CEO narcissism, corporate risk, and the role of narcissistic supply

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Abstract

In spite of narcissism being a common phenomenon among CEOs, the implications of such CEO narcissism on corporate risk has received limited attention. We are the first to empirically show the pivotal role of narcissistic supply in explaining the association between CEO narcissism and corporate risk. Thus, we find that an increase in CEO narcissism is associated with a decline (incline) in corporate risk for CEOs who receive a high (low) level of narcissistic supply by managing large (small) firms or receiving high (low) levels of compensation. Our results are statistically robust, economically meaningful, and have important policy implications.

Keywords: Behavioral corporate finance; CEO narcissism; Corporate risk; CEO optimism; Stock return volatility

JEL classification: G31, G32, G34, G40

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1. Introduction

Chief Executive Officer (CEO) cognitive biases and personality traits affect corporate decisions (e.g., Baker and Wurgler, 2013). The research on CEO cognitive biases has primarily focused on CEO optimism and overconfidence (for an overview, see Malmendier and Tate, 2015). Limited attention has been given to the association between CEO narcissism[1] and corporate decisions (for exceptions, see Chatterjee and Hambrick, 2007 and 2011; Aktas et al., 2016). To the best of our knowledge, no study has investigated the association between CEO narcissism and corporate risk in general in spite of 1) research suggesting that narcissistic persons are likely to emerge as leaders (Brunell et al., 2008), 2) anecdotal evidence pointing to narcissistic leaders being a regular phenomenon in the corporate world (Maccoby, 2000), 3) the CEO tournament which disproportionately places optimistic managers in the CEO position (Goel and Thakor, 2008), and 4) a potential, conceptual overlap (the better-than-average effect and the inflated self-view) between narcissism and optimism (Campbell et al., 2004b). Our aim is to fill this void.

We specifically investigate the association between CEO narcissism and corporate risk in general while we control for 1) the potentially pivotal role of narcissistic supply[2] and 2) the potential overlap and synergies between CEO narcissism and CEO optimism. We study a sample of 281 US non-financial S&P 1500 firms during the period 2006-2015. We find that CEO narcissism is positively associated with corporate risk in smaller firms and negatively associated with corporate risk in larger firms. In economic terms, we find an increase in corporate risk of 6%-8% for small firms and a decrease in corporate risk of 11%-27% for large firms when we go from

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[1] Narcissism is a personality trait (also called a personality dimension or construct) and is thus not limited to being a cognitive bias. However, for convenience/ease of description we will sometimes refer to narcissism and optimism as "biases".

[2] Narcissistic supply refers to the "supply" of admiration, interpersonal support, and/or sustenance which the narcissist receives from the environment and which is essential to the narcissist's self-esteem (Wallace and Baumeister, 2002).

a slightly narcissistic CEO to a strongly narcissistic CEO. We argue that the pivotal role of firm size is caused by 1) a desire among narcissistic CEOs in smaller firms to gain more attention and admiration and 2) a desire among narcissistic CEOs in larger firms to maintain and protect the already large amount of narcissistic supply. We use firm size as our default proxy for narcissistic supply but we show that alternative proxies for narcissistic supply support our conclusions.

We use stock return volatility as our main measure of corporate risk, and we use the proportion of first-person singular pronouns to total first-person pronouns in CEO speech as our main measure of CEO narcissism. The results are robust to alternative specifications and to the insertion of CEO optimism into the analysis. Thus, we find neither a significant overlap nor a significant interaction between CEO narcissism and CEO optimism. We find some indication of a causal effect from CEO narcissism to corporate risk, but we are unable to rule out that our results are a function of time-varying firm effects (such as firms hiring specific types of CEOs to fit their changed strategies).

Our study contributes to the existing literature in three main ways. *First*, our study examines the relationship between CEO narcissism and corporate risk *in general*, whereas previous literature focuses primarily on a subset of corporate decisions such as M&A and R&D (e.g., Chatterjee and Hambrick, 2007; Gerstner et al., 2013; Aktas et al., 2016; Ham, Seybert, and Wang, 2017) and/or a narrow subset of firms (e.g., hardware and software firms in Chatterjee and Hambrick, 2007 and 2011; pharmaceutical firms in Gerstner et al., 2013). *Second*, our study explicitly analyzes the joint effect of and thereby potential overlap and/or synergies between CEO narcissism and CEO optimism. *Third*, our study investigates the pivotal role of narcissistic supply in understanding the interaction between CEO narcissism and corporate risk.

The remainder of the paper is structured as follows. Section 2 reviews the literature and

states hypotheses. Section 3 describes the data and the methodology. Section 4 reports the main results and robustness tests. Section 5 provides discussion. Section 6 concludes.

2. Literature review and hypotheses development

In this section, we present the relevant theory and empirical findings related to narcissism (2.1), narcissistic supply (2.2), and optimism (2.3) in order to provide a basis for developing hypotheses (2.4). Initially, we address the role of the CEO.

The applied approach in the managerial bias literature is based on biases of a single person (the CEO), rather than applying a more organizational view. In this respect, it is important to note that CEOs operate under various constraints. CEOs often need approval from the board of directors to make large investments (Chatterjee and Hambrick, 2011). However, CEOs have the power to accept/reject project proposals and investment decisions, and they can also affect the context in which decisions are made through strategy, visions, hires, layoffs, incentives, and structural arrangements (Gerstner et al., 2013). Therefore, it is reasonable to assume that the personal biases of the CEO can affect the firm and this claim is backed by numerous studies finding an association between CEO characteristics and organizational outcomes (Chatterjee and Hambrick, 2011). One of the first studies to illustrate an organizational effect of managerial biases is Richard Roll (1986), who shows that managers biased by overconfidence overestimate deal synergies, resulting in high bid premiums. Subsequently, a stream of literature has contributed to the field.

2.1 Narcissism

Narcissism is considered a complete personality trait that affects both thinking, feeling, and behavior (Aktas et al., 2016). As a concept, narcissism is a highly complex construct that is difficult

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to measure and is linked to conflicting theoretical perspectives (Morf and Rhodewalt, 2001). However, in relation to the Big Five trait dimensions of personality (OCEAN: Openness to experience, Conscientiousness, Extroversion, Agreeableness, Neuroticism), Paulhus (2001) simplifies matters and describes the narcissist as a "disagreeable extravert".

The term narcissism was introduced by Havelock Ellis in 1898 to describe a clinical condition of perverse self-love, inspired by the Greek myth of Narcissus (Rosenthal and Pittinsky, 2006). The concept was further developed by Sigmund Freud and several other psychologists to describe a complex clinical personality disorder which was recognized by the American Psychiatric Association (APA) in 1980 (Campbell and Foster, 2007). APA describes the Narcissistic Personality Disorder (NPD) as "a pervasive pattern of grandiosity, need for admiration, and lack of empathy" indicated by at least five of their nine[3] listed diagnostic criteria (American Psychiatric Association, 2013, pp. 669-670). Besides these criteria, APA (2013) argues that NPD is associated with vulnerable self-esteem, making the persons in question sensitive to defeat and criticism. Psychologists developed psychometric scales based on the diagnostic criteria for NPD – the most well-known being the Narcissistic Personality Inventory developed by Raskin and Hall (1979).

We follow research within behavioral economics and focus on the personality trait of narcissism, i.e. a scale on which every person can be arrayed (Campbell et al., 2004b). We use the following definition of narcissism: "Narcissism is the degree to which an individual has an inflated sense of self and is preoccupied with having that self-view continuously reinforced" (Gerstner et al., 2013, p. 259). The definition illustrates that narcissism has two important dimensions. The first

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[3] The nine criteria are 1) a grandiose sense of self-importance, 2) fantasies about power and success, 3) a feeling of superiority, 4) an arrogant attitude, 5) a desire for admiration, 6) a high sense of entitlement, 7) envy towards others, 8) lack of empathy, and 9) a high willingness to exploit other people (American Psychiatric Association, 2013, p. 670).

is a positive and inflated self-view; the second is self-regulatory strategies to maintain and enhance the positive self-view (Morf and Rhodewalt, 2001).

The self-view can be considered the cognitive aspect of narcissism. It has been demonstrated that narcissists have a grandiose self-view and believe that they have superior qualities in regards to e.g. competencies, leadership abilities, attractiveness, and intelligence (Gabriel et al., 1994; Farwell and Wohlwend-Lloyd, 1998). However, the empirical findings also suggest that this self-view is inflated and that the arrogance of narcissists makes them overestimate both their abilities and their probability of success, which leads to overconfidence / optimism (Campbell et al., 2004b). Narcissists are obsessed with power and status (Carroll, 1987), and their high degree of selfishness creates a strong sense of entitlement and a desire to be the center of attention (Campbell et al., 2004a).

Narcissists have high self-esteem, but it is fragile as they constantly need to have their ego reaffirmed through attention and admiration. Therefore, they use self-regulatory strategies to feel successful and important. Some strategies are intrapersonal and involve fantasizing about power (Raskin and Novacek, 1991) and ascribing favorable outcomes to own actions and abilities (Campbell and Foster, 2007). Other strategies are interpersonal and use other people to enhance the self-view. Examples of this are acts of exhibitionism such as bragging, talking about oneself, and seeking attention (Buss and Chiodo, 1991) as well as socializing with people of high status and people who admire them (Campbell, 1999). Narcissists also engage in impulsive, bold, and colorful behavior to satisfy their continuous need for attention and applause from others (Vazire and Funder, 2006; Wallace and Baumeister, 2002).

Narcissists' constant need for external confirmation of their superiority is a sign of vulnerability. Several psychological studies have found evidence that the self-esteem of narcissists

is fragile, as they are afraid of destroying their image and losing the admiration of others (Krizan and Herlache, 2017). As a result, narcissists display more extreme reactions to positive and negative feedback (Rhodewalt and Morf, 1998), and they tend to respond to criticism with hostility, anger, and denial (Bogart et al., 2004; Kernis and Sun, 1994). Furthermore, Kernis (2005) argues that high vulnerability can reduce the desire to take on challenges and result in more cautious and safer routes to positive outcomes.

The research in behavioral corporate finance has focused on unobtrusive indicators of narcissism rather than the Narcissistic Personality Disorder. Chatterjee and Hambrick (2007) construct an index of five different indicators of narcissism.[4] They use this index to investigate the association between CEO narcissism and a firm's strategy and performance, based on a sample consisting of 111 CEOs from hardware and software firms in the period from 1992-2004. The findings suggest that CEO narcissism is positively related to strategic dynamism as well as the number and size of acquisitions, which supports the notion that narcissists take on bolder and more risky actions. Their results also show that narcissism leads to more extreme performance.

Chatterjee and Hambrick (2011) construct a slightly altered narcissism index to investigate a sample of CEOs of software and hardware firms from 1992-2008 where they measure risk as the total spending on risky outlays (R&D, CAPEX, and acquisitions). They find no evidence that highly narcissistic CEOs are more extreme risk-takers or that they pay higher acquisition premiums. They do find, however, that narcissists are less responsive to objective performance measures and more responsive to social praise.

Gerstner et al. (2013) find a positive relationship between risk and narcissism in a study

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[4] The five indicators are 1) the prominence of the CEO's photograph in annual reports, 2) the CEO's prominence in press releases, 3) the CEO's use of first-person singular pronouns in interviews, 4) the CEO's cash compensation compared to the second-highest-paid executive, and 5) the CEO's non-cash compensation compared to the second-highest-paid executive.

that examines the adoption of technological discontinuities among major pharmaceutical firms. Using the same narcissism index as Chatterjee and Hambrick (2011), they find that narcissism is positively associated with aggressive investment behavior regarding new technologies. They also show that the effect is stronger when observers pay high attention to the decisions, which supports the notion that self-enhancement opportunities affect the decisions of narcissists.

Aktas et al. (2016) investigate 146 US M&A deals in the period 2002-2006. They measure narcissism as the CEO's first-person singular pronoun usage in interviews and show that narcissistic acquiring CEOs 1) negotiate deals faster, 2) are more likely to initiate deals, and 3) reduce the probability of completing the deals.

In a small-scale study, Oesterle et al. (2016) investigate how CEO narcissism affects the internationalization of 31 German manufacturing firms from 2004-2013. They find a positive association between CEO narcissism and the degree of firm internationalization, but no indication that CEO narcissism leads to more high-risk foreign sales (i.e., sales to countries with high psychic distance).

Finally, Ham, Seybert, and Wang (2017) investigate a sample of S&P 500 firms and find that CEO narcissism is associated with overinvestment in relation to R&D and M&A – but not in relation to (more routine) capital expenditures. They also find that firms led by narcissistic CEOs are associated with lower profitability and operating cash flows. The authors control for CEO overconfidence and their findings are robust to such inclusion.

2.2 Narcissistic supply

Fenichel (1938) introduced the concept of narcissistic supply in the sphere of the drive to

amass wealth.[5] Narcissistic supply is the fuel that drives and motivates narcissists. Even though this supply may come from the narcissist internally through exhibitionism and the diminishment of others (Bogart et al., 2004), the most important source of supply comes in the forms of admiration, attention, and affirmation of own superiority (Wallace and Baumeister, 2002). Chatterjee and Hambrick (2007) argue that CEOs use their organizations as "tools in the service of their own personal needs" to 1) create and 2) maintain narcissistic supply.

The *creation* of narcissistic supply is linked to an approach orientation. The approach orientation implies a focus on rewards with no concern for risk, which means that individuals are driven by a desire to accomplish success rather than avoid failure (Morf and Rhodewalt, 2001). Thus, approach oriented narcissists are more likely to take on bold, challenging, and highly visible actions, since such actions provide greater admiration than incremental changes (Wallace & Baumeister 2002).

However, the *maintenance* of narcissistic supply is linked to an avoidance orientation. Avoidance oriented narcissists focus on maintaining their image and avoiding criticism to defend their fragile self (Krizan and Herlache, 2017). This vulnerability can make narcissists defensive and unwilling to take risks in competitive situations to avoid defeat or failure (Kernis, 2005) and protective in terms of their social image (Krizan and Herlache, 2017).

2.3 Optimism

Optimism is a cognitive illusion, and more specifically it can be defined as positive generalized outcome expectancies (Brandt, 2011). Optimism has been defined as the tendency to overestimate

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[5] Fenichel (1938): "In so far as the drive to amass wealth appears to be a means of the ego for increasing self-regard, or for preventing a lowering of its level, this desire can be looked upon first as a derivative of that primitive form of regulation of self-regard in which the individual requires a 'narcissistic supply' from the environment in the same way as the infant requires an external supply of food. Money is just such a supply."

the mean value of an ability and the probability of favorable outcomes (Heaton, 2002; Baker and Wurgler, 2013). However, it is not possible to find a consensus definition of the concept since optimism and overconfidence have been used interchangeably in previous literature. As Taylor and Brown (1988) and later Moore and Healy (2008) argue, any taxonomy on cognitive illusions – and optimism in particular – is arbitrary because researchers who investigate similar phenomena use different terms.[6] To avoid confusion, we define optimism as a behavioral bias that causes individuals to overestimate the mean value of an ability and/or the mean value or likelihood of a desirable event. Thus, it is captured under the umbrella concept of overconfidence, which, in addition to optimism, covers the concepts of miscalibration and illusion of control (Ben-David et al., 2013).[7] The tendency to overestimate one's skills relative to those of others has been documented in several psychological studies (Svenson, 1981; Alicke et al., 1995).

