CEO SIGNATURE SIZE: A SIGN OF BAD PERFORMANCE?

AN EMPIRICAL STUDY ON THE PREDICTIVE VALUE OF CEO SIGNATURE SIZE, AS A PROXY FOR NARCISSISM, ON OPERATING FIRM PERFORMANCE

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CEO Signature: A Sign of Bad Performance? An Empirical Study on the Predictive Value of CEO Signature Size, as a Proxy for Narcissism, on Operating Firm Performance

Abstract:

Recently there has been an increased focus on CEO personalities and how the trait of narcissism affects decision-making, firm outcomes and stakeholders. The aim of this study is to test whether CEOs' signature size, as an assumed proxy for narcissism, is predictive of operating performance, performance extremeness and fluctuations. By replicating a recently published study on a sample of 243 Swedish CEOs in 159 firms between 2005 and 2017, and extending our analysis, we find no support for a relationship between CEO signature size and operational firm performance. Thus, this thesis contradicts previous research and puts the unobtrusive narcissism measure signature size as well as the generalizability of previous findings into question. This study contributes to the exploratory area of CEO narcissism and its proposed link to financial performance.

Keywords:

Narcissism, CEO, Personality, Signature size, Firm performance, Performance fluctuation, Performance extremeness

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1. Introduction

"The difference between God and Larry Ellison (the CEO of Oracle) is that God doesn't think he's Larry Ellison."

- Mike Wilson, investigative reporter

The past years, there has been an increased focus on CEOs. Their pay relative to blue-collar pay has increased steeply in recent years and is now at an historically high level (LO, 2019). CEOs receive greater media attention and are becoming more of public figures, as manifested by for example the record number of published CEO memoirs (Malmendier and Tate, 2009). In short, the CEO is becoming a more and more important person to the firm.

The notion that CEO personality matters and affects firm performance is intuitive and supported in academic research. In the influential Upper Echelons theory, Hambrick and Mason (1984) put forward the idea that organizational outcomes should be viewed as reflections of the values and cognitive bases of powerful actors in the organization. Strategic choices, such as those made by top management, affect the entire firm and are influenced by behavioural components of the CEO. Furthermore, Schein (2004) argues that the culture of an organization is of utmost importance and that this too is an area where the CEO may set the tone of the organization. Empirical research confirms that personal characteristics of the CEO have an impact in areas such as firm investments, organizational strategy and risk-taking (Bertrand and Schoar, 2003; Malmendier and Tate, 2005).

One personality trait that has increasingly become a topic of debate is narcissism. According to the journalist Jeffrey Kluger, the use of words such as "unique" and "exceptional" in books published in the US from 1960 to 2008 has increased by 20 percent, as well as the use of phrases such as "I can get everything I want" (Sveriges Radio, 2014). Kluger worries that the trait of narcissism is becoming more and more common. As described by the Narcissistic Personality Index, as developed by Raskin & Hall (1979), a narcissist is defined as a person actively displaying grandiosity, entitlement, authority and continuously demanding admiration from others. Narcissism among CEOs is of particular interest to the business community due to their key role in shaping their firms. Previous research has found CEOs with narcissistic tendencies to be overconfident, make fewer decisions based on fact, have a more authoritarian leadership style, take greater strategic risks, prioritize investments that generate media attention and give rise to a more volatile firm performance (Campbell et al., 2004; Nevicka et al., 2012; Ham and Seybert, 2018; Malmendier and Tate, 2005; Chatterjee and Hambrick, 2007).

A key issue for researchers has been how to measure the narcissism of CEOs. Asking CEO's to fill out the Narcissistic Personality Index survey in a truthful way is both costly

and runs the risk of biasing the sample towards CEOs who are prone to take their time to fill out such a survey (Webb et al. 1979). Most researchers have therefore tried to find unobtrusive indicators of CEO narcissism visible in publicly available information. Since these traces can be observed without the CEOs knowledge, they are less likely to be biased. Unobtrusive measures used in previous research, with varying degrees of success, include the frequency of self-referral in interviews, the relative CEO pay compared to the second highest paid person and the size of the CEO's photo in the annual report (Chatterjee and Hambrick, 2007; Olsen et al., 2014).

However, a recent study by Charles Ham and Nicholas Seybert, published in the Review of Accounting Studies (2018) finds that signature size can serve as a single, effective, unobtrusive proxy for narcissism. The authors claim to prove that CEO narcissism, as measured by signature size, leads to a worse overall firm performance. Whereas the relationship between narcissism and risk taking has been found in previous research, Ham and Seybert (2018) is the first study to prove a clear negative relationship between narcissism and operating firm performance (Chatterjee and Hambrick, 2007).

The study by Ham and Seybert (2018) is published in one of the top accounting journals, which lends credibility to results that may otherwise have been met with disbelief by the research community. The notion that a complex personality trait, such as narcissism, can be observed simply by measuring a person's signature is neither intuitive nor well established in psychology research. Even though previous studies show that age and level of professional confidence is related to signature size, there are only a few studies that observe a link to narcissism (Zweigenhaft and Marlove, 1973; Jorgensen et al., 1973). In fact, after the study by Ham and Seybert (2018) had been submitted but not yet published, another research team failed to validate the link between signature size and narcissism, on a large sample of undergraduate students (Mailhos et al., 2016).

In light of the increased focus on CEO role as difference makers in firms and how narcissistic leaders act in distinct ways, to establish a viable unobtrusive measure to spot narcissism is important for stakeholders as well as researchers within the field. Furthermore, the research on CEO narcissism, and the consequences it may have for firms and stakeholders, is still in it's exploratory stages. The question of whether narcissistic CEOs lead their firms to higher, lower, more extreme or more fluctuating financial performance is of particular interest, since there are conflicting results in previous research (Whitman et al., 2009; Wales et al., 2013). Merely testing the validity of the findings in Ham and Seybert (2018) would therefore add to the literature within the field and speak to the generalizability of signature size as a proxy for narcissism. Thus, the research question that we aim to answer is:

Is CEO signature size, as an assumed proxy for narcissism, a predictor of lower firm performance, greater performance extremeness and/or fluctuation?

Our aim is to conduct a similar study as Ham and Seybert (2018) using Swedish data in a search for corroborating their results. In this study, we first replicate the methodology layed out by Ham and Seybert (2018) and apply it to listed Swedish companies and CEOs during the timespan 2005-2017. In a similar fashion as Ham and Seybert (2018) we examine the relationship between CEO signature size and operational performance measured by Return on Assets (ROA) and Operating Cash Flow (OCF).

In a second step, we test if the measure can be used to predict other expected effects of CEO narcissism. Even though previous research is inconclusive on whether narcissistic CEOs have a positive or negative impact on firm performance, a majority of the previous studies agree that narcissistic CEOs tend to take greater strategic and financial risks. Drawing inspiration from one of the most well-cited studies within the area (Chatterjee and Hambrick, 2007), we test whether signature size can be used to predict increased strategic risk-taking, manifested in greater performance extremeness and fluctuations in ROA, OCF and Total Shareholder Return (TSR).

This thesis makes several contributions to existing literature. First, we fail to find statistically significant results in our replication of the study by Ham and Seybert (2018), and find no link between signature size and firm performance. Thus, our thesis raises concerns regarding the generalizability of Ham and Seybert's (2018) findings. Second, we fail to find statistically significant results on whether signature size predicts greater performance extremeness and fluctuations, two other expected effects of CEO narcissism. Our results raise the question of whether signature size by itself can be used as a reliable proxy for narcissism. This should be a useful insight for future research on CEO narcissism. Third, our study adds to the still exploratory field of narcissism among CEOs and its effect on firm performance. Fourth, our lack of statistically significant results demonstrates the difficulty of replicating research with psychological components and highlights the constraining effects of contextual factors.

2. Literature review

This section starts with an overview of why the personality of a CEO affects firm performance. Next, we define the specific personality trait narcissism and why a narcissistic CEO may be a potentially risky hire. We continue by describing various ways to measure narcissism. Last, we examine the recently published study by Ham and Seybert (2018) on firm performance using signature size as a proxy for narcissism and discuss the generalizability of their results.

2.1. Why the CEO matters

A large body of research highlights the importance of good managers for firms to perform well. The influential Upper Echelons theory puts forward the idea that organizational outcomes should be viewed as reflections of the values and cognitive bases of its powerful actors (Hambrick and Mason, 1984). Personal and background characteristics of top management, especially the CEO, is said to affect key strategic choices such as investments, operational risk-taking and openness to innovation, affecting the outcomes of a firm. The CEO exercises power over the structural context of the organization through decisions related to organizational structure, work streams, staffing, evaluation criteria and monitoring (Burgelman, 1983). Furthermore, top leaders have an indirect impact on their firms through setting the tone of the organizational culture (Schein, 2004). Other management characteristics such as prior industry experience and the size of the top management teams have also been found to significantly impact firm outcomes (Virany & Tushman, 1986; Haleblian and Finkelstein, 1993).

In their 1972 study of top executives in large corporations, Lieberson and O'Connor define the CEO impact more precisely. They find that between 6.5 and 14.5 percent of the variation in firm performance, measured as revenue, profit and profit margin is explained by the CEO. This is supported in a study by Bertrand and Schoar (2003) on the CEO fixed effect across firms, demonstrating how individual characteristics or leadership style has a significant impact on performance metrics, investments and strategic choices. Other studies confirm that the CEO accounts for approximately 10-20% of the variation in firm performance (Crossland & Hambrick, 2007; Mackey, 2008). One study even suggests that the CEO effect explains 38% of the variation in ROA, when using a different measurement technique (Hambrick & Quigley, 2014). In conclusion, there is a body of research stating that CEOs matter for firm performance outcomes.

2.1.1. CEO constraints and geographical differences

However, several researchers argue that the variability in firm performance that is traceable to the individual CEO could be limited. For example, CEOs are on average a quite homogenous group with similar educational and professional backgrounds (March and March, 1977). The individual CEO effect may also be reduced by the nature of the CEO's work, where a majority of the time typically is spent on activities with a short-term impact rather than long-term strategic planning (Mintzberg, 1973). Furthermore, CEOs face a considerable amount of internal constraints, such as predetermined levels of investments in fixed assets, restricted information flows and entrenched norms and culture, that limit their influence (Hannan and Freeman, 1977). Given this, the personality of the CEO should be viewed as one of many factors affecting firm performance that can be constrained or enabled depending on external factors or circumstances.

Apart from a variation between firms in terms of their internal constraints, there are institutional variations of interest between countries. These variations can be described as geography specific environmental forces that directly impact firms. They usually follow national boundaries and include local culture, legal system, income profile, political risk, tax system, exchange rate, and government restrictions (Guisinger, 2001). Institutional differences in terms of corporate governance might limit the CEO's influence over their firms. In the U.S. for example, a majority of CEOs are both CEOs and chairmen of the firm's board of directors, which increases their structural power (Dalton and Kesner, 1987). This type of CEO duality is not permitted in Sweden by law[1]. The discrepancy is further enhanced by CEOs in the U.S. also having influence over board member selection (Shivdasani and Yermack, 1999). The U.S. CEOs are also known to receive higher compensation than their counterparts in other countries, which could be interpreted as a sign of their more influential roles (Conyon and Murphy, 2000). Another key difference between the U.S. and Sweden is the level of shareholder concentration, where 75% of publicly traded firms in Sweden have at least one controlling shareholder owning a minimum of 20% of the shares (La porta et al., 1999). By comparison only 20% of publicly traded firms in the U.S. have a controlling shareholder of similar proportion. Sweden having stronger individual owners could indicate an extended power sharing between CEOs and influential ownership spheres. Supporting this notion, that institutional differences between countries matter, Crossland and Hambrick (2007) find that the CEO effect on ROA indeed is significantly larger in the U.S. compared to both Germany and Japan.

Despite the debate on how influential CEOs really are, and how constraints differ between countries or firms, there are to our knowledge no studies claiming that the influence of CEO personality is non-existent. In light of this, the question of interest becomes which personality traits are associated with better or worse firm performance.

[1] 8 chapter 49 § Swedish Companies Act

2.2. Narcissism defined

There are many studies on the topic of personality traits and their impact on leaders' likelihood to succeed. For instance, CEO charisma is a personality trait with an established positive relation to firm performance (Flynn and Staw, 2004). Conscientiousness, described as the ability to be efficient and organized, as well as extraversion in the sense of being sociable and energetic, are also traits that enhance managers job performance (Barrick and Mount, 1998). Furthermore, a high degree of core self-evaluation, referring to having self-esteem and self-efficiency while being emotionally stable and controlled, is found among successful CEOs (Bono and Judge, 2001; Simsek et al., 2010). In Sweden, traits such as being collaborative and refraining from self-centred behaviour are of particular importance for a person's perceived leadership skill (Holmberg and Åkerblom, 2006).

However, the scope of this thesis is limited to one personality trait for which potential downsides are currently debated in research (Maccoby, 2000). The term "narcissism" originates from Greek mythology and the story of the young Narcissus who fell in love with his own image in a pool of water. Today the concept of narcissism is defined as the combined complex set of characteristics including grandiosity, sense of entitlement, authority and a continuous need for admiration (Raskin and Hall, 1979; Emmons, 1987).

In psychology, the phenomenon of narcissism has been discussed since Freud (1914) who argued that for a person to be narcissistic it is not enough be vain, overestimate one's ability and feel grandiose. One also has to be defensive in relationships, idealize oneself, deny criticism and demand praise from others. Today, narcissism in its most extreme form is classified by psychologists as a mental disorder (American Psychiatric Association, 2013). However, a large body of research also acknowledges that narcissism can be considered as a personality trait that is present in people to various degrees. Narcissism as a personality trait includes variations in the perception of authority over others, self-admiration, arrogance and the inclination to manipulate or exploit others while simultaneously seeking their admiration (Raskin and Hall, 1979).

Thus, people with ample narcissistic tendencies may seek immediate attention and affirmation, take exhibitionistic actions to stand out or exploit others to get ahead (Buss and Choido, 1991). The desire to be admired by others typically leads to better personal performance in situations where the reward comes in the form of an opportunity for self-enhancement or public praise (Baumeister and Wallace, 2002). There is no conclusive evidence on if narcissists' urge to be the centre of attention is a consequence of intrinsic self-confidence or, as some psychologists argue, truly masked low self-esteem (Jordan et al., 2003; Lakey et al., 2008). Interestingly, the display of authority typically makes others view narcissists as better leaders, even though their actual leadership skills in experiments rate below average (Nevicka et al., 2011).

