The relationship between psychopathy and financial risk and time preferences

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Abstract

**Purpose** – The purpose of this paper is to examine the relationship between psychopathy and its underlying traits and financial risk and time preferences.

**Design/methodology/approach** – The authors measure risk and time preferences using both the cumulative prospect theory and quasi-hyperbolic time discounting in a sample of business majors. The Psychopathic Personality Inventory – Revised test is then used to measure the global psychopathy and eight primary and two secondary traits of the sample of business majors. The measures of psychopathy are used as explanatory variables to model variation in subjects’ time and risk preferences.

**Findings** – The authors find that the overall score on the continuum of psychopathy is positively related to the linearity of the cumulative prospective utility function. A breakdown of psychopathy into its secondary and primary traits shows a more complex relation. For example, the secondary trait of self-centered impulsivity is statistically significant in models of financial risk preference determinants under the cumulative prospect theory. The authors find that the primary traits of self-centered impulsivity and stress immunity are related to a higher time preference discount rate under quasi-hyperbolic time preferences.

**Originality/value** – This paper adds to the literature on personality and financial decisions and highlights the importance of psychopathy in finance.

**Keywords**  Loss aversion, Time preferences, Risk preferences, Financial psychopath, Present bias

**Paper type**  Research paper

### 1. Introduction

Psychopaths make up about 1% of the general population ([Hare, 1991](#)). However, up to 4% of finance and economics professionals are clinically diagnosed psychopaths ([Babiak and Hare, 2000](#)).

**JEL classification** – A12, D03, G02, G11

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Christopher Bayer, a notable psychologist who specializes in Wall Street professionals, argues that the number of psychopaths working on Wall Street is closer to 10% (DeCovny, 2012). Robert Hare, a leading researcher in psychopathy, states that “If [he] wasn’t studying psychopaths in prison, [he’d] do it at the stock exchange” (Babiak and Hare, 2006). Additional prima facie evidence of the high prevalence of psychopathy in the finance/economics professions comes from criminology and legal studies of ponzi schemes, embezzlement, insider trading and other white-collar crimes. For example, research shows that white-collar criminals score significantly higher on psychopathy tests than non-white-collar criminals (Ragatz et al., 2012) [1].

The term “corporate/financial psychopath” has been used to describe individuals working in business or finance who have a questionable conscience, and are willing to lie, manipulate others and be ruthless to gain a financial advantage. For example, Boddy (2015) claims that many senior employees of Enron, including its CEO, exhibited traits of the stereotypical psychopath, which is consistent with the rampant white-collar criminality that led to the collapse of the corporation. Previously, Boddy et al. (2010) showed that corporate psychopaths have a significantly negative influence on the value of corporations. Additionally, Babiak et al. (2010) show that while financial psychopaths can rate well in creativity, strategic thinking and communication skills, they tend to rate poorly in cooperation, management skills and overall accomplishments.

The findings in this paper show that the psychopathy trait plays an important role in financial decision-making. Our results add to the growing literature that personality traits (in our case, abnormal traits) drive many investment choices (Chitra and Sreedevi, 2011; Conlin et al., 2015), stock market performance (Durand et al., 2008), the disposition effect (Durand et al., 2013a), overconfidence (Durand et al., 2013b), risk aversion (Filbeck et al., 2005), loss aversion (Durand et al., 2019), trading behavior (Durand et al., 2008; Durand et al., 2013a; Tauni et al., 2017; Oehler et al., 2018; Oehler et al., 2019), risk tolerance (Wong and Carducci, 2016) and financial delinquency (Parise and Peijnenburg, 2017). In focusing only on psychopathic traits in the current analysis, we leave the question of how other psychological models might relate to the variables modeled in this paper for future research.

Given the high prevalence of clinical psychopaths in the financial industry, it is imperative to examine the association between psychopathic traits and financial decision-making. Psychopathy has been implicated in a wide range of social risk reward decisions. However, its role in financial decisions is poorly understood [2]. This paper demonstrates that psychopathic personality factors have a significant influence on financial decisions. Specifically, we measure the financial risk and time preferences of 118 subjects using two prominent behavioral models of investor preferences: cumulative prospect theory (CPT) and quasi-hyperbolic time discounting (QTD). We then use data on the psychopathy trait and its primary and secondary traits measured for our subjects to examine if these behavioral features are associated with their preferences. We find that financial risk and time preferences have statistically significant associations with overall (global) psychopathy trait and its primary and secondary traits. We also find that higher levels of the psychopathy trait, self-centered impulsivity and rebellious nonconformity are associated with more rational risk preferences in the form of more linear utility functions and lower levels of risk aversion. Furthermore, self-centered impulsivity and carefree nonplanfulness are negatively related to rational decision-making in a discounting rate time preference sense, as individuals with high scores on self-centered impulsivity have significant difficulties delaying gratification, and higher scores of carefree nonplanfulness are associated with the present bias.