Optimism is higher when it is difficult to compare performance across individuals, when commitment is high, and when individuals feel that outcomes are under their control (Sharot, 2012). This is a consequence of increased weight on their own estimates and contribution compared to the role of exogenous factors (Van den Steen, 2004; Heaton, 2002). Moreover, the above-average effect is found to be stronger for individuals working in highly complex and abstract settings

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[6] There are two main ways to distinguish between the definitions of optimism and overconfidence in previous literature. One is whether the decision-maker (typically a CEO) can influence the outcome of uncertain events. Here optimism relates to the overestimation of expected outcomes from uncertain events where the CEO has no influence (e.g., exogenous outcomes like GDP growth). Overconfidence, on the other hand, relates to the overestimation of expected outcomes where the CEO has some degree of influence (e.g., M&A synergies and revenue growth). This distinction is used by Malmendier and Tate (2005 and 2008) who investigate effects of CEO overconfidence. The other way is whether the bias is regarding the expected value of the mean or variance of an outcome. Here optimism relates to the overestimation of the mean value of either an ability or the likelihood of desirable outcomes, while overconfidence relates to the overestimation of the precision of one's estimates (i.e. the width of the confidence interval). This distinction is used by Brandt (2011).

[7] Miscalibration is the tendency to overestimate the precision of one's estimates, leading individuals to use too narrow confidence intervals. This bias is sometimes referred to as overconfidence in the literature. Illusion of control is the bias leading individuals to overestimate the control that they possess over events on which they have limited or no influence. These definitions are in accordance with Ben-David et al. (2013) who define overconfidence as the manifestations of three biases: the above-average bias, the miscalibration bias, and the illusion of control bias.

(Gervais, 2010) and with more difficult tasks (Marshall and Brown, 2004). These are all aspects that fit the job description of a CEO, and therefore optimism is expected to be particularly pronounced for high-rank executives (Malmendier and Tate, 2005). In fact, CEOs are classified as more optimistic than the lay population (Graham et al., 2013).

Malmendier and Tate (2005) is one of the most cited papers with respect to empirical analysis of CEO overconfidence. They measure overconfidence based on CEOs' option holdings and net purchase of company stock. Investigating a sample of 477 firms from 1980-1994, they find that the investment level of overconfident CEOs is more sensitive to internal resources (cash flows) and that this sensitivity is stronger among equity-dependent firms. Thus, overconfident CEOs will overinvest when they have abundant resources and underinvest when they require external financing. Malmendier and Tate (2015) replicate this study on a different sample of firms from 1997-2012 and confirm the results. Neither study finds evidence that overconfidence is associated with higher investments in general.

Malmendier et al. (2011) analyze the association between overconfidence and capital structure decisions and find that overconfident CEOs use less external finance (risky debt and equity). Landier and Thesmar (2009) also study the association between optimism and debt and find robust evidence that the use of short-term debt for French entrepreneurs is positively associated with optimism. Graham et al. (2013) study the effect of optimism on capital structure. They apply a survey approach where they obtain direct evidence on the psychological traits of more than 1,000 senior executives. They find that CEOs are more optimistic and risk tolerant than the lay population, and that optimistic CEOs tend to have higher debt ratios (total debt/total assets) and use more short-term debt. They find no significant relationship between CEO optimism and acquisitiveness.

Malmendier and Tate (2008) find a significant relationship between CEO overconfidence and the tendency to undertake value-destroying mergers. Thus, overconfident CEOs are more likely to make acquisitions, especially when the merger is diversifying and internal financing is available. Andreou et al. (2017) find that overconfident CEOs are more likely to diversify (especially in cash-rich firms). Billett and Qian (2008) find that frequent acquirers show more overconfidence. Finally, Gervais (2010) also finds that overconfident managers overinvest free cash flows and initiate more mergers.

Galasso and Simcoe (2011) investigate the effect of overconfidence on corporate innovation and find that CEO overconfidence is positively associated with the number of patents, citations per patent, and the level of R&D expenditure. They also show that the effect of overconfidence is larger in three scenarios: when 1) free cash flows are larger, 2) the CEO has more power, and 3) market competition is more intense. Hirshleifer et al. (2012) find that overconfident managers invest more in R&D (and have increased return volatility).

2.4 Hypotheses

We form three testable hypotheses. These hypotheses state how CEO narcissism and CEO optimism, both individually and jointly, are expected to be associated with corporate risk.

Based on previous literature, the expected association between CEO narcissism and corporate risk is ambiguous but with an overweight suggesting a positive relation. The effect of CEO narcissism depends on contextual factors in the CEO's environment as the level of narcissistic supply and fear of failure will determine whether approach or avoidance orientation dominates. If the narcissistic CEO has limited narcissistic supply, the CEO will tend to go to great lengths to acquire more, thus adopting the approach orientation. However, when the opposite holds,

the CEO will likely focus on how to retain the already high level of narcissistic supply, and the vulnerability of narcissism will become dominant, thus adopting the avoidance orientation.

Typically, the level of narcissistic supply is lower in smaller firms where the prestige of holding the CEO position is lower compared to larger firms. Therefore, narcissistic CEOs in smaller firms are prone to seek bold, visible, and spectacular actions, whereas narcissistic CEOs in larger firms are more likely to act to preserve the status quo. Thus, in the latter case, the vulnerable aspects of narcissism may dominate the grandiose aspects and make the CEO less willing to take risk. We expect the association between CEO narcissism and corporate risk to depend on the existing level of narcissistic supply which we proxy by the size of the firm (in robustness test we use CEO compensation as a proxy for narcissistic supply).

Hypothesis 1: CEO narcissism is positively associated with corporate risk for low levels of narcissistic supply and negatively associated with corporate risk for high levels of narcissistic supply.

Optimistic CEOs tend to overestimate the mean value of future cash flows as well as their own abilities. This optimism bias tends to be largest for complex projects with a high level of uncertainty, thus leading to increased risk. However, if the investments must be funded with external capital, the narcissistic CEO will be more likely to decline the investment due to the high perceived cost of financing. Furthermore, if the CEO lacks structural power (e.g. in the form of duality), a strong board may restrict the CEO from acting on the bias.

Hypothesis 2: CEO optimism is positively associated with corporate risk but is moderated by the

lack of free cash flows and lack of structural power (e.g. duality).

Although few empirical articles have tested CEO narcissism and CEO optimism jointly, previous research – as elaborated previously – suggests that a narcissist's elevated self-image may be positively correlated with increased overconfidence and optimism. This indicates a potential overlap between the two biases. Therefore, we expect to find a less significant relation between one of the biases and corporate risk in a joint model where we control for the effect of the other managerial bias. We see no indication that being both optimistic and narcissistic will lead to an extraordinary increase in corporate risk. Hence, we do not expect the presence of both biases to have an amplifying effect.

Hypothesis 3: CEO narcissism and CEO optimism have overlapping associations with corporate risk, but there is no synergy effect of combining both biases.

In the remainder of the paper, we will test these three hypotheses with a special focus on the interaction between CEO narcissism and narcissistic supply in relation to corporate risk.

3. Data and methodology

In this section, we show how we reach our sample of 281 US non-financial firms (3.1). Next, we motivate and describe our proxies for corporate risk (3.2), CEO narcissism (3.3), and CEO optimism (3.4). Further, we show descriptive statistics, correlation coefficients, and univariate analysis (3.5). Finally, we discuss the applied methodology in terms of the specifications of the regression analysis and the treatment of standard errors (3.6).

3.1 Sample

We extract data for the period 2006-2015 on all available S&P 1500 firms from the Execucomp database, which leads to a raw sample of 1,497 firms. We then run through a series of steps to end up with our final sample of 281 firms, equivalent to 2810 observations on 457 different CEOs for the 10-year period. These steps are as follows.

Step 1: We exclude finance and utility firms as they are competing in highly regulated industries. 447 firms are excluded.

Step 2: We exclude non-relevant executives, e.g. board members, CFOs, and COOs, since the focus of this study is on the CEOs. Moreover, we demand at least two observations per CEO to be able to calculate different optimism and narcissism indicators. 46 firms are excluded.

Step 3: We exclude firms with missing data (i.e., when observations on individual years within the sample period are missing). 483 firms are excluded.

Step 4: We exclude firms with fiscal year not equal to the calendar year. 181 firms are excluded.

Step 5: We exclude firms for which it is not possible to get information about daily stock returns for the entire sample period. 45 firms are excluded.

Step 6: We exclude firms for which it is impossible to find either transcripts, press releases, or controls. 14 firms are excluded.

These steps result in a final sample of 281 firms and 457 CEOs, equivalent to approximately 1.6 CEOs per firm. Following the industry classification used by Malmendier and Tate (2008), the final sample consists of 175 manufacturing firms (62%), 48 service firms (17%), 26 transportation firms (9%), 22 trade firms (8%), 7 technical industry firms (3%), and 3 other firms (1%).

To address potential sample selection bias, we compare firm statistics on revenue, return on assets, EBITDA margin, R&D, and leverage. We find no statistically significant differences between the firms in the sample and the firms excluded from the sample. We exclude firms with a fiscal year different from the calendar year. This exclusion increases the share of manufacturing and healthcare firms while it reduces the share of wholesale and retail firms. Finally, if the reason behind missing data in Execucomp is a lack of equity and option-based compensation, this could create a sample selection bias. Thus, optimists are drawn to firms with option compensation packages (Gervais et al., 2011; Graham et al., 2013). Despite this potential source of bias, we conclude that our sample is close to being representative for the population of non-financial S&P 1500 firms.

3.2 Corporate risk

We focus on stock-based indicators for corporate risk. This allows us to calculate the volatility for each year based on daily data. The use of stock price return volatility is consistent with Leahy and Whited (1996) who argue that it captures all the aspects of the firm that are important to investors. Although stock-based indicators measure the risk of equity, a stock is equivalent to an option on the firm's assets. Therefore, the stock price will also be sensitive to the volatility of the underlying asset (Bulan, 2005). Furthermore, it would be difficult to identify and measure the source of uncertainty in the underlying business, which is why we use stock return volatility as a shortcut, in accordance with Hirshleifer et al. (2012), Habib and Hasan (2017), and Serfling (2014). We define this variable as the annualized standard deviation of the total daily shareholder return[8]. It is

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[8] In accordance with Hirshleifer et al. (2012), we use the raw measure of stock return volatility. However, for robustness, we also run our main models using the natural logarithm of the risk indicator to make sure that skewness does not drive our results.

calculated for each year based on stock data from CRSP. Stock return volatility is our default measure of corporate risk.

For robustness, we use an alternative indicator of risk that considers only the idiosyncratic volatility which – to a larger extent – is under the CEO's control. Idiosyncratic risk is calculated as the annualized standard deviation of the residuals from regressing the daily stock returns in excess of the risk-free rate on the market risk premium (and SMB and HML in the case of FF3F). Using the idiosyncratic volatility as a proxy for risk is consistent with previous studies (Roussanov and Savor, 2014; Goyal and Santa-Clara, 2003; Serfling, 2014).

For further robustness, we use ROA volatility as an alternative measure of corporate risk. Inspired by previous literature (Habib and Hasan, 2017), we calculate ROA volatility as the standard deviation of ROA for the past three years, including the focal year.

3.3 CEO narcissism

Psychoanalysis of narcissism has primarily used measures based on questionnaires and interviews to form measures such as the Narcissistic Personality Inventory. However, a complication of this approach is that CEOs are reluctant to participate in these studies (Chatterjee and Hambrick, 2007). To circumvent this issue, many empirical studies have used unobtrusive measures, where data is not specifically produced for the purpose of being analyzed (Webb et al., 1966). Thus, research within behavioral corporate finance has focused on unobtrusive indicators of narcissism which can be collected from public data. Such indicators should be under the CEO's control, and they need to reflect one or more aspects of what is being measured. Based on these criteria, Chatterjee and Hambrick (2007) identify five indicators of narcissism (please refer to the literature review). Most subsequent studies have used one or more of these indicators (Aktas et al., 2016; Chatterjee and

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Hambrick, 2011; Gerstner et al., 2013; Oesterle et al., 2016)

Specifically and in accordance with Chatterjee and Hambrick (2007) and Aktas et al. (2016), we calculate the main measure of CEO narcissism, Narcissism FSP (First-person Singular Pronouns), as the proportion of first-person singular pronouns (I, me, mine, my, myself) to total first-person pronouns (I, me, mine, my, myself, we, us, our, ours, ourselves) in CEO speech. Samples of CEO speech are extracted from interviews with analysts or journalists recorded in the LexisNexis Academic database. In our search for transcripts, we follow the method of Aktas et al. (2016) and exclude transcripts of meetings that may have been scripted and interviews where the CEO makes a presentation. Thus, we only consider transcripts of interviews where the CEO responds spontaneously to analyst questions. Through a manual search for transcripts related to

This study follows Aktas et al. (2016) and measures narcissism based on the usage of first-person singular pronouns in speech by the CEO[9]. Raskin and Shaw (1988) confirm the association by documenting that this indicator is significantly correlated with the Narcissistic Personality Inventory score. Furthermore, this correlation is robust to controlling for age, gender, the content of the speech, as well as other personality traits such as extraversion, neuroticism, psychoticism, and locus of control. Such documentation is not present for any of the other indicators used in previous literature (Aktas et al., 2016).

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[9] Karl McDonnell is the most narcissistic CEO according to this proxy for CEO narcissism. Karl McDonnell is CEO of Strayer Education Inc. (included in the S&P SmallCap 600 index) since 2013. Robert S. Silberman, the executive chairman of Strayer Education Inc., writes the following in the Letter to Shareholders in the annual reports of 2014 and 2015: "Our Company was stewarded over the last year by our very talented President and CEO, Karl McDonnell, and his superb management team." (2014, Annual Report) and "The strong academic and financial results for our company could not happen without the dedicated and inspired leadership of our Company's CEO, Karl McDonnell …" (2015, Annual Report). Karl McDonnell was asked the following question in an interview by Kelly Heyboer, The Star-Ledger's higher education reporter, in an article on for-profit colleges in NJ.com on September 13, 2013: "Your predecessor, former Strayer CEO Robert Silberman, was criticized for having a salary 50 times higher than the president of Harvard University. Why do for-profit college executives need such high salaries?" Karl McDonnell's response to the question was: "I can't comment on what other colleges pay their executives. And just as a matter of principle, my compensation is determined by our company's board of directors and it's not something I comment on." According to the proxy statement of Strayer Education Inc. of 2015, Karl McDonnel received a total compensation of $3.5 million in 2015 (2014: $3.5 million).

the specific firm and CEO name, we collect 2,336 documents for 457 CEOs (i.e. 5.1 per CEO). The transcripts of conference calls typically involve several participants (e.g., analysts, CEO, CFO, and COO). Therefore, we manually remove the speech of all other persons except for the CEO. For each CEO, transcripts are randomly collected across the years in which the CEO is included in our sample period to avoid year effects on the measure. Most transcripts are of quarterly earnings conference calls, and to account for potential seasonality effects, we collect transcripts for each CEO across all four quarters.

Carey et al. (2015) find that personal pronoun usage has an insignificant correlation with narcissism scores. Thus, as a robustness check, we estimate CEO narcissism based on the prominence of the CEO in firm press releases. The content of a press release is under the control of the CEO who typically reviews most announcements personally. Furthermore, press releases allow a narcissistic CEO to remind the public who runs the firm (Chatterjee and Hambrick, 2007).

Specifically, we calculate this alternative measure of CEO narcissism, Narcissism PR (Press Release), as the number of times that the CEO is mentioned by name in press releases divided by the total number of words (in thousands). Using both Factiva and LexisNexis databases as well as individual firms' home pages, we manually gather a total of 2,353 press releases, equivalent to 5.1 press releases per CEO. Each press release is gathered at random across topics and the sample period. Press releases with no apparent relation to the CEO are not included in our sample, and due to an overrepresentation of quarterly earnings in the databases, most press releases collected are of this type.

