Goodwill or "No-will": Hubris in the tone at the top

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ABSTRACT

In this study, we examine the effect of hubris in the "tone at the top" on goodwill accounting, specifically the proportion of the purchase price allocated to goodwill following a business combination, and subsequent decisions to write down goodwill. Using a sample of CEO letters to shareholders from firms listed on the Stockholm Stock Exchange, we carry out textual analysis of CEO letters to identify hubristic language markers. Regression analyses show that hubristic tone is positively and significantly associated with the purchase price allocation to goodwill. Furthermore, we predict that hubristic managers are more likely to overestimate future cash inflows related to goodwill and are less likely to perceive the need for a potential write-down. Consistent with this prediction, we find that hubristic tone in the CEO letters is associated with less timely goodwill write-downs. This study contributes to the literature on goodwill accounting, the role of CEO attributes on corporate decision making, and to research on CEO-speak, by providing evidence that a hubristic tone at the top can explain strategic choices by management and accounting outcomes.

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Introduction

Spurious accounting Goodwill—and there is plenty of it around—is another matter. When an over excited management purchases a business at a silly price, the same accounting niceties described earlier are observed. Because it can't go anywhere else, the silliness ends up in the Goodwill account. Considering the lack of management discipline that created the account, under such circumstances it might better be labeled 'No-Will'. – Warren Buffett in his letter to the shareholders of Berkshire Hathaway Inc., 1983.

Following a business combination, management uses its discretion when recognizing the initial goodwill amount as well as any depletion in the value of the goodwill in future periods. There has been a growing concern among standard setters, practitioners and academics over the large proportion of the purchase price allocated to goodwill as well as overstated goodwill balances in subsequent periods (Linsmeier and Wheeler, 2020). In explaining the allocation and subsequent write-down decisions, prior research has focused on economic determinants (Hayn and Hughes, 2006; Li et al., 2011) and managerial incentives (AbuGhazaleh et al., 2011; Detzen and Zülch, 2012; Ramanna and Watts, 2012; Shalev et al., 2013; Majid, 2015). According to agency theory, a misalignment of interests between managers and investors can explain opportunistic corporate decisions and misreporting. By contrast, upper echelons theory highlights the impact of managers' personalities,

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cognitive values, and experiences on their choices and organizational outcomes (Hambrick and Mason, 1984; Hambrick, 2007). The effect of managerial characteristics is especially pronounced when managers are allowed to exercise discretion (Finkelstein and Hambrick, 1990; Li and Tang, 2010). The purpose of this paper is to investigate the effect of hubristic leadership on the initial and subsequent valuation of goodwill, an area over which management has considerable influence.

The "tone at the top" in CEOs' letters to shareholders can provide cues on managers' personalities and leadership styles (Amernic et al., 2010). Specifically, hubristic tendencies should be reflected in a CEO's language through the use of terms that, for example, connote accomplishment and praise, less ambivalence and passivity, as well as more aggression and motion. We identify hubris in the language by thematically grouping the criteria for hubris syndrome proposed by Owen and Davidson (2009) and linking them to relevant dictionaries in the DICTION software. According to Owen and Davidson (2009), hubristic leaders are prone to have restless and risky behavior, a narcissistic desire to appear in a good light, power-seeking tendencies, excessive confidence, and a disregard for adverse outcomes.

In a corporate setting, the hubris hypothesis (Roll, 1986) posits that hubris leads to valuation errors in the context of mergers and acquisitions (M&A). Specifically, hubristic CEOs—in overestimating their own abilities and the probability of M&A-related synergies—are more likely to bid above the market price, resulting in overpayment. We argue that goodwill, representing the excess value over the fair value of the identifiable assets, is incrementally useful in testing the hubris hypothesis, as it can indicate overpayment. When an overly excited hubristic management pays a large premium for the target firm, we should see a greater portion of the purchase price allocated to goodwill upon initial recognition, since the excess price cannot be justified or traced back to any underlying economic substance.

In case overpayment is not immediately detected, it should be addressed through subsequent impairment tests and write-downs.[1] While larger average impairment losses should follow low-quality or unjustified goodwill, we predict that a hubristic management's inability to anticipate the negative outcomes of their actions, as well as their reluctance to accept the possibility of any valuation mistakes, result in delayed goodwill write-downs. We execute a number of tests to investigate the conjecture that hubristic leadership leads to overvaluation of goodwill in current and subsequent periods. First, we test the association between hubristic tone and the initial value of goodwill. Second, to test for delays in recognizing goodwill impairment losses, we document the pattern of goodwill write-downs over a four-year period relative to the year in which hubristic tone is measured. We also test whether the probability of a write-down in CEO turnover years is dependent on the level of hubristic tone in the departing CEO's letter to shareholders.

Our results show that hubristic tone significantly explains the portion of the total purchase price allocated to goodwill, as well as the percentage of total acquired intangible assets that constitute goodwill. Hubristic tone is also associated with larger average write-downs after controlling for the amount of recorded goodwill, indicating lower-quality goodwill. However, our findings suggest that the write-downs are delayed, as a more hubristic tone is associated with an increasing probability of recognizing a goodwill impairment over the four-year measurement interval. Furthermore, we find that the probability of observing a write-down in the year of a CEO turnover is significantly higher when the previous CEO's language was more hubristic, also indicating delayed write-downs by the departing CEO. In additional analyses, we find that the size of the allocated goodwill accentuates the association between hubristic tone and delays in future goodwill write-downs. We attribute this to hubristic individuals' tendencies not to acknowledge negative outcomes, especially when the stakes are higher.