Our study is, to our knowledge, one of the first to examine the role of psychopathy on financial choices in greater depth than previously done, by examining the role of its various components. Generally, however, studies examining the role of psychopathy in social decision making and behavior use the umbrella (global) psychopathy trait and a sample of incarcerated
individuals. The use of an incarcerated sample creates severe limitations in this line of research, including cohesion and survivorship bias. We avoid these drawbacks by using a sample of business students, which is potentially more representative of the population of finance professionals.

The rest of this paper is organized as follows. Section 2 reviews the literature on psychopathy and decision-making. Section 3 describes the design of the study. The results are reported in Section 4, and Section 5 concludes the study.

2. Overview of the literature
2.1 Portrait of the “financial psychopath” in the literature
Research examining the behavior of financial economists versus non-financial economists in financial decision-making shows that financial economists often engage in greater antisocial behaviors than their counterparts [3]. For example, financial economists are more likely than non-financial economists to free ride and not contribute toward the public good (Marwell and Ames, 1981), to give less to charity (Frank et al., 1993), to care less about fairness (Carter and Irons, 1991), to engage in greedy behavior (Long et al., 2011) and to be more willing to bribe an official for personal gain (Frank and Schulze, 2000). Gandal et al. (2005) explain this antisocial behavior by finding that individuals who are exposed to the self-interest model place more value on achievement and less value on the welfare of others compared to individuals who have not been exposed to the self-interest model [4].

“In mainstream psychology, antisocial personality disorder has been referred to as psychopathy” (DSM-5, p. 659). Shank (2018) finds that business majors are more psychopathic than non-business majors. Similarly, Kowalski et al. (2017) find that narcissism and psychopathy are traits related to individuals pursuing business careers, while Vedel and Thomsen (2017) find that business students have higher scores of narcissism, Machiavellianism and psychopathy compared to psychology, law and political science students. This paper expands the related literature by examining whether finance majors score significantly differently on the various psychopathy sub-traits than other majors.

Schneider and Prasso (2002) show that top business schools deteriorate the morals of their MBA students. As students progress through their program, students change their views of what the priority of a company should be. At the start of the program, students emphasize satisfying customers; in the end, they focus more on maximizing shareholder value. Richards et al. (2002) suggest that the business curriculum may cause unethical behavior. Others argue that the social environment of the business school may shape individuals’ values and behavior differently for students with different majors (Sims and Keon, 1999, 2000). In fact, Cohn et al. (2014) argue that the culture in the financial industry could cause psychopathic behavior.

2.2 Psychopathy and financial risk preferences
Research shows that psychopaths display greater risk-taking behavior than non-psychopaths in an economic setting using the Iowa gambling task (Blair et al., 2001; Mitchell et al., 2002). Additionally, Jones (2014) finds that the gambling behavior of psychopaths is more likely to incorporate biases that are associated with detrimental outcomes. Incarcerated psychopaths also display significantly lower levels of loss aversion in a lottery type of task, even to their detriment (Newman et al., 1987). Gambling tasks (such as the Iowa gambling task), however, may only focus on one specific area of behavioral finance, such as lottery-seeking. It may not allow for conclusions to be drawn about more general aspects of behaviorally driven decision-making, such as the prospect theory (a focus of the subsequent analyses) where the asymmetry between expected gains and losses has a much more
general application to financial decision-making. Additionally, the results using an incarcerated sample may not be applicable to finance professionals in general. We contribute to the literature in two ways. First, we use arguably better measures of financial risk-taking (discussed in Section 3.2) to understand decision-making than lottery tasks or the Iowa gambling task. Lottery tasks fail to examine loss aversion or time preferences, and the Iowa gambling task is a learning task designed to investigate the function of the orbitofrontal cortex. Second, we consider the sub-traits that make up the umbrella term of psychopathy (discussed in Section 3.3).

Rebellious nonconformity, Machiavellian egocentricity and stress immunity are among the best understood primary traits of psychopathy. In general, the literature indicates that rebellious nonconformity has a positive relationship with social risk-taking. For example, Edens et al. (2008), among others, find that rebellious nonconformity is positively related to the number of infractions committed by inmates. Alternatively, research shows that stress immunity has a negative relation with risk-taking. That is, individuals who are less stressed exhibit lower levels of loss aversion (Kandasamy et al., 2014; Schulkin et al., 1994; Nofsinger et al., 2018) and exhibit fewer investment biases (Nofsinger et al., 2020). Shank (2018) finds that Machiavellian egocentricity, rebellious nonconformity, stress immunity as well as second-order traits of self-centered impulsivity, fearless dominance and overall psychopathy levels are related to deceiving others for financial gain [5].

