Psychological Aspects of the Disposition Effect: An Experimental Investigation

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CHAPTER 3:

Personality and Investment:

Personality Differences Affect Investors' Adaptation to Losses

3.1 Abstract

The coping literature has demonstrated that differences in personality affect how individuals adapt to various stressful events, such as physical pain and traumatic experiences. This chapter extends these findings into a stressful event in the financial domain, investment losses. We hypothesize that differences in the Big Five personality traits can explain variance in individuals' extent of adaptation to financial losses. The reported findings show that individuals scoring higher on *agreeableness* and *intellect*, and lower on *conscientiousness* adapt more to losses. It will be argued that these findings suggest that adaptation requires willingness and ability to process new information.

3.2 Introduction

When facing stress, people react differently. While the performance of some people would be negatively affected, some people seem to be able to remain calm and not to be influenced by the stressor. Individuals may deal with stressful events in life using various coping strategies, including their effort to cope with the stressor or to regulate their emotions. The coping strategies can affect the final outcome of the stressful event (Lazarus and Folkman 1984). The stressful events investigated in the extant literature are diverse, including divorce of parents (Lengua and Sandler 1996), traumatic events such as flooding (Morgan, Mattews, and Winton 1995), and physical pain (Miro and Raich 1992). The current chapter applies the findings from the coping literature to another type of stressful events, financial losses. This extension not only provides a first insight into the relevance of coping for financial decision making, but also enhances our knowledge of a recently investigated topic in behavioral finance, i.e., reference point adaptation (Arkes, Hirshleifer, Jiang, and Lim 2008; Lee, Kraeussl, Lucas, and Paas 2009).

Adaptation to a financial loss, or (reference point) adaptation, implies that an individual's reference point is adjusted to the decreased value of the losing investment. Consider an investment with an initial value of $100. The initial reference point for the investment is represented by its initial value of $100. This is the neutral value, in which neither losses nor gains are perceived to have occurred by the investor. Now assume that the value of this investment decreases to $70. Some individuals may not adapt to this change, their reference point remains at $100. Others may fully adapt and have an adapted reference point of $70. Furthermore, those individuals who partially adapted to the financial will have an adjusted reference point between $70 and $100. Adaptation has consequences for the manner in which the investor will interpret future changes in the value of the investment. For example, those who have not adapted to the first $30 value decrease will not feel positive

about the investment when its value changes from $70 to $90, while those who have adapted fully will be positive about the investment after this increase. For the latter group the increase to $90 implies an increase to a level that is above their current reference point.

Reference point adaptation is a salient topic for research, as it is related to the occurrence of the disposition effect. The disposition effect concerns the investors' tendency to hold losing investments (losers) too long and sell winning investments (winners) too soon (Shefrin and Statman 1985; Stracca 2004; Van der Sar 2004). Evidence of the disposition effect has been found in experiments (Weber and Camerer 1998; Lee, Park, Lee, and Wyer 2008) and in trading records among retail and professional investors (Odean 1998; Garvey and Murphy 2004). The disposition effect has high societal relevance as it leads to suboptimal financial decisions, which may have strong effects on household welfare and company profits. Prospect theory (Kahneman and Tversky 1979) is the most prominent explanation for the disposition effect. Apart from prospect theory, Shefrin and Statman (1985) suggest that mental accounting, anticipated regret and pride and self control can explain the disposition effect. Recently other explanations for the occurrence of the disposition effect have also received attention (e.g., Dhar and Zhu 2006; L'Haridon 2009). Most relevant for the current chapter, Lee et al. (2009) find that adaptation to prior financial losses affect individuals' probability to sell losing investments, which is highly relevant in explaining the disposition effect. Lee et al. (2009) find that when holding expectations of the investments future gains or losses constant, larger adaptation to prior loss is linked to a smaller probability to sell losers.

Current knowledge on reference point adaptation, however, is limited, particularly into the occurrence of individual differences in reference point adaptation (Arkes et al. 2008; Lee et al. 2009). Arkes et al. (2007, 2008) find that individuals adapt to gains faster than to losses and they report cross-cultural differences in reference point adaptation. However, no

previous research assessed how reference point adaptation varies across individuals. Thus, there is uncertainty as to how individual heterogeneity, such as personality, affects how much individual adapt to gains and losses. Empirical findings reported in the economics literature show that personality influences individuals' earnings (Bowles, Gintis, and Osborne 2001; Groves 2005; Nyhus and Pons 2005; Semykina and Linz 2007) consumption patterns (Brandstätter and Güth 2000), and the degree of cooperative behaviors (Boone, De Brabander, and van Witteloostuijn 1999). However, since adaptation to financial gains and losses is a relatively novel area of research (Arkes et al. 2008), there is a gap in literature regarding the link between personality and adaptation of reference point.