In using a measure of hubristic tone at the top, we acknowledge that our focus is on hubristic *tendencies* rather than on identifying hubris *syndrome* in CEOs. Such hubristic tendencies may reflect on closely related constructs, such as narcissism—a prerequisite for hubris that constitutes half of the clinical criteria for hubris syndrome (Owen and Davidson, 2009). As the two concepts strongly overlap, hubristic language markers used in this study may also reflect on narcissistic leadership. While narcissism (an *innate* personality disorder) and hubris (an *acquired* condition) are distinct from each other and have different implications for the leadership (Asad and Sadler-Smith, 2020), an at-a-distance-assessment technique does not permit a differentiation between these concepts (see, also, Chatterjee and Hambrick, 2007).[2]

To explore our measure, we look at previously used proxies for hubris and narcissism (see Chatterjee and Hambrick, 2007, Chatterjee and Hambrick, 2011; Rijsenbilt and Commandeur, 2013; Olsen et al., 2014) and find a significant relationship between hubristic tone and the size of the CEO photograph in the CEO letter, CEO excess compensation, and M&A intensity. In additional tests, we note that several dictionaries that make up the hubris tone measure typify the language used by CEOs labelled as hubristic by other sources. Furthermore, we investigate the association between hubristic tone and CEO tenure and find that, consistent with the idea that hubris is triggered by ascension to power (Finkelstein and Hambrick, 1990; Owen and Davidson, 2009), individuals who have recently taken up the position as CEO as well as those who have been in that position for an above-average period of time (five years in our sample), exhibit a more hubristic tone. In observing that the tone measure is not stable over time but forms a systematic pattern, we provide some support to the notion that our tone measure reflects on hubris and not just narcissism (a static trait). Finally, we look at the individual dictionaries that make up the aggregate tone measure and find that the majority of dictionaries carry the expected sign. They are also statistically significant with respect to the first, but not the second, hypothesis.

Our results are based on a sample of 909 CEO letters (published between 2005 and 2011) from firms listed on the Stockholm Stock Exchange. We have opted for a sample of Swedish firms in order to reduce self-selection bias, as Sweden is

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[1] This was pointed out in the Basis for Conclusions on IFRS 3 *Business Combinations* (BC382) issued by the International Accounting Standard Board.

[2] Chatterjee and Hambrick (2007) point out that because narcissism "stirs" hubris, the hubris hypothesis may be accompanied by a "narcissism hypothesis".

unique in that it is standard practice to include a CEO letter to shareholders in the annual report. This stands in contrast to, for example, the U.S., where the focus is on the Form 10-K (which does not contain a CEO letter), and the U.K., where instead it is more common to have the Chairman's statement. Arguably, continental European firms are even less likely than UK and US peers to publish a CEO letter due to their non-capital market-based tradition (see Andreia Costa et al., 2013).

Our study is timely given the International Accounting Standards Board's (IASB) current work plan relating to goodwill and impairment. Following the post-implementation review of *IFRS 3 Business Combinations* and the resulting Discussion Paper *Business Combinations—Disclosures, Goodwill and Impairment* (IASB, 2020), the IASB continues to evaluate the relative merits of annual impairment tests versus amortization of goodwill. This paper also offers a number of contributions to the literature. First, this paper extends the literature on goodwill accounting (Hayn and Hughes, 2006; Ding et al., 2008; Masters-Stout et al., 2008; Jarva, 2009; AbuGhazaleh et al., 2011; Li et al., 2011; Detzen and Zülch, 2012; Ramanna and Watts, 2012; Shalev et al., 2013; Darrough et al. 2014; Zhang and Zhang, 2017; Linsmeier and Wheeler, 2020), by providing evidence that hubristic leadership determines the amount of recognized goodwill and future goodwill impairment losses. We highlight the fact that while overpayment must end up in goodwill, not all goodwill is overpayment. Given concerns about the status of goodwill accounting, we believe it is important to recognize the influence of management's behavioral biases on goodwill-related choices. Second, we contribute to studies that have examined the hubris hypothesis. Few studies have explicitly investigated overpayment, which can be explained by the fact that this concept is difficult to capture (see, for example, the discussion on overbidding by de Bodt et al, 2014). We argue that goodwill, being a residual that captures the excess payment over the fair value of the identifiable assets, can be a direct and therefore useful measure of overpayment in testing the hubris hypothesis. Third, in studying the tone at the top in CEO letters, we contribute to research on CEO-speak and CEO attributes (Li and Tang, 2010; Amernic and Craig, 2011; Craig and Brennan, 2012; Ahmed and Duellman, 2013; Brennan and Conroy, 2013; Patelli and Pedrini, 2015; Buchholz et al. 2018). Whereas several studies have looked at CEO overconfidence and narcissism using indirect measures (such as a CEO's attitude toward exercising stock options, see Malmendier and Tate, 2005) or by carrying out textual analysis of *other people's* writing about the CEO (such as via press portrayals of CEOs, see Brown and Sarma, 2007; Malmendier and Tate, 2008), we focus on the CEOs' own communication. In showing that managers—by setting the tone at the top—can affect the norms, values, and, ultimately, decision-making of firms, we believe that observing the leadership's discourse should be of interest to auditors, boards of directors, and shareholders.

Literature review

Assessing leadership style via the "tone at the top"

Managers' personalities, cognition and motives influence their communication style, language and diction (Winter, 2005), and ultimately the corporate narrative and discourse (see, e.g. Resick, et al., 2009; Merkl-Davies and Brennan, 2011; Amernic and Craig, 2013). By analysing the tone at the top, i.e. the language used by upper management, prior research has established a link between linguistic features and, *inter alia,* performance, accounting phenomena and employee ethics (see, e.g., Amernic and Craig, 2013; Patelli and Pedrini, 2015; Veenstra, 2020). While a leader's personality cannot be definitely determined using only cues from written and oral communication, the validity of such at-a-distance techniques for assessing psychological traits of political and business leaders has been stressed by scholars (Winter, 2005; Schafer, 2000).

Amernic and Craig (2007) argue that understanding CEO-speak (i.e., the public language of CEOs) matters and is useful for governance, management control and measures of performance. CEO letters, apart from providing incremental information and reflecting the corporate/managerial discourse, can be used to detect socio-psychological or cognitive-psychological attributes of an executive (Merkl-Davies and Brennan, 2011).[3] Patelli and Pedrini (2015) predict and find that aggressive financial reporting is associated with the tone at the top (as reflected in the CEO letter). Further, Amernic et al. (2007) and Amernic and Craig (2011) carry out textual analysis of CEO letters to detect destructive narcissism, a specific leadership characteristic. They argue that corporate leadership occurs in—and can therefore be detected via—the corporate discourse, and if that leadership is dysfunctional, it is important that the firm's stakeholders become aware of this. The tone at the top arguably transfers to the rest of the organization, with destructive narcissism leading to reckless decisions and spending, and overall dysfunctional organizations.