Moreover, research shows that narcissism, which is related to Machiavellian egocentricity, makes individuals more overconfident, regardless of whether they turn out to be right or wrong (Campbell et al., 2004). Narcissism also increases gambling frequency and monetary expenditures (Lakey et al., 2008) and increases risk-taking in the Iowa gambling task (Brunell and Buelow, 2017). Finally, self-centered impulsivity (SCI) is linked to sensation-seeking and social risk-taking (Edens et al., 2008; Uzieblo et al., 2007). However, most of these studies look at social risk-taking rather than financial risk-taking. Therefore, we examine the impact of psychopathic sub-traits (see Subsection 3.3 for a more detailed explanation) in a financial setting and expect many psychopathic underlying traits to be related to loss aversion, diminishing curvature and distortion of probability [6].

Medical research shows that clinically diagnosed psychopaths have unique neurological differences. Notably, psychopaths have structural (i.e. anatomical) and functional (i.e. physiological) differences in the amygdala and prefrontal cortex – areas responsible for regulating emotions, financial decision-making, fear, stress resilience, pleasure, monetary reward-seeking behavior and higher cognitive functions (Kiehl et al., 2001; Blair, 2007; Blair, 2008; Glenn et al., 2009; Yang et al., 2009). Furthermore, amygdala hypoactivity results in a reduction of loss aversion during financial tasks (Bechara et al., 1999; De Martino et al., 2010; Sokol-Hessner et al., 2012; Weber et al., 2007) [7]. Overall, these studies provide a biological explanation for the unique decisions made by psychopaths and a foundation for our hypothesis that psychopathic traits are related to financial decision-making.

2.3 Psychopathy and financial time preferences

Edens and McDermott (2010) use the Barratt Impulsivity Scale and find that inmates with high overall psychopathy and high SCI scores (consisting of carefree nonplanfulness, impulsive nonconformity, Machiavellian egocentricity and blame externalization) exhibit higher levels of impulsivity than the average inmate population. Additionally, Newman et al. (1992) find that inmates with clinically high psychopathy scores are less likely to delay gratification [8]. Additionally, Jones and Paulhus (2011) find that overall psychopathy is linked to dysfunctional impulsivity, which suggests that psychopaths’ impulsivity stems from poor self-regulation. Moreover, Lapierre et al. (1995) find that psychopaths have a
structural deficit in the orbitofrontal-ventromedial, which may explain their impulsive behavior. From these studies, we expect psychopathic traits to be significantly related to financial time preferences consistent with being impatient and impulsive.

3. Method
3.1 Participants
To create a sample of individuals who have been exposed to the self-interest model of economics, we recruit subjects from upper-level undergraduate finance and economics courses required for all business majors. With Institutional Review Board (IRB) and instructor approval, a total of 135 individuals were recruited and took part in the study. The participants were offered a small amount of bonus points toward their course grade as an incentive to participate in this study. Luccasen and Thomas (2014) find that no significant difference in outcomes can be detected in experiments using class credit versus monetary incentives.

To receive credit, the participants had to complete three questionnaires. First, the Psychopathic Personality Inventory – Revised (PPI-R) test is used to measure eight primary psychopathic traits, two secondary psychopathic traits and a global psychopathy trait (Lilienfeld et al., 2005) [9]. The PPI-R is equipped with two validity scales that detect whether subjects display defensiveness, malingering, careless or random responding. Second, we use the dynamic experiments for estimating preferences (DEEP) methodology (Toubia et al., 2013) to measure three types of financial risk preferences and two types of financial time preferences [10]. DEEP has been used in previous experimental research, such as Nofsinger and Shank (2018) and Patterson and Shank (2020). At the beginning of the DEEP risk and time surveys, the subjects are given instructions about the tasks and are asked to answer a few simple questions to ensure that they understand the various aspects of the study and topics such as probabilities and the time value of money. Third, the participants completed a demographic survey. Overall, seven participants were disqualified due to invalid responses in the PPI-R survey, and ten participants were disqualified for failing to fill out the required demographics questionnaire (third questionnaire).

Table 1 summarizes the characteristics of the sample. The sample is composed of 118 subjects, with 51 males (43%) and 67 females (57%). The median age of all participants is 22.7 years, with a standard deviation of 5.2 years. Additionally, 32 of the 118 (27%) subjects are finance majors, with 16 being male and 16 being female.

