The Relationship between Psychopathy and Financial Risk and Time Preferences

Abstract

Purpose
The purpose of this paper is to examine the relationship between Psychopathy traits and their underlying components and financial risk and time preferences.

Design/methodology/approach
We test this relationship by employing an experimental task following cumulative prospect theory in a sample of business majors using a Psychopathy personality test.

Findings
We 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 main components 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 cumulative prospect theory. We 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 noncognitive skills and financial decisions, and it has implications for the business industry.

Keywords: Financial Psychopath, Loss Aversion, Present Bias, Risk Preferences, Time Preferences

JEL Classifications: A12, D03, G02, G11
1. Introduction

Psychopaths make up about one percent of the general population (Hare, 1991). However, up to four percent of finance and economics professionals are clinically-diagnosed psychopaths (Babiak and Hare, 2006). Christopher Bayer, a notable psychologist who specializes in Wall Street professionals, argues that the number of psychopaths working on Wall Street is closer to ten percent (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).

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 in order 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)

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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).
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., 2019), risk tolerance (Wong & Carducci, 2016), and financial delinquency (Parise & 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. 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

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, 1988; Hare, 1991). We describe these primary and secondary traits in section 3.3, where we discuss the measurement of psychopathic traits.
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 Nonplanfullness 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 Nonplanfullness 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.
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 towards 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

³ The term “economist” is usually understood and described by the related literature as any individual with knowledge of 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).
literature by examining whether finance majors score significantly differently on the various Psychopathy sub-traits than other majors.

Schneider & 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 & 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 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-trait 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., 2017) and exhibit fewer investment biases (Nofsinger et al., 2019). 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.\footnote{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.}

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 Sub-section 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.

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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).
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 Self-Centered Impulsivity 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

In order 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. Participants were offered a small amount of bonus points towards their course grade as an incentive to participate in this study.

\(^8\) Clinically high denotes a diagnosis of Psychopathy.
Luccasen and Thomas (2014) find that no significant difference in outcomes can be detected in experiments using class credit versus monetary incentives.

In order to receive credit, participants had to complete three questionnaires. First, the Psychopathic Personality Inventory-Revised (PPI-R) test is employed to measure eight primary psychopathic traits, two secondary psychopathic traits, and a global Psychopathy trait (Lilienfeld et al., 2005). The PPI-R is equipped with two validity scales that detect whether subjects display defensiveness, malingering, careless, or random responding. Second, we employ 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. 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, 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.

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9 The PPI-R test contains 154 questions.

10 The risk-preference survey contains 16 questions and the time-preference survey 20 questions.
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. (2013) use 115 subjects, Durand et al. (2013) use 61 subjects, Durand et al. (2019) use 128 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: cumulative prospect theory (CPT) and quasi-hyperbolic time discounting (QTD) models.

Cumulative prospect theory 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:

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\begin{align*}
U(x, p, y, \alpha, \sigma, \lambda) &= \begin{cases} 
\nu(y, \sigma) + \pi(p, \alpha)(\nu(x, \sigma) - \nu(y, \sigma)) & \text{if } x>y>0 \text{ or } x<y<0 \\
\pi(p, \alpha)\nu(x, \sigma) + \pi(1-p, \alpha)\nu(y, \sigma) & \text{if } x<0<y
\end{cases}
\end{align*}
$$

where

$$
\nu(x, \sigma) = \begin{cases} 
x^\sigma & \text{for } x>0 \\
-\lambda(-x)^\sigma & \text{for } x<0
\end{cases}
$$