Although it might be argued that CEOs do not write the letters themselves, there is evidence that a typical CEO spends considerable time formulating the letter to shareholders and sees it as a major communication device to shareholders (McConnell et al., 1986; Kohut and Segars, 1992). Furthermore, Amernic and Craig (2011) point out that it is unlikely that a CEO completely hands over the responsibility of a letter that he or she signs, is widely read, and is central to the conveyance of the firm's vision and strategies. There are also examples of CEOs who most definitely are fully involved in the content and formulation of the letters, such as Jack Welch of General Electric and Warren Buffett of Berkshire Hathaway (Amernic et al.,

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[3] Merkl-Davies and Brennan (2011) provide four explanations for the outcomes of discretionary narrative disclosures such as CEO letters. They classify narratives based on whether they 1) provide incremental information, 2) are used for impression management (including communicative actions aimed at building "a common vision" or "legitimacy"), 3) reflect executive hubris, and 4) are used to communicate retrospective sense-making. The third explanation differs from the other three explanations in that hubris is not deliberate and reflects a subconscious cognitive bias. Brennan and Conroy (2013) argue that whereas both impression management (type 2 above) and hubris (type 3 above) lead to biased reporting, the former is intentional and opportunistic while the latter is unintentional and non-opportunistic.

2007). Ultimately, whether or not the CEO uses a "ghost writer", the CEO's leadership mindset is likely reflected in the letter. As pointed out by Amernic and Craig (2006, p. 200):

> [I]n a perverse sense, whether or not a CEO is involved actively in composing a letter to stockholders does not matter: the words in the CEO's letter are symbolic and emblematic, and the reader takes them to be the CEO's own.

Following several financial accounting scandals (Enron, WorldCom, Lehman Brothers and Parmalat), serious concerns were raised that unethical leadership can lead to fraud and financial misreporting (Chen, 2010). In the case of Enron, the tone at the top was characterized by fantasy and hubris, which was especially apparent in the CEO letter right before the scandal occurred (Tourish and Vatcha, 2005; Amernic et al., 2010). Moreover, in relation to the financial crisis that began in 2007, some leading international bankers displayed hubristic behavior (Owen and Davidson, 2009; Brennan and Conroy, 2013).

The concept of hubris

According to Owen (2008, p. 428) the most basic meaning of hubris comes from the ancient Greek language and refers to: "[an act] in which a powerful figure, puffed up with overweening pride and self-confidence, treated others with insolence and contempt. The individual seemed to derive pleasure from using his power to treat others in this way [...]." Further, Lorenz (2011, p.22) describes hubris as:

> the exaggerated pride, self-confidence or belief about one's own judgment that may deviate from objective standard and therefore ultimately leads to and results in extreme levels of presumptuousness and arrogance, blind ambition, self-admiration, a lack of humility and an overestimation of one's own capabilities.

While hubris is not an officially recognized medical condition,[4] attempts have been made within the psychology literature to identify features or symptoms of hubris. Owen and Davidson (2009) proposed fourteen criteria for *hubris syndrome*, which reflect a tendency to act recklessly and impulsively, an obsession with one's self-image and a desire to appear in a good light, a belief that one's interests and broad vision is shared by the whole organization (or nation), excessive self-confidence, and an extreme belief in being correct. They further explain that hubris syndrome is a disorder for which narcissism (an innate personality trait) is a prerequisite (Owen and Davidson, 2009), and which emerges especially in people that have risen to power.

The criteria for hubris syndrome indicate that hubris is closely related to narcissism and overconfidence. As demonstrated by Campbell et al. (2004), narcissistic people are more likely to exhibit overconfidence than non-narcissistic people and make inappropriately risky decisions, which highlights the overlap between hubris, overconfidence and narcissism. In line with this, research testing the hubris hypothesis (Roll, 1986) have shown that overconfident as well as narcissistic CEOs are more likely to make more, larger and value-destroying M&A (Chatterjee and Hambrick, 2007; Malmendier and Tate, 2008; Kolasinski and Li, 2013), use cash to finance their purchases (indicating a belief in having enough resources to support the takeover decisions), engage in diversifying mergers, and make international acquisition offers (Ferris et al., 2013; Malmendier and Tate, 2005; 2008).[5]

While these concepts have often been used interchangeably in the literature when referring to, or attempting to measure, hubris (Brennan and Conroy, 2013; Kubick and Lockhart, 2017; Buchholz et al. 2018), they are not the same (Asad and Sadler-Smith, 2020). Narcissistic CEOs—being concerned with their self-image and driven by their self-importance—make strategic choices in order to receive positive social admiration, affirmation and praise (Chatterjee and Hambrick, 2007; Olsen et al., 2014). Meanwhile, overconfident individuals tend to overestimate their ability to generate future positive outcomes—often as a result of past positive experiences. They are also more likely to attribute success to their own abilities and actions, while viewing failure as a result of factors outside their control, such as luck (Miller and Ross, 1975). According to Kroll et al. (2000), while narcissism is a *source* of hubris, overconfidence is an *implication* of hubris. However, in spite of these conceptual differences, empirically distinguishing between them is difficult.

Prior research on goodwill accounting

Following a business combination, the acquiring firm needs to undertake an acquisition analysis in the consolidated financial statements. This involves allocating the purchase price to the net identifiable assets in the target firm based on their fair values. The surplus—which is the difference between the purchase price and the book value of the target firm's net assets—appears as an increase in the value of the identifiable assets or is recognized as goodwill. Current major accounting standards[6] allow considerable managerial discretion in purchase price allocation decisions as well as when assessing the future value of goodwill.

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[4] For example, the American Psychology Association does not recognize hubris as a personality disorder.

[5] The literature examining extreme personality traits has mostly focused on the destructive sides of hubris, narcissism and overconfidence (as characterized by ruthlessness and a particular drive for power) and resulting costs to organizations. However, we acknowledge that such personality traits may also entail benefits to the organizations. According to Aktas et al. (2016), narcissistic CEOs are faster negotiators, which can reduce transaction costs in takeover processes, and other studies find that firms with overconfident CEOs invest more heavily in R&D, achieve greater innovation as measured by patent and citation counts (Hirshleifer et al.,2012), and have superior stock performance (Bharati et al., 2016).