The sample size of 118 subjects is consistent with previous papers in the experimental finance literature. By way of comparison, other papers examining the impact of personality traits on financial decisions, Durand et al. (2008) use 18 subjects, Durand et al. (2013a, 2013b) use 115 subjects, Durand et al. (2013a, 2013b) use 61 subjects, Durand et al. (2019) use 128

<table>
<thead>
<tr>
<th>Total</th>
<th>Male</th>
<th>Female</th>
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<tr>
<td>118</td>
<td>51</td>
<td>67</td>
</tr>
<tr>
<td>Age</td>
<td>24.6</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>22.7</td>
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</tr>
<tr>
<td>Accounting</td>
<td>28</td>
<td>Finance</td>
</tr>
<tr>
<td>32</td>
<td>9</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 1. Subject sample statistics

Note: This table reports the subjects’ sample statistics of gender, age and academic major
subjects and Filbeck et al. (2005) use 68 subjects. As such, we view that our sample of 118 subjects provides us with a reasonable sample size to examine our research question of how psychopathic personality traits relate to financial decision-making. We accept, however, that as with any experiment, it would always have been helpful to work with an even larger sample.

3.2 Measuring financial risk and time preferences
Economics often uses mathematical functions to represent people’s preferences. DEEP captures risk and time preferences by dynamically adjusting the series of questions presented to each subject while using data about the distribution of the parameters. Preferences are elicited by finding the convergence on the simulations of two influential models of people’s financial choices: CPT and QTD models.

CPT has the following main features: a value function defined on gains and losses explaining how sensitive individuals are to changes in wealth (instead of total wealth), a loss-aversion feature reflecting how sensitive individuals are to losses and gains of the same amount and probability weightings considering how individuals tend to weigh probabilities in a nonlinear fashion, largely near certainty. These parameters are captured by giving the subject a series of pairs of gambles, defined by \( \{x, p, y\} \) where the outcome of the gamble is equal to \( x \) with a probability \( p \) and equal to \( y \) with a probability \( 1-p \). These parameters extract the distortion of probabilities (\( \alpha \)), the curvature of the value function (\( \sigma \)) and the degree of loss aversion (\( \lambda \)). A truncated normal distribution is used to ensure that the parameters stay within an acceptable range. We, thus, impose \( \alpha \in [0.05, 2] \), \( \sigma \in [0.05, 2] \) and \( \lambda \in [0,10] \) following Toubia et al. (2013). The utility or value of a gamble can, therefore, be denoted by \( U(x, p, y, \alpha, \sigma, \lambda) \) and is equal to:

\[
\begin{cases} 
  v(y, \sigma) + \pi(p, \alpha)(v(x, \sigma) - v(y, \sigma)) & \text{if } x > y > 0 \text{ or } x < y < 0 \\
  \pi(p, \alpha)v(x, \sigma) + \pi(1-p, \alpha)v(y, \sigma) & \text{if } x < 0 < y 
\end{cases}
\]

where

\[
v(x, \sigma) = \begin{cases} 
  x^\alpha & \text{for } x > 0 \\
  -\lambda (-x)^\alpha & \text{for } x < 0 
\end{cases}
\]

and where \( \pi(p, \alpha) = \exp[-(-\ln p)^\alpha] \).

When \( x \) and \( y \) have the same sign, \( v(y, \sigma) \) acts as the value reference point, \( \pi(p, \alpha) \) is how much the individual weights the probability \( p \) and \( v(x, \sigma) - v(y, \sigma) \) is the utility of the gamble. When \( x < 0 < y \), the term \( \pi(p, \alpha)v(x, \sigma) + \pi(1-p, \alpha)v(y, \sigma) \) represents the perceived weighted average of the loss and the gain. The parameters are elicited by asking subjects a series of choices between pairs of gambles where the decisions are indexed by \( i (i = 1, \ldots, I) \), whereby \( w_i \) denotes the vector of decisions for subject \( i \): \( w_i = [\alpha_0, \alpha_i, \lambda_i] \). Questions are indexed by \( j (j = 1, \ldots, J) \), where question \( j \) for subject \( i \) entails choosing between gamble \( X^A_j = \{x^A_{ij}, p^A_{ij}, y^A_{ij}\} \) and gamble \( X^B_j = \{x^B_{ij}, p^B_{ij}, y^B_{ij}\} \). A value of \( \alpha \) that is lower (higher) than 1 reduces (increases) the weight of the probability \( p \). When \( \alpha \) is exactly equal to 1, the probability \( p \) remains unchanged. Additionally, a \( \sigma \) value of 1 yields a linear utility function, while values greater than 1 imply more curvature in the value function and values less than 1, and vice versa. Finally, higher values of \( \lambda \) capture higher levels of loss aversion.
In the time preference survey, the subjects are presented with two situations where they must choose between a smaller but nearer reward and a larger reward at a later date. The decision task is written as \( x, t \) where the reward \( x \) is received in \( t \) periods (i.e. days). The model can then be written as \( U(x, t) = \nu(x)d(t) \), where \( \nu \) is the utility gained from reward \( x \), and \( d \) is the discount function. The time preference model used is a quasi-hyperbolic discount function (Phelps and Pollak, 1968; Laibson, 1997; Angeletos et al., 2001; Frederick et al., 2002; Benhabib et al., 2010).

