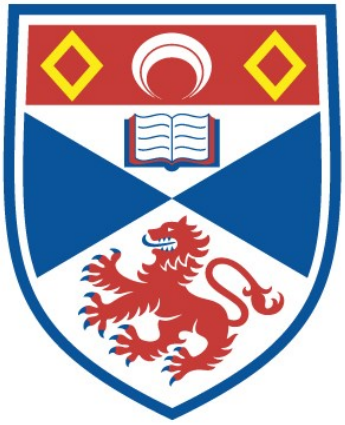
INVESTING, PERSONALITY, AND SOCIAL PREFERENCES : ESSAYS ON THE PSYCHOGRAPHICS OF US INDIVIDUAL INVESTORS

Moritz K. H. Wiesel

A Thesis Submitted for the Degree of PhD
at the
University of St Andrews



2017

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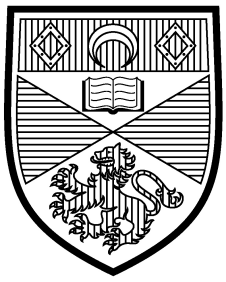

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To the loving memory of my father.
To my mother, and my sister.

Acknowledgements

The last four years have been some of the most challenging years of my life and writing this thesis during those years has been a great challenge in itself. Undoubtedly, I would have not completed this piece of work were it not for the help, guidance, and encouragement that I received from many people during this time. In the following lines I thank them.

First and foremost I want to thank my supervisors Prof. Dr. L.J.R. Bert Scholtens and Dr. Kristian Ove R. Myrseth. Prof. Scholtens has been part of this journey from near the beginning. He has been one of the few constants during this time and he constantly kept me on track to finish it. Prof. Scholtens' professional work ethic is inspirational, his honest feedback, detailed comments coupled with his expertise in finance and SRI has helped me tremendously in writing this thesis. Furthermore, I was fortunate enough that a leave of absence meant that I would return to St Andrews just at the time that the School of Management hired Dr. Myrseth. With his enthusiasm and expertise on Psychology a vague idea became an empirical strategy, became a survey and eventually turned into data. Dr. Myrseth comments, encouragement, and numerous skype calls have made it possible for me to finish this thesis. I truly am grateful to have had the fortune of working with two such exceptional supervisors, thank you both!

Naturally, I also thank my family. My parents whose unwavering support in any endeavour I chose to undertake has helped me overcome obstacles of many different kinds. My father who was so supportive and encouraging when I embarked on this journey and who would have been immensely proud to see me finish it. My mother, who has helped me in so many ways throughout this journey and my life, listing all, would surpass the length of this thesis, so I will just say thank you! My sister, Katharina and her husband Dr. Lars-Arne Schaper who have always been there for me. I want to thank our family friends in Germany especially, Dr. Evi Grebe and Dr. Michael Grebe and Dr. Karel Meirowitz. Without their help, support, and encouragement I surely would have not been able to continue this thesis after my fathers untimely passing. I also want to thank Popi Gkikopoulou, Danai Gotsis, and Andreas Aktundianakis, the best housemates and friends I could ever have wished for. Likewise I thank my friends Dimitris Alexakis, Annamarie Huttunen and Julius Huttunen, and Vladimiros Dagkas-Tsoukalas, for their friendship and many wonderful days spent discussing life and all things related. I thank my friends Aleena Khan, Isabelle Schmidt, Cecil Grau, Afeef Nessouli, Simon Geldmann, Philipp Schacht, Philip-Moritz Schulz, and Anton Wasmuth for their friendship and support.

I thank Dr. Kais Bouslah, for always having an open door. His kind words, advice, comments and help have helped me immensely. I thank Dr. Philip Roscoe for his support and understanding in difficult times. Dr. Pejman Abedifar for very helpful comments. I thank Dr. Dimitrios Alexakis and Dr. Leonidas Barbopoulos my go-to econometricians and friends, and Dr. Annamarie Huttunen for enthusiastic late night discussions about Psychology and Neuroscience. I thank Dr. Roland Proud for his help with python programming, and Dr. Carl Donovan for his tipsy R coding. I also want to thank the wonderful ladies who are the backbone of the School of Management, Shauna Deigman, Eleanor Brown, Jennifer Kerr, Jo McGinley, Sam Letham. Without these ladies the School would not be the wonderful place that it is. I also thank Jan Leenhouts not just the purveyor of the finest coffee in St Andrews but also the creator of a space where people from all walks of life congregate, where a fifteen minute coffee break can turn into a three hour long discussion about any topic, from literature and art, to politics and psychology to name but a few.

Last but not least, I want to thank the people of Scotland, who have always been so welcoming, it truly has been my privilege to live in Scotland for so many years, what a wonderful place it is, I am ever so proud to call it my second home.

Abstract

In three essays, I investigate whether investors' social preferences and personality traits can help explain individual investors' investment decisions. The first essay investigates whether investors' social preferences are associated with three measures of engagement in socially responsible investments (SRI): (1) 'interest' in investing, (2) the likelihood of having invested, and (3) the share of the portfolio invested. The results suggest that investors' social preferences are positively associated with the reported 'interest' investors have in investing in SRI, and the likelihood that investors have invested in SRI in the past. I do not find evidence that investors' social preferences are associated with the share of their portfolio invested in SRI. This pattern is consistent with a 'warm glow' interpretation of investor motivation to hold SRI. The second essay explores whether investors' personality traits - linked to prosocial behaviour - are associated with two measures of engagement in SRI: (1) 'interest' in investing, and (2) the likelihood of having invested. The findings suggest that prosocial personality traits are related to both the 'interest' investors' report in investing in SRI, and the likelihood that investors' have invested in SRI in the past. What is more, investors' aversive personality traits are also associated with the likelihood that investors' have invested in SRI in the past. Together, these results suggest that both 'altruistic' and 'selfish' motivations drive investors' engagement in SRI. The third essay investigates whether investors' personality traits - linked to risk taking - are associated with four measures of financial risk taking. The evidence I uncover in the third essay paints an unclear picture, on the whole the evidence suggests that investors' personality traits are not very important characteristics when it comes to financial risk taking.

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Chapter 1:

Introduction

The models of investment theory such as Modern Portfolio Theory (Markowitz 1952), and the Capital Asset Pricing Model (e.g. Sharpe 1964), are all based on an "excessively narrow view of economic man" (Bénabou and Tirole 2011, p. 806) where the motive of investors is to solely maximise risk-adjusted returns (i.e. rational economic behaviour) and individual differences between investors have no influence on investment decisions (Akerlof and Kranton 2000; Statman 2004). However, this view of agents (i.e. investors) has been challenged many times over the last decades (see e.g. (Sen 1987; Broome 1999; Shiller 2003), and economists have since developed models that account for investors' psychological idiosyncrasies. For example Shefrin and Statman (2000) propose a Behavioral Portfolio Theory (BPT) that takes into account the 'mental accounting' (i.e. the process by which people code, categorise, and evaluate economic budgets) of investors. In the BPT investors choose portfolios by considering expected wealth, desire for security and potential, aspiration levels (i.e. avoiding poverty or a 'shot at riches'), and probabilities of achieving aspiration levels (Shefrin and Statman 2000). Furthermore, economists have developed models where choices of agents are influenced by other characteristics such as their identity (e.g. Akerlof and Kranton 2000; Bénabou and Tirole 2011) or desire for a positive reputation (Bénabou and Tirole 2006). Similarly, academics working at the intersection of economics and personality psychology have developed models that integrate personality traits into economic models (Borghans et al. 2008; Almlund et al. 2011). This thesis addresses this literature by investigating the following principal question: Can investors' social preferences and personality traits help explain investment decisions? Specifically, three topics are investigated. These are: (a) can investors' *social preferences* help explain the decision to invest in socially responsible investments, (b) can investors' *personality traits* help explain the decision to invest in socially responsible investments, and (c) can *personality traits* help explain investors' decisions to invest in riskier assets?

All chapters within this thesis draw on primary cross-sectional data collected between 17th March and 2nd June 2015 via a survey administered on members of the American Association of Individual Investors. Although the cross sectional data does not allow me to apply any of

the aforementioned behavioural finance models directly, I use their underlying framework as a theoretical base for this thesis. In contrast to the framework of traditional finance theory, which assumes strictly rational agents, the framework of the behavioural finance models allows for different investor idiosyncracies. This 'behavioural lens' allows me to investigate important aspects of investors' psychographics and their role in investment decision making on a sound theoretical footing. In turn, the findings presented within this thesis can be used as a starting point for future investigations utilising behavioural finance models directly, for example in experimental settings. To ascertain investors' psychographics I draw on methods from social psychology, experimental economics, and personality psychology. Specifically, chapter 2 utilizes the concept of social preferences, common in social psychology and experimental economics (Fehr and Fischbacher 2002; Murphy and Ackermann 2014). Chapters 3 and 4 employ methods from personality psychology, the branch of psychology specifically concerned with individual differences (Ferguson et al. 2011). The three empirical chapters are presented in the form of articles with the intent of being published in academic journals. In the following lines, I introduce each chapter and summarise its main findings.

Chapters 2 and 3 investigate the role of investors' characteristics in the decision to invest in socially responsible investments. When following a socially responsible investment strategy "… investors try to account for environmental, social, governance and ethical issues in the investment process" (Scholtens 2014, p.382). Within the academic literature and amongst practitioners this practice is also referred to as 'responsible investment', 'ethical investment', or 'sustainable investment' (Winnett and Lewis 2000; Scholtens 2014; GSIA 2016). For the sake of exposition, I hereafter use the term socially responsible investing (SRI) when referring to this investment strategy. SRI is implemented via several different investment strategies[1] or a combination thereof. Common strategies include: negative screening, positive screening, and the best-in-class approach (Scholtens 2014). Negative screening refers to leaving out controversial firms and industries (e.g. tobacco, weapons, fossil fuels); positive screening involves concentrating on particularly favourable firms or industries; and best-in-class means focusing on the top 30-50% of firms with respect to particular social or environmental performance criteria, when choosing a portfolio (Scholtens 2014). Socially

[1] The Global Sustainable Investment Alliance, an international collaboration of SRI investment organisations, distinguishes between the following seven SRI strategies: (1) Negative/exclusionary screening, (2) positive/best-in-class screening, (3) Norms-based screening, (4) integration of ESG factors, (5) sustainability themed investing, (6) impact/community investing, and (7) corporate engagement and shareholder action (GSIA 2016, p.3).

responsible investors, thereby, depart from the assumed textbook investor behaviour that underlies investment theory models - such as the Modern Portfolio Theory (Markowitz 1952) - by limiting their asset universe to investments based on criteria that are not strictly financial. Nonetheless, demand for socially responsible investment (SRI) products is consistently growing.

Several interest groups gather data about the size of the 'SRI market'. It should be noted that no unifying definition of SRI exists; any estimation about the size and the growth rates of the 'SRI market', therefore, is very arbitrary and should be treated with caution (Scholtens 2014). One SRI interest group, reporting data about the 'SRI market' is the Global Sustainable Investment Alliance (GSIA). According to GSIA the SRI market in the Unites States grew by 33 percent from 2014 to 2016, with an estimated $8.72 trillion of assets under professional management being invested according to SRI strategies in 2016 (GSIA 2016). This represents nearly 22 percent of all investment assets under professional management (GSIA 2016).

Keeping in mind the aforementioned caution that should be exercised regarding the estimates of the size and growth of the SRI market, it is worth noting that the definition used by the interest groups have largely remained the same. If anything definitions of the SRI market used by interest groups have become narrower since data collection began[2]. It is, therefore, safe to say that demand for SRI products is consistently growing.

While the bulk of global SRI investing is undertaken by institutional investors, individual investors are an important driver. A US based interest group, The Forum for Sustainable and Responsible Investment, names client demand as a principal reason for money managers to introduce products adhering to SRI (USSIF 2016). Likewise, Eurosif - a European SRI interest group - reports a growing demand for SRI products from individual investors (Eurosif 2016). The question is, why do investors depart from the behaviour assumed by investment theory and limit their asset universe to invest in SRI?

Some researchers have proposed that SRI may provide better risk-adjusted returns compared to conventional investment strategies (Mill 2006). Others have argued that investing in SRI and away from 'sin' industries (i.e. weapons manufacturing, tobacco, alcohol, or gambling) can be financially costly for investors (Fabozzi et al. 2008; Hong and Kacperczyk 2009). However recent surveys of the literature on SRI show that the majority of studies on financial performance of SRI come to the conclusion that SRI investment vehicles overall do neither perform better nor worse when compared to conventional investment benchmarks (see e.g.

[2] For example, the Global Sustainable Investment Alliance reports a "tightening" of the definition of SRI in Europe as the reason for a slowdown in reported SRI growth (GSIA 2016, p.3).

Capelle-Blancard and Monjon 2012, and von Wallis and Klein 2014). This begs the question: Do investors invest in SRI because they believe it offers *better* risk-adjusted returns compared to conventional investing, despite the majority of empirical studies finding no difference, or do SRI investors invest in SRI because of some non-financial reason?
This is the main question that I address in chapters 2 and 3. I propose that investors may invest in SRI for prosocial reasons. SRI investing has a clear moral component, in fact it is also referred to as 'ethical investing' (Winnett and Lewis 2000). In chapter 2 I investigate this question by measuring investors' social preferences in a model that controls for their risk- and return-expectations of SRI assets as well as number of relevant investor characteristics. In chapter 3 I use the same model but investigate this question by measuring investors' personality traits.

Although traditional investment theory models such as the Capital Asset Pricing Model (e.g. (Sharpe 1964) are based on the assumption that investors exclusively pursue wealth maximization, a number of authors have challenged this perspective. Statman (2004), for example, argues that investors seek expressive and not just utilitarian benefits. With regards to SRI specifically, Beal et al. (2005) and Bollen (2007) argue that investors derive non-financial utility from investing in SRI. In fact, some authors argue that wealth maximization is not the primary motivation of the majority of investors who invest in SRI (e.g. Beal and Goyen 1998). Moreover, a number of studies suggest that SRI investors are motivated by both financial and non-financial characteristics of their investments (McLachlan and Gardner 2004; Pérez-Gladish et al. 2012; Dorfleitner and Utz 2014). In chapter 2, I address this literature by investigating whether social preferences can help explain individual investors' engagement in SRI. Specifically, I examine three distinct measures of engagement in SRI: (1) 'interest' in investing in SRI (2) the likelihood of ever having held such investment, and (3) the proportion of such investment in the total investment portfolio currently held. Two studies investigated the role of social preferences in SRI investing to date. Heimann (2013) implemented an experimental investment game with French investors, using both NGO donations and the A3 Altruism scale from the International Personality Item Pool (Goldberg et al. 2006) as measures of social preferences. However, Heimann (2013) finds no association between either measure of social preferences and the proportion of the portfolio dedicated to SRI in the investment game. Riedl and Smeets (2014) combine a trust-game experiment on individual investors with administrative data from the investors' Dutch mutual fund provider. The authors find that the amount returned, in the second stage of the trust game, is associated

positively both with the likelihood of owning an SRI fund and with the percentage of the portfolio invested in the SRI fund (Riedl and Smeets 2014). However, there is a possibility that their measure captures reciprocal behaviour—in response to the initial amount sent by the first mover—as opposed to unconditional prosocial behaviour. I contribute to this literature by measuring *unconditional* social preferences with a recently improved measure of the construct, the 'SVO slider measure' (Murphy et al. 2011). I use ordered logistic, logistic, and tobit regression analysis to ascertain whether investors' unconditional social preferences help explain investors' engagement in SRI.

The main findings in chapter 2 can be summarised as follows. I find evidence to reject the null hypothesis of no association between social preferences and SRI investing. Specifically, I find robust evidence for a positive association between social preferences and the first two measures of engagement in SRI - general interest in SRI, and the likelihood of having invested in SRI - but no association between social preferences and the proportion of responsible investments in the portfolio currently held. Taken together, these results are consistent with a 'warm glow' interpretation (Andreoni 1989; 1990) of investor motivations to hold SRI. In other words it appears that individual investors might be motivated out of pro-social concerns to hold 'some' SRI—but not necessarily to devote a larger share of their wealth to the cause.

My results thus dovetail with the findings of Riedl and Smeets (2014), confirming that the positive relationship between SRI engagement and social preferences is not confined to reciprocity, but also includes unconditional prosociality. Moreover, I obtain the result with members of the American Association of Individual Investors (AAII) —a new sample, both broad and relevant—indicating that patterns obtained previously for European investors also generalize to North Americans. This thesis thus contributes to the literature by providing further evidence of investors' social preferences being associated with SRI engagement in a targeted sample of individual investors from the US. Furthermore, this thesis contributes to the SRI literature by introducing a newly developed and thoroughly validated measure of unconditional social preferences that allows researchers to ascertain investors' social preferences on a continuous scale with high-resolution scores.

In chapter 3 I draw on measures from personality psychology to inform the question whether personality traits that are related to prosocial behaviour can help explain investors'

engagement in SRI. Personality traits are defined as the "relatively enduring patterns of thoughts, feelings, and behaviours that reflect the tendency to respond in certain ways under certain circumstances" (Roberts 2009, p.7). To measure engagement in SRI I use two of the measures that were investigate in chapter 2: (1) 'interest' in SRI investing, and (2) the likelihood of ever having held such investments. I examine investors' personalities with four different personality inventories pertaining to four different, but related, personality frameworks. I employ one measure - the Big Five Short (Gerlitz and Schupp 2005) - pertaining to the most widely researched personality framework - the Big Five (Ferguson et al. 2011). Additionally, I use one measure - the HEXACO-60 (Ashton and Lee 2009) - belonging to a recently proposed alternative framework to the Big Five, the HEXACO personality framework (Lee and Ashton 2004). Moreover, I include two personality inventories that measure personality traits, which are relevant to prosocial behaviour but have received little attention in the literature: Empathy, and the 'dark side' of personality (i.e. aversive personality traits) (Ferguson et al. 2011). I measure investors' empathy with the Interpersonal Reactivity Index (Davis 1980; 1983), the 'gold standard' of measures for empathy (Artinger et al. 2014). And lastly, I assess investors' aversive personality traits with a measure - the Short Dark Triad (Jones and Paulhus 2014) - for the so-called 'Dark Triad' of personality: Machiavellianism, Psychopathy, and Narcissism (Paulhus and Williams 2002).

Personality psychology offers researchers a large toolbox of instruments to study peoples' individual differences. The discipline has recently received attention especially amongst economists looking for ways to examine determinants of economic outcomes beyond commonly used revealed preference measures (Borghans et al. 2008; Cooper 2016). However, with the exception of Heimann (2013) who employs the A3 Altruism scale from the International Personality Item Pool (Goldberg et al. 2006) and uses it as a measure for social preferences, to the best of my knowledge there are no studies investigating the role of personality in the decision to invest in SRI. Chapter 3 thereby addresses, and links two separate literature streams. First, chapter 3 addresses specific questions from the SRI literature, namely: do investors invest in SRI for prosocial reasons? Secondly, chapter 3 links the SRI literature to the burgeoning literature stream at the intersection of personality psychology and economics by using personality trait measures to ascertain investors' prosocial tendencies.

There is a lively debate in the personality psychology literature about how many traits best represent a complete yet parsimonious personality profile (Hilbig et al. 2013a). The most prominent and most widely researched personality framework is the so-called Big Five framework, proposing five traits capture all aspects of a person's personality (Ferguson et al. 2011; Goldberg 1992; Costa and McCrae 1992). However, recently a six-factor structure has been proposed as an alternative, the so-called HEXACO personality framework (Lee and Ashton 2004). Importantly, for my investigation in chapter 3, the six-trait structure differs mainly in the way different aspects of prosocial behaviour are measured (Ashton and Lee 2007). The topic of which structure better captures a complete personality profile is still subject of a heated debate, and ongoing research (Ashton and Lee 2007; Hopwood and Donnellan 2010). I therefore include a measure for both personality frameworks in chapter 3, in the hope of addressing this debate by investigating the extent to which the prosocial traits from both the Big Five and the HEXACO can help explain investors' decision to engage in SRI.

Furthermore, I also include a measure for empathy chapter 3. The so-called 'empathy-altruism' hypothesis posits that empathy is an important antecedent for prosocial behaviour (Batson et al. 1981)[3]. Empathy is widely studied in investigations of cooperative behaviour in both biology (De Waal 2008) and psychology (Batson et al. 1997a; Batson et al. 1997b). However, with the exception of Fong (2007), Kirman and Teschl (2010), and Artinger et al. (2014), empathy is largely overlooked in the literature on prosocial behaviour in economics (Ferguson et al. 2011).

I include the Interpersonal Reactivity Index (Davis 1980) the 'gold standard' measure for empathy in this study, to investigate the role of two different types of empathy related pro-social motivations: Empathic Concern and Personal Distress. Empathic Concern captures "other oriented" feelings of sympathy and concern for unfortunate others, and Personal Distress refers to "self oriented" feelings of personal anxiety and unease in tense interpersonal situations (Davis 1980). Where the former is related to intrinsic prosocial behaviour, and the latter is related to a 'selfish' motivation - acting prosocially to relieve one's own agony. In the context of SRI, a positive association of personal distress could signal a motivation related to 'moral licensing', whereby the moral act of investing in SRI is used to justify immoral behaviour elsewhere (Monin and Miller 2001).

[3] It should be noted that the importance of empathy as a direct precursor for prosocial behaviour is still subject of debate (Maner et al. 2002; Singer and Lamm 2009).

Additionally, I also include a measure of aversive personality traits in the investigation in chapter 3 - the Short Dark Triad (Jones and Paulhus 2014). While 'negative' behaviours have been part of studies on cooperative and prosocial behaviour in economics (e.g. negative reciprocity, free-riding etc.), little attention has been paid to the 'dark side' of personality (i.e. malicious personality traits) (Ferguson et al. 2011). As Ferguson et al. (2011) note the difference between negative behaviour (such as free riding) and dark personality traits is that the former is *reactive* whereas the latter can also be *proactive*. In other words, someone who free rides does so as a reaction to the choice architecture, whereas aversive personality traits can lead people to actively engage aversive behaviour to attain certain goals, deceiving and exploiting others along the way if need be. Personality psychology has a long tradition in studying these negative traits. Three traits in particular have been the subject of extensive study in socially aversive behaviour: Machiavellianism, Psychopathy, and Narcissism (Paulhus and Williams 2002). Together these traits are now commonly referred to as the 'Dark Triad' (Furnham et al. 2013). In chapter 3 I address these specific questions and debates in personality psychology by using ordered logistic, and logistic regression analysis to ascertain whether investors' personality traits help explain investors' engagement in SRI.

The main findings in chapter 3 can be summarised as follows. I find a significant positive association of Big Five Openness but no association of the prosocial trait Agreeableness with investors' self-reported interest in investing and with the likelihood that investors have held SRI investments. I also find a significant positive association of the prosocial HEXACO traits - Honest-Humility, Agreeableness, and Emotionality - with investors' self-reported interest in investing in SRI. Further, I find significant positive association of the empathy trait Empathic Concern with investors' self-reported interest in investing, and with the likelihood that investors have invested in SRI. Lastly, I find a significant negative association of Machiavellianism, and a significant positive association of Psychopathy with the likelihood that investors have invested in SRI at some point in the past.

The findings in chapter 3 regarding the Big Five and the HEXACO traits address an important discussion in the personality psychology literature on whether five or six factors better capture a complete personality profile (e.g Lee and Ashton 2004; Hilbig et al. 2013a; Hilbig et al. 2014). My findings suggest that, at least with regards to prosocial behaviour in the form of SRI investing, the HEXACO captures important aspects of personality that are not detected by the Big Five traits.

Furthermore, the finding of a significant positive association of Empathic Concern with engagement in SRI lends tentative support to the 'empathy-altruism hypothesis', which posits that empathy is an important precursor for prosocial behaviour (Batson et al. 1981) (Batson and Shaw 1991). Additionally, while the negative correlation of Machiavellianism with SRI engagement can be explained by the selfish nature of the trait, the finding regarding Psychopathy seems surprising, however it is consistent with a social signaling motivation. Prosocial behaviour need not stem from prosocial motivations (Bénabou and Tirole 2006). Specifically, the literature distinguishes between 'intrinsic' and 'instrumental' prosocial behaviour (Sobel 2005). Where the former is associated with altruistic motives, and the latter represents behaviour to *signal* prosociality in order to garner social admiration and thereby social standing (Bénabou and Tirole 2006). The finding regarding Psychopathy therefore appears consistent with a social signaling, or, *image* motivation on behalf of SRI investors (Bénabou and Tirole 2006).

Apart from addressing different debates in the personality psychology literature as outlined above, the major contributions of chapter 3 to the literature are two-fold. First, I link the literature streams of personality psychology and SRI, by demonstrating how they can complement one another. SRI investing offers personality psychologists a way to study prosocial behaviour outside the laboratory in an area where stakes are high (i.e. investors could potentially forgo returns by divesting away from sin companies). This could be interesting to personality researchers who want to investigate prosocial behaviour beyond the common methods, i.e. economic games in a laboratory setting (Ben-Ner et al. 2004b; Ben-Ner et al. 2004a; Baumert et al. 2014; Koole et al. 2001; Volk et al. 2011; Becker et al. 2012; Zettler et al. 2013; Thielmann and Hilbig 2014, 2015; Hilbig et al. 2015b; Hilbig et al. 2015a). Likewise, I introduce instruments from personality psychology to the SRI literature and demonstrate that they can be successfully used to help explain investors' decision to engage in SRI. This is of interest to SRI researchers and practitioners who want to measure investor characteristics with measures other than revealed preference measures commonly used to ascertain investors' prosocial tendencies (Riedl and Smeets 2014; Heimann 2013). In contrast to revealed preference measures commonly used in experimental economics, personality trait measures are specifically designed to be administered via self-report surveys and therefore readily lend themselves to investigate large sample of relevant populations such as investors (Borghans et al. 2008). Second, I contribute to the SRI literature by providing additional evidence that SRI investors' prosocial dispositions are indeed related to SRI

engagement (Riedl and Smeets 2014; Heimann 2013), but my findings regarding the positive association of Psychopathy with SRI investing suggests that more sinister motives may also be at play.

Overall, the pattern I observe in chapter 3, including the positive association of Psychopathy with SRI investing, is readily reconcilable with patterns commonly associated with prosocial behaviour (Bénabou and Tirole 2006). This suggests that engaging in SRI is indeed seen as a prosocial act by some investors.

In Chapter 4, I investigate whether personality traits help explain investors' decisions to invest in assets that differ in their risk attributes. Understanding factors of investor risk preferences is very relevant for practitioners in the financial sector. To illustrate, the 'Markets in Financial Instruments Directive' by the European Parliament and the European Council, for example, requires practitioners to take into account investors' preferences: "When providing investment advice, the investment firm should specify in a written statement on suitability how the advice given meets the preferences, needs and other characteristics of the retail client" (Council 2014, § 82). The introduction of similar laws has also been discussed in the US (Weber et al. 2013). Moreover, agents' risk preference is a key parameter in models in traditional finance theory, such as the Modern Portfolio Theory (Markowitz 1952). The study of risky decision-making in uncertainty is a vibrant area of research (e.g. Loewenstein et al. 2001; Slovic et al. 2004; Blais and Weber 2006; Figner and Weber 2011; Andreoni and Sprenger 2012). Recently, some authors bagan to investigate the role of personality traits in financial decision-making and found that personality traits help explain investment decisions (Brown and Taylor 2014; Conlin et al. 2015; Bucciol and Zarri 2017). Specifically, Conlin et al. (2015) use Finnish data to examine the correlation of personality traits - measured with the Temperament and Character inventory (Cloninger et al. 1994) - with stock market participation. They find that the personality trait Harm Avoidance is negatively correlated with holding shares. Brown and Taylor (2014) draw on data from the British Household Panel Survey and find a positive correlation between Openness to Experience and the probability to hold stocks, and a negative association between Extraversion and the probability to hold stocks. Bucciol and Zarri (2017) use US data from the Health and Retirement Study to investigate the association of the Big Five and some additional traits[4]

[4] The authors also measure the traits Cynical Hostility, Anxiety, Anger-in, and Anger-out that are part of the Health and Retirement Study (Bucciol and Zarri 2017).

with the decision to take financial risk. They measure risk with the decision to invest in the stock market, and the share of the portfolio that is invested in stocks. The authors find that trait Cynical Hostility is negatively correlated with both stock market participation and the portfolio share invested in stocks. Further, they find the Big five trait, Agreeableness, is negatively related to the proportion of the portfolio invested in stocks.

However, extant studies on the association of personality traits with financial risk taking have not controlled for investor characteristics that have been found to play a role in the investment decision process, such as risk literacy and risk preferences. It is, therefore, not clear whether personality traits can help explain investment in risky assets on top of other important investor characteristics. I therefore hope to contribute to the literature by investigating the role of personality traits in investment decisions in a model that controls for these characteristics. Specifically, I employ the Berlin Numeracy Test (Cokely et al. 2012) designed to measure individuals' risk literacy (i.e. proficiency in statistical computation related to risk assessment such as transforming probabilities and proportions). Furthermore, I include a lottery-type decision measure (Dohmen et al. 2011), the canonical measure for risk preference in experimental economics to control for investors' domain-independent risk tolerance. Moreover, existing studies have uniformly relied on data drawn from samples of the general population leaving open the question whether personality traits also help explain financial risk taking in a targeted sample comprising individual investors. This, particularly, is a common concern in the finance literature. I thus hope to contribute to the literature by drawing on data collected from a targeted sample of individual investors: members of the American Association of Individual Investors. Additionally, related studies have only investigated a limited number of personality measures, mainly relying on measures of the most common personality framework, the Big Five. Consequently, it remains to be seen if personality trait measures, pertaining to other frameworks, could also help explain financial risk taking. In chapter 4 I address this literature by investigating whether personality traits can help explain financial risk taking. Specifically, I examine whether traits from three personality frameworks - the Big Five, the HEXACO, the Dark Triad, all thought to be associated with risk taking— are related to investors' decisions to invest in asset classes that differ in their risk attributes. To this end, I construct four different measures of financial risk taking: (1) whether an investor invests in stocks directly, (2) the aggregate share of the investor's portfolio invested in stocks directly and indirectly through mutual funds, (3) the aggregate share of the investor's portfolio invested in stocks, derivatives and hedge funds, and

(4) the aggregate share of investor's portfolio held in cash and in savings accounts - a measure for low-risk. I then use binary logistics regression analysis, and tobit regression analysis to investigate the association of personality traits with the four risk measures.

The main results in chapter 4 can be summarised as follows. I find a positive association of Openness with the aggregate share of investors' portfolios invested in stocks, derivatives and hedge funds. I find such an association when I measure Openness with the Big Five measure, as well as the HEXACO measure. Furthermore, I find some weak evidence of a negative association of Big Five Conscientiousness with the likelihood that investors invest in stocks, but a positive association of HEXACO Conscientiousness with the aggregate share of investors' portfolios invested in stocks, derivatives, and hedge funds. I find a negative association of HEXACO Extraversion with the aggregate share of investors' portfolios invested in stocks directly and indirectly through mutual funds. Against my expectations, I do not find an association of the related traits Big Five Neuroticism and HEXACO Emotionality with financial risk taking. Further, I find the Dark Triad trait Machiavellianism is negatively related to the likelihood that investors invest in stocks, and Narcissism is negatively associated with the share of investors' portfolios invested in stocks directly, and indirectly through mutual funds. Lastly, I find some evidence that Psychopathy is positively associated with the aggregate share of investors' portfolios invested in stocks, derivatives, and hedge funds. Overall, the results I obtain in chapter 4 fail to paint a clear picture: no personality trait is consistently associated with financial risk taking, leading me to conclude that personality traits are not very important investor characteristics when it comes to financial risk taking.

The remainder of this thesis consists of the aforementioned three empirical chapters (chapters 2 to 4). Each chapter contains its own abstract and conclusion. Subsequently, the last chapter (chapter 5) consolidates and discusses the contributions and implications of all findings reported in the empirical chapters with regards to the overarching question of this thesis: Can investors’ social preferences and personality traits help explain investment decisions? Lastly, a detailed list of references is presented followed by the appendix.

Chapter 2:

Social preferences and socially responsible investing

Abstract

In this chapter I examine whether social preferences can explain three measures of engagement in socially responsible investment (SRI): interest in SRI; history of SRI investment; and the proportion currently invested in SRI. I undertook a survey of US investors and find that investors with stronger social preferences are more interested in SRI than are those with weaker social preferences. Further, investors with stronger social preferences are more likely to have invested in SRI. I do not, however, obtain any association between their social preferences and the share of total portfolio invested in SRI. These results are consistent with a 'warm glow' interpretation of investor motivations to hold SRI.

1. Introduction

In this chapter I investigate what drives individual investors interest in and financial commitment to Socially Responsible Investments (SRI). The bulk of research articles on SRI are concerned with the question of whether SRI assets offer a better risk-return trade-off to investors, than conventional investments (Capelle-Blancard & Monjon, 2012). The majority of these studies use roughly the same methods and come to a similar conclusion; on average, evidence suggests SRI assets are neither more nor less profitable than conventional assets (Capelle-Blancard & Monjon, 2012; Revelli & Viviani, 2015).

Some researchers have likened this focus of research efforts on a single question - with similar measures and data - to the proverbial "looking for keys under the lamppost" syndrome; and conclude although the question of financial performance of SRI assets is important, maybe too much attention has been paid to this single issue (Capelle-Blancard & Monjon, 2012). The models that are used to investigate this aspect of SRI are the capital asset pricing model (CAPM), and it's extensions the Fama-french three-factor model (Fama-French) and the Carhart four-factor model (Carhart), the workhorses of investment research. In the framework of these three models, it is assumed investor decisions are solely motivated by rational wealth maximisation and that social preferences are driven out in the market place (Levitt & List, 2007; List, 2009).

Alternative, and mostly complimentary, views of investor decision-making take into account other, non-financial, preferences of investors. Statman, for example, claims investors want "expressive " and not just utilitarian benefits (Statman, 2004). Similarly, Beal et al. (2005) and Bollen (2007) argue that investors derive non-financial utility from investing in SRI. Researchers suggest that investors derive utility from the pro-social aspect of SRI assets (Beal, Goyen, & Phillips, 2005). In fact, some authors argue that wealth maximization is not the primary motivation of the majority of investors who invest in SRI (e.g., Beal and Goyen 1998), and Williams (2007) finds that financial returns of SRI only weakly account for the decision to invest in SRI. In contrast, investor attitudes towards the social aim of firms in which they consider investing appear to be strongly related to their investment decisions (Williams 2007). Moreover, a number of studies suggest that SRI investors are motivated by both financial and non-financial characteristics of their investments (Pérez-Gladish et al.

2012; McLachlan and Gardner 2004; Dorfleitner and Utz 2014). To illustrate this point, one commonly used phrase in the SRI literature and professional community is: "doing well by doing good", meaning doing well financially by doing something good for society (Hamilton, Jo, & Statman, 1993; Capelle-Blancard & Monjon, 2012). The framework of the conventional models of finance (e.g. CAPM, Fama-French and Carhart) cannot accommodate these non-financial preferences. As Berry et al. (2013) put it: "... SRI lies outside the common efficient markets framework used in finance theory to decide on the attractiveness of an investment" (p.708). In a widely cited article in the SRI literature Renneboog et al. (2008) speak to this debate about the attractiveness of SRI, they state: "... a central question is whether or not the decisions of investors are affected by non-financial criteria" (p.1723).

Bénabou and Tirole (2006) formalize the claims by Statman (2004), Beal et al. (2005), and Bollen (2007) in a theoretical agency model that describes prosocial decision-making of an agent, in an interdependent, social framework. In this framework, an agent has three types of motivations; extrinsic, intrinsic and reputational-motivations. Extrinsic motivations refer to monetary utility (this includes risk-adjusted return preferences), intrinsic motivations capture how much an investor values "doing good" (for others or society), and reputational motivation captures the aspect of how others view the agent for "doing good" (Bénabou & Tirole, 2006). In this framework an agent may therefore consider the well being of others when contemplating an investment decision through the intrinsic motivational channel, in other words: the agent may have *social preferences* (Murphy & Ackermann, 2014). An agent, the investor, may still be motivated by narrow rational wealth maximisation; this is but one type of social preference (i.e. individualistic social preferences). Importantly, agents differ in their social preferences. If such preferences do indeed affect portfolio choice of investors, this could have an impact on long-term stock prices as some authors have claimed (e.g. Hong & Kacperczyk, 2009).

This chapter - as do the other empirical chapters in this thesis (chapters 3, and 4) - reports results from a survey carried out in 2015 on a large sample of US-based individual investors. The survey included the ‘social value orientation’ (SVO) task, a common procedure in social psychology for eliciting social preferences (Murphy and Ackermann 2011), and it also asked investors to report investment behavior and preferences. Based on the model by Bénabou and Tirole (2006) mentioned above, my hypothesis is that the stronger an investor's social preference (i.e. the more she cares about the well-being of others) the more an investor will

be engaged in SRI. For the purpose of this investigation SRI is therefore conceptualised as prosocial behaviour. The primary concern of the investigation in this chapter is, therefore, to capture part of the *intrinsic motivation* of investors to invest in SRI described in the Bénabou and Tirole (2006) model while controlling for *extrinsic motivations* in the form of investors' expected return and risk attributes of SRI assets and investor characteristics such as wealth, gender, and education that have previously been linked to SRI engagement (e.g. Nilsson 2008). The survey allows me to examine the association between social preferences and three measures of engagement in SRI: (1) 'general interest' in SRI, (2) likelihood of ever having held such investment, and (3) the proportion of such investment in the total investment portfolio currently held. These three measures are closely related but essentially they measure three types of engagement in SRI that differ in their strength of financial commitment. By measuring these three related but distinct (i.e. differing in their level of financial commitment) measures of SRI engagement, the overall picture allows me to comment on what type of motivation investors may have to invest in SRI. To illustrate this point further. The so-called "intention behaviour gap' is a well-documented phenomenon in the literature on prosocial behaviour. It describes the fact that although people proclaim strong intentions to act prosocially they do not always act on this intention when given the choice (e.g. Boulstridge and Carrigan 2000; Nilsson 2008). The first measure - 'general interest' - measures the weakest type engagement in SRI - the intention to invest in SRI. No financial commitment has to be made to proclaim an interest in SRI. In contrast to the 'general interest' measure, the second measure of engagement in SRI - the likelihood of ever having held SRI assets - requires investors to have acted on (i.e. to have invested/financially committed) their social preferences. The third measure of engagement - the proportion of the portfolio invested in SRI - is the measure of engagement in SRI that requires the strongest financial commitment. A significant and positive relationship between social preferences and this measure would be akin to strong prosocial motivations to invest. In other words, if investors' social preferences are significantly and positively related to the proportion the investor invests in SRI this could be interpreted as evidence that prosocial motivations are one of the main motivations to invest in SRI as some authors have claimed (e.g., Beal and Goyen 1998).

I find robust evidence for a positive association between social preferences and the first two measures of engagement in responsible investing, but no association between social preferences and the proportion of responsible investments in the portfolio currently held. Taken together, these results are consistent with a 'warm glow' interpretation (Andreoni

1989; 1990) of investor motivations to hold SRI. In other words, individual investors might be motivated out of pro-social concerns to hold 'some' SRI—but not necessarily to devote a larger share of their wealth to the cause. The results thus suggest that while investors' social preferences do play a role in the decision to invest in SRI, prosocial motivations seem not to be the main motivation of investors to invest in SRI as some authors have posited (e.g., Beal and Goyen 1998).

While addressing the wider question of whether social preferences are driven out in the market place or not (e.g. Levitt & List, 2007; List, 2009) this chapter also specifically contributes to an emerging literature on the motives of socially responsible investment. McLachlan and Gardner (2004) suggest that SRI investors rate ethical issues as being more important than do their conventional counterparts, and that SRI investors have a higher appreciation of 'moral intensity'. Similarly, Dorfleitner and Utz (2014) find for a sample of German investors that investors with higher investment volumes have a higher propensity to invest in firms that are perceived to be in line with their moral values. Nilsson (2009) surveyed clients of a Sweden-based mutual fund provider of SRI, and he clusters investors according to self-reported importance of financial returns and social responsibility. He finds that investors in the cluster 'primarily concerned about profit' report giving less to charity annually than do investors who are 'socially responsible and return driven' and who are 'primarily concerned about social responsibility'. Thus, while shedding light on the relationship between self-expressed motives for responsible investment and social preferences, the study does not directly address the relationship between social preferences, per se, and the decision to invest in SRI. Closer to my endeavor, Heimann (2013) implemented an experimental investment game with French investors, using both NGO donations and the A3 Altruism scale from the International Personality Item Pool (Goldberg et al. 2006) as measures of social preferences, but he finds no association between either measure of social preferences and the proportion of the portfolio dedicated to SRI in the investment game. The first evidence of a relationship between social preferences and engagement in SRI emerges from a study by Riedl and Smeets (2014), who combine a trust-game experiment on individual investors with administrative data from the investors' Dutch mutual fund provider. The authors find that the amount returned, in the second stage of the trust game, is associated positively both with the likelihood of owning an SRI fund and with the percentage of the portfolio invested in the SRI fund. Moreover, the authors' proxy for social preferences correlates positively with the likelihood of investors owning an SRI fund

without tax benefits, but not with the likelihood of owning SRI funds with tax benefits (Riedl and Smeets 2014). However, given that the authors use as a measure of social preferences the amount returned from the second mover, there is a possibility that their measure captures reciprocal behavior—in response to the initial amount sent by the first mover, a possibility that is addressed in more detail in the next section of this chapter.

With this chapter I hope to contribute to the literature in two main ways. First, by introducing a measure of social preferences that is the culmination of a long history in social psychology to find a clear and high-resolution measure of social preferences that is free from any interdependent, strategic confounds - the SVO slider measure (Murphy, Ackermann, & Handgraaf 2011). By introducing the SVO slider measure to the SRI literature, I also hope to contribute to a standardisation of measuring social preferences in the SRI context. I believe the SRI literature would greatly benefit from a standard measure of unconditional social preferences, which would allow researchers to better compare results of studies across different samples. Social psychologists spend years to develop and refine measures to accurately capture theoretical concepts; this also is true for the concept of social preferences. I therefore propose to make use of the most advanced measures when investigating questions at the cross-section of economics and psychology. Secondly, I hope to contribute to the SRI literature by complementing previous studies, which have looked at samples from European countries (e.g. Nilsson 2008; Riedl and Smeets 2008; Heimann 2013; Dorfleitner and Utz 2014) by investigating whether social preferences do play a role in the decision to invest in SRI in a large sample of US investors. I now provide a brief review of the two most commonly used measures of social preferences to highlight the relative advantages of the measure I employ here, to underline the importance of introducing the SVO slider measure to the SRI literature and to further explicate the contribution of this chapter. Thereafter, I introduce the method and sampling before I report and discuss the findings to conclude the chapter.

2. Review of social preference measures

The construct of social preferences has long been of interest to researchers in psychology and other disciplines and has been studied under different names such as other-regarding preferences, altruism, social motives, welfare trade-off ratios, collective interest, and social

value orientation (SVO) (Murphy et al. 2011). The history of measuring social preferences goes back to the seminal work of (Messick & McClintock, 1968) who first devised the technique known as decomposed games for measuring social preferences. In a decomposed game, a decision maker makes unilateral anonymous choices of resource allocations that offer a payoff to her and to an anonymous other (Balliet et al. 2009). The nature of this one-shot resource allocation eliminates strategic considerations resulting in a measure of social preferences only.

Psychologists seem to agree that, theoretically, social preferences are a continuous construct i.e. "... it is the degree to which a DM [decision maker] will choose to sacrifice their own resources to benefit another" (Murphy & Ackermann 2011, p.3). Despite earlier attempts to align measurement techniques with theory, until the emergence of the SVO slider measure, no measure of social preference had been developed that yields a continuous score of social preference. This also relates to the most prevalent measures of social preferences, namely the Ring Measure (Liebrand 1984) and the 9-Item Triple Dominance Measure (Van Lange et al. 1997), which do yield a score of social preferences but at the nominal level, the lowest level of measurement. I provide a brief overview of these two measures of social preference and their most pressing drawbacks to highlight the importance of the type of measure used in this chapter (for a detailed review of the history of measures of social preferences please refer to Murphy et al. (2011)).

The Ring Measure presents respondents with a series of either 16 or 24 binary allocation decisions and subsequently assigns individuals into one of eight social preference categories[5] (Liebrand and McClintock 1988). Each of the dichotomous decisions corresponds to two adjacent points of the social preference continuum. The Ring Measure thus has the advantage of considering the entire range of possible social preferences. However, its main drawback is the inefficiency of the measure, as respondents are asked to report their preference of some undesirable resource allocation, for example, a respondent has to decide whether she prefers a masochistic choice or a sadomasochistic choice. Evidence suggests that the vast majority of respondents do not appear to assign a negative weight to their own payoff (Murphy & Ackermann, 2011). Upon closer inspection the Ring Measure is therefore rather inefficient since it collects data that is not very useful. Furthermore, the Ring Measure results in a high

[5] The eight categories are: prosocial, individualistic, competitive, sadistic, sadomasochistic, masochistic, martyr, and altruistic (Liebrand and McClintock, 1988).

number of respondents not being classified effectively, which reduces the sample size. Participants are only classified if the consistency of their choices is at least 60%; Au & Kwong (2004) report that up to 20% of participants are usually not classified.

In contrast to the Ring Measure, Triple-Dominance Measure is more efficient, as it only considers three categories of social preference - prosocial, individualistic, and competitive. Respondents are presented with 9 items, for each of which the participant has to choose one of three options of allocating resources between herself and an anonymous other, the three choices correspond to one of the three categories. While this results in a more efficient measure, the Triple Dominance Measure has some drawbacks too. First, The Triple-Dominance measure also only yields a categorical classification of participants. Researchers have attempted to convert Triple-Dominance outcomes into continuous scores. For example, researchers have used the sum of the payoffs to the self and the other (Sheldon 1999), or the number of prosocial choices (Hilbig and Zettler 2009). This does not alleviate the concern of confoundedness, as Murphy et al. (2011) point out that the resulting scores do not accurately measure the extent of social preferences but rather are a measure of both intensity and reliability. A second disadvantage is the way in which the choice options are presented. Presenting respondents with only three options, one of which being the least preferred option, may influence the respondents choices (Huber and Puto 1983). The above examples of the disadvantages are only a few of a number of shortcomings of the established measures of social preferences. The social value orientation (SVO) slider measure I employ in this chapter overcomes many of the disadvantages of its alternatives. It is as efficient and easy to use as the Triple-Dominance measure, and it yields a score at the ratio level. The resulting high-resolution score of social preferences corresponds to the continuous nature of social preferences where the higher the score the stronger the social preferences of the respondent. I describe the measure in more detail in the methods section below.

In the context of SRI there are only two studies that investigate the connection of social preferences and SRI, but neither uses one of the most established measures or the measure I employ here. Heimann (2013) uses a personality scale to measure altruism and NGO donations to different charities. Riedl and Smeets (2014) use a two player trust game to measure social preferences, where a first mover sends money to a second mover. Here, the experimenter triples the money before it arrives the second mover; the second mover then has to decide how much money to send back to the first mover. The trust game is not designed to

measure social preferences but trust (of the first mover) and, as a results, sample size is halved, since the first mover choices have to be disregarded completely. The authors only consider the amount returned by the second mover as a proxy for social preferences; this creates a pseudo-decomposed game. Riedl and Smeets (2014) use the so-called strategy measure to record the second-mover's choices. In the strategy method the second mover makes a choice of sending back an amount of money to the first mover for each possible amount the first mover *could* send. They then construct two different proxies for social preference from these responses, a mean measure that is the average ratio of how much a respondent sends back as a proportion of the received amount, and the amount the respondent sends back if she were to receive the maximum amount the first mover could possibly send. While this approach is a clever solution to arrive at meaningful scores of social preferences, neither score sufficiently excludes the possibility of confoundedness. The problem here is that both measures constitute hypothetical "what if" situations, each confounded by different dynamics. The mean measure of Riedl and Smeets (2014) includes the choices a second mover makes at the extreme points. For example, a second mover may choose to not return much money or nothing at all if she were to receive very little money, so as to punish the anti-social behavior of the first mover. If she were to receive the maximum amount (which is the second proxy the authors use but also part of the first proxy), she may be much more generous than she would have been in a proper decomposed game that is designed to only measure her pure social preferences, such as the SVO slider measure.

The concept of social preferences is central to SRI research. By introducing the SVO slider measure to the SRI literature I hope to contribute to a standardisation of measuring social preferences in the SRI context. I believe the SRI literature would greatly benefit from a standard measure of unconditional social preferences, as it would allow researchers to better compare results of studies across different samples. This investigation would thus complement existing studies, by introducing the relatively clean measure of unconditional social preferences—the social value orientation slider measure —in a survey administered on a distinct, but highly relevant sample—US-based individual investors.

The remainder of this chapter is structured as follows: next I present the methodology and describe the sample; the subsequent section presents the results, and the last concludes.

3. Methodology

I administered an online survey to a targeted group of individual investors, all members of the American Association of Individual Investors (AAII).[6] An invitation to participate in my survey was distributed to 116,265 members through the association's mailing list; 5,515 members started the survey and 3,046 respondents finished the study, yielding a response rate 2.6%, slightly lower than in similar studies (Junkus and Berry 2010; Berry and Junkus 2013). The survey consisted of four main sections[7]. The first asked all respondents about their financial characteristics; the dependent variables are derived from measures in this section. The second contained the SVO measure of social preferences (Murphy et al. 2011), the independent variable, in addition to one of four different personality scales, to which participants were randomly assigned.[8] I further randomly assigned the order in which respondents received the SVO measure and their assigned personality scale. In the third section, respondents undertook a risk preference elicitation test (Dohmen et al. 2010; Riedl and Smeets 2014) and, subsequently, a numeracy test (Cokely et al. 2012). The final section contained socioeconomic and demographic measures. No monetary incentive to participate in this study was offered to respondents, nor was any inventive offered for any of the measures that employed.

3.1 Financial measures

The survey first asked respondents to indicate how much they had invested, by assigning their total portfolio size to one of ten categories.[9] The purpose was to help funnel respondents' thoughts towards the next two questions, the first asking for a specific estimate of their total investment portfolio and the second for the amount invested in each of eleven

[6] The AAII is a non-profit association, with a mission to assist "individuals in becoming effective managers of their own assets through programs of education, information and research" (AAII.com, 2016).
[7] For an illustration of the survey structure, please refer to appendix A1 and for the wording of the welcome screen please refer to appendix A2.
[8] Participants were randomly assigned to one of the following four personality measures: the 'Big Five', BFI-S (Gerlitz and Schupp 2005); the Rosenbaum Self-Control Schedule (Rosenbaum 1980); the Interpersonal Reactivity Index (Davis 1983); and the Short Dark Triad measure (Jones & Paulhus 2014). These are explored further in a separate paper (in progress).
[9] The ten categories were as follows: less than $ 10,000; $ 10,001 - $ 25,000; $ 25,001 - $ 50,000; $ 50,001- $ 100,000; $ 100,001 - $ 150,000; $ 150,001 - $ 200,000; $ 200,001 - $ 250,000; $ 250,001 - $ 500,000; $ 500,001 - $ 1 million; more than $ 1 million.

asset classes listed on the screen.[10] The subsequent section in the survey featured all questions regarding SRI. Here, the respondents were first presented with a definition of SRI. I used the following definition, from the Financial Times, as it corresponds to the general public perception of the SRI concept:

"[SRI] *is an investment strategy which seeks to generate both financial and sustainable value. It consists of a set of investment approaches that integrate environmental, social and governance (ESG) and ethical issues into financial analysis and decision-making […] Value in this context refers not only to economic value, but to the broader values of fairness, justice, and environmental sustainability"* (ft.com 2015).

Next, respondents were asked whether they had have ever invested in SRI assets. Only those who answered 'Yes' were also asked if they currently had funds invested in SRI assets. If the respondent indicated this to be the case, she was asked to provide an estimate of the percentage of each asset class that she had invested in SRI. All respondents—except those who reported that they currently held SRI assets—were presented with a measure that elicited their interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?". The measure was scored on a 5-point Likert scale, ranging from 1 ('not at all interested') to 5 ('very interested'). To capture investors' perception of return and risk associated with SRI, respondents were asked to indicate how SRI assets compare to conventional investments. The item measuring return expectations was:

"In the long-term, compared to ordinary investments, do you think that SRI assets offer: A much lower rate of financial return, a slightly lower rate of financial return, a similar rate of financial return, a slightly higher rate of financial return, a much higher rate of financial return."

[10] The asset class categories were as follows: mutual funds, stock (equity shares), bonds, commodities, currencies (foreign exchange), derivative instruments, hedge funds, real estate, savings account, cash, and 'other'.

The item measuring risk expectation was:

"In your view, compared to ordinary investments, are SRI assets: much riskier than ordinary investments, a little riskier than ordinary investments, about the same, a little less risky than ordinary investments, a lot less risky than ordinary investments."

These two items closely follow Lewis and Mackenzie (2000); similar questions were also used by Bauer and Smeets (2014), Riedl and Smeets (2014), and Wins and Zwergel (2016).

3.2 Social preferences

I rely on a measure designed specifically to elicit unconditional social preferences: the SVO slider measure (Murphy et al. 2011). This is motivated on the basis of the discussion in the previous section to allow for an unconditional measure of social preferences within the context of responsible investment. The SVO slider measure is a decomposed one-shot dictator game; the decision maker makes a unilateral choice to allocate resources between herself and an anonymous other person (Messick and McClintock 1968). The respondent is presented with six different resource allocation scenarios, and for each she has to choose one out of nine payoff combinations to distribute an endowment between herself and the anonymous other. In every scenario, each of the payoff combinations corresponds to different degrees of social preferences.[11] For example, in one of the scenarios, the decision maker is tasked with choosing among allocations that range from 'USD 100 to herself and 50 to the other' to 'USD 50 to herself and 100 to the other'. Importantly, in accordance with the decomposed nature of the game, the decision maker and the other person remain mutually anonymous throughout, during the resource allocations and afterwards (Murphy and Ackermann 2014).

This type of measurement eliminates strategic and reciprocal dynamics, resulting in a 'pure' measure of unconditional social preferences (Balliet et al. 2009). The SVO slider measure has been designed to work both for pen-and-paper and online survey-based procedures (Murphy et al. 2011), and it has been used in very different research settings, ranging from psychopharmacology (Schmid et al. 2014) and social neuroscience (Hysek et al. 2013) to

[11] See Appendix A2 for the complete measure, adapted from Murphy et al. (2011).

environmental psychology (Zelenski et al. 2015). The principal advantage of the slider measure, over alternative methods to capture the SVO, is that it yields a social preference score of higher resolution. As discussed above, the alternative measures, categorize individuals into one of three types of social preferences. The slider measure, in contrast, provides for each individual a continuous score on the ratio level, with higher scores indicating greater concern for the welfare of others (Murphy and Ackermann 2014).

3.3 Control variables

After completing the SVO measure, respondents were given a risk-elicitation task, developed by Dohmen et al. (2011), based on Holt and Laury (2002), and also adopted by Riedl and Smeets (2014). In the risk elicitation task, investors had to make a decision across 20 different choice-scenarios, between a certain amount of money and a risky lottery choice, with a 50% chance of winning $300 and 50% of winning nothing. In the first scenario, the certain amount was $0, and the amount increased in increments of $10 as the respondent progressed through the scenarios, with a maximum sure amount of $190, in the 20th scenario[12]. The point at which the respondent switched from the lottery option to the certain amount was recorded as the respondent's risk-preference value. Thus, higher values mean greater preference for risk, with a scale ranging from 0 to 200.

As a measure of numeracy, I used the adaptive version of the 'Berlin numeracy test' (Cokely et al. 2012). The test consists of four math problems, of varying degrees of difficulty. In the adaptive version, respondents are presented with at least two math problems, and at most three, depending on whether or not the answer provided to the first problem is correct. Respondents are scored in categories ranging from 1 (lowest numerical ability) to 4 (highest numerical ability)[13].