[6] The accounting standards implied here are IFRS 3 *Business Combinations,* and ASC 805 *Business Combinations* and ASC 350 *Intangibles — Goodwill and Other* under US GAAP.

In particular, goodwill is subject to annual impairment tests rather than amortization (as compared to finite-lived intangible assets), which creates potential incentives to overallocate the purchase price to goodwill. While amortization leads to an even, predictable recognition of losses, impairment tests may result in avoiding losses over extended periods, thus distorting the usefulness of such tests (Jarva, 2009). In performing annual impairment tests, managers apply their discretion and judgment in determining discount rates and estimating future cash flows associated with the recognized goodwill. Consistent with an opportunistic inflation of post-acquisition earnings, Hamberg et al. (2011) and Zhang and Zhang (2017) showed that the change from an amortization to an impairment approach has led to a substantially higher amount of recognized goodwill. Overallocation of goodwill and a failure to recognize subsequent write-downs is further shown to be associated with earnings-based bonuses to executives (Detzen and Zülch, 2012; Shalev et al., 2013), CEOs' concerns with their reputation and debt-covenant violation concerns (Ramanna and Watts, 2012). Furthermore, other studies hypothesize that CEO tenure and turnover determine goodwill write-downs in accordance with "big bath" behavior—CEOs in the early years of their tenure can blame poor performance on the previous CEO's decisions and are therefore more likely to recognize an impairment (Masters-Stout et al., 2008; AbuGhazaleh et al., 2011; Iatridis and Senftlechner, 2014; Majid, 2015).

Hypotheses

According to upper echelons theory (Hambrick and Mason, 1984; Hambrick, 2007), managers' personal characteristics as well as cognitive bases and values explain organizational outcomes. Consistent with this, prior accounting studies have shown that personality traits explain earnings management and corporate tax policies, the timeliness of loss recognition, and financial misstatements (Schrand and Zechman, 2012; Ahmed and Duellman, 2013; Hsieh et al., 2014; Olsen et al., 2014; Kubick and Lockhart, 2017).

Hubristic individuals have been described as overconfident, narcissistic, over-reliant on simplistic success strategies, and out of touch with reality (Kroll et al., 2000). They tend to be risk-takers who are not afraid of undertaking extravagant projects (see discussion in, e.g., Armor and Taylor, 2002; Picone et al., 2014). By overestimating their own abilities, they misjudge what can be achieved and fail to anticipate adverse outcomes. This is consistent with tendencies in hubristic individuals to assign a higher probability to the occurrence of good events (reflecting "good will") compared to bad events. In the context of mergers and acquisitions, therefore, hubristic managers are more likely to develop unreasonable estimates of the value and potential synergies that can be achieved in the newly combined entity. As a result, the higher premia paid for such overly optimistic acquisitions cannot be traced to any identifiable assets and liabilities, and as Warren Buffett (1983) put it, "[this] silliness ends up in the Goodwill account".

Furthermore, in focusing on immediate self-gratification, and for the sake of enhancing their self-image in the short term, hubristic CEOs are motivated to maintain high post-acquisition earnings. This leads them to allocate a larger amount of the purchase price to goodwill to avoid recognizing an immediate expense. That is, by allocating more of the purchase value to goodwill, amortizations are avoided and earnings maintained at a higher level (at least in the short run).

We therefore present the following hypothesis:

H1: Hubristic tone at the top is positively associated with the proportion of goodwill recognized in a business combination.

Since hubristic individuals are prone to an unwarranted belief in the correctness and precision of their choices, they overplace their own performance in relation to others' (Moore and Healy 2008) and do not believe it necessary for others to validate their actions or to conform to the strategies of others (Hiller and Hambrick, 2005). Therefore, their behavior may simply deviate from what is perceived to be common practice or the objective standard (Lorenz, 2011).

In their analysis of hubris symptoms and the impact of those on executive judgments and decisions, Picone et al. (2014) assert that hubristic executives fail to acknowledge potential negative outcomes of their actions in a timely fashion and appear myopic to any needed changes. In the context of goodwill accounting, a lower probability of recognizing impairment losses in a timely manner should occur for two reasons. First, hubristic CEOs are not expected to be able to acknowledge changes in the value of goodwill since their excessive self-belief and overestimation of their own abilities lead to an unrealistic outlook on future cash flows. That is, even in the face of adverse underlying economic indicators pointing to deteriorating post-merger synergies, they are not able to recognize a decline in the value of goodwill. Second, hubristic CEOs are expected to have exaggerated pride and focus on projecting a positive outward appearance in the short term. As argued above (in relation to H1), their desire to appear in a good light makes them want to preserve high post-acquisition earnings. This leads to a reluctance to recognize losses and, consequently, a delay in observed goodwill write-downs.

We therefore present the following hypothesis:

H2: Hubristic tone at the top is associated with a less timely recognition of goodwill impairment losses.

Research design

Constructing a text-based measure of hubris

We derive our measure of hubristic tone from the 14 criteria of *hubris syndrome* proposed by Owen and Davidson (2009). By investigating personality attributes of US Presidents and UK Prime Ministers over the last 100 years, the authors provide a

precise psychological measure of hubris that is also claimed to be applicable to business leaders (Bollaert and Petit, 2010). Seven of the proposed criteria coincide with narcissistic personality disorder (NPD), consistent with there being a close relationship between hubris and narcissism; two of the criteria are related to antisocial personality and histrionic personality disorders (APD and HPD, respectively); and the five remaining criteria represent unique symptoms of hubris (see Table 1). These unique criteria describe a hubristic person as one who: (i) conflates self with nation or organization (ii) uses the royal 'we' in conversation, indicating self-importance; (iii) displays superiority relative to others and strongly believes in being vindicated in the divine (rather than mundane) court to which he or she believes to be accountable; (iv) is restless, reckless and impulsive; and (v) pursues his or her broad vision in spite of potential costs, negative outcomes or practical obstacles.[7]