Based on a large body of literature on how people cope with stressful events (e.g., Lazurus and Folkman 1984; Connor-Smith and Flachsbart 2007), it is clear that individual differences in personality affect individuals' decision making, behavior, and coping strategies. Acceptance, one of many possible coping strategies, closely resembles adaptation, see Section 3.3. Furthermore, previous research shows personality traits are linked to the use of various coping strategies and also to acceptance in particular (see summary by Connor-Smith and Flachsbart 2007). Therefore, we will derive hypotheses from the coping literature concerning how individual personality differences affect adaptation to financial losses, see Section 3.3. Sections 3.4 and 3.5 present the conducted empirical study and its results. Section 3.6 concludes and discusses the findings and provides implications for future research on the adaptation of reference points, personality and financial decision making.

This chapter contributes to knowledge in various literature streams. Research examining the link between personality differences and coping with financial losses has not been reported previously. Thus, we contribute to the coping literature by investigating a new stressor, namely financial losses. Next to this, insight into the affects of individual personality

differences on adaptation to financial losses will enhance knowledge of this particular adaptation process, see discussion in Section 3.6.

3.3 Theoretical Framework

According to Lazarus and Folkman (1984), coping is commonly defined as attempts to adapt to pain, or manage one's own negative responses to pain or other stressors. Research in coping has shown that individuals cope with various stressful life events using diverse strategies (Lazarus and Folkman 1984). In a review Skinner, Edge, Altman and Sherwood (2003) find that there are more than a hundred coping categorization schemes. Commonly used coping strategies include, problem-solving, wishful thinking, withdrawal, denial and cognitive restructuring. Connor-Smith and Flachsbart (2007) conduct a meta-analysis in the coping literature and find that the Big Five personality traits predict the use of specific coping strategies. For example, extraversion and conscientiousness predict the use of strategies such as problem-solving and cognitive restructuring.

The coping strategy of most interest here is *acceptance*, meaning that one comes to terms with the stressor/environment that cannot be changed, learning how to live with it, and develops a sense of understanding (Connor-Smith and Flachsbart 2007). In a way, the person accepts the current environment to be the new status quo. Section 3.3.1 discusses similarities between acceptance and adaptation. Section 3.3.2 discusses the relations between acceptance, reference point adaptation and personality. Section 3.3.2 also presents the hypotheses to be tested in the empirical study.

3.3.1 Acceptance and Adaptation of Reference Point

Acceptance is a particularly important coping strategy in situations where the stressor is something to be accommodated to, as opposed to situations where the stressor can be

changed easily (Carver, Scheier, and Weintraub 1989). David and Suls (1999) find that lower perceived control over events was associated with greater reliance on coping strategies such as distraction, acceptance, seeking emotional social support, but less use of direct action. When facing paper losses, retail investors can hardly change the situation. The only two actions they can engage in are: hold on to the losing investment or sell it and realize the loss. None of these actions give investors control over the financial loss that they already incurred. Thus, we expect that acceptance is a potential important coping strategy for financial losses.

We propose that the coping strategy *acceptance* closely resembles *reference point adaptation* in the prospect theory framework (Kahneman and Tversky 1979). Before discussing this resemblance, we first briefly discuss reference point adaptation from the perspective of prospect theory. Prospect theory postulates that investors evaluate outcomes with regard to a reference point. This is the salient neutral point on the evaluation scale, if the outcome is above (below) this point, it is considered as a gain (loss). Furthermore, prospect theory suggests investors experience loss aversion, because losses impose approximately double the psychological effect of equally sized gains. In addition, investors are risk averse in the gain domain, and risk seeking in the loss domain. This is reflected in concavity of the value function above the reference point and convexity below, see Figure 3.1. This results in the disposition effect (Shefrin and Statman 1985; Stracca 2004; Van der Sar 2004). Although selling a losing investment can prevent one from incurring additional losses, actually realizing the loss is psychologically painful. Therefore, investors tend to choose the risky option (holding on to the losing investment, i.e. keeping just "paper losses") in order to retain the possibility of avoiding pain. In the gain domain, investors are likely to sell winners to realize/capture the paper gain due to their risk aversion.