2.2.1. Narcissism or overconfidence?

Narcissism is easily confused with overconfidence. Therefore, it is worth mentioning that overconfidence has a broader definition and is less of a distinct personality trait. Overconfidence is defined as a trait found in a person who is more confident than she deserves to be, resulting in an overestimation of performance, capabilities, or excessive precision in beliefs (Moore and Dev, 2017; Moore & Healy, 2008). Thus, overconfidence can be considered to overlap with narcissism in terms of the grandiosity trait. However, since narcissism has a narrower definition, also requiring a sense of entitlement and arrogance to be present, overconfidence is present in a broader group and is by itself not predictive of narcissism (Campbell et al., 2004). Overconfidence is also found to be more affected by situational factors and type of task at hand, meaning that a person can be overconfident in some areas but less confident in others. In comparison to overconfidence, narcissism tends to be a more stable personality trait (Raskin and Terry, 1988; Moore and Dev, 2017). Furthermore, the additional attributes, sense of entitlement and exploitativeness, that distinguish a merely overconfident person from a narcissist are by some researchers found to be the most problematic. These attributes are associated with unethical decision making, lack of empathy and aggressive and distrustful behaviour (Tamborski et al., 2012; Emmons, 1987; Watson et al., 1984).

In conclusion, narcissism is a clearly defined personality trait that may manifest itself in one's perception of oneself, but also in relationships with others. Approximately 1% of the population are estimated to have the most extreme version of narcissism to the extent of it being classified as a mental disorder, suggesting that a larger group may show signs of the trait (Torgensen et al, 2001). Research furthermore shows that narcissists are more likely to emerge as leaders, implying that they should be more common in executive roles (Brunell et al., 2008). Thus, the question from a stakeholder perspective becomes what impact CEO narcissism has on firm performance.

2.3. Narcissistic CEOs performance

The research area of CEO narcissism, and how it affects firm, is still in an exploratory stage. Some pioneering researchers have made interesting contributions. In a decision-making context, several studies show that narcissism leads to increased risk-taking in a firm context (Campbell et al., 2004; Chatterjee and Hambrick, 2007; Hirschleifer et al., 2012). One cause is the related attribute overconfidence. For example, narcissists, when asked general knowledge questions, are more likely to bet money on their answer even though not more often being right (Campbell et al., 2004). This increased overconfidence and inclination to greater risk-taking can lead to biased decision making. Malmendier and Tate (2005) show that overconfident CEOs are more inclined to make investment decisions based on cash on hand rather than expected return, leading to less informed investment decisions and potentially missed opportunities.

The inclination of a narcissistic CEOs to take risks might also be caused by their need for admiration and attention. Narcissistic CEOs respond stronger to social praise and to more often disregard objective performance indicators (Chatterjee and Hambrick, 2011). Several studies also show that narcissism at the CEO level is related to greater investments in high risk projects that generate attention, such as M&A and R&D (Hirschleifer et al., 2012; Wales et al., 2013; Ham and Seybert, 2018). Narcissistic CEOs more frequently initiate acquisition processes and are more eager to close the deal (Aktas et al., 2016). One of the most influential studies within this area is Chatterjee and Hambrick (2007), which shows that narcissistic CEOs take greater strategic risks, do larger acquisitions more frequently and as a result experience a more extreme and fluctuating firm performance. In conclusion, narcissists are more likely to seek out bold opportunities which either result in big wins or big losses.

2.3.1. Better or worse performance?

Most researchers agree that CEO narcissism leads to a more volatile firm performance. However, there is no conclusive evidence on whether narcissistic CEOs on average actually perform better or worse compared to their less narcissistic counterparts (Chatterjee and Hambrick, 2007; Whitman et al., 2009; Hirschleifer et al., 2012).

In their study of 75 CEOs in major league baseball, Whitman et al. (2009) find that narcissistic CEOs lack motivational skills and therefore their firms perform worse in terms of manager turnover, team winning percentage and fan attendance. The study by Ham and Seybert (2018), which is a benchmark study for this thesis, finds that narcissism among CEOs is predictive of lower firm performance measured by ROA and OCF (Ham and Seybert, 2018). In general, narcissists perform worse as team leaders as shown in an experimental setting (Nevicka et al., 2011). Furthermore, CEO narcissism may also be related to direct misconduct as a consequence of the sense of entitlement attribute (Tamborski et al., 2012). Narcissism among CFOs is related to earnings management as indicated by less timely loss recognition, weaker internal control quality and a higher frequency of accounting restatements (Ham and Seybert, 2017). A similar result is observed for CEO narcissism, which Olsen et al. (2014) prove to be related to earnings management through operational activities. Schrand and Zechman (2013) support this view by showing that overconfident executives are more likely to misreport earnings. Narcissistic CEOs also seem to expose their firms to increased legal risks (O'Reilly et al, 2018).

Even though most prior research focuses on the negative effects of CEO narcissism, there are also studies on narcissism being a beneficial trait in settings where risk-taking is rewarded. Overconfident CEOs have been found to be more successful in innovation driven industries, measured as number of patents produced per dollar spent on R&D (Hirschleifer et al, 2012). Narcissistic CEOs are also found to make their firms more

entrepreneurial, potentially explaining both the increased volatility in firm performance and why they succeed in innovation driven industries (Wales et al., 2013).

2.4. How to spot a narcissist

In light of the possibility that CEO narcissism affects firm performance, a key question for both stakeholders and academia is how to detect narcissism. The most reliable way to measure narcissism is to make subjects fill out the extensive Narcissistic Personality Index (NPI) questionnaire. First introduced by Raskin and Hall (1979), the NPI is constructed specifically for testing a person's level of narcissism and includes 223 statements from which a score is calculated. The statements all relate to core attributes of narcissism; authority, exhibitionism, superiority, vanity, exploitativeness, sense of entitlement and self-sufficiency. Below are two examples of statements where the answer A) increases the NPI score:

A. I can make anybody believe anything I want them to
B. People sometimes believe what I tell them

A. I insist upon getting the respect that is due me
B. I usually get the respect that I deserve

The initial NPI construct has since been validated, further developed and widely used in research (Raskin and Terry, 1988; Ames et al., 2006; Buss and Choido, 1991; Nevicka et al., 2011). In 1988, Raskin and Terry introduced the NPI-40 which is a shortened version of the original NPI consisting of 40 statements that capture a similar variation in narcissism as the original NPI construct. In 2006, the NPI was further shortened to include only 16 statements, the NPI-16. Even this shortened version has been proven to hold in large sample tests and therefore seems to identify the most important statements (Ames et al., 2006).

Even though the NPI is the most well-established method of spotting a narcissist, researchers have in empirical settings struggled with low response rates when asking CEOs to fill out the survey. For example, in their 2013 study on U.S CEOs, Wales et al. get a response rate of only 15% (Wales et al., 2013). The NPI also runs a substantial risk of biasing the sample as mainly CEOs with enough time and motivation answer such self-reporting surveys (Webb et al., 1979). The problem is magnified when the objective is to get narcissists to fill out the survey, we know from psychology research that narcissists typically are less likely to perform boring tasks with no opportunity for self-enhancement (Baumeister and Wallace, 2002; Buss and Choido, 1991). Therefore, most research on CEO narcissism struggles to find valid unobtrusive measures of narcissism (Chatterjee and Hambrick, 2007; Olsen et al. 2014; Whitman et al., 2009).

2.4.1. Unobtrusive measures

To solve the measurement issue, many researchers within the field have resorted to creative alternatives to the NPI. Unobtrusive measures of narcissism constitute traces of narcissism that are observable in material that is under the influence of the CEO and made publicly available (Webb et al., 1979).

One category of unobtrusive measures used to measure narcissism is the language used by CEOs in publicly available statements. Raskin and Shaw (1988) show in their validation study that narcissism, measured through the NPI, is correlated with a person's number of self-referrals in an interview setting. This is explained by the narcissistic tendency to idealize and aggrandize oneself, especially in conversations with others (Emmons, 1987). Thus, some studies have used the frequency of CEOs use of words such as "I", "me", "my" and "myself" in interviews as a measure of narcissism (Chatterjee and Hambrick, 2007; Aktas, 2016). However, a recent study puts this measure into question by failing to replicate the original findings in Raskin and Shaw (1988) on a substantially larger sample size (Carey et al., 2015). The authors argue that self-admiration can be verbally expressed in various ways, with or without the specific use of the word "I" (Carey et al., 2015). Other studies have used language as a trace of narcissism in more refined ways. One case study closely examines the contents of three letters to shareholders (Craig and Amrenic, 2011). Another study uses histometric analysis to weigh all publicly available information about a CEO, including statements made by themselves and opinions expressed by others (Whitman et al., 2009). Even though these methods are more sophisticated than simply calculating the number of self-referrals, they are also exposed to bias since the authors themselves have to construct the weighing function.

Further studies have used gestures through which a self-admiring CEO may emphasize her own prominence over others, such as how often the CEOs name is mentioned in the firms own press releases, the CEOs photo size in the annual report and their pay relative to the second highest paid employee (Chatterjee and Hambrick, 2007; Chatterjee and Hambrick, 2011; Olsen et al., 2014). The size of the CEO's photo and the number of times the CEO is mentioned in press releases are both indicators of situations where grandiosity may motivate narcissistic CEOs to demand increased attention. The relative pay could also be influenced by the need for grandiosity and by the narcissists sense of entitlement. However, a key question is to what extent these decisions really are under the CEO's influence. In one study, the researchers interview three communications specialists who claim that CEOs are highly involved in how they are portrayed in both annual reports and press releases (Chatterjee and Hambrick, 2007). Furthermore, research on levels of CEO pay suggests that CEOs at least to some extent are able to influence their own pay, in addition to setting the pay of others in the firm (Tosi and Gomez-Mejia, 1989). Even so, there is reason to believe that CEOs' influence over these decisions may be constrained by for example inadequate information exchanges with the investor relations department, corporate culture and firm structure (Hannan and Freeman, 1977). Additionally, these

factors can vary greatly between firms, making it more difficult to pinpoint stable individual differences in narcissism.

Due to the inherent flaws of each unobtrusive measures of narcissism, one of the most well-cited studies within the field, Chatterjee and Hambrick (2007), construct an index of five combined unobtrusive measurements. The researchers argue that in isolation each measure runs the risk of only capturing one of the narcissism traits, such as grandiosity when using photo size.

2.5. Signature size as a proxy for narcissism

In the absence of a well-functioning unobtrusive indicator of narcissism, that is clearly under the CEOs control, Ham and Seybert (2017; 2018) recently broke new ground by using signature size as a proxy for narcissism. In two studies published in the Review of Accounting Studies and the Journal of Accounting Research, two of the most prominent journals within accounting research, they show that signature size among CEOs and CFOs can be used as a proxy for narcissism and in a turn predicts firm performance, M&A investments and earnings management (Ham and Seybert, 2017; Ham and Seybert, 2018). One of the studies is of particular interest for this thesis since it establishes a negative relationship between CEO signature size and firm performance a large sample of S&P 500 firms (Ham and Seybert, 2018).

The benefit of using signature size is that CEO signatures can be unobtrusively observed in publicly available information. The signature is produced directly by the CEO and since they do not expect their signature to be evaluated, the bias within the measurement should be limited (Ham and Seybert, 2018; Rudman et al., 2007). Previous research confirms that the narcissistic attribute of self-admiration unconsciously leads to a more positive association to one's name, birthday date or other things that resemble the own person (Pelman et al., 2005). Thus, signature size could be an indicator of narcissism as it leaves traces of self-admiration.

There are a few studies on the association between signature size and personality traits, however there is no clear consensus on the proposed link to narcissism (Zweigenhaft and Marlowe, 1973; Mahoney, 1973; Mailhos et al., 2016). In their 1973 study, Zweigenhaft and Marlowe show that signature size is correlated with both self-esteem and professional status, as for example tenured professors were found to have larger signatures than non-tenured professors. The link between signature size and self-esteem has been both supported and challenged in other studies (Mahoney, 1973; Rudman et al., 2007). Signature size is found to be positively related to social dominance, defined as the need to have authority over others, however this holds only for women and not for men (Jorgensen, 1977). Similarly, signature embellishments, such as added exclamation marks or symbols, are related to narcissism among women but not men (Dillon, 1988). Signature

size has also been shown to increase when people feel socially threatened as a way to defensively compensate and show off self-esteem (Rudman et al., 2007).

Due to the lack of clear evidence in previous research on the link between signature size and narcissism, Ham and Seybert (2018) perform their own validation using 53 business graduate students and find a significant correlation with narcissism measured by the NPI. In their study, the authors are also able to rule out that signature size is related to overconfidence, leading them to the conclusion that signature size is a good proxy for narcissism (Ham and Seybert, 2017; Ham and Seybert, 2018). However, after the studies by Ham and Seybert were published as working papers, another research team, Mailhous et al., set out to validate the link between signature size and narcissism using a substantially larger sample of 335 psychology students (Mailhos et al., 2016). Even though Mailhos et al., are able to find a general association with social dominance, they only find a relationship with narcissism among women. The authors consider several possible explanations such as that narcissism may be expressed differently among men compared to women and that women more often produce readable signatures which could bias the sample (Mailhos et al., 2016; Buss and Choido, 1991). In light of these recent studies, the validity of signature size as a proxy for narcissism is still debated.

Since CEO narcissism is likely to have an impact on firm performance, there is an interest from both from an academic and stakeholder point of view to expand this novel field of research. Thus, the publications of Ham and Seybert (2017; 2018) in prominent accounting journals raise the question of the generalisability of their results. Can CEO signature size really be linked to firm performance and are the findings in Ham and Seybert (2018) replicable in another setting? Furthermore, can other expected consequences of CEO narcissism such as strategic risk-taking, manifested in extreme and fluctuating performance, be observed using the signature size proxy? The research question this thesis aims to answer is thus:

Is CEO signature size, as an assumed proxy for narcissism, a predictor of lower firm performance, greater performance extremeness and/or fluctuation?

3. Hypotheses

To answer our research question, we first replicate the study of Ham and Seybert (2018) and test if CEO signature size is predictive of lower firm performance. Second, we test whether CEO signature size is predictive of extreme and/or fluctuating performance, two consequences of strategic risk taking (Chatterjee and Hambrick, 2007). We include the second part of the study to gain further perspectives on the predictive value of CEO signature size and how assumed CEO narcissism affects firm performance. Previous research points to strategic risk-taking as one key explanation for why narcissistic CEOs would perform worse. Even though there are several areas, such as M&A or financial risk-taking, which could also be affected by CEO narcissism, we have in our short time frame chosen to limit our scope to operational firm performance. We conduct our study using a Swedish data sample, hoping to shed light on whether the findings of Ham and Seybert (2018) can be replicated outside of the U.S. In accordance, we will test three hypotheses empirically, relating to firm performance, performance extremeness and performance fluctuations.

There are several reasons to expect that the findings of Ham and Seybert (2018) can be replicated. First, narcissism has proven consequences that are worrying in a CEO context. Narcissists typically require immediate attention and praise which could lead to short-termism in the CEO decision-making (Buss and Choido, 1991). Furthermore, a search for exhibitionism and grandiosity may lead them to take sub-optimal risks purely to gain attention (Campbell et al., 2004; Malmendier and Tate, 2005). Narcissists may also be less capable leaders and in certain situations even take unethical decisions. (Nevicka et al., 2011; Whitman et al., 2009; Tamborski et al., 2012; Schrand and Zechman, 2013) All of the above point towards that a narcissistic CEO should have a negative impact on firm performance. Furthermore, the signature size measure is unobtrusive, directly produced by the CEO and has been separately validated in the study by Ham and Seybert (2018).

