our main hypothesis, these two main effects were qualified by a significant interaction, $F(2, 99) = 3.31$, $p < .05$.[4]

Simple main effects analysis revealed that the difference in the means between the three conditions for the Maximizers were not significant ($M_{above} = 4.43$, $SD = 1.16$; $M_{below} = 4.35$, $SD = 1.27$; $M_{control} = 4.47$, $SD = .74$), $F(2, 49) = .06$, $p = .95$). That is, Maximizers gave high regret ratings regardless of the levels of expectation. For Satisficers, the simple main effects analysis indicated that regret was significantly lower when the unfavorable outcomes were above expectations ($M = 2.86$, $SD = 1.24$) than below expectations ($M = 4.08$, $SD = 1.31$) or expectations unknown ($M = 4.30$, $SD = 1.53$), $F(2, 50) = 6.37$, $p < .01$. Consistent with our reasoning, Satisficers reported less regret when their unfavorable outcomes were higher than expectations than lower than expectations or expectations unknown.[5]

These findings corroborate the view that social comparison processes may add to regret (Boles & Messick, 1995; Huang & Tseng, 2007; Larrick, 1993; Van Dijk & Zeelenberg, 2005; Zeelenberg & Pieters, 2004, 2007). Beyond this corroboration, our findings are of special importance because they support the notion that personality plays an important role in the selection and use of reference points. In particular, we conclude that the effect of expectation on regret (that we revealed in the previous three experiments) was mainly derived from satisficers. When the obtained unfavorable outcome was higher

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[4] The interaction remained significant, at $p < .01$, using a continuous measure of maximization.

[5] The analysis of the two-item regret scale also resulted in a significant interaction effect, $F(2, 99) = 3.36$, $p < .05$. For Maximizers, the regret ratings were not significant between the Above, Below, and Control conditions, $F(2, 49) = .23$, $p = .79$ ($M_{above} = 4.29$, $SD = .96$; $M_{below} = 4.50$, $SD = 1.11$; $M_{control} = 4.37$, $SD = .67$). For Satisficers, the regret differences were significant between conditions Above versus Below and Above versus Control, $F(2, 50) = 7.53$, $p < .001$ ($M_{above} = 2.86$, $SD = 1.14$; $M_{below} = 3.83$, $SD = 1.27$; $M_{control} = 4.33$, $SD = 1.29$).

Figure 4: Results of Experiment 4.
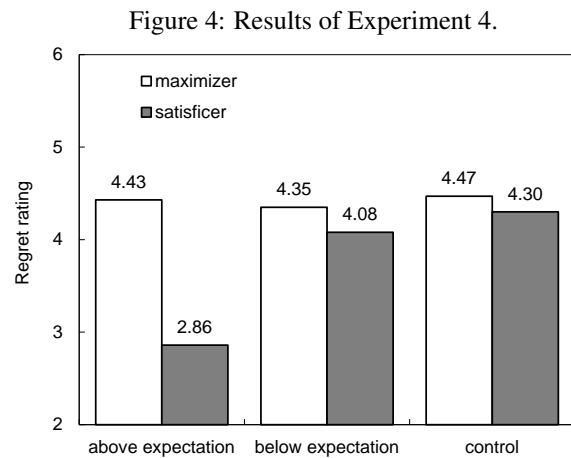
than expectation, satisficers viewed this outcome as good enough and were less likely to compare the actual outcome with the imagined outcome that might have occurred, and thus kept them from the negative feelings of regret. Expectation had no effect for maximizers, because they were inclined to pursue the best results. They thus suffered from a high level of post-decisional regret when they encountered a better-performing forgone outcome.

6 Experiment 5

The previous experiments were consistent with the idea that decision makers feel less regret when their outcomes outperform their expectations because they do not engage in counterfactual comparisons with forgone investments. In Experiment 4 we found that maximizers' regret is always amplified when the counterfactual outperforms the chosen investment, even when the investment performs better than expected. In this experiment we focus more directly on the counterfactual comparison process and ask half of our subjects to make this comparison before we ask them to indicate their emotional response. If our reasoning holds, subjects that are probed to make counterfactual comparisons will show results similar to the maximizers in the previous experiment. For the subjects that are not probed to make counterfactual comparisons we expect to find that regret is only high when the chosen investment performs worse than expected.

Experiment 5 makes another contribution. We also examine the effects of expectation and counterfactual probing on disappointment. We expect that disappointment is affected only by expectation, and not by the counterfactual comparison with the outcome of a different choice.

Finally, this study was run in The Netherlands, in the Dutch language and with Dutch students as subjects, allowing us to ask whether the effect of expectation on re-

gret can also be found in another culture.

6.1 Method

One hundred and fifty nine students at Fontys University in Tilburg (76 males, 83 females, M_{age} = 20.48, SD = 3.52) participated voluntarily and received 5 euro in return. They were randomly assigned to one of 4 conditions of the 2 (Expectation: Above vs. Below) × 2 (Counterfactual Probing: No vs. Yes) design. Subjects read the scenario from Experiment 1, with the exception that it dealt with the Asian funds AQT and BXA.