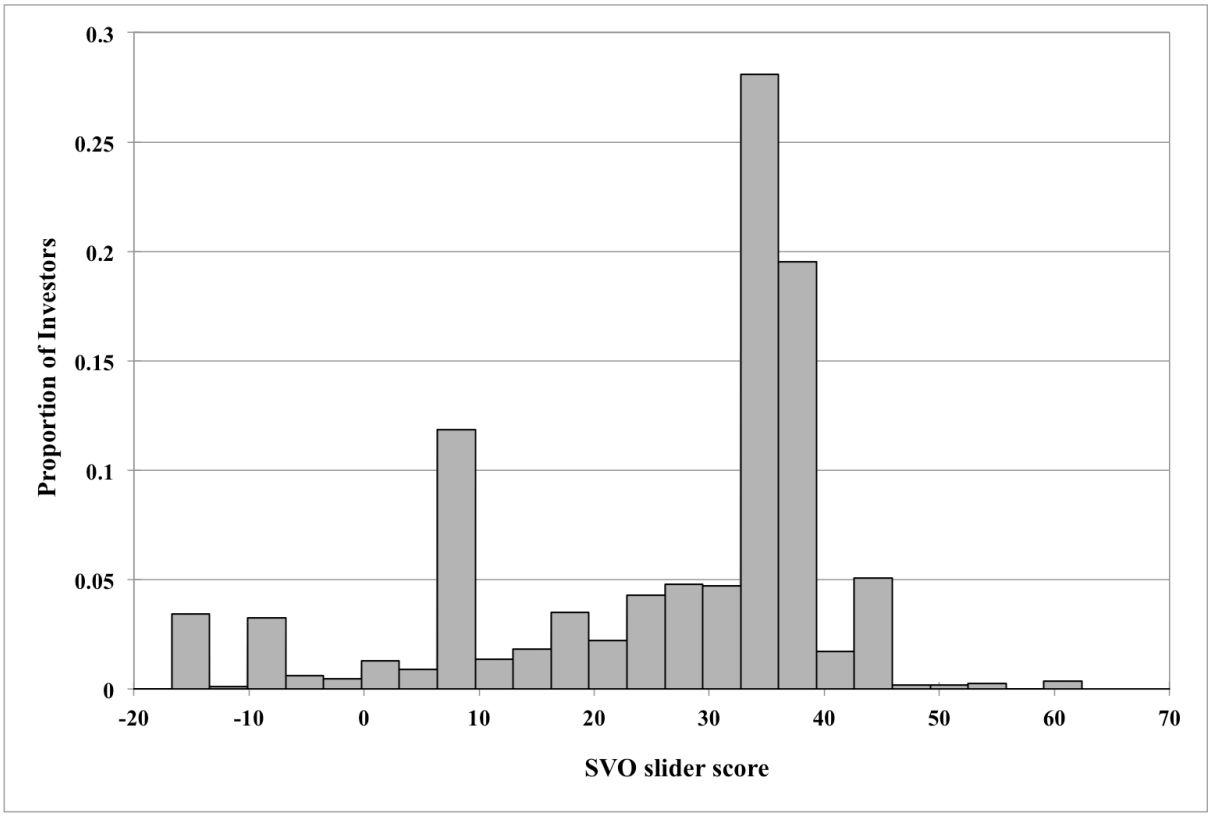
Lastly, I recorded the respondents' age, education-level, and gender. I also asked the respondents explicitly whether they had taken a formal university-level course in economics, to account for financial knowledge.

[12] See appendix A3 for the complete measure adopted from Dohmen et al. (2011).
[13] See appendix A4 for the complete measure adopted from Cokely et al. (2012).

4. Results

Table 1 provides an overview of the sample characteristics. The sample is predominantly male (94.2%), with a mean age of 55.6. It is rather well-educated—87.9% (1,704) have a university degree, and 68.7 % (1,333) have taken a formal economics course at university-level. From 3,022 investors, 525 (17.4%) have invested in SRI at some point in the past, and 324 (10.7%) are invested in SRI at the time of the survey. Investors in the sample believed that SRI yields lower returns (M= 2.29, SD = 0.75) relative to conventional investments, $t(2,863) = -51.23$, $p < 0.001$. Investors also expected SRI to be slightly more risky (M= 2.70, SD = 0.73) than conventional investments, $t(2,863) = -20.99$, $p < 0.001$. Furthermore, the sample appears wealthy; respondents' mean total portfolio value is $ 2.35 million, corresponding closely to the mean portfolio value of members of the organization—$ 2.43 million—as reported to me by the AAII.

Figure 1 - Distribution of SVO-scores for the full sample



Note: Figure 1 gives the histogram of the SVO slider scores for the full sample. Higher scores indicate greater concern for the material well-being of an anonymous other. The y-axis represents the proportion of investors yielding scores within a given bin.

Lastly, the investors in the sample have an average SVO score of 26.07. I do not here use the SVO for a categorical analysis of 'types', but an investor who behaves pro-socially would score between 22.45 and 57.15.[14] The mean SVO of the sample thus falls within the classification-range of a 'prosocial individual', consistent with findings in prior studies (Au and Kwong 2004; Balliet et al. 2009; Murphy et al. 2011; Murphy and Ackermann, 2014).

[14] The ranges for all four types of categories, listed from least pro-social to altruistic, are as follows: a 'competitor' receives a score from -16.26 to - 12.04; an 'individualist' a score between -12.04 and 22.45; a 'pro-social' a score from 22.45 to 57.15; and an 'altruist' a score greater than 57.15 (Murphy et al. 2011). For a detailed description of how the SVO score is calculated and how respondents can be divided into the four categories please refer to Murphy et al. (2011) p. 773.

Table 1 - Summary statistics

Variable	Description	N	Mean	Std. Dev.	Min	Max
SRI-Interest	Answer to the question: *To what extent would you say you are interested in investing in SRI?* Ranging from 1 (not at all) to 5 (very).	2,682	2.41	1.18	1	5
SRI-Ever-Invested	Binary variable, answer to question: *Have you ever invested in SRI?* 0 = No, 1 = Yes.	3,022	0.17	0.37	0	1
SRI-Proportion	The proportion of the total portfolio dedicated to SRI in percentage terms.	219	14.84	8.41	0	94
Social Preferences	SVO slider measure- a continuous measure of social preferences.	1,989	26.07	15.72	-16.26	61.38
SRI-Return	Return expectations of SRI, answer to the question: *In the long-term, compared to ordinary investments, do you think that SRI assets offer?*: 1 (Much lower) to 5 (Much higher).	2,864	2.28	0.75	1	5
SRI-Risk	Risk expectations of SRI, answer to the question: *In your view, compared to ordinary investments, are SRI assets*: 1 (Much riskier) to 5 (A lot less risky).	2,864	2.71	0.73	1	5
Risk-Preferences	Risk elicitation task adopted from Riedl & Smeets (2014) - the higher the value the more risk-loving the participant.	2,010	103.87	48.81	0	200
Age	Age of participant.	1,919	55.1	10.73	24	79
Female	Dummy variable = 1 if participant is female.	1,946	5.75%	0.23	0	1
University	Dummy variable = 1 if participant has a university degree.	1,941	0.87	0.32	0	1
Economics Course	Dummy variable = 1 if participant took an Economics course at University level	1,944	0.68	0.46	0	1
Numeracy	Score on the Berlin Numeracy Test ranging from 1 (lowest) to 4 (highest).	1,944	2.58	1.1	1	4
Total Portfolio	Self-reported estimate of total portfolio value in US $.	3,046	$ 2.35 mil.	$ 3.17 mil.	0	$ 21 mil.

Note: Age and Total Portfolio are winsorised at 1%. Total Portfolio derives from investors' estimate of their portfolio size. In fewer than two dozen cases, I adjusted raw estimates to bring them in in line with investors' prior categorization of the size of their portfolio. For example, when an investor selected category 10 (more than $ 1 million invested), but subsequently reported the estimate of total portfolio value to be $ 2.5, this was changed to $ 2.5 million. The results are preserved, throughout, when Total Portfolio instead takes investor portfolio estimates at face value. Raw data are available upon request.

To provide a complete overview of the interactions between all variables Table B1 in the appendix presents the pairwise correlations between all variables of this chapter. I proceed to the analyses for the three dependent variables and discuss each analysis in turn. I examine first the relation between social preferences and 'interest' in SRI, next whether social preferences are related to investors ever having invested in SRI. And, finally, I test whether social preferences are related to the proportion of total portfolio invested in SRI.

4.1 Social preferences and interest in SRI

Table 2 presents the results for ordered logistic regressions of 'interest in SRI investing' on SVO-score. The dependent variable is an ordinal variable captured on a 5-point Likert scale, ranging from 1 ('no interest at all') to 5 ('very interested'). I present three models: model 1 serves as the baseline, with social preferences as the only independent variable; model 2 in addition controls for investors' SRI risk and return expectations; model 3 includes all control variables. To ascertain the economic significance of each variable Table B2 in the appendix presents the marginal effects for the full specification (model 3).

Table 2 - Ordered logit regressions of SRI-Interest

Model No.	1	2	3
Variables		SRI Interest	
Social Preferences	0.0203***	0.0173***	0.0194***
	(-0.0029)	(-0.0029)	(-0.0033)
SRI-Return		0.7288***	0.7768***
		(-0.0708)	(-0.0792)
SRI-Risk		0.3335***	0.3152***
		(-0.0685)	(-0.0758)
Risk-Preferences			-0.0020*
			(-0.0011)
Numeracy			0.0299
			(-0.0454)
Total Portfolio			-3.74e-08**
			(-1.59E-08)
University degree			0.0637
			(-0.1478)
Economics Course			0.0304
			(-0.1096)
Age			-0.0092**
			(-0.0042)
Female			0.4633**
			(-0.206)
Ordereffect			-0.0451
			(-0.0963)
Constant cut 1	-0.2255***	2.1281***	1.5800***
	(-0.0869)	(-0.2008)	(-0.3951)
Constant cut 2	0.2779***	2.6781***	2.1380***
	(-0.087)	(-0.2051)	(-0.3966)
Constant cut 3	1.7817***	4.3207***	3.8165***
	(-0.0949)	(-0.2194)	(-0.4064)
Constant cut 4	4.4673***	7.1072***	6.5448***
	(-0.1868)	(-0.2739)	(-0.4512)
Observations	1,770	1,770	1,517
Pseudo R-sq.	0.0108	0.0543	0.0644
Wald. Chi-sq.	50.14	231.9	244.3
Prob > Chi2	0	0	0

Table 2 presents maximum-likelihood ordered logit regressions with White heteroskedasticity-consistent standard errors and covariance. The dependent variable is a measure of interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?" The measure was scored on a 5-point Likert scale, ranging from 1 (‘not at all interested’) to 5 (‘very interested’). ‘Ordereffect’ is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. "Constant cut" refers to the estimated cut points on the latent variable used to differentiate the five categories of 'SRI Interest' when the values of the independent variables are evaluated at zero. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

Each of the three models yields a positive and significant association between SVO-score and SRI interest. Furthermore, investors' risk- and return- expectations regarding SRI are also highly significant in explaining self-reported interest in investing in SRI. Both are statistically significant, meaning that financial motivations do play an important part in self-reported interest investors have in investing in SRI. Additionally, investors wealth (Total-portfolio), Age, and their gender (Female) are also significantly associated with the self-reported interest in investing in SRI. The association of social preferences with 'interest in SRI thus appears robust to SRI risk- and return-expectations, and to potentially relevant demographic characteristics, such as numeracy and level of education attained.

To compare the economic significance for the 'SRI Interest' of the different investor characteristics table B2 in the appendix presents the marginal effects of the full specification (model 3) for each of the five categories of self-reported interest in SRI. The coefficients in table B2 are marginal effects of each variable for a one-unit increase of that variable. The results presented in table B2 in the appendix show that, although social preferences are significantly associated with the self-reported interest in investing in SRI, investors' financial expectations of SRI are more relevant. For example, consider the marginal effects of all variables in column 4 (the 4th column from the left) of table B2 in the appendix. Column 4 shows how large the marginal effects are for a one unit increase of each variable on the probability that an investor answers "Somewhat interested" (value of dependent variable = 4) to the question "To what degree would you say you are interested in investing in SRI?". The marginal effect of social preferences (0.0027) is considerably smaller than the marginal effect of investors' SRI-Return (0.1074) and SRI-Risk (0.0436) expectations. Meaning an increase of one unit in Social preferences increases the probability of observing outcome '4' (i.e. 'Somewhat interested') by 0.27%. An increase of one unit in investors' SRI-Return, and SRI-Risk expectations increases the probability of observing outcome '4' by 10.74%, and 4.36% respectively. To put this into context, the marginal effect of social preferences is about is about $\frac{1}{39}$ th of the marginal effect of expected SRI returns, and about $\frac{1}{16}$ th of the marginal effect of investors' SRI risk expectations (4.36%)[15] for category '4' (i.e. somewhat interested).

[15] For category 4 of 'SRI Interest' the marginal effects of social preferences, SRI-Return, and SRI-Risk are 0.0027, 0.1074, and 0.0436 respectively. The calculation for the comparative effect is therefore as follows: To compare the marginal effect of Social preferences vs. SRI-Risk = 0.0027/0.1074= 0.0251 = $\frac{1}{39}$. To compare the marginal effect of Social preferences vs. SRI-Return = 0.0027/0.0436 = 0.062 = $\frac{1}{16}$.

Meaning that, although social preferences do play a role in investors' self-reported interest in SRI, the expected return and risk of SRI investments are a more important factor.

4.2 Social preferences and SRI investments

Table 3 presents logistic regressions of ‘ever having invested in SRI’ on SVO-score, showing three models, with additional control variables included incrementally. The dependent variable takes the value of ‘one’ if an investor has, or currently is, invested in SRI and ‘zero’, otherwise. For ease of interpretation, Table 3 presents marginal effects at the mean.

Table 3 - Logistic regressions of SRI-Ever-Invested

Model No.	4	5	6
Variables		SRI Ever Invested	
Social Preferences	0.0022***	0.0015**	0.0014**
	(-0.0006)	(-0.0006)	(-0.0006)
SRI-Return		0.0932***	0.0925***
		(-0.0117)	(-0.0128)
SRI-Risk		0.0523***	0.0452***
		(-0.0144)	(-0.0154)
Risk-Preferences			0.0001
			(-0.0002)
Numeracy			0.0091
			(-0.0082)
Total Portfolio			-3.72E-09
			(-3.75E-09)
University degree			0.0628**
			(-0.0316)
Economics Course			-0.0232
			(-0.0196)
Age			0.0018**
			(-0.0008)
Female			0.043
			(-0.0347)
Ordereffect			-0.0095
			(-0.0179)
Constant	-1.9131***	-4.5808***	-5.5414***
	(-0.1352)	(-0.3776)	(-0.6395)
Observations	1,989	1,989	1,713
Pseudo R-sq.	0.0079	0.0682	0.0696
Wald. Chi-sq.	12.57	95.55	83.54
Prob > Chi-sq.	0.000393	0	0

Table 3 presents maximum-likelihood logit regressions. Coefficients are marginal effects at the mean. The dependent variable is a binary variable that takes the value of 1 if an investor has invested in SRI in the past (this includes investors that are currently invested in SRI) and 0 otherwise. 'Ordereffect' is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

Each of the three models yields a positive and significant association between SVO-score and the answer 'yes' to the question of whether the investor has ever invested in SRI. As with the dependent variable 'SRI Interest' in the previous analysis, both investors' SRI-Return and SRI-Risk expectations are also significantly associated with the likelihood that investors have invested in SRI in the past. Furthermore, I note that both the level of education attained

(University degree), and the age of the respondents are also significantly positively associated with the likelihood that investors have invested in SRI in the past. The more educated and the older respondents were, the more likely they were to have invested in SRI at some point in the past. As with the variable, 'interest in SRI', in table 2, the association thus appears robust to SRI risk- and return-expectations, and to potentially relevant demographic characteristics, such as age and level of education attained. Again the economic significance of Social Preferences is relatively small compared to the financial expectation variables. SRI-Return expectations are the most important factor (the marginal effect of a one unit increase of SRI-Return is around 9%), followed by investors' perception of SRI-Risk (the marginal effect of a one unit increase in SRI-Risk is around 4.5%). The marginal effect of a one-unit increase in Social Preferences is around 0.14%. These results suggest that while investors' social preferences do play a role in the decision to invest in SRI, financial considerations seem to be more important.

4.3 Social preferences and proportion of assets invested in SRI

Table 4 presents the results for Tobit regressions of 'proportion of assets invested in SRI'—conditional on currently holding SRI assets—on SVO-score. The lower limit is zero, and the upper limit 100. Three models are shown, with additional control variables included incrementally.

Table 4 -Tobit regressions of SRI-Proportion

Model No.	7	8	9
Variables		SRI Proportion	
Social Preferences	0.0411	0.0141	0.1333
	(-0.1402)	(-0.1384)	(-0.108)
SRI-Return		7.7412***	6.9692***
		(-2.7178)	(-2.5868)
SRI-Risk		3.6824	3.2455
		(-2.3905)	(-2.3772)
Risk-Preferences			0.0185
			(-0.0389)
Numeracy			-1.0499
			(-1.6629)
Total Portfolio			4.97E-07
			(-6.82E-07)
University degree			6.9595
			(-6.7581)
Economics Course			-4.7587
			(-4.339)
Age			0.1325
			(-0.1527)
Female			-7.8566
			(-5.05)
Ordereffect			-0.3213
			(-3.2602)
Constant	15.5703***	-16.7647*	-27.6803*
	(-4.7604)	(-9.4057)	(-15.1924)
Observations	149	149	133
Pseudo R-sq.	7.80E-05	0.01	0.0137
F-Stat.	0.09	4.29	1.3
Prob > F	0.7699	0.0062	0.234
N (left-censored)	2	2	1
N (uncensored)	147	147	132
N (right-censored)	0	0	0

Table 4 presents maximum-likelihood tobit regressions. The dependent variable is the proportion of the investor's total portfolio allocated to SRI. The lower limit is set at 0, and the upper limit at 100. 'Ordereffect' is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

On the basis of the results in Table 4, I fail to obtain evidence for a relationship between the SVO-score and the proportion of assets invested in SRI. Although positive in all three models, the coefficient on the SVO-score is non-significant in all cases. It is worth noting, however, that the result might be an artifact of a limited sample, as only a small minority of the surveyed individual investors (324 respondents; 10.7% of the full sample) indicated that they currently held socially responsible investments, and of these, only about half recollected the size of the assets in question. Again, investors' expectation of SRI-Return is significantly positively associated with the proportion of investors' portfolios that she invests in SRI. A one-unit increase in SRI-Return is associated with an increase of 6.9% of the portfolio invested in SRI. Investors' perceived risk of SRI (SRI-Risk) seems not to be a significant factor that that helps to explain the proportion of her portfolio an investor dedicates to SRI.

5. Discussion

In a survey of more than 3,000 AAII members, conducted in 2015, I find evidence that investors' social preferences relate to their engagement in socially responsible investment (SRI). The measure of social preferences, the SVO slider measure (Murphy et al. 2011), is positively associated with respondents' stated 'interest' in SRI, conditional on not currently holding SRI. Moreover, respondents with higher SVO scores are more likely to have held (or to currently hold) SRI than are respondents with lower scores. These results are robust to an array of relevant controls, including investor expectations about SRI risk and return. I fail to obtain evidence of a relationship between SVO and the proportion of assets currently held in SRI, although the number of observations for this latter analysis—about 140—was much smaller than those in the former two—between 1,500 and 1,900.

At face value, the pattern of results is consistent with the warm glow interpretation of investor motivation to hold SRI. Warm-glow is a form of impure altruism, characterized by motivation to perform the act of charity, per se, as opposed to maximizing the actual welfare of recipients (e.g. Andreoni 1989, 1990). It appears that individual investors might be motivated out of pro-social concerns to hold 'some'

SRI—but not necessarily to devote a larger share of their wealth to the cause. The results thus suggest that while investors' social preferences do play a role in the decision to invest in SRI, prosocial motivations seem not to be the main motivation of investors to invest in SRI as some authors have posited (e.g., Beal and Goyen 1998). The results presented in this chapter thus echo the findings of a number of studies suggest that SRI investors are motivated by both financial and non-financial characteristics of their investments (Pérez-Gladish et al. 2012; McLachlan and Gardner 2004; Dorfleitner and Utz 2014).

With this investigation I contribute to the literature in two respects. First, I connect the SRI literature to the SVO, the canonical construct of social preferences in social psychology. And, second, I provide evidence from a large and relevant sample consistent with the notion that individual investments, in part, are driven by non-financial motives, in the form of pro-social preferences. My findings resonate with previous work, which has documented an association between self-expressed motives for investment and SRI holdings (Nilsson 2009), and with recent studies using alternative techniques for capturing social preferences and different samples of individual investors (e.g. Riedl and Smeets 2014). The converging picture is clear: across samples and means of measurement, there appears to be an association between social preferences and engagement in SRI. What is less clear, however, is the strength of the relationship—and perhaps more importantly—the issue of causality (see Gonenc and Scholtens 2017).

The regression analyses yield evidence only of a relatively small ‘effect’ of social preferences on SRI interest. For example, a one-unit increase in Social Preferences of, in model 6, is associated with a mere 0.14% increase in the likelihood that an investor has invested in SRI. This might mean that social preferences, although related to SRI interest, are just not economically very important. However, the weak relationship could also arise from noisy measures—which are self-reported and non-incentivized. Future work might try to examine the relationship between incentivized measures of social preferences and archival data on individual investment behavior among broad samples of individual investors— for example, building on the empirical strategy of Riedl and Smeets (2014). I note that I can also confirm some previous findings regarding other investor characteristics that help explain SRI engagement. I find that

education is positively correlated with the likelihood that an investor has invested in SRI in the past. This finding is in line with previous studies that have reported an association between education and SRI investing (Tippet & Leung, 2001; Junkus & Berry 2010; Cheah et al. 2011; Nilsson 2008). In the analysis of 'SRI Interest' I also find a significant negative correlation of Age and a significant positive association of Gender (labeled Female) with the dependent variable. These findings are in line with previous studies that report that SRI investors tend to be younger, and female (Tippet & Leung, 2001; Junkus & Berry 2010; Cheah et al. 2011; Nilsson 2008). However, in the analysis of the likelihood that an investor has invested in SRI in the past gender is not significant and Age is significantly *positively* correlated with the dependent variable. Furthermore, wealth (labeled 'Total Portfolio') is significantly negatively related to 'SRI Interest' meaning investors who are less wealthy seem to be more interested in investing in SRI. This finding would fit with previous findings in the literature (e.g.Junkus & Berry, 2010). However, in the analysis of the likelihood that investors have invested in SRI in the past wealth is not significantly associated with the dependent variable. Overall the results of the control variables suggest that socio-demographic investor characteristics are not very reliable factors when it comes to SRI engagement.

Naturally, there are some empirical shortcomings inherent to the survey method used in this investigation. First of all, my investigation leaves open the question of causality. Although my results are consistent with a positive effect of social preferences on SRI engagement—and inconsistent with a negative effect—reverse causality and omitted variables represent viable alternative explanations. Future work might try, through experimental treatments—or by exploiting other exogenous variation in social preferences—to test directly whether stronger social preferences lead to greater interest and engagement in SRI. Second, common methods variance (Podsakoff et al. 2003), for example in the form of social desirability, could be a concern. The associations might have been obtained not because pro-social preferences are driving investment in SRI, but because investors who feel a need to display their pro-social intentions do so both by talking up their SRI interest (and history) as well as inflating their pro-social concerns in the SVO slider task. I cannot rule out this possibility, but I note that the survey was administered online, that responses were anonymous, and that the measures of SVO and SRI engagement,

together, constituted a relatively small portion of the survey. In other words, it should not have been readily apparent to respondents that the survey assesed motives behind SRI, specifically.

As a final note, I observe that the pattern obtained among US individual investors—a positive relationship between social preferences and engagement in SRI—harmonizes with the wider literature on social preferences in economic decision making: across economic contexts, in both laboratory and field settings, social preferences matter (e.g. Fehr and Fischbacher 2002, 2003; Fehr and Schmidt 2006).

Chapter 3:

An Exploration into the Psychographics of Socially Responsible Investors

Abstract

Using primary cross-sectional data collected from a targeted sample of individual investors from the US, I examine whether investors' personality traits - related to prosocial behaviour - can help explain two measures of engagement in SRI: (1) the self-reported interest an investor has in invest in SRI, and (2) the likelihood of ever having held such investments. I measure investors' personality traits with a measure for the Big Five personality framework (Gerlitz and Schupp 2005; Lang et al. 2011), one for the HEXACO framework (Ashton and Lee 2009), one for empathy traits (Davis 1980), and the Short Dark Triad (Jones and Paulhus 2014) a measure eliciting aversive personality traits. The main findings can be summarised as follows. I find a significant positive association of Big Five Openness but no association of the prosocial trait Agreeableness with investors' self-reported interest in investing and with the likelihood that investors have held SRI investments. I also find a significant positive association of the prosocial HEXACO traits - Honest-Humility, Agreeableness, and Emotionality - with investors' self-reported interest in investing in SRI. Further, I find significant positive association of the empathy trait Empathic Concern with investors' self-reported interest in investing, and with the likelihood that investors have invested in SRI. Lastly, I find a significant negative association of the aversive trait Machiavellianism, and a significant positive association of the aversive trait Psychopathy with the likelihood that investors have invested in SRI. Overall, the pattern I observe, including the positive association of Psychopathy with SRI investing, is readily reconcilable with patterns commonly associated with prosocial behaviour (Bénabou and Tirole 2006). This suggests that engaging in SRI is indeed seen as a prosocial act.

1. Introduction and Background

There is growing academic and business interest in socially responsible investing. When following a socially responsible investment strategy "… investors try to account for environmental, social, governance (ESG) and ethical issues in the investment process" (Scholtens 2014, p. 382). SRI is implemented via several different investment strategies[16] or a combination thereof. Common strategies include: negative screening, positive screening, and the best-in-class approach (Scholtens 2014). Negative screening refers to leaving out controversial firms and industries (e.g. tobacco, weapons, fossil fuels), positive screening involves concentrating on particularly favourable firms or industries, and best-in-class means focusing on the top 30%/50% of firms with respect to particular social or environmental performance or criteria (Scholtens 2014). Socially responsible investors, thereby, depart from the assumed textbook investor behaviour that underlies investment theory models - such as the Modern Portfolio Theory (Markowitz, 1952) - by limiting their asset universe to investments based on criteria that are not strictly financial. Nonetheless, demand for socially responsible investment (SRI) products is consistently growing.

It should be noted here that no unifying definition of SRI exists; any estimations about the size and the growth rates of the 'SRI market', therefore, are very arbitrary and should be treated with caution (Scholtens 2014). That being said, several interest groups gather data about the size of the 'SRI market'. One such interest group is the Global Sustainable Investment Alliance (GSIA). According to GSIA the SRI market in the Unites States grew by 33 percent from 2014 to 2016, with an estimated $8.72 trillion of assets under professional management being invested according to SRI strategies in 2016 (GSIA 2016). This represents nearly 22 percent of all investment assets under professional management (GSIA 2016). Keeping in mind the aforementioned caution that should be exercised regarding the estimates of the size and growth of the SRI market, it is worth noting that the definition used by the interest groups have largely remained the same. If anything definitions of the SRI

[16] The Global Sustainable Investment Alliance, an international collaboration of SRI investment organisations, distinguishes between the following seven SRI strategies: (1) Negative/exclusionary screening, (2) positive/best-in-class screening, (3) Norms-based screening, (4) integration of ESG factors, (5) sustainability themed investing, (6) impact/community investing, and (7) corporate engagement and shareholder action (GSIA 2016, p.3).

market used by interest groups have become narrower since data collection began[17]. It is, therefore, safe to say that demand for SRI products is consistently growing.

The bulk of global SRI investing is being undertaken by institutional investors, however demand by individual investors is an important driver. A US based interest group, The Forum for Sustainable and Responsible Investment, names client demand as a principal reason for money managers to introduce products adhering to SRI (USSIF 2016). Likewise, Eurosif - a European SRI interest group - reports a growing demand for SRI products from individual investors (Eurosif 2016).

Why do investors depart from the behaviour assumed by classical choice theory and limit their asset universe to invest in SRI?

Some researchers have proposed that SRI may provide better risk-adjusted returns compared to conventional investment strategies (Mill 2006). Others have argued that investing in SRI and away from 'sin' industries (i.e. weapons manufacturing, tobacco, alcohol, or gambling) can be financially costly for investors (Fabozzi et al. 2008; Hong and Kacperczyk 2009). However, recent surveys of the literature investigating the financial performance of SRI show the majority of studies come to the conclusion that SRI investment vehicles generally do neither perform better nor worse compared to conventional investment benchmarks (see e.g. Capelle-Blancard and Monjon 2012; von Wallis and Klein 2014).

This begs the question: Do investors invest in SRI because they believe it offers *better* risk-adjusted returns compared to conventional investment benchmarks despite the majority of empirical studies finding no difference, or do SRI investors invest in SRI because of some non-financial reason?

This is the question that I want to address in this chapter. I propose that investors may invest in SRI for prosocial reasons. SRI investing has a clear moral component, in fact it is also referred to as 'ethical investing' (Winnett and Lewis 2000). As in the previous chapter I use the framework of the Bénabou & Tirole (2006) model of decision making as a theoretical base. To briefly recap, in this framework, an agent has three types of motivations; extrinsic, intrinsic and reputational-motivations. Extrinsic motivations refer to monetary utility (this includes risk-adjusted return preferences), intrinsic motivations capture how much an investor values "doing good" (for others or society), and reputational motivation captures the aspect of how others view the agent for "doing good" (Bénabou & Tirole, 2006). For

[17] For example, the Global Sustainable Investment Alliance reports a "tightening" of the definition of SRI in Europe as the reason for a slowdown in reported SRI growth (GSIA 2016, p.3).

the sake of this investigation I therefore conceptualize SRI engagement as a manifestation of prosocial behaviour along the lines of the Bénabou and Tirole (2006) model. The main objective of this chapter is therefore to capture investors' intrinsic motivation to invest in SRI with investors' personality traits, while controlling for extrinsic motivations in the form of investors' expected return- and risk-return benefits of investing in SRI and other investor characteristics that have been linked to SRI investing in the past such as gender and education (e.g. Nilsson 2008).

I investigate the hypothesis that the prosocial aspect of SRI leads some investors to invest in SRI. Specifically, I investigate in this chapter whether prosocial personality traits can help explain investors' decision to invest in SRI whilst controlling for investors' risk and return expectations. I thereby address, and link two separate literature streams. First, I address specific questions from the SRI literature, namely: do investors invest in SRI for pro-social reasons? Secondly, I link the SRI literature to the burgeoning literature stream at the intersection of personality psychology and economics by using personality trait measures to ascertain investors' prosocial tendencies.

Thus far the bulk of the literature on SRI focuses on the financial performance of the investment strategy, a few studies however investigate investor characteristics (Capelle-Blancard and Monjon 2012). Early investigations on individual SRI investors were largely limited to descriptive accounts (e.g Rosen et al. 1991; Cullis et al. 1992; Anand and Cowton 1993; Mackenzie and Lewis 1999; Junkus and Berry 2010; Pérez-Gladish et al. 2012; Berry and Junkus 2013) and studies comparing investors who invest in SRI and those that do not (e.g. Lewis 2001; Tippet and Leung 2001; McLachlan and Gardner 2004; Wins and Zwergel 2016). However, recently some researchers began to investigate psychographic aspects of SRI investors.

In a study related to the investigation in this chapter, Nilsson (2008) surveyed clients of a Sweden-based mutual fund provider that offers both conventional and SRI funds. Nilsson (2008) investigates investors' self-reported risk- and return-expectations regarding SRI funds, as well as investors' *perceived consumer effectiveness* (PCE) regarding SRI.[18] PCE is an attitudinal measure of the extent to

[18] Nilsson (2008) also included a measure for *trust* in SRI (i.e. to what extent investors trust SRI providers to be reliable and to have integrity) and measures to ascertain investors' attitudes towards different SRI issues (i.e. human rights, workplace rights, manufacturing of harmful products (weapons), unethical business practice (bribery and corruption)).

which investors believe that their investment in SRI will make a contribution towards solving social, environmental, or ethical issues that SRI investment strategies aim to address (Nilsson 2008). Nilsson measures SRI engagement with a self-report where investors choose different categories pertaining to the percentage of their portfolio dedicated to SRI (Nilsson 2008). He finds that PCE is a significant determinant for SRI engagement, furthermore he reports only the return- and not the risk-perception of SRI have an impact on the share of investors' portfolios dedicated to SRI (Nilsson 2008). In another study, Nilsson (2009) surveyed a targeted sample of investors from a Swedish mutual fund provider; he only sampled investors who held at least one SRI fund in their portfolio, and he clusters investors according to self-reported importance of financial returns and social responsibility. He finds that investors in the cluster 'primarily concerned about profit' report giving less to charity annually than do investors who are 'socially responsible and return driven' and who are 'primarily concerned about social responsibility' suggesting that prosocial motives may play a role in SRI investing (Nilsson 2009).

Apart from these closely related studies, a couple of studies investigated investors' social preferences, as I have outlined in chapter 2. Heimann (2013) implemented an experimental investment game with French investors, using both NGO donations and the A3 Altruism scale from the International Personality Item Pool (IPIP) (Goldberg et al. 2006) as measures of social preferences. Heimann (2013) finds no association between either measure of social preferences and the proportion of the portfolio dedicated to SRI in the investment game. Riedl and Smeets (2014) combine a trust-game experiment on individual investors with administrative data from the investors' Dutch mutual fund provider. The authors find social preferences are associated positively both with the likelihood of owning an SRI fund and with the percentage of the portfolio invested in the SRI fund (Riedl and Smeets 2014). Furthermore, I demonstrated in chapter 2 that unconditional social preferences can help explain both the interest of investors in SRI, and the likelihood of having invested in SRI.

In this chapter I address this literature by investigating the extent to which personality traits can explain individual investors' engagement in SRI. Specifically, I investigate whether personality traits related to *prosocial* behaviour can help explain two distinct measures of engagement in SRI investing: (1) the self-reported interest an investor has in invest in SRI, and (2) the likelihood of ever having held such investments. Personality traits are defined as the "relatively enduring patterns of

thoughts, feelings, and behaviours that reflect the tendency to respond in certain ways under certain circumstances" (Roberts 2009, p.7).

I examine investors' personalities with four different personality inventories pertaining to four different, but related, personality frameworks. I employ one measure - the Big Five Short (Gerlitz and Schupp 2005) - pertaining to the most widely researched personality framework - the Big Five (Ferguson et al. 2011). Additionally, I use one measure - the HEXACO-60 (Ashton and Lee 2009) - belonging to a recently proposed alternative framework to the Big Five, the HEXACO personality framework (Lee and Ashton 2004). Furthermore, I include two personality inventories that measure personality traits, which are relevant to prosocial behaviour but have received little attention in the literature: Empathy, and the 'dark side' of personality (i.e. aversive personality traits) (Ferguson et al. 2011). I measure investors' empathy with the Interpersonal Reactivity Index (Davis 1980; Davis 1983), the 'gold standard' of measures for empathy (Artinger et al. 2014). And lastly, I gauge investors' aversive personality traits with a measure - the Short Dark Triad (Jones and Paulhus 2014) - for the so-called 'Dark Triad' of personality: Machiavellianism, Psychopathy, and Narcissism (Paulhus and Williams 2002). I explain each personality framework in detail in section 2 of this chapter.

Personality psychology offers researchers a large toolbox of instruments to study peoples' individual differences. The discipline has recently received attention especially amongst economists looking for ways to examine determinants of economic outcomes beyond commonly used revealed preference measures (Borghans et al. 2008; Cooper 2016). However, with the exception of Heimann (2013) who employs the A3 Altruism scale from the International Personality Item Pool (Goldberg et al. 2006) and uses it as a measure for social preferences, to the best of my knowledge there are no studies investigating the role of personality in the decision to invest in SRI to date. With this chapter I hope to bridge these literature streams by investigating the role of personality traits related to prosocial behaviour in SRI engagement.

Personality psychologists devote enormous effort and time to establish the psychometric validity of personality instruments[19]. Instruments are tested and re-

[19] For an excellent introduction into personality psychology especially regarding its use in economic frameworks see the seminal papers by Borghans et al. (2008) and Almlund et al. (2011).

tested to ensure validity. What is more, personality instruments are designed and tested for administration in self-report surveys. That is to say, personality instruments are ideal research tools to investigate large samples of relevant populations such as investors. By linking the budding literature at the intersection of economics and personality psychology with the SRI literature, I hope to encourage other researchers to consider personality measures in future investigations into the behaviour and the psychographics of SRI investors.

The main findings can be summarised as follows. I find a significant positive association of Big Five Openness but no association of the prosocial trait Agreeableness with investors' self-reported interest in investing and with the likelihood that investors have held SRI investments. I also find a significant positive association of the prosocial HEXACO traits - Honest-Humility, Agreeableness, and Emotionality - with investors' self-reported interest in investing in SRI. Additionally, I find a positive association of HEXACO Openness with 'SRI Interest'. Further, I find significant positive association of the empathy trait Empathic Concern with investors' self-reported interest in investing, and with the likelihood that investors have invested in SRI. Lastly, I find a significant negative association of Machiavellianism, and a significant positive association of Psychopathy with the likelihood that investors have invested in SRI.

The remainder of this chapter is organised as follows. In the following section, section 2, I first motivate the inclusion of the four personality instruments I employ in this investigation. I then review the literature on prosocial behaviour for each of the personality frameworks that I measure in this study. In section 3 I describe all the measures that I employ. Section 4 describes the model and the methodology. Section 5 presents and discusses the results. Finally, section 6 concludes this chapter with a general discussion.

2. Motivation and Hypotheses

In this section I first motivate the choice to use the specific personality instruments that I employ. In order to appreciate my motivation to include the selected personality instruments and in order to follow the hypotheses that I develop below, it is important for the reader to keep in mind that - for the sake of this investigation - I conceptualise

SRI investing as a manifestation of active prosocial behaviour in the market based on the framework of the model developed by Bénabou & Tirole (2006). In other words - all else being equal (i.e. controlling for investors' return- and risk perception of SRI) - investing in SRI assets is an active prosocial choice. Investors actively choose the prosocial investment option compared to investing in a conventional assets. This conceptualisation of SRI as active prosocial behaviour allows me to develop clear hypotheses for an association of some personality traits with SRI engagement while treating the association of other personality traits with SRI engagement as an empirical question (i.e. the association could be positive, negative, or neutral). Following the motivation to include the selected personality measures, I briefly comment on an issue that is pertinent to the study of personality namely: personality traits are not clearly defined. For example, the trait Agreeableness does not just measure how 'agreeable' a person is, it consists of several facets that, together, form the overarching trait. This is a point that has to be kept in mind when investigating personality traits, as has been noted by researchers working at the intersection of personality psychology and economics (e.g. Borghans et al. 2008). I, therefore, provide a table in the appendix - table C1 - containing a description of each personality trait and its underlying facets to clarify each personality traits and it's underlying facets. Following the motivation for the use of the personality measures I employ, I review the literature for each personality framework, starting with the Big Five, followed by the HEXACO, thereafter I review the literature on Empathy, and last I review the literature regarding the 'Dark Triad'. In the literature review I focus on studies that investigate the association of the respective traits with cooperative or prosocial behaviour.

There is a lively debate in the personality psychology literature about how many traits best represent a complete yet parsimonious personality profile (Hilbig et al. 2013a). The most prominent and most widely researched personality framework is the so-called Big Five framework, proposing five traits capture all aspects of a person's personality (Costa and McCrae 1992; Goldberg 1992; Ferguson et al. 2011). However, recently a six-factor structure has been proposed as an alternative, the so-called HEXACO personality framework (Lee and Ashton 2004). The Big Five, and the HEXACO structures are overarching personality frameworks, meaning they capture a complete, yet parsimonious personality profile (Hilbig et al. 2013a). Both the Big Five and the HEXACO were developed through lexical analysis, where

researchers analyse sets of personality descriptive adjectives of a language to look for common themes (Ashton and Lee 2007). The statistical method of factor analysis is then used on these word-sets to ascertain which adjectives load onto common (overarching) traits.

The Big Five is based on the very first lexical studies (e.g. Cattell 1947; Norman 1963) that consistently yielded five overarching traits. Following these early lexical analyses, the Big Five traits were operationalised through personality measures, especially the NEO Personality Inventory-Revised (NEO-PI-R) and the NEO Five-Factor Inventory (NEO-FFI) (Costa and McCrea 1992). The NEO-PI-R and the NEO-FFI were translated into various languages to study the Big Five framework across languages and cultures (McCrae and Costa 1997; McCrae and Costa 2003). Studies that investigated personality traits in languages other than English were, generally, able to recover the five-factor structure (for a detailed overview list of these studies see Ashton et al. 2004). Consequently, it was proposed that five factors best represent a complete personality profile, and by the late 1990's most personality psychologists largely accepted the five-factor structure as an adequate overarching personality framework (Ashton and Lee 2007). Recently, however, the five-factor structure has been challenged anew. Two issues in particular caused researchers to, yet again, employ lexical analysis in the quest to determine how many traits best capture an overarching structure of personality across languages and cultures.

The first issue is that early lexical studies, on which the Big Five framework is based, were hindered by limited computing power (Ashton and Lee 2007). This meant comparatively small word-sets - not encompassing the entire lexicon of the English language - were used to arrive at the five-factor structure (Ashton and Lee 2007). The second issue is that investigations of personality traits in other languages were all based on *translations* of the English five-factor structure (Ashton and Lee 2007). Therefore, while studies that investigate personality in languages other than English generally were able to recover five factors across languages similar to those found in the English language, researchers noted this does not necessarily mean that five factors best describe personality structure (Ashton and Lee 2007). To determine whether five factors indeed represent the best possible taxonomy of personality it is necessary to perform lexical analysis using adjective sets native to the respective languages, as opposed to translations from English into another language. In a quest to arrive at a universal structure of personality (across language and cultures)

researchers have recently undertaken this task for languages other than English[20], and - making use of the advances in computing power - re-analysed larger word-sets from the English language lexicon (Lee and Ashton 2008). In the studies resulting from the recent re-examination both the five and the six-trait structure have been recovered from lexical analysis in *some* languages, however only a six-factor structure has been recovered across *all* languages[21]. In other words, it seems that six rather than five (overarching) traits better represent a universal taxonomy of traits, replicable across languages and cultures (for an overview and discussion on this topic see Ashton and Lee 2007). Importantly, for this investigation, the six-trait structure differs mainly in the way different aspects of prosocial behaviour are measured (Ashton and Lee 2007). The topic of which structure better captures a complete personality profile is still subject of heated debate, and ongoing research (Ashton and Lee 2007; Hopwood and Donnellan 2010). I therefore include a measure for both personality frameworks in this study, in the hope of addressing this debate by investigating the extent to which the prosocial traits from both the Big Five and the HEXACO can help explain investors' decision to engage in SRI.

Furthermore, I employ two personality instruments pertaining to frameworks that measure traits very relevant to prosocial behaviour but, thus far, receive little attention in the literature, namely Empathy and the 'Dark Triad' of personality (Ferguson et al. 2011).

The so-called 'empathy-altruism' hypothesis posits that empathy is an important antecedent for prosocial behaviour (Batson et al. 1981)[22]. However, with the exception of Fong (2007), Kirman and Teschl (2010), and Artinger et al. (2014) empathy is largely overlooked in the literature on prosocial behaviour in economics (Ferguson et al. 2011). This is perhaps surprising, given the concept of empathy has already been described by Adam Smith - the forefather of economics - in his first book *The Theory of Moral Sentiments*.[23] Nevertheless, the concept of empathy is

[20] For an overview of the studies see Ashton & Lee (2007).
[21] The four languages in which only the six and not the five trait structure of personality was found are: Filipino, Greek. Hungarian, and Italian, for an overview of the studies see (Ashton and Lee 2001) and Ashton & Lee (2007).
[22] It should be noted that the importance of empathy as a direct precursor for prosocial behaviour is still subject of debate (Maner et al. 2002; Singer and Lamm 2009).
[23] He famously started the book by stating: "How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it expect the pleasure of seeing it. [...] The

widely studied in investigations of prosocial behaviour in biology (De Waal 2008), psychology (Batson et al. 1997a; Batson et al. 1997b), and neuroscience (Bernhardt and Singer 2012). Based on investigations of empathy in these areas, researchers have proposed that empathy consists of two systems: an affective system, and a cognitive system (Davis 1980). Where the former refers to emotional reactions to situations, and the latter refers to the ability to "put oneself in someone else's shoes" (Davis 1980).[24] I describe these two systems in more detail in the paragraphs on empathy below. That being said, it is worth noting already that the affective system comprises two facets: Empathic Concern, and Personal Distress (Davis 1983). Empathic Concern captures 'other-oriented' feelings of sympathy and concern for unfortunate others, and Personal Distress refers to 'self-oriented' feelings of personal anxiety and unease in tense interpersonal situations (Davis 1983). Measuring empathy thus allows me to comment on the role of two different types of empathy related motivations in SRI investing: 'other-oriented' prosocial motivations and 'selfish' motivations. In the context of SRI the former motivation would be related to true prosocial motivations (i.e. investing in SRI due to concern for the social, or environmental cause), and the latter could be related to a 'moral licensing' motivation, whereby the moral act of investing in SRI is used to justify immoral behaviour elsewhere (Monin and Miller 2001). Furthermore, measuring empathy allows me to comment on the importance of the ability to 'put oneself in someone else's shoes' for SRI investing. In other words it allows me to address the question: Is an investor who is better at seeing others' perspectives more likely to invest in SRI than an investor who is not?

I also include a measure of aversive personality traits in this study - the Short Dark Triad (Jones and Paulhus 2014). While 'negative' behaviours have been part of studies on cooperative and prosocial behaviour in economics (e.g. negative reciprocity, free-riding etc.), little attention has been paid to the 'dark side' of personality (i.e. malicious personality traits) (Ferguson et al. 2011). As Ferguson et al. (2011) note the difference between negative behaviour (such as free riding) and dark personality traits is that the former is reactive whereas the latter can also be proactive. In other words, someone who free rides does so as a reaction to circumstances,

greatest ruffian, the most hardened violator of the laws of society, is not altogether without it." (A. Smith 2009, p. 13)

[24] Although the two-system notion of empathy only emerged later Adam Smith also described concepts relating to the cognitive system of empathy. Consider the following quote: "The mob, when they are gazing at a dancer on the slack rope, naturally writhe and twist and balance their own bodies, as they see him do, and as they feel that they themselves must do if in his situation" (A. Smith 2009, p.14).

whereas aversive personality traits can lead people to actively engage aversive behaviour to attain certain goals, deceiving and exploiting others along the way if neccesary. Personality theory has a long tradition in studying these negative traits. Three traits in particular - that have since been named the 'Dark Triad' of personality (Paulhus and Williams 2002) - have been the subject of extensive study in socially aversive personality namely, Machiavellianism, Psychopathy, and Narcissism (Paulhus and Williams 2002). These three traits are conceptually closely related, and correlated when jointly measured (Furnham et al. 2013). All three traits share a common core of callous, selfish, and malevolent tendencies in interpersonal dealings (Paulhus and Williams 2002). Intuitively, all three traits should be negatively related to prosocial behaviour. However, prosocial behaviour need not stem from prosocial motivations (Bénabou and Tirole 2006). Specifically, the literature distinguishes between 'intrinsic' and 'instrumental' prosocial behaviour (Sobel 2005). Where the former is associated with altruistic motives, and the latter represents behaviour to *signal* prosociality in order to garner social admiration and thereby social standing - a selfish motive (Bénabou and Tirole 2006). Including a measure for the Dark Traid traits, therefore, allows me to comment on whether investors may use SRI to signal prosociality.

Having motivated the inclusion of the four different personality instruments that I include in this investigation it is important to briefly address the issue regarding the definition of personality traits, namely: personality traits are not easily defined. Each trait represents a continuum between two extreme poles. Personality psychologists tend to describe personality traits starting with a general notion of an overarching trait (i.e. the highest level of an hierarchical order for the trait), followed by a list of facets that comprise the lower-levels of the hierarchy. The facets themselves are further defined by adjectives that 'load' onto each facet in factor analysis - a standard statistical method in psychometrics (Almlund et al. 2011). In a seminal paper, which lays the foundation for a framework to use personality traits in economic theories, the authors note: "There is a danger in economists taking the labels assigned to psychologists' personality scores literally and misinterpreting what they actually measure" (Borghans et al. 2008, p.973). I therefore present a table in the appendix - table C1 - containing a description of each personality trait and its underlying facets. I use the term 'description' rather than 'definition' to emphasize that unifying definitions of personality traits do not exist.

2.1 The Big Five traits and the prosocial behaviour

The most widely used and extensively researched framework of personality traits are the Big Five and the related the five factor model (FFM) (Ferguson et al. 2011). The Big Five and the FFM are not identical but so similar that they are often used interchangeably (Matz et al. 2016). In this study I include a measure of the Big Five and thus use the term Big Five to describe this personality framework. In the Big Five, five factors[25] represent the highest level of a hierarchical organisation of traits: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism[26] (Borghans et al. 2008). Within the Big Five, prosocial dispositions (in the form of cooperative/altruistic tendencies) are captured by the trait Agreeableness. The American Psychology Association (APA) defines (high) Agreeableness as "the tendency to act in a cooperative, unselfish manner" (APA 2007). While Agreeableness does not solely measure prosocial inclinations, aspects of the trait are related to it: lower-level facets of Agreeableness include altruism, trust, and tender-mindedness (Almlund et al. 2011).

Given that Agreeableness is the sole trait in the Big Five that captures prosocial behaviour, I hypothesise that Agreeableness is positively associated with the measures of SRI investing.

While the Big Five traits have not yet been studied in connection with SRI investing, a number of studies find a positive link between higher levels of Agreeableness and a greater likelihood of prosocial behaviour in economic games, such as the dictator game (Ben-Ner et al. 2004a; Ben-Ner et al. 2004b; Baumert et al. 2014), the trust game (Evans and Revelle 2008; Müller and Schwieren 2012), public good games (Koole et al. 2001; Volk et al. 2011), and the prisoner's dilemma (Pothos et al. 2011; Kagel and McGee 2014). However, a few studies find evidence that it is not Agreeableness alone that is associated with prosocial behaviour but rather Agreeableness together with Openness. Openness refers to the extent to which people seek novelty over convention, value aesthetics, and are imaginative (Almlund et al. 2011). Openness is characterised by imagination, intellectual curiosity, and preferences for variety (Zhao and Smillie 2015) and has been linked to risk taking

[25] Facets of each of the five traits are more narrowly defined at lower levels of the hierarchy that further specify each global trait (Almlund et al. 2011).

[26] I provide a description of each trait in table 1. In this section I only describe traits that have been linked to prosocial behaviour in detail.

(Lauriola and Levin 2001), and liberal political orientation (Carney et al. 2008). The combination of Agreeableness and Openness has been linked to prosocial behaviour in a trust game (Becker et al. 2012) and in the ultimatum game (Brandstätter and Königstein 2001; Mehta 2007), as well as pro-environmental concern (Hirsh 2010). Moreover, Ben-Ner et al. (2004b) find that not Agreeableness but only Openness is associated with prosocial behaviour in a dictator game. Therefore, while a positive association of Openness with SRI investing would not be too surprising given previous findings discussed above, based on the conceptualization of SRI as a manifestation of prosocial beahviour mentioned in the introduction of this chapter and this section, theoretically Openness should not be related to prosocial behvaiour and thereby not related to engagement in SRI.

To summarise the hypothesis development regarding the Big Five, I hypothesise that Agreeableness, the prosocial trait of the Big Five, is positively related to the measures of SRI investing.

2.2 The HEXACO traits and prosocial behaviour

As explained in the introduction to this section the HEXACO framework was recently developed using lexical analysis, the same methodology that lead to the development of the Big Five (Ashton and Lee 2007). In the studies resulting from the recent re-examination of personality descriptive adjectives both the five and the six-trait structure have been recovered from lexical analysis in *some* languages, however only a six-factor structure has been recovered across *all* languages[27]. In other words, it seems that six rather than five (overarching) traits better represent a universal taxonomy of traits, replicable across languages and cultures (Ashton and Lee 2001). This six-trait personality framework has since been named HEXACO (Lee and Ashton 2004). The name HEXACO is an acronym for these traits, namely: Honest-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to Experience (Lee and Ashton 2004).

Generally, the HEXACO framework differs from the Big Five in three ways. First, it contains an additional sixth trait - Honest-Humility - that marks the biggest difference between the two frameworks (Ashton and Lee 2001). Second, the traits Agreeableness

[27] The four languages in which only the six and not the five trait structure of personality was found are: Filipino, Greek. Hungarian, and Italian, for an overview of the studies see Ashton and Lee (2001) and Ashton and Lee (2007).

and Emotionality are not identical to, but variations of their Big Five counterparts: Agreeableness and Neuroticism respectively (Ashton et al. 2014). Third, the traits Openness, Extraversion, and Conscientiousness are almost identical to their Big Five counterparts, apart from the exclusion of intellectual ability from HEXACO Openness[28] (Ashton et al. 2014). Importantly, for this investigation, the main difference between the HEXACO and the Big Five is how prosocial tendencies are measured. In the HEXACO three traits are directly related to prosocial behaviour, as opposed to one in the Big Five (Agreeableness). The three prosocial traits in the HEXACO are Honest-Humility, Agreeableness, and Emotionality (Ashton et al. 2014). All three traits are all interpreted in terms of constructs from theoretical biology relating to prosocial behaviour (Ashton and Lee 2007). Specifically, Honest-Humility and Agreeableness are explained in terms of different types reciprocal altruism, and Emotionality is explained in terms of kin altruism (Ashton and Lee 2007). I now proceed to explain these three traits in more detail to develop the hypotheses.

Honest-Humility, relates to *fairness* in reciprocal altruism and is defined as the "... tendency to be fair and genuine in dealing with others, in the sense of cooperating with others even when one might exploit them without suffering retaliation" (Ashton and Lee 2007, p. 156). In other words, Honest-Humility captures *active cooperation* (Hilbig et al. 2013b). At lower levels of the hierarchical organisation of the trait, Honest-Humility is characterised by the facets sincerity, fairness, greed avoidance, and modesty (Ashton et al. 2007)[29]. It should be noted here that in the Big Five these terms are "typically *peripheral* elements of Big Five Agreeableness" (Ashton et al. 2014, p.139, italics added). However, this is only true for measures of the Big Five that measure the all aspects of the Big Five[30] (Ashton et al. 2014). In shorter Big Five

[28] Note here that intellectual ability is part of *some* but not *all* Big Five measures (Ashton and Lee 2007). Furthermore, intellectual ability is not part of the facets for Big Five Openness that I list in table 1 since it is not part of the description of the trait that I derived the Big Five content from (John and Srivastava 1999). Big Five and HEXACO Openness can thus be considered nearly identical for the purpose of this investigation (for the subtle difference please refer to the list of facets reported in table C1 in the appendix).

[29] The four facets that Honest-Humility comprises are defined as follows: 1.) Sincerity is the tendency to be genuine in interpersonal relations; 2.) Fairness is the tendency to avoid fraud and corruption; 3.) Greed avoidance is the tendency to be uninterested in possessing lavish wealth, luxury goods, and signs of high social status; and 4.) Modesty is the tendency to be modest and unassuming (Ashton and Lee 2007).

[30] An example for a measure of the Big Five that measures all facets of the Big Five is the 240-item long NEO Personality Inventory-Revised (NEO-PI-R) (Costa and McCrea 1992). The length of this

measures that are most commonly used in the literature, these facets are not considered at all (Ashton et al. 2014). This is important for this investigation, as the facets that Honest-Humility comprises are essential for prosocial behaviour in a context such as SRI investing: when investing in SRI an investor can choose to act prosocial, although she could exploit others without suffering exploitation. In other words, an investor may choose to invest in assets that are not related to SRI in order to maximise risk-adjusted monetary returns, or she may choose to invest in SRI assets, thus actively choosing a prosocial option although she is not forced to do so (i.e. active cooperation). In essence the investment decision is thus very similar to decisions in a dictator game. I, therefore, hypothesise Honest-Humility to be positively related to SRI investing.

Although the HEXACO traits have not been studied in the context of SRI investing, some evidence from studies investigating the association of HEXACO traits with prosocial behaviour in economic games support this notion. Hilbig et al. (2015) report Honest-Humility is positively associated with prosocial behaviour in a dictator game, Hilbig et al. (2012, Study 1) find a positive association of the trait with prosocial behaviour in a public goods game, and Zettler et al. (2013) find such an association in a prisoner's dilemma game.

Within the HEXACO framework Agreeableness relates to *tolerance* in reciprocal altruism, it is described as "... the tendency to be forgiving and tolerant of others, in the sense of cooperating with others even when one might be suffering exploitation by them" (Ashton and Lee 2007, p.156). To put it differently, Agreeableness captures *reactive cooperation* (Hilbig et al. 2013b). HEXACO Agreeableness differs from Big Five Agreeableness in two ways. First, it includes anger, which in the Big Five is part of Neuroticism. People low in HEXACO Agreeableness are therefore more prone to be angry than those high in Big Five Agreeableness. Second, in contrast to Big Five Agreeableness, HEXACO Agreeableness does not include sentimentality related aspects (in the HEXACO sentimentality is part of Emotionality instead) (Ashton and Lee 2007). HEXACO Agreeableness thus manifests itself through lack of anger in the face of perceived wrongdoing of another person towards oneself, a desire for cooperation, tolerance, and low quarrelsomeness (Ashton and Lee 2009). As

measure however means it is rarely used in investigations of the Big Five, meaning that the facets that are close to the HEXACO Honest-Humility trait are largely not measured in the literature.

illustrated in table C1 in the appendix, the four facets that define HEXACO Agreeableness are: forgivingness, gentleness, flexibility, and patience (Ashton et al. 2014)[31]. There is no readily apparent connection of Agreeableness with active prosocial behaviour. Thus, based on the conceptualisation of engagement in SRI outlined in the introduction of this chapter and the beginning of this section, Agreeableness should not be related to the measures of engagement in SRI. When deciding whether to invest in SRI or not an investor does not react to unfair behaviour of someone else but rather actively decides whether to invest or not. I, therefore, do not expect an association of Agreeableness with the measures of SRI engagement but I note that the association is an empirical question given that Agreeableness is very closely related to prosocial behaviour.