CEO-speak, and specifically CEO letters, can provide useful insights into various leadership styles and give information about CEO personalities and behavior, such as narcissism and hubris (see section 2.2). Our method for analyzing CEO letters relies on textual analysis using DICTION. The software is applicable in the analysis of accounting narratives (Weetman, 2005) and has been used in prior analyses of corporate reports and CEO letters (e.g., Cho et al., 2010; Mataira and Van Peursem, 2010; Rogers et al., 2011; Zachary et al., 2011; Craig and Brennan, 2012; Patelli and Pedrini, 2014; 2015; Craig and Amernic, 2018). It is based on linguistic theory, utilizes artificial intelligence, ensures relatively strong objectivity, and simultaneously allows the user flexibility (Cho et al., 2010). DICTION 7.1 uses 31 dictionaries, each comprising a set of words that together constitute some designated feature, and an additional five "Master" variables and four "Calculated" variables, which are derivatives of the basic dictionaries. In order to identify the hubristic tone in CEO letters, we use DICTION dictionaries that can be conceptually linked to hubris syndrome (see note to Table 1 for descriptions of the dictionaries and sample words). For each CEO letter, the score for each of the dictionaries is either added or subtracted depending on whether the hubristic trait in question should yield a high or low score. Specifically, the measure of hubristic tone is calculate as:

HubrisTone = Accomplishment + Aggression – Ambivalence – Concreteness – Denial – Hardship + Inspiration + Motion – Passivity + Praise + Satisfaction + Self-reference [pl.] + Spatial awareness + Tenacity.

In column 1 of Table 1, we first list the distinguishing features of hubris syndrome as proposed by Owen and Davidson (2009). We then thematically group and link these features to relevant DICTION dictionaries (see columns 2 and 3). For example, the unique hubris criteria relating to a tendency to conflate the goals and visions of the group or organization with the individual's own (criterion no. 5), and to speak in the royal "we" (criterion no. 6), may be associated with overly zealous and visionary groupthink, captured by *Inspiration* (reflecting abstract virtues and ideals), *Praise* (reflecting affirmations of some person, group or entity), and *Self-reference [pl.]* (referring to plural first-person pronouns).[8] In addition, dictionaries capturing other aspects of hubris include *Aggression* (embracing human competition and forceful action), *Passivity* (capturing terms related to neutrality and inactivity), *Accomplishment* (expressing task-completion, modes of expansion and leadership), *Ambivalence* (expressing hesitation or uncertainty), and *Denial* (containing negative function words).[9] Wordlists associated with these dictionaries reflect the hubristic individual's overly excited tendencies and optimistic confidence.

Finally, *HubrisTone* is year- and industry-adjusted in order to remove industry-wide and temporal effects on reporting tone. This implies subtracting from each CEO letter's DICTION score the mean value for each industry and year.

Regression models

To test Hypothesis 1, that firms with a hubristic tone at the top allocate a larger amount of the purchase price to goodwill, we use the following regression model (H1):

$$PPA\_GW_{it} = \alpha_0 + \alpha_1 HubrisTone_{it} + \sum_{j=1}^{m} \beta_{it}^j Control_{it}^j + \varepsilon_{it} \qquad (1)$$

where PPA_GW_{it} is a measure of the relative size of goodwill recognized in firm i's business combinations in year t, specifically goodwill as a percentage of the total purchase price; as a variation to this, we also consider goodwill as a percentage of the fair value of total intangible assets including goodwill (PPA_GW^{intang}).

$HubrisTone_{it}$ is a measure of hubristic tone in the CEO letter (see section 4.1). We predict a positive coefficient on this variable (α_1); $\sum_{j=1}^{m} \beta_{it}^j Control_{it}^j$ are m firm-year-specific factors found in prior literature to predict the purchase price allocation to goodwill. We control for firm-level factors that likely affect goodwill recognition following business combinations. These are growth opportunities, measured as the natural logarithm of the market-to-book ratio (*lnMB*); firm size, measured as the logarithm of total assets (*lnTA*); leverage, measured as total debt divided by common equity (*Lev*); current performance, measured as return on assets (*RoA*) and annual stock returns (*Ret*). Furthermore, consistent with accounting-based bonus plans triggering managerial opportunism, CEOs with incentive contracts may allocate a relatively higher amount to goodwill to avoid future amortizations (see, e.g., Shalev et al., 2013; Bugeja and Loyeung, 2015; Zhang and Zhang, 2017). We therefore

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[7] The presence and nature of these unique traits highlight the fact that although hubris largely overlaps with narcissism, hubris is not just about being self-absorbed; hubris is associated with a self-confidence that leads to intense activity, with the objective of aggrandizing not just the self but the group with which the individual identifies—and with the certainty of success. Hubristic individuals do not need others to validate their course of action or conform to the strategies of others; thus, while others may view some actions as risky (in deviating from industry conventions), those affected by hubris are likely not to perceive them in such a light (Hiller and Hambrick, 2005).

[8] The original dictionary *Self-reference* refers to singular first-person pronouns. We have modified this dictionary by replacing it with plural first-person pronouns in order to be consistent with the hubristic tendency to embrace a group/nation/organization and conflate its goals and visions with one's own.

[9] *Accomplishment*, *Praise* and *Tenacity* are the three main dictionaries suggested by Amernic et al. (2010) to be associated with hubris.

Table 1

Deriving aggregate hubristic tone from hubris criteria using DICTION dictionaries.