Subjects in the Probing Counterfactual condition were asked to write down the amount of profit they had made with their investment in AQT, and were also asked to write down how much more profit they would have obtained had they invested in BXA. After this, subjects indicated on two single items how much regret they felt over choosing to invest in AQT and how disappointed they were in the outcome of their investment (0= *not at all*; 10 = *very much*). Subjects in the NO Probing condition did not receive the profit questions and responded to the regret and disappointment question immediately after reading the scenario.

6.2 Results and discussion

The results are shown in Figure 5. A 2 (Expectation: Above vs. Below) × 2 (Counterfactual Probing: No vs. Yes) ANOVA on the regret ratings yielded significant main effects of expectation (M_{above} = 4.84 vs. M_{below} = 5.89, F (1, 155) = 7.99, $p < .01$) and Counterfactual Probing ($M_{no\ probing}$ = 4.82 vs. $M_{probing}$ = 5.91, F (1, 155) = 8.62, $p < .01$. The interaction is not significant, F (1, 155) = 2.03, $p = .16$.

Although the interaction did not reach significance, the simple main effects analysis revealed that for subjects who were not probed we replicated the earlier findings. Regret was significantly lower when the investment outcomes were above expectations (M = 4.03, SD = 2.28) than below expectations (M = 5.61, SD = 2.29), F (1, 155) = 9.13, $p < .01$. However, this difference disappears when subjects that were probed to compare counterfactuals (M_{above} = 5.65, SD = 2.20; M_{below} = 6.17, SD = 2.53), F (1, 155) = .98, $p = .33$. That is, when explicitly asked to compare the investment outcome to the counterfactual investment, regret ratings are high regardless of the levels of expectation. This finding replicates the finding for maximizers that we obtained in Experiment 4, but now more directly shows that it is due to comparison processes.

The ANOVA on the disappointment ratings yielded only a significant main effect of expectation, F (1, 155)

Figure 5: Results of Experiment 5
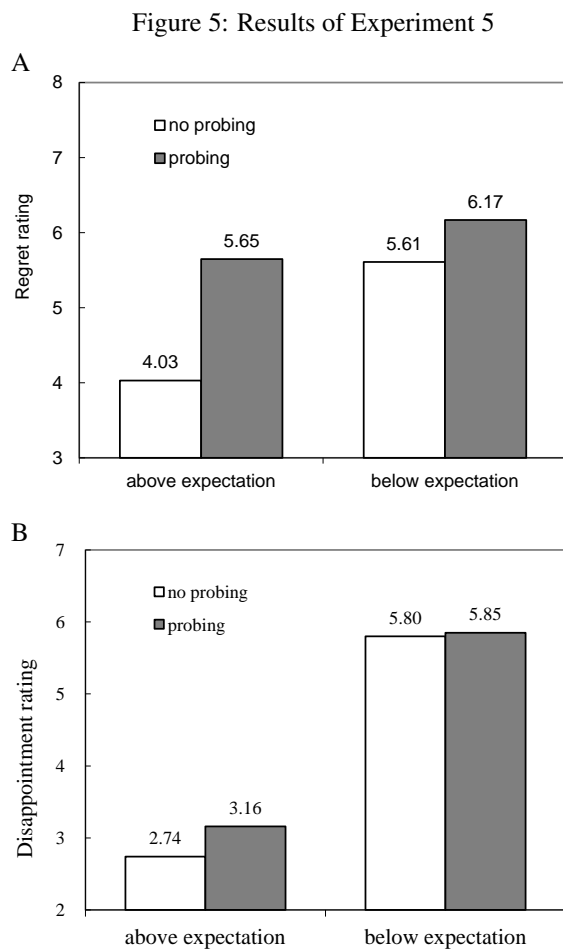
= 71.42, $p < .001$. The Counterfactual Probing main effect and the interaction were non significant, F's (1, 155) = 0.48, p's $< .49$. The subjects were more disappointed when the investment yielded a profit below expectation ($M = 5.83$, $SD = 2.23$), than when it was above expectation ($M = 2.96$, $SD = 2.00$). Note that in also when the obtained outcome was above expectations, the non-chosen investment was even better. The disappointment ratings thus were unaffected by the counterfactual comparison with outcome of the non-chosen investment, and only affected by how the obtained outcome compared to the expectation.

7   General discussion

Regret is rooted in a comparison of actual decision outcomes with counterfactual outcomes. In this study, we used this observation to gain more insight into the comparison process underlying regret. In particular, we explored the role of expectation in moderating the effect of the forgone outcome on the judgments of post-decisional regret. Based on extensive past research, we assumed that, when outcomes exceed expectations, people are less likely to think through the consequences of the better-performing forgone outcomes, and this failure prevents them from experiencing regret. Conversely, when outcomes fall below expectations or expectations are absent, people engage in counterfactual thinking of what could have been, and thus suffer from regret.