Evidence from one study supports this notion. Hilbig et al. (2013a) find that Agreeableness is associated with prosocial behaviour in an ultimatum game i.e. not retaliating against an unfair offer. That being said, in one study by Thielmann and Hilbig (2014) the authors find that a combination of Honest-Humility and Agreeableness is associated with prosocial behaviour in a dictator game indicating that Agreeableness could also be relevant in a context of *active* prosocial behaviour.

The third prosocial trait of the HEXACO framework, Emotionality, represents tendencies related to kin altruism such as empathic concern and emotional attachment towards close others (i.e. kin) (Ashton and Lee 2007). Emotionality is related to Big Five Neuroticism but it differs from it in two aspects. First, Emotionality does not include anger, which is part of Big Five Neuroticism (in the HEXACO anger is part of Agreeableness). In other words, while people that are high in Neuroticism are more prone to anger, this is not the case for people high in Emotionality. The second difference is that Emotionality includes sentimentality, which is part of Agreeableness in the Big Five framework. As illustrated in table 1, four facets define Emotionality at the lower level of the hierarchy: fearfulness, anxiety, dependence, and sentimentality (Ashton et al. 2014)[32]. To recall, I conceptualised SRI investing as active prosocial

[31] Specifically the four facets that HEXACO Agreeableness comprises are defined as follows: a) forgivingness - the willingness to feel trust and liking towards those who may have caused one harm; b.) gentleness - the tendency to be mild and lenient in dealings with other people; c.) flexibility - the willingness to compromise and cooperate with others; d.) patience - the tendency to remain calm rather than to become angry (Ashton et al. 2014).

[32] Although table 1 lists all facets that Emotionality comprises, given that it Emotionality differs from Neuroticism it is useful to give a little more detail about the specific facets. Specifically the four facets

behaviour. It is not readily apparent how prosocial tendencies relating to kin altruism are relevant to SRI investing conceptualised in this manner (i.e. as active prosocial behaviour); I therefore do not expect Emotionality to be associated with the dependent measures but I note that the association is an empirical question given that Emotionality is closely related to prosocial tendencies in general.

To sum up, I hypothesise that the HEXACO trait Honest-Humility is positively associated with the measures of SRI investing in this chapter. While I treat the association of Agreeableness and Emotionality is an empirical question.

2.3 Empathy traits and prosocial behaviour

The so-called 'empathy-altruism' hypothesis posits that empathy is an important antecedent for prosocial behaviour (Batson et al. 1981)[33]. The construct empathy has been widely studied to investigate prosocial behaviour in different disciplines such as biology (De Waal 2008), psychology (Batson et al. 1997), and neuroscience (Shamay-Tsoory et al. 2009).

However, with the exception of Fong (2007), Kirman and Teschl (2010), and Artinger et al. (2014) empathy is largely overlooked in the literature on prosocial behaviour in economics (Ferguson et al. 2011).

Researchers have suggested that empathy consists of two components: a cognitive system and an affective (emotional) system (Davis 1983; De Waal 2008). Evidence from neuroscience supports this two-system view of empathy and suggests that neurologically these two systems may have little to no overlap (Shamay-Tsoory et al. 2009; Bernhardt and Singer 2012).

Emotional empathy refers to emotional responses that a person may experience as a result of *sharing* social emotions (Shamay-Tsoory et al. 2009). The emotional empathy system encompasses two distinct facets: Empathic Concern and Personal Distress. Empathic Concern refers to the extent to which an individual feels sympathy and concern for unfortunate others (Davis, 1983). Empathic Concern, therefore, is a

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that Emotionality comprises are defined as follows: a) Fearfulness - the tendency to experience fear; b) anxiety - the tendency to worry in a variety of contexts; c) dependence - the need for emotional support from others; and d) sentimentality - the tendency to feel strong emotional bonds with others (Ashton et al. 2014).

[33] It should be noted that the importance of empathy as a direct precursor for prosocial behaviour is still subject of debate (Maner et al. 2002; Singer and Lamm 2009).

facet that captures "other oriented" feelings (Davis, 1983). Empathic Concern is thus closely linked to intrinsic prosocial motivations.

Personal distress refers to the extent of "… "self-oriented" feelings of personal anxiety and unease in tense interpersonal settings" that someone may experience when sharing another's emotions (Davis 1983, p. 114). When a person acts to alleviate this type of emotional response it can also be interpreted as a "selfish" act in the sense that it is self-oriented: one acts to improve a situation in order to alleviate one's own distress.
With regards to the measures of SRI investing, I hypothesise the following. Due to its connection to intrinsic prosocial behaviour I hypothesise Empathic Concern to be positively associated with my measures of SRI engagement. The association of Personal Distress with SRI I treat as an open question. Personal Distress refers to the urge to alleviate feelings of anxiety in *tense interpersonal* settings, so although it is possible that Personal Distress is connected to a SRI investing via 'moral licensing' effects, I reason that the act of investing is too impersonal for this connection to warrant a hypothesis.

Thus far the only study that investigates the association of empathy with prosocial behaviour in an economic setting is that of Artinger et al. (2014). The authors investigate the behaviour of a sample of German students in two economic games, a dictator game, and an ultimatum game, they measure empathy with the same measure that I use in this study, the Interpersonal Reactivity Index (Davis 1980). The authors find no evidence that Empathic Concern is related to prosocial behaviour in either game but find a weak evidence of Perspective Taking with prosocial offers in the dictator game.

The cognitive empathy system relates to the Theory of Mind, the capacity to *understand* the social reasoning and social emotions of others (Shamay-Tsoory et al. 2009). The cognitive system consists of two facets: Perspective Taking and Fantasy.
Perspective Taking refers to "the tendency to spontaneously adopt the psychological point of view of others" (Davis 1983, p.114). Fantasy describes "the tendency to transpose oneself imaginatively into the feelings and actions of fictitious characters in books, movies, and plays" (Davis 1983, p.114). The cognitive system relates to the Theory of Mind - the capacity to *understand* the social reasoning and social emotions

of others (Shamay-Tsoory et al. 2009). Generally, the cognitive system of empathy could facilitate prosocial behaviour: a person who understands the perspective of someone in distress may act to alleviate another's suffering. However, high capacities in the cognitive empathy system need not necessarily result in prosocial behaviour; *understanding* the social reasoning and emotions of others does not always result in one acting prosocial. A high capacity in the closely related Theory of Mind would also be integral to strategic interaction that is required to maximise a person's gain, the directional motive in a number of standard game theoretical contexts (Kirman and Teschl 2010)[34]. For this reason, this function of the empathic system has also been called 'Machiavellian intelligence' (Byrne and Whiten 1989).

With regards to hypotheses, although high capacities in the cognitive system of empathy can facilitate prosocial behaviour and thereby could be related to SRI investing, it is also an important aspect of behaviour related to selfish behaviour. I therefore do not expect any specific association with the measures of SRI investing and treat this as an open question.

To summarise, I hypothesise that the empathy trait Empathic Concern is positively related to investment in SRI.

2.4 The Dark Triad traits and prosocial behaviour

Although 'negative' behaviours have been studied extensively in economics (e.g., negative reciprocity, free-riding etc.), little attention has been paid to aversive personality traits i.e. the 'dark side' of personality (Ferguson et al. 2011). As Ferguson et al. (2011) note the difference between negative behaviour (such as free-riding) and dark personality traits is that the former is reactive whereas the latter can also be proactive. A simple example of negative reciprocity is the punishment unfair behaviour in an economic game, such as the ultimatum game (i.e. not accepting a low offer that is considered unfair and resulting in no payment for either participant). By contrast, aversive personality traits can lead to people actively engaging in malevolent behaviour. One extreme example is the case of the white-collar criminal Bernard 'Bernie' Madoff, who ran 'the largest, longest and most widespread Ponzi scheme in

[34] Adam Smith in his second book *The Wealth of Nations* also noted the central role of the Theory of Mind for a rational selfish agent (although he did not call it Theory of Mind back then). He noted the ability to understand the goals and beliefs of one's trading partner facilitates business activities (Kirman and Teschl 2010).

history" before being sentenced to 150 years in prison (Henriques 2009, p. A1). Until his arrest Madoff enjoyed 50 years of success in high finance (Furnham et al. 2013). Madoff's actions therefore required deception and long-term planning with malicious intent to mislead his investors - a proactive behaviour.

Personality psychology has a long tradition in studying aversive personality traits (Ferguson et al. 2011). Three traits in particular have been studied intensively: Machiavellianism, Psychopathy, and Narcissism. Each member of the Dark Triad has different origins and emerged separately form one another. Both Psychopathy and Narcissism originate from the clinical literature, and practice - in the study of personality disorders (Furnham and Crump 2005). Machiavellianism, on the other hand, emerged from the analysis of statements made in Niccolo Machiavelli's infamous book on statecraft -"The Prince"- in which he describes ways for men to seize and retain power (Christie and Geis 1970; O'Boyle Jr et al. 2012). Christie and Geis (1970) analysed the philosophy, and tactical recommendations made by Machiavelli. Based on this analysis, they constructed a questionnaire for "Machiavellianism" that showed to accurately predict behaviour of people in 'everyday' samples, in line with Machiavellian principles (Furnham et al. 2013).

Recently the three traits have been jointly studied under the name 'Dark Triad' (Paulhus and Williams 2002). The three traits are closely related; people "...with these traits share a tendency to be callous, selfish, and malevolent in their interpersonal dealings" (Paulhus & Williams, 2002, p.100). However, although the traits are closely related and also correlated, there are some important differences between them. To illustrate the slight variations of the common features for the three traits table C2 in the appendix provides an overview of these features within each trait, and the extent to which each feature is part of each trait (Paulhus 2014). The "cardinal features" of each trait are indicated with triple plus signs. As table C2 in the appendix shows the feature that is shared by all three is callousness - a deficit in empathy (Paulhus 2014).

Given that all three traits are associated with selfish motives intuitively the three traits should be negatively related to prosocial behaviour. However, prosocial behaviour need not stem from prosocial motivations (Bénabou and Tirole 2006). Specifically, the literature distinguishes between 'intrinsic' and 'instrumental' prosocial behaviour (Sobel 2005). Where the former is associated with altruistic motives, and the latter represents behaviour to *signal* prosociality in order to garner social admiration and

thereby social standing (Bénabou and Tirole 2006). I therefore include a measure of the Dark Trait in this investigation to ascertain whether investors' engagement in SRI is related to social signaling, or, *image* motivations (Bénabou and Tirole 2006).

Out of the three traits, the trait that has an obvious theoretical association with image motivation is Narcissism. Narcissism is defined by a clash between a grandiose personality coupled with underlying insecurity (Jones and Paulhus 2014). Narcissists are exhibitionistic and exaggerate their achievements, they pursue certain goals for the purpose of societal admiration and see themselves as born leaders (Jones and Paulhus 2014). Given the goal directional motive of behaviour for the purpose of societal admiration I believe it is the most obvious candidate out of the three traits to capture image motivations. However, given it's callous core and the fact that investing is a rather private affair I do not believe the theoretical connection warrants a hypothesis. I therefore treat the association of Narcissism with SRI investing as an open question but note that the association could be either positive or negative.

The core features of Psychopathy comprise almost all common features that are shared by the three Dark Triad traits apart from Grandiosity that is more pronounced in Narcissism, as illustrated in table C2 in the appendix. Psychopathy is characterized by affective callous, manipulative behaviour, a lack of self-control, an erratic lifestyle, antisocial behaviour, and overall low levels of empathy (Rauthmann 2012; Rauthmann 2012 ; Furnham et al. 2013). Given the association of Psychopathy with antisocial behaviour, I hypothesise a negative association of Psychopathy with SRI investing.

As illustrated in table C2 in the appendix, the core defining features of Machiavellianism are callousness and manipulation. Machiavellians are skillful manipulators and believe interpersonal manipulation to be key for success in life (Furnham et al. 2013). People scoring high on Machiavellianism have a cynical view of human nature, are unprincipled, and engage in strategic coalition and reputation building behaviour (Jones and Paulhus 2014). Machiavellians are as malevolent as psychopaths, but they are less impulsive, more cautious and deliberate in their behaviour and do not act on temptation like psychopaths (Williams et al. 2010). In short, to paraphrase Rauthmann and Kohler (2012): Machiavellians are cold hearted, cynical, pragmatic manipulators that are motivated by long-term goals typically

related to money and power, who are not afraid to use deceit and exploitation to achieve these goals (Christie and Geis 1970; Jones and Paulhus 2009; Rauthmann 2011; Rauthmann and Will 2011; John F. Rauthmann and Kolar 2012; B. Fehr and Samsom 2013). Given Machiavellianism's association with goal-directional behaviour of the pursuit of money coupled with its selfish core, Machiavellians are not likely to pursue an investment strategy that involves restricting the asset universe and thereby possibly forgoing some financial return. I, therefore, hypothesise a negative association of Machiavellianism with SRI investing.

To sum up my hypotheses regarding the Dark Triad traits, I hypothesise a negative association of Psychopathy and Machiavellianism with SRI investing, and treat the association of Narcissism with SRI as an open question.

Before moving on to the next section that describes all the measures employed in this study, I first present a table - table 1 - that provides an overview for all the hypotheses for all personality traits.

Table 1 - Overview of the hypotheses

Framework	Trait	Hypothesis
Big Five	Openness to experience	
	Conscientiousness	
	Extraversion	
	Agreeableness	+
	Neuroticism (Emotional Stability)	
HEXACO	Honest-Humility	+
	Emotionality	
	Extraversion	
	Agreeableness (versus Anger)	
	Conscientiousness	
	Openness to experience	
Empathy	Empathic Concern	+
	Personal Distress	
	Perspective Taking	
	Fantasy	
Dark Triad	Machiavellianism	-
	Psychopathy	-
	Narcissism	

Note: Table 1 provides an overview on the hypotheses. A "+" denotes I hypothesised a positive association, a "-" denotes I hypothesised a negative association; a blank space indicates no hypothesis or in other words an empirical question.

3. Measures

In this section I describe all measures that I employ in this chapter. I present the different measures in the order that is based on the order in which they appeared in the survey[35]. In other words, the first measures that I present were also the first measures that respondents were presented with in the survey.

3.1 Financial measures

Respondents were first presented with a welcome screen that contained all relevant information regarding the survey. This screen made no mention of personality or SRI so as to avoid priming[36]. To reduce social desirability bias, respondents were reassured that all their responses are treated completely anonymous.

The survey first asked respondents to indicate how much they had invested, by assigning their total portfolio size to one of ten categories.[37] The purpose was to help funnel respondents' thoughts towards the next question, which asked for a specific estimate of respondents' total investment portfolio[38]. The resulting variable labeled 'Total portfolio' is therefore a measure of investors' wealth, I winzorised this variable at 1% to deal with outliers. Following the item measuring the wealth of respondents, I asked for the percentage of the total portfolio invested in each of eleven asset classes listed on the screen, where the total of the items had to sum up to 100[39].

The subsequent section in the survey featured all questions regarding SRI. Here, the respondents were first presented with a definition of SRI. I used the following definition, from the Financial Times, as it corresponds to the general public perception of the SRI concept:

"[SRI] *is an investment strategy which seeks to generate both financial and sustainable value. It consists of a set of investment approaches that integrate environmental, social and governance (ESG) and ethical issues into financial analysis*

[35] For an illustration of the survey structure, please refer to appendix A1.
[36] Please refer to appendix A5 for the wording of the welcome screen.
[37] The ten categories were as follows: less than $ 10,000; $ 10,001 - $ 25,000; $ 25,001 - $ 50,000; $ 50,001- $ 100,000; $ 100,001 - $ 150,000; $ 150,001 - $ 200,000; $ 200,001 - $ 250,000; $ 250,001 - $ 500,000; $ 500,001 - $ 1 million; more than $ 1 million.
[38] The item measuring 'Total portfolio' is as follows: " Please provide below an estimate of the gross value of all your assets combined (i.e. your total portfolio)." A field where the respondent could enter a dollar value accompanied this item.
[39] For a screenshot of the "asset class measure" please see appendix A6.

and decision-making […] Value in this context refers not only to economic value, but to the broader values of fairness, justice, and environmental sustainability" (ft.com 2015).

Next, respondents were asked whether they had have ever invested in SRI assets. Only those who answered 'Yes' were also asked if they currently had funds invested in SRI assets. If the respondent indicated this to be the case, she was asked to provide an estimate of the percentage of each asset class that she had invested in SRI[40]. Thereafter all respondents—except those who reported that they currently held SRI assets—were presented with a measure that elicited their interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?". The measure was scored on a 5-point Likert scale, ranging from 1 ('not at all interested') to 5 ('very interested') and serves as the second dependent measure (labeled 'SRI-interest'). The next two questions were designed to measure investors' perception of the financial attributes of SRI.

3.2 Risk and Return perception measures

To capture investors' perception of return and risk associated with SRI, respondents were asked to indicate how SRI assets compare to conventional investments. The item measuring return expectations was:

"In the long-term, compared to ordinary investments, do you think that SRI assets offer: A much lower rate of financial return, a slightly lower rate of financial return, a similar rate of financial return, a slightly higher rate of financial return, a much higher rate of financial return."

The item measuring risk expectation was:

"In your view, compared to ordinary investments, are SRI assets: much riskier than ordinary investments, a little riskier than ordinary investments, about the same, a little less risky than ordinary investments, a lot less risky than ordinary investments."

[40] The variable resulting from this measure is labeled 'SRI-Proportion'; I do not investigate it in this study because the samples were too small to warrant meaningful analysis. However, I do report the descriptive statistics for 'SRI-Proportion' in table 5 to present as complete a picture of the sample as possible.

These two items closely follow Lewis and Mackenzie (2000); similar questions were also used by Bauer and Smeets (2015), Riedl and Smeets (2014), and Wins and Zwergel (2016).

3.3 Personality measures

The second segment of the survey contained all personality trait scales, which I describe next. For this section of the survey I used the 'randomizer' option of the survey software provider 'Qualtrics', that randomly presents respondents with one of the four different personality scales[41], the randomisation is spread evenly among all scales[42]. The design of the survey means that each respondent is only presented with one of the personality measures, essentially resulting in four different samples. For this reason I hereafter refer to each group of respondents that was presented with a personality measure by the name of the personality measure. For example, those who were presented with the Big Five measure I refer to as the 'Big Five sample'.

3.3.1 Big Five measure

To measure the personality traits of the Big Five model I chose to adopt the 15-item Big Five inventory (BFI-S) (Gerlitz and Schupp 2005; Lang et al. 2011). The BFI-S consists of 15 items, 3 items for each of the five personality traits[43]. Each item is scored on a 7-point Likert scale, ranging from 1 (Strongly agree) to 7 (Strongly

[41] I included a fifth scale, the Rosenbaum self-control schedule, which has been connected to pro-social behaviour under certain conditions (Martinsson et al. 2012; Kocher et al. 2017; Martinsson et al. 2010). However, none of the self-control analyses yielded significant associations with SRI engagement. In the interest of brevity, I omitted these results form this paper, but the analyses are available upon request. In this section I also included a measure of social preferences, the SVO-slider measure (SVO) Murphy et al. (2011), I included the SVO for each scale apart from HEXACO (due to the length of the HEXACO scale), I randomised the order in which respondents saw the two measures (an even number of randomly chosen respondents saw the SVO first and then the personality scale and vice versa). I include in my models a dummy variable that accounts for a possible order effect for all samples apart from the HEXACO. I did not include the SVO-slider measure in this analysis since it would was not part of the measures that was presented to the HEXACO sample and thus it would not have allowed me to directly compare the results for the Big Five and the HEXACO measures which is one of the main research questions for this investigation.

[42] In order to randomly assign respondents to the different variations of the survey I essentially created 3 different versions of the survey. The version of the survey that contained the HEXACO measure did not include the measure for social preferences. This meant that there was only one survey version for the HEXACO which resulted in about one fourth of the number of respondents being randomly assigned to the HEXACO measure, which in turn means that the size of the HEXACO sample is only about one fourth compared to the other samples. Please refer to appendix A1 for a stylized figure of the survey structure.

[43] Please refer to Appendix A7 for the BFI-S measure, including instructions.

disagree). Some items are reverse coded. The mean score across each of the three items are added and divided by three to arrive at a mean score for each of the five traits. The BFI-S is a shortened version of the original 44-item long Big Five Inventory (John et al. 1991). The BFI-S has been shown to have good internal consistency and has been validated against longer measures assessing the Big Five traits; it has been shown to reliably capture the Big Five traits (Hirsh 2010). I chose to use the BFI-S as opposed to the numerous alternative instruments[44] mainly because it has been part of large-scale household surveys such as the British Household Panel Survey and its German and Australian counterparts and is therefore widely used in the literature on personality psychology and economics (Brown and Taylor 2014; Lang et al. 2011). Furthermore, the brevity of the instrument makes it ideal for my type of study; I survey a large number of high net-worth individual investors. In this type of sample the length of the survey can be an issue, especially compared to student samples. The respondents are wealthy individuals and are more likely than, for example, students to not complete the entire survey if it were to take up too much of their time.

3.3.2 The HEXACO measure

To measure HEXACO traits I use the HEXACO-60 a 60-item measure with ten items for each of the six traits of the HEXACO model of personality structure[45] (Ashton and Lee 2009). Each item is scored on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Some items are reverse coded. The mean score across each of the 10 items are calculated to arrive at a score for each of the six traits. The HEXACO-60 is a short version of the original 100-item long HEXACO Personality Inventory-Revised measure (HEXACO-PI-R) (Lee and Ashton 2004, 2006; Ashton and Lee 2008). The HEXACO-60 has been validated in self-report data and showed good levels of internal consistency (the items for each trait are highly correlated), low interscale correlations (each trait measures a different construct), as well as high convergent validity (high levels of correlations between self-reports and observer reports) (Ashton and Lee 2009). I chose to adopt the HEXACO-60 measure instead of alternatives, for two reasons. First, it is much shorter than the original 192-item long HEXACO-PI-R (Ashton et al. 2004) making it better suited for an investigation of a

[44] The most common measures for the big five are the 240-item long NEO PI-R and the 60-item long NEO-FFI (Costa and McCrea 1992).
[45] Please refer to Appendix A8 for the HEXACO-60 measure, including instructions.

sample such as ours, as explained above. Second, although there is a shorter 24-item version, the 60-item version was shown to have better internal consistency; meaning the individual items for each trait are more strongly correlated (de Vries 2013).

3.3.3 Empathy measure

To measure empathy, I use the Interpersonal Reactivity Index (IRI) (Davis 1983). The IRI measures four different dimensions of empathy (Empathic Concern, Personal Distress, Perspective Taking, and Fantasy) with 28 items, 7 items per trait[46]. The items are scored on a 5-point Likert scale, ranging from 0 (Does not describe me well) to 4 (Describes me very well).). Some items are reverse coded. The mean score across each of the 7 items are calculated to arrive at a score for each of the four traits. The IRI is the most widely used measure for empathy, and it has been extensively validated (Davis 1980; Artinger et al. 2014). Furthermore, the IRI is the only empathy measure that allows the measurement of the two-systems of empathy (Shamay-Tsoory et al. 2009).

3.3.4 Dark Triad measure

To measure the three-dimensional dark side of personality, I used the Short Dark triad (SD3) a 27-item scale, with 9 items per trait[47] (Jones and Paulhus 2014). The SD3 is a shortened version of the original 41-item long Dark Triad measure (Paulhus and Williams 2002). The items are scored on a 5-point Likert scale, ranging from 1 (Disagree strongly) to 5 (Agree strongly). Some items are reverse coded. The mean score across each of the 9 items are calculated to arrive at a score for each of the three traits. Jones & Paulhus (2014), validated the SD3 in both student and community samples, and have also compared it to the main alternative, a short measure of the Dark Triad, called the 'Dirty Dozen' (Jonason and Webster 2010). Furthermore, the SD3 was validated against canonical measures for each trait namely: the Mach-IV scale (Christie and Geis 1970) measuring Machiavellianism, the Self-Report Psychopathy Scale (Williams et al. 2007), and the Narcissistic Personality Inventory (Raskin and Hall 1979). The SD3 showed good internal consistency and, compared to the Dirty Dozen measure correlated more strongly with

[46] Please refer to appendix A9 for the IRI measure, including instructions.
[47] Please refer to appendix A10 for the SD3 measure, including instructions.

the aforementioned scales that measure each of the Dark Triad traits separately. Furthermore, the SD3 self-report measure was validated against observer reports, showing high convergent validity (consistently high correlations). Overall the SD3 is a very reliable measure for the Dark Triad traits. And due to its length, it is a suitable instrument for large-scale survey studies such as ours where survey length can be an issue, as explained above.

3.4 Risk preference measure

Having completed the respective personality scale that each respondent was randomly assigned to, all respondents were then presented with the third section of the survey that contained a lottery type risk preference elicitation task. I adopted this risk preference measure from (Dohmen et al. (2011), it is based on Holt & Laury (2002) and has also been used in other studies on SRI investors (e.g. Riedl and Smeets 2014)[48]. In the risk elicitation task, investors had to make a decision in 20 different situations between a 'sure' amount of money and a risky lottery choice with a 50% chance of winning $300 and 50% of winning $0. In the first situation the sure amount was $0, the amount increased in increments of $10, the maximum sure amount was $190 in the 20th situation. The point at which the respondent switched from the lottery option to the sure amount was recorded as her risk-preference value, thus, the higher the value the more risk-loving a respondent. The respondents who were most risk loving received a score of $200. The reason why I chose this measure instead of the alternative by Holt and Laury (2002) is that it is very straightforward and requires no numerical abilities (i.e. calculating probabilities) allowing me to elicit risk preferences that are independent of numerical abilities (Dave et al. 2010).

[48] Please refer to appendix A3 for the risk preference measure adopted from Dohmen et al. (2011).

3.5 Numeracy measure

To measure numeracy of respondents I used the adaptive version of the 'Berlin Numeracy Test' (BNT)[49] (Cokely et al. 2012). The test consists of four math problems, of varying degrees of difficulty. In the adaptive version of this test, respondents are presented with at least two, and at most, three math problems, depending on whether the answer they provide for the first item is correct or not. Respondents are scored in categories ranging from 1 (lowest numerical ability) to 4 (highest numerical ability). The BNT is specifically designed to elicit respondents' numerical ability with regards to statistical computations that are vital for risky decision-making such as investing (i.e. proficiency in statistical computation related to risk assessment such as transforming probabilities and proportions). I chose to include the BNT as opposed to alternative measures of numeracy for two main reasons. *First*, it has been shown to have better psychometric discriminability among highly educated individuals compared to the most common alternative the numeracy test by Lipkus et al. (2001) (Cokely et al. 2012). My sample consists of highly educated individuals; 87% report to have a university degree, and 68% report to have taken a formal course in economics at university level. *Second*, it is a new measure, which is important for the accuracy of such measures. To illustrate, consider the following question: "A bat and a ball cost $ 1.10 in total. The bat costs $ 1.00 more than the ball. How much does the ball cost?" If you are familiar with this question then you know one of the three items that are part of an alternative numeracy measure - the Cognitive Reflection Test (Cokely et al. 2012). Using the recently developed BNT ensures that I am not measuring familiarity with a question but numeracy (risk literacy) proper.

3.6 Demographic measures

In line with the SRI literature, the final section of the survey recorded respondents' socio-demographic characteristics e.g. (Nilsson 2008; Nilsson 2009; Bauer and Smeets 2015; Wins and Zwergel 2015). Specifically, I measured age with a self-report. The resulting variable is a continuous variable labeled 'Age' that is winzorised at 1% to deal with outliers. I also include an item recording respondents' gender labeled 'Female' that is equal to 1 if a respondent is female, and 0 otherwise.

[49] Please refer to appendix A4 for the BNT measure adopted from Cokely et al. (2012).

Additionally, I included an item that asked respondents' to report their attained level of formal education[50]. From this item I create a dummy variable labeled 'University degree' that is equal to 1 if the respondent reports to have attained at least a Bachelors degree, and 0 otherwise. In addition to measuring the education qualification, I also explicitly asked the respondents whether they have taken a formal course in economics at university level to account for financial knowledge. The resulting variable 'Economics course' is equal to 1 if a respondent has taken an economics course at university level, and 0 otherwise.

4. Model and Methodology

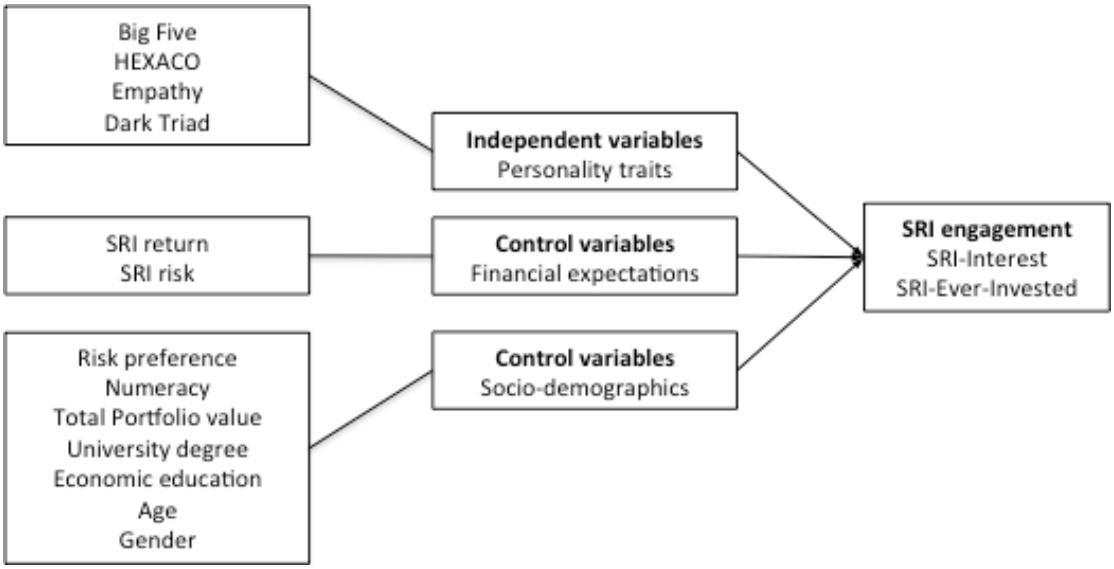
In this section I first give a very brief overview of the model that I estimate, thereafter I describe the methodology that I use to analyse investors' engagement in SRI investing.

4.1 Model

Similar to previous studies on SRI investors (e.g. Riedl and Smeets 2014) I investigate the association of personality traits with SRI investing in a model that includes controls for investors' risk- and return-expectations of SRI. Additionally, I control for investors risk preferences, and numerical abilities. Furthermore, I include a number of socio-demographic controls that have been included in related studies (Nilsson 2008; Nilsson 2009; Bauer and Smeets 2015; Wins and Zwergel 2015).

[50] The specific item was as follows. "What is your level of formal education?" The different options were: (1) High-school, or less; (2) Some college; (3) Associate degree; (4) Bachelors degree; (5) Masters degree; and (6) Doctoral degree.

Figure 2 - Illustration of the model



4.2 Methodology

I now proceed to describe the method I employ to analyse the association of personality traits with the measures of SRI engagement. As I described in the previous section I have two different kinds of dependent variables: SRI-Interest and SRI-Ever-Invested. I use two different types of regression analyses - ordered logit and binary logistic regressions - that I describe below.

4.2.1 Ordered logit analysis

The first dependent variable 'SRI-Interest' measures investors' self-reported interest in investing in SRI on a scale ranging from 1 (not at all interested) to 5 (very interested). The variable is a categorically distributed variable that has an inherent rank order. In order to account for the ordinal nature of dependent variable such variables are analysed with ordered regression models (McCullagh 1980; Greene 2003). The ordered logit is build around the latent variable regression; the functional form is as follows.

$$y_i^* = \beta_0 + \beta_i x_i + \varepsilon_i$$

where

$$y = \begin{cases} 1 & if & y^* & \leq & \mu_1, & \\ 2 & if & \mu_1 & < & y^* & \leq & \mu_2, \\ 3 & if & \mu_2 & < & y^* & \leq & \mu_3, \\ 4 & if & \mu_3 & < & y^* & \leq & \mu_4, \\ 5 & if & \mu_4 & < & y^* & & \end{cases}$$

Where the latent variable y_i^* is the exact but unobserved interest that investor *i* has in investing in SRI such that *i* = 1, ...n. And x_i is a vector of the independent variables pertaining to investor *i,* which includes the personality trait variables. β_0 is the intercept, β is the vector of corresponding coefficients, and ε is a logistically distributed error term. Further, y is the observed category of self-reported interest in SRI, where the parameters μ are the endogenously determined endpoints of the categories of interest in SRI such that $\mu_5 = 1,2,3,4,5.$ All ordered logit regressions in this thesis are estimated using the maximum-likelihood method.

4.2.2 Binary Logistic analysis

The dependent variable 'SRI-Ever-Invested' is a binary variable that takes the value of 1 if an investor is invested in SRI, and 0 otherwise. I perform a standard maximum-likelihood logistic regression to estimate the likelihood of an investor investing in SRI assets. The logit can be derived from an underlying latent variable model. Let y_i^* be a latent, variable, and suppose that

$$y_i^* = \beta_0 + \beta x_i + \varepsilon_i \text{ , y} = 1[y_i^* > 0]$$

Where the probability that *y= 1* for investor *i* is given by y_i^* such that *i* = 1,....,n. The notation $1[y_i^* > 0]$ is the indicator function that defines the binary outcome and takes the value one if y_i^* is greater than 0, and zero otherwise. And x_i is a vector of the independent variables pertaining to investor *i*, which includes the personality trait variables. β is the vector of corresponding coefficients, and β_0 is the constant and ε is a logistically distributed error term independent of *x.* In the logit model, *G* is the logistic function:

$$\beta_0 + \beta x_i + \varepsilon_i = \frac{exp\,(\beta_0 + \beta x_i + \varepsilon_i)}{[1 + exp\,(\beta_0 + \beta x_i + \varepsilon_i)]}$$

5. Results

This section presents the results of the analyses. I first, give an overview of the descriptive statistics for all variables in my model, followed by the descriptive statistics for the SRI engagement measures. Thereafter I present the results for each sample in turn. I first present the results for the Big Five sample, followed by the HEXACO, thereafter I present the results for the Empathy sample, and last I present the results for the Dark Triad sample. For each sample, the presentation of the results is followed by a discussion section where I relate the findings back to the literature. As the personality traits I measure have not been examined with regards to SRI investing I focus on the literature that has investigated these personality traits in an economic context. In the last section of this study - section 6 - I then relate the findings back to the SRI literature.

5.1 Descriptive Statistics

All data was collected between the 17th March and the 2nd June 2015 via the American Association of Individual Investors (AAII).[51] An invitation to participate in survey was distributed to 116,265 members through the association's mailing list, of whom 5,515 investors started the survey, and 3,046 respondents completed it, yielding a response rate of 2.6%.[52] I excluded all respondents who did not finish the entire survey and checked for double responses by comparing IP addresses. I excluded all responses that came from the same IP address; I only considered the first responses from the same IP address so as to ensure that respondents were not familiar with the measures. This left me with 3,055 complete responses. In all sections of the survey, apart from the socio-demographic section, I used the '"forced response" option of the survey provider "Qualtrics", meaning unless respondents answered all questions on each screen they were not able to proceed. I did not use this option for the survey section that collected respondents' socio-demographic characteristics,

[51] [51] The AAII is a non-profit association, with a mission to assist "individuals in becoming effective managers of their own assets through programs of education, information and research" (AAII.com, 2016).

[52] The response rate is slightly lower than those obtained in similar studies (Junkus and Berry 2010; Berry and Junkus 2013).

which is why the number of the socio-demographic variables varies slightly. Table 2 present the descriptive statistics for all personality and control variables[53].

[53] Table 2 does not show the descriptive statistics of the control variables for each of the different samples. Please refer to table B3 in the appendix for the descriptives of all the different samples.

Table 2 -Descriptive statistics - Personality and control variables

Variable type	Variable Name	N	Mean	Std. Dev.	Min	Max
Socio-deomgraphic	Age	1919	55.6	10.88	20	82
	Female	1946	0.05	0.23	0	1
	University degree	1941	0.87	0.32	0	1
	Economics-course	1944	0.68	0.46	0	1
	Total Portfolio	3,046	$ 2.35 mil.	$ 3.17 mil.	$ 1620	$ 21 mil.
Controls	Risk-Preferences	2010	103.87	48.82	0	200
	Numeracy	1944	2.58	1.1	1	4
	SRI-Return	2864	2.28	0.75	1	5
	SRI-Risk	2864	2.71	0.73	1	5
Big Five traits	Openness	569	4.41	0.97	1	6.67
	Conscientiousness	569	4.62	0.9	1.67	6.67
	Extraversion	569	3.76	1.21	1	6.67
	Agreeableness	569	4.58	0.92	1.33	6.67
	Neuroticism	569	3.26	1.14	1	7
HEXACO traits	Honest-Humility	156	3.43	0.42	2	4.3
	Emotionality	156	2.89	0.51	1.6	4.4
	Extraversion	156	3.25	0.48	1.3	4.4
	Agreeableness	156	3.16	0.47	2.1	4.2
	Conscientiousness	156	3.61	0.42	2.3	4.6
	Openness	156	3.65	0.54	2.2	4.9
Empathy traits	Empathic concern	532	2.53	0.61	0	4
	Personal distress	532	1.18	0.67	0	3.29
	Perspective taking	532	2.49	0.62	0.57	4
	Fantasy	532	1.68	0.7	0	4
Dart triad traits	Machiavellianism	520	2.7	0.54	1	4.67
	Narcissism	520	2.69	0.43	1.44	4.11
	Psychopathy	520	1.99	0.48	1	3.67

The sample is predominantly male (94.2%) with a mean age of 55.6. The respondents are generally very well educated - 87.9% (1,704) have a university degree - and also knowledgeable about economic theory; 68.7 % (1,333) have taken a formal economics course at university-level. Further, the investors are rather wealthy; the mean portfolio value across the sample is $ 2.35 million, corresponding closely to the mean portfolio value of members of the organisation - $ 2.43 million - reported to me by the AAII. The risk preference measure reports the switching point where an investor switches from the lottery to the 'sure' payout, the average investor switches at 103.87 dollars (S.D = 48.82) indicating that the average investor is risk averse (the

risk neutral point is 150 Dollar). The numeracy scores of the sample are very similar to those reported by Cokely et al. (2012) for a sample of students from different German Universities. Furthermore, investors in the sample believed that SRI yields lower returns (M= 2.29, SD = 0.75) relative to conventional investments, $t(2,863) = -51.23$, $p < 0.001$.[54] Investors also expected SRI to be slightly more risky (M= 2.70, SD = 0.73) than conventional investments, $t(2,863) = -20.99$, $p < 0.001$.[55] To give th reader a completed overview of the data table B3 in the appendix shows the descriptive statistics for all control variables for all samples.

The scores of the personality traits are comparable to those obtained in adult samples in previous studies employing the same measures (Lang et al. 2011, for the BFI-S: Ashton and Lee 2009, for the HEXACO-60; Konrath et al. 2010, for the empathy measure (IRI); and Jones and Paulhus 2014, for the SD3).

Table 3 reports the descriptive statistics for the dependent measures for the entire sample, and for the samples for each personality measure. In this study I solely investigate the association of personality traits with the dependent variables SRI-Interest and SRI-Ever-Invested. However, for the reader's consideration table 3 also reports results for another measure 'SRI-Proportion' that is the self-reported aggregate share of investors' portfolios invested in SRI assets. Only a small minority of the surveyed individual investors (324 respondents; 10.7% of the full sample) indicated that they currently held SRI investments and of these, only about half recollected the size of the assets in question[56]. I therefore did not analyse the association of the traits with this variable since the samples were too small to warrant meaningful analysis.

[54] T-tests for each sample are : $t(568) = -23.46$, $p < 0.001$ for the Big Five sample; $t(155) = -11.42$, $p < 0.001$ for the HEXACO sample; $t(531) = -22.51$, $p < 0.001$ for the Empathy sample; $t(519) = -20$, $p < 0.001$ for the Dark Triad sample.
[55] T-tests for each sample are: $t(568) = -9.24$, $p < 0.001$ for the Big Five sample; $t(155) = -6.05$, $p < 0.001$ for the HEXACO sample; $t(531) = -9.54$, $p < 0.001$ for the Empathy sample; $t(519) = -8.3$, $p < 0.001$ for the Dark Triad sample.
[56] The sample sizes for the different samples were as follows: 62 for the Big Five; 14 for the HEXACO; 49 for Empathy; and 43 for the Dark Triad.

Table 3 - Descriptive statistics - dependent variables

Sample	Dependent variable	N	Mean	Std. dev.	Min	Max	Skew.	Kurt
Entire sample	SRI Interest	2682	2.42	1.19	1	5	0.07	1.7
	SRI-Ever-invested	3022	0.17	0.38	0	1	1.72	3.95
	SRI Proportion	255	16.79	22.38	.001	99	1.96	6.29
Big Five sample	SRI Interest	494	2.45	1.18	1	5	0.01	1.69
	SRI-Ever-invested	569	0.19	0.39	0	1	1.57	3.46
	SRI Proportion	62	12.90	19.14	.001	91.79	2.57	9.76
HEXACO sample	SRI Interest	140	2.46	1.20	1	5	0.01	1.65
	SRI-Ever-invested	156	0.15	0.36	0	1	1.99	4.96
	SRI Proportion	14	17.76	20.67	.23	65.5	1.11	3.05
Empathy sample	SRI Interest	474	2.52	1.19	1	5	-0.1	1.72
	SRI-Ever-invested	532	0.19	0.40	0	1	1.55	3.41
	SRI Proportion	49	12.57	15.26	.5	67.6	1.72	5.54
Dark Triad sample	SRI Interest	472	2.45	1.19	1	5	0.04	1.66
	SRI-Ever-invested	520	0.15	0.36	0	1	1.92	4.68
	SRI Proportion	43	16.06	21.14	.45	94	2.14	7.18

The first dependent variable 'SRI-Interest' is the answer to the questions: "To what degree would you say that you are interested in investing in SRI assets?" that was only presented to those investors who reported to currently not have any money invested in SRI assets. The item is scored on a 5-point Likert scale ranging from 1 (not at all interested) to 5 (Very interested). The mid-point of this scale - 3 - corresponds to the answer "indifferent". Across the entire sample (2,682) investors reported to be not interested in investing in SRI ($M = 2.42$, SD = 1.19). In other words investors reported to have less interest in SRI rather than being indifferent, this difference was significant in a one-sided t-test, $t(2,681) = -25.44$, $p < 0.001$. This is true for all of the samples[57]. *Ceteris paribus* investors, therefore, are not very interested in investing in SRI. Furthermore, across the entire sample of 3,022 investors only 17% (514) investors reported to ever have invested in SRI assets. This is comparable across the different sample (19% in the Big Five sample; 15% in the HEXACO; 19% in the Empathy sample: and 16% in the Dark Triad sample). Furthermore, tables B4, B5, B6, and B7 in the appendix provide an overview of the pairwise correlations for the BFI-S, the HEXACO, the Empathy, and the Dark Triad sample, respectively.

[57] For the Big Five sample the one sided t-test result was $t(493) = -10.3664$, $p < 0.001$; for the HEXACO sample $t(139) = -5.3$, $p < 0.001$; for the Empathy sample $t(473) = -8.7334$, $p < 0.001$; and for the Dark Triad $t(473) = -8.7334$, $p < 0.001$.

5.2 The Big Five traits and interest in SRI

Table 4 presents the results for ordered logit regressions of 'SRI-Interest' on the Big Five personality trait variables. The dependent variable is an ordinal variable captured on a 5-point Likert scale, ranging from 1 (‘no interest at all’) to 5 (‘very interested’). I present three specifications: model 1 serves as the baseline, with the personality traits as the only independent variable; model 2 controls for investors’ SRI risk and return expectations; model 3 includes all control variables.

I do not find evidence supporting the hypothesis of a positive association of Agreeableness with the self-reported interest an investor has in investing in SRI: Agreeableness is not significantly correlated with SRI-Interest in any of the three specifications. I do find evidence of Openness being positively correlated with the self-reported interest that an investor has in investing in SRI, this association is significant at 1% across all three specifications. Additionally, I note that investors' return expectations are positively correlated with the dependent measure for the two specifications in which it is included as a control. However, investors' risk expectations are only significant in model 2 and non-significant in the full specification (model 3). This association thus appears robust to SRI risk- and return-expectations, and to relevant investor characteristics, such as risk preferences and level of education attained. Furthermore, the diagnostics suggest that the model provides a decent fit with the data (Wald Chi-sq. = 14.68, $p < 0.012$ for model 1; Wald Chi-sq. = 73.89, $p < .000$ for model 2; and Wald Chi-sq. = 72.47, $p < 0.000$ for model 3). To compare the economic significance between the Openness and investors' return expectations of SRI table B8 in the appendix shows the marginal effects of each variable in the full specification for each of the five possible answers to the question "To what degree would you say you are interested in investing in SRI?".
To compare the economic significance please consider the column 4 (the 4th column from the left) of table B8 in the appendix. Column 4 shows the marginal effect of all variables in the full specification when the dependent variable takes the value of '4' (i.e. the probability of a respondent answering 'Somewhat interested')..

Table 4 - Ordered logit regressions of SRI-Interest on the Big Five traits

Model No.	1	2	3
Variables		SRI-Interest	
Openness to Experience	0.2759***	0.2764***	0.2976***
	(0.0891)	(0.0903)	(0.1083)
Conscientiousness	-0.1275	-0.1410	-0.0867
	(0.1097)	(0.1114)	(0.1336)
Extraversion	0.0415	0.0321	0.0561
	(0.0714)	(0.0734)	(0.0804)
Agreeableness	0.1274	0.1121	0.0689
	(0.1010)	(0.1066)	(0.1211)
Neuroticism	0.1116	0.0693	0.0813
	(0.0785)	(0.0777)	(0.0921)
SRI-Return		0.8750***	0.9293***
		(0.1319)	(0.1622)
SRI-Risk		0.2497*	0.2078
		(0.1356)	(0.1622)
Risk-Preferences			-0.0011
			(0.0022)
Numeracy			0.1172
			(0.0896)
Total-portfolio			-0.0000
			(0.0000)
University degree			0.3529
			(0.3404)
Economics-Course			0.1115
			(0.2180)
Age			-0.0061
			(0.0085)
Female			0.3472
			(0.4277)
Ordereffect			-0.0638
			(0.2049)
Constant cut 1	1.0054	3.1987***	3.7425***
	(0.7370)	(0.8612)	(1.2394)
Constant cut 2	1.4571**	3.6950***	4.2345***
	(0.7402)	(0.8670)	(1.2458)
Constant cut 3	3.0669***	5.4870***	6.0597***
	(0.7504)	(0.8875)	(1.2723)
Constant cut 4	5.8701***	8.4263***	8.8870***
	(0.7942)	(0.9388)	(1.3385)
Observations	494	494	402
Pseudo R-squared	0.0111	0.0611	0.0705
Wald Chi-sq.	14.68	73.89	72.47
P > Chi2	0.0118	0	1.61e-09

Note: Table 4 presents maximum-likelihood ordered logit regressions with White heteroskedasticity-consistent standard errors and covariance. The dependent variable is a measure of interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?" The measure was scored on a 5-point Likert scale, ranging from 1 ('not at all interested') to 5 ('very interested'). 'Ordereffect' is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. "Constant cut" refers to the estimated cut points on the latent variable used to differentiate the five categories of 'SRI Interest' when the values of the independent variables are evaluated at zero. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

The marginal effect of Openness in column 4 is 0.038, and the marginal effect of SRI-Return is 0.1186. This means that a one-unit increase in Openness increases the probability of observing outcome '4' by 3.8%. A one-unit increase of SRI-Return increases the probability of observing outcome '4' by 11.86%. Meaning that the marginal effect of a one-unit increase in SRI-Return is around three times as large as a one-unit increase in Openness. Thus, while the personality trait Openness is an important factor for investors' self-reported interest in SRI, investors' expected financial return of SRI is around three times as important.

5.3 Big Five traits and SRI investing

Table 5 presents the results for logistic regressions of 'SRI-Ever-Invested' on the Big Five personality traits, showing three models, with additional control variables included incrementally. The dependent variable takes the value of 'one' if an investor has, or currently is, invested in SRI and 'zero', otherwise. For ease of interpretation, all coefficients in Table 5 are marginal effects at the mean.

Table 5 - Logistic regressions of SRI-Ever-Invested on the Big Five traits

Model No.	4	5	6
Variables	SRI-Ever-Invested		
Openness to Experience	0.0637***	0.0528***	0.0497**
	(0.0180)	(0.0168)	(0.0197)
Conscientiousness	-0.0376*	-0.0334*	-0.0236
	(0.0194)	(0.0184)	(0.0209)
Extraversion	-0.0029	-0.0044	0.0003
	(0.0133)	(0.0124)	(0.0136)
Agreeableness	0.0188	0.0144	0.0218
	(0.0184)	(0.0176)	(0.0194)
Neuroticism	0.0195	0.0138	0.0228
	(0.0143)	(0.0135)	(0.0151)
SRI-Return		0.1053***	0.1149***
		(0.0227)	(0.0267)
SRI-Risk		0.0434*	0.0426
		(0.0249)	(0.0284)
Risk-Preferences			0.0005
			(0.0004)
Numeracy			0.0216
			(0.0160)
Total-portfolio			0.0000
			(0.0000)
University degree			0.0902
			(0.0599)
Economics-Course			-0.0158
			(0.0360)
Age			0.0027*
			(0.0016)
Female			0.0157
			(0.0677)
Ordereffect			0.0084
			(0.0348)
Constant	-3.1533***	-5.5108***	-9.0866***
	(1.0272)	(1.2060)	(1.7715)
Observations	569	569	467
Pseudo R-squared	0.0299	0.0910	0.108
Wald Chi-sq.	16.09	44.29	43.00
P > Chi2	0.00658	1.87e-07	0.000157

Table 5 presents maximum-likelihood binary logit regressions. Coefficients are marginal effects at the mean. The dependent variable is a binary variable that takes the value of 1 if an investor has invested in SRI in the past (this includes investors that are currently invested in SRI) and 0 otherwise. 'Ordereffect' is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

As with the previous analysis of 'SRI-Interest' I do not find any evidence supporting the hypothesis that Agreeableness is positively related to the likelihood that investors have invested in SRI at some point in the past. I do find evidence of a positive association of Openness with the dependent measure. This association is significant for each of the three models, in model 6 that includes all controls the association is significant at 5% suggesting the association is robust to SRI risk- and return-expectations, and to relevant investor characteristics such as risk preferences and education attained. In model 6 a one-unit increase in Openness is associated with an increase in the likelihood that an investor invests in SRI of 4.9%. Furthermore, I also find that Conscientiousness is negatively correlated with the likelihood that investors invest in SRI. This result is significant in the base model (model 4), and when controlled for SRI risk- and return-expectations (model 5), but it is not significant when all controls are included (model 6). I note furthermore, that investors' expectations of SRI returns are positively and highly significantly associated with the likelihood that an investor has invested in SRI at some point in the past. Investors' expectations of SRI risk, on the other hand, are non-significant in the full specification (model 6). The diagnostics suggest that all models provide a good fit with the data Wald Chi-sq. = 16.09 $p < 0.007$ for model 4; Wald Chi-sq. = 44.29, $p < .000$ for model 5; and Wald Chi-sq. = 43, $p < 0.000$ for model 6).

5.4 Big Five traits analysis results - discussion

In the analysis of the Big Five traits I find no evidence in support of the hypothesis of a positive association of Agreeableness with SRI engagement: the 'prosocial' Big Five trait Agreeableness, is associated with neither the interest investors have in investing in SRI nor the likelihood that investors have invested in SRI. My results therefore contrast previous studies finding an association of Agreeableness with pro-social behaviour (e.g. Ben-Ner et al. 2004a; Pothos et al. 2011; Baumert et al. 2014; Kagel and McGee 2014).

Furthermore, I find that investors return expectations are highly significantly positively correlated with both dependent measures.

Given that Agreeableness is the sole 'prosocial' trait within the Big Five and the significant correlation of return expectations, at face value the results could therefore suggest that investors' prosocial tendencies are not an important characteristic when it comes to SRI investing. However, previous studies have also found that not Agreeableness but Openness is associated with prosocial behaviour. For example,

Ben-Ner et al. (2004b) find Openness to be the only Big Five trait associated with pro-social behaviour in a dictator game. I too find that Openness is highly significantly related to both interest in SRI and the likelihood that investors have invested in SRI. This correlation is significant in the full specifications, which includes all controls (models 3 and 6). This association thus appears robust to SRI risk- and return- expectations, and to relevant investor characteristics, such as risk preferences and level of education attained.

In model 3 a one-unit increase in Openness is associated with an increase in the likelihood that this respondent responds 'Somewhat interested' to the question "To what degree would you say you are interested in investing in SRI?" of 3.8%.

In model 6 a one-unit increase of in Openness is associated with an increase in the likelihood that an investor invests in SRI of 4.9%. Other studies also found some evidence of Openness being related to pro-social behaviour, albeit in combination with Agreeableness (Becker et al. 2012; Brandstätter and Königstein 2001; Mehta 2007). It is possible, therefore, rather than prosocial motivations not playing a role in the decision to invest in SRI the non-significance of Agreeableness in my analysis could be due to the way in which Agreeableness accounts for (or rather doesn't effectively account for) prosocial tendencies of people (Hilbig et al. 2014). This was one of the main reasons for the development of the HEXACO framework that I investigate in the next section (Ashton and Lee 2008). Additionally, Openness has been linked to an affinity of individuals for liberal, progressive, left-wing political views (McCrae, 1996). SRI investing could arguably be viewed as a more progressive form of investing, linked to a more left-wing political views. Alternatively, the significance of Openness could thus be interpreted as investors - high in Openness - to be more prone to view SRI as a manifestation of acting on left-leaning political views which is closely related but not identical to prosocial behaviour.

Furthermore, I also find some evidence of a negative association between Conscientiousness and the likelihood that investors have invested in SRI. This association is only weakly significant (at 10%) in the models that include fewer controls, and non-significant in the full specification (model 6). However, previous studies have also found a negative association between Conscientiousness and pro-social behaviour in the dictator game (Ben-Ner et al. 2004a; Becker et al. 2012) and the trust game (Ben-Ner and Halldorsson 2010; Becker et al. 2012; Müller and Schwieren 2012). Given that the results are thus largely in line with previous findings on prosocial behaviour this suggests that SRI engagement could be related to prosocial behaviour but I cannot detect it with Big Five Agreeableness. This

explanation fits in with the extant literature where the association of Agreeableness with prosocial behaviour, although conceptually existent, often has not been found (Hilbig et al. 2014).

5.5 HEXACO traits and interest in SRI

Table 6 presents the results for ordered logit regressions of 'SRI-Interest' on the HEXACO personality trait variables showing three models, with additional control variables included incrementally. The dependent variable is an ordinal variable captured on a 5-point Likert scale, ranging from 1 (‘no interest at all’) to 5 (‘very interested’). I find evidence supporting the hypotheses of a positive association of Honest-Humility with SRI-Interest. The association is significant across all three models and thus seems robust to SRI risk- and return-expectations, and to relevant investor characteristics, such as risk preferences and level of education attained. Furthermore, I find that the other two prosocial traits - Emotionality, and Agreeableness - are also consistently positively associated with SRI-Interest, across all three models. What is more, I find evidence of Openness to be positively associated with the dependent measure. Additionally, I note that investors' risk- and return-expectations are also significantly positively associated with the dependent measure in both models in which they are included (models 8 and 9). All results regarding the personality traits are significant for all three models I estimate, and thus appear robust to investors' SRI risk- and return-expectations and relevant investor characteristics. The diagnostics suggest that the model provides a good fit with the data (Wald Chi-sq. = 24.51 $p < 0.000$ for model 7; Wald Chi-sq. = 37.34, $p < .000$ for model 8; and Wald Chi-sq. = 36.16, $p < 0.002$ for model 9). To ascertain the economic significance of the different variables table B9 in the appendix shows the marginal effects of the full specification for all five possible answers to the question "To what degree would you say you are interested in investing in SRI?". Column 4 (the 4th column from the left) of table B9 in the appendix shows the change in probability of observing outcome '4' (i.e. a respondent answering 'Somewhat interested') for a one-unit increase of the variables. The marginal effects of Honest-Humility, Emotionality, Agreeableness, and Openness are 0.148, 0.1079, 0.1225, and 0.141, respectively. Meaning a one-unit increase of Honest-Humility, Emotionality, Agreeableness, and Openness increases the probability of an investor answering 'Somewhat interested' (i.e. observing the value 4) by 14.8%, 10.79%, 12.25%, and 14.1% respectively. The marginal effect of SRI-Return and SRI-Risk in column 4 is

0.0855, and 0.0958, respectively. Meaning a one-unit increase of SRI-Return and SRI-Risk increases the probability of observing outcome '4' by 8.55%, and 9,58%, respectively. The results suggest that investors' personality traits - measured with the HEXACO instrument - are a more important factor when it comes to the self-reported interest in investing in SRI than are investors' return and risk expectations of SRI assets.