Both indicators of CEO narcissism – Narcissism FSP and Narcissism PR – are continuously scaled. This is consistent with how narcissism is viewed in the psychology literature, and it is also consistent with how other personality dimensions are measured (Campbell and Foster, 2007).

Furthermore, Campbell and Foster (2007) argue that narcissism is a stable trait for three different reasons. First, the self is highly resistant to change. Secondly, narcissists are resistant to critical feedback, which makes them less responsive to suggestions that their behavior is non-optimal. Finally, narcissistic acts feel good as they boost self-esteem, making it hard for narcissists to find motivation to change. Thus, we calculate only a single value of each narcissism indicator per CEO.

The magnitude of our main narcissism measure is in line with previous literature. Thus, we find a mean Narcissism FSP measure of 0.26 while the corresponding means are 0.21 in Chatterjee and Hambrick (2007) and 0.19 and 0.22 for targets and acquirers, respectively, in Aktas et al. (2016). The mean of our alternative Narcissism PR measure is 2.20, which is within the range of previous literature (6.21 in Chatterjee and Hambrick (2007) and 1.34 in Oesterlee et al. (2016)).

3.4 CEO optimism

Most empirical studies of CEO optimism have applied an indicator that is based on the CEOs' failure to exercise deep in-the-money stock options (Malmendier and Tate, 2005, 2008, and 2015; Malmendier et al., 2011; Galasso and Simcoe, 2011; Hilary et al., 2016; Hirshleifer et al., 2012). We follow previous literature and use this approach to establish our default measure of CEO optimism. This binary indicator of CEO optimism is calculated based on information from Execucomp about CEOs' holdings of option packages at the end of each year along with details about their vesting periods, exercise prices, and moneyness.

Previous studies have used different methods in relation to moneyness, timing, and the consistency of the indicator. We follow Hilary et al. (2016), Galasso and Simcoe (2011), and Hirshleifer et al. (2012) and do the classification of optimists based on all options that are exercisable. With respect to moneyness, we follow Campbell et al. (2011a, 2014) and use a cut-

off level at 100%. We use alternative cut-offs (50%, 75%, 150%, and 200%) for robustness purposes.

Lastly, we need to consider whether the optimism dummy should be constant. Sharot (2012) describes optimism as a relatively constant illusion that is hard to get rid of once it is present. This is supported by Kahneman who argues that it is "built so deeply into the structure of the mind that you couldn't change it without changing many other things" (Shariatmadari, 2015). Since optimism is relatively constant, we classify the CEO as an optimist in all periods if the CEO fails to exercise deep in-the-money options at least twice. The reason why we require it to happen twice is to avoid that a one-off event leads a CEO to be classified as optimistic for the entire sample period. Other studies (e.g., Malmendier and Tate, 2008) use a semi-constant variable that classifies CEOs as optimists only in years following the first time that a CEO shows optimistic behavior. However, this could provide a biased categorization of the CEOs who may be classified as non-optimistic in early years because they simply did not have any options deep in-the-money. Also on this aspect, we will perform various robustness tests.

The number of CEOs categorized as optimists using our main measure of optimism (Option Holder 100) is in line with previous literature. Thus, we find that 66% of CEOs are defined as optimists in our sample, while it is 61% in Hirshleifer et al. (2012) and 58% in Galasso and Simcoe (2011).

Previous empirical work has used other indicators of optimism based on 1) CEO insider transactions (Andreou et al., 2017; Campbell et al., 2011a; Billett and Qian, 2008), 2) industry-adjusted investment level (Campbell et al., 2011a), 3) CEO overestimation of quarterly earnings (Hilary et al., 2016), and 4) the press portrayal of the CEO (Hilary et al., 2016; Hirshleifer et al., 2012; Malmendier and Tate, 2008 and 2011). We apply an indicator (Net Buyer) based on the

CEO's insider stock position to check the robustness of our results. We calculate the Net Buyer variable based on data from Execucomp about the equity position (excluding options) that the CEO holds in the firm at the end of each year. In accordance with previous studies (Campbell et al., 2011a), we classify the CEO as a net buyer if the CEO increases the stock position in the firm with more than 10% compared to the total position at the beginning of the year.[10]

3.5 Descriptive statistics, correlation coefficients, and univariate analysis

The descriptive statistics are presented in Table 1. The CEO controls are obtained from Execucomp, while firm controls are from CapitalIQ.

*** Table 1 about here ***

Our main corporate risk variable, stock return volatility, averages 36% p.a. with a standard deviation of 17% p.a.[11] Our main CEO narcissism variable averages 26% with a standard deviation of 9%.[12] Finally, we find that 66% of our CEOs are optimistic based on our main CEO optimism

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[10] There are at least two potential problems with this Net Buyer measure. *First*, a CEO that has just started will typically have a low initial stock position, and due to firm policies, the CEO will likely be required to increase the position. This creates a bias because it captures actions that may not be a result of optimistic behavior. Previous studies have tried to mitigate this issue by requiring that the absolute change in the portfolio should be in the top quintile. However, such a requirement would make it harder for CEOs of smaller firms to be classified as optimists. It will also limit the share of optimists to 20% in each year, which is significantly lower than what previous studies have found. Therefore, we refrain from applying this criterion. *Second*, we only have data for the stock position and not the specific trades. Hence, we do not know whether the CEO has bought the shares or the increased position is due to grants, option expirations, etc. Thus, it may not be an active decision to increase the position.

[11] The magnitudes are in line with Hirshleifer et al. (2012) who report an average non-annualized stock return volatility in the range of 2.66% to 3.19% (i.e., an annualized - 252 trading days - stock return volatility of 42% to 51%) and a non-annualized standard deviation in the range of 1.38% to 1.49% (i.e., an annualized standard deviation of 22% to 24%) for the period 1993-2003.

[12] The average and the standard deviation of our CEO narcissism variable are in line with previous studies. Thus, Aktas et al. (2016) show averages of 19% and 22% for targets and acquirers, respectively, and corresponding standard deviations of 8% and 8%. Chatterjee and Hambrick (2007) have similar magnitudes for their CEO narcissism variable based on CEO speech (an average of 21% and a standard deviation of 9%).

variable.

The average and median CEO is 56 years old and male with an average (median) tenure of 8.4 (6.5) years. The average (median) firm has a market value of assets (MVA) of $26.5 ($4.9) billion, a leverage ratio of 23% (22%), and a levered FCF that makes up 77% of total PP&E on average. Because size has a high positive skewness, we use the natural logarithm of this measure in all regressions. Tenure, Stock Holdings, Option Holdings, and Tangibility are also slightly skewed. However, we use them in their original form in our models and test for robustness when applying a log-transformed version. For robustness, we also run regressions where FCF, Option Holdings, and Narcissism FSP are winsorized at 1% and 99% to reduce the effects of outliers.

The correlations between our main variables are presented in Table 2. The main variables are stock return volatility, CEO narcissism, CEO optimism, five firm control variables, and six CEO control variables. Table 2 shows that stock return volatility is not significantly correlated with CEO narcissism but positively correlated with CEO optimism (10% level). The correlation between CEO narcissism and CEO optimism is not significant which is an early indication that the potential overlap between the two managerial biases / traits may be more potential than actual.

*** Table 2 about here ***

In Table 3, we split our sample in terciles depending on the level of narcissism (Panel A) and into two subsamples depending on whether or not the CEO is an optimist (Panel B) to get a more nuanced view on how our primary indicators of CEO narcissism and CEO optimism relate to other important variables. Table 3 confirms the intuition from the simple correlations in Table 2. There seems to be no significant difference in the mean of the corporate risk variable across the

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CEO narcissism subsamples.

*** Table 3 about here ***

The association between corporate risk and the psychological biases of the CEO must be viewed in relation to the structural environment to uncover the true association. Table 3 indicates that highly narcissistic CEOs are more likely to be employed in large firms and more likely to be chairmen of the board of directors than less narcissistic CEOs. Similarly, highly optimistic CEOs are more likely to be chairmen of the board of directors and more likely to be employed in firms with a high level of free cash flows than less optimistic CEOs. Thus, a multivariate regression analysis is warranted to mitigate omitted variable bias.

3.6 Methodology

Working with panel data, special care must be taken when choosing both estimation method and how to treat standard errors. We use a perfectly balanced panel data set, which means that we have a fixed amount of observations (T=10 years) for a fixed amount of cross sectional units (N=281 firms), giving us a total of 2,810 observations. In addition, we have a hierarchical dimension with 457 CEOs (lower-level entities) nested in the 281 firms (higher-level entities).

The most appropriate estimation technique depends on the research question, the distribution of included variables, and endogeneity considerations. To unveil the rich information inherent in panel data, the choice of estimator is typically the choice between fixed effect (FE) and random effect (RE) estimation (Wooldridge, 2010). In line with previous research, we apply a

random effect estimation as our default and a fixed effect estimation as robustness check.[13] To investigate the robustness of our models and to unveil potential time effects in our data, we also perform ten cross-sectional regressions, one for each sample year with 281 (number of firms) observations each. For these estimations, we use standard OLS and Newey-West standard errors to correct for potential heteroscedasticity and serial correlation in our data.

Based on our three hypotheses, our regressions build on the full model below where the dependent variable, Y_{it}, is a measure of corporate risk:

$$
\begin{aligned}
Y_{it} = \quad & \beta_0 + \beta_1 Narcissism_{it} + \beta_2 Narcissism_{it}Size_{it} + \beta_3 Optimism_{it} + \beta_4 Optimism_{it}FCF_{it} \\
& + \beta_5 Optimism_{it}Duality_{it} + \beta_6 Narcissism_{it}Optimism_{it} + \beta_{7\text{-}11}FirmControls_{it} \qquad (1) \\
& + \beta_{12\text{-}17}CEOControls_{it} + \varepsilon_{it}
\end{aligned}
$$

Irrespective of the estimation technique, we need to account for clustering in the standard errors. Most importantly, the residuals may be correlated across years for a given firm (firm-clustering) due to firm-specific components that affect all observations of a given firm uniformly. Such effects can be time varying, and if this is the case, then not even an FE estimation will deal

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[13] We apply a Hausman test to test for consistency in the random effects model (Wooldridge, 2010). We find that this test rejects the null, suggesting the use of an FE model. However, in terms of making the ultimate methodological decision, a Hausman test is neither necessary nor sufficient (Clark and Linzer, 2015). In relation to the objectives of this paper, there are some severe drawbacks of the FE model. First, FE only considers variations within the firm, and since the primary regressors have small within variation and are constant for each CEO, the FE estimation would be based on only a fraction of the total sample variation, leading to unprecise estimates (Wooldridge, 2010). Effectively, the sample is reduced to the firms that change CEO during the sample period where the new CEO has different characteristics than the former. This leaves a very small effective sample size, making it hard to make statistical inference. This is also considered one of the reasons why previous research has not used FE (Billett and Qian, 2008; Oesterle et al., 2016; Chatterjee and Hambrick, 2007 and 2011). Furthermore, FE estimation does not enable the use of time-constant variables, and if interaction effects between such time-constant variables and the other regressors exist, this will not be captured in an FE model (Plümper and Troeger, 2007). RE, on the other hand, includes both the variation within and between firms, which increases the utilization of the variation in the sample. This inclusion of cross-sectional differences is considered necessary since the variation between firms is significantly higher than within firms for both the narcissism and optimism indicators in our sample.

with the problem. In contrast, standard errors clustered by the firm will be unbiased both when firm effects are permanent and temporary (Petersen, 2009). Therefore, we follow Petersen (2009) and empirical research (Malmendier and Tate, 2005, 2008, and 2015; Hirshleifer et al., 2012) and use firm clustered standard errors that effectively account for heteroskedasticity and serial correlation in the error terms.

Residuals may also be correlated across different firms for a given year (time-clustering). The time-dummies included will capture this effect provided that it affects all firms in the same way. When this is not the case, time-clustering needs to be considered. However, our sample has large N and small T. In such case, Petersen (2009) recommends not to cluster by time; thus, we include time dummies in our panel data regressions.

4. Empirical results

In this section, we perform multivariate regression analysis on the association between CEO narcissism, CEO optimism, and corporate risk. First, we show the main models (4.1). Next, we perform various robustness tests (4.2).

4.1 Main results

In line with previous literature, we include six CEO characteristics and five firm characteristics as control variables in our multivariate regression analysis. The six CEO characteristics are gender, age, tenure, stock ownership, option holdings, and duality. The five firm characteristics are size, tangibility, leverage, Altman's Z-score, and free cash flows. We elaborate on these eleven variables below.

First, we include the *gender* of the CEO as a dummy variable (male=1). Previous studies

show that males undertake riskier corporate investments and financing decisions (Graham et al., 2013; Huang and Kisgen, 2013).

Second, we include the *age* of the CEO because previous studies (e.g. Serfling, 2014) find a relationship between age and corporate risk.

Third, we include CEO *tenure*, in line with Hilary et al. (2016) who find a significant relationship between tenure and late exercise of options.

Fourth and fifth, we follow previous literature and include the CEO *stock ownership* and *option holdings*, both measured in percent of outstanding shares (Chatterjee and Hambrick, 2007 and 2011; Malmendier and Tate, 2005 and 2008). These variables capture effects related to incentive compensation as more convex compensation schemes may increase risk-taking.

Sixth, we include *duality* as a measure for the structural power of the CEO in line with Galasso & Simcoe (2011).

Seventh, a vast amount of finance literature has shown that *size* has a significant effect on risk as large firms tend to be more diversified and are less likely to experience financial distress (Fama and French, 1992). Moreover, it has been argued that larger firms are less involved in risky investments than smaller firms (Perez-Quiros and Timmermann, 2000). Therefore, we follow previous studies on narcissism and optimism and control for the size of the firm (Chatterjee and Hambrick, 2007 and 2011; Malmendier and Tate, 2005 and 2008). The size variable is defined as the natural logarithm of the market value of assets (MVA).

Eight, we include *tangibility*, i.e. the ratio of tangible assets to total assets. Firms with more tangible assets are less restrained and in a better position to initiate more risky projects because debtholders have more secure claims in the event of default. Therefore, tangibility is expected to have a positive impact on corporate risk (Malmendier et al., 2011).

Ninth, we include *leverage* to capture that operational decisions have more impact on equity holders in more levered firms. This is in accordance with previous studies (Serfling, 2014; Hirshleifer et al., 2012). Furthermore, it has been shown that optimism is associated with higher leverage (Landier and Thesmar, 2009; Graham et al. 2013; Malmendier et al., 2011).

Tenth, we include *Altman's Z-score*, in line with Malmendier et al. (2011), to control for the effect of financial distress as firms far from financial distress are less restrained and can take on more risk.

Eleventh and finally, the results of Malmendier and Tate (2005) indicate that higher free cash flows (FCF) can increase the investment level as they reduce the need for external capital. Therefore, we include FCF normalized by PP&E at the beginning of the year in the model consistent with Malmendier and Tate (2008).

On top of these eleven CEO and firm control variables, we include industry dummies and time dummies in all random effects regression models. We do not display coefficients of these variables and the constant term when we report our results in subsequent tables.

We analyze the association between CEO narcissism and corporate risk in Table 4. Model 1 includes only the main CEO narcissism indicator, Narcissism FSP, and the controls described above. Model 1 indicates that narcissism is not significantly associated with corporate risk. However, as discussed in relation to Hypothesis 1, it is possible that narcissism comprises conflicting dimensions, and therefore the interaction with size is included in Model 2 to account for the multi-faceted elements of narcissism.