The quasi-hyperbolic time discount model used follows Benhabib et al. (2010), Laibson (1997) and Phelps and Pollak (1968):

\[
U(x, t, \beta, r) = xd(t, \beta, r)
\]

where

\[
d(t, \beta, r) = \begin{cases} 
1 & \text{for } t = 0 \\
\beta \exp(-rt) & \text{for } t > 0
\end{cases}
\]

The discount function using \( r \) as a discount rate shows a discontinuous drop at \( t = 1 \) when \( \beta < 1 \). This shows an overweighed value at time \( t = 0 \) compared to a future time \( t > 0 \). This phenomenon is called the present bias (O’Donoghue and Rabin, 1999). The parameters of the quasi-hyperbolic time discount model are \( w_i = [\beta, r] \) where subject \( i \) must make decisions for a series of choices between a pair of delayed payments and where the delay of immediate payment is zero. Question \( j \) for respondent \( i \) involves a decision between \( X_A = \{x_A^1, t_A^1\} \) and \( X_B = \{x_B^1, t_B^1\} \). A lower \( \beta \) value demonstrates a stronger present bias, while a higher \( r \) value reveals a higher daily discounting rate. As in CPT, we follow Toubia et al. (2013) and use a truncated normal distribution to keep parameters within an acceptable range for QTD: we impose \( \beta \in [0, 2] \) and \( r \in [0, 0.05] \).

3.3 Measuring psychopathic traits

The PPI-R test is one of the most widely used instruments to break down the umbrella psychopathic personality profile into eight distinct primary subcategories and two distinct secondary subcategories (Lilienfeld et al., 2005). For example, the personality trait of psychopathy can be characterized by more than just one item (i.e. the eight primary traits). As such, a true psychopath will exhibit high tendencies to behave according to all of the descriptions of the primary traits. Furthermore, principal component analysis finds that seven of the eight primary traits (excluding cold-heartedness) can be factored into two secondary traits after orthogonalizing the data. Some people are more likely to behave following the four traits that factor on the SCI, while others may be more likely to exhibit the three traits that factor into fearless dominance.

Table 2 provides a detailed description of the various PPI-R traits and the test validity measures. Raw test scores are standardized to account for differences in age and gender following the PPI-R guidelines. In the general population, every factor has a mean score of 50 and a standard deviation of 10. Standard scores of 65 or above are significantly above the mean and are classified as “clinically high” [11].

4. Results

Table 3 presents the summary statistics for the psychopathic traits and DEEP measures. Panel A shows that our sample is near the average of 50 for the overall psychopathy trait.
However, the sample scores lower than the population mean on SCI and higher on fearless dominance, demonstrating that merely looking at the umbrella trait of global psychopathy does not paint the entire picture. Additionally, the minimum and maximum show a large variance within our sample. The final column shows an about normal number of subjects scoring in the clinical range for all traits, except for carefree nonplanfulness. The sample size of clinical subjects is small (less than 10% of the overall sample), making it difficult to validly examine if psychopaths make different financial decisions than individuals with normal psychopathic trait scores. Furthermore, this type of examination also may not produce accurate results as a subject with standardized scores of 60–64 are just shy of being classified as clinical but may behave much more similarly to subjects who score in the clinical category compared to subjects with standardized scores near 40. Therefore, we view using the continuum of each trait as the best way to answer the research question of how psychopathic traits relate to financial decision-making. Thus, our research question is looking more at how psychopathic traits relate to financial decision-making and less at the difference between financial decisions between psychopaths versus non-psychopaths.