Table 6 - Ordered logit regressions of SRI-Interest on the HEXACO traits

Model No.	7	8	9
Variables		SRI-Interest	
Honest-Humility	1.0014**	1.0715**	1.2081**
	(0.4109)	(0.4660)	(0.6023)
Emotionality	0.7663***	0.7690**	0.8803**
	(0.2842)	(0.3126)	(0.3638)
Extraversion	0.4284	0.2481	0.0572
	(0.3165)	(0.3100)	(0.4117)
Agreeableness	0.7384**	0.8138**	0.9998**
	(0.3481)	(0.3276)	(0.4423)
Conscientiousness	-0.4676	-0.4414	-0.2611
	(0.3507)	(0.4380)	(0.5019)
Openness	0.7835**	0.9452**	1.1506**
	(0.3478)	(0.3755)	(0.5087)
SRI-Return		0.5379**	0.6982***
		(0.2259)	(0.2534)
SRI-Risk		0.6886**	0.7815**
		(0.2981)	(0.3802)
Risk-Preferences			0.0046
			(0.0035)
Numeracy			-0.0735
			(0.2032)
Total-portfolio			-0.0000***
			(0.0000)
University			-0.0087
			(0.5548)
Economics-Course			-0.4174
			(0.4781)
Age			0.0195
			(0.0212)
Female			-0.1808
			(0.8125)
Constant cut 1	9.6462***	13.1320***	16.3073***
	(2.2759)	(2.7579)	(3.6573)
Constant cut 2	10.2274***	13.8059***	17.1131***
	(2.2998)	(2.7866)	(3.7197)
Constant cut 3	11.8703***	15.6201***	19.0521***
	(2.3624)	(2.8844)	(3.8447)
Constant cut 4	15.0612***	18.9622***	22.4897***
	(2.3806)	(2.9308)	(3.9218)
Observations	140	140	116
Pseudo R-squared	0.0652	0.121	0.167
Wald Chi-sq.	24.51	37.34	36.16
P > Chi2	0.000420	9.95e-06	0.00168

Table 6 presents maximum-likelihood ordered logit regressions with White heteroskedasticity-consistent standard errors and covariance. The dependent variable is a measure of interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?" The measure was scored on a 5-point Likert scale, ranging from 1 (‘not at all interested’) to 5 (‘very interested’). "Constant cut" refers to the estimated cut points on the latent variable used to differentiate the five categories of 'SRI Interest' when the values of the independent variables are evaluated at zero. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

5.6 HEXACO traits and SRI investing

Table 7 presents the results for logistic regressions of 'SRI-Ever-Invested' on the HEXACO personality traits, showing three models, with additional control variables included incrementally.

Table 7 - Logistic regressions of SRI-Ever-Invested on the HEXACO traits

Model No.	10	11	12
Variables		SRI-Ever-Invested	
Honest-Humility	0.1194*	0.0963	0.1339**
	(0.0660)	(0.0618)	(0.0665)
Emotionality	0.0314	0.0238	0.0482
	(0.0475)	(0.0449)	(0.0535)
Extraversion	0.0220	0.0072	-0.0081
	(0.0643)	(0.0627)	(0.0735)
Agreeableness	0.0309	0.0337	0.0304
	(0.0650)	(0.0622)	(0.0744)
Conscientiousness	-0.1241**	-0.1018*	-0.1208**
	(0.0565)	(0.0552)	(0.0616)
Openness	0.0570	0.0454	0.0014
	(0.0626)	(0.0592)	(0.0697)
SRI-Return		0.0094	0.0051
		(0.0325)	(0.0405)
SRI-Risk		0.0757	0.0817
		(0.0460)	(0.0525)
Risk-Preferences			-0.0002
			(0.0004)
Numeracy			-0.0225
			(0.0230)
Total-portfolio			0.0000
			(0.0000)
University			-0.0330
			(0.1215)
Economics-Course			0.0619
			(0.0706)
Age			0.0002
			(0.0025)
Female			-0.0906
			(0.1206)
Constant	-5.6751	-7.1867*	-6.0312
	(3.7196)	(3.7884)	(4.0380)
Observations	156	156	130
Pseudo R-squared	0.0544	0.0918	0.119
Wald Chi-sq.	7.836	11.83	10.88
P > Chi2	0.250	0.159	0.761

Table 7 presents maximum-likelihood binary logit regressions. Coefficients are marginal effects at the mean. The dependent variable is a binary variable that takes the value of 1 if an investor has invested in SRI in the past (this includes investors that are currently invested in SRI) and 0 otherwise.

Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

The dependent variable in table 7 takes the value 'one' if an investor has, or currently is, invested in SRI and 'zero', otherwise. For ease of interpretation, all coefficients reported in Table 7 are marginal effects at the mean. However, the diagnostics suggest that none of the three models provide a good fit for the data (Wald Chi-sq. = 7.836, $p < 0.25$ for model 10; Wald Chi-sq. = 11.83, $p < .159$ for model 12; and Wald Chi-sq. = 10.88, $p < 0.761$ for model 13). The findings in table 7, therefore, cannot be considered valid by conventional standards. I further investigate whether a probit model may provide a better fit with the data. However, the probit models with the same specifications of the models reported in table 9 do not meet conventional standards for a good fit[58] (i.e. P > Chi2 < 0.1). The results reported in table 9, therefore, are not robust.

5.7 HEXACO trait analysis results - discussion

In the analysis of the HEXACO traits I find evidence supporting the hypothesis of a positive association of Honest-Humility with SRI engagement: Honest-Humility is positively associated with the interest investors have in investing in SRI.

Honest-Humility is significant in the full specification that includes all controls (model 9) and thus appears robust to relevant investor characteristics such as risk- and return-expectations and level of education attained. The marginal effects presented in table B9 in the appendix show that a one-unit increase of Honest-Humility is associated with an increase of the probability that an investor answers 'Somewhat interested' (i.e. the value of the dependent variable 'SRI Interest' equals '4') to the question ""To what degree would you say you are interested in investing in SRI?" by 14.8%. This result suggests that prosocial motivations do play a role in SRI engagement. This finding is in line with findings reported in the literature. For example, Hilbig et al. (2015) report Honest-Humility is positively associated with prosocial behaviour in a dictator game, Hilbig et al. (2012, Study 1) find a positive association of the trait with prosocial behaviour in a public goods game, and Zettler et al. (2013) find such an association in a prisoner's dilemma game.

[58] The Wald Chi-squared statistics for the probit with the same specifications as the models reported in table 9 are (Wald Chi-sq. = 8.47, $p < 0.21$ for the specifications of model 10; Wald Chi-sq. = 12.17, $p < .144$ for the specifications of model 12; and Wald Chi-sq. = 11.39, $p < 0.6846$ for the specifications of model 13)

Furthermore, I also find evidence of the other two prosocial traits - Agreeableness and Emotionality - being positively associated with 'SRI-Interest'. These associations too are significant in the full specification (model 9) and thus appear robust to relevant investor characteristics. The marginal effects presented in table B9 in the appendix show that a one-unit increase of Agreeableness and Emotionality are associated with an increase of the probability that an investor answers 'Somewhat interested' (i.e. the value of the dependent variable 'SRI Interest' equals '4') to the question ""To what degree would you say you are interested in investing in SRI?" by 12.25%, and 10.79% respectively. I did not hypothesise a positive association of Agreeableness with SRI engagement based on the conceptualisation of SRI as an *active* prosocial act - which conceptually is the type of prosocial behaviour associated with Honest-Humility within the HEXACO framework - and the theoretical conception of Agreeableness as a *reactive* prosocial within the HEXACO framework. However, the evidence suggests that Agreeableness is an important investor characteristic when it comes to investors' self-reported interest in SRI. These findings are partly in line with previous findings. For example by Thielmann and Hilbig (2014) find that a combination of Honest-Humility and Agreeableness is associated with prosocial behaviour in a dictator game. However, investigations into the association of the HEXACO and prosocial behaviour in an economic context, thus far have not uncovered a positive association of Emotionality with prosocial behaviour my finding of a significant positive association of Emotionality with self-reported interest in investing in SRI thus differs from those in the extant literature who find no positive association of Emotionality with *active* prosocial behaviour (e.g. Hilbig et al. 2012; Zettler et al. 2013; Hilbig et al. 2015a).

Furthermore, I also find a significant positive correlation of Openness with 'SRI-Interest'. Table B9 in the appendix shows that a one-unit increase in Openness is associated with an increase of 14.1% in the probability of observing outcome '4' (i.e. an investor declaring to be 'Somewhat interested' in investing in SRI). This finding is in line with previously reported findings of a positive association of the related trait Big Five Openness and prosocial behaviour (Ben-Ner et al. 2004b; Becker et al. 2012; Brandstätter and Königstein 2001; Mehta 2007). Together, these results suggest that investors' prosocial tendencies are positively associated with the self-reported interest investors have in investing in SRI beyond financial expectations. Together, the results

regarding the HEXACO traits and investors' self-reported Interest in investing in SRI for one suggest that SRI can be viewed as a prosocial act seen as all three prosocial traits - Honest-Humility, Agreeableness, and Emotionality - are significantly associated with 'SRI Interest'. What is more, counter to my expectations, Honest-Humility is not the only, or the most important prosocial HEXACO trait when it comes to capturing investors' interest in SRI. I hypothesised earlier in this chapter that Honest-Humility is the only HEXACO trait that is related to engagement in SRI given that I conceptualised SRI engagement as an *active* prosocial decision. However, all three prosocial HEXACO traits are significantly associated with 'SRI Interest' and the marginal effects of Agreeableness and Emotionality are similar in size to that of Honest-Humility. The results therefore suggest that a general tendency to be prosocial - captured with all three prosocial traits - is what is relevant when ascertaining investors' interest in investing in SRI, as opposed to the specific type of prosocial behaviour associated with the individual traits (i.e. active prosocial behaviour related to Honest-Humility). Furthermore, Openness is also a significant trait to capture investors' interest in SRI. The significance of Openness suggests that it is not just prosocial tendencies specifically that are a important investor characteristics when it comes to capturing investors' self-reported interest in SRI but also investors' tendency to seek novel experiences and to experiment, which are facets of Openness. Additionally, the significant association of Openness could also be related to investors - high in Openness - having a greater affinity for left-leaning, progressive political views as has been reported in the literature (McCrae, 1996). Furthermore, both investors' risk- and return-expectations are significantly positively correlated with the self-reported interest investors have in investing in SRI.

Turning to the results regarding the dependent variable 'SRI-Ever-Invested' I find a positive association of Honest-Humility and the likelihood that investors have invested in SRI in the past. However, while the overall pattern suggest that investors' prosocial tendencies play a role in the decision to invest in SRI, the diagnostics suggest the models do not provide an adequate fit for the data by conventional standards (i.e. $p < 0.1$). I therefore cannot exclude the null hypothesis that the independent variables do not have an effect on the dependent variable. It is possible that the poor model fit is due to the small sample size. Compared to the samples of the other personality instruments I employ, the HEXACO sample is only about one-fourth the size. This possibility is supported by the fact that the analysis of the HEXACO traits and 'SRI-Ever-Invested' is the only analysis in which investors'

return-expectations are not significant. However, I stress that this is just an educated guess, future work could explore the association of the HEXACO traits with the likelihood that investors invest in SRI in larger samples to explore whether there is a robust association.

5.8 Empathy and SRI interest

Table 8 presents the results for ordered logit regressions of 'SRI-Interest' on the Empathy personality trait variables showing three models, with additional control variables included incrementally. The dependent variable is an ordinal variable captured on a 5-point Likert scale, ranging from 1 (‘no interest at all’) to 5 (‘very interested’).

Table 8 - Ordered logit regressions of SRI-Interest on Empathy traits

Model No.	13	14	15
Variables		SRI-Interest	
Empathic Concern	0.4286***	0.4066**	0.4388**
	(0.1662)	(0.1740)	(0.1926)
Personal Distress	0.1034	-0.0099	-0.0053
	(0.1371)	(0.1369)	(0.1555)
Perspective Taking	0.2615*	0.1584	0.1074
	(0.1548)	(0.1548)	(0.1606)
Fantasy	0.1560	0.2176	0.2034
	(0.1355)	(0.1390)	(0.1594)
SRI-Return		0.8552***	0.9137***
		(0.1488)	(0.1698)
SRI-Risk		0.4139***	0.3668**
		(0.1477)	(0.1615)
Risk-Preferences			-0.0014
			(0.0022)
Numeracy			0.1013
			(0.0952)
Total-portfolio			-0.0000
			(0.0000)
University			-0.5400*
			(0.2858)
Economics-Course			-0.0607
			(0.2186)
Age			-0.0192**
			(0.0086)
Female			0.3069
			(0.3931)
Ordereffect			-0.2012
			(0.1971)
Constant cut 1	1.2920***	3.8080***	2.0670***
	(0.4408)	(0.5567)	(0.7679)
Constant cut 2	1.7180***	4.2908***	2.6038***
	(0.4410)	(0.5593)	(0.7704)
Constant cut 3	3.3630***	6.1335***	4.4985***
	(0.4554)	(0.5915)	(0.7936)
Constant cut 4	6.1278***	9.0618***	7.3939***
	(0.5594)	(0.6931)	(0.9115)
Observations	474	474	393
Pseudo R-squared	0.0180	0.0783	0.0862
Wald Chi-sq.	24.16	85.62	76.74
P > Chi2	7.43e-05	0	1.14e-10

Table 8 presents maximum-likelihood ordered logit regressions with White heteroskedasticity-consistent standard errors and covariance. The dependent variable is a measure of interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?" The measure was scored on a 5-point Likert scale, ranging from 1 (‘not at all interested’) to 5 (‘very interested’). ‘Ordereffect’ is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. "Constant cut" refers to the estimated cut points on the latent variable used to differentiate the five categories of 'SRI Interest' when the values of the independent variables are evaluated at zero. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

I find evidence for my hypothesis of a positive association of Empathic Concern with SRI investing. Empathic Concern is positively correlated with the self-reported interest that an investor has in investing in SRI across all three models I estimate.

Furthermore, I find evidence that Perspective Taking is positively associated with SRI-Interest, however, this association is not significant when controls are included (models 14 and 15). Additionally, I note that investors' risk- and return-expectations are significant determinants of SRI-Interest. The association of Empathic Concern thus appears robust to SRI risk- and return- expectations, and to relevant investor characteristics, such as risk preferences and level of education attained. The model diagnostics suggests the models present a good fit for the data (Wald Chi-sq. = 24.16, $p < 0.000$ for model 13; Wald Chi-sq. = 85.62, $p < .000$ for model 14; and Wald Chi-sq. = 76.74, $p < 0.000$ for model 15). Table B10 in the appendix shows the marginal effects of all variables in the full specification for all five possible answers to the question "To what degree would you say you are interested in investing in SRI?". Column 4 (the 4th column from the left) of table B10 in the appendix shows the change in probability of observing outcome '4' (i.e. a respondent answering 'Somewhat interested') for a one-unit increase of all variables in the full specification. The marginal effects of Empathic Concern, SRI-Return, and SRI-Risk in column 4 are 0.0595, 0.1239, and 0.0497, respectively. Meaning a one-unit increase of Empathic Concern, SRI-Return, and SRI-Risk increases the probability of an investor answering 'Somewhat interested' (i.e. observing the value 4) by 5.95%, 12.39%, and 4.97%, respectively. This suggest that Empathic Concern is an important investor characteristic to capture interest in investing in SRI which is slightly more is slightly more important than investors' expected risk of SRI. However, investors' expected return of SRI is the most important characteristic, and it's marginal effect is around twice as large as that of Empathic Concern.

5.9 Empathy and SRI investing

Table 9 presents the results for logistic regressions of 'SRI-Ever-Invested' on the Empathy traits, showing three models, with additional control variables included incrementally. The dependent variable in table 11 takes the value of ‘one’ if an investor has, or currently is, invested in SRI and ‘zero’, otherwise. For ease of interpretation, all coefficients reported in Table 11 are marginal effects at the mean. I find evidence supporting my hypothesis of a positive association of Empathic Concern with SRI investing. The association is significant across all three models I estimate, albeit only marginally so (at 10%) once I include control variables in models 17 and 18. The association thus appears to be robust to risk- and return- expectations, and to relevant investor characteristics, such as risk preferences and level of education attained. In model 18 a one-unit increase of Empathic Concern is associated with an increase in the likelihood that an investor has invested in SRI at some point in the past of 6.19%. Furthermore, I note that investors' return-expectations are also positively associated with the likelihood of an investor having invested in SRI. A one-unit increase in SRI-Return is associated with an increase in the likelihood that an investor has invested in SRI at some point in the past of 7.9%. Investors' risk-expectations, on the other hand are only significant in model 17 and not in model 18, which includes all control variables. The diagnostics of the models suggest they provide a good fit for the data (Wald Chi-sq. = 10.76, $p < 0.0293$ for model 16; Wald Chi-sq. = 28.64, $p < .000$ for model 17; and Wald Chi-sq. = 26.51, $p < 0.022$ for model 18).

Table 9 - Logistic regressions of SRI-Ever-Invested on the Empathy traits

Model No.	16	17	18
Variables	SRI-Ever-Invested		
Empathic concern	0.0637**	0.0567*	0.0619*
	(0.0309)	(0.0305)	(0.0343)
Personal distress	0.0075	0.0025	-0.0022
	(0.0269)	(0.0256)	(0.0291)
Perspective taking	0.0290	0.0166	0.0240
	(0.0329)	(0.0315)	(0.0349)
Fantasy	0.0363	0.0399	0.0303
	(0.0267)	(0.0263)	(0.0301)
SRI-Return		0.0775***	0.0790***
		(0.0232)	(0.0240)
SRI-Risk		0.0563**	0.0350
		(0.0273)	(0.0297)
Risk-Preferences			0.0002
			(0.0004)
Numeracy			-0.0096
			(0.0168)
Total-portfolio			-0.0000
			(0.0000)
University			-0.0089
			(0.0622)
Economics-Course			-0.0073
			(0.0401)
Age			0.0015
			(0.0017)
Female			0.0481
			(0.0785)
Ordereffect			-0.0056
			(0.0359)
Constant	-3.4780***	-5.6813***	-5.8166***
	(0.7157)	(0.9432)	(1.3695)
Observations	532	532	442
Pseudo R-squared	0.0249	0.0717	0.0774
Wald Chi-sq.	10.76	28.64	26.51
P > Chi2	0.0293	7.13e-05	0.0223

Table 9 presents maximum-likelihood logistic regressions. Coefficients are marginal effects at the mean. The dependent variable is a binary variable that takes the value of 1 if an investor has invested in SRI in the past (this includes investors that are currently invested in SRI) and 0 otherwise. 'Ordereffect' is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

5.10 Empathy trait analysis results - discussion

In the analysis of the Empathy traits I find evidence supporting the hypothesis of a positive association of Empathic Concern with SRI engagement: Empathic Concern is positively associated with both the interest investors have in investing in SRI and the likelihood that investors have invested in SRI. Both associations are significant in the specifications that include all controls (models 15 and 18) and thus appear robust to an array of relevant investor characteristics such as risk- and return-expectations, education attained, risk preferences, and numeracy.

In model 15, a one-unit increase in Empathic Concern is associated with an increase of 5.95% in the probability that an investor responds to the question "To what degree would you say you are interested in investing in SRI?" with 'Somewhat Interested',

Similarly, in model 18 a one standard deviation increase of Empathic Concern is associated with an increase in the likelihood that an investor invests in SRI of 6.19%. These findings differ from those reported by Artinger et al. (2014) who find no such association in a dictator game. However, the results are in line with previous studies that find a positive association between empathy and prosocial behaviour (Batson and Shaw 1991; Batson et al. 1997a; Batson et al. 1997b; Fong 2007). Furthermore my results lend support to the so-called 'empathy-altruism hypothesis' that posits empathy to be an important precursor for prosocial behaviour (Batson et al. 1981; Batson and Shaw 1991). I also find some evidence of Perspective Taking being positively associated with the self-reported interest investors have in investing in SRI. However, this association is not significant in the two models that include controls suggesting that the association is not robust. Furthermore, I find no association between Personal Distress and SRI engagement suggesting that 'self-oriented' emotions are not relevant investor characteristics when it comes to engagement in SRI. What is more, I find that investors' return-expectations are consistently significantly positively correlated with both measures of SRI engagement. Together the findings suggest that investors' 'other-oriented' prosocial tendencies play a role in the decision to invest in SRI beyond financial expectations. The null-result regarding Personal Distress further suggests that 'moral licensing' motive seems not to be related to engagement in SRI.

5.11 The Dark Triad and SRI interest

Table 10 presents the results for ordered logit regressions of 'SRI-Interest' on the Dark Triad personality trait variables showing three models, with additional control variables included incrementally. The dependent variable is an ordinal variable captured on a 5-point Likert scale, ranging from 1 ('no interest at all') to 5 ('very interested').

Table 10 - Ordered logit regressions of SRI-Interest on the Dark Triad traits

Model No.	19	20	21
Variables		SRI-Interest	
Machiavellianism	-0.0458	-0.0338	0.0505
	(0.1914)	(0.1967)	(0.2099)
Psychopathy	-0.1065	-0.0477	0.0276
	(0.1956)	(0.1938)	(0.2320)
Narcissism	0.3045	0.3147	0.3216
	(0.1938)	(0.1997)	(0.2419)
SRI-Return		0.6203***	0.6688***
		(0.1359)	(0.1590)
SRI-Risk		0.2694**	0.2761*
		(0.1309)	(0.1567)
Risk-Preferences			-0.0066***
			(0.0022)
Numeracy			-0.0075
			(0.0905)
Total-portfolio			-0.0000
			(0.0000)
University			0.0832
			(0.2815)
Economics-Course			0.1651
			(0.2116)
Age			-0.0065
			(0.0087)
Female			0.7666*
			(0.4476)
Ordereffect			0.2970
			(0.2055)
Constant cut 1	-0.2321	2.0035***	1.7539*
	(0.5829)	(0.6812)	(1.0100)
Constant cut 2	0.3247	2.6040***	2.3738**
	(0.5818)	(0.6837)	(1.0069)
Constant cut 3	1.7188***	4.0950***	3.8732***
	(0.5888)	(0.7025)	(1.0200)
Constant cut 4	4.6906***	7.1386***	6.9379***
	(0.7007)	(0.7802)	(1.1092)
Observations	472	472	382
Pseudo R-squared	0.00187	0.0359	0.0521
Wald Chi-sq.	2.680	43.93	56.71
P > Chi2	0.444	2.39e-08	2.02e-07

Table 10 presents maximum-likelihood ordered logit regressions with White heteroskedasticity-consistent standard errors and covariance. The dependent variable is a measure of interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?" The measure was scored on a 5-point Likert scale, ranging from 1 ('not at all interested') to 5 ('very interested'). 'Ordereffect' is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. "Constant cut" refers to the estimated cut points on the latent variable used to differentiate the five categories of 'SRI Interest' when the values of the independent variables are evaluated at zero. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

I hypothesised a negative association of Machiavellianism and Psychopathy with SRI investing. I find no evidence for these hypotheses; none of the Dark Triad traits are significantly associated with SRI-Interest. I note that both investors' risk- and return-expectations are positively associated with SRI-Interest. Furthermore, the diagnostics suggest that while model 19 does not provide a good fit for the data, models 20 and 21 do (Wald Chi-sq. = 2.68, $p < 0.444$ for model 19; Wald Chi-sq. = 43.93, $p < .000$ for model 20; and Wald Chi-sq. = 56.71, $p < 0.000$ for model 22). Table B11 in the appendix reports the marginal effects for the full specification of the ordered logit regrssion presented in table 10.

5.12 The Dark Triad and SRI investing

Table 11 presents the results for logistic regressions of 'SRI-Ever-Invested' on the Dark Triad personality traits, showing three models, with additional control variables included incrementally. The dependent variable in table 13 takes the value of 'one' if an investor has, or currently is, invested in SRI and 'zero', otherwise. For ease of interpretation, all coefficients reported in Table 11 are marginal effects at the mean.

Table 11 - Logistic regressions of SRI-Ever-Invested on the Dark Triad traits

Model No.	22	23	24
Variables		SRI-Ever-Invested	
Machiavellianism	-0.0956***	-0.0819***	-0.0856**
	(0.0330)	(0.0308)	(0.0350)
Psychopathy	0.0924***	0.0932***	0.1109***
	(0.0352)	(0.0313)	(0.0389)
Narcissism	0.0014	0.0032	0.0051
	(0.0381)	(0.0328)	(0.0340)
SRI-Return		0.0951***	0.0716***
		(0.0183)	(0.0202)
SRI-Risk		0.0571**	0.0508**
		(0.0226)	(0.0239)
Risk-Preferences			-0.0004
			(0.0003)
Numeracy			0.0073
			(0.0131)
Total-portfolio			-0.0000
			(0.0000)
University			0.1376**
			(0.0580)
Economics-Course			-0.0198
			(0.0330)
Age			-0.0008
			(0.0013)
Female			0.0668
			(0.0523)
Ordereffect			0.0021
			(0.0295)
Constant	-1.1900	-5.5354***	-5.3487***
	(0.9182)	(1.4185)	(1.9387)
Observations	520	520	420
Pseudo R-squared	0.0210	0.129	0.152
Wald Chi-sq.	10.14	47.42	44.88
P > Chi2	0.0174	4.66e-09	2.19e-05

Table 11 presents maximum-likelihood binary logit regressions. Coefficients are marginal effects at the mean. The dependent variable is a binary variable that takes the value of 1 if an investor has invested in SRI in the past (this includes investors that are currently invested in SRI) and 0 otherwise. 'Ordereffect' is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

I find evidence supporting my hypothesis of a negative association of Machiavellianism with the likelihood that investors have invested in SRI at some

point in the past. The association is significant across all three models I estimate and thus appears to be robust to risk- and return- expectations, and to relevant investor characteristics, such as risk preferences and level of education attained. In model 24 a one-unit increase of Machiavellianism is associated with a decrease in the likelihood that investors have invested in SRI at some point in the past of 8.56%. Furthermore, I find, contrary to my hypothesis of a negative association, Psychopathy is positively associated with 'SRI-Ever-Invested'. This association is highly significant across all three models I estimate and thus appears to be robust to risk- and return- expectations, and to potentially relevant investor characteristics. In model 24 a one-unit increase of Psychopathy is associated with an increase in the likelihood that an investor has invested in SRI at some point in the past of 11.09%. Narcissism is not significantly associated with the dependent measure. Furthermore, I note that both investors' risk- and return-expectations are positively associated with SRI-Ever-Invested. A one-unit increase in SRI-Return, and SRI-Risk are associated with an increase in the likelihood that in investor has invested in SRI in the past of 7.16%, and 5.08%, respectively. The diagnostics suggest that all models provide a good fit for the data (Wald Chi-sq. = 10.14, $p < 0.017$ for model 22; Wald Chi-sq. = 47.42, $p < .000$ for model 23; and Wald Chi-sq. = 44.88, $p < 0.000$ for model 24).

5.13 The Dark Triad trait analysis results - discussion

I do not find any evidence for my hypothesis of a negative association of Machiavellianism and Psychopathy with the self-reported interest investors have in investing in SRI. Neither is Narcissism associated with 'SRI-Interest'. I treated the association of Narcissism with SRI engagement as an open question. I argued that Narcissism - due to its callous and selfish core - could be either negatively associated with SRI engagement, or it could be positively associated due to its relation to behaviour in the pursuit of social admiration leading to an association through 'image' motivated prosocial behaviour. I find instead that Narcissism is not associated with SRI engagement when measured with the self-reported interest investors have in investing in SRI nor with the likelihood that investors have invested in SRI at some point in the past.

I do find evidence in support of my hypothesis of a negative association of Machiavellianism with SRI engagement when measured with the likelihood that an investor ever has invested in SRI. The correlation is significant in all three models I estimate (models 22 to 24) suggesting it is robust to an array of investor

characteristics such as risk- and return-expectations. In model 24 that includes all controls a one-unit increase in Machiavellianism is associated with a decrease in the likelihood that investors have invested in SRI of 8.56%. Machiavellians are, therefore, less likely to engage in SRI. One possible explanation could be that Machiavellians, in their pursuit of monetary goals that is part of the motivations associated with Machiavellianism, would not be willing to restrict their asset universe and thereby forgo financial returns, for example by not investing in 'sin' industries (e.g. tobacco, and weapon manufacturing) (Rauthmann and Kolar 2013).

Contrary to my hypothesis I find a highly significant positive association of Psychopathy with the likelihood that investors have invested SRI in the past. This association is significant at 1% across all three models I estimate and thus appears robust to relevant investor characteristics such as risk- and return expectations. In the full specification (model 24) a one-unit increase in Psychopathy is associated with an increase in the likelihood that an investor has invested in SRI of 11.09%. Conceptually Psychopathy should be negatively related to prosocial behaviour, due to its selfish core. This finding therefore, at first glance is somewhat puzzling. However, Psychopathy is also characterised by (short-term) manipulation. One explanation for this finding could thus be that respondents in the survey wanted to seem prosocial by claiming to have invested in SRI (i.e. a social desirability bias) (Podsakoff et al. 2003). However, this explanation seems unlikely, given that Psychopathy was not related to self-reported interest in investing in SRI (reported in table 10). Another explanation would be that Psychopathy, instead of Narcissism, is related to image motivations of investors to behave prosocial. In other words, it is possible that the finding of a significant positive correlation of Psychopathy is related to respondents, high in Psychopathy, investing in SRI for the purpose of social admiration. Although related to social desirability, there is a difference between the two explanations. A social desirability would suggest that respondents would want to 'impress' the researchers whereas an image motivation to invest in SRI would mean that investors high in Psychopathy would use SRI as a signal to society as whole and possibly as means to 'get ahead' (Hogan 2007). Evidence of Psychopathy with image related prosocial behaviour emerged from a study by White (2014). White (2014) measured Psychopathy with the Levenson Primary and Secondary Psychopathy Scale (Levenson et al. 1995) and prosocial behaviour with a self-report measure, the Prosocial Tendencies Measure-Revised (Carlo and Randall 2002; Carlo et al. 2003).

The author finds Psychopathy to be positively associated with public- but not private-prosocial behaviour (White 2014).

On the whole the results of the Dark Triad analysis suggest that SRI investing is seen as a prosocial act, both the negative association of Machiavellianism as well as the positive association of Psychopathy with the likelihood that investors have invested in SRI are reconcilable with patterns commonly associated with prosocial behaviour (Bénabou and Tirole 2006).

6. Discussion and conclusion

A central question in the SRI literature is whether or not the decisions of investors are affected by non-financial criteria (Renneboog et al. 2008). In this study I investigated whether investors' prosocial tendencies are related to SRI engagement in a sample of more than 1,700 individual investors, all members of the AAII. Specifically, I investigated whether personality traits related to *prosocial* behaviour can help explain two distinct measures of engagement in SRI investing: (1) the self-reported interest an investor has in invest in SRI, and (2) the likelihood of ever having held such investments. I examined investors' personalities with four different personality inventories pertaining to four different, but related, personality frameworks. I employed one measure for the Big Five framework (Gerlitz and Schupp 2005), a measure for the HEXACO framework (Ashton and Lee 2009), a measure for empathy (Davis 1980; Davis 1983), and a measure for the Dark Triad of personality (Jones and Paulhus 2014).

I raised a number of questions, some broad, and some specific throughout this chapter that I answer in this section. The main question that I set out to answer is whether investors engage in SRI because they believe it offers better risk-adjusted returns, or due to the prosocial motivations. My findings suggest that both financial and prosocial motivations appear to play a role in the decision to engage in SRI.

While investors' risk-expectations regarding SRI are not consistently associated with SRI engagement, the return-expectations are. In all of the models I estimate, apart from the model investigating the HEXACO traits' influence on the likelihood that investors have held SRI investments, investors' return-expectations are significantly associated with engagement in SRI. The pattern of risk-expectations not being as significantly associated with SRI engagement as the return-expectations is in line with

previous findings (Nilsson 2008). This pattern suggests that investors mainly see SRI as an investment strategy that offers superior returns compared to conventional investment benchmarks, rather than a less risky investment strategy.

I also find that investors' prosocial motivations seem to play a role in SRI engagement. Specifically, I find that the HEXACO traits Honest-Humility, Agreeableness, and Emotionality - all capturing different aspects of prosocial tendencies - are all positively correlated with investors' self-reported interest in investing in SRI. Additionally, I find the empathy trait Empathic Concern to be positively correlated with both investors' self-reported interest in investing in SRI and the likelihood that investors have invested in SRI in the past. All of these associations are robust to an array of relevant control variables including risk- and return-expectations. Together these findings suggest that investors engage in SRI for prosocial reasons.

Furthermore, contrary to my hypothesis of a positive association of Big Five Agreeableness with SRI engagement, I do not find a significant association. While this null-result could suggest that prosocial motivations do not play a part in investors' decisions to engage in SRI, I propose that the non-significance of Big Five Agreeableness is due to the way the trait accounts for (or rather does not account for) prosocial tendencies (Hilbig et al. 2014). The inconsistency of Big Five Agreeableness is well documented and is one of the main reasons why the HEXACO has been offered as an alternative framework (Ashton and Lee 2001).

This explanation is supported by my finding of Big Five Openness being significantly positively correlated with both measures of SRI engagement that I employ. Previous studies also report that Big Five Openness, rather than Agreeableness is associated with prosocial behaviour (Ben-Ner et al. 2004b). This addresses a second question that I raised in this study, namely does the HEXACO framework better capture prosocial behaviour than the Big Five? The results suggest that this is the case. The poor model fit in my analysis of the association of the HEXACO traits with the likelihood that investors have invested in SRI (reported in table 7) prevents me from commenting on the ability of the two frameworks to capture investors' prosocial motivations with regards to the likelihood of having invested in SRI. However, all three prosocial traits of the HEXACO framework - Honest-Humility, Agreeableness, and Emotionality - are significantly positively related to investors' self-reported interest in investing in SRI, while the sole prosocial trait of the Big Five - Agreeableness - is non-significant (reported in table 6 and 4 respectively). These

findings suggest that the HEXACO indeed better captures prosocial behaviour than the Big Five framework. This addresses an important discussion in the personality psychology literature on whether five or six factors better capture a complete personality profile (e.g. Lee and Ashton 2004; Hilbig et al. 2013a; Hilbig et al. 2014). The results suggest that, at least with regards to prosocial behaviour in the form of SRI investing, the HEXACO captures important aspects of personality that are not detected by the Big Five traits. However, the fact that both Big Five Openness and HEXACO Openness is significantly positively associated with 'SRI Interest' also suggest that despite prosocial motivations to invest in SRI (as captured by the prosocial HEXACO traits) Openness may just be an important trait when it comes to capturing investors' interest in investing in SRI in general. An explanation for the significant correlation of Openness - measured both with the Big Five and the HEXACO instruments - could also be the previously reported link of Openness with more progressive, left-leaning political views of people high in Openness, compared to people low in Openness (McCrae, 1996). Compared to conventional investing strategies, SRI is arguably more progressive and closely linked to a left-leaning political agenda (i.e. considering the wellbeing of all stakeholders as opposed to only shareholders). Future work could explore this possibility further by, for example, also collecting data on investors political leanings in addition to the investor characteristics I measure in this investigation.

Furthermore, I included a measure for empathy in this study for three reasons. First, I wanted to ascertain whether the empathy trait Empathic Concern is related to prosocial behaviour, in this case engagement in SRI. Second, I wanted to examine whether the trait Personal Distress is related to SRI engagement to address the question whether SRI may be used by some investors as means for 'moral licensing' i.e. using the moral act of investing to behave immoral elsewhere (Monin and Miller 2001; Miller and Effron 2010). Third, I wanted to ascertain whether the Perspective Taking i.e. the ability to 'put oneself in someone else's shoes' is an important trait in for SRI engagement (Davis 1980; 1983). I find that Empathic Concern is indeed significantly positively correlated with both investors' self-reported interest in investing in SRI and the likelihood that investors have invested in SRI in the past. This result is significant in the full specification and thus appears to be robust to an array of relevant investor characteristics such as risk- and return-expectations regarding SRI. This finding lends support to the 'empathy-altruism hypothesis', which

posits that empathy is an important precursor for prosocial behaviour (Batson et al. 1981; Batson and Shaw 1991).

I do not find a significant association of the empathy trait Personal Distress with either measure of SRI engagement, this suggest that investors seem not to use SRI as a 'moral license' to act immorally elsewhere (Monin and Miller 2001; Miller and Effron 2010). Neither do I find a significant association of Perspective Taking with SRI engagement that is robust to relevant investor characteristics. This null-result suggests that Perspective Taking is not a relevant investor characteristic when it comes to SRI investing. The findings suggest that the most relevant empathy trait with regards to engagement in SRI is Empathic Concern, the affective trait that captures "other-oriented" feelings of sympathy and concern for unfortunate others (Davis 1980). Together with the null-result regarding Personal Distress - the 'self-oriented' affective empathy traits - the results suggest that indeed altruistic, rather than selfish motivations are relevant for the decision to engage in SRI.

I also included in this investigation a measure for the Dark Triad of personality, namely the traits Machiavellianism, Psychopathy and Narcissism. Given that all three traits share a core of callous, selfish behaviour, all three traits are conceptually negatively associated with prosocial behaviour. However, as I have mentioned throughout this study prosocial behaviour need not stem from 'other-oriented' motivations. The literature on prosocial behaviour distinguishes between so-called 'intrinsic' and 'instrumental' prosocial behaviour (Sobel 2005). Where the former is associated with altruistic motives, and the latter represents behaviour to *signal* prosociality in order to garner social admiration and thereby social standing - a selfish motive (Bénabou and Tirole 2006). I hypothesised that both Machiavellianism and Psychopathy would be negatively related to engagement in SRI, given their clear conceptual relationship with anti-social behaviour. However, I also suggested that Narcissism would be the most obvious trait out of the three to be associated with engagement in SRI, given that Narcissism is conceptually associated with the pursuit of certain goals for the purpose of social admiration (Jones and Paulhus 2014).

While I find a significant negative association of Machiavellianism with the likelihood of investors having invested in SRI, I also find - contrary to my hypothesis - a significant positive association of Psychopathy with the likelihood that investors have invest in SRI in the past. Narcissism, on the other hand, is not significantly associated with either measure of SRI engagement in this investigation.

One explanation for the positive correlation of Psychopathy with the likelihood that investors have invested in SRI could be that respondents in the survey wanted to seem prosocial by claiming to have invested in SRI (i.e. a social desirability bias) (Podsakoff et al. 2003). However, as I explained in the discussion section on the results of the Dark Triad analysis (section 5.13) I deem this explanation unlikely on the basis of the non-significant association of Psychopathy with investors' self-reported interest in investing in SRI (reported in table 10). I therefore suggest that this positive association may be explained by Psychopathy, and not Narcissism, capturing an image motivation to engage in SRI. In other words investors high in Psychopathy may use SRI as a means to appear prosocial to their peers in order to 'get ahead' (Hogan 2007). Although research on the association of Psychopathy with image related prosocial behaviour is scarce, one study supports this interpretation. White (2014) finds that Psychopathy is positively associated with public- but not with anonymous-prosocial behaviour. Future work might try - through experimental treatments, for example manipulating the visibility of SRI investing - to determine whether the positive association between SRI investing and Psychopathy is indeed related to image motivations.

The main contributions of this study to the literature are two-fold. First, I link the literature streams of personality psychology and SRI, by demonstrating how they can complement one another. SRI investing offers personality psychologists a way to study prosocial behaviour outside the laboratory in an area where stakes are high (i.e. investors could potentially forgo returns by divesting away from sin companies). This could be interesting to personality researchers who want to investigate prosocial behaviour outwith the common methods, i.e. economic games in a laboratory setting (Ben-Ner et al. 2004b; Ben-Ner et al. 2004a; Baumert et al. 2014; Koole et al. 2001; Volk et al. 2011; Becker et al. 2012; Zettler et al. 2013; Thielmann and Hilbig 2014, 2015; Hilbig et al. 2015b; Hilbig et al. 2015a). Likewise, I introduce instruments from personality psychology to the SRI literature and demonstrate that they can be successfully used to help explain investors' decision to engage in SRI. This could be interesting to SRI researchers who want to measure investor characteristics with measures other than revealed preference measures commonly used to ascertain investors' prosocial tendencies (e.g. Riedl and Smeets 2014; Heimann 2013). As I have noted earlier in this study, in contrast to revealed preference measures personality trait measures are specifically designed to be administered via self-report surveys and therefore readily lend themselves to investigate large samples of relevant

populations such as investors (Borghans et al. 2008). Second, I contribute to the SRI literature by providing additional evidence that SRI investors' prosocial dispositions are indeed related to SRI engagement (Riedl and Smeets 2014; Heimann 2013), but my findings regarding the positive association of Psychopathy with SRI investing suggests that more sinister motives - such as social signaling - may also play a role in the decision to invest in SRI.

Naturally, there are some empirical shortcomings inherent to the survey method of this investigation. First of all, this investigation leaves open the question of causality. Although the results are consistent with a positive effect of prosocial personality traits on SRI engagement—and inconsistent with a negative effect—reverse causality and omitted variables represent viable alternative explanations. Future work might try, through experimental treatments to test directly whether prosocial personality traits lead to greater interest and engagement in SRI. Second, common methods variance (Podsakoff et al. 2003), for example in the form of social desirability, could be a concern. The associations might have been obtained not because prosocial personality traits are driving investment in SRI, but because investors who feel a need to display their pro-social intentions do so both by talking up their SRI interest (and history) as well as inflating their prosocial personality in the personality trait measures. I cannot rule out this possibility, but I note that the survey was administered online and that responses were anonymous. Furthermore, I note that across the entire sample (2,682) investors reported to be not interested in investing in SRI (M = 2.42, SD = 1.19). In other words investors reported to have less interest in SRI rather than being indifferent, this difference was significant in a one-sided t-test, $t(2{,}681) = -25.44$, $p < 0.001$. This is true for all of the samples[59]. *Ceteris paribus* investors, therefore, reported not to be very interested in investing in SRI. Furthermore, across the entire sample of 3,022 investors only 17% (514) investors reported to ever have invested in SRI assets. Additionally, the scores of the personality traits are comparable to those obtained in adult samples in previous studies employing the same measures (Lang et al. 2011, for the BFI-S; Ashton and Lee 2009, for the HEXACO-60; Konrath et al. 2010, for the empathy measure (IRI); and Jones and Paulhus 2014, for the SD3).

As a final note I note that the pattern I observe, including the positive association of Psychopathy with SRI investing, is readily reconcilable with patterns commonly

[59] For the Big Five sample the one sided t-test result was $t(493) = -10.3664$, $p < 0.001$; for the HEXACO sample $t(139) = -5.3$, $p < 0.001$; for the Empathy sample $t(473) = -8.7334$, $p < 0.001$; and for the Dark Triad $t(473) = -8.7334$, $p < 0.001$.

associated with prosocial behaviour (Bénabou and Tirole 2006). This suggests that engaging in SRI is indeed seen as a prosocial act, tentatively lending support to my conceptualisation of SRI engagement as prosocial behaviour and the argument of some authors that investors consider more than financial concerns when investing (i.e. Statman 2004; Renneboog 2009). That being said, in all of the models I estimate, apart from the model investigating the HEXACO traits' influence on the likelihood that investors have held SRI investments; investors' return-expectations are significantly associated with engagement in SRI. Furthermore, the marginal effects of investors' financial expectations of SRI are larger than the marginal effects of the personality traits in almost all analyses I presented (the HEXACO analysis is an exception, but the relatively large effect of the HEXACO traits could also be due to the smaller sample size). This can be interpreted as financial considerations being the most important motivation of investors to invest in SRI. The results thus suggest that while investors' prosocial traits do play a role in the decision to invest in SRI, prosocial motivations seem not to be the main motivation of investors to invest in SRI as some authors have posited (e.g., Beal and Goyen 1998).

Chapter 4:

Personality traits and investment behaviour: An analysis of the role of personality in asset allocation of US investors

Abstract

Using primary cross-sectional data collected from a targeted sample of individual investors from the US, I investigate whether personality traits - thought to be related to risk taking - can help explain investors' decision to invest riskier assets. I measure financial risk with four different measures: (1) whether investors invest in stocks directly, (2) the aggregate share of investors' portfolios invested in stocks directly and indirectly through mutual funds, (3) the aggregate share of investors' portfolios invested in stocks, derivatives and hedge funds, and (4) the aggregate share of investors' portfolios held in cash and in savings accounts - a measure for low-risk. To measure personality I use measures from three different frameworks: the Big Five, the HEXACO, and the Dark Triad. I find a positive association of both Big Five and HEXACO Openness with the aggregate share of investors' portfolios invested in stocks, derivatives and hedge funds. Furthermore, I find some weak evidence of a negative association of Big Five Conscientiousness with the likelihood that investors invest in stocks, but some evidence of a positive association of HEXACO Conscientiousness with the aggregate share of investors' portfolios invested in stocks, derivatives, and hedge funds. I find a negative association of HEXACO Extraversion with the aggregate share of investors' portfolios invested in stocks directly and indirectly through mutual funds. Against my expectations, I do not find an association of the related traits Big Five Neuroticism and HEXACO Emotionality with risk taking. Further, I find the Dark Triad trait Machiavellianism is negatively related to the likelihood that investors invest in stocks, and Narcissism is negatively associated with the share of investors' portfolios invested in stocks directly, and indirectly through mutual funds. Lastly, I find some evidence that Psychopathy is positively associated with the aggregate share of investors' portfolios invested in stocks, derivatives, and hedge funds. Together, the results suggest that no personality trait is

consistently related to financial risk taking, overall personality traits thus appear not to be a very important investor characteristic when it comes financial risk-taking.

7. Introduction

Understanding factors of investors' risk preferences is very relevant for practitioners in the financial sector (Nosic and Weber 2010). In some countries practitioners are legally obliged to ascertain customers' risk preferences. For example, the 'Markets in Financial Instruments Directive' by the European Parliament and the European Council requires practitioners to take into account investors' preferences: "When providing investment advice, the investment firm should specify in a written statement on suitability how the advice given meets the preferences, needs and other characteristics of the retail client" (Council 2014, § 82). The introduction of similar laws has also been discussed in the US (Weber et al. 2013).

Moreover, agents' risk preference is a key parameter in models in traditional finance theory, such as the Modern Portfolio Theory (Markowitz 1952) and the study of risky decision-making is a vibrant area of research (Loewenstein et al. 2001; Slovic et al. 2004; Blais and Weber 2006; Figner and Weber 2011; Andreoni and Sprenger 2012). A large part of the literature on risky decision-making in psychology and economics investigates risk taking from a *consequentialist* perspective (Loewenstein et al. 2001). In other words the study of risk taking as a result of a deliberate, analytical, cognitive choice of an individual, following the rules of logic (Loewenstein et al. 2001; Slovic et al. 2004). There is no doubt about the importance of the cognitive aspect of risk taking for financial decisions. For example, properly applying financial models to ascertain portfolio risk - such as the Capital Asset Pricing Model (e.g. Sharpe 1964) - requires a certain mathematical proficiency that, in turn, depends on cognitive abilities. What is more, findings support the relevance of cognitive abilities for financial decision-making. (Christelis et al. 2010), for example, show that investors' cognitive abilities are strongly associated with stock market participation. Recently, however, researchers have proposed that investigating the non-cognitive side of risk taking can complement our understanding of investors' decision-making (Bucciol and Zarri 2017). Specifically, some authors have begun to investigate the role of personality traits in financial decision-making and find that personality traits help explain investment decisions (Brown and Taylor 2014; Conlin

et al. 2015; Bucciol and Zarri 2017). In this study I address this literature by investigating whether personality traits can help explain financial risk taking. Specifically, I examine whether traits from three personality frameworks - the Big Five, the HEXACO, the Dark Triad, all thought to be associated with risk taking— are related to investors' decisions to invest in asset classes that differ in their risk attributes. To this end, I construct four different measures of financial risk taking: (1) whether an investor invests in stocks directly, (2) the aggregate share of the investor's portfolio invested in stocks directly and indirectly through mutual funds, (3) the aggregate share of the investor's portfolio invested in stocks, derivatives and hedge funds, and (4) the aggregate share of investor's portfolio held in cash and in savings accounts - a measure for low-risk.

It should be noted from the outset that financial risk taking as I conceptualise it in this chapter (i.e. the decision to invest in risky assets such as stocks, and the proportion of the portfolio invested in risky asset classes such as stocks, derivatives, and hedge funds) should be moderated or mediated by the expected financial returns of the investments. A risk averse investor could be willing to invest in risky assets if she is compensated for the risk by above average returns. However, my data does not allow me to control for investors return expectations. For this reason I cannot comment on the absolute willingness to take risk of investors but can merely assess whether investors' personality traits that are conceptually related to risk taking are correlated with the decision to invest in certain asset classes at face value (i.e. without controlling for return expectations).

This investigation is closely related to Brown and Taylor (2014), Conlin et al. (2015), and Bucciol and Zarri (2017). Conlin et al. (2015) use Finnish data to examine the correlation of personality traits and their facets - measured with the Temperament and Character inventory (Cloninger et al. 1994) - with stock market participation. They find that the personality trait Harm Avoidance, and several of its facets are negatively correlated with holding shares. Brown and Taylor (2014) use data from the British Household Panel Survey and find that some of the Big Five personality traits are associated with the amount of debt held and the decision to hold several financial assets. Specifically, they find that Conscientiousness, Extraversion, and Agreeableness are correlated with the amount of unsecured debt and savings of households. Furthermore, they find a significantly positive correlation of Openness to

experience, and a significantly negative association of Extraversion with the probability to hold stocks. In a paper that is most closely related to this investigation, Bucciol and Zarri (2017) use US data from the Health and Retirement Study to investigate the association of the Big Five and some additional traits[60] with the decision to take financial risk. They measure financial risk with the decision to invest in the stock market, and the share of the portfolio that is invested in stocks (both directly, and indirectly through mutual and pension funds). The authors find that the trait Cynical Hostility is negatively correlated with both stock market participation and the share of the portfolio invested in stocks. Further, they find that Big five trait Agreeableness is negatively related to the proportion of the portfolio invested in stocks. Overall, these studies show that personality traits are associated with financial risk taking. It is less clear, however, which traits in particular are relevant. Thus far, no clear pattern has emerged. What is more, the role of personality traits in financial risk taking, to date, has mainly been studied by drawing on secondary - household finance - data, collected by independent organisations (Conlin et al. 2015; use Finnish data) or government agencies (Brown and Taylor 2014, draw on data from the British Household Panel Survey: Bucciol and Zarri 2017, analyse data from the US Health an Retirement Survey). While this approach results in large samples, it means that researchers have no influence on research design or sampling. Consequently, with this study I hope to contribute to the literature by addressing some of these issues to provide a better understanding of the role of personality traits in financial risk taking. Specifically, I hope to contribute to the literature by addressing the following four issues.

First, existing research on personality and financial risk taking, thus far, has not controlled for investors' cognitive abilities. Neither do existing investigations include measures for risk preferences, common in experimental economics (Dohmen et al. 2011). It is thus unclear whether investors' personality traits are an important determinant for risk taking *beyond* cognitive abilities and risk preferences. To this end, I include in this investigation a numeracy measure that allows me to control for investors' cognitive ability. Specifically, I employ the Berlin Numeracy Test (Cokely et al. 2012) designed to measure individuals' risk literacy (i.e. proficiency in statistical

[60] The authors also measure the traits Cynical Hostility, Anxiety, Anger-in, and Anger-out that are part of the Health and Retirement Study (Bucciol and Zarri 2017).

computation related to risk assessment such as transforming probabilities and proportions). Furthermore, I include a lottery-type decision measure (Dohmen et al. 2011), the canonical measure for risk preference in experimental economics to control for investors' domain-independent risk tolerance.

Second, existing studies have uniformly relied on data drawn from samples of the general population leaving open the question whether personality traits also help explain financial risk taking in a targeted samples comprising individual investors. This, particularly, is a common concern in the finance literature. To illustrate, consider the following quote: "*Within finance, there is a concern about the validity of studies that have used participants drawn from the general population. Conclusions drawn from such studies may need some modification if they are to be applied to investors, either individual or corporate*." (Muradoglu and Harvey 2012, p. 71). I hope to contribute to the literature by drawing on data collected from a targeted sample of individual investors: members of the American Association of Individual Investors.

Third, related studies have only investigated a limited number of personality measures, mainly relying on measures of the most common personality framework, the Big Five. Consequently, it remains to be seen if personality trait measures, pertaining to other frameworks, could also help explain financial risk taking. I address this issue by including in the investigation not only a measure for the Big Five, but also an instrument measuring traits of the related HEXACO framework, and a measure for aversive personality traits - the Dark Triad.

Last, the role of personality traits in financial risk taking has mainly been investigated by studying investors' direct and indirect investments in the stock market. It is, therefore, not clear whether personality traits can also help explain investment decisions in risky assets other than stocks. In this study, I not only measure direct and indirect investment in stocks but also construct two additional measures: (1) a high risk measure that is the aggregate share of the portfolio invested in stocks, derivatives, and hedge funds; and (2) the aggregate share of the portfolio invested held in cash, and savings account - a measure for low risk assets.

The main results can be summarised as follows. I find a positive association of Openness with the aggregate share of investors' portfolios invested in stocks, derivatives and hedge funds. I find such an association when I measure Openness

with the Big Five measure, as well as the HEXACO measure. Furthermore, I find some weak evidence of a negative association of Big Five Conscientiousness with the likelihood that investors invest in stocks, but a positive association of HEXACO Conscientiousness with the aggregate share of investors' portfolios invested in stocks, derivatives, and hedge funds. I find a negative association of HEXACO Extraversion with the aggregate share of investors' portfolios invested in stocks directly and indirectly through mutual funds. Against my expectations, I do not find an association of the related traits Big Five Neuroticism and HEXACO Emotionality with risk taking. Further, I find the Dark Triad trait Machiavellianism is negatively related to the likelihood that investors invest in stocks, and Narcissism is negatively associated with the share of investors' portfolios invested in stocks directly, and indirectly through mutual funds. Lastly, I find some evidence that Psychopathy is positively associated with the aggregate share of investors' portfolios invested in stocks, derivatives, and hedge funds.

The remainder of this chapter is structured as follows. In the following section, section 2, I first provide some important background information on personality psychology, and then review the literature for each of the three personality frameworks that I measure in this study. In section 3 I describe in detail all the measures that I employ, including the personality trait measures. For measures, other than the personality measures, I also provide a motivation for their inclusion in the study based on their relevance for financial risk taking. Section 4 describes the model and the methodology. Section 5 presents and discusses the results. Section 6 concludes this chapter with a general discussion.

8. Background and hypothesis development

In this section I outline the three different personality frameworks that I employ to formulate the hypotheses. Before doing so, however, it is useful to give a brief account of the origins of the personality constructs that I employ to better understand their nature. This section is therefore structured as follows. First, I give a brief account of the development of the three personality constructs that I employ, and comment on the issue regarding the 'definitions' of the individual traits - a

consequence of their origins. Table C1 in the appendix describes each personality trait and lists their underlying facets for the reader so that the 'definitions' of the personality traits are clear. Subsequently, I review the literature for each personality framework, starting with the Big Five, followed by the HEXACO, and last I review the literature regarding the Dark Traid. In the literature review I focus on the literature investigating the association with risk taking in an economic/financial context, for each of the three constructs[61].

The Big Five, and the HEXACO structures are overarching personality frameworks, meaning they capture a complete, yet parsimonious personality profile (Hilbig et al. 2013a). Both the HEXACO and the Big Five were developed through lexical analysis, meaning researchers analyse sets of personality descriptive words (usually adjectives) of a language to look for common themes (Ashton and Lee 2007). The statistical method of factor analysis is then used on these word-sets to ascertain which adjectives load onto common (overarching) traits. Both the Big Five, and the HEXACO are, therefore, atheoretical frameworks (Borghans et al. 2008). The atheoretical nature of the two is one of the most common criticisms of these frameworks (Borghans et al. 2008).