On the other hand, there are also reasons for doubt. The research field of how narcissistic CEOs impact firm performance is still exploratory and only consists of a few studies. Among the studies that exist, both negative and positive aspects of narcissism have been found (Whitman et al., 2009; Wales et al., 2013). Given that narcissistic CEOs are more entrepreneurial and perform better in innovation driven industries, there is a possibility that their success or failure is highly dependent on the firm context (Wales et al., 2013). Furthermore, the use of signature size as a proxy for narcissism can be questioned. Other researchers are only able to validate the link to narcissism among women, which is problematic since a majority of Swedish and U.S. CEOs are men (Dillon, 1988; Mailhos et al., 2016). The risk that signature size is more connected to neighbouring traits such as self-esteem, professional status or social dominance or that the measure may be affected by situational factors is imminent (Zweigenhaft and Marlowe, 1973; Rudman et al., 2007; Jorgensen, 1977). There are also institutional differences between the U.S. and Sweden

that may constrain Swedish CEOs, making their personality have less impact on firm performance (Hannan and Freeman, 1977; Guisinger, 2001).

Due to this tension, and based on our research question, we will in the first part of our study test the following hypothesis:

H1: *CEO signature size predicts lower operational firm performance*

In the second part of our study we aim to examine if CEO signature size is able to predict greater performance extremeness and/or fluctuation. The objective is to observe whether or not narcissistic CEOs take greater strategic risks which would lead to a more extreme and fluctuating performance. While there is currently a lack of consensus within the research community regarding whether CEO narcissism leads to worse firm performance, researchers are more unified in their view that narcissistic CEOs tend to take on more risk in their desire to attract attention (Ham and Seybert, 2018; Wales et al., 2013; Chatterjee and Hambrick, 2007 Campbell et al., 2004; Malmendier and Tate, 2005; Wales et al., 2013). This should lead to firms with narcissistic CEOs to display more fluctuating performance over time and larger deviations from their industry average performance (Hambrick et al., 2007). If signature size is a valid proxy for CEO narcissism, it should therefore also be indicative of greater performance extremeness and fluctuations in line with previous research using other unobtrusive measures (Chatterjee and Hambrick, 2007).

To gain further explanatory insights related to our research question, we will also test the following hypotheses:

H2*: CEO signature size predicts a more extreme firm performance in relation to industry average*

H3: *CEO signature size predicts greater fluctuations in firm performance*

4. Research design

In this section, we start by describing the overall research design. We then describe the operationalization of our key independent variable, signature size, as well as the chosen performance metrics. We present the two main regression models used to the tests our hypotheses. Last, we discuss some potential concerns related to endogeneity and heteroscedasticity.

4.1. Overall research design

To answer our research question, we conduct an empirical study using panel data on listed Swedish firms and CEOs between 2005-2017. We perform several different tests. First, we replicate the methodology in Ham and Seybert (2018) to test hypothesis 1. Second, we use a modified version of the model outlined in Chatterjee and Hambrick (2007) to test hypotheses 2 and 3.

In all tests, we only consider CEOs who started their tenures during our period of study. Furthermore, to only capture the effect of CEOs who have been able to have a substantial firm impact, we only include CEOs with a tenure of at least two years. We also disregard the first year of the CEOs tenure since it runs a risk of being associated with anomalies connected to CEO succession. We exclude companies classified as financial, investment or real estate firms. We exclude financial firms as the structure of their financial reports differs significantly from those of other firms in the sample. We exclude investment companies and real estate firms since their earnings are significantly impacted by value changes in their asset portfolios leading to less comparable profitability ratios (Liang & Riedl, 2014). These industries are also heavily regulated, increasing the constraints hindering CEOs to impact performance (Hannan and Freeman, 1977). All continuous variables are winsorized at the 1st and 99th percentile in order to mitigate the influence of potential outliers. This means that all values below or above the respective percentiles are set to the value of that percentile.

4.2. Operationalization of the signature size measure

The main difference between our benchmark study by Ham and Seybert (2018) and our study is that we use a relative, rather than absolute, measure of the key independent variable, signature size. While Ham and Seybert (2018) simply measure the area-per-letter signature size of the CEOs, we measure the CEOs signature size in relation to a peer group consisting of board members who have signed their name on the same page.

This is mainly due to a difference in the format between U.S. and Swedish annual reports. In the study performed by Ham and Seybert (2018), the signature size is obtained from the letter to shareholders, which in the U.S. is produced in the standardized 10-K format

(Ham and Seybert, 2018). This is not the case in Swedish annual reports, where the layout of the letter to shareholders varies considerably between firms. Thus, using Swedish letters to shareholders, the variation in the designated space for the CEO to sign their name would bias an absolute measure such as that used by Ham and Seybert (2018). In search for a less biased measure of signature size, we turn to the page in the annual report where the CEO and board of directors are obliged by law to sign their names, an typically do so next to one another, assuring readers that the financial report has been prepared in accordance with applicable accounting standards[2]. We call this page the "assurance page". We measure the CEOs area-per-letter signature size and compare it to those of the five random board members whose signatures are located closest the CEO's on the page. This mitigates the issue of format differences between annual reports, since the peer group has faced a similar space constraint as the CEO when signing their names. Furthermore, from psychology research we know that displays of narcissism, conscious or not, are most visible in encounters with others (Buss and Choido, 1991; Raskin and Hall, 1979). Under the assumption that larger signatures can be seen as a display of grandiosity, the urge of narcissists to produce larger signatures could be even greater when signing their name next to someone else. Our relative measure of CEO signature size should therefore capture a similar variation in narcissism as the one used by Ham and Seybert (2018).

We perform our measurements under the assumption that board member narcissism, and it's assumed manifestation through signature size, is normally distributed within the randomly selected group of board members. In line with Ham and Seybert (2018), we also assume that a person's signature remains stable over time, given that it serves as a proxy for the stable personality trait narcissism (Raskin and Hall, 1979). Ideally, we would have preferred to validate our signature size measure prior to conducting our main analysis similarly to Ham and Seybert (2018), who test the correlation between signature sizes and NPI scores on a sample of students prior to performing their main study. However, due to lack of time and resources we have not been able to separately validate the measurement and will in our study assume it to be a proxy for narcissism. These assumptions are further discussed in section 7.2.

4.3. Measures of firm performance

In the first part of our study, we examine firm performance in terms of the metrics ROA and OCF, in line with the methodology of Ham and Seybert (2018). This choice is based on our intent to closely follow their method. In the second part, we examine performance extremeness and fluctuation in ROA, OCF and TSR. Adding the market-based measure TSR in the second part of our study gives us the possibility to gain additional insights on how the performance of narcissistic CEOs is perceived by the stock market. The addition of TSR makes our findings more comparable to those of Chatterjee and Hambrick (2007).

[2] 2 chapter 7§ Annual Accounts Act

All three metrics are widely used to gauge firm performance (Chatterjee and Hambrick, 2007; Ham and Seybert, 2018). ROA and OCF are accounting metrics known to be influenced by the personality of the CEO (Bertrand and Schoar, 2003). ROA has the benefit of being less affected by firms' capital structures compared to related measures and OCF is a metric that gives a sense of the actual cash flow generated by the operations of the firm (Johansson and Runsten, 2005). Compared to these backwards looking performance metrics, TSR reflects the market's view of current and future performance.

In our study, both ROA and OCF are scaled by total assets to control for firm size (Ham and Seybert, 2018). ROA is defined as income before extraordinary items divided by prior year total assets. OCF is defined as cash flow from operations divided by prior year total assets. TSR is defined as the change in market value of equity plus total dividends to common shareholders, scaled by the prior year market value of equity (Chatterjee and Hambrick, 2007).

4.4. Part 1: Signature size and firm performance

In the first part of our study, we aim to replicate the methodology used in Ham and Seybert (2018). We use a multivariate ordinary least squares (OLS) regression model where the dependent performance metrics ROA and OCF are regressed on the independent variable signature size, together with a number of control variables. We use two specifications for each of the performance metrics, one for the current year and one for future years. In the future year's specification, the performance is summed over the two consecutive years following after the current year *t*. Since we measure performance in terms of both ROA and OCF, we run a total of four separate regressions. The model includes year and industry fixed effects and uses robust standard errors clustered by firm, further motivated in section 4.7.

The main regression model is described in equation (1). Subscript *i* denotes firm, subscript *j* denotes CEO and subscript *t* denotes year.

$$\begin{aligned} Performance_{it} = {} & \beta_0 + \beta_1 SigSize_j + \beta_2 Pos(Perf)_{j,pretenure} + \\ & \beta_3 Neg(Perf)_{j,pretenure} + \beta_4 Pos(Acc)_{i,t-1} + \\ & \beta_5 Neg(Acc)_{i,t-1} + \beta_6 Div_{i,t-1} + \beta_7 NoDiv_{i,t-1} + \\ & \beta_8 ATGrowth_{i,t-1} + \beta_9 MTB_{i,t-1} + \beta_{10} lnMVE_{i,t-1} + \\ & \beta_{11} CEOAge_{jt} + \beta_{12} CEOTenure_{jt} + \beta_{13} CEOGender_j + \\ & Year_{it} + Industry_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

In each test, the generic term $Performance_{it}$ is replaced by either ROA or OCF measured according to the current or future year specification as previously defined. In order to maximize the comparability of our results, all of the control variables have been constructed in an as similar form to Ham and Seybert (2018) as possible.

$SigSize_j$ is the relative CEO area-per-letter signature size, as defined in section 4.2. In line with results obtained in previous research we expect our main independent variable to be negatively related to firm performance.

$Pos(Perf)_{j,pretenure}$ and $Neg(Perf)_{j,pretenure}$ control for firm performance prior to the CEO's first year in office. These variables are included as a way to address endogeneity concerns in the model, elaborated in section 4.6. $Pos(Perf)_{j,pretenure}$ is equal to the average performance in the three years prior to the CEO's first year in office if positive, otherwise zero. $Neg(Perf)_{j,pretenure}$ is a binary variable equal to one if the average pretenure performance is negative, otherwise zero. In contrast to Ham and Seybert (2018), we choose to calculate the average performance using the prior three rather than five years, as the latter would result in a considerable loss of observations. We expect $Pos(Perf)_{j,pretenure}$ to be positively related to our dependent variable. Similarly, we expect $Neg(Perf)_{j,pretenure}$ to be negatively related to our dependent variable.

$Pos(Acc)_{i,t-1}$ is equal to the accruals scaled by the prior year total assets if positive, otherwise zero. $Neg(Acc)_{i,t-1}$ is equal to the accruals scaled by the prior year total assets if negative, otherwise zero. Accruals are defined as the change in current assets less the change in cash and cash equivalents less the change in current liabilities plus the change in debt in current liabilities (Ham and Seybert, 2018; So, 2013). Since firms with a high accrual component of earnings have been shown to underperform in terms of future earnings and returns, we expect this variable to be negatively related to firm performance (So, 2013).

$Div_{i,t-1}$ is equal to dividends reserved for common shareholders scaled by prior year total assets. $NoDiv_{i,t-1}$ is a binary variable equal to one for firms with no dividends reserved for common shareholders during the year and zero otherwise. As demonstrated by So (2013), firms with higher dividends tend to have higher future earnings. We therefore expect $Div_{i,t-1}$ to be positively and $NoDiv_{i,t-1}$ to be negatively related to firm performance.

$ATGrowth_{i,t-1}$ is the current year total assets scaled by the prior year total assets. We expect asset growth to be negatively related to our firm performance measures in line with the findings of So (2013).

$MTB_{i,t-1}$ is the market value of common equity scaled by the book value of common equity. We expect the market to book ratio to be positively related to profitability, due to the financial markets pricing of future expectations regarding profitability (Fama and French, 2006).

$lnMVE_{i,t-1}$ is the natural logarithm of the market value of equity and is included as a control for firm size. Based on the findings of Ham and Seybert (2018), we expect this variable to be negatively related to firm performance.

$CEOAge_{jt}$ is the natural logarithm of the CEOs age. Several previous studies have proved a positive correlation between age and signature size, thus we include this variable to control for the variation in our independent variable pertaining to age (Mailhos et al., 2016; Zweigenhaft and Marlowe, 1973).

$CEOTenure_{jt}$ is the natural logarithm of the CEOs tenure at the time of measurement. As signature size has been found to increase with tenure and professional status, we include a control variable for tenure (Zweigenhaft and Marlowe, 1973).

$CEOGender_j$ is a binary variable equal to one if the CEO is female, and zero if the CEO is male. Previous studies have found males to write larger signatures compared to females, measured both as the area occupied by the signature itself as well as the area occupied by each letter of the name (Mailhos et al., 2016; Zweigenhaft, 1977; Zweigenhaft and Marlowe, 1973). To control for this potential distortion of the signature size, a gender variable is included.

4.5. Part 2: Signature size and firm performance extremeness and fluctuation

In the second part of our study, we aim to test hypothesis 2 and hypothesis 3. Our main point of reference when constructing our model is the 2007 study by Chatterjee and Hambrick, which is one of the most cited studies on CEO narcissism and strategic risk-taking. Similar to Part 1, we use a multivariate ordinary least squares (OLS) regression model. We measure current year extremeness and fluctuation in ROA, OCF and TSR, yielding a total of six separate regressions. In contrast to Chatterjee and Hambrick (2007), we include CEOs with a tenure of at least two rather than four years, for the purpose of not losing too many observations. The model includes year and industry fixed effects and uses robust standard errors clustered by firm, further motivated in section 4.7.

Equation (2) specifies the model used to test performance extremeness and equation (3) specifies the model used to test performance fluctuation. Subscript *i* denotes firm, subscript *j* denotes CEO and subscript *t* denotes year.

$$\begin{aligned} PerfExtremeness_{it} = {} & \beta_0 + \beta_1 SigSize_j + \beta_2 Slack_{it} + \beta_3 Perf_{i,t-1} + \\ & \beta_4 AvgIndPerf_{it} + \beta_5 PerfExtremeness_{i,t-1} + \\ & \beta_6 lnAT_{i,t-1} + \beta_7 CEOAge_{jt} + \beta_8 CEOTenure_{jt} + \\ & \beta_9 CEOGender_j + Year_{it} + Industry_{it} + \varepsilon_{it} \end{aligned} \quad (2)$$

$$PerfFluctuation_{it} = \beta_0 + \beta_1 SigSize_j + \beta_2 Slack_{it} + \beta_3 Perf_{i,t-1} + \beta_4 AvgIndPerfFluc_{it} + \beta_5 PerfFluctuation_{i,t-1} + \beta_6 lnAT_{i,t-1} + \beta_7 CEOAge_{jt} + \beta_8 CEOTenure_{jt} + \beta_9 CEOGender_j + Year_{it} + Industry_{it} + \varepsilon_{it} \quad (3)$$

A majority of the variables included in our models are constructed using the methodology developed by Chatterjee and Hambrick (2007). A number of control variables used in Chatterjee and Hambrick (2007) related to the structural power of the CEO have been disregarded in our study. Given our time restraints we were unable to collect this data. Furthermore, since our measure of narcissism is based solely on signature size, we include a number of variables that have been found to impact a person's signature size, similar to in Part 1.