*** Table 4 about here ***

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Model 2 shows that firms with more narcissistic CEOs tend to have a higher level of corporate risk when the firm size is relatively small. However, for larger firms, this positive relation is offset by the negative interaction with size. Thus, using the estimated coefficients in Model 2, CEO narcissism turns from being positively to being negatively associated with corporate risk when the size of the firm (MVA) exceeds $2.6 billion – corresponding to the 36th percentile in our sample. Thus, CEO narcissism is positively associated with risk in smaller firms and negatively associated with risk in larger firms.[14]

Model 3 includes duality and its interaction with CEO narcissism to capture whether structural power restricts the relation between CEO narcissism and corporate risk. The results reject any existence of a significant interaction with duality. This suggests – if there is a causal relationship – that narcissistic CEOs are able to push their own agenda through regardless of their level of structural power.

Turning to the control variables, all firm controls are significantly related to corporate risk and in line with expectations. However, none of the CEO controls show statistical significance.

To fully capture the relation between CEO narcissism and size and their combined association with corporate risk, Models 4-6 in Table 4 report the output from regressing CEO narcissism on corporate risk for three subsamples split by firm size. CEO narcissism is positively related to corporate risk in the lowest size tercile and negatively related to corporate risk in the highest size tercile. We address the economic magnitude of these results at a later stage. Following the rationale behind Hypothesis 1, we argue that the relation between corporate risk and CEO narcissism can be ascribed to differences in narcissistic supply, which is higher (lower) in

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[14] Our findings are not necessarily inconsistent with the positive association found by Chatterjee and Hambrick (2007) since their sample consists of smaller firms. Thus, in their sample, average revenue is less than $3 billion compared to more than $16 billion in our sample.

relatively larger (smaller) firms.

We analyze the association between CEO optimism and corporate risk in Table 5. Panel A reports four random effects estimations with different model specifications. Model 1 includes the CEO and firm controls and the primary optimism indicator, Option Holder 100. Models 2-4 add to Model 1 by including interaction terms between the optimism indicator and duality and FCF. The rationale for including the interaction with duality (a dummy variable indicating whether the CEO is also the chairman of the board of directors) is to explicitly model the structural power of the CEO. There is no theoretical framework suggesting that gains in structural power will lead to excessive risk-taking unless it is combined with a cognitive bias. For this reason, duality will not be included in the models on its own except when the interaction term is also present. The rationale for including the interaction with free cash flows comes from previous studies, finding that investment-cash-flow sensitivity is higher for optimistic CEOs because they are more reluctant to use external financing (Malmendier and Tate, 2015).

*** Table 5 about here ***

Model 1 shows that firms run by optimistic CEOs are associated with more corporate risk – specifically 2.0% points more (compared to the sample average in annual stock return volatility of 36%, this corresponds to 5.5%). This finding supports previous research that links CEO optimism to increases in risky investments (Galasso and Simcoe, 2011; Hirshleifer et al., 2012; Malmendier and Tate, 2008). The positive relation also holds when controlling for free cash flows in Model 2. Thus, the apparent positive relation between firms with optimistic CEOs and corporate risk is not constrained by cash availability. This is partly in contrast to Malmendier and Tate (2015)

who find a significant relation for equity-dependent firms – however, only partly in contrast because their sample consists of smaller firms and smaller firms tend to be more dependent on equity.

When we include duality and its interaction with optimism, the conclusion is altered. The specifications in Model 3 and 4 suggest that in cases where CEOs lack structural power, there is no significant association between CEO optimism and corporate risk. Thus, the relation between corporate risk and CEO optimism is driven by CEOs who are also chairmen of the board of directors. These findings are consistent with Galasso and Simcoe (2011) who find a significant positive interaction between optimism and duality with respect to R&D investments. Because there is no significant interaction between FCF and optimism, we will apply the specification of Model 3 in further analysis.

Looking at the marginal effects, firms with an optimistic CEO who is chairman of the board of directors have 3.4% points higher volatility (equivalent to 9.3% of the average volatility) than firms with a non-optimistic CEO who has duality. When the CEO does not have duality, optimists are only associated with 0.7% point higher risk, which is insignificant. Models 5-6 further support this finding, showing regressions on subsamples dividing the sample into CEOs with and without duality. Model 6 illustrates that CEO optimism has no significant association with corporate risk for duality=0, while CEO optimism is positively associated with corporate risk when the CEO has duality (Model 5), specifically 2.5% points higher volatility.[15]

The results also show that none of the CEO controls are significant, while all the firm

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[15] As shown in Table 5, duality itself is negatively associated with risk, which is puzzling. However, this may be linked to differences in how the CEOs are compensated. In our sample, CEOs with dual titles have on average 27.2% of their total stake in their own firm in options, while the equivalent number for CEOs without duality is 45.3%. This could indicate that firms are aware that a combination of very convex compensation and structural power may result in too much risk-taking. CEOs without duality have a higher exposure to options and will benefit more from increasing stock return volatility. Another potential explanation is that boards are more reluctant to give CEOs dual titles in fast-paced and more volatile businesses, where strategic decisions have a larger impact.

controls are highly significant. This indicates that only biases directly linked to the personality and behavior of the CEO, and not basic characteristics such as gender and age, are associated with corporate risk.

Previous literature has primarily focused on the individual relations between CEO narcissism or CEO optimism and various dependent variables. Table 6 combines both CEO narcissism and CEO optimism into the same regression. This is done to unveil how they relate to each other regarding potential overlaps, and to identify which relation is dominant. The combined models are based on the results of the individual models. Therefore, the interactions between firm size and CEO narcissism and between CEO duality and CEO optimism are included due to their significant association with corporate risk.

*** Table 6 about here ***

Model 1 shows that the significant relation between CEO narcissism and corporate risk is largely unaffected by controlling for CEO optimism. Thus, the firm size at which the association turns negative is only slightly altered to the 39th percentile. Looking at CEO optimism when controlling for CEO narcissism, the association with corporate risk is almost identical to the one suggested by the individual model. CEO and firm controls still exhibit the same relations as in the previous models. Due to this strong robustness, we will not show results for controls in our tables from this point on. All further analyses and robustness checks will be based on the model specifications in Table 6, Model 1, which henceforth will be referred to as the joint risk model.

Based on these results, the impact of CEO narcissism and CEO optimism seems very robust to the inclusion of the other bias. This suggests that the indicators measure two phenomena, each

with a significant association with corporate risk. Model 2 further supports this interpretation by including an interaction term between the two indicators. The coefficient for such an interaction term is not statistically significant and the previous conclusions are unaffected.

Based on the results of Model 1-2 in Table 6, it seems fair to infer that there are neither overlaps nor synergies related to the established associations between CEO narcissism and corporate risk on the one hand (Table 4) and CEO optimism and corporate risk on the other hand (Table 5). Therefore, the potential omitted variable bias arising from performing analysis on the two biases independently will be small or non-existing, which supports the validity of previous studies that do not include both measures. We conclude that CEO narcissism and CEO optimism are two distinct phenomena – a personality trait and a cognitive bias – each with their own independent association with corporate risk.

If risky firms tend to hire more optimistic CEOs and make them chairmen of the boards of directors, this may be the reason behind the association in the random effects model. This illustrates that significant relationships found between the managerial biases and corporate risk could be a result of fixed firm effects omitted in the regressions, leading RE to be potentially inconsistent. If this is the case, we would expect the change in the level of narcissism and optimism to be small for CEOs within the same firm. Tracking the absolute differences in Option Holder 100, the average absolute change from the predecessor to the successive CEO is 0.44, meaning that in 44% of the instances, the bias of the new CEO is different from that of the predecessor. For Narcissism FSP, the average absolute change is 0.09, which is also relatively high compared to the median level (0.25). For both measures, the absolute change is significantly different from zero (t-test). This is an indication that the effects of the RE estimations are not caused by firms consistently hiring a specific type of CEO.

The variation within firms makes it possible to investigate the effect of the personality trait (CEO narcissism) / cognitive bias (CEO optimism), controlling for time-invariant firm effects, as these are removed when applying fixed effects (FE) estimation. Effectively, FE investigates only the variation caused by changes over time in firm and CEO observables within a given firm and ignores the variation in these observables across the various firms. Holding the firm constant eliminates all fixed firm effects, but in a sample period of ten years, not all firm effects are time-constant, meaning that the suggested relations may still result from firm-specific effects rather than CEO effects. An example of such a firm-wide change over time is new strategies which potentially lead to the hiring of a new CEO with the preferred personality, different from that of the previous CEO. Thus, using FE estimation, we can infer that significant relations are caused by something time-variant in the firm but not necessarily that they are caused by the CEO. Established relations may arise from the CEO influencing the course of action for the firm, but they may as well result from the firm hiring a new "type" of CEO to the new strategic focus set by the board of directors. Whether it is the former or the latter, we will not be able to prove without controlling for largely unobservable factors like changes in strategy.

Model 3 reports the results from an FE estimation of the joint risk model. Our previous results are robust to this alternative estimation. The firm size at which the association between CEO narcissism and corporate risk changes from positive to negative is for all practical purposes unaltered around the 37th percentile. The association between CEO narcissism and corporate risk is present both between and within firms.

The marginal effect of optimism in the presence of duality is, however, significantly larger in the fixed effects model, as an optimistic CEO in a firm with duality is associated with 4.5% points higher stock return volatility. The interaction with duality is also more significant, which is

an indication that most of the association in the RE estimation comes from within-firm effects. This is further supported in the robustness section below which shows that there is no significant association between CEO optimism and corporate risk in the cross-section.

A strong association in the FE model increases the likelihood that the effects come from the personality trait / the cognitive bias rather than firm characteristics. The fact that results hold when controlling for fixed firm effects is an indication that the RE model is consistent, and it illustrates that the associations are also present within firms. Thus, corporate risk is affected by changes in a firm over time, but whether this is a result of changes in CEO personality traits / cognitive biases or a result of a changed firm strategy is a question for future research.

Table 7 addresses the question of economic significance in relation to the association between CEO narcissism and corporate risk. The preceding tables show a statistically significant association. However, the economic significance may – in spite of the statistical significance – be limited to a degree that our results are of little practical relevance (Cuervo-Cazurra et al., 2013).

*** Table 7 about here ***

Panel A, Table 7, reports levels of and changes in stock return volatility for various levels of firm size and CEO narcissism based on the random effects regression in Table 6, Model 1. Panel A shows an increase in corporate risk of 6% (from 0.39 to 0.42) for small firms (10% percentile, market value of assets of $0.7 billion) when going from a CEO with a low degree of narcissism (10% percentile, 0.16) to a CEO with a high degree of narcissism (90% percentile, 0.37). However, Panel A shows corresponding *decreases* in corporate risk of 2% (from 0.33 to 0.32) for median sized firms (market value of assets of $4.9 billion) and 19% (from 0.24 to 0.20) for large firms

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(90% percentile, market value of assets of $58.2 billion).

Panel B, Table 7, is structured the same way as Panel A but the results are based on the fixed effects regression model (Model 3, Table 6). Panel B shows an increase in corporate risk of 7% (from 0.41 to 0.44) for small firms, a decrease in corporate risk of 3% (from 0.33 to 0.32) for medium-sized firms, and a decrease in corporate risk of 27% (from 0.22 to 0.16) for large firms. Panels A-B, Table 7, show that independent of the specific model (random versus fixed effects model), an increase in CEO narcissism is associated with an increase in corporate risk (6%-7%) for small firms, a small decrease in corporate risk (2%-3%) for medium-sized firms, and a large decrease in corporate risk (19%-27%) for large firms.

As a robustness test of the results in Panels A-B, Panel C reports levels of and changes in stock return volatility for various levels of firm size and CEO narcissism based on the random effects regressions for the three sub-samples (size terciles) in Table 4. Analyzing the interaction between CEO narcissism and narcissistic supply (proxied by firm size) for subsamples is a relevant robustness test because a model that spans the entire spectrum of firm sizes may fail to adequately encompass the potentially idiosyncratic differences between firms of different sizes. Panel C shows an increase in corporate risk of 8% (from 0.39 to 0.43) for small firms (median-sized firm in the first tercile, market value of assets of $1.0 billion) when going from a CEO with a low degree of narcissism (10% percentile in the first tercile, 0.16) to a CEO with a high degree of narcissism (90% percentile in the first tercile, 0.36). Panel C further shows a decrease in corporate risk of 6% (from 0.32 to 0.30) for medium-sized firms (median-sized firm in the second tercile, market value of assets of $4.9 billion) when going from a CEO with a low degree of narcissism (10% percentile in the second tercile, 0.16) to a CEO with a high degree of narcissism (90% percentile in the second tercile, 0.38). Finally, Panel C shows a decrease in corporate risk of 11% (from 0.27 to 0.24) for

large firms (median-sized firm in the third tercile, market value of assets of $30.0 billion) when going from a CEO with a low degree of narcissism (10% percentile in the third tercile, 0.17) to a CEO with a high degree of narcissism (90% percentile in the third tercile, 0.37). In qualitative terms, Panel C confirms the main conclusions from Panels A-B.

Collectively, the results reported in Panels A-C in Table 7 indicate an economically important positive association between CEO narcissism and corporate risk for small firms and an even more important negative association between CEO narcissism and corporate risk for large firms. It is also interesting to note that narcissism among CEOs is not a unique feature for a certain firm size. Thus, the distribution of values for CEO narcissism across the size terciles in Panel C shows almost identical distributions. These almost identical distributions imply that our findings are likely to be of economic relevance for a large range of firms and not limited to a few "outlier" firms or a special subset of firms.

Above we have investigated the economic magnitude of the association between CEO narcissism and corporate risk and the robustness of this magnitude. In the next section, we focus on the robustness of our results in a statistical sense.

4.2 Robustness tests

We run a cross-sectional analysis of the individual years in Table 8. The purpose of such an analysis is twofold. First, our previous results could be driven by (an) extreme year(s) and thus not be representative for the entire period. By focusing on single years, we exclude this possibility. Second, the approach to panel data is controversial (Petersen, 2009). By investigating single years and using standard OLS and Newey-West standard errors, we mitigate the controversy.

*** Table 8 about here ***

CEO narcissism and its interaction with firm size are very robust across all years, supporting the hypothesis that CEO narcissism is positively associated with corporate risk. This conclusion seems to hold before, during, and after the financial crisis (in contrast to the findings of Buyl, Boone, and Wade, 2017, in relation to US banks). On the other hand, the relation between CEO optimism, duality, and corporate risk disappears.

Table 9 performs robustness tests in terms of our proxies for corporate risk (Panel A), CEO narcissism (Panel B), CEO optimism (Panel C), narcissistic supply (Panel D), and log-transformation of variables (Panel E). All regressions in Table 9 are random effects regressions and include CEO narcissism and CEO optimism variables as well as the interaction between CEO narcissism and firm size (or alternatively Total Compensation log in Panel D) and the interaction between CEO optimism and duality. A constant, fixed time effects, fixed industry effects, and the usual controls are included in all models but not reported. All estimations apply standard errors clustered by the firm.

*** Table 9 about here ***

Panel A reports the results of using three alternative risk indicators: 1) idiosyncratic volatility based on CAPM, 2) idiosyncratic volatility based on FF3F, and 3) ROA volatility. The results show that our previous conclusions are robust to alternative stock based risk measures (Model 1-2), but only the conclusions in respect to the association between CEO narcissism and corporate risk are robust to an accounting based risk measure (Model 3).

Panel B reports the results of using different indicators of CEO narcissism. The press release measure is based on the number of times that the CEO is mentioned per 1000 words in firm press releases, while the index is generated by standardizing and adding the Narcissism FSP and the Narcissism PR measures. Using these measures provides the same qualitative results as the joint risk model (Model 1, Table 6) although with reduced statistical significance. The association between corporate risk and CEO narcissism changes from positive to negative around the 38th percentile for both new indicators (compared to the 39th percentile for Narcissism FSP). The association between CEO optimism and corporate risk is unaffected by alternating the CEO narcissism indicator.