Figure 3.1

Utility function in prospect theory

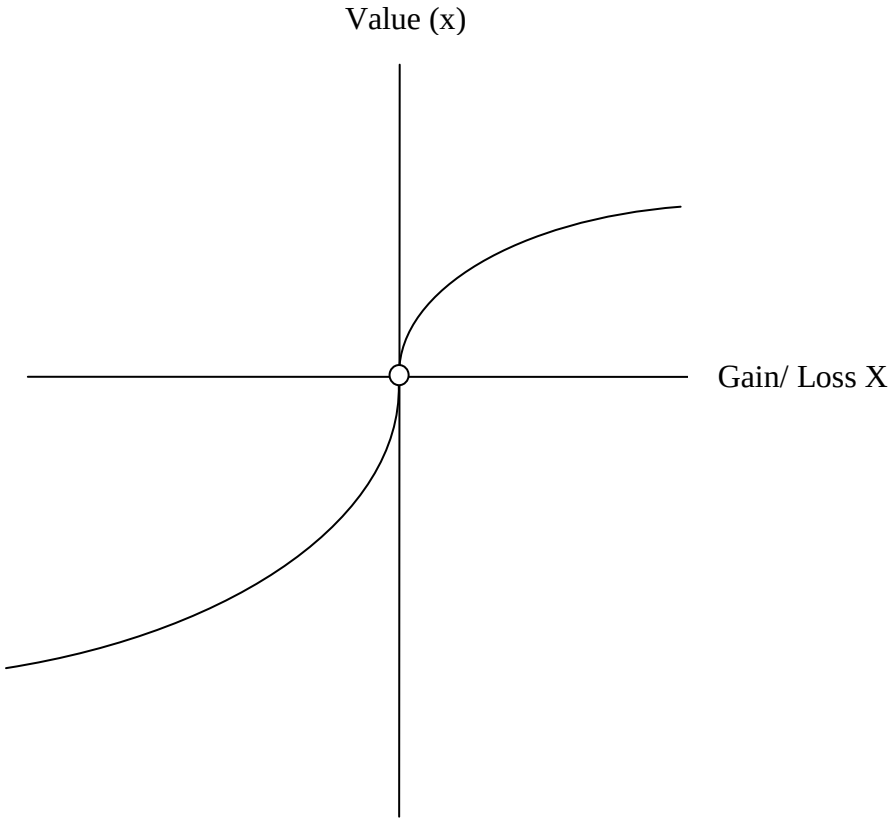

Figure 3.1 depicts the conventional prospect theory value function (Kahneman and Tversky 1979) that is used in the theoretical framework of this chapter. Here we do not employ the value function with concave region in the loss domain as shown in Figures 2.1 and 2.2 in Chapter 2. It is because in this chapter we conduct a single-stage experiment to investigate how personality affect adaptation, therefore it is not appropriate to use the double kink value function for multi-stage setting illustrated in Chapter 2.

The reference point of an individual in prospect theory may not be static. Recent studies (Arkes et al. 2008; Lee et al. 2009) have demonstrated occurrence of reference point adaptation, after the values of investments have changed. The shift of the reference point is in the direction of a prior outcome. After incurring a loss the reference point of many investors will shift downwards and upward adjustments may occur after gains. Arkes et al. (2008) find

that individuals can adapt to both gains and losses in the financial domain, meaning that through time, prior gains (losses) would generate less positive (negative) value. Individuals update their reference point based on prior financial gains or losses, and partly if they do not fully accept their prior gain and loss as their status quo. Furthermore, individuals adapt to gains at a faster pace as compared to losses (Arkes et al. 2008). Lee et al. (2009) also found that investors adapt to gains and losses, and they report an experiment that shows investors are more likely to let go of their losing investments if they have adapted less to the losing investment, holding expectations constant.

The notion of acceptance in the coping literature and adaptation of reference point both concern reactions of individuals to a new stressor or loss. When people engage in acceptance, they learn to live with the loss and the resulting limitations. Thus, the situation with a stressor becomes the status quo. When investors adapt to paper losses, their reference point moves downward and towards the paper loss, that is, they have a new status quo. As such, both acceptance and adaptation of reference point are dealing with individuals' perception of the updated status quo/neutral reference. In both of these concepts, the stressor/paper loss influences the location of the updated status quo/reference point.

Adaptation is a relatively novel topic in the behavioral finance literature and has not received much attention. However, acceptance as a coping strategy, has been examined to a wide extent in the psychology and personality literature. In the following, we review the literature on the Big Five personality dimensions and propose links between personality and adaptation in the financial domain, based on the coping literature.