PerfExtremeness$_{it}$ is defined as the absolute difference in performance from the calculated industry average. This is in line with Chatterjee and Hambrick (2007). As we are interested in the magnitude of deviation, we do not consider the directionality of the extremeness. Negative values are therefore converted to positive values.

PerfFluctuation$_{it}$ is defined as the absolute difference in performance between the prior year and the current year. This is in line with Chatterjee and Hambrick (2007). Again, since we are interested in the magnitude of the deviation we do not consider the directionality of the fluctuation.

SigSize$_j$ is the relative CEO area-per-letter signature size as motivated in 4.2. We expect our main independent variable to be positively related to both performance fluctuation and extremeness.

Slack$_{it}$ is defined as the ratio of current assets to current liabilities for the prior year and acts as a control for immediate resource availability. As firms with an abundance of immediate resources available have been shown to have a less fluctuating and extreme performance, we expect this variable to be negatively related to our dependent variables (Chatterjee and Hambrick, 2007).

Perf$_{i,t-1}$ is the prior year performance. *AvgIndPerf$_{it}$* is the average industry performance during the current year. *AvgIndPerfFluc$_{it}$* is the average industry performance fluctuation within the industry. These three variables are included to control for positive or negative trends in performance. In line with Chatterjee and Hambrick (2007), we expect these variables to be positively related to the dependent variables.

PerfExtremeness$_{i,t-1}$ and *PerfFluctuation$_{i,t-1}$* are the values of the dependent variables in the year prior to the CEOs first year in office. These variables are included to control for firm specific tendencies and to also mitigate potential endogeneity concerns, elaborated in 4.6. Thus, these variables are expected to be positively related to the dependent variables.

$lnAT_{i,t-1}$ is the natural logarithm of the prior year total assets. This variable serves as a proxy for firm size. Since large and old firms may face bureaucratic momentum in their operations, we expect this variable to be negatively related to firm performance extremeness and fluctuation (Chatterjee and Hambrick, 2007).

$CEOAge_{jt}$, $CEOTenure_{jt}$ and $CEOGender_j$ are constructed as specified in Part 1.

4.6. Endogeneity concerns

A potential concern in all our models is endogeneity. Rather than being randomly distributed among the sample firms it might be the case that more narcissistic CEOs in their search for grandiosity and attention are drawn to companies with certain characteristics. These firms could be active in high risk environments where failure is more likely. They could also be firms that experience a declining performance and as a consequence hire what they perceive to be strong leaders to perform a turnaround.

In our benchmark studies, endogeneity has been addressed in different ways. Ham and Seybert (2018) include control variables in their model for pre-tenure firm performance as well as industry characteristics. They also perform a variety of different robustness tests such as removing observations pertaining to the first three years of the CEOs tenure as well as collapsing the results from each individual CEO into a single average measurement for all dependent and independent variables. The results found in their study all remain stable throughout these tests, however these tests are not generally considered sufficient to rule out endogeneity. In fact, the authors also regress signature size on a number of firm and industry characteristics in the five years prior to the CEO's first year in office and find a negative association with ROA, indicating that narcissistic CEOs might indeed be attracted to firms with a poor prior performance. Ham and Seybert (2018) conclude that their study cannot completely rule out the issue of endogeneity.

The study by Chatterjee and Hambrick (2007) includes a specific endogeneity control variable, constructed using the coefficients from a regression of the level of narcissism on a number of CEO and firm specific variables. By including this variable, Chatterjee and Hambrick (2007) are able to predict the level of narcissism that would be expected from the CEOs of the respective companies. This is essentially the same technique as that used in so called instrumental variable regressions. ROA at the CEO's entry condition as well as ROA change between the current and the following year were both predictive of a person's narcissism score.

In the first part of our study, we strive to replicate Ham and Seybert (2018) as precisely as possible. We therefore include a pretenure performance variable to mitigate endogeneity. In the second part of the study, we have for the sake of time and simplicity used this approach as well and included control variables for the pre-tenure performance extremeness and fluctuation. We further discuss problems of endogeneity in section 7.1.

4.7. Heteroscedasticity concerns

The standard errors reported from the ordinary least squares (OLS) estimators rely on the key Gauss-Markov MLR. 5 assumption of homoscedasticity, stating that the variance of the error term should, conditional on the independent variables, be constant (Wooldridge, 2013). This means that the error terms should be uncorrelated with our independent variables. If we wrongly assume our sample to be homoscedastic, we risk overestimating the predictive value of our model and in effect underestimating the true size of the standard errors.

In social sciences, this is a problem because heteroscedasticity is usually the norm (Sing, 2018). This is a potential area of concern, which has also been highlighted in previous studies (Chatterjee and Hambrick, 2007). The problem is associated to our experimental design, where our sample includes multiple CEO observations per firm. It seems likely that the standard errors relating to the dependent performance variables are correlated within each firm, since specific firm characteristics are likely to affect the variation in performance.

Ham and Seybert (2018) use a multivariate ordinary least squares (OLS) regression model and cluster the standard errors by firm to correct for this issue. Hambrick uses another model, the Generalized Estimating Equations (GEE) model, that accommodates non-independent observations and also clusters robust standard errors by firm. The GEE approach uses weighted combinations of observations to extract the appropriate amount of data (Hanley et al. 2002). Using this approach, one can obtain consistent standard errors while retaining some efficiency in the parameter estimates. GEE lends itself well to cases where a dependent variable is non-continuous, i.e. measured as a binary variable or in the format of counts. This is the case in one of the sub-studies of Chatterjee and Hambrick (2007), in which they examine variations in the number of times a firm changed their portfolio of business, measured as number of changes in their SIC-code.

For the sake of simplicity, we use a multivariate ordinary least squares (OLS) regression model and cluster the standard errors by firm, in line with Ham and Seybert (2018). We also run the GEE regression for our second part of the study as a robustness test. When using the GEE-model we use robust standard errors and specify a Gaussian (normal) distribution with an identity link function. We use the xtgee routine in Stata 14.2.

5. Empirics

In this section, we outline how we collected the firm data and CEO signatures used in our study. We also specify the sample scope used in the different parts of our study. Last, we present descriptive statistics and Pearson correlations for all variables.

5.1. Firm sample selection

The starting point for our firm sample selection is all securities listed on the Nasdaq Large, Mid and Small cap lists as of February 21, 2019[3]. Since our benchmark studies are performed on large listed firms, we find it suitable to limit our sample to large listed firms in Sweden (Ham and Seybert, 2018; Chatterjee and Hambrick, 2007). Similar to Ham and Seybert (2018), we do not adjust our sample to reflect delistings. We discuss the potential of selection bias in section 7.3. We restrict our sample to CEOs who held their positions during the time period 2005-2017, to make our study reflect a similar number of years as Ham and Seybert (2018). Some of our control variables require data on firm performance prior to the CEO's first year in office. Therefore, we collect financial data for three additional years. The total time period for data collection is therefore 2002-2017. We use the two-digit Global Industry Classification Standard (GICS) code to classify our companies into their respective industry. GICS has the advantage of being annually updated and has also been proven to vary less between different databases compared to the commonly used SIC classification (Hrazdil & Scott, 2013).

This initial scope yields 376 listed securities with a unique International Security Identification Number (ISIN). We make a number of adjustments to this list as explained below and itemised in *Table 1*.

1. We have set out to study Swedish firms, thus we exclude 26 securities with a non-Swedish ISIN.
2. Some firms have multiple ISIN relating to several listed securities, we therefore eliminate 46 ISIN belonging to dual share classes or preferred shares.
3. The dataset is further reduced by 10 ISIN for firms that were listed in 2018. These companies had not yet submitted data for a full fiscal year and were therefore not found in the database. The remaining 297 ISIN all point to individual companies, for which we are able to extract data pertaining to the chosen time period.
4. We exclude 26 firms classified as financial or investment companies and 22 firms classified as belonging to the real estate industry. The basis for this exclusion is specified in section 4.1.

[3] The list was downloaded from nasdaqomxnordic.com.

5. We require financial data from three years prior to CEO's first year in office and that the CEO has been in office for at least two years as motivated in section 4.1. This effectively excludes 6 firms for which data is unavailable five years prior to 2017.

6. We exclude three firms for which an event such as a spin-off or separate listing was deemed to have made the data gathered unreliable.

Following these exclusions, 237 companies with a total of 3384 firm year observations remain.

Table 1: *Firm Selection*

Criteria	Adjustments	# of firms
Delimitation*		376
1. Swedish ISIN	-26	350
2. Single class share and Non-preferred stock	-46	304
3. Data available	-10	294
4. Non-financial, investment or real estate company	-48	246
5. Data available five years prior to 2017	-6	240
6. No spin-off or other peculiarity	-3	237
Total main sample of firms	**-139**	**237**
Firm year observations		*3384*

Table 1 shows adjustments to our delimitation to derive the main sample of firms used in the study.
*Listed on Nasdaq Stockholm as of Feb 21, 2019

5.2. CEO sample selection

Following the initial delimitation, we hand-collect data on the name, age, tenure and gender of CEOs in the selected firms during our time period of interest. This information was collected using the Retriever database and, in cases where the database proved insufficient, supplemented by press releases issued by the companies themselves. The initial mapping of CEOs yielded a sample comprising 647 CEOs, to which list we make a number of further adjustments, detailed below and itemised in *Table 2*.

1. We restrict our sample to only include CEOs who were appointed after 2005, as detailed in 4.1. We exclude 144 CEOs who do not meet this criterion.

2. In order to measure the pretenure performance of the CEO, we require a minimum of three years of financial data to be available before the CEOs first year in office. We therefore exclude 59 CEOs for which such data is lacking.

3. We exclude CEOs with a tenure of less than two years, as motivated in section 4.1. This results in 175 additional exclusions.

4. An additional 31 CEOs were excluded as their signature or other key data was missing.
5. We adjust our exclusions for five CEOs that had multiple tenures at the same company and were thus double counted in previous exclusions.

After applying the above criteria, the dataset consists of 243 CEOs, for whom we proceed to collect signatures. At this stage, the number of firms is reduced to 159 and the total number of firm year observations is reduced to 1322.

Table 2: *CEO selection*

Criteria	Adjustments	# of CEOs
Initial delimitation		647
1. Assumed their position before 2005	-144	503
2. A minimum of three years of past data available	-59	444
3. Tenure of at least two years	-175	269
4. Signature and other key information available	-31	238
5. Add back double exclusions	5	243
Total main sample of CEOs	**-404**	**243**
Firms remaining		*159*
Firm year observations remaining		*1322*

Table 2 shows adjustments to our delimitation to derive the main sample of CEOs used in the study.

5.3. Collection of the CEO signatures

We hand-collect signature size data from CEOs and a peer group of five board members per CEO. These are collected from the assurance page in Swedish annual reports, collected from the Retriever database. Under the assumption that narcissism is a stable personality trait over time, we collect signatures only once for each CEO and peer group member. The signatures are collected from the annual report issued one year after the CEO's appointment. In a few cases where the annual report pertaining to that specific year was lacking signatures, we collect signatures from the annual report two years after appointment. The five board members included in the peer group were chosen based on their signature's proximity to the CEOs signature on the assurance page, where the five closest were selected. The number of collected CEO signature sizes is 243 and the number of collected board member signature sizes is 1215.

In line with previous research, signature size is defined as the area consumed by the signature divided by the number of letters in a person's name. This way, the measure controls for larger signatures being explained by name length (Ham and Seybert, 2018; Mailhos et al., 2016). The area consumed by a signature is measured by drawing a rectangle around the signature, with each side touching the signature's outermost points. The area is calculated by multiplying the rectangles length and width. We choose this

measure as it is the most straightforward in its application. Furthermore, Mailhous et al. (2016) demonstrate in their study that the gain from using more advanced methods of measuring the signature size, such as drawing a flexible line around it's utmost points, is non-existent. We measure each signature size manually using the "measure" function in Adobe Acrobat reader. The average area-per-letter CEO signature size is 0.58 cm^2 and the average area-per-letter signature size in the peer groups consisting of board members is 0.52 cm^2. An example of an annual report assurance page with measured signatures is included in *Appendix A.*

5.4. Financial data collection

The financial data used in our study was collected from the Compustat Global Fundamentals Annual database, provided by Wharton Research Data Services. The closing share price as well as the number of outstanding shares for each company, needed to calculate the market value of equity, were collected from the Compustat Global Securities Daily database, also provided by Wharton Research Data Services. Wharton Research Data Services provides company data for a wide variety of different research variables and is extensively used in previous research. We complement the dataset with data from annual reports for a number of detected missing values of OCF.

5.5. Specifying the final samples

Finally, we create two different samples to be used in the first and the second part of the study, respectively. We exclude all firm year observations for which at least one of the control variables needed in the regression models are missing to mitigate the risk of sample specification bias. This reduces the sample used in the current year specification in the first part of our study to 232 CEOs in 158 firms with a total of 927 firm year observations. In the future year specification in the first part of our study, the sample is reduced to 191 CEOs in 141 firms over 723 firm years. The slight reduction in number of observations in the future year specification is expected as all firms lack data on the performance in the future year period for 2017, and some also for 2016. The sample used in the second part of the study, is through the application of the above method reduced to 149 CEOs in 117 firms, with a total of 569 firm year observations.

5.6. Descriptive statistics

We report descriptive statistics for the two samples in *Table 3*. The descriptive statistics of the variables used in our study are similar to those found in previous research, with the main exception being that the firms in our sample are less profitable on average, measured as both ROA and OCF, and also considerably smaller. For example, the average ROA in our sample is 4.33%, whereas it in Ham and Seybert (2018) is 8.00%. Furthermore, the

average market capitalization in Ham and Seybert (2018) is 85.5 BSEK, whereas it in our sample is 2.4 BSEK. 4.75% of our sample CEOs are women, compared to 2.50% in Ham & Seybert (2018). The average performance extremeness in our data sample is similar to that of Chatterjee and Hambrick (2007). The average performance extremeness in ROA is 10.10% in our sample compared to 10.41% in Chatterjee and Hambrick (2007). The performance fluctuation is in general lower for our sample firms compared to Chatterjee and Hambrick (2007). The fluctuation in ROA is on average 5.3 percentage points in our sample compared to 11.8 percentage points in their study.

5.7. Pearson correlations

We report the correlation coefficients for the variables used in our two models in *Table 4*. We find our key independent variable *SigSize* to be uncorrelated with most of the variables, most importantly to the dependent variables. Only two of the ten dependent variables are significantly correlated to CEO signature size. Furthermore, the correlation with performance extremeness in ROA and OCF has a small coefficient and has the opposite sign to our expectations. These findings are unsettling as they reduce the likelihood of us being able to verify any of the three stated hypotheses. Out of the few variables that have a significant correlation to *SigSize*, *CEOAge* has the highest coefficient at 0.21.