Panel C reports the results of changing the moneyness requirement applied to classify CEOs as optimists (Models 1-5), using an option-based optimism indicator without a persistency requirement (Model 6), and using the Net Buyer measure (Model 7). Models 1-5 estimate the joint risk model using different optimism indicators that classify optimists based on 50%, 75%, 100%, 150%, and 200% moneyness cut-off levels. The average moneyness of the option holdings of the CEOs in our sample is 253%. Thus, moneyness is not expected to restrain many CEOs from exhibiting optimistic behavior. The reported results show that the findings are robust to using optimism variables based on different levels of moneyness. The suggested impact of CEO narcissism and firm size in the model is unaffected.[16]

In the Option Holder 100 measure, we require that the CEO displays optimistic behavior persistently, i.e. fails to exercise deep in-the-money options twice, to be classified as optimistic. However, since we only have as few as two observations on some of the CEOs, this may be a

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[16] Analysis not tabulated confirms the results, using a measure that defines optimists only if they hold options more than 67% in-the-money five years prior to expiration. Older studies have used this measure since option packages tended to last for 10 years and be vested after five years. However, this rule does not apply anymore, making the measure less useful.

rather strict requirement. Therefore, Model 6 estimates the joint risk model using an optimism indicator that only requires the CEO to hold options that are more than 100% in-the-money once to be classified as optimistic. Using this measure, 71% are classified as optimistic, and all regressors have almost identical coefficients and significance levels compared to the joint risk model. Thus, our results are robust to various ways of tweaking the Option Holder measure.

It is relevant to test the robustness of our results to an optimism indictor that is not based on options. We apply the Net Buyer measure as a distinct alternative indicator of optimism. This measure classifies roughly the same share of CEOs as optimists as Option Holder 100, but the correlation between the two measures is relatively low (14%). Model 7 shows that the results are different when replacing Option Holder 100 with the Net Buyer variable. The relation between CEO narcissism and corporate risk remains relatively unchanged, but now CEO optimism seems to be highly significant while the interaction with duality seems to have lost a lot of its importance in relation to corporate risk. Thus, our results in relation to the association between CEO optimism and corporate risk are not robust to using a completely different CEO optimism indicator.[17]

Panel D reports the results of changing the narcissistic supply indicator from Size (log) to Total Compensation (log). The correlation between Size (log) and Total Compensation (log) is 0.80. The results in Panel D show that our conclusions are qualitatively similar when we use this alternative indicator of narcissistic supply. Using the estimated coefficients, CEO narcissism turns

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[17] An important difference between the indicators is that we include only vested options for the Option Holder measure, while the stock positions used to calculate Net Buyer include both vested and unvested options. Thus, one reason why the Net Buyer measure exhibits different results may be that CEOs have received stocks via grants or gifts as part of their compensation, without any vested stocks to sell. Hence, the increase in equity stake may not be an expression of an optimistic view on the future, but rather a lack of opportunity to sell. There may also be internal rules linked to the equity compensation preventing the CEO from selling stock, which further limits the CEO's ability to adapt the stake in accordance with personal preference. Finally, inertia may also be a possible explanation for an increase in the stock position. To accommodate this, we have also calculated an alternative Net Buyer measure, which only includes transactions coded as either purchases or sales using public data from SEC. This measure excludes changes in the equity position not related to a CEO action to sell or buy (e.g. stock grants). The results from applying this measure are equal to the results in Model 7, which rules out inertia as an explanation.

from being positively to being negatively associated with corporate risk when the total compensation of the CEO exceeds $2.7 million – corresponding to the 26th percentile in our sample.

Panel E reports the results of using a log-transformed version of stock return volatility (Model 1) and log-transformed versions of all variables where such log-transformation improves the Jarque–Bera statistics (Model 2). In accordance with Hirshleifer et al. (2012), we use the raw measure of stock return volatility as our default risk measure. However, to make sure that skewness does not drive our results, we rerun the joint risk model using log-transformed data. The results in Panel E show that such log-transformation does not have a significant impact on our findings. This indicates that our results are not driven by variables violating the normality assumption.

Our proxies for CEO narcissism may be biased by corporate performance. Thus, the tendency to say "I" as opposed to "we" could be reduced if the performance of the firm in question is mediocre and increased if the firm in question is performing very well. Table 10 shows four random effects models in line with Model 1 from Table 6, but with corporate performance indicators as dependent variables as opposed to corporate risk indicators. We apply the same control variables as used in the risk models. The alternative performance measures are total shareholder return (Model 1), alpha from a CAPM model (Model 2), alpha from a FF3F model (Model 3), and ROA (Model 4).

*** Table 10 about here ***

The most interesting and robust finding from Table 10 is that we see no indication of an association between CEO narcissism and corporate performance. This is also the case if CEO

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optimism is excluded from the model or an interaction term between the two biases is included in the model (not tabulated). Furthermore, the results are robust to the use of the alternative narcissism indicator based on press releases, Narcissism PR, or the combined index (not tabulated). Finally, the results are robust to the application of a fixed effects model (not tabulated). The results are in line with Gerstner et al. (2013) who argue that increased risk-taking by narcissistic CEOs is likely to lead to more extreme performance – however, not necessarily worse or better performance. The results are in contradiction to Ham et al. (2017) who find that narcissistic CEOs are associated with worse performance (ROA and operating cash flows).

The association between CEO optimism and corporate performance is significantly positive with a moderating effect when the CEO is chairman of the board of directors and when free cash flows are high. The results indicate that CEO optimism in a median firm is associated with a 3.0% points higher total shareholder return and a 2.1% points higher annual alpha.[18] However, the optimism associations are not robust to using the accounting-based performance indicator, ROA. Furthermore, the results are not robust to using Net Buyer as an alternative measure of CEO optimism (not tabulated). Finally, if we apply a fixed effects model, only the Option Holder 100 measure is significant while the interactions with FCF and duality are insignificant. The general lack of robustness in relation to the results on the association between CEO optimism and corporate performance indicates that inference must be made with caution.

We perform four further robustness tests (not tabulated). The tests relate to variable

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[18] The results relating performance to optimism could potentially be driven by persistency in returns. A CEO of a successful firm is more likely to become optimistic. However, with a yearly recurrence rate of only 26% among top quintile firms in terms of performance (measured using Alpha (CAPM)), this is unlikely to be the (whole) explanation. The relation between optimism and performance could also exist because firms offer more option-based compensation to optimistic CEOs to exploit their bias (Graham et al., 2013). All else equal, this will increase the possibility that optimistic CEOs have options that are deep in-the-money. However, in our sample, the share of salary to total compensation is only slightly lower for optimists (20.7% vs. 22.4%), so this does not seem to be the (whole) explanation of the association either.

transformations, alternative proxies for important control variables, and the inclusion of additional firm control variables.[19]

First, to test for the effect of outliers, we winsorize our variables at the 1% and 99% level. Some of the variables used in our models have significant outliers, and therefore it is relevant to test whether results hold when these variables are winsorized. We make alternative regressions where 1) we winsorize all variables or 2) we winsorize only variables where it significantly improves the distribution (Option Holdings, Narcissism FSP, FCF, Return Volatility and IV (CAPM)). The results of such regressions are similar to the results in our main Model 1 in Table 6 and this indicates that our results are not driven by extreme outliers.

Second, in our models, we consistently make use of MVA as a size indicator, in contrast to most previous literature that uses book value of assets. We rerun the joint risk model using this alternative size indicator. Our results do not depend on the specific choice of size estimator.

Third, the tests presented so far are based on the classification into seven industries from Malmendier and Tate (2008). We re-run the tests based on the Fama-French 12 industry portfolios defined on French's website (French, 2017). Such alternative industry classification does not alter our results.

Fourth and finally, using random effects as estimation method has the drawback of potentially being inconsistent if the model fails to include variables that are correlated with the other explanatory variables. Therefore, it is important to correctly specify and include a wide range of variables which are believed to have explanatory power. To see whether omitted variable bias

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[19] As a further elaboration, we investigate the extent to which CEO narcissism is associated with the firm's capital structure (debt to assets) and growth (growth in total assets). Specifically, we run Model 1 from Table 6 - first on the full sample and then on size terciles (in line with the methodology in Models 4-6, Table 4). We replace stock return volatility as the dependent variable with debt to assets and growth in total assets, respectively, to see if we can identify a link between CEO narcissism and 1) the firm's capital structure and 2) the firm's growth (whether internal or external). However, we find no statistical support for such direct links.

drives the results of our models, we run the joint risk model including five additional control variables: 1) Tobin's Q, to control for investment opportunities (Malmendier and Tate, 2008), 2) Current Ratio, to control for resource availability (Chatterjee and Hambrick, 2011), 3) Revenue Growth, to account for the tendency that optimists are drawn to growth firms (Graham et al., 2013), 4) Salary to Total Compensation, to control for the potential incentives for CEOs to take on more risk to maximize personal wealth, and finally 5) Founder, to control for the effect from entrepreneurs being more risk-seeking (Landier and Thesmar, 2009). Our previous conclusions are unaffected by such inclusion of additional variables and only Salary to Total Compensation has a significant (and positive) relation with corporate risk.

5. Discussion

We find robust results that CEO narcissism is positively associated with corporate risk in smaller firms and negatively associated with corporate risk in larger firms (confirming Hypothesis 1). This indicates that the vulnerable part of narcissism dominates when the CEO has more to lose and has a higher regular flow of narcissistic supply (proxied by firm size and CEO compensation). Our results on CEO optimism are less robust but indicate a positive association only when the CEO has duality (partly confirming Hypothesis 2). We find that including both biases in the same model does not change the individual conclusions and there is no significant overlap and/or interaction between the two biases (partly confirming Hypothesis 3).

A potential driver of our results for CEO narcissism is board governance beyond the question of duality. Changes in governance policies over time could potentially drive the identified association between CEO narcissism and corporate risk. For example, board governance may become more restrictive as the firm grows, making it harder for the narcissistic CEO to take higher

levels of risk. Hence, the lower corporate risk associated with narcissists in large firms may be a result of stricter corporate governance. However, when testing the relations in subsamples split by size, we find a significant negative association between CEO narcissism and corporate risk among the largest firms, even when controlling for size. Furthermore, provided that strong board governance can restrict narcissistic CEOs from taking unnecessary risk, it should not lead them to take *less* risk than their non-narcissistic peers.

The results of CEO optimism are not robust to the use of the Net Buyer measure. Thus, one could suspect that failing to exercise deep in-the-money stock options captures other factors than optimism. In fact, it could be argued that CEOs choose to hold deep in-the-money options due to superior knowledge about future events rather than optimism. If this is the case, the Option Holder 100 measure might be an indicator of insider information rather than optimism. However, we fail to find support for such superior information.[20]

Another challenge to the option holder measure is that it classifies optimists based on lack of action, and therefore the classification may be driven by inertia rather than optimism. However, investigating the sample, we find that the optimistic CEOs make insider transactions of company stock in more than 60% of the sample years while the corresponding number is around 48% for non-optimists. Thus, the CEOs classified as optimists are more likely to make active portfolio decisions, which indicates that they are not failing to exercise their options due to inertia.

If the associations between CEO narcissism and CEO optimism on the one hand and corporate risk on the other hand are signs of causal effects, our findings have important policy implications. They imply that firms should be careful of the candidates' degree of narcissism and

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[20] We calculate the average alpha in the year following the CEO's failure to exercise deep in-the-money options. The results show that the daily alpha is 0.034% point lower in the year following their decision not to exercise. Furthermore, the average alpha in the following year is also smaller than the average alpha for the entire sample, which indicates that CEOs are not holding options because of insider information.

optimism when hiring a new CEO in order to secure the best alignment with their corporate strategy, risk profile, and long-term goals. Our findings suggest that small (large) firms wanting to pursue more (less) risk should hire a narcissistic CEO. Our results also imply that an inflated level of risk-taking for an optimistic CEO can be moderated by denying the CEO board chairmanship and to a lesser extent by keeping a tight capital structure.

However, we cannot say with certainty that these are implications of our findings since the results may be a function of omitted factors. We feel confident that the identified associations are not driven by constant firm effects. Nor do they seem to originate from certain firms consistently hiring a specific type of CEO or by CEOs with certain biases consistently being drawn to a specific type of firm. Still, our results may be – at least partly – driven by time-varying firm effects for which we have not controlled. One obvious such candidate is a change in corporate strategy initiated by the board of directors on behalf of the owners of the firm. Thus, if the firm changes strategy and combines it with a change in CEO profile, including a different level of CEO narcissism and/or CEO optimism, this may be the real driver behind the identified associations.[21]

6. Conclusion

We investigate the association between CEO narcissism (and optimism) on the one hand and corporate risk on the other hand for a sample of 281 US non-financial S&P 1500 firms during the period 2006-2015. The results for CEO narcissism are robust and show that CEO narcissism is positively associated with corporate risk in smaller firms and negatively associated with corporate

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[21] Schoar and Zuo (2017) have a related discussion on causality in their analysis of the association between the early work environment of CEOs and their managerial styles: "*Management styles may be (at least partially) observable to the board before a new CEO is appointed. Therefore, firms with a need for a certain type of management style might opt for a CEO who has this style. As a result, the policy differences observed between recession and other CEOs are likely a combination of the true causal effects of recession CEOs and unobserved differences in (time-varying) firm characteristics.*"

risk in larger firms. We argue that this is caused by a desire among narcissistic CEOs in smaller firms to gain more attention and admiration which they try to acquire via riskier actions. In contrast, managers in larger firms are less willing to take risk because they already receive a large amount of narcissistic supply and consequently have more to lose. The results for CEO optimism are less robust but indicate that CEO optimism is positively associated with corporate risk. However, this only applies when the CEO has sufficient structural power in the form of duality. Testing the joint effect of CEO narcissism and CEO optimism, we find neither a significant overlap nor a significant interaction. The robustness of the results in the fixed effects estimation illustrates that the findings are not caused by constant firm effects. This suggests that the association is either a causal effect of the CEO personality trait / cognitive bias or a time-varying firm effect (or most likely a combination).

References

Aktas, N., de Bodt, E., Bollaert, H. and Roll, R. 2016, "CEO narcissism and the takeover process: From private initiation to deal completion", *Journal of Financial and Quantitative Analysis,* vol. 51, no. 1, pp. 113-137.

Alicke, M.D., Klotz, M.L., Breitenbecher, D.L., Yurak, T.J. and Vredenburg, D.S. 1995, "Personal contact, individuation, and the better-than-average effect", *Journal of Personality and Social Psychology,* vol. 68, no. 5, pp. 804-825.

Altman, E.I. 1968, "Financial ratios, discriminant analysis and the prediction of corporate bankruptcy", *The Journal of Finance,* vol. 23, no. 4, pp. 589-609.

American Psychiatric Association 2013, *Diagnostic and statistical manual of mental disorders (DSM-5®),* American Psychiatric Pub, Washington, DC.

Andreou, P.C., Doukas, J.A., Koursaros, D. and Louca, C. 2017, "CEO Overconfidence and the Valuation Effects of Corporate Diversification & Refocusing Decisions", Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2898469.

Baker, M. and Wurgler, J., 2013. "Behavioral corporate finance: An updated survey", In Constantinides, G.M., Harris, M. and Stulz, R.M. (Eds.), *Handbook of the Economics of Finance,* Elsevier, Oxford, pp. 351-424.

Ben-David, I., Graham, J.R. and Harvey, C.R. 2013, "Managerial Miscalibration", *The Quarterly Journal of Economics,* vol. 128, no. 4, pp. 1547-1584.

Billett, M.T. and Qian, Y. 2008, "Are overconfident CEOs born or made? Evidence of self-attribution bias from frequent acquirers", *Management Science,* vol. 54, no. 6, pp. 1037-1051.