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

When $x$ and $y$ have the same sign, $\nu(y, \sigma)$ acts as the value reference point, $\pi(p, \alpha)$ is how much the individual weights the probability $p$, and $\nu(x, \sigma) - \nu(y, \sigma)$ is the utility of the gamble. When $x<0<y$, the term $\pi(p, \alpha)\nu(x, \sigma) + \pi(1-p, \alpha)\nu(y, \sigma)$ 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 gamble where the decisions are indexed by $i$ ($i=1,\ldots,I$) whereby $w_i$ denotes the vector of decisions for subject $i$: $w_i = [\alpha_i, \sigma_i, \lambda_i]$. Questions are indexed by $j$ ($j=1,\ldots,J$), where question $j$ for subject $i$ entails choosing between gamble $X^A_y = \{x_y^A, p_y^A, y_y^A\}$ and gamble $X^B_y = \{x_y^B, p_y^B, y_y^B\}$. 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 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 $U(x, t) = v(x)d(t)$, where $v$ 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; Benhabit 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 $w_i = [\beta_i, r_i]$ 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 $X^A_{ij} = \{x^A_{ij}, t^A_{ij}\}$ and $X^B_{ij} = \{x^B_{ij}, t^B_{ij}\}$. 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 Psychopathic Personality Inventory-Revised (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 Self-Centered Impulsivity, 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

TABLE 2 ABOUT HERE

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 Self-Centered Impulsivity and higher on

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

TABLE 3 ABOUT HERE

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. 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 4 ABOUT HERE**

Table 5 presents the relationship between psychopathic traits and financial risk preferences obtained using OLS regressions. Each column of Table 5 shows a regression analyzing a parameter of CPT(α, σ, λ) or QTD(β, 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 & 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 backwards stepwise regressions to examine the impact of psychopathic traits and financial decision making.\(^\text{12}\) Durand et al. (2013a, p. 121, endnote 15) argue that a stepwise procedure is optimal due to the correlation of the traits in the

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\(^{12}\) Additionally, we do not include models where no variables show significance to save space. Analyses including all variable may be obtained from the corresponding author upon request.
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 ABOUT HERE

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 in order to gain the same level of utility as normal scoring individuals.

The secondary trait of Self-Centered Impulsivity is statistically significant in two of the three models of financial risk preferences presented in Table 5. Self-Centered Impulsivity 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, Self-Centered Impulsivity 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 Self-Centered Impulsivity are associated with the diminishing curvature ($\sigma$), as well as why Self-Centered Impulsivity is associated with probability distortion ($\alpha$). The primary trait of Rebellious Nonconformity, a component of the
secondary trait of Self-Centered Impulsivity - 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 individuals who are more averse to loss earn less money than individuals who are not, our results suggest that investors with higher scores of Self-Centered Impulsivity 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 (β) and the discounting rate (r). 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, Asadi and Olson, 2019). Therefore, individuals who score lower on Carefree Nonplanfulness, which most of the sample does, exhibit a natural advantage for rational economic behavior and the resulting financial performance. Finally, our results show that Self-Centered Impulsivity 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 & Sutter, 2009). These results are primarily due to higher scores in the secondary trait of Self-Centered Impulsivity 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 Self-Centered Impulsivity has a positive association with the discounting rate when we analyze quasi-hyperbolic time discounting; 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 amongst 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.
References


Table 1: Subject Sample Statistics

<table>
<thead>
<tr>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>118</td>
<td>51</td>
<td>67</td>
</tr>
</tbody>
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**Age**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24.6</td>
<td>22.7</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Accounting</th>
<th>Finance</th>
<th>Information Systems</th>
<th>Management</th>
<th>Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>32</td>
<td>9</td>
<td>39</td>
<td>10</td>
</tr>
</tbody>
</table>