### Table 2.
**Description of psychopathy measures**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Construct descriptions</th>
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<tbody>
<tr>
<td><strong>Panel A: psychopathy (global)</strong></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Psychopathy (SCI + FD + C)</td>
</tr>
<tr>
<td><strong>Panel B: secondary traits</strong></td>
<td></td>
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<tr>
<td>SCI</td>
<td>Self-centered impulsivity (ME + RN + BE + CN)</td>
</tr>
<tr>
<td>FD</td>
<td>Fearless dominance (SOI + F + STI)</td>
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<tr>
<td><strong>Panel C: primary traits</strong></td>
<td></td>
</tr>
<tr>
<td>ME</td>
<td>Machiavellian egocentricity</td>
</tr>
<tr>
<td>RN</td>
<td>Rebellious nonconformity</td>
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<tr>
<td>BE</td>
<td>Blame externalization</td>
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<tr>
<td>CN</td>
<td>Carefree nonplanfulness</td>
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<tr>
<td>SOI</td>
<td>Social influence</td>
</tr>
<tr>
<td>F</td>
<td>Fearlessness</td>
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<tr>
<td>STI</td>
<td>Stress immunity</td>
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<tr>
<td>C</td>
<td>Cold-heartedness</td>
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<tr>
<td><strong>Panel D: validity scales</strong></td>
<td></td>
</tr>
<tr>
<td>VR</td>
<td>Virtuous responding</td>
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<tr>
<td>DR</td>
<td>Deviant responding</td>
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</table>

**Note:** This table displays the descriptions of the psychopathic dimensions described in the PPI-R (Lilienfeld et al., 2005)
However, we do believe that our results can be used to draw possible conclusions about psychopaths vs non psychopaths. To use an analogy to the five factors, all people can be summarized using the metric of conscientiousness, but a relatively smaller proportion of people could be accurately described as being conscientious. In our study, as the trait increases (decreases), the phenomena with which they have a significant correlation also change. Our findings allow us to predict how people with different scores, including those in the clinical range, will behave. Finally, Panel B displays the DEEP measures and shows similar mean and standard deviation as compared to Toubia et al. (2013) and shows a large variance from our measures.

Table 4 presents the correlation matrix of the psychopathy variables used in the analysis. These correlations are consistent with those of the original instrument, and thereby the population. Durand et al. (2013a, p. 121, endnote 15) discuss the correlations of the traits they examine and use this to justify their use of a stepwise methodology; we will discuss and develop this issue below.

Table 5 presents the relationship between psychopathic traits and financial risk preferences obtained using ordinary least squares (OLS) regressions. Each column of Table 5 shows a regression analyzing a parameter of CPT ($\alpha$, $\sigma$, $\lambda$) or QTD ($\beta$, $r$), and each row presents estimated coefficients for the global psychopathy trait, its primary or its secondary traits (with the associated $t$-statistics in brackets beneath). Global psychopathy is a linear combination of the secondary traits and cold-heartedness, and the secondary traits are linear combinations of the seven primary traits (cold-heartedness does not factor into either).

We include the variables of age and gender as the literature shows that they can have an impact on financial decision-making (Barber and Odean, 2001; Byrnes et al., 1999; Dwyer et al., 2002; Van den Bos et al., 2009; Charness and Gneezy, 2012). We also include...
a dummy variable identifying whether the subject is a finance major, as a greater knowledge of finance may make the subject gravitate toward different financial decisions. Following Durand et al. (2008, 2013a, 2013b, 2019), we focus on analyses derived from backward stepwise regressions to examine the impact of psychopathic traits and financial decision-making [12]. Durand et al. (2013a, p. 121, endnote 15) argue that a stepwise procedure is optimal because of the correlation of the traits in the sample they study as certain “packages” are more prevalent in the group. A point that Durand et al. (2008, 2013a, 2013b, 2019) perhaps should have highlighted is that sample sizes available to researchers where financial decisions are modeled using personality traits (such as the facets of psychopathy used in this paper) are much lower than those available to researchers modeling such decisions using archival data. Accordingly, the signal-to-noise ratio in these studies represents a considerable hurdle. The stepwise procedure is, therefore, a potentially useful tool that allows researchers to understand the phenomena of interest.

Table 5 shows that the global trait of psychopathy is significantly related to having a more linear cumulative prospective utility function with a coefficient of 0.0042 at the 5% level, implying that psychopaths need to take less risk to gain the same level of utility as normal scoring individuals.

The secondary trait of SCI is statistically significant in two of the three models of financial risk preferences presented in Table 5. SCI is negatively related to $\alpha$, showing that individuals high in this trait do not overweigh high probabilities. As found for the global trait of psychopathy, SCI is positively related to diminishing curvature ($\sigma$), showing that the finding for the global trait is driven by the subjects’ scores on this secondary trait.