Bogart, L.M., Benotsch, E.G. and Pavlovic, J.D.P. 2004, "Feeling superior but threatened: The relation of narcissism to social comparison", *Basic and Applied Social Psychology,* vol. 26, no. 1, pp. 35-44.

Brandt, P.R. 2011, *Psychology of Optimism,* Nova Science.

Brunell, A.B., Gentry, W.A., Campbell, W.K., Hoffman, B.J., Kuhnert, K.W., and DeMarree, K.G. 2008, "Leader emergence: The case of the narcissistic leader", *Personality and Social Psychology Bulletin*, vol. 34, no. 12, pp. 1663–1676.

Bulan, L.T. 2005, "Real options, irreversible investment and firm uncertainty: New evidence from US firms", *Review of Financial Economics,* vol. 14, no. 3, pp. 255-279.

Buss, D.M. and Chiodo, L.M. 1991, "Narcissistic acts in everyday life", *Journal of Personality,* vol. 59, no. 2, pp. 179-215.

Buyl, T., Boone, C. and Wade, J.B. 2017, "CEO Narcissism, Risk-Taking, and Resilience: An Empirical Analysis in U.S. Commercial Banks", *Journal of Management,* forthcoming.

Campbell, T.C. 2014, "CEO optimism and the board's choice of successor", *Journal of Corporate Finance,* vol. 29, pp. 495-510.

Campbell, T.C., Gallmeyer, M., Johnson, S.A., Rutherford, J. and Stanley, B.W. 2011a, "CEO optimism and forced turnover", *Journal of Financial Economics,* vol. 101, no. 3, pp. 695-712.

Campbell, W.K. 1999, "Narcissism and romantic attraction.", *Journal of Personality and Social Psychology,* vol. 77, no. 6, pp. 1254-1270.

Campbell, W.K., Bonacci, A.M., Shelton, J., Exline, J.J. and Bushman, B.J. 2004a, "Psychological entitlement: Interpersonal consequences and validation of a self-report measure", *Journal of Personality Assessment,* vol. 83, no. 1, pp. 29-45.

Campbell, W.K. and Foster, J.D. 2007, "The narcissistic self: Background, an extended agency model, and ongoing controversies", In C. Sedikides and S. Spencer (Eds.), *Frontiers in social psychology: The self,* Psychology Press, pp. 115-138.

Campbell, W.K., Goodie, A.S. and Foster, J.D. 2004b, "Narcissism, confidence, and risk attitude", *Journal of Behavioral Decision Making,* vol. 17, no. 4, pp. 297-311.

Campbell, W.K., Hoffman, B.J., Campbell, S.M. and Marchisio, G. 2011b, "Narcissism in organizational contexts", *Human Resource Management Review,* vol. 21, no. 4, pp. 268-284.

Carey, A. L., Brucks, M., Küfner, A., Holtzman, N., Deters, F., Back, M., Donnellan, M., Pennebaker, J., and Mehl, M. 2015, "*Narcissism and the use of personal pronouns revisited*" *Journal of Personality and Social Psychology*, vol. 109, no. 3, pp. e1–e15.

Carroll, L. 1987, "A study of narcissism, affiliation, intimacy, and power motives among students in business administration", *Psychological Reports,* vol. 61, no. 2, pp. 355-358.

Chatterjee, A. and Hambrick, D.C. 2011, "Executive personality, capability cues, and risk taking: How narcissistic CEOs react to their successes and stumbles", *Administrative Science Quarterly,* vol. 56, no. 2, pp. 202-237.

Chatterjee, A. and Hambrick, D.C. 2007, "It's all about me: Narcissistic chief executive officers and their effects on company strategy and performance", *Administrative Science Quarterly,* vol. 52, no. 3, pp. 351-386.

Clark, T.S. and Linzer, D.A. 2015, "Should I use fixed or random effects?", *Science Research and Methods*, vol. 3, no. 2, pp. 399-408.

Cuervo-Cazurra, A., Caligiuri, P., Andersson, U. and Brannen, M.Y. 2013, "From the Editors: How to write articles that are relevant to practice", *Journal of International Business Studies*, vol. 44, no. 4, pp. 285–289.

Fama, E.F. and French, K.R. 1992, "The cross-section of expected stock returns", *The Journal of Finance,* vol. 47, no. 2, pp. 427-465.

Farwell, L. and Wohlwend-Lloyd, R. 1998, "Narcissistic Processes: Optimistic Expectations, Favorable Self-Evaluations, and Self-Enhancing Attributions", *Journal of Personality,* vol. 66, no. 1, pp. 65-83.

Fenichel, O. 1938, "The Drive to Amass Wealth", *Psychoanalytic Quarterly*, vol. 7, pp. 69-95.

French, K.R. 2017, *Data Library*. Viewed 12 February 2017, Available at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Gabriel, M.T., Critelli, J.W. and Ee, J.S. 1994, "Narcissistic illusions in self-evaluations of intelligence and attractiveness", *Journal of Personality,* vol. 62, no. 1, pp. 143-155.

Galasso, A. and Simcoe, T.S. 2011, "CEO overconfidence and innovation", *Management Science,* vol. 57, no. 8, pp. 1469-1484.

Gerstner, W., König, A., Enders, A. and Hambrick, D.C. 2013, "CEO narcissism, audience engagement, and organizational adoption of technological discontinuities", *Administrative Science Quarterly,* vol. 58, no. 2, pp. 257-291.

Gervais, S. 2010, "Capital budgeting and other investment decisions", in Baker, H.K. and Nofsinger, J.R. (Eds.). *Behavioral finance: Investors, corporations, and markets,* Wiley and Sons, Hoboken, pp. 413-434.

Gervais, S., Heaton, J.B. and Odean, T. 2011, "Overconfidence, compensation contracts, and capital budgeting", *The Journal of Finance,* vol. 66, no. 5, pp. 1735-1777.

Goel, A.M. and Thakor, A.V. 2008, "Overconfidence, CEO Selection, and Corporate Governance", *The Journal of Finance,* vol. 63, no. 6, pp. 2737-2784.

Goyal, A. and Santa-Clara, P. 2003, "Idiosyncratic risk matters!", *The Journal of Finance,* vol. 58, no. 3, pp. 975-1007.

Graham, J.R., Harvey, C.R. and Puri, M. 2013, "Managerial attitudes and corporate actions", *Journal of Financial Economics,* vol. 109, no. 1, pp. 103-121.

Habib, A. and Hasan, M.M. 2017, "Firm life cycle, corporate risk-taking and investor sentiment", *Accounting & Finance*, vol. 57, no. 2, pp. 465-497.

Ham, C., Seybert, N., and Wang W. 2017, "Narcissism is a bad sign: CEO signature size, investment, and performance", *Review of Accounting Studies*, forthcoming.

Heaton, J. 2002, "Managerial Optimism and Corporate Finance", *Financial Management*, vol. 31, no. 2, pp. 33-45.

Hilary, G., Hsu, C., Segal, B. and Wang, R. 2016, "The bright side of managerial over-optimism", *Journal of Accounting and Economics,* vol. 62, no. 1, pp. 46-64.

Hirshleifer, D., Low, A. and Teoh, S.H. 2012, "Are overconfident CEOs better innovators?", *The Journal of Finance,* vol. 67, no. 4, pp. 1457-1498.

Huang, J. and Kisgen, D.J. 2013, "Gender and corporate finance: Are male executives overconfident relative to female executives?", *Journal of Financial Economics,* vol. 108, no. 3, pp. 822-839.

Kernis, M.H. 2005, "Measuring self-esteem in context: The importance of stability of self-esteem in psychological functioning", *Journal of personality,* vol. 73, no. 6, pp. 1569-1605.

Kernis, M.H. and Sun, C. 1994, "Narcissism and reactions to interpersonal feedback", *Journal of Research in Personality,* vol. 28, no. 1, pp. 4-13.

Krizan, Z. and Herlache, A.D. 2017, "The narcissism spectrum model: A synthetic view of narcissistic personality", *Personality and Social Psychology Review*, forthcoming.

Landier, A. and Thesmar, D. 2009, "Financial contracting with optimistic entrepreneurs", *Review of Financial Studies,* vol. 22, no. 1, pp. 117-150.

Leahy, J.V. and Whited, T.M. 1995, "The effect of uncertainty on investment: Some stylized facts"*, Journal of Money, Credit and Banking*, vol. 28, no. 1, pp. 64–83.

Maccoby, M. 2000, "Narcissistic leaders: The incredible pros, the inevitable cons", *Harvard Business Review,* vol. 78, no. 1, pp. 69-77.

Malmendier, U. and Tate, G. 2015, "Behavioral CEOs: The role of managerial overconfidence", *The Journal of Economic Perspectives,* vol. 29, no. 4, pp. 37-60.

Malmendier, U. and Tate, G. 2008, "Who makes acquisitions? CEO overconfidence and the market's reaction", *Journal of Financial Economics,* vol. 89, no. 1, pp. 20-43.

Malmendier, U. and Tate, G. 2005, "CEO overconfidence and corporate investment", *The Journal of Finance,* vol. 60, no. 6, pp. 2661-2700.

Malmendier, U., Tate, G. and Yan, J. 2011, "Overconfidence and early-life experiences: the effect of managerial traits on corporate financial policies", *The Journal of Finance,* vol. 66, no. 5, pp. 1687-1733.

Marshall, M.A. and Brown, J.D. 2004, "Expectations and realizations: The role of expectancies in achievement settings", *Motivation and Emotion,* vol. 28, no. 4, pp. 347-361.

Moore, D.A. and Healy, P.J. 2008, "The trouble with overconfidence", *Psychological Review,* vol. 115, no. 2, pp. 502-517.

Morf, C.C. and Rhodewalt, F. 2001, "Unraveling the paradoxes of narcissism: A dynamic self-regulatory processing model", *Psychological Inquiry,* vol. 12, no. 4, pp. 177-196.

Oesterle, M., Elosge, C. and Elosge, L. 2016, "Me, myself and I: The role of CEO narcissism in internationalization decisions", *International Business Review,* vol. 25, no. 5, pp. 1114-1123.

Paulhus, D.L. 2001, "Normal Narcissism: Two Minimalist Accounts", *Psychological Inquiry*, vol. 12, no. 4, pp. 228-230.

Perez-Quiros, G. and Timmermann, A. 2000, "Firm size and cyclical variations in stock returns", *The Journal of Finance,* vol. 55, no. 3, pp. 1229-1262.

Petersen, M.A. 2009, "Estimating standard errors in finance panel data sets: Comparing approaches", *Review of Financial Studies,* vol. 22, no. 1, pp. 435-480.

Plümper, T. and Troeger, V.E. 2007, "Efficient estimation of time-invariant and rarely changing variables in finite sample panel analyses with unit fixed effects", *Political Analysis,* vol. 15, no. 2, pp. 124-139.

Raskin, R.N. and Hall, C.S. 1979, "A narcissistic personality inventory", *Psychological reports,* vol. 45, p. 590.

Raskin, R. and Novacek, J. 1991, "Narcissism and the use of fantasy", *Journal of Clinical Psychology,* vol. 47, no. 4, pp. 490-499.

Raskin, R. and R. Shaw. 1988, "Narcissism and the Use of Personal Pronouns", *Journal of Personality*, vol. 56, no. 2, pp. 393-404.

Rhodewalt, F. and Morf, C.C. 1998, "On self-aggrandizement and anger: a temporal analysis of narcissism and affective reactions to success and failure", *Journal of Personality and Social Psychology,* vol. 74, no. 3, pp. 672-685.

Roll, R. 1986, "The hubris hypothesis of corporate takeovers", *Journal of Business,* vol. 59, no. 2, pp. 197-216.

Rosenthal, S.A. and Pittinsky, T.L. 2006, "Narcissistic leadership", *The Leadership Quarterly,* vol. 17, no. 6, pp. 617-633.

Roussanov, N. and Savor, P. 2014, "Marriage and managers' attitudes to risk", *Management Science,* vol. 60, no. 10, pp. 2496-2508.

Schoar, A. and Zuo, L. 2017, "Shaped by Booms and Busts: How the Economy Impacts CEO Careers and Management Styles", *Review of Financial Studies*, vol. 30, no. 5, pp. 1425-1456.

Serfling, M.A. 2014, "CEO age and the riskiness of corporate policies", *Journal of Corporate Finance,* vol. 25, pp. 251-273.

Shariatmadari, D. 2015, "Daniel Kahneman:'What Would I Eliminate If I Had a Magic Wand? Overconfidence.'", *The Guardian,* 18 July, Viewed 25 March 2017, Available at: https://www.theguardian.com/books/2015/jul/18/daniel-kahneman-books-interview.

Sharot, T. 2012, *The Optimism Bias: Why we're wired to look on the bright side,* Constable and Robinson, London.

Svenson, O. 1981, "Are we all less risky and more skillful than our fellow drivers?", *Acta Psychologica,* vol. 47, no. 2, pp. 143-148.

Taylor, S.E. and Brown, J.D. 1988, "Illusion and well-being: a social psychological perspective on mental health", *Psychological Bulletin,* vol. 103, no. 2, pp. 193-210.

Van den Steen, E. 2004, "Rational overoptimism (and other biases)", *The American Economic Review,* vol. 94, no. 4, pp. 1141-1151.

Vazire, S. and Funder, D.C. 2006, "Impulsivity and the self-defeating behavior of narcissists", *Personality and Social Psychology Review,* vol. 10, no. 2, pp. 154-165.

Wallace, H.M. and Baumeister, R.F. 2002, "The performance of narcissists rises and falls with perceived opportunity for glory", *Journal of Personality and Social Psychology,* vol. 82, no. 5, pp. 819-834.

Webb, E.J., Campbell, D.T., Schwartz, R.D. and Sechrest, L. 1966, *Unobtrusive measures: Nonreactive research in the social sciences,* Rand McNally, Chicago.

Wooldridge, J.M. 2010, *Econometric analysis of cross section and panel data,* MIT Press, London.