The dependent variables used in Part 1 of our study, ROA and OCF, are strongly correlated with each other, which is logical since they are both accounting-based measures of operational performance. Out of the control variables used in the first part of the study Div_{t-1} has the highest correlation to the dependent variables. Among the dependent variables in the second part of the study, we find strong correlations between ROA and OCF extremeness and fluctuation. TSR extremeness and fluctuation are not as highly correlated with the other dependent variables which is expected since it is a market based and forward-looking measure. Many of the correlation coefficients for the control variables report statistical significance which lends credibility to their inclusion in the model. In part two of the study, *lnAt* is negatively correlated with all dependent variables. This indicates that larger firms have less extreme and fluctuating performance on average.

We also find that many of the independent variables are correlated to each other. This could be an indication of multicollinearity within our samples. We conduct a robustness test for multicollinearity in section 6.3.4.

Table 3: *Descriptive statistics*

VARIABLES	N	mean	sd	min	max
CEO characteristics					
$SigSize_j$	927	1.158	0.662	0.274	3.747
$CEOAge_t$	927	3.928	0.130	3.497	4.174
$CEOTenure_t$	927	1.033	0.718	0	2.485
$CEOGender_j$	927	0.048	0.213	0	1
Part 1 - Narcissism and performance					
ROA_t	927	0.043	0.162	-1.073	0.622
$ROA_{t+1,t+2}$	723	0.073	0.302	-1.839	1.179
OCF_t	927	0.078	0.160	-0.867	0.647
$OCF_{t+1,t+2}$	723	0.154	0.289	-1.508	1.192
$Pos(ROA)_{pretenure}$	927	0.053	0.077	0	0.387
$Neg(ROA)_{pretenure}$	927	0.243	0.429	0	1
$Pos(OCF)_{pretenure}$	927	0.067	0.077	0	0.347
$Neg(OCF)_{pretenure}$	927	0.165	0.371	0	1
$Pos(Acc)_{t-1}$	927	0.031	0.063	0	0.451
$Neg(Acc)_{t-1}$	927	-0.020	0.044	-0.354	0
Div_{t-1}	927	0.038	0.052	0	0.292
$NoDiv_{t-1}$	927	0.302	0.459	0	1
$ATGrowth_{t-1}$	927	1.151	0.525	0.552	5.045
MTB_{t-1}	927	3.651	5.165	0.267	35.040
$lnMVE_{t-1}$	927	7.831	2.072	3.300	12.410
Part 2 - Narcicissm and performance extremeness/fluctuation					
$ROAExtremeness_t$	569	0.101	0.148	0.001	1.209
$OCFExtremeness_t$	569	0.100	0.125	0.001	1.036
$TSRExtremeness_t$	569	0.361	0.359	0.006	3.262
$ROAFluctuation_t$	569	0.053	0.102	0.000	1.187
$OCFFluctuation_t$	569	0.068	0.110	0.000	0.994
$TSRFluctuation_t$	569	0.533	0.642	0.011	5.046
$Slack_{t-1}$	569	1.822	1.408	0.409	13.23
$lnAT_{t-1}$	569	8.101	2.059	3.279	12.43
ROA_{t-1}	569	0.048	0.142	-1.073	0.630
OCF_{t-1}	569	0.087	0.153	-0.883	0.671
TSR_{t-1}	569	0.292	0.621	-0.738	4.339
$AvgIndROA_t$	569	0.017	0.136	-0.720	0.196
$AvgIndOCF_t$	569	0.065	0.082	-0.217	0.199
$AvgIndTSR_t$	569	0.267	0.327	-0.455	1.828
$AvgIndROAFluctuation_t$	569	0.101	0.136	0.017	0.749
$AvgIndOCFFluctuation_t$	569	0.089	0.070	0.024	0.445
$AvgIndTSRFluctuation_t$	569	0.626	0.368	0.194	2.229
$ROAExtremeness_{t-1}$	569	0.105	0.137	0.002	1.279
$OCFExtremeness_{t-1}$	569	0.096	0.110	0.001	0.615
$TSRExtremeness_{t-1}$	569	0.426	0.450	0.011	3.469
$ROAFluctuation_{t-1}$	569	0.085	0.143	0.001	1.184
$OCFFluctuation_{t-1}$	569	0.082	0.120	0.001	0.996
$TSRFluctuation_{t-1}$	569	0.721	0.958	0.009	6.275

Table 3 shows descriptive statistics for all variables used in Part 1 and Part 2 of our study. "N" is the number of observations, "mean" is the mean value of the variable, "sd" is the standard deviation, "min" is the minimum value and "max" is the maximum value. All variables are as previously defined in section 4.4 and 4.5. All variables are Winsorized at the 1st and 99th percentile.

Table 4: *Pearson correlations*

Panel A - *Pearson correlations for the variables used in Part 1 of the study*

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) ROA_t	1.00																		
(2) $ROA_{t+1,t+2}$	0.69*	1.00																	
(3) OCF_t	0.84*	0.64*	1.00																
(4) $OCF_{t+1,t+2}$	0.66*	0.89*	0.67*	1.00															
(5) $SigSize_j$	0.01	0.01	0.02	0.02	1.00														
(6) $Pos(ROA)_{pretenure}$	0.19*	0.15*	0.19*	0.16*	-0.04	1.00													
(7) $Neg(ROA)_{pretenure}$	-0.20*	-0.15*	-0.18*	-0.14*	0.00	-0.16*	1.00												
(8) $Pos(OCF)_{pretenure}$	0.19*	0.15*	0.21*	0.18*	0.01	0.84*	-0.10*	1.00											
(9) $Neg(OCF)_{pretenure}$	-0.20*	-0.15*	-0.21*	-0.15*	-0.07	-0.09*	0.69*	-0.16*	1.00										
(10) $Pos(Acc)_{t-1}$	-0.02	-0.04	-0.04	-0.06*	-0.06	0.06*	0.02	-0.01	0.06*	1.00									
(11) $Neg(Acc)_{t-1}$	0.09*	0.06*	0.13*	0.06*	0.04	-0.00	-0.09*	0.03	-0.13*	0.20*	1.00								
(12) Div_{t-1}	0.38*	0.34*	0.37*	0.35*	0.03	0.35*	-0.19*	0.31*	-0.16*	0.00	0.05*	1.00							
(13) $NoDiv_{t-1}$	-0.31*	-0.26*	-0.31*	-0.26*	-0.03	-0.16*	0.32*	-0.20*	0.31*	0.12*	-0.20*	-0.53*	1.00						
(14) $ATGrowth_{t-1}$	-0.04	-0.09*	-0.05*	-0.07*	-0.06	0.01	-0.02	-0.04	0.02	0.32*	-0.20*	-0.01	0.13*	1.00					
(15) MTB_{t-1}	0.01	-0.05	0.00	-0.05	-0.09*	0.10*	0.01	0.09*	0.04	0.06*	-0.11*	0.18*	0.09*	0.09*	1.00				
(16) $lnMVE_{t-1}$	0.25*	0.19*	0.25*	0.21*	0.13*	0.16*	-0.21*	0.25*	-0.20*	-0.09*	0.14*	0.22*	-0.37*	-0.02	0.17*	1.00			
(17) $CEOAge_t$	0.02	0.03	0.03	0.04	0.21*	-0.11*	0.06*	-0.06*	0.01	-0.03	0.04	0.02	-0.09*	-0.09*	0.00	0.17*	1.00		
(18) $CEOTenure_t$	0.13*	0.10*	0.09*	0.06*	0.03	-0.19*	-0.21*	-0.25*	-0.16*	0.02	0.05	0.12*	-0.17*	-0.00	0.05	0.06*	0.28*	1.00	
(19) $CEOGender_j$	-0.09*	-0.09*	-0.07*	-0.06*	-0.06	0.03	0.03	0.04	0.06*	0.03	-0.02	0.03	0.01	0.04	-0.03	-0.13*	-0.04	-0.07*	1.00

Panel B - *Pearson correlations for the variables used in Part 2 of the study*

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
(1) $ROAExtremeness_t$	1.00																										
(2) $OCFExtremeness_t$	0.78*	1.00																									
(3) $TSRExtremeness_t$	0.24*	0.22*	1.00																								
(4) $ROAFluctuation_t$	0.56*	0.46*	0.24*	1.00																							
(5) $OCFFluctuation_t$	0.46*	0.54*	0.21*	0.70*	1.00																						
(6) $TSRFluctuation_t$	0.22*	0.20*	0.53*	0.31*	0.25*	1.00																					
(7) $SigSize_j$	-0.08*	-0.07*	-0.06	-0.05	-0.05	-0.04	1.00																				
(8) $Slack_{t-1}$	0.19*	0.20*	0.12*	0.24*	0.25*	0.11*	-0.02	1.00																			
(9) ROA_{t-1}	-0.33*	-0.34*	-0.17*	-0.36*	-0.29*	-0.13*	0.01	-0.20*	1.00																		
(10) OCF_{t-1}	-0.26*	-0.28*	-0.14*	-0.30*	-0.25*	-0.12*	0.03	-0.24*	0.84*	1.00																	
(11) TSR_{t-1}	0.15*	0.13*	0.01	0.19*	0.15*	0.49*	-0.02	0.06*	0.04	0.04	1.00																
(12) $AvgIndROA_t$	-0.49*	-0.35*	-0.12*	-0.23*	-0.21*	-0.05	-0.00	-0.27*	0.28*	0.25*	-0.03	1.00															
(13) $AvgIndOCF_t$	-0.42*	-0.37*	-0.09*	-0.22*	-0.21*	-0.05	0.01	-0.26*	0.27*	0.26*	-0.06*	0.84*	1.00														
(14) $AvgIndTSR_t$	0.07*	0.04	0.40*	0.04	0.02	0.19*	-0.02	0.05*	-0.05	-0.03	-0.02	-0.12*	-0.07*	1.00													
(15) $AvgIndROAFluctuation_t$	0.48*	0.35*	0.13*	0.21*	0.20*	0.07*	-0.01	0.24*	-0.24*	-0.22*	0.08*	-0.77*	-0.64*	0.12*	1.00												
(16) $AvgIndOCFFluctuation_t$	0.42*	0.39*	0.16*	0.23*	0.20*	0.10*	-0.00	0.18*	-0.20*	-0.19*	0.05	-0.58*	-0.58*	0.15*	0.70*	1.00											
(17) $AvgIndTSRFluctuation_t$	0.11*	0.11*	0.28*	0.08*	0.07*	0.30*	-0.06	0.07*	-0.06*	-0.05	0.09*	-0.09*	-0.10*	0.53*	0.21*	0.30*	1.00										
(18) $ROAExtremeness_{t-1}$	0.46*	0.45*	0.15*	0.43*	0.43*	0.19*	-0.04	0.21*	-0.27*	-0.21*	0.11*	-0.28*	-0.29*	0.03	0.29*	0.25*	0.06	1.00									
(19) $OCFExtremeness_{t-1}$	0.48*	0.49*	0.12*	0.42*	0.47*	0.17*	-0.00	0.26*	-0.28*	-0.24*	0.10*	-0.30*	-0.29*	0.03	0.29*	0.26*	0.05	0.83*	1.00								
(20) $TSRExtremeness_{t-1}$	0.15*	0.12*	0.14*	0.17*	0.14*	0.28*	-0.04	0.12*	-0.08*	-0.05	0.26*	-0.02	-0.02	0.03	0.08*	0.10*	0.14*	0.42*	0.20*	1.00							
(21) $ROAFluctuation_{t-1}$	0.25*	0.24*	0.18*	0.38*	0.36*	0.21*	-0.06	0.21*	-0.13*	-0.12*	0.13*	-0.12*	-0.12*	0.04	0.13*	0.12*	0.06	0.76*	0.57*	0.53*	1.00						
(22) $OCFFluctuation_{t-1}$	0.28*	0.26*	0.10*	0.36*	0.41*	0.14*	-0.04	0.26*	-0.01	-0.02	0.09*	-0.14*	-0.13*	0.02	0.14*	0.13*	0.04	0.71*	0.76*	0.35*	0.77*	1.00					
(23) $TSRFluctuation_{t-1}$	0.10*	0.03	0.11*	0.16*	0.11*	0.23*	-0.11*	0.03	-0.07*	-0.03	0.15*	0.00	0.01	-0.01	0.03	0.03	0.03	0.35*	0.15*	0.64*	0.47*	0.37*	1.00				
(24) $lnAT_{t-1}$	-0.42*	-0.45*	-0.23*	-0.37*	-0.41*	-0.20*	0.16*	-0.29*	0.28*	0.27*	-0.11*	0.25*	0.28*	-0.09*	-0.23*	-0.26*	-0.14*	-0.37*	-0.38*	-0.16*	-0.29*	-0.30*	-0.13*	1.00			
(25) $CEOAge_t$	-0.07*	-0.10*	-0.09*	-0.10*	-0.09*	-0.07*	0.21*	-0.04	0.01	0.02	-0.04	0.01	0.01	-0.04	-0.04	-0.07*	-0.08*	-0.11*	-0.08*	-0.09*	-0.14*	-0.10*	0.02	0.19*	1.00		
(26) $CEOTenure_t$	-0.05	-0.05	-0.06*	-0.09*	-0.05	-0.06	0.03	0.01	0.15*	0.12*	0.00	0.01	-0.02	-0.03	-0.02	0.01	-0.02	0.05	0.02	0.11*	0.09*	0.04	0.02	0.02	0.28*	1.00	
(27) $CEOGender_j$	0.15*	0.08*	0.03	0.09*	0.09*	0.02	-0.06	0.04	-0.07*	-0.05*	-0.00	-0.05*	-0.04	-0.01	0.05*	0.06*	-0.00	0.00	0.03	-0.04	-0.01	0.05	0.00	-0.15*	-0.04	-0.07*	1.00

Table 4 displays Pearson correlations between all variables used in the tests. All variables are as previously defined in section 4.4 and 4.5.

* indicates significance at the 1% level

6. Results

This section contains results from the performed tests relating to our three hypotheses. In this section, we also conduct a number of robustness tests. None of our models report statistically significant coefficients for the key independent variable *SigSize*.

6.1. Hypothesis 1: Signature size and firm performance

In the first part of our study, we examine the relationship between signature size, as a proxy for narcissism, and firm performance by replicating the methodology of Ham and Seybert (2018). We present our findings in *Table 5*.