3.3.2 Big Five Personality Traits and Adaptation

Changes in life circumstances can create ups and downs in life satisfaction. Most individuals will be capable of adapting to such changes (Brickman, Coates, and Janoff-

Bulman 1978; Kahneman 1999). Nonetheless, Lucas, Clark, Georgellis and Diener (2003) report evidence showing that there are significant individual differences in the extent to which individuals adapt back to their baseline level (or reference point). They find that years after a loss or a traumatic event, some people do not rebound to how satisfied they felt about their life, prior to the event. That is, they do not accept the occurrence of the event and its consequences over time. Adaptation to financial losses resembles acceptance. Since there are individual differences in terms of accepting events in life, it is not surprising that in the financial domain some investors adapt more/faster to financial gains and losses than the others (Arkes et al. 2008; Lee et al. 2009). However, the specific individual differences that are related to reference point adaptation have not been researched previously.

In terms of how individual differences affect other aspects of financial decision-making, several antecedents have been tested previously. For instance, Dhar and Zhu (2006) find that investors with higher educational levels and professional occupations are less likely to exhibit the disposition effect. Grinblatt, Keloharju and Linnainmaa (2009) suggest that investors with a high IQ outperform those with a below average IQ. While individual differences such as age, gender, income, intelligence, etc have been tested or controlled for in these prior studies, the effects of personality on investment have not been examined. We propose that the Big Five model of personality provides a useful context for assessing individual differences in adaptation to financial losses. Many studies in the coping literature are based on this model (for example, Bishop et al. 2001; David and Suls 1999). Since we build our hypotheses upon the findings in the coping literature, we also make use of the Big Five model of to hypothesize individual differences in adaptation to financial losses.

The Big Five traits are commonly labeled as: (1) Extraversion (or Surgency); (2) Agreeableness; (3) Conscientiousness (or Dependability); (4) Emotional Stability (vs.

Neuroticism); and (5) Intellect or Openness to Experience, Culture (Goldberg 1992)[1]. These traits are rooted in biological structure and processes (McCrae et al. 2000). The Big Five traits are the five main dimensions of personality. In each dimension various characteristic are included, as will be discussed below. A recent meta-analysis study by Connor-Smith and Flachsbart (2007) indicates that the Big Five personality traits predict the use of different coping strategies by individuals. As there seem to be strong similarities between the coping strategy acceptance and adaptation to financial gains/losses, we focus our discussion on the literature of the Big Five personality traits and acceptance, and propose hypotheses.

Extraversion includes positive affectivity, sociability, assertiveness and sensitivity to reward (McCrae and John 1992; Rothbart and Bates 1998). Individuals scoring high on extraversion tend to be energetic, cheerful, and optimistic, and they tend to view stressful situations as challenges (Gallagher 1990). Being energetic and optimistic should facilitate the use of engagement strategies such as cognitive restructuring, problem solving, seeking support, etc. David and Suls (1999) also suggest that those who score higher on extraversion should rely more on active, problem-focused coping strategies because of their tendency to see problems as challenges. As an exception, Bishop et al. (2001) have found that extraversion to be positively related to acceptance, which is not an active coping strategy (Connor-Smith and Flachsbart 2007). In sum, most of the reported empirical research suggests extraversion primarily affects the likelihood to engage in coping strategies other than acceptance. Thus, we expect no relation between extraversion and reference point adaptation/acceptance, i.e.:

H1*: Extraversion does not affect adaptation to financial losses.*

[1] There are two dominant labels of the Factor V in five-factor models of personality: Openness to Experience versus Intellect. Goldberg (1994) suggests that in the Five Factor Model of genotypic personality dispositions, Factor V can be interpreted as Openness to Experience. However, in the Big Five model of phenotypic personality-trait, Factor V is better labeled as Intellect or Imagination.