Consideration of the primary traits of psychopathy helps us gain a deeper understanding of why the global psychopathy trait and the second trait of SCI are associated with the diminishing curvature ($\sigma$), as well as why SCI is associated with probability distortion ($\alpha$). The primary trait of rebellious nonconformity, a component of the secondary trait of SCI – and through this, the global psychopathy trait, is positively related to having a more linear utility function with a coefficient of 0.0046 at the 1% level while being inversely related to loss aversion with a coefficient of – 0.01 at the 5% level. As Shiv et al. (2005) show that

<table>
<thead>
<tr>
<th></th>
<th>ME</th>
<th>RN</th>
<th>BE</th>
<th>CN</th>
<th>SOI</th>
<th>F</th>
<th>STI</th>
<th>C</th>
<th>SCI</th>
<th>FD</th>
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<tbody>
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<td>RN</td>
<td>0.38</td>
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<td>BE</td>
<td>0.27</td>
<td>0.35</td>
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<tr>
<td>CN</td>
<td>0.34</td>
<td>0.11</td>
<td>0.29</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SOI</td>
<td>0.14</td>
<td>0.02</td>
<td>-0.35</td>
<td>-0.28</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>F</td>
<td>0.26</td>
<td>0.46</td>
<td>0.15</td>
<td>0.00</td>
<td>0.16</td>
<td></td>
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<tr>
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<td>-0.20</td>
<td>-0.51</td>
<td>-0.31</td>
<td>0.49</td>
<td>0.11</td>
<td></td>
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<td></td>
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<tr>
<td>C</td>
<td>0.35</td>
<td>0.19</td>
<td>-0.02</td>
<td>0.26</td>
<td>0.09</td>
<td>0.22</td>
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<td>0.70</td>
<td>0.59</td>
<td>-0.15</td>
<td>0.33</td>
<td>-0.41</td>
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<tr>
<td>FD</td>
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<td>-0.28</td>
<td>0.81</td>
<td>0.57</td>
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<tr>
<td>P</td>
<td>0.70</td>
<td>0.58</td>
<td>0.28</td>
<td>0.30</td>
<td>0.41</td>
<td>0.63</td>
<td>0.23</td>
<td>0.58</td>
<td>0.70</td>
<td>0.60</td>
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</table>

Notes: This table shows the correlation coefficients between the eight primary, two secondary and global psychopathy dimensions for the sample ($N = 118$). The psychopathic dimensions are Machiavellian egocentricity (ME), rebellious nonconformity (RN), blame externalization (BE), carefree nonplanfulness (CN), social influence (SOI), fearlessness (F), stress immunity (STI), cold-heartedness (C), self-centered impulsivity (SCI), fearless dominance (FD) and global psychopathy (P). Table 2 provides descriptions of these factors.
<table>
<thead>
<tr>
<th>Trait</th>
<th>Lack of probability distortion (α)</th>
<th>Diminishing curvature (σ)</th>
<th>Loss aversion (λ)</th>
<th>Discount function (β)</th>
<th>Discounting rate (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychopathy</td>
<td>0.0042** (2.046)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCI</td>
<td>-0.0043* (-1.925)</td>
<td></td>
<td></td>
<td></td>
<td>0.0001* (1.691)</td>
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<tr>
<td>Rebellious nonconformity</td>
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<td>0.0042** (2.213)</td>
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<tr>
<td>Blame externalization</td>
<td>-0.0041** (-2.065)</td>
<td></td>
<td>0.0046*** (2609)</td>
<td>-0.0100** (-2.548)</td>
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<tr>
<td>Carefree nonplanfulness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.0081** (-2.142)</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0025** (2.039)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.031</td>
<td>0.034</td>
<td>0.034</td>
<td>0.035</td>
<td>0.044</td>
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<tr>
<td>Adjusted $R^2$</td>
<td>0.023</td>
<td>0.035</td>
<td>0.025</td>
<td>0.027</td>
<td>0.036</td>
</tr>
</tbody>
</table>

Notes: This table reports the regression results where the dependent variable is one of the financial risk or time preferences and the independent variables are the psychopathic measures using the entire sample ($n = 118$). The natural log of all psychopathic traits has been taken to account for nonlinearity of the data. A description of these traits is presented in Table 2. Male is a variable taking the value of 1 if the subject is male, and 0 if the subject is female. $T$-statistics are listed in parentheses with significance shown at the 10% (*), 5% (**), 1% (***) levels.
individuals who are more averse to loss earn less money than individuals who are not, our results suggest that investors with higher scores of SCI and rebellious nonconformity may earn higher returns. Therefore, our results show that higher scores on some psychopathic traits are beneficial in financial decision-making.

Furthermore, the final two columns of Table 5 report regression results where the dependent variables capture one of the two financial time preference parameters: the discount function ($\beta$) and the discounting rate ($\rho$). We find that carefree nonplanfulness has a negative and statistically significant relationship with the discount function at the 5% level. That is, higher scores on this trait are associated with a stronger present bias. The ability to control or suppress the present bias, as is the ability to manage other investment biases, is related to making rational financial decisions (Moffitt et al., 2011; Hampton et al., 2018). Therefore, individuals who score lower on carefree nonplanfullness, which most of the sample does, exhibit a natural advantage for rational economic behavior and the resulting financial performance. Finally, our results show that SCI has a positive relationship with the discount function, indicating that narcissistic and impulsive individuals are less likely to delay gratification.