Table 5: *CEO signature size and firm performance*

VARIABLES	ROA_t	$ROA_{t+1,t+2}$	OCF_t	$OCF_{t+1,t+2}$
$SigSize_i$	0.010	0.019	0.010	0.011
	(0.008)	(0.020)	(0.010)	(0.021)
$Pos(ROA)_{pretenure}$	0.071	0.246		
	(0.095)	(0.198)		
$Neg(ROA)_{pretenure}$	-0.025	-0.077*		
	(0.020)	(0.044)		
$Pos(OCF)_{pretenure}$			0.230**	0.407*
			(0.102)	(0.220)
$Neg(OCF)_{pretenure}$			-0.007	0.002
			(0.030)	(0.062)
$Pos(Acc)_{t-1}$	-0.320*	-0.634	-0.176	-0.721
	(0.163)	(0.439)	(0.169)	(0.441)
$Neg(Acc)_{t-1}$	0.492***	0.968**	0.437**	0.863*
	(0.172)	(0.478)	(0.211)	(0.485)
Div_{t-1}	0.803***	1.223***	0.775***	1.392***
	(0.125)	(0.286)	(0.151)	(0.308)
$NoDiv_{t-1}$	-0.043***	-0.079*	-0.047***	-0.070*
	(0.015)	(0.040)	(0.016)	(0.039)
$ATGrowth_{t-1}$	0.048**	0.061	0.030	0.059
	(0.021)	(0.049)	(0.019)	(0.045)
MTB_{t-1}	0.000	-0.002	0.000	-0.003
	(0.002)	(0.004)	(0.002)	(0.004)
$lnMVE_{t-1}$	0.005	0.004	0.003	0.003
	(0.003)	(0.007)	(0.003)	(0.007)
$CEOAge_t$	-0.100	-0.168	-0.012	-0.051
	(0.061)	(0.140)	(0.064)	(0.140)
$CEOTenure_t$	0.011	0.015	0.010	0.019
	(0.008)	(0.021)	(0.007)	(0.019)
$CEOGender_i$	0.075**	0.090	0.035	0.036
	(0.029)	(0.075)	(0.033)	(0.074)
Observations	927	723	927	723
Adj. R-squared	0.295	0.268	0.269	0.263

Table 5 reports OLS regression results of the association between CEO narcissism and firm performance. All variables are as previously defined in section 4.4 and 4.5. The model includes industry and year fixed effects, omitted from the table due to space constraints. Robust standard errors are clustered by firm and reported witin parentheses.

***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

The coefficient for our main independent variable *SigSize* remains statistically insignificant in all four tests. The coefficient is furthermore positive, indicating that CEO narcissism, measured through signature size, would be related to a better rather than worse firm performance. We do not find support for our first hypothesis stating that signature size, as an assumed proxy for narcissism, predicts a lower firm performance. A number of control variables report high and statistically significant coefficients. Div_{t-1} is statistically significant at the 1% level in all four test and has a, relative to other variables, large positive coefficient spanning between 0.775 and 1.392. This implies that dividend payments as a share of total assets in the prior year is predictive of higher performance in both the current year as well as future years. Furthermore, the coefficient for $Pos(OCF)_{pretenure}$ is statistically significant whereas $Pos(ROA)_{pretenure}$ is not. The explanatory power of the model, expressed as the adjusted R-squared, averages at 0.274. This is slightly lower than Ham and Seybert (2018) whose model has an average adjusted R-squared of 0.383.

6.2. Hypotheses 2 and 3: Signature size and firm performance extremeness and fluctuation

In the second part of our study, we examine the relationship between signature size and performance extremeness and fluctuation in the three performance measures ROA, OCF and TSR. We present our findings in *Table 6*.

The coefficient for our main independent variable *SigSize* remains statistically insignificant in all six tests. Furthermore, the reported coefficient is small and has a varying positive and negative sign. We do not find support for either our second or third hypothesis, that CEO signature size, as an assumed proxy for narcissism, is positively related to extreme and fluctuating firm performance. A number of control variables report statistically significant coefficients. $lnAT_{t-1}$ has a statistically significant negative coefficient throughout all of the tests, indicating that firm size is negatively related to extreme or fluctuating performance. The explanatory power of the model, expressed as adjusted R-squared, ranges between 0.207 to 0.600. The study by Chatterjee and Hambrick (2007) report an average pseudo R-Squared in their tests of 0.228.

Table 6: *CEO signature size and performance extremeness and fluctuation*

VARIABLES	$ROAExtremeness_t$	$OCFExtremeness_t$	$TSRExtremeness_t$	$ROAFluctuation_t$	$OCFFluctuation_t$	$TSRFluctuation_t$
$SigSize_j$	-0.009	-0.008	-0.005	-0.002	0.009	0.030
	(0.008)	(0.007)	(0.020)	(0.005)	(0.008)	(0.039)
$Slack_{t-1}$	0.005	-0.003	0.003	0.012**	0.008	0.020
	(0.005)	(0.005)	(0.011)	(0.006)	(0.006)	(0.013)
ROA_{t-1}	0.092			-0.138		
	(0.089)			(0.094)		
OCF_{t-1}		-0.009			-0.096	
		(0.081)			(0.097)	
TSR_{t-1}			-0.008			0.601***
			(0.024)			(0.068)
$AvgIndROA_t$	-0.716***					
	(0.110)					
$AvgIndOCF_t$		-0.278				
		(0.175)				
$AvgIndTSR_t$			0.627***			
			(0.089)			
$AvgIndROAFluctuation_t$				-0.032		
				(0.074)		
$AvgIndOCFFluctuation_t$					0.030	
					(0.237)	
$AvgIndTSRFluctuation_t$						0.245**
						(0.118)
$ROAExtremeness_{t-1}$	0.168*					
	(0.098)					
$OCFExtremeness_{t-1}$		0.358***				
		(0.126)				
$TSRExtremeness_{t-1}$			0.017			
			(0.030)			
$ROAFluctuation_{t-1}$				0.060		
				(0.042)		
$OCFFluctuation_{t-1}$					0.050	
					(0.051)	
$TSRFluctuation_{t-1}$						0.018
						(0.030)
$lnAT_{t-1}$	-0.007**	-0.010***	-0.023***	-0.011***	-0.014***	-0.019
	(0.003)	(0.003)	(0.007)	(0.004)	(0.005)	(0.012)
$CEOAge_t$	0.090*	0.067	-0.260*	-0.006	0.001	-0.401
	(0.051)	(0.051)	(0.149)	(0.041)	(0.052)	(0.246)
$CEOTenure_t$	-0.002	-0.014	-0.034	-0.014*	-0.034***	-0.099**
	(0.009)	(0.009)	(0.030)	(0.008)	(0.011)	(0.046)
$CEOGender_j$	0.008	-0.000	-0.006	-0.020	-0.019	0.096
	(0.031)	(0.035)	(0.043)	(0.018)	(0.024)	(0.102)
Observations	569	569	569	569	569	569
Adj. R-squared	0.600	0.450	0.286	0.230	0.207	0.442

Table 6 reports OLS regression results of the relation between CEO narcissism and firm performance extremeness and fluctuations. All variables are as previously defined in section 4.4 and 4.5. The model includes industry and year fixed effects, omitted from the table due to space constraints. Robust standard errors are clustered by firm and reported within parentheses.

***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

6.3. Robustness and other tests

To be able to fully conclude our failure to confirm either of our hypotheses, we conduct a number of robustness tests.

6.3.1. Extreme values and outliers

A flaw of OLS is that outliers have the potential to distort the results. The reason is that OLS minimizes the sum of squared residuals in the model, leading to large residual values having a potentially large influence on coefficients and the explanatory power of the model.

To mitigate this problem, we have used winsorized variables at the 1st and 99th percentile in line with Ham and Seybert (2018). However, the use of winsorized variables, while decreasing the potential bias due to outliers, also decreases the total variation in the model. Therefore, as a test of robustness, we rerun all regressions using non-winsorized values. For this test, we inspect the data to check for extreme values, as an alternative way to mitigate potential distortions due to outliers. In the test relating to the first part of our study, we remove two observations, relating to Starbreeze in 2014 and Cherry AB in 2016. These observations were excluded as their performance in terms of ROA and OCF deviated substantially from the other observations in the sample. In the test relating to the second part of the study, we remove the observations relating to Starbreeze in 2015 and Karo Pharma in 2015, as their prior year performance and performance fluctuations are considerably higher than the remaining sample.

The results from rerunning all regressions using non-winsorized values and excluding outliers remain largely unchanged, in particular with regards to our main independent variable *Sigsize*. We report the results from these additional tests in *Appendix B* and *C*.

6.3.2. Heteroscedasticity

We have reason to believe that the Gauss Markov assumption MLR 5, homoscedasticity, is violated, as outlined in section 4.7. In order to test for heteroscedasticity, we conduct Breusch-Pagan/Cook-Weisberg tests for all main regressions. We find χ^2-statistica averaging 397.57 across our various tests, with a min- and max value of 99.95 and 692.81 respectively, indicating that we can reject the null hypothesis of homoscedasticity at a statistical significance level of less than 1%. In order to mitigate the issue of heteroscedasticity, we use robust standard errors clustered at the firm level in all regressions.

6.3.3. GEE method

As discussed in section 4.7, the study by Chatterjee and Hambrick (2007) uses the GEE method rather than a multivariate ordinary least squares (OLS) regression model. One of the reasons for using this model is to obtain consistent standard errors to mitigate a potential heteroscedasticity problem. As a further robustness test, we rerun all tests in the second part of the study using the GEE method. We use robust standard errors and specify a Gaussian (normal) distribution with an identity link function. The results from rerunning the tests in the second part of the study remain largely unchanged, in particular with regards to *SigSize*. We report the results in *Appendix D*.

6.3.4. Multicollinearity

Multicollinearity is the presence of considerable correlations between two or more independent variables. This can cause the variance of the coefficients to be inflated, leading to unstable and unreliable estimations of the regression coefficients (Allison, 2012). To test if multicollinearity is a problem in our sample, we examine the Variance Inflation Factors (VIF) of our independent variables. While there are no definitive levels of the VIF factors that automatically signal multicollinearity, values greater than 10 are often considered to be problematic (Wooldridge, 2013). We calculate the VIF factors for our independent variables in our samples and find them to range between 1.03 and 2.28. One independent variable, *AvgIndOCF* is an exception with a score of 6.07. The VIF factors for most of the year or industry binary variables have significantly higher levels in our tests, often exceeding 10 and typically ranging between 15 and 60. As the VIF factors for the independent variables of interest are below 10, we can conclude that we do not have a problem with multicollinearity in our sample.

7. Analysis

In the following section, we elaborate on factors that may explain our failure to find support for either of our hypotheses. We discuss potential issues with regards to our two models, the validity of signature size as a proxy for narcissism and potential dataset differences compared to our benchmark studies.

As a preface to this section we should mention that academic studies connected to psychology or personality traits in general are difficult to replicate. In their 2016 study, Aarts et al. tried to replicate the findings of 100 studies published in three prominent psychology journals. The authors only managed to replicate the results in 39% of the cases, illustrating that studies connected to psychology may be extra sensitive to situational factors (Bavel et al, 2016). Coincidental factors other than those mentioned in this section may therefore also play a role in explaining our insignificant results.

7.1. Potential model issues

7.1.1. Problems in our model application

In the first part of our study, we fail to replicate the findings of Ham and Seybert (2018). Even though we throughout the study have aimed to replicate their methodology to its full extent, we have to consider any differences in our application that may impact our results. The main discrepancy between our study and the benchmark study is our relative measure of signature size, which is separately discussed in section 7.2.1. A seemingly minor difference is our choice to use three rather than five years of pretenure performance for constructing our endogeneity control variables. By basing these variables on a shorter and more recent time period, they may control for a larger share of the variance. To rule out the possibility that this has noticeably impacted our findings, we rerun the Part 1 regressions using a control variable based on five years of pretenure performance. Our inferences remain unchanged in this additional test. However, we lose a significant number of observations, dropping from 927 to 584 in the current year specification and from 723 to 425 in the future year specification, illustrating why we chose three years to begin with.

In the second part of our study, we fail to find support for the hypothesis that signature size, as a proxy for narcissism, is predictive of greater performance extremeness and fluctuation. In testing our hypotheses, we have constructed a model inspired by Chatterjee and Hambrick (2007). Since our model is not a clear-cut replica of the one used in their study, it is more difficult to directly compare the results. The model of Chatterjee and Hambrick (2007) includes several control variables for variations in CEO power, which we for time and data unavailability reasons did not include in our study. Differences in

the choice of the proxy for narcissism is however the main divergence and we further discuss our proxy choice in section 7.2.

7.1.2. Control variable choices

In all our collective tests, a majority of the control variables fail to report a statistically significant coefficient. This could be a sign of overspecification bias, meaning having included redundant control variables that may capture too much of the variation.

In our first model, where we replicate Ham and Seybert (2018), the previous year's dividend, Div_{t-1}, was found to be highly related to all four dependent firm performance variables. A majority of the other control variables failed to report a statistically significant coefficient. One explanation could be that Div_{t-1} acts as a proxy for the firms' past performance. This seems intuitive since firms are more likely to pay high dividends during times of good performance. It is also reasonable to assume that last year's performance is one of the single best predictors of the current, and future years performance. However, by controlling for this variation, we might overlook some of the impact that CEOs have on firm performance. For example, a CEO with a long tenure may implement changes over time that gradually affect firm performance. By controlling for last year's performance through the dividend proxy, that variation may be considerably reduced. We rerun the regressions excluding Div_{t-1} and $NoDiv_{t-1}$. *SigSize* remains statistically insignificant, however the $PosPerf_{pretenure}$ becomes statistically significant with a larger coefficient than before.

Another potential issue in the model is overspecification of control variables related to CEO characteristics. The purpose of the control variables gender, age and tenure are to control for factors other than narcissism that may impact signature size. However, we cannot ignore the risk that some of these control variables actually are connected to a person's level of narcissism. Controlling for these personal characteristics may therefore reduce the variation in narcissism supposedly measured by our main independent variable signature size. Gender is one example of a variable that could overspecify the model since previous research shows that narcissism is more common among men than women (Ames et al., 2006). On the other hand, we also know that men in general write larger signatures which is an argument for including the control variable (Mailhous et al., 2016). We rerun the regressions excluding *CEOGender, CEOAge* and $CEOTenure_{jt}$. The results are largely unchanged and *SigSize* remains statistically insignificant.

Another issue may be the use of restricted variables in the first part of our study. One example is pretenure ROA, which is split into a variable for the positive values and a binary variable being equal to one in the cases where ROA has a negative value. Ham and Seybert (2018) do not disclose their motivation behind this method which is why we can only speculate that they might seek to mitigate the risk of negative pretenure ROA reaching extreme levels. However, by doing so, we may run the risk of censored variable

bias where we restrict too much of the negative variation (Wooldridge, 2013). This is likely a less severe issue that probably does not explain why our main independent variable signature size fails to reach statistical significance. Even so, it should be kept in mind when interpreting the results.

7.1.3. Narcissism: Only relevant when taken to its extreme?

Throughout our tests, we have considered the full variation in narcissism and treated signature size as a continuous variable. However, one could make the case that the effect of narcissism, measured as signature size, for CEOs with a signature size around or below average should be negligible for firm performance. The more extreme cases of narcissism where the CEO writes substantially larger signatures would in that case be of greater interest. Even though most behavioural research on narcissism view it as a personality trait present among all people to various extents, some psychologists define narcissism as a disorder (Raskin and Hall, 1979; American Psychiatric Association, 2013). If narcissism is indeed a disorder it would only manifest itself in the extremes. In this case, treating it as a continuous variable might be problematic.