Agreeableness includes characteristics such as trust, altruism, and compliance (McCrae and John 1992). This dimension largely reflects interpersonal tendencies. Individuals scoring high on agreeableness tend to have a more extensive social support network from which they can seek support when stressors are encountered. Since agreeableness relates to compliance, individuals scoring higher on agreeableness are more likely to accept the current situation (Costa, Somerfield, and McCrae 1996). Bishop et al. (2001) find that agreeableness is positively related to the use of acceptance as a coping strategy. In the financial domain, we expect that if the price of the investment has decreased, people who score high on agreeableness are more likely to accept the current situation, i.e.:

H2: *Agreeableness has a positive relation with adaptation to financial losses.*

Conscientiousness includes characteristics such as high levels of self-regulation, persistence, impulse control, achievement orientation, and self-discipline (McCrae and John 1992). Conscientiousness represents the general tendency to be strong-willed, and determined. Conscientious individuals are careful planners and engage in active coping strategies when a stressor is encountered. Individuals scoring high on conscientiousness have strong control over their own attention; they are able to stay focused on tasks, regardless whether the tasks are enjoyable or not. This high attention span and persistence enables individuals to engage in various coping strategies, which leads to a smaller probability that acceptance is chosen above other coping strategies. Moreover, individuals scoring high on conscientiousness have high levels of persistence and achievement orientation, they may hold on to their expectations and previously set goals and refuse to accept anything less (McCrae and John 1992). This may lead to a negative relation between conscientiousness and adaptation to financial losses.

H3: *Conscientiousness has a negative relation with adaptation to financial losses.*

Neuroticism (vs. emotional stability) reflects one's general tendency to experience negative affective states. *Neuroticism* includes characteristics such as negative affectivity, self-consciousness, physiological reactivity, and behavioral inhibition (McCrae and John 1992; Miles and Hempel 2003; Rothbart and Bates 1998). Neuroticism includes intense emotions and strong responses to stress. Individuals scoring high on neuroticism experience a high level of unpleasant arousal, when facing stressful events. To avoid feeling unpleasant, they are likely to use coping strategies that help disengaging themselves from the stressful events, such as avoidance, withdrawal, venting emotions, etc (Connor-Smith and Flachsbart 2007). As these means of coping are more likely to be used by individuals scoring high on neuroticism, acceptance becomes a strategy that is less likely to be chosen. Thus, we expect a negative relation between neuroticism and reference point adaptation. Since neuroticism is opposite to emotional stability, we expect a positive relation between emotional stability and reference point adaptation:

H4: *Emotions Stability has a positive relation with adaptation to financial losses.*

Intellect, also often referred as Openness to experience[1], represents the tendency to be creative and to engage in divergent thinking. Openness to experience/ intellect includes creativity, curiosity, flexibility, imagination, and intellectual interests (McCrae and John 1992). Since individuals scoring high on intellect are more flexible and creative, they may try a number of coping strategies until they find one that suits the demands of the stressful situation. Furthermore, Bishop et al. (2001) find that openness to experience is positively related to positive reinterpretation and acceptance. People who score high on openness to experience are more likely to take new perspectives and look into new events from various angles. They may be more likely to perceive a paper loss as expectable or less surprising when other external factors, such as market turbulence, economics and political factors, etc, are under consideration. Thus, they are expected to be more likely to accept the new financial

situations and the updated price of an investment, that is, they are more likely to accept their paper losses. Therefore, we expect a positive relation between openness to experience and reference point adaptation.

H5: *Intellect has a positive relation with adaptation to financial losses.*

3.4 Empirical Study

3.4.1 Subjects

A total of 229 undergraduate students (132 male, 93 female, 4 non-responses) from a university in The Netherlands participated in this study. Questionnaires were filled in during a class that is part of an undergraduate course in marketing for the Business Program. The average age of participants is 21.67 years (SD=2.38). Each participant voluntarily filled out the questionnaire to enter a lottery of cash rewards, a total of 500 EUR was paid.

3.4.2 Personality Measures

There are various measures for the Big Five factors. The more commonly used ones are: the Eysenck Personality Questionnaire (EPQ-R) (Eysenck, Eysenck, and Barrett 1985) and the NEO Five-Factor Inventory (NEO-FFI) (Costa and McCrae 1992). Among these Big Five personality traits, openness (also referred to as openness to experience, intellect, culture) is least consistent across measures (John and Srivastava 1999). Several authors have criticized the reliability of the scores of openness in NEO scales across studies (Caruso 2000), and the validity of openness as a personality trait (Goldberg 1994). To overcome problematic measurement of openness within the NEO scales, we use another relatively new personality inventory the International Personality Item Pool - IPIP (Goldberg 1992) to measure personality (Theakston et al. 2004; Heaven and Bucci 2001). Gow, Whiteman, Pattie, and Deary (2005) find that Emotional Stability, Extraversion and Conscientiousness

scales of the IPIP were highly correlated with those of the NEO-FFI, while Agreeableness and Intellect/Openness scales correlated less strongly. They conclude that the IPIP scales have good internal consistency and relate strongly to major dimensions of personality assessed by NEO Five Factor Inventory (NEO-FFI) developed by Costa and McCrae (1992) and Eysenck Personality Questionnaire-Revised Short Form (EPQ-R) developed by Eysenck, Eysenck and Barrett (1985).