Notes: This table reports the subjects’ sample statistics of gender, age, and academic major.
<table>
<thead>
<tr>
<th>Panel A: Psychopathy (Global)</th>
<th>Construct Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P</strong> Psychopathy (SCI + FD + C)</td>
<td>The greater the probability that the respondent matches the features of the prototypical psychopathic individual, such as guiltlessness, callousness, dishonesty, manipulativeness, superficial charm, egocentricity, risk taking, and poor impulsive control</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: Secondary Traits</th>
<th>Construct Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SCI</strong> Self-Centered Impulsivity (ME + RN + BE + CN)</td>
<td>Tendency toward self-centeredness, ruthless use of others, brazen flouting of traditional values, propensity to attribute blame to others for one’s mistakes, and reckless impulsivity</td>
</tr>
<tr>
<td><strong>FD</strong> Fearless Dominance (SOI + F + STI)</td>
<td>Lack of anticipatory social and physical anxiety, low levels of tension and worry, low harm avoidance, and high levels of interpersonal dominance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel C: Primary Traits</th>
<th>Construct Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ME</strong> Machiavellian Egocentricity</td>
<td>Narcissistic and ruthless attitudes in interpersonal functioning</td>
</tr>
<tr>
<td><strong>RN</strong> Rebellious Nonconformity</td>
<td>Reckless lack of concern regarding social norms</td>
</tr>
<tr>
<td><strong>BE</strong> Blame Externalization</td>
<td>Tendency to blame others for one's problems and to rationalize one's misbehavior</td>
</tr>
<tr>
<td><strong>CN</strong> Carefree Nonplanfulness</td>
<td>Attitude of indifference in planning one's actions</td>
</tr>
<tr>
<td><strong>SOI</strong> Social Influence</td>
<td>Perceived ability to influence and manipulate others</td>
</tr>
<tr>
<td><strong>F</strong> Fearlessness</td>
<td>Absence of anticipatory anxiety concerning harm and willingness to participate in risky activities</td>
</tr>
<tr>
<td><strong>STI</strong> Stress Immunity</td>
<td>Absence of marked reactions to anxiety-provoking events</td>
</tr>
<tr>
<td><strong>C</strong> Cold-Heartedness</td>
<td>Propensity toward callousness, guiltlessness, and lack of sentimentality</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel D: Validity Scales</th>
<th>Construct Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VR</strong> Virtuous Responding</td>
<td>Positive impression management</td>
</tr>
<tr>
<td><strong>DR</strong> Deviant Responding</td>
<td>Tendency to admit bizarre symptoms not indicative of known psychopathy</td>
</tr>
</tbody>
</table>

Note: This table displays the descriptions of the psychopathic dimensions described in the PPI-R (Lilienfeld, Widows, and Staff, 2005).
### Table 3: Summary Statistics of Variables

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>Clinical Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Summary Statistics of Psychopathic Traits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychopathy</td>
<td>50.01</td>
<td>9.04</td>
<td>23</td>
<td>79</td>
<td>7</td>
</tr>
<tr>
<td>Self-Centered Impulsivity</td>
<td>47.69</td>
<td>9.16</td>
<td>24</td>
<td>69</td>
<td>4</td>
</tr>
<tr>
<td>Fearless Dominance</td>
<td>52.10</td>
<td>9.88</td>
<td>28</td>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td>Machiavellian Egocentricity</td>
<td>49.24</td>
<td>10.01</td>
<td>29</td>
<td>78</td>
<td>10</td>
</tr>
<tr>
<td>Rebellious Nonconformity</td>
<td>51.61</td>
<td>9.28</td>
<td>30</td>
<td>75</td>
<td>10</td>
</tr>
<tr>
<td>Blame Externalization</td>
<td>49.74</td>
<td>10.13</td>
<td>30</td>
<td>84</td>
<td>9</td>
</tr>
<tr>
<td>Carefree Nonplanfulness</td>
<td>42.06</td>
<td>8.47</td>
<td>26</td>
<td>65</td>
<td>1</td>
</tr>
<tr>
<td>Social Influence</td>
<td>51.51</td>
<td>10.41</td>
<td>25</td>
<td>72</td>
<td>14</td>
</tr>
<tr>
<td>Fearlessness</td>
<td>49.83</td>
<td>8.98</td>
<td>31</td>
<td>70</td>
<td>8</td>
</tr>
<tr>
<td>Stress Immunity</td>
<td>53.68</td>
<td>10.19</td>
<td>29</td>
<td>78</td>
<td>17</td>
</tr>
<tr>
<td>Cold-Heartedness</td>
<td>52.74</td>
<td>11.14</td>
<td>31</td>
<td>85</td>
<td>20</td>
</tr>
<tr>
<td><strong>Panel B: Summary Statistics of DEEP Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of Probability</td>
<td>0.635</td>
<td>0.223</td>
<td>0.122</td>
<td>1.083</td>
<td></td>
</tr>
<tr>
<td>Distortion (α)</td>
<td>0.556</td>
<td>0.204</td>
<td>0.196</td>
<td>1.182</td>
<td></td>
</tr>
<tr>
<td>Diminishing Curvature (σ)</td>
<td>0.903</td>
<td>0.432</td>
<td>0.109</td>
<td>1.771</td>
<td></td>
</tr>
<tr>
<td>Loss Aversion (λ)</td>
<td>0.885</td>
<td>0.333</td>
<td>0.0226</td>
<td>1.568</td>
<td></td>
</tr>
<tr>
<td>Discount Function (β)</td>
<td>0.011</td>
<td>0.007</td>
<td>0.001</td>
<td>0.024</td>
<td></td>
</tr>
</tbody>
</table>