To address this concern, we conduct an additional test where we divide the CEOs into deciles based on their signature sizes. We use the 10th decile, i.e. the group with the largest signatures, and conduct univariate t-tests against the mean values of our key dependent variables. We also rerun all main regression models having replaced *SigSize* with a binary variable equal to one for the extreme group of narcicissts and zero otherwise. We report our results from the univariate t-test in *Table 7.* We report our results from the regression using the binary variable *SigEx* in *Appendix E* and *Appendix F.*

Table 7: *Univariate t-test*

Part 1 - Narcissism and firm performance

Variable	ROA_t	$ROA_{t+1,t+2}$	OCF_t	$OCF_{t+1,t+2}$
Mean 10th decile	0.066***	0.073***	0.103***	0.204***
Orig. sample mean	0.043	0.122	0.078	0.154
t-stat	2.966	3.084	3.268	3.853
P-value	0.004	0.003	0.002	0.000
n	92	76	92	76

Part 2 - Narcicissm and firm performance extremeness/fluctuation

Variable	$ROAExtremeness_t$	$OCFExtremeness_t$	$TSRExtremeness_t$	$ROAFluctuation_t$	$OCFFluctuation_t$	$TSRFluctuation_t$
Mean 10th decile	0.066***	0.066***	0.318	0.031***	0.044***	0.638
Orig. sample mean	0.101	0.100	0.361	0.053	0.068	0.533
t-stat	-4.044	-3.336	-0.952	-4.607	-4.640	0.838
P-value	0.000	0.002	0.346	0.000	0.000	0.406
n	51	51	51	51	51	51

Table 7 reports results from the univariate t-tests comparing mean values in dependent variables of the CEOs whose signature sizes belong to the 10th decile with those of the rest of the sample.

***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

The results from the univariate t-tests indicate, in contrary to our previous lack of statistically significant results, that the performance of the CEOs with the largest signatures may actually differ from that of CEOs with an average sized signature. All of the t-tests report statistically significant coefficients. The direction of the effect on performance, performance extremeness and fluctuation, however, is opposite to the expected and to findings in previous research. These tests suggest that CEOs in the top decile of signature sizes perform better and take less strategic risk (Ham and Seybert, 2018; Chatterjee and Hambrick, 2007). However, when including the same extreme group as a binary variable in our main regression models, the coefficient for signature size again turns out statistically insignificant. These results should be interpreted with caution since we note that the sample size of the extreme group includes only 18 CEOs from 17 firms in the first part and only 11 CEOs in 11 firms in the second part. Our inconclusive results in these additional tests further question the findings in previous research and suggest that our choice of treating signature size as a continuous variable is not the main explanation for our insignificant results.

7.1.4. Endogeneity

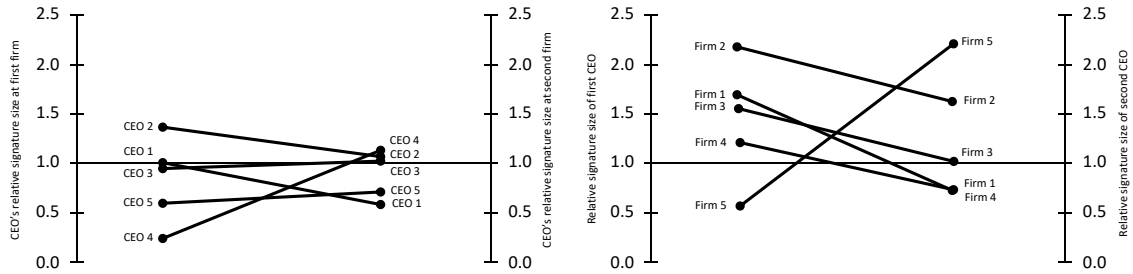
As discussed in section 4.6, the issue of endogeneity refers to the possibility that narcissistic CEOs are drawn to certain firms, rather than being randomly distributed. It could for example be the case that narcissistic CEOs seek high-risk environments, like start-ups, where the risk for failure is greater. In their study, Ham and Seybert (2018) conclude that they are unable to rule out the issue of endogeneity. In this regard, we have followed the methodology of Ham and Seybert (2018) and thus cannot either rule out endogeneity in our study. The potentially reversed causality can, however, probably not explain our insignificant results, since the hypothesis is that the cause of effects in both directions have the same sign.

A simple way to visualize the extent of the endogeneity problem in our study, is to compare the signature sizes of different CEO's hired by the same firm. If some firms consistently hire narcissistic CEOs, the signature sizes of CEOs in those firms should be similar. This would indicate reversed causality where firm characteristics are in fact the predictor of CEO narcissism rather than the opposite. In *Figure 1*, the graph on the right compares the signature size of five randomly selected firms in our sample which had two different CEOs at different points in time. For example, in *Firm 1*, the first CEO had a signature size of 1.73 and the second CEO had a signature size of 0.77. Even though the graph only displays a small number of firms, the signature sizes of CEOs appointed at the same firm clearly differ.

As a point of reference, we have also compared the signature sizes of five individuals who have switched firms and thus reappear as CEOs in different firms in our sample. If signature size, as a proxy for narcissism, is not firm specific but rather a stable personality trait, we would expect the narcissism score of a person to be similar regardless of which

firm they work in. Thus, the left graph shows the signature size of individual CEOs in their first and second firm at different points in time. For example, *CEO 5* had a signature size of 0.58 at the first firm, compared to 0.71 in the second firm. Comparing the left and the right graph, signature sizes seems to be more stable within individuals than within firms. Given the small sample of these tests, the results are not generalizable. It is, however, a hint that firm specific endogeneity may be a limited issue in our study.

Figure 1: *Small scale test of SigSize stability*



7.2. Signature size: a flawed measure?

7.2.1. Relative measure of signature size

The most noteworthy difference in our research design compared to Ham and Seybert (2018) is our choice to measure narcissism using relative signature sizes, rather than absolute signature sizes.

In our study, we construct a relative measure based on the CEO's signature size in relation to those of a peer group consisting of five board members. We have previously argued that the attributes of narcissism are particularly visible in relations with others, meaning that narcissists should be more likely to unconsciously write larger signatures when they are placed next to others (Emmons, 1987). In order for our signature size measure to be a valid substitute we have to assume that narcissism, and thus signature size, among board members is normally distributed. This implies that board members in some firms do not produce systematically different signature sizes compared to board members in other firms. However, in a situation where narcissistic boards more often hire narcissistic CEOs or vice versa our relative signature size measure would be deflated and not reflect the differences in narcissism between more or less narcissistic CEOs. On the other hand, one previous study, examining hiring decisions in M&A situations, shows that narcissistic CEOs in acquiring firm are less likely to hire other narcissistic CEOs from target firms (Aktas et al., 2016). This suggests that narcissists in general may not prefer to hire other narcissists who steal their spotlight. Other factors could exist that affect the distribution of signature size within the board of directors. We assume, however, these factors to be randomly distributed in our sample.

7.2.2. Reliability of signature size as a proxy for narcissism

An additional concern related to signature size is whether or not signature size actually can serve as valid proxy for narcissism. Considering our statistically insignificant results in the first part of our study, one could argue for the interpretation that narcissism may not be indicative of better or worse firm performance but that other effects of narcissism should still be visible in the sample. However, the lack of statistically significant results also in the second part, where strategic risk-taking measured as performance extremeness and fluctuation is tested, indicates that the problem might be more likely to lie within the proxy itself. In the extensive study conducted by Mailhous et al. (2016), narcissism was only found to be related to signature size among females, but not males. Since males constitute a 95% majority of CEOs in our data sample, using signature size as a proxy for narcissism in a study on CEOs is questionable.

In contrast to the claim made by Ham and Seybert (2018), signature size has also been linked to other personality traits such as general self-confidence and has been experimentally proven to change depending on situational factors (Zweigenhaft and Marlowe, 1973; Rudman et al., 2007). For example, a study by Rudman et al. (2007) show that test subjects write larger signatures in response to feeling socially threatened as a way to demonstrate self-esteem as an assumed defence mechanism. In our context, this gives rise to the possibility that CEOs may feel pressured in times of bad performance, thus biasing their signature size, and perceived narcissism, upwards. This is one of many potential situational factors that could unconsciously affect signature sizes, and thus bias both our and Ham and Seybert's (2018) findings.

Furthermore, signature size may be a questionable proxy for narcissism due to its high level of noise. In their two validation tests of signature size and narcissism among students, Ham and Seybert (2018) find a Pearson correlation between NPI and signature size of 0.36 and 0.23, where the latter barely turned out statistically significant ($p = 0.071$). The results suggest that the bulk of the variance in signature sizes is explained by factors other than narcissism, and that these factors could vary considerably between samples. Apart from other personality traits at play we would expect factors such as handwriting style or pure randomness to bias the measure. More generally, we know from previous research that studies aimed at capturing psychological tendencies are highly sensitive to contextual factors which make these types of studies less generalizable and harder to replicate (Bavel et al., 2016). For example, another used unobtrusive measure of narcissism that was recently proven to lack validity in a large sample replication is self-referral in interviews (Raskin and Shaw, 1988; Carey et al., 2015).

7.3. Geographical differences and other data issues

Another concern that needs to be addressed is the possibility that geographical or other differences in the dataset is the true reason behind our inability to replicate the results of

Ham and Seybert (2018). One factor that may impact our results is a difference in the selected time period of study. This should, however, be mitigated by the using year fixed effects. Furthermore, our data sample is approximately a quarter the size of Ham and Seybert's (2018), which increases the risk of extreme values biasing our results. As previously discussed, we have checked the data for extreme values and performed several robustness tests to mitigate this risk. Another potential issue is survivorship bias that could arise as a consequence of us disregarding delisted firms in our sample, thus potentially excluding firms with extreme performance. This method, however, is also applied by Ham and Seybert (2018).

The most noteworthy difference between the samples is that our study has been performed on Swedish data, rather than U.S. data as in Ham and Seybert (2018) and most other studies on CEO narcissism and firm effects (Chatterjee and Hambrick, 2007; Chatterjee and Hambrick, 2011; Whitman, 2009). Companies that are part of the S&P 500 index in the U.S. are on average substantially larger than firms listed on the Swedish Nasdaq Stockholm exchange, which could impact the results of our study. Furthermore, constraints placed on individual CEOs could mitigate the effect of CEO narcissism on firm performance (Hannan and Freeman, 1977). Thus, one possible explanation for our lack of significant results could be that Swedish CEOs in general face more constraints compared to their U.S. counterparts. A previous study finds that the CEO effect on ROA was higher in the U.S. compared to Germany. It seems likely that Germany more closely resembles Sweden in terms of institutional factors such as culture, legal system and income profile, thus indicating that the CEO effect would be smaller also within a Swedish sample (Crossland and Hambrick, 2007; Guisinger, 2001).

Other evidence also seems to indicate that individual CEOs in the U.S. may have a larger impact on their firms compared to Swedish CEOs. A majority of CEOs in the U.S. are not just CEOs but also chairmen of the board of directors. This gives them more power and also influence over board member selection (Dalton and Kesner, 1987; Shivdasani and Yermack, 1999). Additionally, shareholders in Sweden are more concentrated compared to the U.S., which could lead to the power of a Swedish CEO being more constrained by powerful boards and ownership spheres (La porta et al., 1999). Thus, we cannot rule out that CEOs in Sweden have less influence on firm performance in general, which could explain why one personality trait among CEOs, such as narcissism, does not have a significant impact on financial outcomes. There could also be cultural differences at play which affect the results. Previously we have discussed that narcissists more often emerge as leaders due to their display of authority (Nevicka et al., 2011). However, there may be cultural discrepancies in perceptions of what defines a good leader in Sweden compared to in the U.S. In Sweden, the ability to collaborate with others and refraining from being self-absorbed is more important for managers to succeed compared to other countries (Holmberg and Åkerlund, 2006). Thus, narcissists may less often be hired as CEOs in Sweden, reducing our ability to find a significant link in our study.

8. Conclusion, limitations and future research

This study examines the link between CEO signature size and firm performance. The starting point for the study is an article published in one of the top accounting journals that finds CEOs with larger signature sizes, as an assumed proxy for narcissism, to perform worse in terms of operational outcome measures (Ham and Seybert, 2018). To test the validity and generalizability of their findings, this study replicates as a first step the methodology of the mentioned study on a Swedish dataset. To take the analysis further, this thesis also examines whether signature size is predictive of extreme and fluctuating firm performance, which are other expected consequences of strategic risk raking among narcissistic CEOs (Chatterjee and Hambrick, 2007). Throughout the study we fail to find a statistically significant relationship between signature size and firm performance. Thus, this study lends no support to the notion that signature size, as a proxy for narcissism, can predict operational firm performance, performance extremeness or fluctuation.

One possible reason for the lack of predictive value in our key independent variable signature size is a flawed validity of signature size as a proxy for narcissism. Another reason may be that CEO personality traits have less influence on firm outcomes in Sweden compared to the U.S. due to structural power constraints and more powerful ownership spheres. There may also be other explanations, including situational factors or sheer randomness, that have previously been proven to make research connected to psychology hard to replicate.

We acknowledge that this thesis has several limitations. Our model has focused on the relationship between CEO signature size and selected operational performance measures. However, there are various ways to measure operational performance and our choice of metrics limit the generalizability of our study. As discussed previously, we cannot either confirm nor dismiss that CEO narcissism has an effect on firm performance due to a lack of validation in signature size as a proxy for narcissism. Our novel method to measure signature size on a relative rather than absolute basis limits the comparability of our findings. There is furthermore reason to suspect that CEOs in different firms and industries face different constraints in their ability to influence firm performance. The inability to control for these factors in our study could bias our results. Last, the issue of endogeneity is a potential problem in both our study as in previous research, even though we have made efforts to mitigate the issue it cannot be completely ruled out.

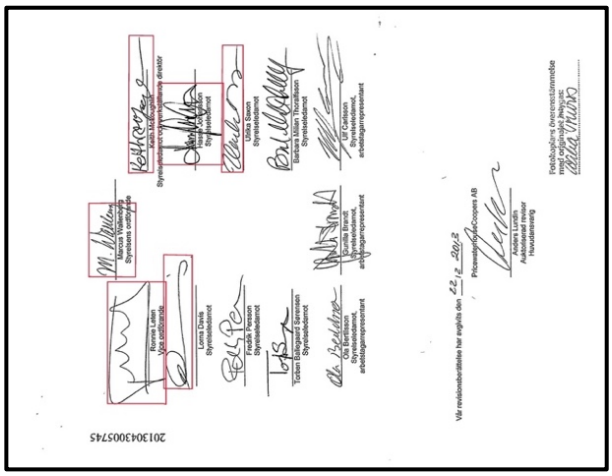
The research field of narcissism among CEOs and its effect on firm performance is still in an exploratory stage, leaving many venues for future research. First, there is a need for further studies on the validity of signature size as a proxy for narcissism. Future research should aim to analyse and compare all unobtrusive measures of narcissism to establish in what way narcissism among CEOs best can be captured. Second, the implications of CEO

narcissism on firm performance should be further researched. It is still not established if narcissistic CEOs actually perform worse and to what extent their performance is altered by circumstantial factors such as type of firm or industry. In previous research there are signs that narcissism could have a significant impact on CEO leadership style, decision-making and risk appetite. These assumptions however all have to be further validated and researched to shed light on how narcissism is manifested in a CEO context. The implications of CEO narcissism on related issues might also be of interest. For example, one could relate accounting quality to CEO narcissism by testing if firms with a more narcissistic management also have to pay higher audit fees. Third, research on how psychological factors, such as distinct personality traits, among top management influences firms in the short and long run is still incomplete. Even though this study, with its limitations, fails to find a link between narcissism and short-term performance, the long-term effects of CEO personality on a firm's culture, structure and strategy have yet to be determined. This would arguably be an interesting, however difficult, venue for further research.