We used the 50-Item set of IPIP Big Five factor markers (Goldberg 1992); each of the five domains was measured by 10 items rated on a 5-point scale (1=very inaccurate, 5= very accurate). About half of the items in each domain are negatively scored. Examples of the items include: am the life of the party (measuring *Extraversion*), am interested in people (measuring *Agreeableness*), am always prepared (measuring *Conscientiousness*), get stressed out easily (measuring *Emotional Stability*), have a rich vocabulary (measuring *Intellect*). We calculate the mean score for each of the five traits. The IPIP scale has good internal consistency. The Cronbach's alphas of the Big Five personality traits obtained in our study are: Extraversion = .86, Agreeableness = .72, Conscientiousness = .75, Emotional Stability = .79, Intellect = .74. Reliability of the IPIP items for each of the five traits obtained in this study is consistent with previous studies[2].

3.4.3 Adaptation Measures

We adopt the reference point adaptation measures used in study 1 in the paper of Arkes et al. (2008). While our focus is on adaptation in the domain of loss, we also included the domain of gain for comparison purposes. By random assignment, participants were presented either with a gain (N=118) or a loss (N=111) scenario. In both scenarios participants were told that they had bought a stock for $30 per share two months ago. The

[2] For example, the Cronbach's alpha obtained in the student sample of Gow et al. (2005) for Extraversion, Agreeableness, Conscientiousness, Emotional Stability, Intellect are .87, .72, .80, .85, and .77 respectively.

price of the stock decreased (increased) to $24 ($36) last month. Participants were asked to fill out what stock price today would make them feel equally sad (happy) as the previous loss (gain). With this question, participants were in fact asked to report what the stock price has to be today to generate the same utility as the previous gain or loss. In the loss domain, if one does not adapt to the previous loss at all, then the stock price at $24 per share today would generate the same negative utility. If one does adapt to the loss, then we expect the equally sad price to be under $24. For the gain domain not adapting implies one would be equally happy if the price of the stock remains to be $36. To calculate the adaptation of reference point, Arkes et al. (2008) proposed an equality, which we also used to calculate adaptation in this study. Assume that the previous reference point is R_0 and the previous stock price is defined as P_1. Furthermore, the shape of the prospect theory value function is held constant and the difference between R_0 and P_1 is the same as the difference between the equally happy/sad price (P^*) and the adapted reference point (R^*).

$$P^* - R^* = P_1 - R_0 \;\rightarrow\; \Delta R = R^* - R_0 = P^* - P_1 \qquad (1)$$

For the loss domain in our study, participants on average think that a second loss to $21.26 would make them feel as sad as the previous loss from $30 to $24. For the gain domain in our study, participants on average believe that a second gain to $40.14 would make them feel equally happy as the first gain from $30 to $36. These answers are extremely close to those obtained in study 1 of Arkes et al. (2008) ($40.24 for winning investments and 21.49 for loser). Equation (1) implies that the value obtained from the second gain ($40.14 – R*) is the same as the value of the first gain ($36 – R_0). Thus, on average participants in the gain domain have adapted $4.14 upwards ($40.14 $- R^* = 36 - R_0 \rightarrow \Delta R = R^* - R_0$ = $40.14 – $36) after the first gain. In the loss domain, on average participants have adapted $2.74 downwards ($21.26 – $24). Participants have adapted to a greater extent in the gain domain then in the loss domain, which is also consistent with Arkes et al. (2008).

3.5 Results

We calculated the participants' scores on the Big Five personality traits, by taking the means of the item-scores for each trait, as the Cronbach's Alpha in each scale was sufficiently high, see Section 3.4.2. Multivariate linear regression analysis was conducted to assess the effects of these mean scores on the extent of adaptation in the loss and gain domains. Results indicate that in the loss domain, higher scores on agreeableness (β = .245, t (109) = 2.73, p = .007) and intellect (β = .318, t (109) = 3.26, p = .001), and lower score on conscientiousness (β = -.210, t (109) = -2.22, p = .028) are related to a greater extent of adaptation to loss. The effect of extraversion (β = -.173, t (109) = 1.79, p = .076) on adaptation is marginally insignificant and emotional stability does not affect adaptation to financial losses (β = -.040, t (109) = -.436, p = .664). In this analysis, R-square equals .16, F (5, 105) = 4.010, p = .002.