General hubristic trait or tendency, and associated criteria for hubris syndrome[†] (Owen and Davidson, 2009)	Related DICTION dictionaries[‡] and scores	
	High (+)	Low (-)
Hyperactive, risky, restless, expansionist, power-seeking tendencies 1. A narcissistic propensity to see their world primarily as an arena in which to exercise power and seek glory; NPD 6 12. Restlessness, recklessness and impulsiveness; (unique)	*Accomplishment Aggression Inspiration MotionSpatial awareness*	*Passivity*
Narcissistic desire to appear in a good light 2. A predisposition to take actions which seem likely to cast the individual in a good light—i.e. in order to enhance image; NPD 1 3. A disproportionate concern with image and presentation; NPD 3 4. A messianic manner of talking about current activities and a tendency to exaltation; NPD 2	*Accomplishment PraiseSatisfaction*	*Denial*
Embracing group/nation/organization, conflating its goals and visions with one's own 5. An identification with the nation, or organization to the extent that the individual regards his/her outlook and interests as identical; (unique) 6. A tendency to speak in the third person or use the royal 'we'; (unique)	*Inspiration raise Self-reference [pl.]*	
Excessive confidence and belief in one's own abilities and successes, and contempt for criticism by others 7. Excessive confidence in the individual's own judgment and contempt for the advice or criticism of others; NPD 9 8. Exaggerated self-belief, bordering on a sense of omnipotence, in what they personally can achieve; NPD 1 and 2 combined 9. A belief that rather than being accountable to the mundane court of colleagues or public opinion, the court to which they answer is: History or God; NPD 3 10. An unshakable belief that in that court they will be vindicated; (unique)	*Aggression Inspiration Praise Satisfaction Tenacity*	*Ambivalence Denial Hardship*
Loss of contact with reality and disregard for costly or adverse outcomes 11. Loss of contact with reality; often associated with progressive isolation; APD 3 and 5 13. A tendency to allow their 'broad vision', about the moral rectitude of a proposed course, to obviate the need to consider practicality, cost or outcomes; (unique) 14. Hubristic incompetence, where things go wrong because too much self-confidence has led the leader not to worry about the nuts and bolts of policy; HPD 5	*Aggression Inspiration Tenacity*	*Ambivalence Concreteness Passivity*

Notes: This table shows the attributes of hubris syndrome in relation to our identified DICTION dictionaries. The hubris criteria have been grouped into categories and predictions generated for whether hubris should lead to a high or low score for a particular dictionary.

†Proposed criteria for hubris syndrome, and their correspondence to features of cluster B personality disorders in DSM-IV (Owen and Davidson, 2009).

‡According to definitions provided by the DICTION 7.1 software package, *Accomplishment* expresses task-completion, modes of expansion and leadership (e.g. advances, concluded, achieved); *Aggression* embraces human competition and forceful action (e.g. compete, crash, defend, opposed, triumph); *Ambivalence* expresses hesitation or uncertainty (e.g. almost, appear, doubtful, perhaps, somewhere); *Concreteness* is a large dictionary reflecting tangibility and materiality, including sociological units and occupational groups, physical structures and elements of nature (e.g. budgets, courts, money, workers); *Denial* contains negative function words (e.g. nothing, notwithstanding, won't); *Hardship* contains hostile actions, censurable human behavior, natural disasters, unsavory political outcomes, as well as human fears and incapacities (e.g. difficulty, losses, strained, threat); *Inspiration* reflects abstract virtues and ideals (e.g. honor, ideals, power, success); *Motion* incorporates terms of human movement, physical processes, speed and modes of transit (e.g. leave, thrust, quicker, swiftly); *Passivity* consists of words ranging from neutrality to inactivity, including terms of compliance, docility, and cessation, as well as inertness, disinterest and tranquility (e.g. accepted, careful, hesitation, retreat, slow); *Praise* contains affirmative adjectives describing social, physical, intellectual, entrepreneurial and moral qualities (e.g. brilliant, greater, ranked); *Satisfaction* represents positive affective states, joy, pleasurable diversion as well as moments of triumph (e.g. enjoying, favorable, proud); *Self-reference [pl.]* is a pluralized version of the DICTION dictionary *Self-reference* (containing first-person pronouns), replacing words such as"I, me, myself" with "we, us, ourselves"; *Spatial awareness* refers to geographical entities, physical distances, and modes of measurement (e.g. communities, international, transcontinental); *Tenacity* consists of verbs connoting confidence and totality (e.g. is, will, have).

control for CEO bonus ratio (*CEObonus*), where bonus is defined as the ratio of cash bonus to total cash compensation (bonus plus salary). Finally, we control for CEO age (*CEOage*) and CEO tenure (*CEOtenure*), which are proxies for career concerns and risk-taking behavior (Zhang and Zhang, 2017)[10];

subscripts i and t indicate firm i and year t, and ε is an error term.

To test Hypothesis 2, that firms with a hubristic tone at the top delay the recognition of impairment losses, we use two model specifications. First, we examine the association between *HubristicTone* and the pattern of write-downs over a four-year period subsequent to the time of the purchase price allocation (at time t). A relatively higher probability of a write-down in later periods indicates delayed loss recognition (see Eq. (2)). Second, prior studies document that goodwill

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write-downs are more likely to follow a CEO turnover (Watts, 2003; Masters-Stout et al., 2008) since incoming executives want to "clear the air" (Haggard et al., 2015). We expect that the turnover effect will be stronger in firms that have failed to write down goodwill in a timely manner (i.e., where carrying values exceed market values).

To examine the association between hubristic tone and the probability of goodwill write-downs over time, we adopt the following logit model (Λ represents the logit function):

$$\Pr(dGWimp_{it+\tau} = 1) = \Lambda\left[\lambda_0 + \lambda_1 HubrisTone_{it} + + \sum_{j=2}^{n} \lambda_{it}^j Control_{it+\tau}^j + \varepsilon_{it+\tau}\right] \forall \tau = 1, 2, 3, 4 \tag{2}$$

where

$dGWimp_{it}$ is an indicator variable that is equal to "1″ if the firm recognizes a goodwill impairment loss in time t, and "0" otherwise;

$HubrisTone_{it}$ is a measure of hubristic tone in the CEO letter;

$\sum_{j=1}^{n} \lambda_{it}^j Control_{it+\tau}^j$ are n firm-year-specific variables found in prior literature to predict goodwill write-downs. We include all the control variables from Eq. (1). In addition, we include an indicator variable for whether the firm reports a loss in the current year (*Loss*), the annual percentage change in revenue (*ΔRev*), and the total size of accumulated goodwill, adjusted for current-year impairments and scaled by total assets (*GWTA*). We also control for CEO turnover (*CEOturnover*), an indicator variable capturing the increased likelihood of a write-down in turnover years; and an indicator variable for whether the CEO has been in the position for at least three consecutive years (*sameCEO*). Finally, we control for recent M&A by including the number of M&A in t-1;

subscript $t + \tau$ indicates year $t + 1, t + 2, t + 3$, and $t + 4$ for the dependent variable as well as all the control variables, with the exception of *lnMB* and *Ret*, which are lagged one year in relation to the dependent variable.

We expect $\lambda_{1,t+4} > \lambda_{1,t+3} > \lambda_{1,t+2} > \lambda_{1,t+1}$, indicating an increasing probability of writing down goodwill as time progresses.