Appendix - Overview of variables

Variable	Definitions and measurement
Main variables	
Stock return volatility	Total risk, measured as the standard deviation of total daily stock returns, annualized by multiplying with the square root of the number of trading days per year
Narcissism FSP	Ratio of the number of first-person singular pronouns (I, me, mine, my, myself) to total first-person pronouns (I, me, mine, my, myself, we, us, our, ours, ourselves) in CEO speech
Option Holder 100	Dummy variable equal to 1 if the CEO fails to exercise options more than 100% in-the-money at least twice during the sample period, and zero otherwise
Size	Size of the firm measured as the market value of assets, calculated as the book value of assets plus the difference between market cap and book value of equity
Debt to Assets	Total debt divided by total book-value of assets
Z-score	Altman's Z-score following Altman (1968)
Tangibility	Fraction of tangible assets to total assets
FCF	Levered free cash flows as a ratio to PP&E lagged one year following Malmendier and Tate (2008)
Age	Age of the CEO at the end of the year
Gender	Dummy variable equal to 1 if the CEO is male, and 0 otherwise
Tenure	Number of days that the CEO has had the position as CEO, normalized to number of years
Stock Ownership	The CEO's holding of shares as a fraction of common shares outstanding
Option Holdings	The CEO's holding of vested and unvested options as a fraction of common shares outstanding
Duality	Dummy variable equal to 1 if the CEO is also chairman of the board of directors, and 0 otherwise
IndustryMT	Dummy variables dividing sample firms into seven industry classifications following Malmendier and Tate (2008). Firms with primary SIC codes 1000-1799, 8711 are classified as Technical Industry; 6000-6799 as Financial Industry; 2000-3999 as Manufacturing Industry; 4000-4999 as Transportation Industry; 5000-5999 as Trade Industry; and 7000-8710, 8712-8720, 8722-8999 as Service Industry. The seventh dummy is labeled Other and contains the remaining SIC codes. Financial Industry is not included as we exclude financial firms in our sample
Robustness variables	
IV (CAPM)	Idiosyncratic risk, measured as the standard deviation of the residuals from regressing the daily stock returns in excess of the risk-free rate on the market risk premium, annualized by multiplying with the square root of the number of trading days per year
IV (FF3F)	Standard deviation of the residuals from regressing the daily stock returns in excess of the risk-free rate on MRP, SMB, and HML, annualized by multiplying with the square root of the number of trading days per year
ROA Volatility	Standard deviation of the ROA from the past three years, including the focal year
Option Holder 100 (NP)	Dummy variable equal to 1 if the CEO fails to exercise options more than 100% in-the-money at least once during the sample period, and 0 otherwise
Option Holder 100 (Resid)	The residuals from regression Narcissism FSP on Option Holder 100
Option Holder 50	Dummy variable equal to 1 if the CEO fails to exercise options more than 50% in-the-money at least once during the sample period, and 0 otherwise
Option Holder 75	Dummy variable equal to 1 if the CEO fails to exercise options more than 75% in-the-money at least once during the sample period, and 0 otherwise
Option Holder 150	Dummy variable equal to 1 if the CEO fails to exercise options more than 150% in-the-money at least once during the sample period, and 0 otherwise
Option Holder 200	Dummy variable equal to 1 if the CEO fails to exercise options more than 200% in-the-money at least once during the sample period, and 0 otherwise
Net Buyer	Dummy variable equal to 1 if the CEO has increased the stock position with 10% or more from the beginning of the year to the end.
Narcissism PR	Number of times that the CEO is mentioned by name in press releases per 1,000 words
Narcissism Index	Sum of the standardized Narcissism FSP measure and Narcissism PR measure
Total Assets	The book-value of assets

FCF (alternative)	Levered free cash flows as a ratio to total capital (total preferred and common equity and total debt) lagged one year
Tobin's Q	Market value of assets to book-value of assets
Current Ratio	Ratio of total current assets divided by total current liabilities
Revenue Growth	The change in revenue divided by revenue in the beginning of the year
Salary to Total Compensation	Ratio of salary compensation to total compensation, incl. option and stock grants
Founder	Dummy variable equal to 1 if the CEO is also the founder of the firm, and 0 otherwise.
IndustryFF	Dummy variables dividing firms into 12 industry classifications following Fama-French (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html)

Transformed variables

Tenure (log)	Log-transformation of (1+Tenure)
Stock Ownership (log)	Log-transformation of (1+Stock Ownership in pct.)
Option Holdings (log)	Log-transformation of (1+Option Holdings in pct.)
Size (log)	Log-transformation of MVA
Total Assets (log)	Log-transformation of Total Assets
Tangibility (log)	Log-transformation of Tangibility
Stock return volatility (log)	Log-transformation of Stock return volatility
IV (CAPM, log)	Log-transformation of IV (CAPM)

Table 1 - Descriptive statistics
This table reports descriptive statistics of the variables. Variables are defined in the Appendix.

Main variables	Obs.	Mean	Median	SD	Min	Max
Stock return volatility	2,810	0.36	0.32	0.17	0.10	1.72
Narcissism FSP	2,810	0.26	0.25	0.09	0.05	0.79
Option Holder 100	2,810	0.66	1.00	0.47	0	1
Size (MVA, $m)	2,810	26,453	4,863	75,205	156	1,046,757
Size (log)	2,810	8.63	8.49	1.69	5.05	13.86
Debt to Assets	2,810	0.23	0.22	0.17	0	1.07
Z-score	2,810	4.34	3.47	3.55	-6.33	37.35
Tangibility	2,810	0.23	0.16	0.19	0.01	0.92
FCF	2,810	0.77	0.35	1.91	-22.30	27.10
Age	2,810	55.86	56.00	6.59	36.00	79.00
Gender	2,810	0.97	1	0.17	0	1
Tenure	2,810	8.36	6.51	7.37	0.50	44.03
Stock Ownership	2,810	0.0189	0.0059	0.0523	0	0.6502
Option Holdings	2,810	0.0092	0.0049	0.0148	0	0.1916
Duality	2,810	0.58	1	0.49	0	1
Robustness variables	**Obs**	**Mean**	**Median**	**SD**	**Min**	**Max**
Narcissism PR	2,810	2.20	1.96	1.65	0.00	9.67
Narcissism Index	2,810	0.00	-0.14	1.41	-3.80	5.77
Option Holder 100 – NP	2,810	0.78	1	0.42	0	1
Option Holder 50	2,810	0.79	1	0.41	0	1
Option Holder 75	2,810	0.71	1	0.45	0	1
Option Holder 150	2,810	0.52	1	0.50	0	1
Option Holder 200	2,810	0.43	0	0.50	0	1
Net Buyer	2,810	0.70	1	0.46	0	1
IV (CAPM)	2,810	0.28	0.25	0.14	0.08	1.59
IV (FF3F)	2,810	0.27	0.25	0.13	0.08	1.54
ROA Volatility	2,810	0.02	0.01	0.02	0.00	0.24
Size - Assets in $m	2,810	16,041	2,743	53,938	57	797,769

	Obs	Mean	Median	SD	Min	Max
Size - Assets (log)	2,810	8.07	7.92	1.70	4.05	13.59
FCF alternative	2,810	0.11	0.09	0.20	-1.16	5.74
Tobin's Q	2,810	1.98	1.64	1.22	0.52	14.96
Current Ratio	2,810	0.02	0.02	0.02	0.00	0.15
Revenue Growth	2,810	0.08	0.06	0.26	-0.85	8.84
Salary to Total Compensation	2,810	0.21	0.16	0.16	0.00	0.999
Founder	2,810	0.06	0.00	0.23	0.00	1.00
Transformed variables	**Obs**	**Mean**	**Median**	**SD**	**Min**	**Max**
Stock return volatility log	2,810	-1.11	-1.13	0.43	-2.34	0.54
IV (CAPM) log	2,810	-1.37	-1.37	0.45	-2.56	0.46
IV (FF3F) log	2,810	-1.40	-1.40	0.44	-2.59	0.43
ROA Volatility log	2,810	-4.62	-4.61	0.99	-8.14	-1.41
Tangibility log	2,810	-1.86	-1.81	0.96	-5.10	-0.08
Tenure log(1+x)	2,810	1.96	2.02	0.76	0.40	3.81
Stock Ownership log(1+100x)	2,810	0.677	0.466	0.686	0.000	4.190
Option Holdings log(1+100x)	2,810	0.514	0.398	0.468	0.000	3.004

Table 2 - Correlations between main variables

This table reports the correlations between the main variables. Variables are defined in the Appendix. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Stock return volatility													
2. Narcissism FSP	0.011												
3. Option Holder 100	0.032*	-0.027											
4. Size	-0.214***	0.093***	-0.063***										
5. Debt to Assets	-0.040**	0.073***	0.058***	0.124***									
6. Z-score	-0.006	0.017	0.041**	-0.096***	-0.501***								
7. Tangibility	0.129***	-0.131***	-0.021	0.008	0.152***	-0.127***							
8. FCF	-0.003	0.005	0.055***	-0.013	-0.094***	0.174***	-0.303***						
9. Age	-0.033*	0.075***	-0.063***	0.036*	0.014	-0.048**	0.095***	-0.115***					
10. Gender	0.053***	0.043**	-0.001	-0.039**	0.003	0.001	0.021	-0.013	0.050***				
11. Tenure	0.078***	0.183***	0.137***	-0.085***	-0.011	0.067***	0.041**	-0.040**	0.472***	0.083***			
12. Stock Ownership	0.112***	0.028	0.091***	-0.106***	-0.113***	0.164***	0.004	-0.002	0.087***	0.051***	0.362***		
13. Option Holdings	0.125***	0.031	0.220***	-0.156***	-0.009	0.106***	-0.014	0.002	0.000	0.049***	0.226***	0.427***	
14. Duality	-0.072***	0.055***	0.089***	0.163***	-0.016	0.007	0.014	-0.039**	0.309***	0.058***	0.291***	0.125***	-0.006

Table 3 - Univariate analysis

This table reports the mean, median, and standard deviation of the most important variables. Panel A is split into terciles based on the value of Narcissism FSP, while Panel B is split into two subsamples of CEOs classified as non-optimists and optimists, respectively. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A: Narcissism

	Tercile 1 - Narcissism FSP (n=938)			Tercile 2 - Narcissism FSP (n=934)			Tercile 3 - Narcissism FSP (n=938)			Tercile 3 mean - Tercile 1 mean	
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	Diff	t-stat
Stock return volatility	0.36	0.32	0.17	0.36	0.32	0.17	0.36	0.33	0.17	0.00	0.21
Narcissism FSP	0.17	0.18	0.04	0.26	0.25	0.02	0.36	0.35	0.05	0.18	86.77***
Option Holder 100	0.63	1.00	0.48	0.74	1.00	0.44	0.60	1.00	0.49	-0.03	-1.52
Size (log)	8.52	8.48	1.68	8.63	8.51	1.64	8.74	8.49	1.74	0.22	2.74***
Duality	0.56	1.00	0.50	0.57	1.00	0.50	0.61	1.00	0.49	0.04	1.92**

Panel B: Optimism

	Option Holder 100 = 0 (n=957)			Option Holder 100 = 1 (n=1,853)			Difference in means	
	Mean	Median	SD	Mean	Median	SD	Diff	t-stat
Stock return volatility	0.36	0.31	0.18	0.37	0.33	0.17	0.01	1.69**
Narcissism FSP	0.27	0.26	0.10	0.26	0.25	0.08	0.00	-1.34
Duality	0.52	1.00	0.50	0.61	1.00	0.49	0.09	4.72***
FCF	0.62	0.30	1.34	0.84	0.38	2.14	0.22	3.34***

Table 4 - CEO narcissism and corporate risk

This table reports various random effects regressions of stock return volatility on narcissism. The first three models are based on the full sample and include different interaction terms as well as eleven firm and CEO controls. The last three columns contain results of regressions performed on size terciles, based on the firms' market value of assets. All variables are defined in the Appendix. A constant, fixed time effects, and fixed industry effects are included in all models but not reported. All estimations apply standard errors clustered by the firm. Test statistics are reported in parentheses, and *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

| | Dependent variable: Stock return volatility | | | | | |
| | Full sample | | | Subsamples (Size Terciles) | | |
	(1)	(2)	(3)	1st	2nd	3rd
Narcissism FSP	-0.04458	0.55142	0.53698	0.16387	-0.09323	-0.13816
	(-0.85)	(2.74)***	(2.69)***	(2.79)***	(-1.65)	(-2.47)**
Narcissism FSP · Size (log)		-0.06991	-0.06791			
		(-3.10)***	(-2.93)***			
Narcissism FSP · Duality			-0.01142			
			(-0.15)			
Size (log)	-0.04290	-0.02396	-0.02370	-0.07256	-0.03809	-0.02712
	(-13.40)***	(-3.64)***	(-3.48)***	(-6.36)***	(-3.07)***	(-3.71)***
Duality			-0.00675			
			(-0.32)			
Debt to Assets	0.17212	0.16911	0.16603	0.20749	0.13757	0.16004
	(5.93)***	(5.80)***	(5.73)***	(3.45)***	(3.68)***	(3.52)***
Z-score	0.00300	0.00304	0.00299	0.00302	0.00219	0.00271
	(2.67)***	(2.80)***	(2.72)***	(1.68)*	(1.57)	(1.65)*
Tangibility	0.10892	0.10950	0.10937	0.10439	0.12800	0.02330
	(3.00)***	(3.01)***	(3.03)***	(1.74)*	(2.50)**	(0.63)
FCF	0.00450	0.00441	0.00439	0.00631	0.00231	0.00283
	(2.54)**	(2.53)**	(2.52)**	(2.11)**	(1.21)	(1.35)
Age	0.00067	0.00070	0.00082	-0.00055	0.00113	0.00182
	(0.92)	(0.97)	(1.11)	(-0.53)	(1.29)	(1.80)*
Gender	-0.00651	-0.00314	-0.00169	0.03691	-0.01646	-0.01812
	(-0.56)	(-0.27)	(-0.14)	(2.85)***	(-0.98)	(-1.07)
Tenure	0.00027	0.00039	0.00056	0.00090	-0.00031	-0.00019
	(0.28)	(0.40)	(0.59)	(0.80)	(-0.27)	(-0.17)

Stock Ownership	-0.12457	-0.13496	-0.12760	-0.08939	-0.45124	1.19001
	(-1.12)	(-1.22)	(-1.16)	(-1.00)	(-1.92)*	(1.56)
Option Holdings	-0.08064	-0.08009	-0.08797	-0.36481	0.37607	-1.72286
	(-0.34)	(-0.34)	(-0.37)	(-1.24)	(1.19)	(-1.52)
Observations	2,810	2,810	2,810	937	936	937

Table 5 - CEO optimism and corporate risk

This table reports random effects regressions of stock return volatility on optimism and its interaction with FCF and duality as well as eleven firm and CEO controls. Variables are defined in the Appendix. A constant, fixed time effects, and fixed industry effects are included in all models but not reported. All estimations apply standard errors clustered by the firm. Test statistics are reported in parentheses, and *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

	Dependent variable: Stock return volatility					
	Full sample				Subsamples	
	(1)	(2)	(3)	(4)	Duality = 1 (n=1,853)	Duality = 0 (n=957)
Option Holder 100	0.01984 (2.65)***	0.01821 (2.37)**	0.00705 (0.63)	0.00455 (0.41)	0.02487 (2.69)***	0.01534 (1.27)
Option Holder 100 · FCF		0.00215 (0.65)		0.00290 (0.88)	0.00086 (0.20)	0.00266 (0.50)
Option Holder 100 · Duality			0.02673 (1.91)*	0.02739 (1.98)**		
FCF	0.00449 (2.52)**	0.00262 (0.86)	0.00442 (2.49)**	0.00189 (0.63)	0.00491 (1.37)	-0.00169 (-0.37)
Duality			-0.02869 (-2.16)**	-0.02954 (-2.25)**		
Size (log)	-0.04381 (-13.90)***	-0.04387 (-13.90)***	-0.04263 (-13.60)***	-0.04268 (-13.60)***	-0.0395 (-11.20)***	-0.0422 (-8.39)***
Debt to Assets	0.16990 (5.84)***	0.17060 (5.86)***	0.16468 (5.77)***	0.16544 (5.81)***	0.1620 (4.67)***	0.1433 (3.63)***
Z-score	0.00289 (2.58)**	0.00292 (2.60)***	0.00277 (2.47)**	0.00280 (2.50)**	0.0028 (1.85)*	0.0029 (1.84)*
Tangibility	0.11255 (3.14)***	0.11180 (3.11)***	0.11259 (3.13)***	0.11159 (3.10)***	0.1008 (2.70)***	0.1227 (2.16)**
Age	0.00096 (1.41)	0.00097 (1.43)	0.00114 (1.61)	0.00116 (1.65)*	-0.0001 (-0.13)	0.0023 (1.90)*
Gender	-0.00193 (-0.17)	-0.00150 (-0.13)	-0.00027 (-0.02)	0.00038 (0.03)	-0.0208 (-1.33)	0.0105 (0.63)
Tenure	-0.00020 (-0.23)	-0.00021 (-0.23)	0.00005 (0.05)	0.00005 (0.06)	0.0009 (1.09)	-0.0021 (-1.89)*
Stock Ownership	-0.11796 (-1.06)	-0.12044 (-1.08)	-0.12460 (-1.12)	-0.12798 (-1.14)	-0.1119 (-1.09)	-0.0603 (-0.18)
Option Holdings	-0.16766 (-0.69)	-0.16698 (-0.69)	-0.14850 (-0.61)	-0.14729 (-0.61)	-0.1655 (-0.72)	-0.1573 (-0.37)