By contrast, none of the Dark Triad traits - Psychopathy, Narcissism, and Machiavellianism - result from lexical analysis. Each member of the Dark Triad has different origins and emerged separately form one another. Both Psychopathy and Narcissism originate from the clinical literature, and practice - in the study of personality disorders (Furnham and Crump 2005). Machiavellianism, on the other hand, emerged from the analysis of statements made in Niccolo Machiavelli's infamous book on statecraft -"The Prince"- in which he describes ways for men to seize and retain power (Christie and Geis 1970; O'Boyle Jr et al. 2012). Christie and Geis (1970) analysed the philosophy, and tactical recommendations made by Machiavelli. Based on this analysis, they constructed a questionnaire for "Machiavellianism" that showed to accurately predict behaviour of people in 'everyday' samples, in line with Machiavellian principles (Furnham et al. 2013). The

[61] I focus on the literature that has investigated the association of personality traits with risk taking in an economic/financial context because extensive investigations of risk taking have demonstrated that risk-taking is domain specific (i.e. a person may take risk in one domain but not in another - e.g. choose to smoke (health domain) but not be willing to do extreme sports (recreational domain) (Figner and Weber 2011).

three traits are closely related; people “with these traits share a tendency to be callous, selfish, and malevolent in their interpersonal dealings” (Paulhus & Williams, 2002, p.100). Due to their commonalities, the three traits also strongly correlate when administered together (Furnham et al. 2013). There is a large body of literature relating to each trait, however, given their commonalities it is less clear whether previous findings for each trait are due to aspects specific to each trait, or due to common features. To ascertain the specific effects of each it is, therefore, vital to administer a measure for all three to the same sample (Furnham et al. 2013). This is important for the hypothesis development; it means I cannot solely rely on studies that have measured the traits separately, but rather focus on studies that measured all three traits together.

Having briefly outlined the origins of the personality constructs that I measure it is important to address the issue regarding the definition of personality traits: personality traits are not easily defined. Each trait represents a continuum between two extreme poles. Personality psychologists tend to describe personality traits starting with a general notion of an overarching trait (i.e. the highest level of an hierarchical order for the trait), followed by a list of facets that comprise the lower-levels of the hierarchy. The facets themselves are further defined by adjectives that 'load' onto each facet in factor analysis - a standard statistical method in psychometrics (Almlund et al. 2011). In a seminal paper, which lays the foundation for a framework to use personality traits in economic theories, the authors note: "There is a danger in economists taking the labels assigned to psychologists' personality scores literally and misinterpreting what they actually measure" (Borghans et al. 2008, p.973). Before reviewing the literature on personality and risk taking I, therefore, refer the reader to table C1 in the appendix which contains a description of each personality trait and its underlying facets. I use the term 'description' rather than 'definition' to emphasize that unifying definitions of personality traits do not exist.

8.1 The Big Five traits and financial risk taking

The most widely used and extensively researched framework of personality traits are the Big Five and the related the five factor model (FFM) (Ferguson et al. 2011). The Big Five and the FFM are not identical but so similar that they are often used interchangeably (Matz et al. 2016). In this study I include a measure of the Big Five and, therefore, use the term Big Five to describe this personality model hereafter. In the Big Five model, five factors[62] represent the highest level of a hierarchical organisation of traits: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (Almlund et al. 2011). A description for each trait is provided in table C1 in the appendix. Given the atheoretical nature of the Big Five framework, formulating hypotheses is challenging. Nonetheless, some traits are more likely to be related to risk taking. Specifically, Openness to experience, Conscientiousness, and Neuroticism should be related to risk taking. I next describe the 'theoretical', or rather conceptual, connection each trait has with risk taking. (Costa and McCrea 1992; McCrae and Costa 1997).

Openness to Experience (hereafter Openness) is defined as "the tendency to be open to new aesthetic, cultural, or intellectual experiences" (APA 2007)[63]. A person that is on the high pole of Openness is unconventional, values aesthetics, and is more imaginative than a person low on Openness. A person high in Openness may take risks by engaging in unconventional behaviour to discover new experiences, which would lead to risk taking. What is more, one facet of Openness - feelings (i.e. excitable) - relates to affective dispositions: meaning people high in Openness are more easily excited by experiences than people low in Openness. In the case of investing, therefore, an investor high in Openness may enjoy the thrill of investing in more risky assets. For example, it would be more exciting to follow the movements of stocks compared to investing in savings accounts where the return is rather certain

[62] Facets of each of the five traits are more narrowly defined at lower levels of the hierarchy that further specify each global trait (Almlund et al. 2011).

[63] Costa and McCrae (1992) provide an alternative definition of Openness to Experience, they define it as the extent "... to which a person needs intellectual stimulation, change and variety" (Costa and McCrae 1992 as cited in Borghans et al. 2008, p. 983). The definition of Openness by the APA, in my view, is clearer which is why I used it instead.

and, thereby, less exciting. Consequently, I hypothesize a positive relationship of Openness with financial risk taking.

Although, on the whole, the evidence is mixed some findings support this notion. Nicholson et al. (2005) develop a questionnaire type risk measure that measures risk in six domains[64] including the financial domain. The authors find that Openness is significantly positively related to risk taking in the financial domain when assessed through their survey measure[65] and controlled for gender and age. Relying on data from an Italian sample Lauriola and Levin (2001) investigate the association of personality with risk taking in two lottery tasks that are framed as avoiding a loss or achieving a gain. The authors find that Openness to experience is positively related to risk taking to achieve a gain but not correlated with risk taking to avoid a loss. Moreover, Brown and Taylor (2014) investigate the association of personality traits and various types of debts and assets for UK households. They draw on data from the British Household Panel Survey that includes samples of both single and couple households. The authors find that Openness is positively related to the probability of households to own stocks in the couples sample but not in the singles sample (Brown and Taylor 2014). Bucciol and Zarri (2017) use US data from the Health and Retirement Study (HRS) to investigate the association of the Big Five and some additional traits[66] with the decision to take financial risk. They measure risk with the decision to invest in the stock market and the share of the portfolio that is invested in stocks (both directly, and indirectly through mutual funds and pension funds). The authors not find evidence of Openness being related to either measure of financial risk taking they investigate (Bucciol and Zarri 2017). However, it should be noted that the HRS data that Bucciol and Zarri (2017) rely upon, does not contain an independent measure of the Big Five traits but rather a subset of measures from the Midlife Development Inventory (Lachman and Weaver 1997) that relate to the Big Five. This means that their findings are not necessarily directly comparable to

[64] The six domains within which Nicholson et al (2005) investigate risk taking are: Recreation, Health, Career, Finance, Safety, and Social. Each item was scored on a 5-point Likert scale ranging from (1) 'strongly disagree' to (5) 'strongly agree'. The means of all six measures are then also added up to arrive at an Overall Risk score (Nicholson et al. 2005).

[65] The survey measure asks respondents to state whether they have ever taken financial risk now, and in the past. The responses are scored on a 5-point Likert scale ranging from 1 (never) to 5 (very often): see Nicholson et al. (2005) for details.

[66] The authors also measure the traits Cynical Hostility, Anxiety, Anger-in, and Anger-out that are part of the Health and Retirement Study (Bucciol and Zarri 2017).

findings from studies using a complete and independently validated Big Five measure - a point stressed by the authors themselves (Bucciol and Zarri 2017).

The second Big Five trait that is conceptually related to risk taking is Conscientiousness. Conscientiousness is described as the tendency to be organised, responsible (i.e. following through with obligations), control one's impulses, and hard working (APA 2007; Roberts et al. 2014). Conceptually Conscientiousness is related to low risk taking (Borghans et al. 2008). If a person - scoring high on Conscientiousness - sets herself a task such as investing, she is more likely to control her impulses and stay focused on the task at hand (i.e. achieving risk-adjusted returns), making it less likely that she would take financial risk. I therefore hypothesise a negative association of Conscientiousness with risk taking.

Empirical findings support this notion. Some evidence suggests that Conscientiousness is indicative of a more prudent approach to finance. A few studies find that people, high in Conscientiousness, have more financial self-control (Webley and Nyhus 2001) and engage in more discretionary saving (Wärneryd 1996; Brandstätter and Königstein 2001). In line with this notion Nicholson et al. (2005) find Conscientiousness to be negatively related to risk taking when assessed with their survey measure of financial risk taking. Similarly, Soane and Chmiel (2005) measure the association of Big Five traits and risk preference in the financial domain with a self-report survey measure (Sitkin and Weingart 1995) and find weak evidence (the correlation becomes insignifcant when additional controls are added to their model) for a negative correlation with Conscientiousness. Brown and Taylor (2014) find evidence of Conscientiousness to be negatively related with holding unsecured debt, but do not find evidence of Conscientiousness being related to the propensity to invest in stocks. Further, Bucciol and Zarri (2017) find weak evidence (i.e. significant at 10%) of Conscientiousness being negatively correlated with the proportion of the portfolio invested in stocks, and - in line with the findings reported by Brown and Taylor (2014) - no evidence of Conscientiousness being associated with the likelihood to invest in stocks.

Within the Big Five framework the trait that, conceptually, is most clearly related to risk taking is Neuroticism. Neuroticism is described as "a chronic level of emotional instability and proneness to psychological distress" (APA 2007). A slightly different

description of Neuroticism that better illustrates the association of Neuroticism with risk taking is provided by Costa and McCrae (1992), who describe Neuroticism as "... the degree to which a person experiences the world as threatening and beyond his/her control". Generally a higher score on Neuroticism is associated with less risk taking (Borghans et al. 2008). People who are more neurotic have difficulty dealing with stressful situations and seek to avoid stress. Taking greater financial risk increases the potential for stressful situations: if an investor takes greater financial risk he increases the probability that his portfolio looses money. More Neurotic investors that understand the risk (intelligence as mediator) could refrain from taking risk to avoid potentially stressful situations. Conversely, low risk assets could offer neurotic investors "peace of mind" (i.e. avoiding the stressful, uncertain situation of unexpected downward movements of the portfolio). I therefore hypothesise a negative relationship of Neuroticism with risk taking.

Some evidence supports this notion, for example Rustichini et al. (2012) study the effect of personality traits and cognitive ability (intelligence) of respondents on risk taking, measured with a lottery task that is constructed as risk taking to achieve a gain or avoid a loss. The authors find that Neuroticism is negatively related to risk taking in both domains but the association is only significant in the gain domain: people who are neurotic are less willing to take risk to achieve a gain. This is supported by evidence from Jadlow and Mowen (2010). The authors use a survey and investigate the association of personality[67] with the propensity to gamble, and involvement in the stock market[68] in a representative US sample (Jadlow and Mowen 2010). Jadlow and Mowen (2010) find Neuroticism to be negatively related to involvement in the stock market. Conversely, in two studies that are most closely related to ours the authors find no relationship of Neuroticism being related to the propensity to own stocks (Brown and Taylor 2015; Bucciol and Zarri 2017), or the share of the portfolio that is invested in stocks (Bucciol and Zarri 2017).

The remaining two traits of the Big Five, Extraversion and Agreeableness, have no obvious connection to risk taking. Extraversion refers to the tendency of the

[67] The authors use the 3M measure (Mowen 2000) to measure personality.

[68] The construct a four-item measure to proxy involvement in the stock market, the items are: 1.) "I really enjoy buying and selling stocks"; 2.) "Playing the stock market is exciting to me"; 3.) "I frequently buy and sell stocks"; 4.) "I see myself buying and selling stocks in the future". The items are scored on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) (Jadlow and Mowen 2010).

"orientation of one's interests and energies toward to outer world of people and things rather than the inner world of subjective experience; characterized by positive affect and sociability" (APA 2007)[69]. One facet of Extraversion is gregariousness (i.e. sociability). Generally, therefore, the more extroverted a person is, the more sociable she is (Almlund et al. 2011). With this in mind, it is worth noting that sociability has previously been linked to stock market participation. For example, Hong et al. (2004) (Hong et al. 2004) find that more sociable investors are substantially more likely to own stocks. Similarly, Christelis et al. (2010) show that socially active households are more likely to own stocks, and also invest a larger share of their portfolio in stocks. However, neither study measures Extraversion *directly* with a personality measure[70]. Furthermore, given that sociability is only one facet of the trait, I do not believe that Extraversion is related to financial risk taking. What is more, the mixed evidence supports this view. Brown and Taylor (2014), find a *negative* association between Extraversion and the propensity to hold stocks in the couples sample. Bucciol and Zarri (2017) do not find a correlation of Extraversion with the propensity of investors to hold stocks or the proportion of investors' portfolios invested in stocks. Conversely, Nicholson et al. (2005) find Extraversion to be positively correlated with financial risk taking with their self-report survey measure.

Lastly, Agreeableness refers to "the tendency to act in a cooperative, unselfish manner"[71] (APA 2007). Within the Big Five framework Agreeableness is the trait that measures cooperative, 'altruistic' tendencies in social interactions. Furthermore, facets of the trait include compliance, and tender-mindedness. There is, therefore, no readily apparent conceptual association of Agreeableness with risk taking. Consequently, I do not believe Agreeableness is related to financial risk taking. What is more, apart from Bucciol and Zarri's (2017) finding of a negative association of Agreeableness with the likelihood to hold shares, there is no other evidence suggesting a relationship of Agreeableness with financial risk taking. Here it is worth mentioning again that

[69] A slightly different description is provided by Costa and McCrae (1992) who describe Extraversion as "the degree to which a person needs attention and social interaction".

[70] Hong et al. (2004) measure *sociability* with two dummy variables: one that measures whether respondents interact with their neighbours, and one that measures church attendance. Chrsitelis et al. (2010) measure sociability with three dummy variables: (1) a dummy variable of respondents' participation in sports, social or other clubs; (2) a dummy measuring whether respondents take part in a political or community-related organisation: (3) a dummy for participation in a religious organisation. They also construct a household indicator that is the sum of the first two dummies.

[71] An slightly different description of Agreeableness is provided by Cost & McCrae (1992) who decribe it as "the extent to which a person needs pleasant and harmonious relations with others".

Bucciol and Zarri (2017) did not use an independently verified measure of the Big Five but rather relied on a measure *related* to the Big Five, which is part of the HRS.

To sum up the hypotheses regarding the Big Five traits: I hypothesise Openness to have a positive, and Conscientiousness and Neuroticism to have a negative association with the measures of high risk taking, and vice versa for the measure of low risk taking

8.2 The HEXACO traits and financial risk taking

As mentioned in the introduction of this background section, the Big Five and the HEXACO were developed through lexical analysis. The Big Five is based on the very first lexical studies (e.g. Cattell 1947; Norman 1963) that consistently yielded five overarching traits. The Big Five traits were then operationalised through personality measures, especially the NEO Personality Inventory-Revised (NEO-PI-R) and the NEO Five-Factor Inventory (NEO-FFI) (Costa and McCrea 1992). These measures - the NEO-PI-R and NEO-FFI - were then translated from English to study personality traits in other languages (Ashton and Lee 2007). Studies that investigated personality traits in languages other than English were, generally, able to recover the five-factor structure (for a detailed overview list of these studies see Ashton et al. 2004). Consequently, it was proposed that five factors best represent a complete personality profile, and by the late 1990's most personality psychologists largely accepted the five-factor structure as an adequate overarching framework to investigate personality (Ashton and Lee 2007). Recently, however the five-factor structure has been challenged again. Two issues in particular caused researchers to, yet again, employ lexical analysis in the quest to determine whether five-factors indeed represent an optimal overarching personality structure across languages and cultures, or if a different structure is more appropriate. The first issues is that, the early lexical studies, on which the Big Five framework is based, were hindered by limited computing power; meaning comparatively small word-sets - not encompassing the entire lexicon of the English language - were used to arrive at the five-factor structure (Ashton and Lee 2007). The second issue is that investigations of personality traits in other languages were all based on *translations* of the English five-factor structure, rather than on lexical analysis using words native to the respective language (Ashton

and Lee 2007). In the studies resulting from the recent re-examination of personality descriptive adjectives both the five and the six-trait structure have been recovered from lexical analysis in *some* languages, however only a six-factor structure has been recovered across *all* languages[72]. In other words, it seems that six rather than five (overarching) traits better represent a universal taxonomy of traits, replicable across languages and cultures (for an overview and discussion on this topic see Ashton and Lee 2007). This six-trait personality framework has since been named HEXACO (Lee and Ashton 2004). The name HEXACO is an acronym for these traits, namely: Honest-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to Experience.

Generally, the HEXACO framework differs from the Big Five in three ways. First, it contains an additional sixth trait - Honest-Humility - that marks the biggest difference between the two and incorporates some lower-level traits that are part of Agreeableness, Conscientiousness, and Neuroticism in the Big Five framework (Ashton and Lee 2001). Second, the traits Agreeableness and Emotionality are not identical to, but variations of their Big Five counterparts: Agreeableness and Neuroticism respectively (Ashton et al. 2014). Third, the traits Openness, Extraversion, and Conscientiousness are almost identical to their Big Five counterparts, apart from the exclusion of intellectual ability from HEXACO Openness[73] (Ashton et al. 2014).

The main difference between the HEXACO and the Big Five is how prosocial personality traits are interpreted; the three traits Honest-Humility, Agreeableness, and Emotionality are all interpreted as slightly differing altruistic tendencies (as is explained in chapter 3 of this thesis) (Ashton and Lee 2007). Although prosociality is not pertinent to this study, the difference in the structure that results from this interpretation has some implications that are relevant to this investigation: it results in

[72] The four languages in which only the six and not the five trait structure of personality was found are: Filipino, Greek. Hungarian, and Italian, for an overview of the studies see (Ashton and Lee 2001) and Ashton & Lee (2007).

[73] Note here that intellectual ability is part of *some* but not *all* Big Five measures (Ashton and Lee 2007). Furthermore, intellectual ability is not part of the facets for Big Five Openness that I list in table 1 since it is not part of the description of the trait that I derived the Big Five content from (John and Srivastava 1999). Big Five and HEXACO Openness can thus be considered nearly identical for the purpose of our investigation (for the subtle difference please refer to the list of facets reported in table 1).

a structure where each of the six traits is more narrowly focused compared to the Big Five. This has implications for the conceptual interpretation of *all* traits. In the HEXACO, the six traits can be organised into two "... unifying concepts that identify previously unnoticed parallels among those [traits]" (Ashton and Lee 2007, p. 155).
Specifically, the HEXACO the three traits that are similar to their Big Five counterparts - Openness, Conscientiousness, and Extraversion - are interpreted as three traits that measure the extent to which people engage in idea-related, task-related, and social endeavours respectively (Ashton and Lee 2007). A higher level of any of these three traits is therefore associated with greater engagement in terms of mental energy, physical energy, and time spent for each of the three different types of endeavours (Ashton and Lee 2007). Furthermore, the remaining three HEXACO traits - Emotionality, Agreeableness, and Honest-Humility - share the common theme of measuring different types of altruistic tendencies (Ashton and Lee 2001). These specific commonalities between the traits were not readily apparent within the Big Five framework (Ashton and Lee 2007).
I now proceed to describe the six traits of the HEXACO and their association with risk taking. I review the six traits according to the two common themes of the traits; I start with the three 'endeavour' related traits (Openness, Conscientiousness, and Extraversion), followed by the three traits describing different types of altruistic tendencies (Agreeableness, Emotionality, and Honest-Humility).

Within the HEXACO, Openness describes the extent to which people are engaged in idea-related endeavours. It is, therefore, defined by facets related to this type of behaviour at the lower level of the hierarchy (e.g. creativity, and intellectual curiosity) (Ashton and Lee 2001). However, Openness also incorporates facets that may appear less relevant to this behaviour (e.g. appreciation of aesthetics, and a tendency to fantasise) (Ashton and Lee 2007). The only difference between HEXACO Openness and Big Five Openness is the exclusion of intellectual ability.
Apart from this difference HEXACO Openness closely resembles Big Five Openness. People who score high on Openness are therefore generally considered to be unconventional, curious, creative, and innovative (Weller and Tikir 2011). I hypothesised a positive association of Openness with risk taking in the Big Five framework. This hypothesis was not based on the intellectual ability facet but rather on the remaining facets. I, therefore, also hypothesise a positive association of

HEXACO Openness with risk taking. An investor, scoring high on Openness, may take financial risk by being curious, and excited about investing in assets that are more 'unconventional' than 'safe' assets such as cash and savings accounts.

Some evidence supports this notion. Apart from the evidence pertaining to Big Five Openness that I described in the previous section three studies, to date, investigate the association of Openness and risk taking with personality traits elicited with a HEXACO measure. Two studies report a positive association of Openness with risk taking and one does not report an association. Specifically, Lee et al. (2005) measure the association of personality with risk taking. Their measure of risk taking is a self-report measure of general disposition to take risks[74]. The authors find that HEXACO Openness is positively associated with risk taking. Similarly, Weller and Tikir (2010) measure risk taking with a self-report measure, the so-called "DOSPERT-R" scale (Blais and Weber 2006) that measures risk taking in four domains (social, recreational, health/safety, and ethical). The authors sample US university students and find a positive association of HEXACO Openness with risk taking in the social and recreational domain but no association in the health/safety or ethical domain. The only study to date that investigates the association of HEXACO traits with risk taking in an economic context is that of Weller and Thulin (2012). The authors report results from a sample of North American university students who completed a HEXACO measure (Ashton et al. 2004) and made twelve decisions in a lottery-type risk experiment. In the lottery-type risk measure six decisions were framed as taking risks to avoid a loss and six were framed as a decision to achieve a gain. The authors did not find an association of Openness with either type of risk taking (Weller and Thulin 2012).

Conscientiousness, within the HEXACO framework, refers to the extent to which people engage themselves in task-related endeavours (Ashton and Lee 2007). Conscientious people are generally more organised, disciplined, careful and precise in tasks that they decide to undertake than people who are low in Conscientiousness (Weller and Tikir 2011). HEXACO Conscientiousness is nearly identical to its Big Five counterpart, and as mentioned in the previous section on the Big Five traits,

[74] The risk measure used by Lee et al. (2005) is part of the part of the Supernumerary Personality Inventory (Paunonen 2002).

Conscientiousness is conceptually related to lower risk taking, through its connection to self-control (Ashton and Lee 2001). I therefore, also hypothesise a negative association between risk taking and Conscientiousness when measured with the HEXACO instrument.

Apart from the evidence mentioned earlier with regards to Big Five Conscientiousness, some evidence of studies that used a HEXACO measure support this notion. Weller and Tikir (2011) find that high HEXACO Conscientiousness is negatively related to risk taking in all of the four domains they investigate. Furthermore, Weller and Thulin (2012) find that HEXACO Conscientiousness - in a lottery-type risk experiment - is negatively correlated with risk taking to avoid a loss, but not significantly related to risk taking to achieve a gain. Conversely, Lee et al. (2005) find no association of Conscientiousness with risk taking.

Within the HEXACO framework Extraversion refers to the extent to which people become engaged (i.e. the amount of time and energy spent) in social endeavours such as socialising, leading, or entertaining (Ashton and Lee 2007). Lower-level facets that define Extraversions are directly related to social endeavours such as sociability and talkativeness. Ashton et al. (2002) propose that Extraversion is not merely a preference for social interaction, but rather the core of Extraversion is the tendency to behave in ways that attract social attention. HEXACO Extraversion therefore also includes traits such as liveliness and enthusiasm, which may not appear to be directly related to social endeavours but foster social interaction by making a person an attractive partner in social interactions, and motivate one to engage in social interaction (Ashton and Lee 2007). As previously mentioned - in the paragraph pertaining to the Big Five trait Extraversion - previous studies have found associations of the related construct *sociability* with stock market participation (Hong et al. 2004; Christelis et al. 2010). However, these studies did not explicitly measure Extraversion with a personality measure. Furthermore, sociability is just *one* facet of Extraversion. As with Big Five Extraversion I, therefore, do not expect HEXACO Extraversion to be associated with financial risk taking. Empirical evidence supports this notion. Apart from the evidence reported in the paragraph on Big Five Extraversion, findings of studies investigating HEXACO Extraversion also support this view. Lee et al. (2005) find no association of Extraversion with risk taking, neither do Weller and Tikir (2011). What is more, in the only study to date

investigating the association of HEXACO Extraversion and risk taking in a financial context Weller and Thulin (2012) find no association of Extraversion with risk taking to achieve a gain or avoid a loss in a lottery-type risk elicitation task.

Emotionality is the one of the three HEXACO traits that explain different types of altruistic dispositions. Specifically, Emotionality represents tendencies related to kin altruism such as empathic concern and emotional attachment towards close others (i.e. kin) (Ashton and Lee 2007). Emotionality is related to Big Five Neuroticism but it differs from it in two aspects. First, Emotionality does not include anger, which is part of Big Five Neuroticism (in the HEXACO anger is part of Agreeableness). In other words, while people that are high in Neuroticism are more prone to anger, this is not the case for people high in Emotionality. The second difference is that Emotionality includes sentimentality, which is part of Agreeableness in the Big Five framework. As illustrated in table 1, four facets define Emotionality at the lower level of the hierarchy: fearfulness, anxiety, dependence, and sentimentality (Ashton et al. 2014)[75].
Despite the differences between Emotionality and Big Five Neuroticism, they share aspects that mean people high in Emotionality are likely to avoid stress (i.e. anxiety and fearfulness) and thereby should be more risk averse. I, therefore, expect Emotionality to be negatively related to the risk measures.
The empirical evidence supports this view. Lee et al. (2005) find a significant negative correlation of Emotionality with risk taking. Weller and Tikir (2010) find Emotionality to be the only trait that is significantly negatively correlated with risk taking in all four domains they measure. Moreover, Weller and Thulin (2012) find Emotionality to be negatively related to risk taking in a lottery-type measure for both risk taking to achieve a gain and to avoid a loss, suggesting that people high in Emotionality shy away from risk however it may be framed.

Within the HEXACO framework the trait Agreeableness relates to *tolerance* in reciprocal altruism, it is described as "... the tendency to be forgiving and tolerant of others, in the sense of cooperating with others even when one might be suffering

[75] While table C1 in the appendix lists all facets that Emotionality comprises, given that it Emotionality differs from Neuroticism it is useful to give a little more detail about the specific facets. Specifically the four facets that Emotionality comprises are defined as follows: a) Fearfulness - the tendency to experience fear; b) anxiety - the tendency to worry in a variety of contexts; c) dependence - the need for emotional support from others; and d) sentimentality - the tendency to feel strong emotional bonds with others (Ashton et al. 2014).

exploitation by them" (Ashton and Lee 2007, p.156). HEXACO Agreeableness differs from Big Five Agreeableness in two ways. First, it includes anger, which in the Big Five is part of Neuroticism. People low in HEXACO Agreeableness are therefore more prone to be angry than those low in Big Five Agreeableness. Second, in contrast to Big Five Agreeableness, HEXACO Agreeableness does not include sentimentality related aspects (in the HEXACO sentimentality is instead part of Emotionality) (Ashton and Lee 2007). HEXACO Agreeableness thus manifests itself through lack of anger in the face of perceived wrongdoing of another person towards oneself, a desire for cooperation, tolerance, and (low) quarrelsomeness (Ashton and Lee 2009). The four facets that define HEXACO Agreeableness are: forgivingness, gentleness, flexibility, and patience (Ashton et al. 2014)[76]. Conceptually there is no association of HEXACO Agreeableness with risk taking, which is why I do not expect it to be related to the risk measures. Evidence reported by Lee et al. (2005) supports this notion; they find no association of Agreeableness with risk taking. Furthermore, Weller and Thulin (2012) do not find and association of HEXACO Agreeableness with risk taking elicited with a lottery-type risk measure. Though, Weller and Tikir (2010) report a negative correlation of Agreeableness with risk taking in the social, health/safety, and ethical domain but not in the recreational domain.

The sixth trait of the HEXACO, Honest-Humility, relates to fairness in reciprocal altruism it is defined as the "... tendency to be fair and genuine in dealing with others, in the sense of cooperating with others even when one might exploit them without suffering retaliation" (Ashton and Lee 2007, p. 156). Honest-Humility is characterised by the facets sincerity, fairness, greed avoidance, and modesty (Ashton et al. 2007)[77]. Adjectives that describe Honest-Humility are associated with different traits within the Big Five framework such as Agreeableness, Conscientiousness and Neuroticism (Ashton and Lee 2001). People low in Honest-Humility are less inclined to follow

[76] Specifically the four facets that HEXACO Agreeableness comprises are defined as follows: a) forgivingness - the willingness to feel trust and liking towards those who may have caused one harm; b.) gentleness - the tendency to be mild and lenient in dealings with other people; c.) flexibility - the willingness to compromise and cooperate with others; d.) patience - the tendency to remain calm rather than to become angry (Ashton et al. 2014).

[77] The four facets that Honest-Humility comprises are defined as follows: 1.) Sincerity is the tendency to be genuine in interpersonal relations; 2.) Fairness is the tendency to avoid fraud and corruption; 3.) Greed avoidance is the tendency to be uninterested in possessing lavish wealth, luxury goods, and signs of high social status; and 4.) Modesty is the tendency to be modest and unassuming (Ashton and Lee 2007).

rules and social norms, conversely those high Honest-Humility are more likely to help, and less willing to exploit others (Weller and Thulin 2012). There is no obvious conceptual association of Honest-Humility with risk taking, which is why I do not expect it to be related to the risk measures. The empirical evidence largely supports this notion. While Lee et al. (2005) report no association of Honest-Humility with risk taking; Weller and Tikir (2010) find Honest-Humility to be negatively associated with risk taking in the health/safety, and ethical domain. Furthermore, Weller and Thulin (2012) find Honest-Humility to be negatively associated with risk taking, for choices involving both potential gains and potential losses, elicited with a lottery-type risk measure. The evidence, therefore, is mixed but no uniform association of Honest-Humility with risk taking in an economic context has emerged thus far.

To sum up the hypotheses regarding the HEXACO traits and risk taking: I hypothesise Openness to have a positive, and Conscientiousness and Emotionality to have a negative association with the measures of high risk taking, and vice versa for the measure of low risk taking.

8.3 The Dark Triad of personality

Although ‘negative’ behaviours have been studied extensively in economics (e.g., negative reciprocity, free-riding etc.), little attention has been paid to aversive personality traits i.e. the ‘dark side’ of personality (Ferguson et al. 2011). As Ferguson et al. (2011) note the difference between negative behaviour (such as free-riding) and dark personality traits is that the former is reactive whereas the latter can also be proactive. Free riding refers one receiving a benefit from a common good without paying for it's use (Baumol 1952). To illustrate consider the following example. A simple, example of a free rider would be a person who doesn't pay for a train fare if there are no conductors around to check, thus receiving the benefit of a free ride. This type of negative behaviour is not proactive; it is a reaction to the situational circumstances i.e. no conductor checked for tickets. By contrast, aversive personality traits can lead to people actively engaging in malevolent behaviour. One extreme example is the case of the white-collar criminal Bernard 'Bernie' Madoff, who ran 'the largest, longest and most widespread Ponzi scheme in history" before

being sentenced to 150 years in prison (Henriques 2009, p. A1). Until his arrest Madoff enjoyed 50 years of success in high finance (Furnham et al. 2013). Personality psychology has a long tradition in studying aversive personality traits. Three traits in particular have been studied intensively: Machiavellianism, Psychopathy, and Narcissism (Furnham et al. 2013). Recently the three traits have been joined under the name 'Dark Triad' (Paulhus and Williams 2002).

The three traits are closely related; people "with these traits share a tendency to be callous, selfish, and malevolent in their interpersonal dealings" (Paulhus & Williams, 2002, p.100). However, although the traits are closely related and also correlated, there are some important differences between them. To illustrate the slight variations of the common features for the three traits table C2 in the appendix provides an overview of these features within each trait, and the extent to which each feature is part of each trait (Paulhus 2014). The "cardinal features" of each trait are indicated with triple plus signs. As table C2 indicates the feature that is shared by all three is callousness - a deficit in empathy (Paulhus 2014).

Furnham at el. (2013): "The key to differentiating the Dark Triad lies in administering measures of all three to the same sample and applying multiple regressions to determine their independent contributions. Only then do theoretically predicated differences emerge" (p.203).

As illustrated in table C2, the core defining features of Machiavellianism are callousness and manipulation. Machiavellians are skillful manipulators and believe interpersonal manipulation to be key for success in life (Furnham et al. 2013).

People scoring high on Machiavellianism have a cynical view of human nature, are unprincipled, and engage in strategic coalition and reputation building behaviour (Jones and Paulhus 2014). Machiavellians are as malevolent as psychopaths, but they are less impulsive, more cautious and deliberate in their behaviour and do not act on temptation like psychopaths (Williams et al. 2010). In short, to paraphrase Rauthmann and Kolar (2012): Machiavellians are cold hearted, cynical, pragmatic manipulators that are motivated by long-term goals typically related to money and power, who are not afraid to use deceit and exploitation to achieve these goals (Christie and Geis 1970; Jones and Paulhus 2009; Rauthmann 2011; Rauthmann and Will 2011; Rauthmann and Kolar 2012; Fehr and Samsom 2013).

As for the expected association of Machiavellianism with risk taking, there is no readily apparent association with risk taking. I therefore treat the association of Machiavellianism with the risk measures as an open question.

The empirical findings on Machiavellianism is somewhat mixed. Some empirical evidence suggests there is a negative association of Machiavellianism with risk taking. Kapoutsis et al. (2013) investigate the Machiavellianism and risk taking in negotiations. They measure Machiavellianism with the Mach IV (Christie and Geis 1970) and risk taking with a self-report risk propensity measure (Cho and Lee 2006). The correlational evidence reported by the authors shows Machiavellianism to be negatively correlated with the risk measure, albeit the correlation is not significant. Closer to this endeavour, Jones (2014) investigates the association of the Dark Triad traits and gambling money in an online experiment. The study was designed so that participants either gambled with their own money or with someone else's money. Jones (2014) does not find a significant association of Machiavellianism with gambling one's own money but does report a significant positive association of Machiavellianism and gambling someone else's money.

The second trait of the Dark Triad - Psychopathy - is rooted in the clinical psychology literature and was originally considered to be a clinical disorder, but has since been studied as a trait in subclinical samples[78] (O'Boyle Jr et al. 2012; Furnham et al. 2013). The core features of Psychopathy comprise almost all common features that are shared by the three Dark Triad traits apart from Grandiosity that is more pronounced in Narcissism, as illustrated in table C2.
Psychopathy is characterized by affective callous, manipulative behaviour, a lack of self-control, an erratic lifestyle, antisocial behaviour, and overall low levels of empathy (Rauthmann 2012; Furnham et al. 2013). Again, conceptually it is not readily apparent if Psychopathy is related to risk taking.

To date there is little research investigating the role of Psychopathy with financial risk taking. Hosker-field et al. (2016) investigate the association of Psychopathy with risk

[78] Clinical samples consist of individuals that are currently under clinical or forensic supervision whereas subclinical samples refer to broader community samples (Furnham et al. 2013).

taking in two studies, the first comprising a sample of undergraduates from a Canadian University and the second a sample of US and Canadian citizens recruited via Amazon Mechanical Turk. The authors measure Psychopathy with the Self-report Psychopathy scale (Paulhus et al. 2015) and risk taking with the self-report DOSPERT-R scale (Blais and Weber 2006). The authors report Psychopathy to be positively correlated with risk taking in the financial domain[79]. Jones (2014) finds an association between Psychopathy and gambling someone else's money but not with one's own money.

Narcissism is defined by a clash between a grandiose personality coupled with underlying insecurity (Jones and Paulhus 2014). Narcissists are exhibitionistic and exaggerate their achievements, they pursue certain goals for the purpose of societal admiration and see themselves as born leaders (Jones and Paulhus 2014). As with the other two traits, there is no obvious connection to risk taking. I thus also treat the association of Narcissism with the risk measures as an open question.

Lakey et al. (2008) investigate the association of Narcissism - measured with the 37-item Narcissistic Personality Inventory (Rhodewalt and Morf 1995) - in an undergraduate sample. Narcissism was positively related to both the frequency of gambling and the amount gambled within six months prior to the study (study 1) both were measured by self-reports. Further, Narcissism was also associated with pathological gambling in a sample of frequent gamblers (study 2) measured with the Diagnostic Interview for Gambling severity (Winters et al. 2002). Similarly, Crysel et al. (2013) report that Narcisissm is the only trait of the dark triad that is significantly correlated with blackjack betting in an online experiment (Crysel et al. 2013). Closer to this endeavor, Foster et al. (2011) studied stock volatility preference of students, measured by the decision to pick stocks that differ in their volatility based on a graphical depiction of the volatility (Study 1). Those who picked stocks displaying higher volatility also scored significantly higher in Narcissism (Foster et al. 2011). Similarly, Foster et al. (2009) find that people high in Narcissism report to have a preference for aggressive financial investment strategies (e.g. investing in volatile

[79] The other domains in which psychopathy has been associated with risk-seeking behaviour are: ethical, health & safety, recreational, and social domain (Hosker-Field et al. 2016).

stocks, rather than stable bonds) (Study 2) (Foster et al. 2009). Furthermore, Foster et al. (2011) find that undergraduates that score high in Narcissism are more likely to invest in riskier stocks in an experimental setting, i.e. stocks that display a higher level of volatility (study 2).

In summary, given the similarity of all the traits I cannot formulate any specific hypotheses for the Dark Triad traits' association with the risk measures. I, therefore, treat this as an open question.

Before moving onto the next section where I describe all the measures I employ in this study, I first present a table - table 1 - that provides an overview of all facets for each trait. In contrast to table C1 in the appendix, however, table 1 also lists the specific facets that are measured by the personality measures I employ in this chapter. This is relevant for the final discussion in this chapter, especially for the Big Five measure, as the specific measure I employ does not measure every single facet that makes up the Big Five framework. Additionally, table 1 also provides an overview of the hypotheses.

Table 1 - Personality trait facets (conceptual and measured) and hypotheses overview

Framework	Trait	Facets	Facets measured in this study	Hypothesis
Big Five	Openness	Fantasy (imaginative), Actions (wide interests)	Fantasy (imaginative)	
		Aesthetics (artistic), Values (unconventional)	Aesthetics (artistic)	+
		Ideas (curious), Feelings (excitable)	Ideas (curious)	
	Conscientiousness	Competence (efficient), Achievement striving (thorough)	Competence (efficient)	
		Self-discipline (not lazy), Order (organised)	Self-discipline (not lazy)	-
		Dutifulness (not careless), Deliberation (not impulsive)	Dutifulness (not careless)	
	Extraversion	Activity (energetic), Excitement seeking (adventurous) Gregariousness (sociable), Positive emotion (enthusiastic) Warmth (outgoing), Assertiveness (forceful)	Activity (energetic) Gregariousness (sociable) Warmth (outgoing)	
	Agreeableness	Trust (forgiving), Compliance (not stubborn) Tender-mindedness (sympathetic), Modesty (not show-off) Altruism (warm), Straightforwardness (not demanding)	Trust (forgiving) Tender-mindedness (sympathetic) Altruism (warm)	
	Neuroticism	Anxiety (tense), Self-consciousness (shy) Vulnerability to stress (not self-confident), Angry hostility (irritable) Depression (not concerned), Impulsiveness (moody)	Anxiety (tense) Vulnerability to stress (not self-confident) Depression (not concerned)	-
HEXACO	Honest-Humility	Sincerity, Greed avoidance Fairness, Modesty	Sincerity, Greed avoidance Fairness, Modesty	
	Emotionality	Fearfulness, Dependence Anxiety, Sentimentality	Fearfulness, Dependence Anxiety, Sentimentality	-
	Extraversion	Expressiveness, Sociability Social Boldness, Liveliness	Expressiveness, Sociability Social Boldness, Liveliness	
	Agreeableness	Forgiveness, Flexibility Gentleness, Patience	Forgiveness, Flexibility Gentleness, Patience	
	Conscientiousness	Organisation, Perfectionism Diligence, Prudence	Organisation, Perfectionism Diligence, Prudence	-
	Openness	Aesthetic appreciation Inquisitiveness, Creativity	Aesthetic appreciation Inquisitiveness, Creativity	+

Framework	Trait	Facets	Facets measured in this study	Hypothesis
Dark Triad	Machiavellianism	Reputation (protecting one's reputation), Coalition building Cynicism, Planning	Reputation, Coalition building Cynicism, Planning	
	Psychopathy	Antisocial behaviour, Callous affect (retaliation against others) Erratic Lifestyle, Short-term manipulation	Antisocial behaviour, Callous affect Erratic Lifestyle, Short-term manipulation	
	Narcissism	Leadership (viewing oneself as natural leader), Grandiosity Exhibitionism, Entitlement	Leadership, Grandiosity Exhibitionism, Entitlement	

Note: The facets of the Big Five are adopted from (John and Srivastava 1999) and (Costa and McCrea 1992), for the Big Five facets parentheses show adjectives that correlated substantially with scores on that facet, I include these for clarification. The facets of the HEXACO are adopted from (Lee and Ashton 2004). The Facets of the Dark Triad are adopted from (Paulhus and Williams 2002). All facets in the column "Facets measured in this study" relate to the three instruments I employ to ascertain investor's personality. The BFI-S for the Big Five (Gerlitz and Schupp 2005), HEXACO-60 (Ashton and Lee 2009), and the SD3 for the Dark Triad (Jones and Paulhus 2014). The column Hypothesis denotes the predicted relationship for each individual trait regarding the High-risk measures. A "+" denotes a positive relationship, a "-" denotes a negative relationship, a blank space denotes no specific prediction.

9. Measures

In this section I describe all measures that I employ in this investigation. For measures, other than the personality measures and socio-demographics, I also provide a motivation for their inclusion in the study based on their relevance for financial risk taking. I present the different measures based on the order in which they appeared in the survey[80]. In other words, the first measures that I present were also the first measures that respondents were presented with in the survey.

9.1 Total portfolio measure

In the survey, respondents were first presented with a welcome screen[81] that contained all relevant information regarding the survey. This screen made no mention of personality so as to avoid priming. To reduce social desirability bias, I reassured respondents that all their responses are treated completely anonymous. The survey first asked respondents to indicate how much they had invested, by assigning their total portfolio size to one of ten categories.[82] The purpose was to help funnel respondents' thoughts towards the next question asking respondents for a specific estimate of respondents' total investment portfolio[83]. The resulting variable labeled 'Total portfolio' is therefore a measure of investors' wealth, I winzorised this variable at 1% to deal with outliers.

9.2 Asset Risk measures

Following the item measuring the wealth of respondents, I asked for the percentage of the total portfolio invested in each of eleven asset classes listed on the screen, where the total of the items had to sum up to 100[84]. I derive all the dependent variables from this measure. I, therefore, describe it in more detail and relate it to the literature.

[80] For an illustration of the survey structure, please refer to Appendix A1.
[81] For the wording of the welcome screen, please refer to Appendix A5.
[82] The ten categories were as follows: less than $ 10,000; $ 10,001 - $ 25,000; $ 25,001 - $ 50,000; $ 50,001- $ 100,000; $ 100,001 - $ 150,000; $ 150,001 - $ 200,000; $ 200,001 - $ 250,000; $ 250,001 - $ 500,000; $ 500,001 - $ 1 million; more than $ 1 million.
[83] The item measuring 'Total portfolio' is as follows: " Please provide below an estimate of the gross value of all your assets combined (i.e. your total portfolio)." A field where the respondent could enter a dollar value accompanied this item.
[84] For a screenshot of the "asset class measure" please see Appendix A6.

Eliciting investors' portfolio composition in a survey study in this manner is common practice in the literature (e.g. Corter and Chen 2006). The asset class categories were as follows: mutual funds, stock (equity shares), bonds, commodities, currencies (foreign exchange), derivative instruments, hedge funds, real estate, savings account, cash, and 'other'.

To illustrate, consider the following example. A respondent - lets call her "Investor X" - reports to have invested her portfolio in the following manner: 30% in stocks, 20% in mutual funds, 20% in bonds, 10% in cash, 10% in savings accounts, 5% in derivatives, 2% hedge funds, 3% in 'other'.
The first dependent variable that I construct is a dummy - labeled "Stock holding" - that takes the value "1" if a respondent indicates to stocks (stocks>0), Investor X would thus be assigned a 1 for this variable.
The second dependent variable I construct - "Stock share" - is the aggregate proportion of the investors' portfolio that is invested in stocks directly and indirectly via mutual funds. For this variable Investor X would receive a score of 50 (30% Stocks + 20% Mutual funds).
The third dependent variable in the analyses - labeled "High-risk" - is the aggregate proportion of an investors' portfolio that is invested in stocks, derivatives, and hedge funds. For the "High-risk" variable Investor X would thus receive a score of 37 (30% Stocks + 5% derivatives + 2% hedge funds).
Last, I construct a fourth dependent variable - labeled "Low-risk" - that is the aggregate proportion of an investors' portfolio that is held in cash and savings accounts. For this variable Investor X would thus receive a score of 20 (10% cash + 10% savings accounts). I therefore derive the following four dependent variables for the analysis: 1.) Stock holding; 2.) Stock share; 3.) "High-risk"; and 4.) "Low-risk".

The first variable - 'Stock holding' - is a common measure of financial risk taking in the literature and has been used in numerous studies, including the closely related studies by Brown and Taylor (2014), and Bucciol and Zarri (2017). It is also a commonly used measure of "stock market participation" popular in the economics literature (e.g. Grinblatt et al. 2011; Malmendier and Nagel 2011).

Similarly, the second variable - "Stock share" - is also frequently taken as a measure of financial risk taking in the extant literature, and is typically justified as a measure of financial risk taking based on mean-variance portfolio theory (Bucciol and Zarri 2017). It has been used as such in the economics literature since the seminal studies by Cohn et al. (1975), Friend and Blume (1975), and it is also used in the closely related study by Bucciol and Zarri (2017).

With the third variable - high-risk - I aim to explore the depth of my data set. While it is common in the economic psychology literature to regard stocks as a high-risk asset class, derivative, and hedge fund investments are rarely considered, this may be due to the lack of available data (a notable exception is the study by Corter and Chen (2006) who also investigate hedge funds and futures). I draw on standard textbook finance to justify the classification of derivatives and hedge funds as high-risk asset classes.

Derivatives are contracts that *derive* their value from the movements of a number of possible underlying assets such as stocks, bonds, stock/bond indices, currencies, or commodities (Fabozzi 2003, p.723). Derivative contracts can be futures and forwards, options, or swaps (Fabozzi 2003). Given that the underlying assets can be any of the aforementioned asset class, derivatives in general are associated with a number of different types of risks, associated with the underlying asset class, additionally their value is often tied to several variables (Buffet 2002; Fabozzi 2003). The data does not allow me to discriminate between the different types of underlying assets or indices but I posit that derivatives nevertheless are a risky asset class[85]. For the purpose of this investigation it matters less how risky derivatives are specifically, but it suffices to say that derivatives are more risky than the assets comprising the low-risk measure - cash and savings accounts.

A hedge fund is "a privately organized investment vehicle that manages a concentrated portfolio of public securities and derivative instruments on public

[85] To illustrate the risk perception of some practitioners consider the following statement by Warren Buffet in a 2002 letter to his shareholders: " Charlie [Berkshire Hathaway's vice Chairman and partner] and I are of one mind in how I feel about derivatives and the trading activities that go with them: I view them as time bombs, both for the parties that deal in them and the economic system." (Buffet 2002, p.13).

securities, that can invest both long and short, and can apply leverage" (Fabozzi 2003, p.606). There are several factors that make hedge funds a risky "asset class". First, in contrast to investment companies such as mutual funds, hedge funds are not regulated by the Security and Exchange Commission, meaning there is much less transparency for the investor (Fabozzi 2003). Second, Hedge funds are typically much more concentrated (focusing on particular strategy and/or sector of the economy) than for example mutual funds, meaning they are less diversified and thus more risky (Fabozzi 2003). Lastly, in contrast to mutual funds, hedge funds do not have a restriction on the amount of leverage that they are allowed to employ, which means (in the worst case) the maximum downside risk can amount to a total loss of all capital under management (Fabozzi 2003).

The low-risk measure - labeled 'Low-Risk' - is the aggregate proportion of an investors' portfolio that is held as cash and in savings accounts. Both asset classes are a popular measure of low risk in the extant literature (e.g. Kapteyn and Panis 2003; Corter and Chen 2006). While cash offers no real return opportunities, the only risk associated with it is inflation risk, making it a very safe asset class by comparison.
Savings accounts also offer very low return opportunities; the only risk associated with savings accounts is the possible default of the institution (e.g. a bank or a savings association) providing the savings account. However, even in the case of a bank default, in the US, deposits in savings accounts are covered by the Federal Deposit Insurance Corporation for a loss of up to $ 250.000 per depositor, per bank, making it a very safe asset class indeed (FDIC 2017). Table 2 lists all asset classes that make up the dependent variables and the different types of risks associated with them.

Table 2 - Asset classes comprising the risk measures and associated risk types

Asset Class	Risk type	Risk classification
Stocks	Company risk, Price risk, Dividend risk, Market/ Systematic risk, Unsystematic risk, Foreign-Exchange risk	High
Mutual funds	Company risk, Price risk, Dividend risk, Market/ Systematic risk, Unsystematic risk, Foreign-Exchange risk	High
Derivatives	Company risk, Price risk, Dividend risk, Market/ Systematic risk, Unsystematic risk, Foreign-Exchange risk, Counterparty risk, Liquidity risk, Interconnection risk	High
Hedge Funds	Company risk, Price risk, Dividend risk, Market/ Systematic risk, Unsystematic risk, Foreign-Exchange risk, Counterparty risk, Liquidity risk, Interconnection risk	High
Cash	Inflation risk	Low
Savings account	Bank/Savings association default	Low

Note: The Risk types are adopted from (Fabozzi 2003).

The second segment of the survey contained all personality trait scales. That I describe next. For this section of the survey I used the 'randomizer' option of the survey software provider 'Qualtrics', that randomly presents respondents with one of the three different personality scales, the randomisation is spread evenly among all scales[86]. The design of the survey means that each respondent is only presented with one of the personality measures, essentially resulting in three different samples. For this reason I hereafter refer to each group of respondents that was presented with a personality measure by the name of the personality measure. For example, those who were presented with the Big Five measure I refer to as the "Big Five sample".

9.3 Big Five measure

To measure the personality traits of the Big Five model I chose to adopt the 15-item Big Five inventory (BFI-S) (Gerlitz and Schupp 2005; Lang et al. 2011). The BFI-S consists of 15 items, 3 items for each of the five personality traits[87]. For a detailed

[86] In order to randomly assign respondents to the different variations of the survey (where both the order of the personality scale and the order of the items within the social preference measure differed resulting in a 2x2 design) I essentially created 4 different versions of the survey. The version of the survey that contained the HEXACO measure did not include the measure for social preferences. This meant that there was only one survey version for the HEXACO which resulted in about one fourth of the number of respondents being randomly assigned to the HEXACO measure, which in turn means that the size of the HEXACO sample is only about one fourth compared to the other samples.

[87] Please refer to Appendix B1 for the BFI-S measure, including instructions.

description and motivation for the use of the BFI-S over its alternatives please refer to pages 73, 74 in chapter 3 of this thesis.

9.4 HEXACO measure

To measure HEXACO traits I use the HEXACO-60 a 60-item measure with ten items for each of the six traits of the HEXACO model of personality structure[88] (Ashton and Lee 2009). Each item is scored on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). For a detailed description and motivation for the use of the HEXACO-60 over its alternatives please refer to pages 74, 75 in chapter 3 of this thesis.

9.5 Dark triad measure

To measure the three-dimensional dark side of personality, I used the Short Dark triad (SD3) a 27-item scale, with 9 items per trait[89] (Jones and Paulhus 2014). The SD3 is a shortened version of the original 41-item long Dark Triad measure (Paulhus and Williams 2002). The items are scored on a 5-point Likert scale, ranging from 1 (Disagree strongly) to 5 (Agree strongly). For a detailed description and motivation for the use of the SD3 over its alternatives please refer to page 75 in chapter 3 of this thesis.

Lastly, is should be noted that the section of the survey which contained the personality scales (apart from the survey that was presented to the HEXACO sample) also included a measure eliciting social preference of investors, the so-called SVO slider measure which is utilised in the analysis of chapter 2 of this thesis (Murphy et al. 2011). Given that social preference is a construct that is impertinent to risk taking I did not include it in the model for this investigation[90].

[88] Please refer to Appendix A8 for the HEXACO-60 measure, including instructions.
[89] Please refer to Appendix A10 for the SD3 measure, including instructions.
[90] I tested in separate analyses whether social preferences would have any influence on the outcome of the results that I report in this study this was not the case. The analyses are available upon request.

9.6 Risk-preferences measure

Having completed the respective personality scale that each respondent was randomly assigned to, the survey flow then converged onto the third section of the survey for *all* respondents (i.e. all samples). In the third section of the survey respondents were first presented a lottery-type risk preference measure task to elicit their risk preferences.

Investors' risk preferences are a key parameter in models in traditional investment theory, such as the Modern Portfolio Theory (Markowitz 1952). What is more, economics has a long tradition of measuring risk preferences (for a comparative study for the most common measures see Szrek et al. 2012).
As I mentioned in the introduction of this chapter, thus far none of the studies investigating the association of personality traits with financial risk-taking control for investors' risk preferences (Brown and Taylor 2014; Conlin et al. 2015; Bucciol and Zarri 2017). I therefore included in the survey a lottery-type risk measure that is the canonical measure in experimental economics to elicit investors' risk preferences. This allows me to investigate whether personality traits are important investor characteristics *beyond* risk preferences as they are traditionally measured in the experimental economics literature.

I adopted the risk preference measure[91] from Dohmen et al. (2011), it is based on Holt & Laury (2002). In the risk elicitation task, investors had to make a decision in 20 different situations between a 'sure' amount of money and a risky lottery choice with a 50% chance of winning $300 and 50% of winning $0. In the first situation the sure amount was $0, the amount increased in increments of $10, the maximum sure amount was $190 in the 20th situation. The point at which the respondent switched from the lottery option to the sure amount was recorded as her risk-preference value, thus, the higher the value the more risk-loving a respondent. The respondents who were most risk loving received a score of $200. The reason why I chose this measure instead of the alternative by Holt and Laury (2002) is that it is very straightforward and requires no numerical abilities (i.e. calculating probabilities) allowing me to elicit risk preferences that are independent of numerical abilities (Dave et al. 2010). Moreover, I specifically include a measure for risk literacy that elicits respondents'

[91] Please see Appendix A3 for the risk preference measure.

numerical abilities and is specifically designed to measure numeric proficiency pertaining to risk decisions. I describe this measure in the following paragraph.

9.7 Risk literacy measure

As I mentioned in the introduction to this chapter, a large part of the literature in psychology and economics investigates risky decision-making from a 'consequentialist' or 'risk as analysis' perspective (Loewenstein et al. 2001; Slovic et al. 2004). From this perspective the decision to take risk is the result of a deliberate process of analytical reasoning, where a person carefully weighs up the pros and cons of a decision before making it (Slovic et al. 2004). In order to make decisions in this way a person needs to be endowed with a certain amount of cognitive abilities. Specifically, proficiency in statistical methods related to risk assessment such as calculating probabilities and proportions would better position a person to properly analyse risky decisions. When calculating risk-adjusted returns of assets with complicated finance models - such as the Capital Asset Pricing Model (Sharpe 1964) - cognitive ability and especially the aforementioned statistical skills would be advantageous for an investor.
Empirical evidence supports this notion. (Christelis et al. 2010), for example find that investors' cognitive abilities are strongly associated with stock market participation. However, none of the studies that investigate the association of personality traits with financial risk taking to date have included a measure for cognitive, or numerical ability (Brown and Taylor 2014; Conlin et al. 2015; Bucciol and Zarri 2017). I do so in this study. What is more, I measure the cognitive ability with the adaptive version of the "berlin numeracy test" (BNT) measure[92] (Cokely et al. 2012). The BNT is specifically designed to elicit respondents' numerical ability with regards to statistical computations that are vital for risky decision-making (i.e. proficiency in statistical computation related to risk assessment such as transforming probabilities and proportions).

The BNT has been extensively validated across fifteen countries in diverse samples and it showed good convergent, discriminant, and criterion validity (Cokely et al.

[92] Please refer to Appendix A4 for the risk literacy measure.

2012). The test consists of four math problems, of varying degrees of difficulty testing probabilistic and statistical computations. In the adaptive version of this test, respondents are presented with at least two, and at most, three math problems, depending on whether the answer they provide for the first and second item is correct or not. Respondents are scored in categories ranging from 1 (lowest numerical ability) to 4 (highest numerical ability).