Next, we test whether hubris causes delayed write-downs by looking at CEO turnover:

$$\Pr(dGWimp_{it} = 1) = \Lambda\left[\gamma_0 + \gamma_1 HubrisTone_{it-1} + \gamma_2 CEOturnover_{it} + \gamma_3 HubrisTone_{it-1} \times CEOturnover_{it} \right.$$
$$\left. + \sum_{j=4}^{n} \gamma_{it}^j Control_{it}^j + \varepsilon_{it}\right] \tag{3}$$

where

$HubrisTone_{it-1} \times CEOturnover$ captures the effect of CEO turnover on goodwill write-downs conditional on the level of hubristic tone in the departing CEO's letter. We expect a positive coefficient (γ_3) on the interaction term since recognizing a goodwill impairment loss in the year of the CEO turnover is more likely when the departing CEO was hubristic;

All control variables are the same as for Eq. (2) with the addition of a variable capturing the hubristic tone at the top in the current year (*HubrisTone_{it}*).

Industry division indicators based on the standard industry classification (SIC) and year indicator variables are included in all the above models. Standard errors are clustered the firm level.[11] A description of all the variables is provided in Table 2.

Sample

Our sample in this study is based on listed non-financial companies on the Stockholm Stock Exchange for the years 2005 to 2011, with an extension to 2014 when we look at delayed goodwill write-downs (Eq. (2)). The initial sample consists of 1,838 firm-year observations. From this sample, we exclude firms with missing observations on key variables from Datastream and firm-years lacking information on CEO attributes or English versions of the annual reports. The final sample consists of 909 CEO letters (from 335 unique CEOs). Table 3 presents the sample selection and the distribution of observations by year. For the main independent variable, i.e., *HubrisTone*, we extracted the text of each CEO letter from the firm's annual report, stored it in a plain-text file, and imported it into DICTION. We hand-collected all CEO-related and purchase price allocation data from annual reports.

Empirical analysis

Analysis of the hubristic tone measure

Table 4 presents the analysis of *HubrisTone* and the dictionaries used in generating this variable. We compare our measure of hubristic tone with previously studied indicators of CEO hubris and narcissism (see, for instance, Chatterjee and Hambrick, 2007; Chatterjee and Hambrick, 2011; Rijsenbilt and Commandeur, 2013; Olsen et al, 2014; Buchholz et al., 2018). First, we investigate whether hubristic tone is associated with the likelihood and size of M&A, as inferred by the hubris hypothesis (Roll, 1986). Second, we look at CEO "overpay", or excess compensation, consistent with the notion that highly narcissistic

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[11] Throughout, reported results are robust to alternative clustering at the CEO level.

Table 2
Description of variables.

	Source†	Description
Main variables:		
H_DICTION	CEO letter	A measure of hubristic tone based on 14 dictionaries from DICTION.
HubrisTone		H_DICTION adjusted for mean values by year and industry.
PPA_GW	Annual reports	The ratio of goodwill to the total purchase price. Alternatively, the ratio of goodwill to the fair value of total intangible assets including goodwill (*PPA_GW^{intang}*).
dGWimp	DS: WC18225	An indicator variable that takes the value of "1" if a goodwill write-down has taken place in the firm during the year, and "0" otherwise.
Control variables:		
lnTA	DS: WC02999	The natural logarithm of total assets.
lnMB	DS: PTBV	The natural logarithm of the market-to-book ratio.
RoA	DS: WC08326, WC02999	Return on assets before write-downs, calculated as (Net Income - Goodwill write-down)/ Total Assets.
Ret	DS: P	Annual stock returns, calculated as (Price$_t$ – Price$_{t-1}$)/Price$_{t-1}$.
Lev	DS: WC08231	Leverage, calculated as (Total debt/Common Equity) * 100.
CEObonus	Annual reports	CEO cash bonus as a ratio of total cash compensation (base salary plus bonus).
CEOage	Annual reports	CEO age in years.
CEOtenure	Annual reports	CEO tenure, measured as the number of years the CEO has been in office.
MA	Zephyr database	The total number of M&A-related transactions completed by firm *i* in year *t*.
GWTA	DS: WC18280, WC03995, WC02999	Goodwill (net of accumulated write-downs but prior to any current-year write-downs) scaled by total assets.
Loss	DS: WC08326	An indicator variable that takes the value of "1" if the firm reports a net loss in the current year, and "0" otherwise.
ΔRev	DS: P	The annual percentage change in operating revenues, calculated as (Rev$_t$ – Rev$_{t-1}$)/Rev$_{t-1}$.
CEOturnover	Annual reports	An indicator variable that takes the value of "1" in years when there has been a change of CEO, and "0" otherwise.
sameCEO	Annual reports	An indicator variable that takes the value of "1" if the CEO has been the CEO in the current firm for at least three years, and "0" otherwise.
σRoA	DS: WC08326, WC02999	The standard deviation of the return on assets over the preceding five years.
σRet	DS: P	The standard deviation of annual stock returns over the preceding five years.
Validation variables:		
CEOoverpay	Annual reports	The residual of CEO bonus regressed on economic determinants of CEO pay (including *lnTA, lnMB, RoA, Ret, σRoA, σRet*, and industry and year indicator variables)
lnCEOpicsize	Annual reports	The natural logarithm of the size of the CEO photograph in the CEO letter, where the size is measured in centimeters squared. If there are multiple photos, the sum of their sizes is calculated.
dMA	Annual reports	An indicator variable that takes the value of "1" if the firm was involved in at least one merger or acquisition requiring consolidation during the year, and "0" otherwise.
PPA_Price	Annual reports	The total purchase price paid in a business combination, scaled by lagged total assets.

Notes: This table contains descriptions of all the variables. These refer to firm-year characteristics (all subscripts *i* and *t* have been dropped).
†DS: Thomson Reuters Datastream, including Worldscope.

Table 3
Sample composition.