5. Conclusion
To the best of our knowledge, this paper is the first to show that psychopathic traits are related to financial decisions. We obtain data on 118 subjects’ scores on metrics capturing a global psychopathy trait as well as primary and secondary traits. We then use this data to model subjects’ cumulative prospective utility functions and quasi-hyperbolic discount functions. The results show that psychopathic traits are associated with the financial risk and time preferences captured in subjects’ cumulative prospective utility functions and quasi-hyperbolic discount functions.

The findings in this paper point to psychopathic traits being associated with attitudes to risk that are associated with success in finance. Less fear of risk and being less loss averse results in higher returns in the finance industry (Shiv et al., 2005; Fellner and Sutter, 2009). These results are primarily because of higher scores in the secondary trait of SCI and the primary trait of rebellious nonconformity. Additionally, the trait of rebellious nonconformity is related to being less averse to losses. However, we also find that SCI has a positive association with the discounting rate when we analyze QTD; we argue that this relationship is consistent impulsive behavior which, we presume, may not be associated with success in finance.

Employers and regulators are on the horns of a dilemma. We highlighted the association of psychopathy and white-collar crimes and suggested that ponzi schemes, embezzlement and insider trading are prima facie examples of the presence of higher levels of psychopathy among market professionals. Yet, financial institutions are at the heart and soul of a mature and healthy economy (Shiller, 2012). Given the importance of finance to our well-being, should we be at peace with a finance profession that seemingly attracts, and then offers opportunities for success to, professionals with higher psychopathic tendencies? In light of the importance of this question, the findings in this paper are relevant and important not only for regulators but for the wider community.

As with any experiment, there are always limitations, and recognizing these can guide the way for future research. The sample of college students could be expanded to include professional business individuals. For example, a sample of financial advisors could confirm the generalizability of the results presented in this paper. Furthermore, our paper is one of few that draws its subjects from a non-incarcerated sample. This, we believe, allows better generalizability to the general population. However, this leaves us with a small sample of clinical psychopaths. As such, future research could study incarcerated criminals convicted
of white-collar crimes again to consider the generalizability of the results presented in this paper.

Notes
1. Gregory (2012) highlights an interesting and well-known case by making use of a speech given by Diane Henriques at the University of New England in 2012. “. . . The media have highlighted many financial professionals since 2007 for fraud and mismanagement of money. One high-profile case was Bernard Madoff, accused of running a Ponzi scheme that defrauded investors of billions of dollars over decades. Diane Henriques spent hours interviewing Madoff in prison and concluded he was psychopathic. She found him to be charming and not the least remorseful for what he had done. Without formal clinical training, Henriques had followed the guidelines in the DSM-5 and formulated a diagnosis” (Gregory, 2012, p. 162).

2. The psychopathic personality trait (which we also call global psychopathy in this paper) can be decomposed into several underlying primary and secondary factors (Cleckley, 1955; Hare, 1991). We describe these primary and secondary traits in Section 3.3, where we discuss the measurement of psychopathic traits.

3. The term “economist” is usually understood and described by the related literature as any individual with knowledge of the rational choice theory (i.e. the rational/self-interest model of economics). For example, individuals who have taken economics or finance courses in college fit this description.

4. For further explanation of the self-interest model, see Federal Reserve Bank of St. Louis (2012).

5. A second-order trait is a combination of primary traits obtained using principal component analysis, while overall psychopathy is the combination of all primary traits.

6. Psychopathy encompasses a range of specific features, its primary and second traits. By considering these more granular dimensions of psychopathy, we are able to examine which, if any, of these features drive any influence of psychopathy per se on the behaviors studied in this paper. This might provide a deeper understanding of the topic under consideration. Alternatively, psychopathy might be too broad a construct to find a relationship with the behaviors we examine. Using the sub-traits may allow for a cleaner examination of the behaviors.

7. For a greater explanation about the physiology of financial decisions and neurofinance in general, see Nofsinger and Shank (2020) and Sahi (2012).

8. Clinically high denotes a diagnosis of psychopathy.

9. The PPI-R test contains 154 questions.

10. The risk preference survey contains 16 questions and the time preference survey 20 questions.

11. As the psychology literature typically deals with an individual being a psychopath or not, there is no low group.

12. Additionally, we do not include models where no variables show significance to save space. Analyses including all variables may be obtained from the corresponding author upon request.

References


Further reading


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