I chose to include the BNT as opposed to alternative measures of numeracy for two main reasons. *First*, it has been shown to have better psychometric discriminability among highly educated individuals compared to the most common alternative the numeracy test by Lipkus et al. (2001) (Cokely et al. 2012). The sample consists of highly educated individuals; 87% report to have a university degree, and 68% report to have taken a formal course in economics at university level. *Second*, it is a new measure, which is important for the accuracy of such measures. To illustrate, consider the following question: "A bat and a ball cost $ 1.10 in total. The bat costs $ 1.00 more than the ball. How much does the ball cost?" If you are familiar with this question then you know one of the three items that are part of an alternative numeracy measure - the Cognitive Reflection Test (Cokely et al. 2012). Using the recently developed BNT ensures that I are not measuring familiarity with a question but numeracy (risk literacy) proper.

9.8 Socio-demographic controls

In the final section of the survey, recorded respondents' socio-demographic characteristics. Specifically, I measured age with a self-report. The resulting variable is a continuous variable labeled 'Age' that is winzorised at 1% to deal with outliers. I also include an item recording respondents' gender labeled 'Female' that is equal to 1 if a respondent is female, and 0 otherwise.

Additionally, I included an item that asked respondents' to report their attained level of formal education[93]. From this item I create a dummy variable labeled 'University degree' that is equal to 1 if the respondent reports to have attained at least a Bachelors degree, and 0 otherwise. In addition to measuring the education qualification, I also

[93] The specific item was as follows. "What is your level of formal education?" The different options were: (1) High-school, or less; (2) Some college; (3) Associate degree; (4) Bachelors degree; (5) Masters degree; and (6) Doctoral degree.

explicitly asked the respondents whether they have taken a formal course in economics at university level. I include this variable in the model because it is more likely that an investor who has taken a formal economics course is familiar with conventional investment theory and risk modeling. The resulting variable 'Economics course' is equal to 1 if a respondent has taken an economics course at university level, and 0 otherwise.

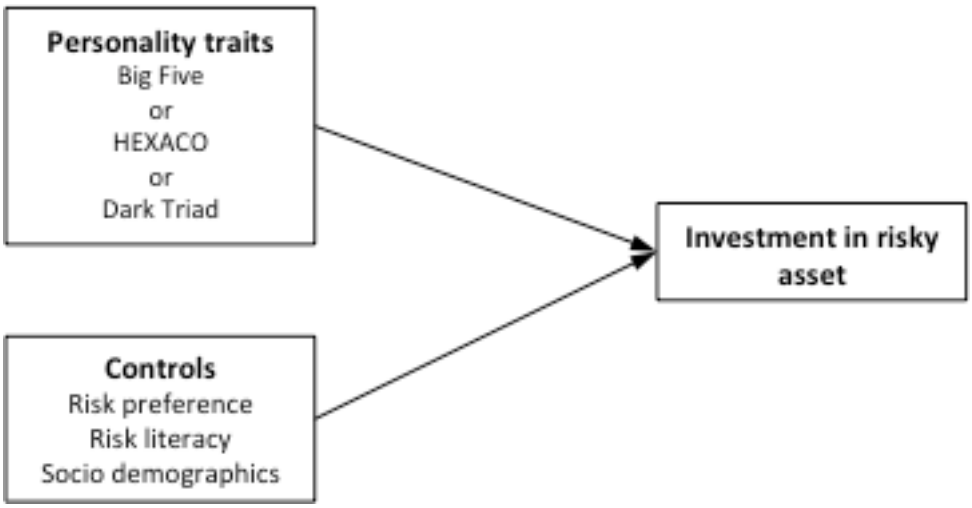
10. Model and Methodology

In this section I briefly outline the model, thereafter I describe the methodology that I use to analyse the association of personality traits with investors' financial risk taking.

10.1 Model

The model I estimate consists of the personality trait variables and the control variables for risk preference, risk literacy, and socio-demographic characteristics. I describe all variables in the 'Measures' section above. I, therefore, here just give an illustration of the model. Figure 1 depicts the model I use to analyse the association of personality with financial risk taking.

Figure 1 - A simple model of financial risk taking



10.2 Methodology

I now proceed to describe the method I employ to analyse the association of personality traits with the risk measures. As noted by some researchers one of the ways in which personality psychology can benefit from economics is by utilising the wealth of methods that allow for more precise measurement (Ferguson et al. 2011). Using the appropriate method is especially important for traits such as the Dark Triad, which are all closely related and correlated strongly with one another. This point is illustrated by Furnham at el. (2013): "The key to differentiating the Dark Triad lies in administering measures of all three to the same sample and applying multiple regressions to determine their independent contributions. Only then do theoretically predicated differences emerge" (p.203). I pick up on this point and use multiple regressions to determine the associations of personality traits with the measures of financial risk. As I described in the previous section I have two different kinds of dependent variables. I use two different types of regression analyses - logit regressions and tobit regressions - that I describe below.

10.2.1 Binary logistic analysis

The dependent variable 'Stock holding' is a binary variable that takes the value of 1 if an investor is invested in stocks directly, and 0 otherwise. Following Brown and Taylor (2014) and Bucciol and Zarri (2017), I perform a standard maximum-likelihood logistic regression to estimate the likelihood of an investor investing in stocks. The logit can be derived from an underlying latent variable model. Let y_i^* be a latent variable, and suppose that

$$y_i^* = \beta_0 + \beta x_i + \varepsilon_i \text{ , } y = 1[y_i^* > 0]$$

Where the probability of $y = 1$ for investor i is given by y_i^* such that i = 1,....,n. The notation $1[y_i^* > 0]$ is the indicator function that defines the binary outcome and takes the value one if y_i^* is greater than 0 and, and zero otherwise. And x_i is a vector of the independent variables pertaining to investor i, which includes the personality trait

variables. β is the vector of corresponding coefficients, and β_0 is the constant and ε is a logistically distributed error term independent of *x*. In the logit model, *G* is the logistic function:

$$\beta_0 + \beta x_i + \varepsilon_i = \frac{exp\ (\beta_0 + \beta x_i + \varepsilon_i)}{[1 + \ exp\ (\beta_0 + \beta x_i + \varepsilon_i)]}$$

10.2.2 Tobit analysis

The three remaining dependent variables - Stock share, High-risk, and Low-risk - are the aggregate proportions that are invested in different types of asset classes as I described in the measures section above. These dependent variables are all measured as a percentage of the investor's portfolio, and thus cannot be negative or exceed 100. Along the lines of to Brown and Taylor (2014), I perform maximum-likelihood tobit regressions that are left-censored at 0 and right-censored at 100. The functional form for the tobit model is as follows:

$$y_i^* = \beta_0 + \beta x_i + \varepsilon_i$$

where

$$\varepsilon_i \sim N(0, \sigma^2)$$

and

$$y_i = \begin{cases} y_i^* & \text{if } y_0 < y_i^* < y_{100} \\ y_0 & \text{if } y_i^* \leq y_0 \\ y_{100} & \text{if } y_i^* \geq y_{100} \end{cases}$$

Where the proportion of her portfolio that an investor *i* invests in either of the three dependent measures *y* is given by the latent variable y^* that is left censored at 0 and right censored at 100. Further, y^* is linearly dependent on the vector of independent variables x that includes the personality variables. β is the vector of corresponding coefficients, β_0 is the constant and ε is a normally distributed error term with 0 mean and constant variance such that $\varepsilon_i \sim N(0, \sigma^2)$.

11. Results

This section presents the results of the analyses. I first, give an overview of the descriptive statistics for all variables in the model, followed by the descriptive statistics for the risk measures. Thereafter I present the results for each sample in turn. I first present the results for the Big Five sample, followed by the HEXACO, and last I present the results for the Dark Triad sample. For each sample, the presentation of the results is followed by a discussion section where I relate the findings back to the literature.

11.1 Descriptive Statistics

All data was collected between the 17th March and the 2nd June 2015 via the American Association of Individual Investors (AAII).[94] An invitation to participate in the survey was distributed to 116,265 members through the association's mailing list, of whom 5,515 investors started the survey, and 3,046 respondents completed it, yielding a response rate of 2.6%.[95] I excluded all respondents who did not finish the entire survey and checked for double responses by comparing IP addresses. I excluded all responses that came from the same IP address; I only considered the first responses from the same IP address so as to ensure that respondents were not familiar with the measures. This left me with 3055 complete responses. In all sections of the survey, apart from the socio-demographic section, I used the '"forced response" option of the survey provider "Qualtrics", meaning unless respondents answered all questions on each screen they were not able to proceed. I did not use this option for the survey section that collected respondents' socio-demographic characteristics, which is why the number of the socio-demographic variables varies slightly. Table 3 present the descriptive statistics for all personality and control variables.

[94] The AAII is a non-profit association, with a mission to assist "individuals in becoming effective managers of their own assets through programs of education, information and research" (AAII.com, 2016).

[95] The response rate is slightly lower than those obtained in similar studies (Junkus and Berry 2010; Berry and Junkus 2013).

Table 3 Descriptive Statistics - Personality and control variables

Variable type	Variable Name	N	Mean	Std. Dev.	Min	Max
Controls	Risk preference	2010	103.87	48.82	0	200
	Risk literacy	1944	2.58	1.11	1	4
	Total-Portfolio	3055	$ 2.35 mil.	$ 3.17 mil.	$ 1620	$ 21 mil.
	Economics course	1944	0.69	0.46	0	1
	University degree	1941	0.88	0.33	0	1
	Age	1919	55.61	10.74	24	79
	Female	1946	0.06	0.23	0	1
Big Five traits	Openness	569	4.41	0.97	1	6.67
	Conscientiousness	569	4.62	0.90	1.67	6.67
	Extraversion	569	3.76	1.21	1	6.67
	Agreeableness	569	4.58	0.92	1.33	6.67
	Neuroticism	569	3.26	1.14	1	7
HEXACO traits	Honest Humility	156	3.43	0.42	2	4.3
	Emotionality	156	2.89	0.51	1.6	4.4
	Extraversion	156	3.25	0.48	1.3	4.4
	Agreeableness	156	3.16	0.47	2.1	4.2
	Conscientiousness	156	3.61	0.42	2.3	4.6
	Openness	156	3.65	0.54	2.2	4.9
Dark Triad traits	Machiavellianism	520	2.7	0.54	1	4.67
	Psychopathy	520	1.99	0.48	1	3.67
	Narcissism	520	2.69	0.43	1.44	4.11

Note: Table 3 displays the summary statistics for all personality measures and the control variables. The variables "Total-portfolio" and "Age" are winsorised at 1%. Please note the Big Five personality items are scored on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), while both the HEXACO and the Short Dark triad items are scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

The sample is predominantly male (94.2%) with a mean age of 55.6. The respondents are generally very well educated - 87.9% (1,704) have a university degree - and also knowledgeable about economic theory; 68.7 % (1,333) have taken a formal economics course at university-level. Further, the investors are rather wealthy; the mean portfolio value across the sample is $ 2.35 million, corresponding closely to the mean portfolio value of members of the organisation - $ 2.43 million - reported to me by the AAII. The risk preference measure reports the switching point where an investor switches from the lottery to the 'sure' payout, the average investor switches at 103.87 dollars (S.D = 48.82), indicating that the average investor is risk averse (the risk neutral point is 150 Dollar). The risk literacy scores of the sample are very similar to those reported by Cokely et al. (2012) for a sample of students from different German Universities.

The scores of the personality traits are comparable to those obtained in adult samples in previous studies employing the same measures (Lang et al. 2011, for the BFI-S: Ashton and Lee 2009, for the HEXACO-60; and Jones and Paulhus 2014, for the SD3). Table 3 shows the descriptive statistics for the control variables for the whole sample only, for the descriptive statistics for each individual sample, please refer to table B12 in the appendix. Furthermore, tables B13, B14, and B15 in the appendix show the pairwise correlation for all variables for the Big Five, HEXACO, and Empathy sample respectively.

Table 4 provides an overview of the summary statistics for the three different dependent variables. I report the descriptive statistics for the entire sample as well as for each sample pertaining to the three different personality scales.

Table 4 - Descriptive statistics - dependent variables

Sample	Dependent variable	N	Mean	Std. dev.	Min	Max
Entire sample	Stock holding	3055	0.87	0.34	0	1
	Stock share	3039	67.04	23.86	0	100
	High risk	3040	35.42	28.68	0	100
	Low risk	3020	11.83	15.14	0	100
Big Five sample	Stock holding	569	0.88	0.32	0	1
	Stock share	567	67.64	22.92	0	100
	High risk	566	36	28.3	0	100
	Low risk	557	11.99	15.47	0	100
HEXACO sample	Stock holding	156	0.92	0.28	0	1
	Stock share	154	65.19	24.82	0	100
	High risk	154	37.85	28.94	0	100
	Low risk	155	12.03	16.44	0	100
Dark Triad sample	Stock holding	520	0.87	0.34	0	1
	Stock share	517	67.1	23.23	0	100
	High risk	517	34.53	28.51	0	100
	Low risk	515	10.92	13.16	0	100

Across the entire sample 87% of the investors hold some stocks (Stocks > 0) directly, which is similar across all three samples (88% for the Big Five sample: 92% for the HEXACO sample; and 87% for the Dark triad sample). On average investors invest about two thirds (67%) of their portfolio in stocks directly and indirectly through mutual funds. Again, these figures are similar across all three samples (67.6% for the Big Five; 65.19% for the HEXACO: and 67% for the Dark Triad). This number is

slightly lower for the 'High-risk' measure, which comprises the aggregate proportion of investors' portfolios that is invested in stocks, derivatives, and hedge funds. Here investors on average invest about 35% across the sample, again this score is comparable across the three samples (36% for the Big Five: 38% for the HEXACO: and 34% for the Dark triad). As for the 'Low-risk' measure - the aggregate proportion of investors' portfolios that is held in cash and savings accounts - the average is approximately 12% across the entire sample, again this closely corresponds to the scores for each sample (12% for the Big Five; 12% for the HEXACO: and 11% for the Dark Triad).

11.2 The Big Five traits and investment in high risk assets

Table 5 presents the results from the binary logit analysis of the determinants of the probability to hold shares. The dependent variable, 'Stock holding', is a binary variable that is equal to 1 if an investor holds stocks directly, and 0 otherwise. For ease of interpretation, all coefficients reported in table 5 are marginal effects at the mean. I report three specifications in table 5: first, I only include the personality traits, second I include the controls for risk preference and risk literacy, and third, I include all controls.

'Stock holding' is one of the high-risk measures. I hypothesised a positive association of Openness with the high-risk measures, and a negative association of Conscientiousness and Neuroticism. I fail to obtain evidence for the former hypothesis, but I find some evidence in support of the other two hypotheses: both Conscientiousness and Neuroticism are negatively correlated with the likelihood that investors hold stocks in model 1, significant at 10%. However, both associations become insignificant when I include the controls for risk preference and risk literacy, in model 2. In the main specification, which includes all controls, I find that only Conscientiousness is negatively correlated with the propensity to hold stocks. Significant at 10%, this association is robust to relevant controls, such as risk preferences and risk literacy. In model 3, a one-unit increase in Conscientiousness is associated with a decrease in the likelihood of an investor holding stocks of 2.7%.

I note, the diagnostics suggest that only model 1 and model 3 provide a decent fit with the data (Wald Chi-sq. = 10,97 $p < 0.052$ for model 1; Wald Chi-sq. = 10.6, $p < .152$ for model 2; and Wald Chi-sq. = 22.35, $p < 0.0337$ for model 3).

Table 5 - Logistic regressions of Stock holding on the Big Five traits

Model No.	1	2	3
Variables		Stock holding	
Openness	0.0185	0.0058	0.0088
	(0.0163)	(0.0173)	(0.0146)
Conscientiousness	-0.0303*	-0.0268	-0.0270*
	(0.0161)	(0.0167)	(0.0161)
Extraversion	0.0191	0.0164	0.0134
	(0.0120)	(0.0128)	(0.0113)
Agreeableness	-0.0065	-0.0147	-0.0061
	(0.0162)	(0.0168)	(0.0162)
Neuroticism	-0.0193*	-0.0175	-0.0109
	(0.0108)	(0.0113)	(0.0103)
Risk-preference		-0.0005	-0.0004
		(0.0003)	(0.0003)
Risk literacy		0.0017	0.0026
		(0.0131)	(0.0124)
Total-portfolio			0.0000**
			(0.0000)
University degree			-0.0985
			(0.0633)
Economics-course			0.0285
			(0.0280)
Age			0.0008
			(0.0011)
Female			-0.0564
			(0.0390)
Constant	2.8574**	4.2805***	3.9094**
	(1.1748)	(1.2757)	(1.6456)
Observations	569	484	467
Pseudo R-Sq.	0.0268	0.0290	0.0701
Wald. Chi-sq.	10.97	10.60	22.35
Prob > Chi2	0.0519	0.157	0.0337

Note: Table 5 reports results of maximum-likelihood binary logit regressions of Stock holding on the Big Five personality traits. Coefficients are marginal effects at the mean. Stock holding is a binary variable that takes the value 1 if an investor invests in stocks directly and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

Table 6 presents the results for tobit regressions of the determinants of investment in two risky asset measures. Models 4 to 6 are the results for tobit regressions of the dependent variable 'Stock share' on the Big Five traits: 'Stock share' is the aggregate proportion of investors' portfolios that is invested in stocks directly, and indirectly through mutual funds, in percentage terms.

Models 7 to 9 are the results for tobit regressions of the dependent variable 'High-risk' on the Big Five traits: 'High-risk' is the aggregate share of investors' portfolios that is invested in stocks, derivatives, and hedge funds, in percentage terms. For each dependent variable I report three specifications: in the first specification I only include the personality variables, in the second I add the controls for risk preference and risk literacy, the third specification includes all control variables. For all tobit regressions, reported in table 6, the lower limit is set at 0, and the upper limit at 100.

However, the diagnostics of the models suggest that none of the three models provide a good fit for the data (F-Stat. = 1.128, $p < 0.344$ for model 4; F-Stat. = 1.251, $p < 0.273$ for model 5; F-Stat = 0.904, $p < 0.543$ for model 6), for this reason I do not discuss the results as I cannot reject the null hypothesis of the variables having no effect.

Table 6 - Tobit regressions of Stock share and High-risk on the Big Five traits

Model No.	4	5	6	7	8	9
Variables	Stock share			High-risk		
Openness	-0.8989	-0.4683	-0.3796	3.1661**	2.6117	2.8860*
	(1.1208)	(1.2234)	(1.2518)	(1.6017)	(1.7079)	(1.6956)
Conscientiousness	0.6938	1.4849	1.0601	-2.3856	-1.1876	-0.6591
	(1.1545)	(1.2311)	(1.2680)	(1.6735)	(1.7922)	(1.7777)
Extraversion	-1.5512*	-1.4150	-1.3576	1.1409	0.6921	0.5554
	(0.8112)	(0.8755)	(0.8858)	(1.1848)	(1.2885)	(1.2595)
Agreeableness	0.3869	0.1917	-0.0012	0.6381	0.0221	0.2989
	(1.1073)	(1.2001)	(1.2477)	(1.5076)	(1.5905)	(1.5938)
Neuroticism	-0.5829	-0.7793	-0.4695	-2.7301**	-2.3075*	-1.2640
	(0.9259)	(0.9999)	(1.0192)	(1.2073)	(1.2706)	(1.2735)
Risk-preference		0.0396*	0.0293		0.0108	0.0071
		(0.0228)	(0.0230)		(0.0315)	(0.0321)
Risk literacy		0.2583	0.3614		-1.6451	-1.5656
		(1.0066)	(1.0378)		(1.3918)	(1.4160)
Total-portfolio			-0.0000			0.0000
			(0.0000)			(0.0000)
University degree			5.4184			0.8732
			(3.7821)			(4.7841)
Economics-course			0.7548			5.1377
			(2.4574)			(3.1920)
Age			-0.0084			0.3077**
			(0.1125)			(0.1440)
Female			4.1472			-14.2809**
			(4.3608)			(5.6433)
Constant	74.9140***	65.7030***	63.9959***	32.9779***	36.0188***	6.4302
	(9.0405)	(10.3778)	(12.9392)	(11.6225)	(13.6742)	(16.8081)
Observations	567	482	465	566	481	464
Pseudo R-Sq.	0.00101	0.00187	0.00257	0.00256	0.00208	0.00577
F-Stat.	1.128	1.251	0.904	2.152	1.136	2.215
Prob > F	0.344	0.273	0.543	0.0580	0.339	0.0104
N (left-censored)	7	6	5	65	54	50
N (uncensored)	528	449	433	496	422	409
N (right-censored)	32	27	27	5	5	5

Note: Table 6 reports results for tobit regressions. The dependent variable 'Stock share' is the aggregate proportion of investors' portfolios invested in stocks directly and indirectly through mutual funds, in percentage terms. 'High-risk' is the aggregate proportion of investors' portfolios invested in stocks, derivatives, and hedge funds, in percentage terms. The lower limit for all tobit regressions in table 8 is set at 0, and the upper limit at 100. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

I perform two additional analyses for the dependent variable 'Stock share' to ascertain whether the results change when restricting the sample to investors' who invest a certain proportion of their portfolio in stocks directly and indirectly through mutual funds. To restrict the sample I first considered the 25th and the 50th percentile (the score for the percentiles are 50 and 70 respectively) of 'Stock holding' for the Big Five sample as a starting point. I then considered the notion that individual investors often use heuristics to arrive at their portfolio composition: so-called 'mental accounting' (Thaler 1999). Mental accounting posits that investors mainly do not calculate an optimal portfolio composition but rather use certain reference points to decide how many funds to allocate to certain assets (Thaler 1999). I therefore choose to restrict the sample in the additional analysis to only those investors who invest between half of the portfolio and two-thirds, which represent reasonable reference points close to the 25th and 50th percentile. After restricting the sample in this way, I run tobit regressions that including all controls, where the lower limit is set to 0, and the upper limits is set at 100. The results are reported in columns 1 and 2 of table D1 in the appendix. However, the diagnostics suggest that the model does not provide a good fit with the data (F-Stat = 1143, $p < 0.326$), for this reason I do not discuss the results since I cannot reject the null hypothesis.

Models 7 to 9 in table 6 show the results for tobit regressions of the dependent variable 'High-risk' on the Big Five personality traits. 'High-risk' is the aggregate proportion of investors' portfolios that is invested in stocks, derivatives, and hedge funds in percentage terms. I find evidence supporting the hypothesis of a positive association of Openness with financial risk taking. Although, the association is not significant in model 8, Openness is significantly correlated with the dependent variable in model 7 and in model 9. It thus appears that the association is robust to possibly relevant controls such as level of education attained and wealth of the investor ('Total-portfolio'). In model 9 a one-unit increase in Openness is associated with an increase in the aggregate proportion of investors' portfolios invested in stocks, derivatives, and hedge funds of approximately 2.8%. Furthermore, I find some evidence supporting the hypothesis that Neuroticism is associated with financial risk taking. Neuroticism is negatively correlated with the dependent variable in models 7 and 8, however it is not significantly correlated with the dependent variable in the model 9, which includes all control variables. The association thus appears not to be

robust to possibly relevant controls. Moreover, I do not find evidence supporting the hypothesis of a negative association of Conscientiousness with financial risk taking. Generally the diagnostics suggest that only model 7 and 9 provide a good fit for the data (F-Stat. = 2.152, $p < 0.058$ for model 7; F-Stat. = 1.136, $p < 0.339$ for model 8; F-Stat = 2.215, $p < 0.010$ for model 9).

I perform two additional analyses for the dependent variable 'High risk' in a similar manner as I have done for the previous analysis of 'Stock share'. To restrict the sample I first considered the 50th and the 75th percentile of 'High risk' for the Big Five sample as a starting point. The scores for the 50th and 75th percentile are 30 and 60 respectively. As I did before, considering mental accounting of investors, I choose reasonable reference points - 30 and 50 - that closely resemble the 50th and 75th percentiles. After restricting the sample in this way, I run tobit two regressions for the full specification of the model, where the lower limit is set to 30, and 50 respectively. The results are reported in columns 3 and 4 of table D1 in the appendix. In the tobit regression where the sample is restricted to investors who invest at least half of their portfolio in 'High-risk' (column 4 in table D1). However, the diagnostics suggest that the model does not provide a good fit for the data (F-Stat. = 0.857, $p < 0.592$) meaning I cannot reject the null hypothesis of the independent variables having no effect on the dependent variable.

11.3 The Big Five traits and investment in low risk assets

Table 7 presents results from the tobit regression analysis of determinants of the aggregate share of the portfolio that investors hold in 'Low-risk' assets, namely cash and in savings accounts. Three specifications are reported in table 7: in the first, I only include the Big Five trait variables, in the second I include the controls for risk preference and risk literacy, and in the third I include all controls. For all three regressions the lower limit is set at 0 and the upper limit at 100.

Table 7 - Tobit regressions of Low-risk on the Big Five traits

Model No.	10	11	12
Variables		Low-risk	
Openness	-0.9571	-1.1938	-1.1557
	(0.8992)	(0.9806)	(0.9640)
Conscientiousness	-0.2294	-0.7711	-0.5859
	(0.8484)	(0.9086)	(0.8895)
Extraversion	0.2317	-0.0106	-0.0778
	(0.5542)	(0.6122)	(0.6017)
Agreeableness	-0.5849	-0.8832	-0.8945
	(0.8027)	(0.8753)	(0.9009)
Neuroticism	1.3785**	1.4485**	1.2363*
	(0.6740)	(0.7284)	(0.7311)
Risk-preference		0.0059	0.0078
		(0.0161)	(0.0153)
Risk literacy		-0.2184	-0.6522
		(0.7391)	(0.7464)
Total-portfolio			-0.0000
			(0.0000)
University degree			-2.1677
			(2.5435)
Economics-course			-0.6587
			(1.8153)
Age			-0.0973
			(0.0802)
Female			-3.4821
			(2.1649)
Constant	13.0738**	18.6408**	27.5522***
	(6.5810)	(7.5160)	(9.9189)
Observations	557	475	458
Pseudo R2	0.00176	0.00293	0.00386
F-Statistic	1.360	1.231	1.110
Prob > F	0.238	0.284	0.350
N (left-censored)	79	66	65
N (uncensored)	475	406	391
N (right-censored)	3	3	2

Note: Table 7 reports results for maximum-likelihood tobit regressions. The dependent variable 'Low-risk' is the aggregate proportion of the investor's portfolio held in cash and savings accounts. The lower limit is set at 0, and the upper limit at 100. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

However, the diagnostics of the models suggest that none of the models provide a sufficient fit for the data (F-Stat. = 1.36, $p < 0.238$ for model 10; F-Stat. = 1.231, $p < 0.284$ for model 11; F-Stat = 1.110, $p < 0.350$ for model 12), meaning I cannot reject the null hypothesis of the independent variables having no effect on the dependent variable.

In an additional analysis reported in the appendix I restrict the sample to only those investors who invest at least 10% of their portfolio in savings accounts and cash. I chose a cut-off of 10% as it is close to the mean value of the proportion of Low-risk assets held by investors across the samples (M = 12%), and represents a reasonable reference point for mental accounting of investors. The aim of this analysis (reported in column 5 of table D1) is to check if the results obtained change if I consider only those investors that hold a larger proportion in savings accounts and cash. In the additional analysis, I do not find any evidence of any of the Big Five traits being associated with the proportion of the portfolio that investors hold in cash and savings accounts.

11.4 Big Five traits results discussion

Overall the results of the analysis of the association of Big Five personality traits with financial risk taking do not present a very clear picture: none of the Big Five traits is *consistently* associated with financial risk taking. I find some evidence in support of the hypothesis of Openness being positively related to risk taking. Openness is positively correlated with the 'High-risk' variable. An one unit increase in Openness is associated with an increase in the aggregate proportion of investors' portfolios invested in stocks, derivatives, and hedge funds of approximately 2.8%. This result is in line with findings of Lauriola and Levin (2001) who find such an association, and the results reported by Brown and Taylor (2014) who find such an association in the couples sample. However, it differs from the findings reported by Bucciol and Zarri (2017), who find no such association for either of the two measures of financial risk taking. The findings, taken together with previous findings, suggest that Openness is not a personality trait that is uniformly associated with financial risk taking. In other words, Openness appears not be very relevant for financial risk taking.

I do find some weak evidence of Conscientiousness being associated with financial risk taking. Conscientiousness is negatively correlated with the likelihood that investors invest in stocks This association is significant (at 10%) in the model that includes all controls (model 3 reported in table 5) and thus seems robust to relevant controls. An one-unit increase in Conscientiousness is associated with a decrease in the likelihood of an investor holding stocks of 2.7%.

This finding is in line with findings reported by and Nicholson et al. (2005) and Soane and Chmiel (2005), both studies find Conscientiousness to be negatively associated with financial risk taking, measured with self-report survey measures. My finding, however, differs from those reported in the closely related studies of Brown and Taylor (2014) and Bucciol and Zarri (2017), who find no association of Conscientiousness with the likelihood that investors invest in stocks directly. Furthermore, I find no significant association of Conscientiousness with any of the three other measures for financial risk taking. This is in line with the findings reported by Brown and Taylor (2014), who find no such association, but differs from the weak evidence (i.e. significant at 10%) reported by Bucciol and Zarri (2017) of a negative association of Conscientiousness with the proportion of investors' portfolios invested in stocks directly and indirectly through mutual funds. The results, taken together with previous findings, suggest that Conscientiousness may not be an important investor characteristic when it comes to investors' decisions to invest in risky assets.

Furthermore, Neuroticism is negatively related to the *likelihood* that investors hold stocks (labeled 'Stock holding'), but only in the base model (model 1 reported in table 5), which does not include any control variables. This association thus appears not to be robust to possibly relevant controls. Furthermore, I note that neither risk preference nor risk literacy improve the model fit for any of the models significantly. Overall, the results suggest that the Big Five personality traits appear not to be important determinants of investor decisions to invest in risky assets.

11.5 The HEXACO traits and investment in high risk assets

Table 8 presents the results from the logistic regression analysis of the determinants of the probability to hold shares. The dependent variable 'Stock holding' is a binary variable that is equal to 1 if an investor holds stocks directly, and 0 otherwise. All coefficients reported in table 10 are marginal effects at the mean. I report three models in table 10: in the first, I only include the HEXACO traits, in the second I include the controls for risk preference and risk literacy, and in the third I include all controls. 'Stock holding' is one of the high-risk measures; I hypothesised a positive association of Openness, and a negative association of Conscientiousness and Emotionality with the high-risk measures.

I do not obtain any evidence supporting the hypothesis of a positive association of Openness with 'Stock holding'. Also, I do not find support for the hypothesised negative association of Emotionality with the dependent variable: neither personality trait is significantly correlated with the dependent variable. I do find supporting evidence for the hypothesis of a negative association of Conscientiousness with 'Stock holding'. However, the association is only significant in models 13 and 14 and not in model 15, which includes all controls. It thus appears the association is not robust. I also find some evidence of Honest-Humility being positively associated with the dependent variable in model 13; this is an association that I did not expect. The association becomes non-significant, however, in the full specification - model 14 - and thus appears not to be robust to relevant controls, such as wealth and education attained.

Furthermore, I note that risk preference is negatively associated with the propensity of investors holding stocks, which is not the direction that would be expected, given that higher scores on risk preference indicated more willingness to take risk. This association is only significant in model 14, however, and thus appears not to be robust to possibly relevant controls such as educational level attained and investors' wealth.

Overall, the diagnostics suggest that the models provide a decent fit with the data (Wald Chi-sq. = 17.97 $p < 0.006$ for model 13; Wald Chi-sq. = 16.87, $p < 0.032$ for model 14; and Wald Chi-sq. = 30.72, $p < 0.004$ for model 15).

Table 8 - Logistic regressions of Stock holding on the HEXACO traits

Model No.	13	14	15
Variables	Stock holding		
Honest-Humility	0.0843**	0.0249	0.0082
	(0.0337)	(0.0242)	(0.0129)
Emotionality	-0.0305	-0.0151	-0.0148
	(0.0234)	(0.0241)	(0.0139)
Extraversion	-0.0622	-0.0255	-0.0159
	(0.0381)	(0.0314)	(0.0148)
Agreeableness	0.0184	0.0276	0.0115
	(0.0360)	(0.0341)	(0.0181)
Conscientiousness	-0.1062***	-0.0644*	-0.0364
	(0.0396)	(0.0355)	(0.0277)
Openness	0.0420	-0.0141	-0.0027
	(0.0358)	(0.0287)	(0.0107)
Risk-preference		-0.0004*	-0.0002
		(0.0002)	(0.0002)
Risk literacy		0.0089	0.0048
		(0.0137)	(0.0078)
Total-portfolio			0.0000
			(0.0000)
University degree			0.0164
			(0.0163)
Economics-course			-0.0030
			(0.0143)
Age			0.0013
			(0.0010)
Female			-0.0131
			(0.0206)
Constant	6.5275*	11.0128*	13.1341*
	(3.8524)	(5.9614)	(7.5685)
Observations	156	135	130
Pseudo R-Sq.	0.154	0.158	0.315
Wald. Chi-sq.	17.97	16.87	30.72
Prob > Chi2	0.00630	0.0315	0.00371

Note: Table 8 reports results of binary logit regressions of Stock holding on the HEXACO personality traits. Coefficients are marginal effects at the mean. Stock holding is a binary variable that takes the value 1 if an investor invests in stocks directly and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

Table 9, below, presents the results from the tobit regression analysis of the determinants of investment in two high-risk asset measures. Models 16 to 18 are the

results for tobit regressions of the dependent variable 'Stock share' on the HEXACO traits: 'Stock share' is the aggregate proportion of investors' portfolios that is invested in stocks directly, and indirectly through mutual funds, in percentage terms. Models 19 to 21 are the results for tobit regressions of the dependent variable 'High-risk' on the HEXACO traits: 'High-risk' is the aggregate share of investors' portfolios that is invested in stocks, derivatives, and hedge funds, in percentage terms. For each dependent variable I report three specifications: in the first specification I only include the personality variables, in the second I add the controls for risk preference and risk literacy, the third specification includes all control variables. For all regressions, reported in table 11, the lower limit is set at 0, and the upper limit at 100.

However, the diagnostics suggest none of the models reported in table 11 provide a good fit with the data (F-Stat. = 1.277, $p < 0.271$ for model 16; F-Stat. = 1.134, $p < 0.345$ for model 17; F-Stat = 0.678, $p < 0.781$ for model 18; F-Stat. = 0.585, $p < 0.742$ for model 19; F-Stat. = 1.344, $p < 0.228$ for model 20; F-Stat = 1.290, $p < 0.229$ for model 21) meaning I cannot reject the null hypothesis of the independent variables having no effect on the dependent variable.

I perform additional analyses analogous to those performed for the Big Five analysis. For 'Stock share', I again restrict the sample to only those investors who invest at least half, and at least two-thirds of their portfolio in stocks directly and indirectly through mutual funds[96]. I run two tobit regressions where the lower limits are set at 0, and the upper limits at 100. The results for these regressions are reported in columns 1 and 2 of table D2 in the appendix. I find in the sample of investors who invest at least two-thirds of their portfolio in 'Stock share' a negative association of Extraversion with the proportion of investors' portfolios invested in stocks. This association appears to be robust to possibly relevant controls (column 2 of table D2). A one-unit increase of Extraversion is associated with a decrease of the proportion that investors invest in stocks of around 5.3%. The diagnostics suggest the model provides an adequate fit for the data (F-Stat. = 2.173, $p < 0.0234$).

[96]The 25th and the 50th percentile of 'Stock share' for the HEXACO sample are 50 and 70 respectively.

Table 9 - Tobit regressions of Stock share and High-risk on the HEXACO traits

Model No.	16	17	18	19	20	21
Variables	Stock share			High-risk		
Honest-Humility	5.6598	4.6855	3.6164	3.8219	-1.1528	-1.6052
	(5.1088)	(5.5951)	(5.4989)	(6.1279)	(6.2070)	(6.7300)
Emotionality	-1.8282	-0.8410	-2.2390	-5.7444	-4.5841	-4.5014
	(3.9779)	(4.3954)	(4.6784)	(5.2185)	(5.6131)	(6.1362)
Extraversion	-10.0395**	-9.6849*	-6.4018	-3.7061	-1.2194	0.9410
	(4.5827)	(5.0935)	(5.4498)	(5.5268)	(5.8734)	(6.8423)
Agreeableness	-0.6315	3.7313	1.6636	0.8017	1.7857	3.9959
	(4.3760)	(4.6877)	(4.8565)	(5.1453)	(5.3371)	(6.1284)
Conscientiousness	-6.5240	-7.7267	-7.5782	-7.1775	-4.3552	-3.6839
	(5.0208)	(5.2739)	(5.4789)	(6.6271)	(6.6712)	(6.7811)
Openness	-1.5774	-3.0101	-3.6080	5.7467	4.4107	2.3391
	(5.0170)	(5.1449)	(5.6707)	(5.1540)	(5.3353)	(6.2197)
Risk-preference		-0.0263	-0.0497		-0.1500***	-0.1773***
		(0.0400)	(0.0440)		(0.0527)	(0.0572)
Risk literacy		-2.0794	-1.1073		-2.7097	-3.0586
		(2.1666)	(2.2955)		(2.3962)	(2.5198)
Total-portfolio			0.0000			0.0000
			(0.0000)			(0.0000)
University degree			4.8041			2.7664
			(6.8199)			(9.7999)
Economics-course			-6.7771			-5.7065
			(5.3025)			(6.7823)
Age			0.0971			-0.1443
			(0.2419)			(0.2832)
Female			2.2273			-20.2733**
			(8.1549)			(8.9556)
Constant	115.1628***	118.7054***	115.8598***	55.0587	76.1584**	82.2847*
	(32.5958)	(35.9527)	(38.3718)	(38.9733)	(37.5613)	(41.7787)
Observations	154	133	128	154	133	128
Pseudo R-Sq.	0.00616	0.00901	0.0103	0.00265	0.00996	0.0148
F-Stat.	1.277	1.134	0.678	0.585	1.344	1.290
Prob > F-Stat	0.271	0.345	0.781	0.742	0.228	0.229
N (left-censored)	3	2	2	9	6	5
N (uncensored)	146	128	123	142	124	120
N (right-censored)	5	3	3	3	3	3

Note: Table 9 reports results for maximum-likelihood tobit regressions. The dependent variable 'Stock share' is the aggregate proportion of investors' portfolios invested in stocks directly and indirectly through mutual funds, in percentage terms. 'High-risk' is the aggregate proportion of investors' portfolios invested in stocks, derivatives, and hedge funds, in percentage terms. The lower limit for all tobit regressions in table 11 is set at 0, and the upper limit at 100. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

Furthermore, I also perform an additional analysis for the dependent variable 'High-risk'. I restrict the sample to only those investors who invest at least 30%, and 50% in 'High-risk' assets, which closely corresponds to the 50th and 75th percentile of the dependent variable for the HEXACO sample[97]. I run two tobit regressions where the lower limits are set at 0, and the upper limits at 100. The results for these regressions are shown in columns 3 and 4 of table D2 in the appendix. I find a significant positive association of Openness when the sample is restricted to only those investors who invest at least thirty percent of their portfolio in 'High-risk' assets. A one-unit increase in Openness is associated with an increase of the share of investors' portfolios invested in 'High-risk' assets of 11.9%.

I also find evidence for a positive association of Conscientiousness with 'High-risk' when the sample is restricted to only those investors who invest at least thirty percent of their portfolio in 'High-Risk'; this association is significant at 10%. A one-unit increase in Conscientiousness is associated with an increase in the proportion of a investors' portfolios invested in 'High-risk' assets of around 10.8%.

Furthermore, I find that Extraversion is negatively associated with the aggregate proportion of investors' portfolios invested in the 'High-risk' assets. In the sample that is restricted to only those investors who invest at least 30% of their portfolio in 'High-risk', a one-unit increase in Extraversion is associated with a decrease of the share of investors' portfolio invested in shares, derivatives, and hedge funds of 14.4% (column 3 of table D2 in the appendix). What is more, when I restrict the sample to only those investors who invest at least fifty percent of the portfolio in 'High-risk', a one-unit increase in Extraversion is associated with a decrease of 18% (column 4 of table D2 in the appendix). All models of the tobit regressions reported in table D2 include all control variables. The associations thus appear to be robust to possibly relevant controls. Furthermore, the diagnostics suggest that the models provide a decent fit for the data (F-Stat. = 2.051, $p < 0.032$ for the model reported in column 3; F-Stat. = 3.648, $p < 0.002$ for the model in column 4).

[97] The 50th and 75th percentiles for 'High-risk' for the HEXACO sample are 32.5 and 60 respectively.

11.6 The HEXACO traits and investment in low risk assets

Table 10 presents results from the tobit regression analysis of determinants of the aggregate share of the portfolio that investors hold in 'Low-risk', namely in cash and in savings accounts. Three specifications are reported in table 10: in the first, I only include the HEXACO trait variables, in the second I include the controls for risk preference and risk literacy, and in the third I include all controls. For all three specifications the lower limit is set at 0 and the upper limit at 100.

Table 10 - Tobit regressions of Low-risk on the HEXACO traits

Model No.	22	23	24
Variables		Low-risk	
Honest-Humility	0.3074	0.2049	1.0665
	(3.0927)	(3.7168)	(3.8892)
Emotionality	1.9321	1.2271	0.7493
	(2.5024)	(2.7141)	(2.8126)
Extraversion	3.0256	3.2327	0.6087
	(3.4069)	(4.0082)	(4.3926)
Agreeableness	4.8471	2.8066	1.3314
	(3.0087)	(3.1162)	(3.0704)
Conscientiousness	2.5480	2.3112	2.3365
	(3.6297)	(3.9286)	(4.1119)
Openness	1.4999	3.4304	5.4530
	(3.7226)	(3.1213)	(3.6206)
Risk-preference		0.0122	0.0274
		(0.0254)	(0.0278)
Risk literacy		1.3221	1.2375
		(1.6611)	(1.6670)
Total-portfolio			-0.0000***
			(0.0000)
University degree			4.0176
			(3.2464)
Economics-course			4.8183
			(3.6176)
Age			0.0187
			(0.1291)
Female			9.8727
			(7.0289)
Constant	-35.7342	-38.2981	-41.5254
	(24.9683)	(27.2549)	(29.1121)
Observations	155	134	129
Pseudo R2	0.00431	0.00616	0.0162
F-Statistic	1.052	0.748	1.915
Prob > F	0.394	0.649	0.0351
N (left-censored)	18	14	14
N (uncensored)	136	119	114
N (right-censored)	1	1	1

Note: Table 10 reports results for maximum-likelihood tobit regressions. The dependent variable 'Low-risk' is the aggregate proportion of the investor's portfolio held in cash and savings accounts. The lower limit is set at 0, and the upper limit at 100. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

I do not find any evidence supporting the hypotheses; neither Openness, nor Conscientiousness, nor Emotionality is significantly correlated with the 'Low-risk' measure. Furthermore only model 24 seems to provide a good fit for the data (F-Stat. = 1.052, $p < 0.394$ for model 22; F-Stat. = 0. 748, $p < 0.649$ for model 23; F-Stat = 1.915, $p < 0.035$ for model 24).

In an additional analysis reported in the appendix I restrict the sample to only those investors who invest at least 10% of their portfolio in savings accounts and cash. I chose a cut-off of 10% as it is close to the mean value of the proportion of 'Low-risk' assets held by investors across the samples (12%), and represents a reasonable reference point for mental accounting of investors. The aim of this analysis (reported in column 5 of table D2) is to check if the results obtained change if I consider only those investors that hold a larger proportion in savings accounts and cash. In the additional analysis, I do not find any evidence of any of the HEXACO traits being associated with the proportion of the portfolio that investors hold in cash and savings accounts.

11.7 HEXACO discussion of the results

In the analysis of the HEXACO traits with the financial risk taking measures, I do not find strong evidence supporting any of the hypotheses. I do find some evidence of Conscientiousness being negatively related to the likelihood that investors invest stocks directly. However, this association is not significant in the main specification, which includes all relevant controls (model 15 reported in table 10), suggesting that this association is not robust to possibly relevant controls.

Furthermore, Conscientiousness is not associated with any of the other four risk taking measures that I investigate. In fact, in the additional analysis where I analyse the association of the HEXACO traits with the 'High risk' measure (reported in table D2 in the appendix), Conscientiousness is *positively* correlated with risk taking (significant at 10%). In this analysis, I restricted the sample to only those investors who invest at least fifty percent of their portfolio in stocks, derivatives, and hedge funds. This result is somewhat counterintuitive, given the conceptual association of

Conscientiousness with self-control (Ashton and Lee 2001), which has previously also been related to more financial self-control, specifically (Webley and Nyhus 2001). Moreover, Conscientiousness has been linked to people engaging in more discretionary saving (Wärneryd 1996; Brandstätter and Königstein 2001)[98].
Furthermore, this finding contrasts with those reported by Weller and Tikir (2011), who find a significant negative association of Conscientiousness with risk taking in four different domains, measured with a self-report measure. It also contrasts with those reported by Weller and Thulin (2012), who report a significant negative correlation of HEXACO Conscientiousness with risk taking to avoid a loss in a lottery-type experiment, when the decision is framed as avoiding a loss.

Furthermore, I find some evidence supporting the hypotheses of a positive association of Openness with risk taking. I find a significant positive association of Openness with 'High-risk' when the sample is restricted to only those investors who invest at least thirty percent of their portfolio in 'High-risk' assets (column 3 of table D1 in the appendix). This association is significant at 5%, and a one-unit increase in Openness is associated with an increase of the aggregate share of investors' portfolios invested in stocks, derivatives, and hedge funds of 11.9%. This result, therefore, aligns with those reported by previous studies such as Weller and Thulin (2012), who report no association of Openness with risk taking when measured with a lottery-type experiment. However, the null results I report do not align with previous findings by Lee et al. (2005) who investigate the association of HEXACO traits with risk taking, measured with a self-report measure of general disposition to take risks[99], and find a positive association of HEXACO Openness with risk taking.

Furthermore, I cannot confirm the hypothesis of a positive association of Emotionality with risk taking. Emotionality is not significantly associated with any of the risk measures that I employ. This result differs from previous findings by Weller and Tikir (2010), who find Emotionality to be the only HEXACO trait that is significantly negatively correlated with risk taking in all four domains they measure. The results also differ from findings reported by Weller and Thulin (2012), who find

[98] The findings by (Webley and Nyhus 2001) (Wärneryd 1996; Brandstätter and Königstein 2001) all relate to the closely related Big Five trait Conscientiousness.
[99] The risk measure used by Lee et al. (2005) is part of the part of the Supernumerary Personality Inventory (Paunonen 2002).

Emotionality to be negatively related to risk taking in a lottery-type measure, both for risk taking to achieve a gain and to avoid a loss.

I find a negative association of Extraversion with the proportion of investors' portfolios invested in stocks in the sample of investors who invest at least two-thirds of their portfolio in 'Stock share'. This association appears to be robust to relevant controls (column 2 of table D2 in the appendix). A one-unit increase in Extraversion is associated with a decrease of the aggregate proportion of their portfolio that investors invest in stocks of around 5.3%. Furthermore, I also find a significant negative correlation of Extraversion with 'High-risk' in two regressions where I restrict the sample to only those investors who invest at least thirty, and at least fifty percent of their portfolio in 'High-risk' assets (columns 3 and 4 of table D2 in the appendix). In those samples a one-unit increase in Extraversion is associated with a decrease in the aggregate share of the portfolio invested in stocks, derivatives, and mutual funds of 14.41% and 18.07% respectively. This finding echoes that reported by Brown and Taylor (2014), who find a negative association of Big Five Extraversion and the propensity to hold stocks. However, just like Brown and Taylor (2014), I also measured the likelihood that investors invest in stocks and found no association with Extraversion in that analysis. What is more, prior investigations of HEXACO traits with risk taking do not find any association of Extraversion with risk taking (Lee et al. 2005; Weller and Tikir 2011; Weller and Thulin 2012). Taken together it seems that Extraversion may not be a relevant trait when it comes to financial risk taking.

11.8 The Dark Triad traits and investment in high risk assets

Table 11 presents the results from the logistic analysis of the determinants of the probability to hold shares. The dependent variable Stock holding is a binary that is equal to 1 if an investor holds stocks directly, and 0 otherwise. All coefficients reported in table 13 are marginal effects at the mean. I report three specifications in table 11: in the first, I only include the Dark Triad variables, in the second I include the controls for risk preference and risk literacy, and in the third I include all controls.

Table 11 - Logit regressions of Stock holding on the HEXACO traits

Model No.	25	26	27
Variables		Stock holding	
Machiavellianism	-0.0576*	-0.0641*	-0.0673**
	(0.0333)	(0.0331)	(0.0335)
Psychopathy	0.0011	-0.0220	-0.0200
	(0.0325)	(0.0335)	(0.0341)
Narcissism	-0.0331	-0.0395	-0.0332
	(0.0352)	(0.0375)	(0.0375)
Risk-preference		0.0000	-0.0001
		(0.0003)	(0.0003)
Risk literacy		-0.0118	-0.0050
		(0.0134)	(0.0131)
Total-portfolio			0.0000
			(0.0000)
University degree			-0.0435
			(0.0458)
Economics-course			0.0950***
			(0.0312)
Age			-0.0002
			(0.0014)
Female			0.1017
			(0.1034)
Constant	4.1327***	5.2796***	5.1304***
	(0.9871)	(1.1530)	(1.4991)
Observations	520	435	420
Pseudo R-Sq.	0.0162	0.0295	0.0601
Wald. Chi-sq.	6.304	11.50	19.01
Prob > Chi2	0.0977	0.0423	0.0401

Note: Table 11 reports results of maximum-likelihood binary logit regressions of Stock holding on the Dark Triad personality traits. Coefficients are marginal effects at the mean. Stock holding is a binary variable that takes the value 1 if an investor invests in stocks directly and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

I treated the association of the Dark Triad traits with investment in risky assets as an open question. I find that Machiavellianism is negatively associated with the likelihood that investors invest in stocks. The association is significant across all three models estimated and thus appears to be robust to relevant controls, such as the risk preference and risk literacy. In model 27, which includes all controls, a one-unit increase in Machiavellianism is associated with a decrease in the likelihood that an investor invests in stocks of 6.7%. Neither risk preference, nor risk literacy are significantly associated with the likelihood that investors invest in stocks. The diagnostics of the models suggest that they provide a good fit for the data (Wald Chi-sq. = 6.304 $p < 0.0977$ for model 25; Wald Chi-sq. = 11.5, $p < 0.0423$ for model 26; and Wald Chi-sq. = 19.01, $p < 0.040$ for model 27).

Table 12 presents the results from the tobit regression analysis of the determinants of investment in two risky asset measures. Models 28 to 30 are the results for tobit regressions of the dependent variable 'Stock share' on the Dark Triad variables: 'Stock share' is the aggregate proportion of investors' portfolios that is invested in stocks directly, and indirectly through mutual funds, in percentage terms. Models 31 to 33 are tobit regressions of the dependent variable 'High-risk' on the Dark Triad variables: 'High-risk' is the aggregate share of investors' portfolios that is invested in stocks, derivatives, and hedge funds, in percentage terms. For each dependent variable I report three specifications: in the first specification I only include the personality variables, in the second I add the controls for risk preference and risk literacy, the third specification includes all control variables. For all tobit regressions, reported in table 14, the lower limit is set at 0, and the upper limit at 100.

Table 12 - Tobit regressions of Stock share and High-risk on the Dark Triad traits

Model No.	28	29	30	31	32	33
Variables		Stock share			High-risk	
Machiavellianism	-0.9658	0.3637	0.5830	-4.9954	-5.0807	-4.9915
	(2.4334)	(2.5492)	(2.6287)	(3.2749)	(3.5073)	(3.6445)
Psychopathy	-0.5953	-0.6946	-1.8911	5.1459	2.1436	2.8442
	(2.6882)	(2.9902)	(2.9746)	(3.5395)	(4.0148)	(4.0379)
Narcissism	-2.0464	-3.3993	-2.9152	-4.7243	-6.3699	-5.6447
	(2.5364)	(2.7584)	(2.8113)	(3.7485)	(4.1366)	(4.2789)
Risk-preference		0.0360	0.0420		0.0282	0.0261
		(0.0266)	(0.0281)		(0.0352)	(0.0357)
Risk literacy		0.2341	0.4113		-3.2068**	-2.3323
		(1.0672)	(1.1412)		(1.4623)	(1.5437)
Total-portfolio			-0.0000*			0.0000
			(0.0000)			(0.0000)
University degree			-1.5100			-7.0928
			(3.8773)			(5.5498)
Economics-course			-0.7347			6.2026
			(2.6876)			(3.9095)
Age			0.0966			0.2691
			(0.1291)			(0.1712)
Female			-2.3600			12.2540*
			(4.5248)			(6.4386)
Constant	76.8188***	73.8509***	71.5095***	48.5905***	64.4453***	43.6557**
	(8.1421)	(9.2063)	(12.9889)	(11.1195)	(13.8640)	(18.0060)
Observations	517	433	418	517	433	419
Pseudo R-Sq.	0.000310	0.00108	0.00214	0.00117	0.00291	0.00518
F-Stat.	0.435	0.758	0.750	1.743	2.178	1.970
Prob > F	0.728	0.580	0.677	0.157	0.0557	0.0352
N (left-censored)	4	2	2	65	54	52
N (uncensored)	491	414	400	442	371	359
N (right-censored)	22	17	16	10	8	8

Note: Table 12 reports results for tobit regressions. The dependent variable 'Stock share' is the aggregate proportion of investors' portfolios invested in stocks directly and indirectly through mutual funds, in percentage terms. 'High-risk' is the aggregate proportion of investors' portfolios invested in stocks, derivatives, and hedge funds, in percentage terms. The lower limit for all tobit regressions in table 14 is set at 0, and the upper limit at 100. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

I do not find evidence of any of the Dark Triad traits being associated with 'Stock share' or 'High-risk'. I note, that risk literacy is negatively associated with the aggregate share of the portfolio that investors invest in 'High-risk' assets, but only in model 32 and not in the includes all controls - model 33. The diagnostics suggest that only model 32 and model 33 provide a good fit for the data (F-Stat. = 0.435, $p < 0.728$ for model 28; F-Stat. = 0.758, $p < 0.580$ for model 29; F-Stat = 0.750, $p < 0.677$ for

model 30; F-Stat. = 1.743, p < 0.157 for model 31; F-Stat. = 2.178, p < 0.056 for model 32; F-Stat = 1.970, p < 0.035 for model 33).

To check whether the Dark Triad traits may be associated with the dependent variables if I restrict the sample to only those investors who invest a certain proportion of their portfolio in the assets pertaining to the two dependent variables, I perform additional analyses, as I have done for the other personality samples (Big Five and HEXACO sample). For 'Stock share' I, again, restrict the sample to only those investors who invest at least half, and at least two-thirds of their portfolio in stocks directly and indirectly through mutual funds[100]. I run two tobit regressions where the lower limits are set at 0, and the upper limit at 100. The results for these regressions are reported in columns 1 and 2 of table D3 in the appendix. I find that Narcissism is negatively associated with the dependent variable 'Stock share' in the sample that is restricted to only those investors who invest at least two-thirds of their portfolio in stocks directly, and indirectly through mutual funds (column 2 of table D3). This association is significant at 1% in a model that includes an array of possibly relevant controls. A one-unit increase in Narcississm is associated with a decrease in the share of the portfolio that is invested in stocks of around 4.6%. The diagnostics of the model (column 2 in table D3) suggest that the model provides a adequate fit for the data (F-Stat. = 1.649, p < 0.0937).

Furthermore, I also perform an additional analysis for the dependent variable 'High-risk'. I restrict the sample to only those investors who invest at least 30%, and 50% in 'High-risk' assets, which closely corresponds to the 50th and 75th percentiles of the dependent variable for the Dark Triad sample[101]. I then run two tobit regressions where the lower limits are set at 0, and the upper limit at 100. I find that Psychopathy is positively related to the aggregate share of the portfolio that investors invest in three 'High-risk' asset classes: stocks, derivatives, and hedge funds. This is true for those investors who invest at least half of their portfolio in these three asset classes together (column 4 in table D3). This association is significant at 1% and robust to an array of relevant controls including risk preference and risk literacy. A one-unit increase in Psychopathy is associated with an increase of the share of investors' portfolios invested in stocks, derivatives, and hedge funds of around 9.78%. The

[100] The 25th and 50th percentiles for 'Stock share' in the Dark Triad sample are 51 and 70, respectively.
[101] The 50th and 75th percentiles for 'High-risk' in the Dark Triad sample are 29 and 56 respectively.

diagnostics of the model (column 4 in table D3) suggest that the model provides a decent fit for the data (F-Stat. = 1.8545, $p < 0.0594$).

11.9 The Dark Triad traits and investment in low risk assets

Table 13 presents results from the tobit regression analysis of determinants of the aggregate share of the portfolio that investors hold in 'Low-risk', namely in cash and in savings accounts. Three specifications are reported in table 13: in the first, I only include the Dark Triad trait variables, in the second I include the controls for risk preference and risk literacy, and in the third I include all controls. For all three specifications the lower limit is set at 0 and the upper limit at 100.