We ran a similar multivariate linear regression of personality on adaptation in the gain domain to provide a comparison. In the gain domain, none of the scores are significantly related to the extent of adaptation to gains, for agreeableness β = -.075 (t (115) = -.786, p = .434), for intellect β = -.093 (t (115) = -.957, p = .341), for extraversion β = -.018 (t (115) = -.186, p = .853), for conscientiousness β = -.131 (t (115) = -1.38 , p = .170), and for emotional stability β = -.045, (t (115) = -.471, p = .639). In this analysis, R-square equals .04, F (5, 111) = .937, p = .460. These results are summarized in Table 3.1.

Table 3.1

Effects of Big Five personality traits on adaptation to losses and gains

	Extent of Adaptation (Beta**)**			
	Domain of Loss	Domain of Gain	Domain of Loss	Domain of Gain
Big Five personality traits				
Extraversion	-0.173	-0.018	-0.168	-0.004
Agreeableness	0.245**	-0.075	0.230*	-0.049
Conscientiousness	-0.210*	-0.131	-0.216*	-0.113
Emotional Stability	-0.040	-0.045	-0.042	-0.061
Intellect	0.318**	-0.093	0.310**	-0.106
Controls				
Sex			-0.005	-0.071
Age			0.042	-0.027
$\mathbf{R^2}$	0.160	0.040	0.160	0.039

Notes: * $p < .05$. ** $p < .01$.

As hypothesized, higher scores on agreeableness and intellect, and lower scores on conscientiousness lead to more adaptation to losses. Furthermore, extraversion does not significantly affect adaptation to financial losses. Thus, hypotheses 1, 2, 3 and 5 received support respectively. Emotional stability is not linked to adaptation to loss, so hypothesis 4 was not supported. Another finding is that personality is only relevant for adaptation to financial losses and not for adaptation to gains. Our results remain robust after controlling for individual differences such as sex and age.

3.6 Conclusion and Discussion

The behavioral finance literature has demonstrated that risk aversion, loss aversion, mental accounting (Kahneman and Tversky 1979; Shefrin and Staman 1985; Thaler 1985; Thaler and Johnson 1990), education level, professional occupations (Dhar and Zhu 2006) and IQ (Grinblatt, Keloharju, and Linnainmaa 2009) can all affect individuals' decisions. Our results support previous studies (Dhar and Zhu 2006; Grinblatt, Keloharju, and Linnainmaa 2009) that heterogeneity among individuals can explain the variance in their financial decisions. We extend the literature by researching beyond the conventional socio-economical, demographical factors and cognitive capabilities, and test how personality traits relate to adaptation to losses. While our results confirm previous findings that individuals adapt faster to gains than to losses (Arkes et al. 2008), we also show that there is a link between personality and adaptation. With the use of a questionnaire, we find that individuals who score higher on *agreeableness* and *intellect*, and lower on *conscientiousness* adapt to losses to a larger extent. The Big Five personality traits, on the contrary, do not have significant impact on adaptation to gains. Thus, personality is influential when one is adapting to negative events, for example, financial losses, but not when one is facing positive events. The latter is a topic that can be investigated in other domains.

The results of this study, together with the results of previous studies that investigated investor heterogeneity (Dhar and Zhu 2006; Grinblatt, Keloharju, and Linnainmaa 2009), may have implications for the design of investment education programs that frequently focused on cognitive skills, such as understanding risks and returns. If personality traits affect adaptation to financial losses, investment education programs may teach investors about how their disposition traits in personality may affect their trading decisions.

In this study, we have focused on personality and have excluded other potentially relevant individual differences. Further investigation is needed to increase our understanding

of the explanatory power of heterogeneity among individuals on adaptation to financial losses and subsequent effects on financial decisions. Future research should explore other potential variables that may explain the variance in adaptation of the reference point, such as self-esteem, type-A personality. Our results may also link to the study of subjective well-being. Our results suggest that personality may affect how individuals adapt to the economic environment and how they perceive their subjective well-being. Greater knowledge of how variables measuring individual differences are related to adaptation to financial losses can increase our understanding of retail investors' decision–making processes.

Our results also lead to a more general suggestion for further research. Adaptation to gains and losses is important for gaining understanding into investment decisions in a dynamic setting. It has been found that adaptation to prior gains or losses affect subjective value of attached to subsequent trading options, which eventually affect investors' investment decisions. More specifically, Lee et al. (2009) found that adapted reference point interacts with expectation and affects investors' decisions to hold or to sell a losing investment. In this chapter, we find that individuals' personality traits affect their extent of adaptation, implying that personality traits should be taken into account in economic models as well.