Notes: This table displays the mean, standard deviation (SD), minimum (MIN), and maximum (MAX) of the psychopathic traits (Panel A) and DEEP measures (Panel B). Additionally, Panel A displays the number of subjects who are clinically high for each trait (standardized score ≥ 65).
<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>
</tr>
</thead>
<tbody>
<tr>
<td>RN</td>
<td>0.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BE</td>
<td>0.27</td>
<td>0.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN</td>
<td>0.34</td>
<td>0.11</td>
<td>0.29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<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>
<td></td>
<td></td>
<td></td>
</tr>
<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>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STI</td>
<td>-0.12</td>
<td>-0.20</td>
<td>-0.51</td>
<td>-0.31</td>
<td>0.49</td>
<td>0.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<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>
<td>0.27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCI</td>
<td>0.76</td>
<td>0.68</td>
<td>0.70</td>
<td>0.59</td>
<td>-0.15</td>
<td>0.33</td>
<td>-0.41</td>
<td>0.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FD</td>
<td>0.14</td>
<td>0.12</td>
<td>-0.34</td>
<td>-0.28</td>
<td>0.81</td>
<td>0.57</td>
<td>0.73</td>
<td>0.26</td>
<td>-0.11</td>
<td></td>
</tr>
<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>
</tr>
</tbody>
</table>

Notes: This table shows the correlation coefficients between the 8 primary, 2 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></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**</td>
<td></td>
<td></td>
<td></td>
<td>0.0001*</td>
</tr>
<tr>
<td></td>
<td>(2.046)</td>
<td></td>
<td></td>
<td></td>
<td>(1.691)</td>
</tr>
<tr>
<td>Self-Centered Impulsivity</td>
<td>-0.0043*</td>
<td>0.0042**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.925)</td>
<td>(2.213)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rebellious Nonconformity</td>
<td></td>
<td></td>
<td>0.0046***</td>
<td>-0.0100**</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2.609)</td>
<td>(-2.548)</td>
<td></td>
</tr>
<tr>
<td>Blame Externalization</td>
<td>-0.0041**</td>
<td></td>
<td></td>
<td></td>
<td>-0.0081**</td>
</tr>
<tr>
<td></td>
<td>(-2.065)</td>
<td></td>
<td></td>
<td></td>
<td>(-2.142)</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0025**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td>(2.059)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.031</td>
<td>0.034</td>
<td>0.034</td>
<td>0.035</td>
<td>0.044</td>
</tr>
<tr>
<td></td>
<td>0.044</td>
<td>0.046</td>
<td>0.046</td>
<td>0.042</td>
<td>0.047</td>
</tr>
<tr>
<td>Adj. R-Squared</td>
<td>0.023</td>
<td>0.026</td>
<td>0.025</td>
<td>0.027</td>
<td>0.036</td>
</tr>
<tr>
<td></td>
<td>0.036</td>
<td>0.038</td>
<td>0.034</td>
<td>0.031</td>
<td></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 zero if the subject is female. T-statistics are listed in parentheses with significance shown at the 10% (*), 5% (**), and 1% (***) levels.