Table 6 - **CEO narcissism, CEO optimism, and corporate risk**

This table reports the results of random effects regressions (Models 1-2) and a fixed effects regression (Model 3) of stock return volatility on narcissism, optimism, and interactions. Included are also the eleven firm and CEO controls (less in Model 3). Variables are defined in the Appendix. A constant, fixed time effects, and fixed industry effects are included in all models but not reported. All estimations apply standard errors clustered by the firm. Test statistics are reported in parentheses, and *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Dependent variable	Stock return volatility	Stock return volatility	Stock return volatility
	Joint	Interaction	Fixed effects regression
	(1)	(2)	(3)
Narcissism FSP	0.58661	0.57377	0.73831
	(3.06)***	(2.89)***	(3.10)***
Narcissism FSP · Size (log)	-0.07285	-0.07436	-0.09332
	(-3.41)***	(-3.39)***	(-3.46)***
Option Holder 100	0.00802	-0.00586	0.01214
	(0.73)	(-0.31)	(1.06)
Option Holder 100 · Duality	0.02637	0.02498	0.03321
	(1.93)*	(1.77)*	(2.21)**
Narcissism FSP * Option Holder 100		0.05751	
		(0.76)	
Duality	-0.02825	-0.02714	-0.03285
	(-2.18)**	(-2.04)**	(-2.24)**
Size (log)	-0.02285	-0.02253	-0.02745
	(-3.62)***	(-3.52)***	(-2.66)***
Firm controls	✓	✓	✓
CEO controls	✓	✓	✓

Table 7 – CEO narcissism and corporate risk: Economic significance

This table reports estimations of the economic significance of the association between CEO narcissism and corporate risk. Variables are defined in the Appendix.
<u>Panel A</u> reports levels of and changes in stock return volatility for various levels of firm size and CEO narcissism based on the random effects regression in Table 6, Model 1.
<u>Panel B</u> reports levels of and changes in stock return volatility for various levels of firm size and CEO narcissism based on the fixed effects regression in Table 6, Model 3.
<u>Panel C</u> reports levels of changes in stock return volatility for various levels of firm size and CEO narcissism based on the random effects regressions for the three sub-samples in Table 4

Panel A:

			- CEO narcissism -				
			10% percentile (=0.16)	Median (=0.25)	90% percentile (=0.37)	Δ: 10% to 90%	Δ%: 10% to 90%
Size	Size (MVA, $m)	Size (log)	- Stock return volatility -				
10% percentile	659	6.49	0.39	0.41	0.42	0.02	6%
Median	4863	8.49	0.33	0.32	0.32	-0.01	-2%
90% percentile	58163	10.97	0.24	0.22	0.20	-0.04	-19%

Panel B:

			- CEO narcissism -				
			10% percentile (=0.16)	Median (=0.25)	90% percentile (=0.37)	Δ: 10% to 90%	Δ%: 10% to 90%
Size	Size (MVA, $m)	Size (log)	- Stock return volatility -				
10% percentile	659	6.49	0.41	0.42	0.44	0.03	7%
Median	4863	8.49	0.33	0.32	0.32	-0.01	-3%
90% percentile	58163	10.97	0.22	0.20	0.16	-0.06	-27%

Panel C:

			- CEO narcissism -			- CEO narcissism -				
			10% percentile	Median	90% percentile	10% percentile	Median	90% percentile	Δ: 10% to 90%	Δ%: 10% to 90%
Size	Size (MVA, $m)	Size (log)	- CEO narcissism -			- Stock return volatility -				
1st tercile	986	6.89	0.16	0.25	0.36	0.39	0.41	0.43	0.03	8%
2nd tercile	4866	8.49	0.16	0.26	0.38	0.32	0.31	0.30	-0.02	-6%
3rd tercile	29959	10.31	0.17	0.26	0.37	0.27	0.25	0.24	-0.03	-11%

Table 8 - Cross-sectional analysis of CEO narcissism, CEO optimism, and corporate risk

This table reports ten cross-sectional OLS regressions with Stock return volatility as the dependent variable, which is regressed on narcissism and optimism indicators and their interaction with size and duality, respectively. The eleven firm and CEO controls are also included. Variables are defined in the Appendix. A constant and fixed industry effects are included in all models but not reported. All estimations apply Newey-West standard errors. Test statistics are reported in parentheses, and *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

	Dependent variable: Stock return volatility									
Time Period	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Narcissis m FSP	1.18593	1.14832	1.60946	1.91211	1.24091	1.63690	1.26550	1.13137	1.32956	1.47559
	(4.72)***	(5.26)***	(4.55)***	(5.07)***	(5.05)***	(6.75)***	(6.33)***	(6.75)***	(8.02)***	(5.30)***
Narcissism FSP · Size (log)	-0.13460	-0.12794	-0.18880	-0.21417	-0.14221	-0.17690	-0.13263	-0.12638	-0.13552	-0.15652
	(-4.96)***	(-5.26)***	(-4.71)***	(-5.20)***	(-5.38)***	(-7.21)***	(-6.31)***	(-6.80)***	(-7.30)***	(-5.31)***
Option Holder 100	0.04068	0.03081	0.03469	0.00680	0.00354	0.03003	0.00067	-0.00156	-0.00220	-0.00614
	(1.89)*	(1.59)	(0.93)	(0.16)	(0.16)	(1.46)	(0.04)	(-0.11)	(-0.14)	(-0.31)
Option Holder 100 · Duality	-0.01798	-0.00857	-0.00322	-0.00332	-0.00913	-0.01399	0.03552	0.02681	0.01686	-0.00129
	(-0.71)	(-0.37)	(-0.07)	(-0.07)	(-0.32)	(-0.52)	(1.56)	(1.45)	(0.86)	(-0.05)
Size (log)	0.00614	0.00449	0.00381	0.00388	0.00465	0.00801	0.00620	0.01170	0.01170	0.01590
	(0.82)	(0.66)	(0.31)	(0.28)	(0.57)	(0.98)	(0.90)	(2.01)**	(2.10)**	(2.08)**
Duality	-0.02367	-0.01233	-0.03694	-0.02281	-0.00997	-0.00414	-0.03400	-0.03042	-0.03208	-0.01174
	(-1.07)	(-0.64)	(-0.90)	(-0.54)	(-0.39)	(-0.18)	(-1.77)*	(-1.90)*	(-2.05)**	(-0.53)
Firm controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CEO controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	281	281	281	281	281	281	281	281	281	281

Table 9 - Robustness tests for CEO narcissism, CEO optimism, and corporate risk

This table uses regressors that include narcissism and optimism variables as well as the interaction between narcissism and size and the interaction between optimism and duality. All regressions are random effects regressions. Variables are defined in the Appendix. A constant, fixed time effects, fixed industry effects, and the usual controls are included in all models but not reported. All estimations apply standard errors clustered by the firm. Test statistics are reported in parentheses, and *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A reports the results of using three alternative risk indicators: idiosyncratic volatility based on CAPM and FF3F, and ROA volatility.

Panel B reports the results of using different indicators of narcissism. The press release measure is based on the number of times that the CEO is mentioned per 1000 words in firm press releases, while the index is generated by standardizing and adding the Narcissism FSP and the Narcissism PR measures.

Panel C reports the results of changing the moneyness requirement used to classify CEOs as optimists (Models 1-5), using an option-based optimism indicator without a persistency requirement (Model 6), and using the net buyer measure (Model 7).

Panel D reports the results of changing the narcissistic supply indicator from Size (log) to Total Compensation (log).

Panel E reports the results of using a log-transformed version of stock return volatility (Model 1) and log-transformed versions of all variables where such log-transformation improves the Jarque–Bera statistics (Model 2).

Panel A:

Dependent variable	IV (CAPM)	IV (FF3F)	ROA Volatility
	(2)	(3)	(4)
Narcissism FSP	0.37359	0.37502	0.08915
	(2.21)**	(2.23)**	(2.39)**
Narcissism FSP · Size (log)	-0.04783	-0.04757	-0.00884
	(-2.55)**	(-2.58)**	(-2.18)**
Option Holder 100	0.00252	0.00289	-0.00086
	(0.26)	(0.30)	(-0.64)
Option Holder 100 · Duality	0.02409	0.02286	0.00162
	(2.09)**	(2.01)**	(0.97)
Size (log)	-0.02816	-0.02536	0.00103
	(-4.92)***	(-4.55)***	(1.10)
Duality	-0.02373	-0.02219	0.00036
	(-2.17)**	(-2.07)**	(0.25)
Firm controls	✓	✓	✓
CEO controls	✓	✓	✓

Panel B:

Dependent variable	Stock return volatility	
	Press Release	Index
Narcissism indicator	(1)	(2)

Narcissism	0.01956	0.03902
	(1.81)*	(3.12)***
Narcissism · Size (log)	-0.00246	-0.00487
	(-2.24)**	(-3.53)***
Option Holder 100	0.00726	0.00803
	(0.65)	(0.74)
Option Holder 100 · Duality	0.02937	0.02960
	(2.12)**	(2.20)**
Size (log)	-0.03800	-0.04299
	(-10.90)***	(-13.70)***
Duality	-0.03121	-0.03139
	(-2.35)**	(-2.45)**
Firm controls	✓	✓
CEO controls	✓	✓

Panel C:

Dependent variable: Stock return volatility Optimism indicator:	Option Holder (different moneyness)					Option Holder (no persistency)	Net Buyer
	50%	75%	100%	150%	200%		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Option Holder	0.00236	0.00598	0.00802	0.00839	0.01077	0.01157	0.02503
	(0.23)	(0.55)	(0.73)	(0.83)	(0.89)	(1.03)	(2.60)***
Option Holder · Duality	0.02731	0.02647	0.02637	0.01962	0.01904	0.02660	-0.01563
	(1.94)*	(1.84)*	(1.93)*	(1.62)	(1.37)	(2.04)**	(-1.25)
Narcissism FSP	0.58893	0.57705	0.58661	0.55454	0.56366	0.63671	0.52862
	(3.01)***	(2.99)***	(3.06)***	(2.86)***	(2.83)***	(3.25)***	(2.67)***
Narcissism FSP · Size (log)	-0.07422	-0.07243	-0.07285	-0.06898	-0.07026	-0.07861	-0.06917
	(-3.40)***	(-3.38)***	(-3.41)***	(-3.21)***	(-3.19)***	(-3.58)***	(-3.10)***
Duality	-0.03163	-0.02871	-0.02825	-0.02049	-0.01834	-0.03054	-0.00020
	(-2.27)**	(-2.09)**	(-2.18)**	(-1.92)*	(-1.90)*	(-2.42)**	(-0.02)
Size (log)	-0.02273	-0.02319	-0.02285	-0.02320	-0.02294	-0.02145	-0.02334
	(-3.54)***	(-3.69)***	(-3.62)***	(-3.65)***	(-3.56)***	(-3.34)***	(-3.55)***
Firm controls	✓	✓	✓	✓	✓	✓	✓
CEO controls	✓	✓	✓	✓	✓	✓	✓

Panel D:

Dependent variable:	Stock return volatility
Narcissism FSP	0.59427
	(2.23)**
Narcissism FSP*Total Compensation (log)	-0.07517
	(-2.45)**
Optimism Holder 100	0.00723
	(0.66)
Optimism Holder 100*Duality	0.02717
	(1.98)**
Total Compensation (log)	0.01648
	(1.62)
Duality	-0.02936
	(-2.26)**
Firm controls	✓
CEO controls	✓

Panel E:

Dependent variable	Stock return volatility	
	Only dependent variable	All relevant variables
Log-transformed variables	(1)	(2)
Narcissism FSP	1.55739	1.54340
	(3.32)***	(3.34)***
Narcissism · Size (log)	-0.19071	-0.18830
	(-3.61)***	(-3.57)***
Option Holder 100	0.02160	0.02710
	(0.84)	(1.05)
Option Holder 100 · Duality	0.05095	0.04651
	(1.66)*	(1.52)
Size (log)	-0.06726	-0.07127
	(-4.13)***	(-4.34)***
Duality	-0.04733	-0.03993
	(-1.70)*	(-1.41)
Firm controls	✓	✓
CEO controls	✓	✓

Table 10 - CEO narcissism, CEO optimism, and corporate performance

This table reports the results of random effects regressions using four different performance indicators: TSR, Alpha based on CAPM and FF3F, and ROA. TSR is total stock return, measured as the change in share price plus dividend payments divided by the share price at the beginning of the year. Alpha (CAPM) is the risk-adjusted excess return, measured as the intercept from regressing the daily stock returns in excess of the risk-free rate on the market risk premium. Alpha (FF3F) is the risk-adjusted excess return, measured as the intercept from regressing the daily stock returns in excess of the risk-free rate on Fama-French's three risk factors, i.e. MRP, SMB, and HML. ROA is NOPAT divided by the average of the book value of assets at the beginning and end of the year. Variables are defined in the Appendix. The regressors include narcissism and optimism variables and the interaction between narcissism and size as well as the interactions between optimism and both Duality and FCF. Firm and CEO controls are also included. A constant, fixed time effects, and fixed industry effects are included in all models but not reported. All estimations apply standard errors clustered by the firm. Test statistics are reported in parentheses, and *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Dependent variable	TSR	Alpha (CAPM)	Alpha (FF3F)	ROA
	(1)	(2)	(3)	(4)
Narcissism FSP	0.45199	0.00087	0.00078	0.05362
	(1.28)	(0.76)	(0.65)	(0.54)
Narcissism FSP · Size (log)	-0.05238	-0.00012	-0.00009	-0.00685
	(-1.39)	(-0.94)	(-0.68)	(-0.59)
Option Holder 100	0.13594	0.00037	0.00033	-0.00018
	(6.45)***	(4.92)***	(4.63)***	(-0.05)
Option Holder 100 · Duality	-0.10046	-0.00027	-0.00024	0.00933
	(-4.06)***	(-3.23)***	(-3.00)***	(2.01)**
Option Holder 100 · FCF	-0.01640	-0.00005	-0.00004	-0.00189
	(-2.01)**	(-1.58)	(-1.33)	(-0.88)
Size (log)	-0.00083	-0.00001	-0.00006	0.01043
	(-0.08)	(-0.40)	(-1.64)	(3.05)***
Duality	0.05393	0.00018	0.00015	0.00215
	(2.58)**	(2.50)**	(2.20)**	(0.53)
FCF	0.02525	0.00009	0.00008	0.00409
	(3.33)***	(3.12)***	(2.69)***	(2.06)**
Debt to Assets	0.09696	0.00027	0.00027	-0.00034
	(1.89)*	(1.72)*	(1.83)*	(-0.03)
Z-score	0.00373	0.00002	0.00001	0.00836
	(1.58)	(2.16)**	(1.70)*	(6.55)***
Tangibility	0.06418	0.00013	0.00017	0.02182

	(1.67)*	(1.02)	(1.42)	(1.29)
Age	0.00218	0.00001	0.00001	0.00003
	(1.88)*	(1.84)*	(2.05)**	(0.12)
Gender	0.07599	0.00023	0.00022	0.00638
	(2.19)**	(1.54)	(1.51)	(0.84)
Tenure	-0.00275	-0.00001	-0.00001	-0.00013
	(-2.21)**	(-1.52)	(-2.12)**	(-0.38)
Stock Ownership	-0.09741	-0.00066	-0.00067	-0.01970
	(-0.75)	(-1.47)	(-1.83)*	(-0.41)
Option Holdings	-0.04022	-0.00006	-0.00003	-0.07474
	(-0.07)	(-0.04)	(-0.02)	(-0.78)