This hypothesis was supported by the results of five experimental studies. Our results showed that subjects with unfavorable outcomes (the obtained outcome is worse than the forgone one) tended to report less regret when outcomes were above expectations than below expectations or no expectation—either in a win (Experiments 1, 3, and 4) or loss (Experiment 2) situation. This hypothesis was also supported in a large forgone gain situation (Experiment 3): when outcomes exceeded expectations, subjects indicated less regret about their unfavorable outcomes regardless of the magnitude of the missed gain. However, when outcomes fell below expectations, subjects expressed more regret when they missed out on a much better investment (e.g., NT$400,000) than when they missed out on only a slightly better one (e.g., NT$200,000). Experiment 5 further reveals that when subjects are probed to make counterfactual comparisons, investments that exceed expectations also lead to regret.

Lin et al. (2006) were the first to show that expectation is related to regret (see also, Huang & Tseng, 2007). Our findings expand this insight in three important ways. First, our data are experimental instead of correlational, allowing for causal conclusions to be drawn. Second, we provided five replications of the effect of expectations, showing the robustness of the effect. Third, and psychologically most interesting, our data reveal interesting knowledge about the underlying process. The experimental data clearly show that the comparison process that takes place when people judge their post-decisional regrets is moderated by expectations and individual differences in maximization.

We are not the first to theorize on the role of potential moderators regarding counterfactual outcomes and regret. For example, Van Dijk and Zeelenberg (2005) demonstrated that uncertainty about counterfactual outcomes, and incomparability of counterfactual and factual outcomes were factors that moderated comparison process of eliciting regret. The current study examined from a different angle how the effect of the might have been outcome on the experienced regret was strongly moderated by the expectations. Subjects used the violation of their expectations as a criterion for comparing relative performance of the different investment options. This behavior may be an advantage because it might protect people from experiencing regret. Regret threatens people's self-image because it can lead them to question the

wisdom of their original decision (Larrick, 1993). People can escape regret by thinking positively about what has happened (e.g., I earned as much as I expected) rather than what could have happened. This protects their self-images and sense of personal well-being. This conclusion is consistent with the claim made by Loewenstein and Lerner (2003, p. 624): "People care not only about the relative outcomes of a decision but also about what the chosen outcome implies for their own self-evaluation as a competent, intelligent person."

In addition, although many studies have documented that regret and disappointment are independent of each other (e.g., Bell, 1985; Zeelenberg & Pieters, 2004; Zeelenberg et al., 1998), Loomes and Sugden (1987, 1988) suggested the possibility that people make both comparisons. They claimed that "under certain circumstances we might expect regret and disappointment to occur simultaneously: they may be complementary rather than mutually exclusive" (Loomes & Sugden, 1987, p. 120). More recently, Yi and Baumgartner (2004) concluded that regret experiences are sometimes accompanied by negative disconfirmation regarding a chosen alternative; regret and disappointment were positively correlated. Our results in the present study are consistent with these conjectures of multiple reference points.

An additional insight stems from the finding that the effects of expectation are moderated by individual differences in the need to maximize (Schwartz et al., 2002). Results from Experiment 4 show that maximizers are not affected by how the obtained investment outcome relates to the prior held expectation, but only by the comparison with the outcome of the unchosen investment. Satisficers, however, look for something that is good enough (that passes a threshold of acceptability). When an obtained outcome exceeded expectation, satisficers felt less regret because that outcome has crossed the threshold of acceptability. For them, it is less necessary to regret a bird in the hand to two in the bush. As far as we know, this is the first demonstration of effects maximization on the state of regret.

Interestingly, the findings concerning maximization are compatible with other studies that reveal the role played by personality in counterfactual thinking and reference point selection. For example, Kasimatis and Wells (1995) found that individuals with high self-esteem tend to select downward counterfactuals (e.g., a person with a lower salary), while low self-esteem subjects tended to select upward counterfactuals (e.g., a person with a higher salary). Van Dijk and Zeelenberg (2005) found that compared to those lower in social comparison orientation (Gibbons & Buunk, 1999), subjects high in social comparison orientation engaged in social comparisons that produced regret, even if these turned out to be difficult comparisons. Our findings that maximizers

tend to select the better-performing outcome as a comparison standard, while satisficers may initially select the expectation as a comparison standard after decision making also adds new insight to this literature.

Finally, we studied the role of prior expectancies on the psychology of investor regret. This is especially useful, since it has often been argued that regret is a crucial emotion in the life of investors (e.g., Kahneman & Riepe, 1998, Shefrin & Statman, 1986). One may argue that our study is limited by the fact that we used hypothetical scenarios, and that things may be different for actual investors (Girotto et al., 2007; Fernandez-Duque &Landers, 2008). Even though we are sensitive to such comments concerning the external validity of lab studies, we note that our subjects all had personal experience with investing. Moreover, our studies were partly inspired by the research of Lin et al. (2006) who found that regret was related to expectation, using a sample of real investors who reflected about their own investments. We think that our experimental studies, along with the survey of Lin et al. provide strong evidence for the role of expectation in investor regret.

To sum up, while the forgone alternative has long been the dominant focus in regret studies, our study contributes considerably to the understanding of the powerful effects of expectation and individual differences in maximization on the post-decisional comparison processes regarding regret.

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