Appendix 3A: The 50-Item Set of IPIP Big-Five Factor Markers

How Accurately Can You Describe Yourself?

Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Indicate for each statement whether it is 1. Very Inaccurate, 2. Moderately Inaccurate, 3. Neither Accurate Nor Inaccurate, 4. Moderately Accurate, or 5. Very Accurate as a description of you.

	Very Inaccurate	Moderately Inaccurate	Neither Accurate Nor Inaccurate	Moderately Accurate	Very Accurate	
1. Am the life of the party.	O	O	O	O	O	(1+)
2. Feel little concern for others.	O	O	O	O	O	(2-)
3. Am always prepared.	O	O	O	O	O	(3+)
4. Get stressed out easily.	O	O	O	O	O	(4-)
5. Have a rich vocabulary.	O	O	O	O	O	(5+)
6. Don't talk a lot.	O	O	O	O	O	(1-)
7. Am interested in people.	O	O	O	O	O	(2+)
8. Leave my belongings around.	O	O	O	O	O	(3-)
9. Am relaxed most of the time.	O	O	O	O	O	(4+)

10. Have difficulty understanding abstract ideas.	O	O	O	O	O	(5-)
11. Feel comfortable around people.	O	O	O	O	O	(1+)
12. Insult people.	O	O	O	O	O	(2-)
13. Pay attention to details.	O	O	O	O	O	(3+)
14. Worry about things.	O	O	O	O	O	(4-)
15. Have a vivid imagination.	O	O	O	O	O	(5+)
16. Keep in the background.	O	O	O	O	O	(1-)
17. Sympathize with others' feelings.	O	O	O	O	O	(2+)
18. Make a mess of things.	O	O	O	O	O	(3-)
19. Seldom feel blue.	O	O	O	O	O	(4+)
20. Am not interested in abstract ideas.	O	O	O	O	O	(5-)
21. Start conversations.	O	O	O	O	O	(1+)
22. Am not interested in other people's problems.	O	O	O	O	O	(2-)
23. Get chores done right away.	O	O	O	O	O	(3+)
24. Am easily disturbed.	O	O	O	O	O	(4-)
25. Have excellent ideas.	O	O	O	O	O	(5+)
26. Have little to say.	O	O	O	O	O	(1-)
27. Have a soft heart.	O	O	O	O	O	(2+)

28. Often forget to put things back in their proper place.	O	O	O	O	O	(3-)
29. Get upset easily.	O	O	O	O	O	(4-)
30. Do not have a good imagination.	O	O	O	O	O	(5-)
31. Talk to a lot of different people at parties.	O	O	O	O	O	(1+)
32. Am not really interested in others.	O	O	O	O	O	(2-)
33. Like order.	O	O	O	O	O	(3+)
34. Change my mood a lot.	O	O	O	O	O	(4-)
35. Am quick to understand things.	O	O	O	O	O	(5+)
36. Don't like to draw attention to myself.	O	O	O	O	O	(1-)
37. Take time out for others.	O	O	O	O	O	(2+)
38. Shirk my duties.	O	O	O	O	O	(3-)
39. Have frequent mood swings.	O	O	O	O	O	(4-)
40. Use difficult words.	O	O	O	O	O	(5+)
41. Don't mind being the center of attention.	O	O	O	O	O	(1+)
42. Feel others' emotions.	O	O	O	O	O	(2+)
43. Follow a schedule.	O	O	O	O	O	(3+)
44. Get irritated easily.	O	O	O	O	O	(4-)

45. Spend time reflecting on things.	O	O	O	O	O	(5+)
46. Am quiet around strangers.	O	O	O	O	O	(1-)
47. Make people feel at ease.	O	O	O	O	O	(2+)
48. Am exacting in my work.	O	O	O	O	O	(3+)
49. Often feel blue.	O	O	O	O	O	(4-)
50. Am full of ideas.	O	O	O	O	O	(5+)

Notes. The numbers in parentheses after each item indicate the scale on which that item is scored (i.e., of the five factors: (1) Extraversion, (2) Agreeableness, (3) Conscientiousness, (4) Emotional Stability, or (5) Intellect/Imagination) and its direction of scoring (+ or -). These numbers should not be included in the actual survey questionnaire.

Source: http://ipip.ori.org/New_IPIP-50-item-scale.htm