Table 13 - Tobit regressions of Low-risk on the Dark Triad traits

Model No.	34	35	36
Variables		Low-risk	
Machiavellianism	0.4618	-0.1632	-0.4099
	(1.4423)	(1.4813)	(1.5316)
Psychopathy	-0.0397	1.1287	1.2540
	(1.8477)	(2.0854)	(1.9635)
Narcissism	1.3899	0.2687	0.0589
	(1.4872)	(1.5634)	(1.5812)
Risk-preference		-0.0102	-0.0061
		(0.0181)	(0.0193)
Risk literacy		-0.3608	-0.3219
		(0.6435)	(0.6999)
Total-portfolio			-0.0000
			(0.0000)
University degree			-0.6696
			(2.7979)
Economics-course			1.0017
			(1.6325)
Age			-0.0477
			(0.0857)
Female			-0.2947
			(2.5545)
Constant	4.6169	8.8487	12.6308*
	(5.0138)	(5.8495)	(7.6527)
Observations	515	430	415
Pseudo R-Sq.	0.000287	0.000524	0.00164
F-Stat	0.382	0.200	0.482
Prob > F	0.766	0.962	0.902
N (left-censored)	79	59	57
N (uncensored)	435	370	357
N (right-censored)	1	1	1

Note: Table 13 reports results for maximum-likelihood tobit regressions. The dependent variable 'Low-risk' is the aggregate proportion of the investor's portfolio held in cash and savings accounts. The lower limit is set at 0, and the upper limit at 100. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

The results in table 13 suggest that none of the Dark Triad traits is associated with the aggregate share of the portfolio that investors hold in 'Low-risk' assets, namely cash and savings accounts: none of the Dark Triad traits are significantly associated with the dependent variable. Moreover, the diagnostics suggest none of the models seem to provide a good fit for the data (F-Stat. = 0.382, $p < 0.766$ for model 34; F-Stat. = 0.2, $p < 0.962$ for model 35; F-Stat. = 0.482, $p < 0.902$).

I perform additional analyses where I restrict the sample to only those investors who invest at least ten percent of their portfolio in the 'Low risk' assets. In the additional analysis - reported in column 5 of table D3 in the appendix - I do not find any evidence of an association of any of the Dark Triad traits and the low-risk measure.

11.10 Dark Triad analysis results - discussion

I did not formulate specific hypotheses regarding the Dark Triad traits and treated the association of the Dark Traid traits with financial risk taking as an open question

I find weak evidence (significant at 10%) that Machiavellianism is negatively related to the likelihood of an investor investing in stocks. This association is significant in the model that includes all possibly relevant controls (model 27 reported in table 11). A one-unit increase in Machiavellianism is associated with a decrease in the likelihood to invest in stocks of around 6.7%. Machiavellianism is characterised by self-control and deliberate actions. The findings of a negative association of Machiavellianism with risk taking is in line with findings reported by Kapoutsis et al. (2013), who find a negative association of Machiavellianism with risk taking, when risk taking is measured with a self-report measure. However, the negative association of Machiavellianism with risk taking differ from findings reported by Jones (2014) who finds no significant association of Machiavellianism with gambling one's own money and a positive association of Machiavellianism with gambling someone else's money.

I do not find any evidence of either Narcissism or Psychopathy being related to the financial risk measures in the main analyses (reported in tables 11, 12, and 13). However, in the additional analysis (column 2 reported in table D3 of the appendix), I find that Narcissism is negatively associated with the proportion of investors' portfolios invested in stocks directly, and indirectly through mutual funds. This differs from the results obtained by Foster et al. (2011). Foster et al. (2011) studied stock volatility preference of students, measured by the decision to pick stocks that differ in their volatility based on a graphical depiction of the volatility (Study 1). Those who picked stocks displaying higher volatility also scored significantly higher in Narcissism (Foster et al. 2011). In a second study, the authors measured participants portfolio choice in an incentivised investment game where participants were rewarded

for the best performing (i.e highest return) portfolio after a period of five weeks (Foster et al. 2011). The authors find that Narcissism is significantly related to choosing more risky portfolios (Foster et al. 2011). However, Foster et al. (2011) use a measure to elicit Narcissism that does not include scales for the other two traits. One could speculate that their results are caused by a common feature of the three traits that gets 'watered down' when all three traits are measured together. Personality researchers argue that it is imperative to use a measure that includes all three traits to ascertain the independent contributions of each of the three dark traits (Furnham et al. 2013).

Furthermore, in the additional analysis (column 4 in table D3 in the appendix), I find that Psychopathy is positively related to the aggregate share of the portfolio that investors invest in three high risk asset classes: stocks, derivatives, and hedge funds (labeled 'High-risk'). This is true for those investors who invest at least half of their portfolio in these three asset classes. Together with the null results of a relationship of Psychopathy with the other high risk measure - 'Stock share' - I propose that this association could be driven by psychopaths being erratic and impulsive and thereby drawn to the very high risk asset classes derivatives and hedge funds. In an unreported analysis I find support for this interpretation. Psychopathy is significantly positively related to the share of the portfolio that investors invest in derivatives, and the share of the portfolio invested in hedge funds. It seems, therefore, that the association of Psychopathy with derivatives and hedge funds drives the association with 'High-risk' that I find. This finding is in line with that reported by Hosker-field et al. (2016), who find a positive association of Psychopathy with risk taking measured with a self-report measure. However, differ from those reported by Jones (2014), who finds an association between Psychopathy and gambling someone else's money but not with one's own money.

12. Discussion and conclusion

In this chapter, I investigated whether personality traits from three personality frameworks - the Big Five, the HEXACO, the Dark Triad, all thought to be associated with risk taking— are related to investors' decisions to invest in asset classes that differ in their risk attributes. I measured financial risk taking with four different measures: (1) 'Stock holding, a binary variable that takes the value one if an investor invests in stocks, and zero otherwise; (2) 'Stock share', a continuous variable that

measures the aggregate share of investors' portfolios invested in stocks directly and indirectly through mutual funds; (3) 'High-risk', a continuous variable that measures the aggregate share of investors' portfolios invested in stocks, derivatives and hedge funds; and (4) 'Low-risk', a continuous variable that measures the aggregate share investors' portfolios held in savings accounts and cash. In contrast to the most closely related studies by Brown and Taylor (2014) and Bucciol and Zarri (2017) I included in the model a lottery-type risk preference measure, common in experimental economics (Dohmen et al. 2011) - and a measure for numeracy, the Berlin Numeracy Test (Cokely et al. 2012) designed to measure individuals' risk literacy (i.e. proficiency in statistical computation related to risk assessment such as transforming probabilities and proportions). Moreover, this chapter differs from previous investigations as I draw the data from targeted a sample of individual investors, instead of a representative sample (Brown and Taylor 2014; Bucciol and Zarri 2017). I thereby wanted to ascertain whether previously reported associations of personality traits with financial risk taking are robust to relevant controls of risk preference and risk literacy, and whether previous findings, uncovered in representative samples, would be replicable in a targeted sample of individual investors.

I hypothesised a positive association of the two closely related traits Big Five Openness and HEXACO Openness with risk taking. Openness is defined as "the tendency to be open to new aesthetic, cultural, or intellectual experiences" (APA 2007). One facet of Openness - feelings (i.e. excitable) - relates to affective dispositions: meaning people high in Openness are more easily excited by experiences than people low in Openness. I reasoned that investors high in Openness would perhaps enjoy the thrill of investing in more risky assets resulting in a positive association of Openness with risk taking.

I find some evidence in support of this hypothesis. Big Five Openness is significantly positively correlated with the share of investors' portfolios invested in stocks, derivatives, and hedge funds (labeled 'High-risk'), but only when I restrict the sample to those investors who invest at least fifty percent of their portfolio in these assets. Similarly, I find a significant positive association of HEXACO Openness with the share of investors portfolios invested in 'High-risk' in the regressions where the sample is restricted to those investors who invest at least thirty percent of their portfolio in stocks, derivatives, and hedge funds. I do not find an association of either Big Five or HEXACO Openness with any of the other measures of financial risk taking. The positive correlation of Openness with investment in 'High risk' in the

restricted samples is in line with findings reported by Nicholson et al. (2005) who find a positive association of Openness with risk taking in the financial domain, measured with a self-report survey measure. Furthermore, the positive association of Openness also aligns with findings reported by Lauriola and Levin (2001) investigate the association of personality with risk taking in two lottery tasks that are framed as avoiding a loss or achieving a gain and find a positive association of Openness with risk taking to achieve a gain but no association with risk taking to avoid a loss. However, Weller and Thulin (2012) similarly investigated the association of Openness with risk taking in a lottery-type risk elicitation task where decisions are framed as risk taking to avoid a loss and to achieve a gain. The authors do not find a significant association of Openness with risk taking with risk taking in either of the two framing conditions (Weller and Thulin 2012). My finding of a positive association of Openness with investment in 'High risk' therefore differs from the findings reported by Weller and Thulin (2012), while the null-results of an association of Openness with the other risk measures align with those reported by the authors. What is more, the null-results are in line with the findings reported by Bucciol and Zarri (2017) who do not find an association of Openness with risk taking neither when measured with the likelihood that investors invest in stocks, nor when measured with the share of investors' portfolios invested in stocks. However, the null-results I report regarding the association of Openness with the likelihood that investors invest in stocks directly (labeled 'Stock holding') differ from the findings reported by Brown and Taylor (2014) who find such an association in the couples household sample (i.e. household where two partners invest their money together).

Overall the findings of a positive association of Openness with the share of investors' portfolios invested in 'High risk' assets, and the null-results I report regarding an association of Openness with the other risk measures, together with the findings reported by previous studies suggest that Openness is not uniformly associated with more financial risk taking. Nevertheless, Openness seems to be an important investor characteristic when it comes to the decision whether to take additional financial risk in the form of investing more than thirty (in the case of HEXACO Openness) percent of their portfolio in the highly risky assets stocks, derivatives, and hedge funds. The thrill seeking aspect of Openness may thus result in investors having a large share of their portfolio invested in such high-risk assets.

I also hypothesised a negative association of the closely related traits Big Five Conscientiousness and HEXACO Conscientiousness. Conscientiousness is described as the tendency to be organised, responsible (i.e. following through with obligations), control one's impulses, and hard working (APA 2007; Roberts et al. 2014). Conceptually Conscientiousness is related to lower risk taking (Borghans et al. 2008). If a person - scoring high on Conscientiousness - sets herself a task such as investing, she is more likely to control her impulses and stay focused on the task at hand (i.e. achieving risk-adjusted returns), making it less likely that she would take financial risk. I find some weak evidence of Big Five Conscientiousness being negatively correlated with the likelihood that investors invest in stocks (labeled 'Stock-holding') supporting my hypothesis. This finding is in line with findings reported by and Nicholson et al. (2005) and Soane and Chmiel (2005), both studies find Conscientiousness to be negatively associated with financial risk taking, measured with self-report survey measures. However, the closely related trait HEXACO Conscientiousness is not significantly correlated with any of the four risk measures that I investigate in the primary analysis (i.e. in the unrestricted samples). What is more, in the additional analysis where I restrict the sample to only those investors who invest at least fifty percent of their portfolio in stocks, derivatives, and hedge funds (labeled 'High-risk') Conscientiousness is *positively* correlated with risk taking (significant at 10%). This finding therefore differs from those reported in the closely related studies of Brown and Taylor (2014) and Bucciol and Zarri (2017), who find no association of Conscientiousness with financial risk taking, measured with the likelihood that investors invest in stocks. What is more, the finding of a positive association of HEXACO Conscientiousness is somewhat surprising given that Conscientiousness has previously been linked to a more prudent approach to household finance. A few studies found that people, high in Conscientiousness, have more financial self-control (Webley and Nyhus 2001) and engage in more discretionary saving (Wärneryd 1996; Brandstätter and Königstein 2001). However, I note that the sample in which I uncover this association is relatively smalle (N = 44). And this finding might thus be a sample artifact. Furthermore, it seems reasonable to posit that an investor - high in Conscientiousness might be willing to take risks if she is compensated for risk with high returns, however given that the data does not allow me to control for investors' return expectations I based the hypothesis of a negative association of Conscientiousness on the previously reported general negative association of Conscientiousness with risk taking Taken together my results and the findings reported by previous studies suggest that Conscientiousness seems not to be

uniformly associated with financial risk taking. It therefore appears as though Conscientiousness is not an important investor characteristic when it comes to financial risk taking.

I further hypothesised a negative association of the Big Five trait Neuroticism and the closely related HEXACO trait Emotionality with financial risk taking. Neuroticism is described as "a chronic level of emotional instability and proneness to psychological distress" (APA 2007). Generally, a higher score on Neuroticism is associated with lower risk taking (Borghans et al. 2008). HEXACO Emotionality is very similar to Neuroticism in the sense that it also captures a tendency to get stressed and be anxious. People who score high on Neuroticism or Emotioanlity have difficulty dealing with stressful situations and seek to avoid stress. I hypothesised that the anxiety facet of the two traits would lead investors' - high on those traits - to shun risky assets and seek low-risk assets in order to avoid stressful situations such as a stark downward movement of the portfolio. However, neither Big Five Neuroticism nor the related HEXACO trait Emotionality is significantly associated with risk taking. These null-results echo the null-results reported in the closely related studies by Brown and Taylor (2015) and Bucciol and Zarri (2017). The null-results regarding these two traits, nevertheless, is somewhat surprising given that these two traits have a conceptually strong negative association with risk taking. What is more, previous investigations have consistently linked both traits to risk taking when measured with self-report measures (Jadlow and Mowen 2010; Weller and Tikir 2011; Weller and Thulin 2012) or in a lottery-type experiment (Rustichini et al. 2012). The null-results, together with the null-results reported by Brown and Taylor (2014) and Bucciol and Zarri (2017) suggest that - despite their strong conceptual association with low risk taking, and the previously reported negative associations where risk taking was measured not with real investments but with self-report measures (Jadlow and Mowen 2010; Weller and Tikir 2011; Weller and Thulin 2012) and a lottery-type experiment (Rustichini et al. 2012) - the association of Neuroticism and Emotionality may not be strong enough to keep investors, high in those traits, from investing in risky asset classes. Neuroticism and Emotionality may, thus, not be important investor characteristics when it comes to financial risk taking.

Furthermore, although I did not expect to find an association of Extraversion with financial risk taking, I find a negative association of HEXACO Extraversion with the proportion of investors' portfolios invested in stocks in the sample of investors who

invest at least two-thirds of their portfolio in 'Stock share'. This association appears to be robust to relevant controls such as risk preferences and risk literacy. Furthermore, I also find a significant negative correlation of HEXACO Extraversion with 'High-risk' in two regressions where I restrict the sample to only those investors who invest at least thirty, and at least fifty percent of their portfolio in 'High-risk' assets. This finding is perhaps surprising given the previously reported positive association of sociability - a facet of Extraversion - with risk taking (Hong et al. 2004; Christelis et al. 2010). However, my findings echo those reported by Brown and Taylor (2014), who find a negative association of Big Five Extraversion and the propensity to hold stocks. That being said, just like Brown and Taylor (2014), I also measured the likelihood that investors invest in stocks and found no association with Extraversion in that analysis. What is more, prior investigations of HEXACO traits with risk taking do not find any association of Extraversion with risk taking (Lee et al. 2005; Weller and Tikir 2011; Weller and Thulin 2012). Taken together my findings and those reported in previous studies suggest that Extraversion has no unifying, one-directional, association with financial risk taking. What is more, the regressions in which I uncover the negative association of Extraversion with risk taking are rather small (68, 71, and 44 respectively) these findings may thus be an artifact of the sample. Overall, it seems Extraversion may thus not be an important investor characteristic when it comes to financial risk taking.

Turning to the Dark Triad traits I treated the association of the traits with risk taking as an open question given that there is no readily apparent association of any of the three traits with risk taking. I find that each of the three traits is associated with risk taking, but with different measures of financial risk. Both Machiavellianism and Narcissism are negatively correlated with different high-risk measures, and Psychopathy is significantly positively correlated with the share of investors' portfolios invested in stocks, derivatives, and hedge funds.

Specifically, Machiavellianism is negatively associated with the likelihood that investors invest in stocks. This finding is in line with findings reported by Kapoutsis et al. (2013), who find a negative association of Machiavellianism with risk taking, when risk taking is measured with a self-report measure. However, Kapoutsis et al. (2013) did not measure all three Dark Triad traits together. As I have argued in this chapter the three Dark Triad traits are very closely related, and correlated. In order to find the independent contribution of each trait for a given decision it is therefore essential to administer all three traits to the same sample at the same time (Furnham et

al. 2013). One study in which the authors did administer a measure of all three traits to the same sample is that of Jones (2014). Jones (2014) finds no significant association of Machiavellianism with gambling one's own money and a positive association of Machiavellianism with gambling someone else's money. My results of a negative association therefore differ to those reported by Jones (2014).

Narcissism is negatively associated with the aggregate share of investors' portfolios invested in stocks directly and indirectly through mutual funds, but only for those investors who invest at least two-thirds of the aggregate share their portfolio in stocks. This finding differs from the results reported by Foster et al. (2011). Foster et al. (2011) studied stock volatility preference of students, measured by the decision to pick stocks that differ in their volatility based on a graphical depiction of the volatility (Study 1). Those who picked stocks displaying higher volatility also scored significantly higher in Narcissism (Foster et al. 2011). Similarly, Foster et al. (2009) found that people high in Narcissism report to have a preference for aggressive financial investment strategies (e.g. investing in volatile stocks, rather than stable bonds) (Study 2) (Foster et al. 2009). Furthermore, Foster et al. (2011) found that undergraduates that score high in Narcissism are more likely to invest in riskier stocks (i.e. stocks that display a higher level of volatility) in an experimental investment game (study 2). However, Foster et al. (2009; 2011) did not measure all three Dark Triad traits at the same time, it is therefore not clear whether the associations the authors report are due to factors that are shared by the three traits or due to specific aspects of Narcissism. In the only study that did administer a measure for all three traits to the same sample Jones (2014) finds that Narcissism is not significantly associated neither with gambling one's own money nor with gambling someone else's money.

Psychopathy is positively associated with the aggregate share of investors' portfolios invested in stocks, derivatives, and hedge funds (labeled 'High-risk') but only when I restrict the sample to only those investors who invest at least fifty of their portfolio in these asset classes. This finding is in line with that reported by Hosker-field et al. (2016), who find a positive association of Psychopathy with risk taking measured with a self-report measure. However, my finding differs from those reported by Jones (2014), who finds an association between Psychopathy and gambling someone else's money but not with one's own money. I proposed that the positive association of Psychopathy with the share of investors' portfolios invested in 'High-risk' assets is

driven by the preference of 'psychopathic' investors for derivatives, and hedge funds. This interpretation is supported by an unreported analysis where I ran tobit regressions of only the share of investors' portfolios invested in derivatives, and only the share of investors' portfolios invested in hedge funds. In these two regressions Psychopathy is significantly positively related to the dependent variables.

Lastly, I note that neither investors risk preferences - measured with the canonical measure for risk preference from experimental economics a lottery-type experiment (Dohmen et al. 2011) - nor risk literacy - measured with the Berlin Numeracy Test (Cokely et al. 2012) - are consistently or significantly associated with financial risk taking. It seems therefore that these investor characteristics do not help explain financial risk taking.

Naturally my investigation is subject to shortcomings. Firstly, my measures of financial risk taking - partly based on the extant literature - may be confounded by other factors. Attributes other than the riskiness of the assets that comprise my risk measures could have an influence on investors' decisions to invest in these asset classes. Future work might try to investigate the association of the personality traits that I measure with risk taking by taking a different approach. For example, another way of measuring risk taking would be to examine β - the standard deviation of investors' portfolios - that is the standard measure of financial risk in the finance literature. Future work could examine the association of personality trait with financial risk taking, perhaps in an experimental investment game, where investors pick assets for their portfolio and the performance of the portfolio is tracked over a period of time. Experimenters could then manipulate the volatility of the assets and monitor investors reactions to upward and downward movements of the portfolio.
Secondly, the model in which I estimate the associations of personality traits with risk taking includes relevant investor characteristics - such as risk preferences and risk literacy - that are not part of the models of closely related studies (Brown and Taylor 2014; Bucciol and Zarri 2017). However, my model might be improved upon by including additional investor characteristics that may play a role in financial risk taking. For example, the literature on risky decision-making suggests that investors' return- and risk-expectations are important factors to consider when analysing peoples' willingness to take risk (Weber et al. 2013). Unfortunately my data does not allow me to control for investors' return- and risk-expectations regarding the different

asset classes. Including investors' risk- and return-expectations in future investigations could result in more accurate estimations.

Overall the results fail to paint a clear picture: no personality trait is consistently associated with financial risk taking. I, therefore, conclude that personality traits are not very important investor characteristics when it comes to financial risk taking.

Chapter 5:

General discussion and conclusion

The primary objective of this thesis is to answer the question: Can investors' social preferences and personality traits help explain investment decisions? To this end I presented three empirical chapters (chapters 2 to 4), in which I investigated this question with different measures, specifically I addressed this question in each chapter as follows.

In chapter 2, I investigated whether unconditional social preferences - measured with the 'SVO slider measure' (Murphy et al. 2011) - can help explain investors' engagement in SRI. I measured engagement in SRI with three distinct measures: (1) 'interest' in investing in SRI (2) the likelihood of ever having held such investment, and (3) the proportion of such investment in the total investment portfolio currently held. I found robust evidence for a positive association between social preferences and the first two measures of engagement in SRI - general interest in SRI, and the likelihood of having invested in SRI - but no association between social preferences and the proportion of responsible investments in the portfolio currently held.

Subsequently, in chapter 3, I investigated whether personality traits, related to prosocial behaviour, can help explain investors' engagement in SRI. To measure engagement in SRI I used two of the measures that were also investigated in chapter 2: (1) 'interest' in SRI investing, and (2) the likelihood of ever having held such investments. I examined investors' personalities with four different personality inventories pertaining to four different, but related, personality frameworks. I employed one measure - the Big Five Short (Gerlitz and Schupp 2005) - pertaining to the most widely researched personality framework - the Big Five (Ferguson et al. 2011). I used one measure - the HEXACO-60 (Ashton and Lee 2009) - belonging to a recently proposed alternative framework to the Big Five, the HEXACO personality framework (Lee and Ashton 2004). Additionally, I include two personality inventories that measure personality traits, which are relevant to prosocial behaviour but have received little attention in the literature: Empathy, and the 'dark side' of personality (i.e. aversive personality traits) (Ferguson et al. 2011). I measured investors' empathy with the Interpersonal Reactivity Index (Davis 1980; 1983) (Davis 1980; Davis 1983). And lastly, I measured investors' aversive personality traits with a

measure - the Short Dark Triad (Jones and Paulhus 2014) - for the so-called 'Dark Triad' of personality: Machiavellianism, Psychopathy, and Narcissism (Paulhus and Williams 2002). The main findings in chapter 3 can be summarised as follows. I found a significant positive association of Big Five Openness but no association of the prosocial trait Agreeableness with investors' self-reported interest in investing and with the likelihood that investors have held SRI investments. I also found a significant positive association of the prosocial HEXACO traits - Honest-Humility, Agreeableness, and Emotionality - with investors' self-reported interest in investing in SRI. Further, I found significant positive association of the empathy trait Empathic Concern with investors' self-reported interest in investing, and with the likelihood that investors have invested in SRI. Lastly, I found a significant negative association of Machiavellianism, and a significant positive association of Psychopathy with the likelihood that investors have invested in SRI at some point in the past.

Lastly, In Chapter 4, I investigated whether personality traits help explain investors' decisions to invest in assets that differ in their risk attributes. Specifically, I examined whether traits from three personality frameworks - the Big Five, the HEXACO, the Dark Triad, all thought to be associated with risk taking— are related to investors' decisions to invest in asset classes that differ in their risk attributes. I constructed four different measures of financial risk taking: (1) whether an investor invests in stocks directly, (2) the aggregate share of the investor's portfolio invested in stocks directly and indirectly through mutual funds, (3) the aggregate share of the investor's portfolio invested in stocks, derivatives and hedge funds, and (4) the aggregate share of investor's portfolio held in cash and in savings accounts - a measure for low-risk. Although I found some evidence of some personality traits being associated with the measures of financial risk taking, not one personality trait is consistently associated with any of the four measures of financial risk taking. I therefore concluded that personality traits seem not to be very relevant investor characteristics when it comes to financial risk taking.

Each of the three empirical chapters contains its own conclusion and discussion section, the aim of this chapter, therefore, is to consolidate the findings of the three chapters in light of the contributions to the extant literature as well as pointing to fruitful avenues for future research, and highlighting the shortcomings.

The remainder of this chapter is structured as follows. First the findings regarding the association of investors' prosocial tendencies with SRI are discussed. Second, the findings regarding personality and financial risk taking are discussed.

Thereafter, the limitations of this thesis are discussed. Finally, this thesis is concluded.

The results obtained from the analysis in chapters 2 and 3, together, show that prosocial tendencies play a part in investors' decisions to engage in SRI. In chapter, 2 I demonstrated that stronger social preferences increase the likelihood that investors have invested in SRI in the past, but stronger social preferences are not associated with investors' dedicating a larger proportion of their portfolio to SRI. Additionally, in chapter 3, I showed that personality traits related to prosocial behaviour help explain investors' engagement in SRI. In all of the analyses I controlled for investors' financial expectations, demonstrating that prosocial tendencies explain SRI engagement next to motivations related to the pursuit of risk-adjusted returns.

While the data does not allow me to ascertain whether prosocial tendencies, measured by personality traits, lead investors to dedicate a larger proportion of their portfolio to SRI, the results reported in chapter 2 suggest that this is not the case, at least with regards to social preferences. Although the pattern I observe in chapter 2 with regards to social preferences is *consistent* with a 'warm glow' interpretation (i.e. individual investors might be motivated out of pro-social concerns to hold 'some' SRI—but not necessarily to devote a larger share of their wealth to the cause) this is not necessarily the only explanation (Andreoni 1989, 1990). This pattern could also arise from noisy measures—which are self-reported and non-incentivized. Future work might try to examine the relationship between incentivized measures of social preferences and archival data on individual investment behavior among broad samples of individual investors— for example, building on the empirical strategy of Riedl and Smeets (2014).

Additionally I note that the overall pattern I observe in chapters 2 and 3, including the positive association of Psychopathy with SRI investing reported in chapter 3, is readily reconcilable with patterns commonly associated with prosocial behaviour (Bénabou and Tirole 2006). This suggests that engaging in SRI is indeed seen as a prosocial act at least by some investors. Together, these findings have implications for the modeling of investor decision-making.

I suggested that the positive association of Psychopathy with engagement in SRI is related to an image motivation on behalf of investors. Future research could clarify this association and ascertain - perhaps through experimental treatment, manipulating the visibility of SRI engagement - whether my interpretation is viable.

With the findings reported in chapters 2 and 3 I contribute to a couple of literature streams. First, as mentioned in the conclusions of chapters 2 and 3 I contribute to the SRI literature by providing further evidence that investors' prosocial tendencies - captured by social preferences (chapter 2) and personality traits (chapter 3) - are associated with engagement in SRI.

Secondly, I link the literature streams of SRI and the burgeoning literature at the intersection of personality psychology and economics, by demonstrating how they can complement one another. SRI investing offers personality psychologists a way to study prosocial behaviour outside the laboratory in an area where stakes are high (i.e. investors could potentially forgo returns by divesting away from sin companies). This could be interesting to personality researchers who want to investigate prosocial behaviour outwith the common methods, i.e. economic games in a laboratory setting (Ben-Ner et al. 2004b; Ben-Ner et al. 2004a; Baumert et al. 2014; Koole et al. 2001; Volk et al. 2011; Becker et al. 2012; Zettler et al. 2013; Thielmann and Hilbig 2014, 2015; Hilbig et al. 2015b; Hilbig et al. 2015a). Likewise, I introduce instruments from personality psychology to the SRI literature and demonstrate that they can be successfully used to help explain investors' decisions to engage in SRI. This could be interesting to SRI researchers who want to measure investor characteristics with measures other than revealed preference measures commonly used to ascertain investors' prosocial tendencies (Riedl and Smeets 2014; Heimann 2013). As I have noted in chapter 3, in contrast to revealed preference measures personality trait measures are specifically designed to be administered via self-report surveys and therefore readily lend themselves to investigate large samples of relevant populations such as investors (Borghans et al. 2008).

Thirdly, I contribute to economics literature by providing empirical evidence of how investors' idiosyncrasies can have an impact on economic outcomes. As I mentioned in the introduction to this thesis (chapter 1) economists and psychologists have developed alternative models to the standard investment theory models, such as the Capital Asset Pricing Model (e.g. Sharpe 1964). For example, Akerlof and Kranton (2000) develop a general model of agents' behaviour where an agent's utility function incorporates identity - a person's sense of self. With this general model of identity management, the authors are able to explain various economic outcomes that are not easily explained by standard economic models of behaviour, such as gender discrimination in the workplace, the economics of poverty and social exclusion, and the household division of labour (Akerlof and Kranton 2000). Similarly, Bénabou and

Tirole (2011) develop a model that comprises the identity of agents. With their general model of identity management the authors specifically explain 'moral' (i.e. prosocial) behaviour (Bénabou and Tirole 2011). The authors note "because people have better, more objective access to the record of their conduct than to the exact mix of motivations driving them, they are led to judge themselves by what they do" (Bénabou and Tirole 2011, p.806). In other words, if investors think of themselves as being a "good" person, they are more likely to act morally if given the chance. By acting in accord with their 'sense of self' (i.e. identity) people thereby reduce cognitive dissonance (i.e. acting against their own beliefs) (Bénabou and Tirole 2011). The findings I presented in chapters 2 and 3 can be viewed as 'inputs' for these models of identity management. Both, social preferences and personality traits are part of a person's identity. Social preferences are a measure of the extent to which a person would forgo a financial return in order to make an anonymous other better off and personality traits are defined as the "relatively enduring patterns of thoughts, feelings, and behaviours that reflect the tendency to respond in certain ways under certain circumstances" (Roberts 2009, p.7). Given that I find associations of both social preferences and personality traits with engagement in SRI, my findings, thus, provide tentative empirical evidence for the validity of these alternative models of agents' behaviour. With the findings reported in chapters 2 and 3 I demonstrated a viable empirical strategy to ascertain aspects of peoples' identity, and demonstrate that these have an impact on economic outcomes in the form of investors' engagement in SRI. Future research could use social preference and/or personality trait measures to test hypotheses derived from behavioural models such as the ones developed by Akerlof and Kranton (2000) and Bénabou and Tirole (2011).

Turning to the findings I presented regarding the association of personality traits with financial risk taking. In the analysis of the Big Five and the HEXACO measures I could not confirm a previously reported association of Openness with financial risk taking (Brown and Taylor 2014). Furthermore, contrary to Bucciol and Zarri (2017), I do not find a negative association of Agreeableness with financial risk taking. There are three possible explanations for these findings or, rather, null-results. First, the associations of these two traits are not strong enough to persist in models that include relevant controls. Second, the associations, uncovered in representative samples, do not emerge in a targeted sample of individual investors, such as the one I draw upon here. Third, Openness and Agreeableness could simply not be relevant traits with regards to financial risk taking. More research is needed to further inform the question

whether personality traits can help explain financial risk taking. For example, future work could measure risk taking with by taking a different approach. For example, another way of measuring risk taking would be to examine β - the standard deviation of investors' portfolios - that is the standard measure of financial risk in the finance literature. Future work could examine the association of personality trait with financial risk taking, perhaps in an experimental investment game, where investors pick assets for their portfolio and the performance of the portfolio is tracked over a period of time, similarly to Foster et al. (2011).

Furthermore, I showed that Psychopathy is positively correlated with financial risk taking (measured by the share of the portfolio invested in stocks, derivatives, and hedge funds). It is useful to briefly recall the description of the trait. Psychopathy is characterized by affective callous, manipulative behaviour, a lack of self-control, an erratic lifestyle, antisocial behaviour, and overall low levels of empathy (Rauthmann 2012 ; Furnham et al. 2013). As I explained in the results section of chapter 4, additional analysis revealed that a positive association of Psychopathy with investing in derivatives and hedge funds drives this correlation. Moreover, in contrast to Machiavellianism, Psychopathy is also significantly negatively correlated with the proportion invested in mutual funds. These results are not completely unexpected. Both derivatives and hedge funds are financial instruments that, arguably, are more closely related to 'high finance' rather than conventional retail investing. Previous research has shown that students with psychopathic traits are more likely to be drawn to a career in finance (Henley 2001; Wilson and McCarthy 2011). Additionally, research on finance practitioners has shown that levels of Psychopathy are significantly higher for finance professionals, compared to community samples (Howe et al. 2014). Furthermore, previous findings suggest individuals with psychopathic traits are more capable to climb the corporate ladder and reach positions of power compared to individuals with lower levels of psychopathic traits (Babiak and Hare 2006; Boddy 2006). Moreover, Psychopathy has also been linked to higher corporate ranks in samples of finance professionals (Howe et al. 2014). Referring to findings of higher levels of Psychopathy in some parts of the Business world, authors have used terms such as 'snakes in suits' (Babiak and Hare 2006), and - not surprisingly - such vivid imagery meant these results have willingly been picked up and widely covered by the media. Compared to the media attention that trait Psychopathy has received, to date, there are only few scientific findings linking

Psychopathy to economic outcomes (Smith and Lilienfeld 2013). The results I presented therefore contribute to the literature by linking Psychopathy to financial risk taking, specifically to investing in derivatives and hedge funds.

Naturally, the research presented is also subject to a number of limitations. First of all, there are some empirical shortcomings inherent to the survey method. While collecting data via surveys is common practice in social sciences such as psychology and sociology, it is less common in economics and finance (Manski 2004). Common methods variance (Podsakoff et al. 2003), for example in the form of social desirability, could be a concern. In the case of the findings I reported with regards to prosocial tendencies (chapters 2 and 3) this could mean the following. The associations might have been obtained not because prosocial preferences and personality traits are driving investment in SRI, but because investors who feel a need to display their pro-social intentions do so both by talking up their SRI interest (and history) as well as inflating their social preferences and personality. I cannot rule out this possibility, but I note that the survey was administered online, that responses were anonymous, and that the measures of social preferences, personality traits and SRI engagement, together, constituted a relatively small portion of the survey. In other words, it should not have been readily apparent to respondents that I was assessing motives behind SRI, specifically. Future work could utilise a different type of analysis along the lines of Heckmann (1977) to mitigate response bias. Additionally, future work may also use a method that splits early from late responses along the lines of Burton et al. (2005) to minimise response bias.

A second caveat of the method is causation. All findings are I report are correlations, although the findings are consistent with theoretical interpretations, reverse causality and omitted variables represent viable alternative explanations. Future work could shed light on the causal nature of the findings I presented through experimental treatments. Lastly, the analyses of the HEXACO traits are based on smaller sample compared to the analyses of the other personality measures. This, as noted in the results section of the corresponding chapters (chapters 3 and 4), results in models that are less robust compared to the models pertaining to the other personality constructs. The small sample size could also be an explanation for the null results reported in chapter 4, of the HEXACO traits with financial risk taking. Future research could address these limitations by relying on larger samples.

To conclude, at the very beginning of this thesis the following question was posed: Can investors' social preferences and personality traits help explain investment decisions. Within this thesis I provided evidence that the answer to this question can be given as follows. Yes, they can help explain certain investment decisions, such as the decision to invest in SRI. I must also conclude, however, that investors' personality traits seem not to be relevant investor characteristics with regards to financial risk taking.

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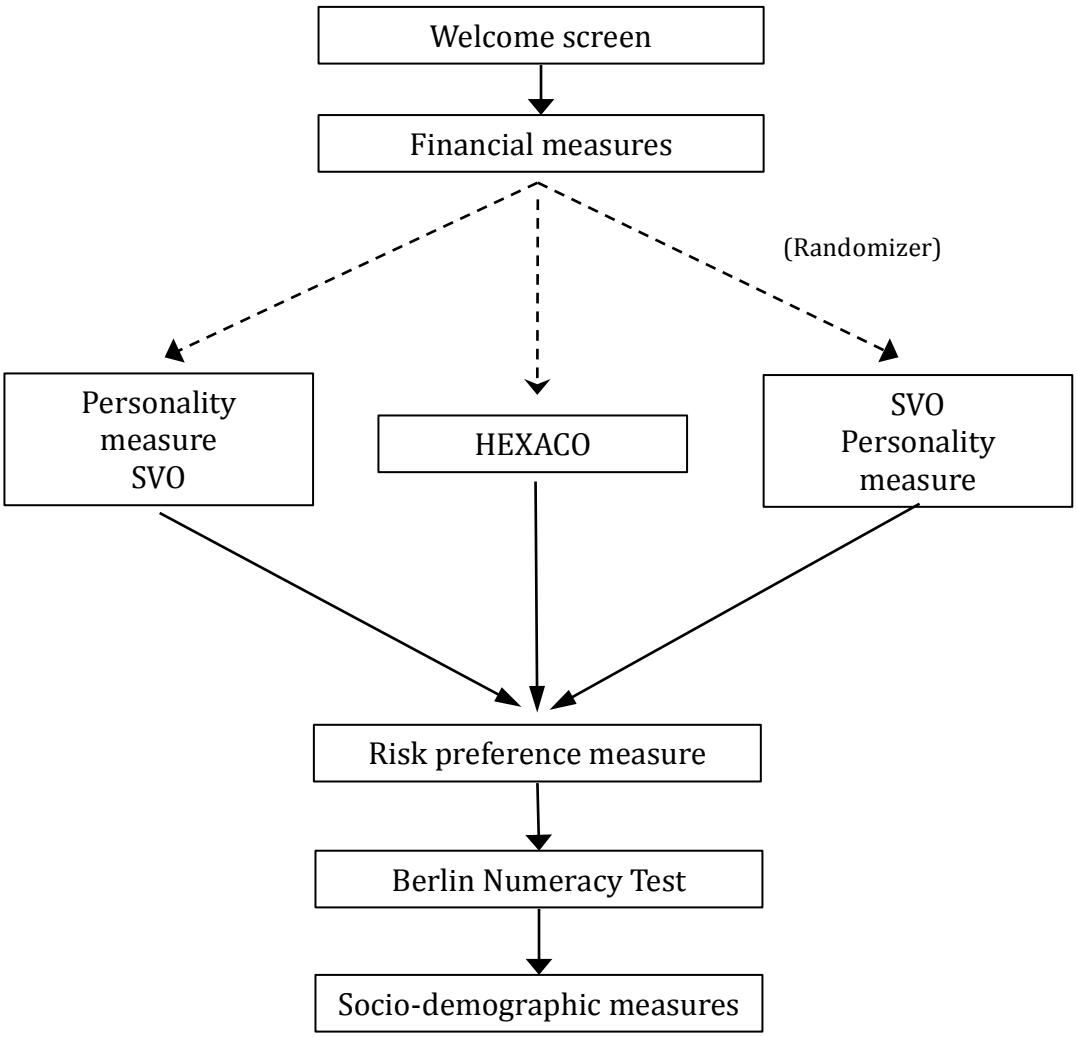
Appendix A

A1 - Illustration of the survey structure

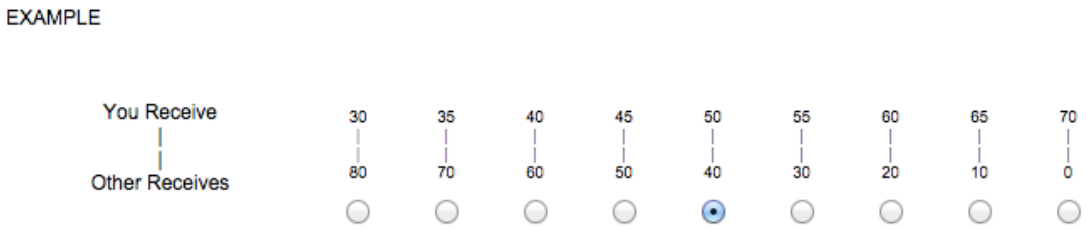


Note: SVO refers to the social value orientation slider measure.

A2 - The SVO slider measure as seen by participants.

Instructions: In this task you have been randomly paired with another person, whom we will refer to as the other. This other person is someone you do not know and will remain mutually anonymous. All of your choices are completely confidential. You will be making a series of decisions about allocating resources between you and this other person. For each of the following questions, please indicate the distribution you prefer most by marking the respective position along the mid-line. You can only make one mark for each question.
Your decisions will yield hypothetical money for both yourself and the other person.

In the example below, a person has chosen to distribute money so that he/she receives 50 dollars, while the anonymous other person receives 40 dollars.



A2 continued

Please choose one option for each question below. All numbers below represent US dollar values.

You Receive	85	85	85	85	85	85	85	85	85
Other Receives	85	76	68	59	50	41	33	24	15
You Receive	85	87	89	91	93	94	96	98	100
Other Receives	15	19	24	28	33	37	41	46	50
You Receive	50	54	59	63	68	72	76	81	85
Other Receives	100	98	96	94	93	91	89	87	85
You Receive	50	54	59	63	68	72	76	81	85
Other Receives	100	89	79	68	58	47	36	26	15
You Receive	100	94	88	81	75	69	63	56	50
Other Receives	50	56	63	69	75	81	88	94	100
You Receive	100	98	96	94	93	91	89	87	85
Other Receives	50	54	59	63	68	72	76	81	85

A3 -Risk preference measure

Instructions:

You are participating in a hypothetical choice experiment during which you will make financial decisions. Within these experiments there are no right or wrong decisions and you are free to decide in any manner that you like.

In the tables below you will find two options on each line. You can choose among:

- Option A: a fixed amount that you will receive 'with certainty'
- Option B: an 'all or nothing' lottery, in which you have a 50% chance of winning $ 300 and a 50% chance of winning nothing.

	Safe Payment	Lottery
1	$ 0 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
2	$ 10 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
3	$ 20 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
4	$ 30 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
5	$ 40 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
6	$ 50 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
7	$ 60 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
8	$ 70 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
9	$ 80 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
10	$ 90 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
11	$ 100 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
12	$ 110 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
13	$ 120 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
14	$ 130 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
15	$ 140 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
16	$ 150 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
17	$ 160 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
18	$ 170 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
19	$ 180 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.
20	$ 190 for sure	or 50 percent chanace of winning $ 300 and 50 percent chance of getting $ 0.

Source: Dohmen et al. (2011)

A4 - Adaptive Berlin Numeracy Test format

Instructions: Please answer the questions that follow. Do not use a calculator but feel free to use the scratch paper for notes.

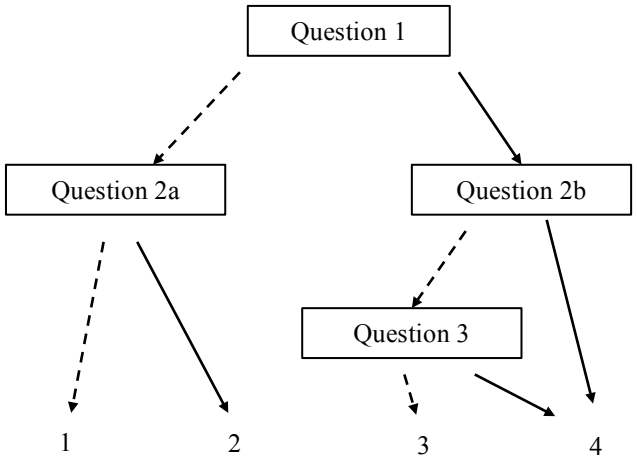
1.
Out of 1,000 people in a small town 500 are members of a choir. Out of these 500 members in the choir 100 are men. Out of the 500 inhabitants that are not in the choir 300 are men. What is the probability that a randomly drawn man is a member of the choir? Please indicate in percent? ____ %

2a.
Imagine we are throwing a five-sided die 50 times. On average, out of these 50 throws how many times would this five-sided die show an odd number (1, 3, or 5)? ____ out of 50 throws.

2b.
Imagine we are throwing a loaded die (6 sides). The probability that the die shows a 6 is twice as high as the probability of each of the other numbers. On average, out of these 70 throws how many times would the die show the number 6? ____ out of 70 throws.

3.
In a forest 20% of mushrooms are red, 50% brown and 30% white. A red mushroom is poisonous with a probability of 20%. A mushroom that is not red is poisonous with a probability of 5%. What is the probability that a poisonous mushroom in the forest is red? _____

Correct answers are as follows: 1 = 25; 2a = 30; 2b = 20; 3 = 50.
The following figure shoes the structure for the adaptive version of the Berlin Numeracy test. Each questions has a 50% probability of being right/wrong. If a question is answered right/wrong a harder/easier question is provided that again has a 50% chance of being right/wrong. Solid lines indicate correct answers, dashed lines indicate incorrect answers.



Source: Cokely et al. (2012)

A5 - The wording of the welcome screen

Welcome to our study on individual investment behaviour and investor characteristics. It is undertaken by researchers at the University of St Andrews, UK.
Completion time is estimated to range between 15 and 25 minutes.
We kindly ask you to answer truthfully, and to the best of your ability.
Responses to this survey are kept **completely anonymous; information cannot be traced back to you as an individual.**
All information collected here will be used solely for academic purposes. The data are stored on secured servers of the service provider, "Qualtrics."
Only the researchers involved in the study have access to the data. We reserve the right not to destroy the data collected and to share the data with other researchers, for scientific study only.
You can at any point withdraw from this research, without further questions, simply by closing your browser window.

By clicking "Next" below, you agree to participate in this study.

Note: Appendix A5 shows the verbatim wording of the welcome screen. The text in bold appeared as such in the survey to emphasise anonymity of the responses and thereby reduce social desirability bias.

A6 - Screenshot of the Asset Class measure

Instructions:

Below we have listed some common asset classes. Please indicate the approximate percentage occupied by each asset class, in your total portfolio.

The percentages must sum up to 100. Investments that don't belong to any of the listed asset classes can be designated to the bottom category, "other."

A7 - The Big Five Short (BFI-S) (Gerlitz and Schupp 2005)

Instructions:

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others?

Please mark the answer to indicate the extent to which you agree or disagree with each statement.

List of items:

Conscientiousness
1. I see myself as someone who does a thorough job
2. I see myself as someone who tends to be lazy*
3. I see myself as someone who does things efficiently

Extraversion
1. I see myself as someone who is talkative
2. I see myself as someone who is outgoing, sociable
3. I see myself as someone who is reserved*

Agreeableness
1. I see myself as someone who is sometimes rude to others*
2. I see myself as someone who has a forgiving nature
3. I see myself as someone who is considerate and kind to almost everyone

Neuroticism
1. I see myself as someone who worries a lot
2. I see myself as someone who gets nervous easily
3. I see myself as someone who remains calm in tense situations*

Openness to Experience
1. I see myself as someone who is original, comes up with new ideas
2. I see myself as someone who values artistic, aesthetic experiences
3. I see myself as someone who has an active imagination

Note: All items are scored on a 7 point Likert-scale ranging from 1 (strongly disagree) to 7 (strongly agree), * denotes that the score relating to this item has been reversed.

A8 - The HEXACO-60 measure (Ashton et al. 2009)

Instructions:

On the following pages, you will find a series of statements about you. Please read each statement and decide how much you agree or disagree with that statement. Then indicate your response using the following scale:

5 = strongly agree
4 = agree
3 = neutral (neither agree nor disagree)
2 = disagree
1 = strongly disagree

Please answer every statement, even if you are not completely sure of your response.

List of items:

1. I would be quite bored by a visit to an art gallery.
2. I plan ahead and organize things, to avoid scrambling at the last minute.
3. I rarely hold a grudge, even against people who have badly wronged me.
4. I feel reasonably satisfied with myself overall.
5. I would feel afraid if I had to travel in bad weather conditions.
6. I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed.
7. I'm interested in learning about the history and politics of other countries.
8. I often push myself very hard when trying to achieve a goal.
9. People sometimes tell me that I am too critical of others.
10. I rarely express my opinions in group meetings.
11. I sometimes can't help worrying about little things.
12. If I knew that I could never get caught, I would be willing to steal a million dollars.
13. I would enjoy creating a work of art, such as a novel, a song, or a painting.
14. When working on something, I don't pay much attention to small details.
15. People sometimes tell me that I'm too stubborn.
16. I prefer jobs that involve active social interaction to those that involve working alone.
17. When I suffer from a painful experience, I need someone to make me feel comfortable.
18. Having a lot of money is not especially important to me.
19. I think that paying attention to radical ideas is a waste of time.
20. I make decisions based on the feeling of the moment rather than on careful thought.
21. People think of me as someone who has a quick temper.
22. On most days, I feel cheerful and optimistic.
23. I feel like crying when I see other people crying.
24. I think that I am entitled to more respect than the average person is.
25. If I had the opportunity, I would like to attend a classical music concert.
26. When working, I sometimes have difficulties due to being disorganized.

(continued)...

...(A8 continued)

27. My attitude toward people who have treated me badly is “forgive and forget.”
28. I feel that I am an unpopular person.
29. When it comes to physical danger, I am very fearful.
30. If I want something from someone, I will laugh at that person’s worst jokes.
31. I’ve never really enjoyed looking through an encyclopedia.
32. I do only the minimum amount of work needed to get by.
33. I tend to be lenient in judging other people.
34. In social situations, I’m usually the one who makes the first move.
35. I worry a lot less than most people do.
36. I would never accept a bribe, even if it were very large.
37. People have often told me that I have a good imagination.
38. I always try to be accurate in my work, even at the expense of time.
39. I am usually quite flexible in my opinions when people disagree with me.
40. The first thing that I always do in a new place is to make friends.
41. I can handle difficult situations without needing emotional support from anyone else.
42. I would get a lot of pleasure from owning expensive luxury goods.
43. I like people who have unconventional views.
44. I make a lot of mistakes because I don’t think before I act.
45. Most people tend to get angry more quickly than I do.
46. Most people are more upbeat and dynamic than I generally am.
47. I feel strong emotions when someone close to me is going away for a long time.
48. I want people to know that I am an important person of high status.
49. I don’t think of myself as the artistic or creative type.
50. People often call me a perfectionist.
51. Even when people make a lot of mistakes, I rarely say anything negative.
52. I sometimes feel that I am a worthless person.
53. Even in an emergency I wouldn’t feel like panicking.
54. I wouldn’t pretend to like someone just to get that person to do favors for me.
55. I find it boring to discuss philosophy.
56. I prefer to do whatever comes to mind, rather than stick to a plan.
57. When people tell me that I’m wrong, my first reaction is to argue with them.
58. When I’m in a group of people, I’m often the one who speaks on behalf of the group.
59. I remain unemotional even in situations where most people get very sentimental.
60. I’d be tempted to use counterfeit money, if I were sure I could get away with it.

...(A8 continued)

Scoring of HEXACO–60:

Honesty-Humility:	6, 12R, 18, 24R, 30R, 36, 42R, 48R, 54, 60R
Emotionality:	5, 11, 17, 23, 29, 35R, 41R, 47, 53R, 59R
Extraversion:	4, 10R, 16, 22, 28R, 34, 40, 46R, 52R, 58
Agreeableness (versus Anger):	3, 9R, 15R, 21R, 27, 33, 39, 45, 51, 57R
Conscientiousness:	2, 8, 14R, 20R, 26R, 32R, 38, 44R, 50, 56R
Openness to Experience:	1R, 7, 13, 19R, 25, 31R, 37, 43, 49R, 55R

(R indicates reverse-scored item.)

Note. The HEXACO–60 items may be used free of charge for nonprofit research purposes. Researchers who wish to use the observer report form of the HEXACO–60 or to use other-language translations of the HEXACO–60 are advised to contact the authors to obtain the authorized observer report form and the authorized translations.

A9 - Interpersonal Reactivity Index (Davis 1980)

Instructions: The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate number of the scale : 0, 1, 2, 3, or 4. **Please read each item carefully before responding.** Answer as honestly and as accurately as you can. Thank you.

1. I daydream and fantasize, with some regularity, about things that might happen to me.
2. I often have tender, concerned feelings for people less fortunate than me.
3. I sometimes find it difficult to see things from the "other guy's" point of view. **(R)**
4. Sometimes I don't feel very sorry for other people when they are having problems. **(R)**
5. I really get involved with the feelings of the characters in a novel.
6. In emergency situations, I feel apprehensive and ill-at-ease.
7. I am usually objective when I watch a movie or play, and I don't often get completely caught up in it. **(R)**
8. I try to look at everybody's side of a disagreement before I make a decision.
9. When I see someone being taken advantage of, I feel kind of protective towards them.
10. I sometimes feel helpless when I am in the middle of a very emotional situation.
11. I sometimes try to understand my friends better by imagining how things look from their perspective.
12. Becoming extremely involved in a good book or movie is somewhat rare for me. **(R)**
13. When I see someone get hurt, I tend to remain calm. **(R)**
14. Other people's misfortunes do not usually disturb me a great deal. **(R)**
15. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments. **(R)**
16. After seeing a play or movie, I have felt as though I were one of the characters.
17. Being in a tense emotional situation scares me.
18. When I see someone being treated unfairly, I sometimes don't feel very much pity for them. **(R)**
19. I am usually pretty effective in dealing with emergencies. **(R)**
20. I am often quite touched by things I see happen.
21. I believe that there are two sides to every question and try to look at them both.
22. I would describe myself as a pretty soft-hearted person.
23. When I watch a good movie, I can very easily put myself in the place of a leading character.
24. I tend to lose control during emergencies.
25. When I'm upset at someone, I usually try to "put myself in his shoes" for a while.
26. When I'm reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me.
27. When I see someone who badly needs help in an emergency, I go to pieces.
28. Before criticizing somebody, I try to imagine how I would feel if I were in their place.

(R) denotes items that are reverse coded. The mean of all items for each scale gives the score for that scale.
Empathic Concern scale: 9; 18; 2; 22; 4; 14; 20.
Personal Distress scale: 27; 10; 6; 19; 17; 13; 24.
Perspective-Taking scale: 28; 15; 11; 21; 3; 8; 25.
Fantasy scale: 26; 5; 7; 16; 1; 12; 23.

Appendix A10 - The Short Dark Triad (SD3) (Jones & Paulhus 2014)

Instructions: Please indicate how much you agree with each of the following statements

Disagree strongly	*Disagree*	*Neither agree nor disagree*	*Agree*	*Agree strongly*
1	2	3	4	5

Machiavellianism
1. It's not wise to tell your secrets.
2. I like to use clever manipulation to get my way.
3. Whatever it takes, you must get the important people on your side.
4. Avoid direct conflict with others because they may be useful in the future.
5. It's wise to keep track of information that you can use against people later.
6. You should wait for the right time to get back at people.
7. There are things you should hide from other people to preserve your reputation.
8. Make sure your plans benefit yourself, not others.
9. Most people can be manipulated.

Narcissism
1. People see me as a natural leader.
2. I hate being the center of attention. (R)
3. Many group activities tend to be dull without me.
4. I know that I am special because everyone keeps telling me so.
5. I like to get acquainted with important people.
6. I feel embarrassed if someone compliments me. (R)
7. I have been compared to famous people.
8. I am an average person. (R)
9. I insist on getting the respect I deserve.

Psychopathy
1. I like to get revenge on authorities.
2. I avoid dangerous situations. (R)
3. Payback needs to be quick and nasty.
4. People often say I'm out of control.
5. It's true that I can be mean to others.
6. People who mess with me always regret it.
7. I have never gotten into trouble with the law. (R)
8. I enjoy having sex with people I hardly know
9. I'll say anything to get what I want.

Note. The subscale headings should be removed before the SD3 is administered. Items should be kept in the same order. Reversals are indicated with (R)

Appendix B - Complementary Tables for Chapters 2, 3, and 4

Table B1 - Correlation matrix for all variables of Chapter 2

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 SRI-Ever invested	1												
2 SRI-Interest	0.22***	1											
3 SRI-Proportion	-	-	1										
4 Social preferences	0.08**	0.18***	0.03	1									
5 SRI-return	0.20***	0.31***	0.08	0.13***	1								
6 SRI-risk	0.15***	0.21***	-0.01	0.08**	0.39***	1							
7 Risk-preferences	0.2	-0.03	0.01	0.01	0.02	0.03	1						
8 Numeracy	0.04	0.02	-0.05	0.06	0.01	0.02	0.19***	1					
9 Total Portfolio	-0.02	-0.07**	0.01	-0.05	-0.04	-0.01	0.09***	0.05	1				
10 University	0.04	-0.00	-0.00	0.04	0.01	0.03	0.15***	0.16***	0.12***	1			
11 Economics Course	-0.02	-0.01	-0.06	0.03	0.00	-0.04	0.11***	0.07	0.02	0.27***	1		
12 Age	0.03	-0.08	0.09	-0.06	-0.06	-0.03	-0.07	-0.15***	0.11***	-0.02	-0.09**	1	
13 Female	0.04	0.08**	-0.04	0.06	0.06	0.05	-0.05	-0.06	-0.01	-0.01	-0.06	-0.01	1

Note: Table B1 presents the results for Pearson's correlation coefficients for all variables of chapter 2. * denotes 10%, ** 5 %, and *** 1% significance.