9. Appendix

Appendix A

Example of signature size measurement from the assurance page in Electrolux Annual Report 2012, page 68.



Appendix B

Robustness test – Test of H1 using non-winsorized values and excluding outliers

VARIABLES	ROA_t	$ROA_{t+1,t+2}$	OCF_t	$OCF_{t+1,t+2}$
$SigSize_i$	0.009	0.019	0.008	0.010
	(0.008)	(0.020)	(0.010)	(0.020)
$Pos(ROA)_{bretenure}$	0.030	0.208		
	(0.085)	(0.186)		
$Neg(ROA)_{bretenure}$	-0.035*	-0.082*		
	(0.019)	(0.044)		
$Pos(OCF)_{bretenure}$			0.257***	0.543**
			(0.089)	(0.236)
$Neg(OCF)_{bretenure}$			-0.018	0.002
			(0.030)	(0.063)
$Pos(Acc)_{t-1}$	-0.125	-0.373	0.004	-0.435
	(0.191)	(0.367)	(0.188)	(0.354)
$Neg(Acc)_{t-1}$	0.407**	0.863*	0.347	0.717
	(0.192)	(0.493)	(0.213)	(0.445)
Div_{t-1}	0.759***	1.251***	0.648***	1.205***
	(0.098)	(0.277)	(0.121)	(0.246)
$NoDiv_{t-1}$	-0.048***	-0.083**	-0.054***	-0.080**
	(0.017)	(0.042)	(0.018)	(0.039)
$ATGrowth_{t-1}$	0.036**	0.048	0.019	0.044
	(0.015)	(0.040)	(0.013)	(0.033)
MTB_{t-1}	-0.000	-0.002	-0.000	-0.002
	(0.000)	(0.002)	(0.000)	(0.002)
$lnMVE_{t-1}$	0.006*	0.005	0.004	0.003
	(0.003)	(0.007)	(0.003)	(0.007)
$CEOAge_t$	-0.097	-0.182	-0.009	-0.060
	(0.064)	(0.155)	(0.068)	(0.151)
$CEOTenure_t$	0.014*	0.020	0.016**	0.027
	(0.009)	(0.021)	(0.008)	(0.018)
$CEOGender_i$	0.082***	0.097	0.047	0.052
	(0.029)	(0.076)	(0.035)	(0.075)
Observations	925	721	925	721
Adj. R-squared	0.284	0.268	0.267	0.271

Appendix B reports OLS regression results of the association between CEO narcissism and firm performance, using non-winsorized values and having excluded outliers. All variables are as previously defined in section 4.4 and 4.5. The model includes industry and year fixed effects, omitted from the table due to space constraints. Robust standard errors are clustered by firm and reported witin parentheses.

***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

Appendix C.

Robustness test – Test of H2 using non-winsorized values and excluding outliers

VARIABLES	$ROAExtremeness_t$	$OCFExtremeness_t$	$TSRExtremeness_t$	$ROAFluctuation_t$	$OCFFluctuation_t$	$TSRFluctuation_t$
$SigSize_j$	-0.008	-0.007	-0.006	0.000	0.011	0.031
	(0.007)	(0.007)	(0.021)	(0.004)	(0.007)	(0.039)
$Slack_{t-1}$	0.006	-0.002	0.001	0.013**	0.008	0.020
	(0.005)	(0.005)	(0.010)	(0.005)	(0.006)	(0.013)
ROA_{t-1}	0.110			-0.198***		
	(0.086)			(0.041)		
OCF_{t-1}		0.008			-0.141	
		(0.077)			(0.097)	
TSR_{t-1}			-0.008			0.610***
			(0.023)			(0.073)
$AvgIndROA_t$	-0.706***					
	(0.107)					
$AvgIndOCF_t$		-0.103				
		(0.177)				
$AvgIndTSR_t$			0.611***			
			(0.076)			
$AvgIndROAFluctuation_t$				0.015		
				(0.062)		
$AvgIndOCFFluctuation_t$					0.144	
					(0.211)	
$AvgIndTSRFluctuation_t$						0.252*
						(0.130)
$ROAExtremeness_{t-1}$	0.150					
	(0.094)					
$OCFExtremeness_{t-1}$		0.337***				
		(0.125)				
$TSRExtremeness_{t-1}$			0.030			
			(0.029)			
$ROAFluctuation_{t-1}$				0.039**		
				(0.018)		
$OCFFluctuation_{t-1}$					0.056	
					(0.051)	
$TSRFluctuation_{t-1}$						0.021
						(0.030)
$lnAT_{t-1}$	-0.006*	-0.009***	-0.021***	-0.006***	-0.010**	-0.018
	(0.003)	(0.003)	(0.006)	(0.001)	(0.004)	(0.012)
$CEOAge_t$	0.066	0.051	-0.204	-0.014	0.002	-0.371
	(0.043)	(0.047)	(0.146)	(0.028)	(0.047)	(0.246)
$CEOTenure_t$	-0.002	-0.016*	-0.035	-0.008	-0.031***	-0.099**
	(0.010)	(0.009)	(0.030)	(0.007)	(0.010)	(0.047)
$CEOGender_j$	0.009	-0.002	0.005	-0.006	-0.012	0.103
	(0.030)	(0.034)	(0.040)	(0.015)	(0.023)	(0.096)
Observations	569	569	569	569	569	569
Adj. R-squared	0.622	0.424	0.293	0.374	0.231	0.455

Appendix C reports OLS regression results of the relation between CEO narcissism and firm performance extremeness and fluctuations, using non-winsorised values and having excluded outliers. All variables are as previously defined in section 4.4 and 4.5. The model includes industry and year fixed effects, omitted from the table due to space constraints. Robust standard errors are clustered by firm and reported within parentheses.

***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

Appendix D.

Robustness test – Test of H2 using the GEE method

VARIABLES	$ROAExtremeness_t$	$OCFExtremeness_t$	$TSRExtremeness_t$	$ROAFluctuation_t$	$OCFFluctuation_t$	$TSRFluctuation_t$
$SigSize_j$	-0.008	-0.007	-0.006	0.000	0.011	0.031
	(0.007)	(0.007)	(0.021)	(0.004)	(0.007)	(0.039)
$Slack_{t-1}$	0.006	-0.002	0.001	0.013**	0.008	0.020
	(0.005)	(0.005)	(0.010)	(0.005)	(0.006)	(0.013)
ROA_{t-1}	0.110			-0.198***		
	(0.086)			(0.041)		
OCF_{t-1}		-0.013			-0.141*	
		(0.083)			(0.084)	
TSR_{t-1}			-0.015			0.576***
			(0.024)			(0.068)
$AvgIndROA_t$	-0.754***					
	(0.102)					
$AvgIndOCF_t$		-0.221				
		(0.178)				
$AvgIndTSR_t$			0.648***			
			(0.085)			
$AvgIndROAFluctuation_t$				0.019		
				(0.061)		
$AvgIndOCFFluctuation_t$					0.107	
					(0.171)	
$AvgIndTSRFluctuation_t$						0.277**
						(0.118)
$ROAExtremeness_{t-1}$	0.143					
	(0.096)					
$OCFExtremeness_{t-1}$		0.283**				
		(0.128)				
$TSRExtremeness_{t-1}$			0.032			
			(0.030)			
$ROAFluctuation_{t-1}$				0.042**		
				(0.018)		
$OCFFluctuation_{t-1}$					0.049	
					(0.056)	
$TSRFluctuation_{t-1}$						0.023
						(0.029)
$lnAT_{t-1}$	-0.006**	-0.012***	-0.020***	-0.006***	-0.012**	-0.018
	(0.003)	(0.003)	(0.006)	(0.002)	(0.005)	(0.012)
$CEOAge_t$	0.054	0.044	-0.217	-0.015	0.006	-0.315
	(0.042)	(0.046)	(0.142)	(0.029)	(0.044)	(0.241)
$CEOTenure_t$	0.000	-0.016*	-0.032	-0.008	-0.023***	-0.094*
	(0.010)	(0.009)	(0.030)	(0.006)	(0.009)	(0.048)
$CEOGender_j$	0.015	-0.007	0.008	-0.005	-0.015	0.101
	(0.029)	(0.032)	(0.038)	(0.015)	(0.022)	(0.096)
Observations	567	567	567	567	567	567
Number of GCK	117	117	117	117	117	117

Appendix D reports results of the relation between CEO narcissism and firm performance extremeness and fluctuations, using the GEE routine. All variables are as previously defined in section 4.4 and 4.5. The model includes industry and year fixed effects, omitted from the table due to space constraints. Robust standard errors are used and reported within parentheses.

***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

Appendix E.

Test of H1 using the binary variable SigEx

VARIABLES	ROA_t	$ROA_{t+1,t+2}$	OCF_t	$OCF_{t+1,t+2}$
$SigEx_j$	0.007	0.011	0.009	0.007
	(0.012)	(0.026)	(0.014)	(0.027)
$Pos(ROA)_{pretenure}$	0.074	0.257		
	(0.096)	(0.204)		
$Neg(ROA)_{pretenure}$	-0.025	-0.074*		
	(0.020)	(0.044)		
$Pos(OCF)_{pretenure}$			0.232**	0.410*
			(0.104)	(0.223)
$Neg(OCF)_{pretenure}$			-0.007	0.004
			(0.030)	(0.063)
$Pos(Acc)_{t-1}$	-0.322*	-0.639	-0.177	-0.724
	(0.164)	(0.444)	(0.171)	(0.444)
$Neg(Acc)_{t-1}$	0.494***	0.976**	0.438**	0.867*
	(0.174)	(0.485)	(0.214)	(0.490)
Div_{t-1}	0.816***	1.253***	0.789***	1.411***
	(0.126)	(0.285)	(0.154)	(0.314)
$NoDiv_{t-1}$	-0.042***	-0.076*	-0.046***	-0.068*
	(0.016)	(0.039)	(0.017)	(0.038)
$ATGrowth_{t-1}$	0.048**	0.061	0.029	0.059
	(0.021)	(0.049)	(0.019)	(0.045)
MTB_{t-1}	0.000	-0.002	0.000	-0.003
	(0.002)	(0.003)	(0.002)	(0.004)
$lnMVE_{t-1}$	0.005	0.004	0.004	0.003
	(0.003)	(0.007)	(0.003)	(0.007)
$CEOAge_t$	-0.091	-0.147	-0.003	-0.040
	(0.060)	(0.131)	(0.062)	(0.133)
$CEOTenure_t$	0.011	0.016	0.010	0.019
	(0.008)	(0.021)	(0.008)	(0.019)
$CEOGender_j$	0.073**	0.087	0.033	0.034
	(0.028)	(0.074)	(0.033)	(0.074)
Observations	927	723	927	723
Adj. R-squared	0.319	0.298	0.294	0.294

Appendix E reports OLS regression results of the association between CEO narcissism and firm performance, using a binary variable equal to one for the top decile of signature sizes. All other variables are as previously defined in section 4.4 and 4.5. The model includes industry and year fixed effects, omitted from the table due to space constraints. Robust standard errors are clustered by firm and reported witin parentheses.

***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

Appendix F.

Test of H2 using the binary variable SigEx

VARIABLES	$ROAExtremeness_t$	$OCFExtremeness_t$	$TSRExtremeness_t$	$ROAFluctuation_t$	$OCFFluctuation_t$	$TSRFluctuation_t$
$SigEx_j$	-0.009	-0.003	-0.010	-0.009	-0.003	0.095
	(0.016)	(0.016)	(0.030)	(0.012)	(0.013)	(0.087)
$Slack_{t-1}$	0.004	-0.004	0.002	0.012**	0.009	0.023
	(0.005)	(0.005)	(0.011)	(0.006)	(0.006)	(0.016)
ROA_{t-1}	0.082			-0.139		
	(0.091)			(0.096)		
OCF_{t-1}		-0.012			-0.097	
		(0.081)			(0.097)	
TSR_{t-1}			-0.025			0.465***
			(0.027)			(0.065)
$AvgIndROA_t$	-0.742***					
	(0.117)					
$AvgIndOCF_t$		-0.192				
		(0.178)				
$AvgIndTSR_t$			0.502***			
			(0.054)			
$AvgIndROAFluctuation_t$				-0.013		
				(0.071)		
$AvgIndOCFFluctuation_t$					0.148	
					(0.222)	
$AvgIndTSRFluctuation_t$						0.476***
						(0.137)
$ROAExtremeness_{t-1}$	0.167					
	(0.101)					
$OCFExtremeness_{t-1}$		0.358***				
		(0.131)				
$TSRExtremeness_{t-1}$			0.020			
			(0.034)			
$ROAFluctuation_{t-1}$				0.059		
				(0.043)		
$OCFFluctuation_{t-1}$					0.049	
					(0.051)	
$TSRFluctuation_{t-1}$						0.019
						(0.030)
$lnAT_{t-1}$	-0.007**	-0.009***	-0.024***	-0.011***	-0.014***	-0.021
	(0.003)	(0.003)	(0.007)	(0.004)	(0.005)	(0.013)
$CEOAge_t$	0.081	0.053	-0.269*	-0.004	0.014	-0.377
	(0.051)	(0.051)	(0.138)	(0.037)	(0.049)	(0.237)
$CEOTenure_t$	0.013	-0.011	-0.039	-0.013	-0.018**	-0.186***
	(0.011)	(0.009)	(0.026)	(0.008)	(0.008)	(0.044)
$CEOGender_j$	0.011	0.000	-0.004	-0.017	-0.019	0.091
	(0.031)	(0.036)	(0.044)	(0.018)	(0.025)	(0.127)
Observations	569	569	569	569	569	569
Adj. R-squared	0.604	0.456	0.302	0.259	0.232	0.382

Appendix F reports OLS regression results of the relation between CEO narcissism and firm performance extremeness and fluctuations, using non-winzorised values and having excluded outliers. All variables are as previously defined in section 4.4 and 4.5. The model includes industry and year fixed effects, omitted from the table due to space constraints. Robust standard errors are clustered by firm and reported witin parentheses.

***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

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