Table B2 - Marginal effects for the ordered logit regression of SRI Interest on social preferences for Chapter 2

Category of dependent variable	1	2	3	4	5
Variables			SRI Interest		
Social preferences	-0.0037***	-0.0004***	0.0010***	0.0027***	0.0004***
	(0.0006)	(0.0001)	(0.0002)	(0.0005)	(0.0001)
SRI-Return	-0.1475***	-0.0177***	0.0414***	0.1074***	0.0164***
	(0.0138)	(0.0025)	(0.0054)	(0.0108)	(0.0032)
SRI-Risk	-0.0599***	-0.0072***	0.0168***	0.0436***	0.0067**
	(0.0142)	(0.0019)	(0.0041)	(0.0106)	(0.0020)
Risk-Preferences	0.0004**	0.0000*	-0.0001*	-0.0003*	0.0000*
	(0.0002)	(0.0000)	(0.0001)	(0.0001)	(0.0000)
Numeracy	-0.0057	-0.0007	0.0016	0.0041	0.0006
	(0.0086)	(0.0010)	(0.0024)	(0.0063)	(0.0010)
Total-Portfolio	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
University Degree	-0.0121	-0.0015	0.0034	0.0088	0.0013
	(0.0280)	(0.0034)	(0.0079)	(0.0204)	(0.0031)
Economics Course	-0.0058	-0.0007	0.0016	0.0042	0.0006
	(0.0208)	(0.0025)	(0.0058)	(0.0151)	(0.0023)
Age	0.0017**	0.0002**	-0.0005**	-0.0013**	-0.0002**
	(0.0008)	(0.0001)	(0.0002)	(0.0006)	(0.0001)
Female	0.0086**	-0.0106**	0.0247**	0.0641**	0.0098**
	(0.0392)	(0.0047)	(0.0114)	(0.0284)	(0.0047)
Ordereffect	0.0086	0.0010	-0.0024	-0.0062	-0.0010
	(0.0183)	(0.0022)	(0.0051)	(0.0133)	(0.0020)
Constant cut1	1.5800***	1.5800***	1.5800***	1.5800***	1.5800***
	(0.3951)	(0.3951)	(0.3951)	(0.3951)	(0.3951)
Constant cut2	2.1380***	2.1380***	2.1380***	2.1380***	2.1380***
	(0.3966)	(0.3966)	(0.3966)	(0.3966)	(0.3966)
Constant cut3	3.8165***	3.8165***	3.8165***	3.8165***	3.8165***
	(0.4064)	(0.4064)	(0.4064)	(0.4064)	(0.4064)
Constant cut4	6.5448***	6.5448***	6.5448***	6.5448***	6.5448***
	(0.4512)	(0.4512)	(0.4512)	(0.4512)	(0.4512)
Observations	1,517	1,517	1,517	1,517	1,517
Pseudo R-sq.	0.0654	0.0654	0.0654	0.0654	0.0654
Wald. Chi-sq	244.3	244.3	244.3	244.3	244.3
Prob > Chi2	0	0	0	0	0

Note: Table B2 presents the marginal effects of a maximum-likelihood ordered logit regressions with White heteroskedasticity-consistent standard errors and covariance for the full specification. The dependent variable is a measure of interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?" The measure was scored on a 5-point Likert scale, the values of the dependent variable correspond to the following answer 1 (‘not at all interested’), 2 ('somewhat not interested'), 3 ('indifferent'), 4 ('somewhat interested') ,5 (‘very interested’). ‘Ordereffect’ is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

Table B3 - Descriptive Statistics of control variables for all samples of Chapter 3

Sample name	Variable Name	N	Mean	Std. Dev.	Min	Max
Whole sample	Age	1919	55.6	10.88	20	82
	Female	1946	0.05	0.23	0	1
	University degree	1941	0.87	0.32	0	1
	Economics-course	1944	0.68	0.46	0	1
	Total Portfolio	3,046	$ 2.35 mil.	$ 3.17 mil.	$ 1620	$ 21 mil.
	Risk-Preferences	2010	103.87	48.82	0	200
	Numeracy	1944	2.58	1.1	1	4
	SRI-Return	2864	2.28	0.75	1	5
	SRI-Risk	2864	2.71	0.73	1	5
Big Five sample	Age	480	55.73	11.07	24	79
	Female	484	0.06	0.23	0	1
	University degree	480	0.89	0.32	0	1
	Economics-course	484	0.66	0.47	0	1
	Total Portfolio	569	$ 2.29 mil.	$ 2.7 mil.	$ 1620	$ 21 mil.
	Risk-Preferences	502	104.26	49.56	0	200
	Numeracy	484	2.63	1.10	1	4
	SRI-Return	569	2.27	0.74	1	5
	SRI-Risk	569	2.71	0.74	1	5
HEXACO sample	Age	133	55.98	10.45	24	79
	Female	135	0.07	0.25	0	1
	University degree	135	0.90	0.30	0	1
	Economics-course	135	0.70	0.46	0	1
	Total Portfolio	156	$ 2.6 mil.	$ 3.86 mil.	$ 1620	$ 21 mil.
	Risk-Preferences	140	109.07	52.72	0	200
	Numeracy	135	2.66	1.13	1	4
	SRI-Return	156	2.23	0.84	1	5
	SRI-Risk	156	2.63	0.75	1	5

Table B3 Continued

Sample name	Variable Name	N	Mean	Std. Dev.	Min	Max
Empathy sample	Age	452	55.28	11.01	24	79
	Female	457	0.06	0.23	0	1
	University degree	457	0.88	0.33	0	1
	Economics-course	457	0.69	0.46	0	1
	Total Portfolio	532	$ 2.33 mil.	$ 3.25 mil.	$ 1620	$ 21 mil.
	Risk-Preferences	472	101.63	48.27	0	200
	Numeracy	455	2.57	1.13	1	4
	SRI-Return	532	2.25	0.77	1	5
	SRI-Risk	532	2.70	0.72	1	5
Dart triad sample	Age	425	55.88	10.67	24	79
	Female	435	0.05	0.22	0	1
	University degree	433	0.86	0.35	0	1
	Economics-course	434	0.67	0.47	0	1
	Total Portfolio	520	$ 2.23 mil.	$ 2.79	$ 1620	$ 21 mil.
	Risk-Preferences	449	103.85	47.50	0	200
	Numeracy	435	2.54	1.12	1	4
	SRI-Return	520	2.32	0.78	1	5
	SRI-Risk	520	2.72	0.78	1	5

Table B4 - Correlation matrix of the variables of the Big Five sample in chapter 3

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	SRI Interest	1																
2	SRI-Ever-Invested	0.22***	1															
3	Openness	0.14**	0.13**	1														
4	Conscientiousness	-0.01	-0.05	0.27***	1													
5	Extraversion	0.05	0.01	0.24***	0.11**	1												
6	Agreeableness	0.04	0.03	0.07*	0.23***	0.08**	1											
7	Neuroticism	0.06	0.07	-0.04	-0.23***	-0.14**	-0.14**	1										
8	SRI Return	0.31***	0.2***	0.08*	0	0.02	0.04	0.07	1									
9	SRI Risk	0.21***	0.16***	0.02	-0.05	0.03	-0.02	0.04	0.39***	1								
10	Risk-preferences	-0.03	0.02	0.02	0.03	0.04	0.07	-0.09	0.02	0.03	1							
11	Numeracy	0.02	0.01	-0.05	-0.03	-0.11**	0.01	-0.02**	0.01	0.02	0.19***	1						
12	Total-Portfolio	-0.07**	-0.02	0.04	-0.04	0.02	-0.08*	-0.03	-0.04**	-0.01	0.1***	0.05**	1					
13	University Degree	0	0.04**	0	0.12**	0.02**	0.08*	-0.01	0.01	0.03	0.15***	0.16***	0.12***	1				
14	Economics-course	-0.01	-0.02	-0.03	0.07	0.05	0	-0.09**	0	-0.04*	0.11***	0.07**	0.02	0.27***	1			
15	Age	-0.08**	0.03	-0.02	-0.05	0.03	-0.09*	-0.06	-0.06**	-0.03	-0.07**	-0.15***	0.11***	-0.02	-0.09**	1		
16	Female	0.08**	0.04*	0	0.05	-0.03	-0.04	0.07	0.06**	0.05**	-0.05**	-0.06**	-0.01	0.04	-0.07**	-0.01	1	
17	Ordereffect	0	-0.01	0.01	0.08*	0.01	0.11**	0.14**	0	0	-0.01	-0.01	0.01	0.02	-0.05**	0	0.02	1

Note: Table B4 presents the results for Pearson's correlation coefficients for all variables of the Big Five sample in chapter 3. * denotes 10%, ** 5 %, and *** 1% significance.

Table B5 - Correlation matrix of the variables of the HEXACO sample in chapter 3

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	SRI Interest	1																
2	SRI-Ever-Invested	0.22***	1															
3	Honest-Humility	0.18**	0.11	1														
4	Emotionality	0.17**	0.04	-0.09	1													
5	Extraversion	0.13	0.03	0.16**	-0.21**	1												
6	Agreeableness	0.18**	0.04	0.11	-0.16	0.11	1											
7	Conscientiousness	-0.01	-0.1	0.25**	-0.11**	0.18**	0.06	1										
8	Openness	0.23**	0.08	0.01	0.09	0.18**	0.05	0.09	1									
9	SRI Return	0.31***	0.2***	-0.04	0.02	-0.02	-0.07	-0.04	-0.07	1								
10	SRI Risk	0.21***	0.16***	0.14**	0.05*	0.09	0.01	-0.05	0.06	0.39***	1							
11	Risk-preferences	-0.03	0.02	-0.08	-0.1	0.12	-0.03	0.1	0.1	0.02	0.03	1						
12	Numeracy	0.02	0.01	0.06	-0.04	-0.19**	0.14	0	0.06	0.01	0.02	0.19***	1					
13	Total-Portfolio	-0.07**	-0.02	-0.17**	0.03**	-0.11	-0.07	-0.02	0.22**	-0.04**	-0.01	0.1***	0.05**	1				
14	University Degree	0	0.04*	-0.03	0.1	-0.12	0.11	-0.02	0.02	0.01	0.03	0.15***	0.16***	0.12***	1			
15	Economics-course	-0.01	-0.02	-0.11	-0.13	0.14	0.04	-0.01	-0.07	0	-0.04*	0.11***	0.07**	0.02	0.27***	1		
16	Age	-0.08**	0.03	0.11	0.03	0.25**	0	0.02	-0.11	-0.06**	-0.03	-0.07**	-0.15***	0.11***	-0.02	-0.09**	1	
17	Female	0.08**	0.04*	-0.06	0.07	0.06	0.16*	0.09	0.04	0.06**	0.05**	-0.05**	-0.06**	-0.01	0.04	-0.07**	-0.01	1

Note: Table B5 presents the results for Pearson's correlation coefficients for all variables of the HEXACO sample in chapter 3. * denotes 10%, ** 5 %, and *** 1% significance.

Table B6 - Correlation matrix of the variables of the Empathy sample in Chapter 3

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	SRI Interest	1															
2	SRI-Ever-Invested	0.22***	1														
3	Personal Distress	0.05	0.02	1													
4	Perspective Taking	0.14**	0.09**	-0.18***	1												
5	Fantasy	0.12**	0.1**	0.19***	0.21***	1											
6	Empathic concern	0.19***	0.13**	0.08*	0.38***	0.28***	1										
7	SRI Return	0.31***	0.2***	0.01	0.13**	-0.01	0.09**	1									
8	SRI Risk	0.21***	0.16***	0.09**	0.02	0.05	0.06	0.39***	1								
9	Risk-preferences	-0.03	0.02	0	0.09*	-0.04	-0.11**	0.02	0.03	1							
10	Numeracy	0.02	0.01	-0.03	0.03	0.01	-0.1**	0.01	0.02	0.19***	1						
11	Total-Portfolio	-0.07**	-0.02	-0.01	-0.05	-0.04	-0.07*	-0.04**	-0.01	0.1***	0.05**	1					
12	University Degree	0	0.04*	0.07	0.01	0.08*	0.04	0.01	0.03	0.15***	0.16***	0.12***	1				
13	Economics-course	-0.01	-0.02	-0.05	0.03	0	0.01	0	-0.04*	0.11***	0.07**	0.02	0.27**	1			
14	Age	-0.08**	0.03	0.12**	-0.02	-0.13**	0.11**	-0.06**	-0.03	-0.07**	-0.15***	0.11***	-0.02	-0.09**	1		
15	Female	0.08**	0.04*	-0.03	0	0.06	0.04	0.06**	0.05**	-0.05**	-0.06**	-0.01	0.04	-0.07**	-0.01	1	
16	Ordereffect	0	-0.01	0.02	0.08*	0.01	0.06	0	0	-0.01	-0.01	0.01	0.02	-0.05**	0	0.02	1

Note: Table B6 presents the results for Pearson's correlation coefficients for all variables of the Empathy sample in chapter 3. * denotes 10%, ** 5 %, and *** 1% significance.

Table B7 - Correlation matrix of the variables of the Short Dark Triad sample in Chapter 3

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	SRI Interest	1														
2	SRI-Ever-Invested	0.22***	1													
3	Machiavellianism	-0.01	-0.08*	1												
4	Psychopathy	-0.02	0.05	0.5***	1											
5	Neuroticism	0.06	-0.01	0.26***	0.26***	1										
6	SRI Return	0.31***	0.2***	-0.05	-0.05	-0.01	1									
7	SRI Risk	0.21***	0.16***	-0.04	-0.04	-0.06	0.39***	1								
8	Risk-preferences	-0.03	0.02	0	-0.01	0.05	0.02	0.03	1							
9	Numeracy	0.02	0.01	0.02	-0.06	-0.09*	0.01	0.02	0.19***	1						
10	Total-Portfolio	-0.07**	-0.02	-0.08*	-0.15**	-0.02	-0.04**	-0.01	0.1***	0.05**	1					
11	University Degree	0	0.04*	-0.04*	-0.13**	0.03	0.01	0.03	0.15***	0.16***	0.12***	1				
12	Economics-course	-0.01	-0.02	0.07	0.06	0.1**	0	-0.04*	0.11***	0.07**	0.02	0.27***	1			
13	Age	-0.08**	0.03	-0.02	-0.07	-0.01	-0.06**	-0.03	-0.07**	-0.15***	0.11***	-0.02	-0.09**	1		
14	Female	0.08**	0.04*	-0.07*	-0.1**	0	0.06**	0.05**	-0.05**	-0.06**	-0.01	0.04	-0.07**	-0.01	1	
15	Ordereffect	0	-0.01	-0.19	-0.04	-0.12**	0	0	-0.01	-0.01	0.01	0.02	-0.05**	0	0.02	1

Note: Table B7 presents the results for Pearson's correlation coefficients for all variables of the Short Dark Triad sample in chapter 3. * denotes 10%, ** 5 %, and *** 1% significance.

Table B8 - Marginal effects for the ordered logit regression of SRI Interest on the Big Five traits in Chapter 3

Value of dependent variable	1	2	3	4	5
Variables			SRI Interest		
Openness to Experience	-0.0583**	-0.0049**	0.0204**	0.0380**	0.0049*
	(0.0207)	(0.0022)	(0.0073)	(0.0139)	(0.0028)
Conscientiousness	0.0170	0.0014	-0.0059	-0.0111	-0.0014
	(0.0261)	(0.0023)	(0.0090)	(0.0172)	(0.0022)
Extraversion	-0.0110	-0.0009	0.0038	0.0072	0.0009
	(0.0158)	(0.0013)	(0.0055)	(0.0103)	(0.0014)
Agreeableness	-0.0135	-0.0011	0.0047	0.0088	0.0011
	(0.0236)	(0.0020)	(0.0082)	(0.0154)	(0.0021)
Neuroticism	-0.0159	-0.0013	0.0056	0.0104	0.0013
	(0.0180)	(0.0016)	(0.0064)	(0.0118)	(0.0015)
SRI-Return	-0.1822***	-0.0153***	0.0636***	0.1186***	0.0154**
	(0.0286)	(0.0045)	(0.0131)	(0.0215)	(0.0060)
SRI-Risk	-0.0407	-0.0034	0.0142	0.0265	0.0034
	(0.0315)	(0.0029)	(0.0109)	(0.0208)	(0.0030)
Risk-Preferences	0.0002	0.0000	-0.0001	-0.0001	0.0000
	(0.0004)	(0.0000)	(0.0002)	(0.0003)	(0.0000)
Numeracy	-0.0230	-0.0019	0.0080	0.0150	0.0019
	(0.0176)	(0.0015)	(0.0062)	(0.0115)	(0.0017)
Total-portfolio	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
University degree	-0.0692	-0.0058	0.0241	0.0450	0.0058
	(0.0665)	(0.0057)	(0.0234)	(0.0432)	(0.0062)
Economics-Course	-0.0219	-0.0018	0.0076	0.0142	0.0018
	(0.0427)	(0.0036)	(0.0151)	(0.0278)	(0.0036)
Age	0.0012	0.0001	-0.0004	-0.0008	-0.0001
	(0.0017)	(0.0001)	(0.0006)	(0.0011)	(0.0001)
Female	-0.0681	-0.0057	0.0238	0.0443	0.0057
	(0.0839)	(0.0071)	(0.0293)	(0.0543)	(0.0078)
Ordereffect	0.0125	0.0011	-0.0044	-0.0081	-0.0011
	(0.0401)	(0.0034)	(0.0141)	(0.0261)	(0.0033)
Constant cut1	2.1336***	2.1336***	2.1336***	2.1336***	2.1336***
	(0.7241)	(0.7241)	(0.7241)	(0.7241)	(0.7241)
Constant cut2	2.4308***	2.4308***	2.4308***	2.4308***	2.4308***
	(0.7263)	(0.7263)	(0.7263)	(0.7263)	(0.7263)
Constant cut3	3.5205***	3.5205***	3.5205***	3.5205***	3.5205***
	(0.7372)	(0.7372)	(0.7372)	(0.7372)	(0.7372)
Constant cut4	4.9642***	4.9642***	4.9642***	4.9642***	4.9642***
	(0.7562)	(0.7562)	(0.7562)	(0.7562)	(0.7562)
Observations	402	402	402	403	404
Pseudo R-squared	0.0711	0.0711	0.0711	0.0712	0.0713
Chi2	78.18	78.18	78.18	78.19	78.20
P > Chi2	1.50e-10	1.50e-10	1.50e-10	1.50e-11	1.50e-12

Note: Table B8 presents the marginal effects of a maximum-likelihood ordered logit regressions with White heteroskedasticity-consistent standard errors and covariance for the full specification. The dependent variable is a measure of interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?" The measure was scored on a 5-point Likert scale, the values of the dependent variable correspond to the following answer 1 (‘not at all interested’), 2 ('somewhat not interested'), 3 ('indifferent'), 4 ('somewhat interested') ,5 (‘very interested’). ‘Ordereffect’ is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

Table B9 - Marginal effects for the ordered logit regression of SRI Interest on the HEXACO traits in Chapter 3

Value of dependent variable	1	2	3	4	5
Variables	SRI Interest				
Honest-Humility	-0.1781**	-0.0272*	0.0384	0.1480**	0.0189
	(0.0868)	(0.0155)	(0.0236)	(0.0724)	(0.0162)
Emotionality	-0.1298**	-0.0198**	0.0280*	0.1079**	0.0137
	(0.0543)	(0.0097)	(0.0157)	(0.0457)	(0.0108)
Extraversion	-0.0084	-0.0013	0.0018	0.0070	0.0009
	(0.0608)	(0.0093)	(0.0131)	(0.0506)	(0.0065)
Agreeableness	-0.1474**	-0.0225*	0.0318*	0.1225**	0.0156
	(0.0597)	(0.0117)	(0.0191)	(0.0507)	(0.0114)
Conscientiousness	0.0385	0.0059	-0.0083	-0.0320	-0.0041
	(0.0740)	(0.0112)	(0.0159)	(0.0617)	(0.0083)
Openness	-0.1696**	-0.0259**	0.0366*	0.1410**	0.0180
	(0.0685)	(0.0144)	(0.0195)	(0.0577)	(0.0157)
SRI-Return	-0.1029**	-0.0157**	0.0222**	0.0855**	0.0109
	(0.0355)	(0.0072)	(0.0109)	(0.0308)	(0.0084)
SRI-Risk	-0.1152**	-0.0176*	0.0249*	0.0958**	0.0122
	(0.0505)	(0.0099)	(0.0146)	(0.0429)	(0.0099)
Risk-Preferences	-0.0007	-0.0001	0.0001	0.0006	0.0001
	(0.0005)	(0.0001)	(0.0001)	(0.0004)	(0.0001)
Numeracy	0.0108	0.0017	-0.0023	-0.0090	-0.0011
	(0.0298)	(0.0046)	(0.0066)	(0.0247)	(0.0032)
Total-portfolio	0.0000***	0.0000**	0.0000**	0.0000**	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
University	0.0013	0.0002	-0.0003	-0.0011	-0.0001
	(0.0818)	(0.0125)	(0.0177)	(0.0680)	(0.0087)
Economics-Course	0.0615	0.0094	-0.0133	-0.0511	-0.0065
	(0.0697)	(0.0117)	(0.0164)	(0.0592)	(0.0076)
Age	-0.0029	-0.0004	0.0006	0.0024	0.0003
	(0.0031)	(0.0005)	(0.0007)	(0.0026)	(0.0004)
Female	0.0266	0.0041	-0.0057	-0.0222	-0.0028
	(0.1192)	(0.0186)	(0.0260)	(0.0991)	(0.0129)
Constant cut1	16.3073***	16.3073***	16.3073***	16.3073***	16.3073***
	(3.6573)	(3.6573)	(3.6573)	(3.6573)	(3.6573)
Constant cut2	17.1131***	17.1131***	17.1131***	17.1131***	17.1131***
	(3.7197)	(3.7197)	(3.7197)	(3.7197)	(3.7197)
Constant cut3	19.0521***	19.0521***	19.0521***	19.0521***	19.0521***
	(3.8447)	(3.8447)	(3.8447)	(3.8447)	(3.8447)
Constant cut4	22.4897***	22.4897***	22.4897***	22.4897***	22.4897***
	(3.9218)	(3.9218)	(3.9218)	(3.9218)	(3.9218)
Observations	116	116	116	116	116
Pseudo R-squared	0.167	0.167	0.167	0.167	0.167
Chi 2	36.16	36.16	36.16	36.16	36.16
P > Chi2	0.00168	0.00168	0.00168	0.00168	0.00168

Note: Table B9 presents the marginal effects of a maximum-likelihood ordered logit regressions with White heteroskedasticity-consistent standard errors and covariance for the full specification. The dependent variable is a measure of interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?" The measure was scored on a 5-point Likert scale, the values of the dependent variable correspond to the following answer 1 (‘not at all interested’), 2 ('somewhat not interested'), 3 ('indifferent'), 4 ('somewhat interested') 5 (‘very interested’). ‘Ordereffect’ is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

Table B10 - Marginal effects for the ordered logit regression of SRI Interest on the Empathy traits in Chapter 3

Value of dependent variable	1	2	3	4	5
Variables			SRI-Interest		
Personal distress	0.0009	0.0001	-0.0002	-0.0007	-0.0001
	(0.0274)	(0.0037)	(0.0069)	(0.0211)	(-0.0001)
Perspective taking	-0.0189	-0.0026	0.0047	0.0146	0.0022
	(0.0281)	(0.0039)	(0.0071)	(0.0217)	(0.0022)
Fantasy	-0.0358	-0.0049	0.0090	0.0276	0.0041
	(0.0282)	(0.0039)	(0.0077)	(0.0215)	(0.0041)
Empathic concern	-0.0772**	-0.0105**	0.0194**	0.0595**	0.0089*
	(0.0335)	(0.0049)	(0.0091)	(0.0263)	(0.0089)
SRI-Return	-0.1608***	-0.0220***	0.0403***	0.1239***	0.0185**
	(0.0266)	(0.0054)	(0.0110)	(0.0216)	(0.0185)
SRI-Risk	-0.0645**	-0.0088**	0.0162**	0.0497**	0.0074*
	(0.0282)	(0.0042)	(0.0079)	(0.0224)	(0.0074)
Risk-Preferences	0.0002	0.0000	-0.0001	-0.0002	0.0000
	(0.0004)	(0.0001)	(0.0001)	(0.0003)	(0.0000)
Numeracy	-0.0178	-0.0024	0.0045	0.0137	0.0021
	(0.0167)	(0.0023)	(0.0042)	(0.0130)	(0.0021)
Total-portfolio	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
University	0.0950*	0.0130*	-0.0238*	-0.0732*	-0.0109
	(0.0500)	(0.0072)	(0.0141)	(0.0383)	(-0.0109)
Economics-Course	0.0107	0.0015	-0.0027	-0.0082	-0.0012
	(0.0385)	(0.0053)	(0.0097)	(0.0296)	(-0.0012)
Age	0.0034**	0.0005**	-0.0008**	-0.0026**	-0.0004*
	(0.0015)	(0.0002)	(0.0004)	(0.0012)	(-0.0004)
Female	-0.0540	-0.0074	0.0135	0.0416	0.0062
	(0.0694)	(0.0096)	(0.0180)	(0.0535)	(0.0062)
Ordereffect	0.0354	0.0048	-0.0089	-0.0273	-0.0041
	(0.0348)	(0.0047)	(0.0089)	(0.0266)	(-0.0041)
Constant cut1	2.0670***	2.0670***	2.0670***	2.0670***	2.0670***
	(0.7679)	(0.7679)	(0.7679)	(0.7679)	(0.7679)
Constant cut2	2.6038***	2.6038***	2.6038***	2.6038***	2.6038***
	(0.7704)	(0.7704)	(0.7704)	(0.7704)	(0.7704)
Constant cut3	4.4985***	4.4985***	4.4985***	4.4985***	4.4985***
	(0.7936)	(0.7936)	(0.7936)	(0.7936)	(0.7936)
Constant cut4	7.3939***	7.3939***	7.3939***	7.3939***	7.3939***
	(0.9115)	(0.9115)	(0.9115)	(0.9115)	(0.9115)
Observations	393	393	393	393	393
Pseudo R-squared	0.0862	0.0862	0.0862	0.0862	0.0862
Chi-squared	76.74	76.74	76.74	76.74	76.74
P > Chi2	1.14e-10	1.14e-10	1.14e-10	1.14e-10	1.14e-10

Note: Table B10 presents the marginal effects of a maximum-likelihood ordered logit regressions with White heteroskedasticity-consistent standard errors and covariance for the full specification. The dependent variable is a measure of interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?" The measure was scored on a 5-point Likert scale, the values of the dependent variable correspond to the following answer 1 (‘not at all interested’), 2 ('somewhat not interested'), 3 ('indifferent'), 4 ('somewhat interested'),5 (‘very interested’). ‘Ordereffect’ is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

Table B11 - Marginal effects for the ordered logit regression of SRI Interest on the Short Dark Triad traits in Chapter 3

Value of dependent variable	1	2	3	4	5
Variables			SRI-Interest		
Machiavellianism	-0.0100	-0.0012	0.0029	0.0075	0.0008
	(0.0417)	(0.0049)	(0.0122)	(0.0075)	(0.0008)
Psychopathy	-0.0055	-0.0006	0.0016	0.0041	0.0004
	(0.0461)	(0.0054)	(0.0134)	(0.0041)	(0.0004)
Narcissism	-0.0639	-0.0075	0.0186	0.0478	0.0049
	(0.0481)	(0.0057)	(0.0146)	(0.0478)	(0.0049)
SRI-Return	-0.1329***	-0.0155**	0.0387**	0.0994***	0.0103**
	(0.0302)	(0.0049)	(0.0115)	(0.0994)	(0.0103)
SRI-Risk	-0.0549*	-0.0064	0.0160*	0.0410*	0.0042
	(0.0306)	(0.0041)	(0.0087)	(0.0410)	(0.0042)
Risk-Preferences	0.0013**	0.0002**	-0.0004**	-0.0010**	-0.0001*
	(0.0004)	(0.0001)	(0.0001)	(-0.0010)	(-0.0001)
Numeracy	0.0015	0.0002	-0.0004	-0.0011	-0.0001
	(0.0180)	(0.0021)	(0.0052)	(-0.0011)	(-0.0001)
Total-portfolio	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
University	-0.0165	-0.0019	0.0048	0.0124	0.0013
	(0.0559)	(0.0065)	(0.0163)	(0.0124)	(0.0013)
Economics-Course	-0.0328	-0.0038	0.0096	0.0245	0.0025
	(0.0419)	(0.0049)	(0.0122)	(0.0245)	(0.0025)
Age	0.0013	0.0002	-0.0004	-0.0010	-0.0001
	(0.0017)	(0.0002)	(0.0005)	(-0.0010)	(-0.0001)
Female	-0.1523*	-0.0178*	0.0444	0.1139*	0.0118
	(0.0896)	(0.0106)	(0.0277)	(0.1139)	(0.0118)
Ordereffect	-0.0590	-0.0069	0.0172	0.0441	0.0046
	(0.0408)	(0.0049)	(0.0124)	(0.0441)	(0.0046)
Constant cut1	1.7539*	1.7539*	1.7539*	1.7539*	1.7539*
	(1.0100)	(1.0100)	(1.0100)	(1.0100)	(1.0100)
Constant cut2	2.3738**	2.3738**	2.3738**	2.3738**	2.3738**
	(1.0069)	(1.0069)	(1.0069)	(1.0069)	(1.0069)
Constant cut3	3.8732***	3.8732***	3.8732***	3.8732***	3.8732***
	(1.0200)	(1.0200)	(1.0200)	(1.0200)	(1.0200)
Constant cut4	6.9379***	6.9379***	6.9379***	6.9379***	6.9379***
	(1.1092)	(1.1092)	(1.1092)	(1.1092)	(1.1092)
Observations	382	382	382	382	382
Pseudo R-squared	0.0521	0.0521	0.0521	0.0521	0.0521
Chi-squared	56.71	56.71	56.71	56.71	56.71
P > Chi2	2.02e-07	2.02e-07	2.02e-07	2.02e-07	2.02e-07

Note: Table B11 presents the marginal effects of a maximum-likelihood ordered logit regressions with White heteroskedasticity-consistent standard errors and covariance for the full specification. The dependent variable is a measure of interest in investing in SRI: "To what degree would you say you are interested in investing in SRI?" The measure was scored on a 5-point Likert scale, the values of the dependent variable correspond to the following answer 1 (‘not at all interested’), 2 ('somewhat not interested'), 3 ('indifferent'), 4 ('somewhat interested'),5 (‘very interested’). ‘Ordereffect’ is a dummy taking 1 if a respondent is presented first with the personality scale, followed by the SVO slider measure, and 0 otherwise. Robust standard errors are in parentheses. * denotes significance at the 10%-level, ** at the 5%-level, and *** at the 1%-level.

Table B12 - Descriptive Statistics of control variables for all samples of Chapter 4

Sample name	Variable Name	N	Mean	Std. Dev.	Min	Max
Whole sample	Risk-Preferences	2010	103.87	48.82	0	200
	Risk literacy	1944	2.58	1.11	1	4
	Total Portfolio	3055	$ 2.35 mil.	$ 3.17 mil.	$ 1620	$ 21 mil.
	Economics-course	1944	0.69	0.46	0	1
	University degree	1941	0.88	0.33	0	1
	Age	1919	55.61	10.74	24	79
	Female	1946	0.06	0.23	0	1
Big Five sample	Risk-Preferences	502	104.26	49.56	0	200
	Risk literacy	484	2.63	1.10	1	4
	Total Portfolio	569	$ 2.29 mil.	$ 2.69 mil.	$ 1620	$ 21 mil.
	Economics-course	484	0.66	0.47	0	1
	University degree	480	0.89	0.32	0	1
	Age	480	55.73	11.07	24	79
	Female	484	0.06	0.23	0	1
HEXACO sample	Risk-Preferences	140	109.07	52.72	0	200
	Risk literacy	135	2.66	1.13	1	4
	Total Portfolio	156	$ 2.6 mil.	$ 3.86 mil.	$ 1620	$ 21 mil.
	Economics-course	135	0.70	0.46	0	1
	University degree	135	0.90	0.30	0	1
	Age	133	55.98	10.45	24	79
	Female	135	0.07	0.25	0	1
Dark Triad Sample	Risk-Preferences	449	103.85	47.50	0	200
	Risk literacy	435	2.54	1.12	1	4
	Total Portfolio	520	$ 2.23 mil.	$ 2.78 mil.	$ 1620	$ 21 mil.
	Economics-course	434	0.67	0.47	0	1
	University degree	433	0.86	0.35	0	1
	Age	425	55.88	10.67	24	79
	Female	435	0.05	0.22	0	1

Table B13 - Correlation matrix of the variables of the Big Five sample in Chapter 4

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Stock holding	1															
2	Stock share	0.06	1														
3	High-risk	0.47**	0.33***	1													
4	Low-risk	-0.09***	-0.5***	-0.17***	1												
5	Openness	0.05	-0.05	0.09**	-0.05	1											
6	Conscientiousness	-0.05	0.02	0	-0.06	0.27***	1										
7	Extraversion	0.09**	-0.08*	0.06	-0.01	0.24***	0.11**	1									
8	Agreeableness	-0.02	0.01	0.03	-0.05	0.07*	0.23***	0.08**	1								
9	Neuroticism	-0.06	-0.02	-0.09**	0.1**	-0.04	-0.23***	-0.14**	-0.14**	1							
10	Risk-preference	-0.02	0.04	0	0	0.02	0.03	0.04	0.07	-0.09**	1						
11	Risk literacy	-0.01	0.03	-0.06**	-0.01	-0.05	-0.03	-0.11**	0.01	-0.02	0.19***	1					
12	Total-Portfolio	0.06**	-0.03	0.05**	-0.1***	0.04	-0.04	0.02	-0.08*	-0.03	0.1***	0.05	1				
13	University degree	-0.01	0.02	-0.03	0	0	0.12**	0.02	0.08*	-0.01	0.15***	0.16***	0.12***	1			
14	Economics-course	0.06**	-0.01	0.03	0.01	-0.03	0.07	0.05	0	-0.09**	0.11***	0.07**	0.02	0.27***	1		
15	Age	0.05**	0.02	0.09***	-0.07**	-0.02	-0.05	0.03	-0.09*	-0.06	-0.07**	-0.15***	0.11***	-0.02	-0.09**	1	
16	Female	0.01	-0.01	-0.01	0.01	0	0.05	-0.03	-0.04	0.07	-0.05*	-0.06**	-0.01	0.04	-0.07**	-0.01	1

Note: Table B13 presents the results for Pearson's correlation coefficients for all variables of the Short Dark Triad sample in chapter 4. * denotes 10%, ** 5 %, and *** 1% significance.

Table B14 - Correlation matrix of the variables of the HEXACO sample in Chapter 4

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Stock holding	1															
2	Stock share	0.06**	1														
3	High-risk	0.47***	0.33***	1													
4	Low-risk	-0.09***	-0.5***	-0.17***	1												
5	Honest-Humility	0.11	0.04	0.02	0.01	1											
6	Emotionality	-0.02	0	-0.07	0.02	-0.09	1										
7	Extraversion	-0.1	-0.18**	-0.01	0.09	0.16**	-0.21**	1									
8	Agreeableness	0.06	-0.01	0.02	0.12	0.11	-0.16**	0.11	1								
9	Conscientiousness	-0.17**	-0.12	-0.06	0.07	0.25**	-0.11	0.18**	0.06	1							
10	Openness	0.07	-0.08	0.06	0.07	0.01	0.09	0.18**	0.05	0.09	1						
11	Risk-preference	-0.02	0.04	0	0	-0.08	-0.1	0.12	-0.03	0.1	0.1	1					
12	Risk literacy	-0.01	0.03	-0.06**	-0.01	0.06	-0.04	-0.19**	0.14	0	0.06	0.19***	1				
13	Total-Portfolio	0.06**	-0.03	0.05**	-0.1***	-0.17**	0.03	-0.11	-0.07	-0.02	0.22**	0.1***	0.05**	1			
14	University degree	-0.01	0.02	-0.03	0	-0.03	0.1	-0.12	0.11	-0.02	0.02	0.15***	0.16***	0.12***	1		
15	Economics-course	0.06**	-0.01	0.03	0.01	-0.11	-0.13	0.14	0.04	-0.01	-0.07	0.11**	0.07**	0.02	0.27***	1	
16	Age	0.05**	0.02	0.09**	-0.07**	0.11	0.03	0.25**	0	0.02	-0.11	-0.07***	-0.15***	0.11***	-0.02	-0.09**	1
17	Female	0.01	-0.01	-0.01	0.01	-0.06	0.07	0.06	0.16*	0.09	0.04	-0.05***	-0.06**	-0.01	0.04	-0.07**	-0.01

Note: Table B14 presents the results for Pearson's correlation coefficients for all variables of the Short Dark Triad sample in chapter 4. * denotes 10%, ** 5 %, and *** 1% significance.

Table B15 - Correlation matrix of the variables of the Short Dark Triad sample in Chapter 4

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Stock holding	1													
2	Stock share	0.06**	1												
3	High-risk	0.47***	0.33***	1											
4	Low-risk	-0.09***	-0.5***	-0.17***	1										
5	Machiavellianism	-0.1**	-0.03	-0.05	0.01	1									
6	Psychopathy	-0.06	-0.04	0.02	0.03	0.5***	1								
7	Neuroticism	-0.07	-0.04	-0.06	0.03	0.26***	0.26***	1							
8	Risk-preference	-0.02	0.04	0	0	0	-0.01	0.05	1						
9	Risk literacy	-0.01	0.03	-0.06**	-0.01	0.02	-0.06	-0.09*	0.19***	1					
10	Total-Portfolio	0.06**	-0.03	0.05**	-0.1***	-0.08*	-0.15**	-0.02	0.1***	0.05**	1				
11	University degree	-0.01	0.02	-0.03	0	-0.04	-0.13**	0.03	0.15***	0.16**	0.12***	1			
12	Economics-course	0.06**	-0.01	0.03	0.01	0.07	0.06	0.1**	0.11***	0.07***	0.02	0.27***	1		
13	Age	0.05**	0.02	0.09**	-0.07**	-0.02	-0.07	-0.01	-0.07**	-0.15**	0.11***	-0.02	-0.09**	1	
14	Female	0.01	-0.01	-0.01	0.01	-0.07	-0.1**	0	-0.05**	-0.06**	-0.01	0.04	-0.07**	-0.01	1

Note: Table B15 presents the results for Pearson's correlation coefficients for all variables of the Short Dark Triad sample in chapter 4. * denotes 10%, ** 5 %, and *** 1% significance.

Appendix C1

Table C1 - Description of personality traits and overview of their facets

Framework	Overarching trait	Description of the trait	Facets
Big Five	Openness to experience	The tendency to be open to new aesthetic, cultural, or intellectual experiences.	Fantasy (imaginative), Actions (wide interests) Aesthetics (artistic), Values (unconventional) Ideas (curious), Feelings (excitable)
	Conscientiousness	The tendency to be organised, responsible, and hardworking.	Competence (efficient), Achievement striving (thorough) Order (organised), Self-discipline (not lazy) Dutifulness (not careless), Deliberation (not impulsive)
	Extraversion	An orientation of one's interests and energies toward the outer world of people and things rather than the inner world of subjective experience; characterized by positive affect and sociability.	Activity (energetic), Excitement seeking (adventurous) Gregariousness (sociable), Positive emotion (enthusiastic) Warmth (outgoing), Assertiveness (forceful)
	Agreeableness	The tendency to act in a cooperative, unselfish manner.	Trust (forgiving), Compliance (not stubborn) Tender-mindedness (sympathetic), Modesty (not show-off) Altruism (warm), Straightforwardness (not demanding)
	Neuroticism (Emotional Stability)	Neuroticism is a chronic level of emotional instability and proneness to psychological distress. Emotional stability is predictability and consistency in emotional reactions, with absence of rapid mood changes.	Anxiety (tense), Self-consciousness (shy) Vulnerability to stress (not self-confident), Angry hostility (irritable) Depression (not concerned), Impulsiveness (moody)
HEXACO	Honest-Humility	Reciprocal altruism (fairness). The tendency to be fair and genuine in dealing with others, in the sense of cooperating with others even when one might exploit them without suffering retaliation.	Sincerity, Greed avoidance Fairness, Modesty
	Emotionality	Tendencies related to kin altruism, such as empathy/attachment towards close others. But also harm-avoidant, and help seeking behaviours that are associated with investment in kin.	Fearfulness, Dependence Anxiety, Sentimentality
	Extraversion	Engagement in social endeavors. The tendency to be excitable and dramatic in one's interpersonal style; comfort and confidence within a variety of social situations; enjoy conversations, social interactions and parties; enthusiastic and energetic.	Expressiveness, Sociability Social Boldness, Liveliness
	Agreeableness (versus Anger)	Reciprocal altruism (tolerance). The tendency to be forgiving and tolerant of others, in the sense of cooperating with others even when one might be suffering exploitation by them.	Forgiveness, Flexibility Gentleness, Patience
	Conscientiousness	Engagement in task-related endeavours. The tendency to seek order in one's physical surroundings; to work hard; to be through and concerned with details; to deliberate carefully and to inhibit impulses.	Organisation, Perfectionism Diligence, Prudence
	Openness to experience	Engagement in idea-related endeavours. The tendency to enjoy beauty in art and nature; to seek information about, and experiences with, the natural and human world; to have preference for innovation and experiment; to accept the unusual.	Aesthetic appreciation Inquisitiveness, Creativity

Framework	Overarching trait	Description of the trait	Facets
Empathy	Emotional empathy*	The emotional responses that a person may experience as a result of sharing social emotions	Empathic concern - "Other oriented" feelings of sympathy and concern for unfortunate others. Personal Distress - "Self oriented" feelings of personal anxiety and unease in tense interpersonal settings.
	Cognitive Empathy*	The Capacity to understand social reasoning and social emotions of others.	Perspective Taking - The tendency to spontaneously adopt the psychological point of view of others. Fantasy - The tendency to transpose oneself imaginatively into the feelings and actions of fictitious characters in books, movies, and plays
Dark Triad	Machiavellianism	The tendency to be a cold hearted, cynical, pragmatic manipulator who is motivated by long-term goals typically related to money and power, who is not afraid to use deceit and exploitation to achieve these goals.	Reputation (protecting one's reputation), Coalition building Cynicism, Planning
	Psychopathy	The tendency to be affectively callous (mean) engage in manipulative behaviour, have a lack of self-control, an erratic lifestyle, engage in anti-social behaviour, and have low-levels of empathy.	Antisocial behaviour, Callous affect (retaliation against others) Erratic Lifestyle, Short-term manipulation
	Narcissism	The tendency to be exhibitionistic and exaggerate one's own achievements, to pursue goals for the purpose of societal admiration, and see oneself as a natural leader.	Leadership (viewing oneself as natural leader), Grandiosity Exhibitionism, Entitlement

Note: Emotional empathy and Cognitive empathy are defined as systems, rather than traits, nevertheless the conceptualisation is similar which is why I include them under the colu 'Overarching trait'. The description of the Big Five traits is adopted from (John and Srivastava 1999). The description of the HEXACO traits is adopted from (Lee and Ashton 2004; Ashton Lee 2009). The description of the empathy traits is adopted from (Davis 1980). The description of the Machiavellianism is a paraphrase from (Jones and Paulhus 2009; John F. Rauthmann Kolar 2012). The description of Psychopathy is a paraphrase of (Rauthmann 2012 ; Furnham et al. 2013). The description of Narcissism is a paraphrase from (Paulhus and Williams 2002) (Jones and Paulhus 2014). The facets of the Big Five are adopted from (John and Srivastava 1999) and (Costa and McCrea 1992), for the Big Five facets parentheses show adjectives correlated substantially with scores on that facet, I include these for clarification. The facets of the HEXACO are adopted from (Lee and Ashton 2004). The facets of Empathy are adopted fi Davis (1980;1983). The Facets of the Dark Triad are adopted from (Paulhus and Williams 2002). All facets in the column "Facets measured in this study" relate to the three instruments I emp to ascertain inestor's personality. The BFI-S for the Big Five (Gerlitz and Schupp 2005), HEXACO-60 (Ashton and Lee 2009), and the SD3 for the Dark Triad (Jones and Paulhus 2014).

Table C2 - Key Common Features of the Dark Triad of Personality

Feature	Machiavellianism	Psychopathy	Narcissism
Callousness	+++	+++	+++
Impulsivity	+	+++	++
Manipulation	+++	+++	++
Criminality	Only white-collar	+++	+
Grandiosity	+	++	+++

Note: Table C2 illustrates the common features of the Dark Triad traits and the strength of their association within each trait. A triple plus sign indicates high levels of a given trait (top quintile) relative to the average population-wide level. A double plus sign indicates slightly elevated levels (top tertile). A single plus sign indicates average levels of a trait. Table 1 is adopted in part from Paulhus (2014). The original table also included the dark trait "Sadism" which I did not measure in the thesis and hence did not include. I also do not include a sixth Feature from the original table labeled "Enjoyment of Cruelty" which is a cardinal feature of Sadism but not of the other three traits.

Appendix D - Additional analyses for chapter 4

Table D1 - Tobit regressions of Stock share, High-risk, and Low-risk on the Big Five traits

Column No.	1	2	3	4	5
Variables	Stock share		High-risk		Low-risk
Openness	-0.6066	0.6220	-0.1456	0.1748	0.6902
	(0.9588)	(0.7088)	(1.7564)	(1.7046)	(2.0433)
Conscientiousness	1.4596	-0.6932	1.5249	0.1698	-1.4297
	(1.0835)	(0.8434)	(1.7701)	(1.6898)	(1.6449)
Extraversion	-0.7277	-0.4490	-0.7415	-0.4278	-0.8082
	(0.7452)	(0.6192)	(1.2479)	(1.0863)	(1.2681)
Agreeableness	-0.4240	-1.3748*	-0.5580	-1.1104	-2.4566
	(1.0151)	(0.8237)	(1.5476)	(1.4704)	(1.9024)
Neuroticism	0.4481	0.2287	0.0709	-2.1068*	1.8408
	(0.8191)	(0.5983)	(1.2978)	(1.2074)	(1.3915)
Risk-preference	0.0250	-0.0179	0.0465	0.0177	-0.0359
	(0.0202)	(0.0153)	(0.0308)	(0.0298)	(0.0336)
Risk literacy	-0.9336	0.7973	-2.7913**	-2.3610*	0.2192
	(0.8776)	(0.6804)	(1.3806)	(1.3352)	(1.5533)
Total-portfolio	-0.0000*	-0.0000	-0.0000*	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
University degree	3.6850	0.8266	-3.2498	-1.7175	4.4901
	(3.2305)	(2.0025)	(5.7974)	(5.1881)	(4.9586)
Economics-course	-0.9042	-1.9440	4.6405	3.2387	-1.4145
	(2.0290)	(1.5378)	(3.1254)	(2.9766)	(3.8632)
Age	-0.0137	0.0151	0.1481	-0.0511	-0.1080
	(0.0891)	(0.0651)	(0.1429)	(0.1414)	(0.1632)
Female	2.0424	1.1982	-12.2043*	-5.6991	-7.2077
	(3.8930)	(2.9987)	(6.5511)	(11.2312)	(5.3816)
Constant	75.2265***	93.9565***	50.7002***	89.6381***	35.8663*
	(10.4739)	(7.8148)	(18.7735)	(16.4944)	(20.0067)
Observations	372	257	253	150	211
Pseudo R2	0.00377	0.00631	0.00712	0.00781	0.00780
F-Statistic	1.001	1.141	1.387	0.747	0.891
Prob > F	0.447	0.327	0.173	0.704	0.557
N (left-censored)	25	2	29	21	70
N (uncensored)	320	228	219	124	139
N (right-censored)	27	27	5	5	2

Note: Table D1 reports the results for tobit regressions. The dependent variable 'Stock share' is the aggregate proportion of investors' portfolios invested in stocks directly and indirectly through mutual funds, in percentage terms. 'High-risk' is the aggregate proportion of investors' portfolios invested in stocks, derivatives, and hedge funds, in percentage terms. The dependent variable 'Low-risk' is the aggregate proportion of the investor's portfolio held in cash and savings accounts in percentage terms. The samples in the tobit regressions reported in columns 1 and 2 are restricted to investors who invest at least 50% and 66% in 'Stock share' respectively. The lower limit of the tobit in column 1 is set at 50, the upper limit at 100. The lower limit for the tobit in column 2 is set at 66, the upper limit at 100. The sample of the tobit regressions reported in columns 3 and 4 is restricted to investors who invest at least 30% and 50% in 'High-risk' respectively. The lower limit for the tobit in column 3 is set at 30, the upper limit at 100. The lower limit for the tobit in column 4 is set at 50, the upper limit at 100.The sample in the tobit regression reported in column 5 is restricted to only those investors who hold at least ten percent of their portfolio in the assets pertaining to 'Low-risk' the lower limit for this tobit regression is set at 10 and the upper limit is set at 100.

Table D2 - Additional analyses - tobit regressions of Stock share, High-risk, and Low-risk on the HEXACO traits

Column No.	1	2	3	4	5
Variables	Stock share		High-risk		Low-risk
Honest-Humility	2.4763	0.8785	5.8669	1.6525	1.4914
	(3.7877)	(2.6185)	(6.6212)	(6.7951)	(9.0094)
Emotionality	-1.1614	-2.6416	1.2167	-2.6496	-5.4164
	(2.9591)	(2.1497)	(4.5905)	(3.4353)	(8.0629)
Extraversion	-4.3757	-5.3218**	-14.4125*	-18.0706***	-6.4662
	(4.3680)	(2.1868)	(7.3553)	(5.3279)	(8.4779)
Agreeableness	0.0794	3.6135	-4.5140	2.6479	2.9001
	(3.6636)	(2.3535)	(6.0646)	(5.2424)	(8.6625)
Conscientiousness	-0.0996	-0.6456	8.1211	10.8999*	7.5617
	(4.0751)	(2.8115)	(5.9515)	(5.4244)	(9.1854)
Openness	2.8672	1.9652	11.9271**	6.6869	12.9457
	(3.8682)	(2.3785)	(5.1510)	(4.2784)	(9.0699)
Risk-preference	0.0097	0.0116	-0.1468**	-0.0947	0.1025
	(0.0344)	(0.0233)	(0.0560)	(0.0579)	(0.0764)
Risk literacy	-0.2485	0.1184	0.1721	-3.7882	2.0715
	(1.5168)	(1.0291)	(2.3917)	(2.2833)	(3.3715)
Total-portfolio	0.0000	0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
University degree	0.9302	-1.6851	1.0882	5.3699	27.5835
	(6.4720)	(2.5296)	(10.4876)	(10.4097)	(17.1168)
Economics-course	2.5222	-3.2846	-0.2732	-0.2848	6.4560
	(3.8615)	(2.4010)	(6.8323)	(5.6203)	(11.1093)
Age	-0.0882	-0.1938*	0.4611*	0.2461	0.3804
	(0.1596)	(0.0991)	(0.2472)	(0.2081)	(0.3467)
Female	2.7654	-2.8325	-5.7039	2.8907	9.1861
	(4.3356)	(2.4438)	(17.4278)	(12.1058)	(11.2770)
Constant	75.3374***	102.1073***	13.7379	60.9317	-101.9267
	(27.0239)	(16.8624)	(35.1068)	(39.9173)	(77.1257)
Observations	95	68	71	44	62
Pseudo R2	0.00602	0.0366	0.0370	0.0525	0.0206
F-Statistic	0.429	2.173	1.941	3.085	0.757
Prob > F	0.955	0.0234	0.0437	0.00499	0.699
N (left-censored)	5	0	6	4	24
N (uncensored)	87	65	62	37	37
N (right-censored)	3	3	3	3	1

Note: Table D2 reports the results for maximum-likelihood tobit regressions. The dependent variable 'Stock share' is the aggregate proportion of investors' portfolios invested in stocks directly and indirectly through mutual funds, in percentage terms. 'High-risk' is the aggregate proportion of investors' portfolios invested in stocks, derivatives, and hedge funds, in percentage terms. The dependent variable 'Low-risk' is the aggregate proportion of the investor's portfolio held in cash and savings accounts in percentage terms. The samples in the tobit regressions reported in columns 1 and 2 are restricted to investors who invest at least 50% and 66% in 'Stock share' respectively. The lower limit of the tobit in column 1 is set at 50, the upper limit at 100. The lower limit for the tobit in column 2 is set at 66, the upper limit at 100. The sample of the tobit regressions reported in columns 3 and 4 is restricted to investors who invest at least 30% and 50% in 'High-risk' respectively. The lower limit for the tobit in column 3 is set at 30, the upper limit at 100. The lower limit for the tobit in column 4 is set at 50, the upper limit at 100.The sample in the tobit regression reported in column 5 is restricted to only those investors who hold at least ten percent of their portfolio in the assets pertaining to 'Low-risk' the lower limit for this tobit regression is set at 10 and the upper limit is set at 100.

Table D3 - Additional analyses - tobit regressions of Stock share, High-risk, and Low-risk on the Dark Triad traits

Column No.	1	2	3	4	5
Variables	Stock share		High-risk		Low-risk
Machiavellianism	1.8160	1.5160	2.5577	2.5681	-0.0134
	(1.9874)	(1.5054)	(3.2892)	(3.1105)	(2.7559)
Psychopathy	1.5158	-0.5494	6.0342	9.7831***	5.5272
	(2.0580)	(1.7951)	(3.8449)	(3.2063)	(3.8905)
Narcissism	-3.1482	-4.6316***	-2.8392	-4.3655	-2.0279
	(2.1316)	(1.6917)	(3.9192)	(4.0162)	(2.9158)
Risk-preference	0.0423**	0.0119	0.0688**	0.0510	0.0243
	(0.0183)	(0.0160)	(0.0341)	(0.0339)	(0.0362)
Risk literacy	0.2420	-0.0939	-0.7317	-0.6698	-1.5527
	(0.8287)	(0.6921)	(1.5961)	(1.5481)	(1.4064)
Total-portfolio	-0.0000	-0.0000*	-0.0000	0.0000	-0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
University degree	-1.8869	2.3738	-1.8291	-3.0254	0.2605
	(2.5211)	(2.1727)	(5.2625)	(4.9027)	(5.8088)
Economics-course	-1.3974	-0.1812	-5.1442	-0.4302	0.2778
	(1.9423)	(1.5492)	(3.5308)	(3.5691)	(3.3653)
Age	0.0949	-0.0152	0.3147*	0.1129	-0.0015
	(0.0991)	(0.0773)	(0.1629)	(0.1755)	(0.1811)
Female	-4.6785	3.4133	4.8048	-1.7369	-6.7113
	(3.7130)	(3.2904)	(4.7632)	(4.4183)	(6.5192)
Constant	70.8369***	92.2225***	30.3377*	47.9668***	15.3426
	(10.3850)	(8.3093)	(17.9945)	(17.4336)	(16.3969)
Observations	344	250	204	135	180
Pseudo R-Sq.	0.00591	0.00826	0.00856	0.0152	0.0126
F-Stat	1.855	1.644	1.535	1.657	1.334
Prob > F	0.0506	0.0949	0.129	0.0981	0.216
N (left-censored)	17	2	16	16	54
N (uncensored)	311	232	180	111	125
N (right-censored)	16	16	8	8	1

Note: Table D3 reports the results for tobit regressions. The dependent variable 'Stock share' is the aggregate proportion of investors' portfolios invested in stocks directly and indirectly through mutual funds, in percentage terms. 'High-risk' is the aggregate proportion of investors' portfolios invested in stocks, derivatives, and hedge funds, in percentage terms. The dependent variable 'Low-risk' is the aggregate proportion of the investor's portfolio held in cash and savings accounts in percentage terms. The samples in the tobit regressions reported in columns 1 and 2 are restricted to investors who invest at least 50% and 66% in 'Stock share' respectively. The lower limit of the tobit in column 1 is set at 50, the upper limit at 100. The lower limit for the tobit in column 2 is set at 66, the upper limit at 100. The sample of the tobit regressions reported in columns 3 and 4 is restricted to investors who invest at least 30% and 50% in 'High-risk' respectively. The lower limit for the tobit in column 3 is set at 30, the upper limit at 100. The lower limit for the tobit in column 4 is set at 50, the upper limit at 100.The sample in the tobit regression reported in column 5 is restricted to only those investors who hold at least ten percent of their portfolio in the assets pertaining to 'Low-risk' the lower limit for this tobit regression is set at 10 and the upper limit is set at 100.