Panel A: Sample selection		
		Obs.
Non-financial firms listed on the Stockholm Stock Exchange between 2005 and 2011		1838
– missing observations due to no available data in Datastream	–	245
– missing observations due to no available English annual report and foreign company observations lacking information on CEO attributes	–	658
– missing observations due to no available CEO compensation data	–	26
Final sample		909
Of which unique firms		289
Of which unique CEOs		335
Panel B: Sample breakdown by year		
Year	Obs.	%
2005	115	13
2006	130	14
2007	141	16
2008	121	13
2009	129	14
2010	132	15
2011	141	16
Total	909	100

Notes: This table presents the sample selection procedure and the composition of the sample by year.

Table 4
Analysis of the *HubrisTone* variable.

Panel A: Mean difference analysis

		dMA			CEOoverpay			lnCEOpicsize		
	Expected sign	dMA = 0	dMA = 1	t-stat.	Below median	Above median	t-stat.	Below median	Above median	t-stat.
HubrisTone	+	−1.34	3.09	3.33***	−0.64	1.68	1.75*	−1.25	2.74	2.84***
Accomplishment	+	33.08	35.06	3.25***	33.07	34.76	2.78***	33.76	34.36	0.94
Aggression	+	3.54	3.58	0.28	3.89	3.29	−3.59***	3.39	3.87	2.62***
Ambivalence	−	4.65	4.31	−1.87*	4.62	4.36	−1.44	4.28	4.65	1.93*
Concreteness	−	17.63	15.37	−4.95***	16.61	16.58	−0.07	17.24	15.78	−2.95***
Denial	−	1.33	1.15	−2.15**	1.29	1.21	−1.00	1.19	1.40	2.19**
Hardship	−	1.49	1.32	−1.46	1.59	1.27	−2.86***	1.36	1.53	1.42
Inspiration	+	5.64	6.09	1.88*	5.71	5.98	1.11	5.57	6.07	1.94*
Motion	+	2.38	2.47	0.59	2.48	2.37	−0.76	2.29	2.56	1.66*
Passivity	−	6.38	6.20	−0.88	6.44	6.18	−1.25	6.20	6.20	−0.01
Praise	+	8.17	8.48	1.19	7.76	8.73	3.68***	8.46	8.08	−1.33
Satisfaction	+	3.22	3.25	0.11	3.19	3.24	0.29	3.14	3.11	−0.14
Self-reference [pl.]	+	19.19	19.83	1.08	19.22	19.74	0.88	18.22	20.50	3.70***
Spatial awareness	+	9.69	10.43	2.13**	10.02	10.01	−0.03	10.38	9.94	−1.16
Tenacity	+	24.55	23.03	−3.61***	24.12	23.57	−1.30	23.81	23.88	0.16
Obs.		782			902			909		
Obs. below median		391			491			417		
Obs. above median		391			411			494		

Panel B: Regression analysis

		Model 1: Pr(dMA = 1)		Model 2: PPA_Price	
		ME	z-stat	Coeff.	t-stat
HubrisTone		0.0025***	(3.07)	0.001**	(2.24)
lnTA		0.080***	(5.09)	0.000	(−0.06)
lnMB		−0.011	(−0.41)	0.000	(−0.10)
RoA		0.111	(0.79)	0.024	(1.01)
Ret		−0.012	(−0.35)	0.009	(1.04)
Lev		0.000	(0.98)	0.000	(0.45)
CEOage		0.000	(−0.05)	0.000	(−0.50)
CEOtenure		0.005	(1.20)	0.002*	(1.97)
CEObonus		0.094	(0.76)	0.032	(1.59)
Industry fixed effects		Yes		Yes	
Year fixed effect		Yes		Yes	
Adj. R^2				0.061	
Pseudo R^2		0.184			
N		900		885	

Notes: This table presents analyses of the hubristic tone (*HubrisTone*) measure. Panel A shows calculated mean differences from two-sample t-tests (*** p < 0.01, **p < 0.05, * p < 0.10). The mean values of *HubrisTone* along with hubris components are compared for firms that have below and above median values for firms with and without M&A (*dMA*), and for *lnCEOpicsize* and *CEOoverpay*. Panel B shows the effect of *HubrisTone* on the probability of firms engaging in M&A (Model 1: Pr(dMA = 1)) and on the size of the acquisitions as measured by the total purchase price (Model 2: PPA_Price). For Model 1, the marginal effects from a logistic regression are reported, along with z-statistics, while for Model 2, the coefficients from an OLS regression are reported, along with *t*-statistics. Standard errors are clustered at the firm level (***p < 0.01, **p < 0.05, *p < 0.10). All variables are defined in Table 2.

CEOs believe themselves to be more valuable than their peers and therefore seek to increase their own pay (Chatterjee and Hambrick, 2007). To estimate excess compensation, we use the residuals from a model predicting CEO bonus, controlling for economic determinants (*lnTA, lnMB, RoA, Ret, σRoA* and *σRet*) as well as industry and year indicators. Finally, we measure the prominence of the CEO photograph in the CEO letter. Specifically, inspired by Ham et al., (2017), we measure the CEO's picture size in centimeters squared (or in case there is more than one photo we use the total sum), and use the logarithm of this value (*lnCEOpicsize*).

Table 4, Panel A, presents mean comparison tests. We decompose the sample to show variations in tone for firm-years with and without M&A (*dMA*); with above and below median CEO excess compensation (*CEOoverpay*); and with above and below median picture size (*lnCEOpicsize*). We show results for the aggregate hubristic tone measure, as well as for the individual dictionaries. The average (aggregate) hubristic tone is significantly higher for firms that have a larger photograph in the CEO letter, undertake M&A, and pay excessive CEO compensation. We also find that among the DICTION variables, the difference in tone is largely consistent with expectations.

The tone of CEO letters in firms with M&A is characterized by more accomplishment terms, less ambivalence, less concreteness, less denial, more inspiration and more spatial awareness. Meanwhile, *Tenacity* is significantly different in the opposite direction than expected. *Tenacity* connotes confidence and totality, according to the definition provided by DICTION,

and has been suggested by Amernic et al. (2010) to be one of the main dictionaries reflecting hubris (also in a positive direction). However, this dictionary is primarily composed of auxiliary verbs and includes negative contractions (e.g., haven't), which may lead to a *less* certain and therefore less hubristic tone (for further discussion and robustness tests, see section 5.4). With respect to CEO overpay, firms-years with above-mean values have a tone that reflects more accomplishment, less hardship, more praise, but also less aggression. While we predict higher *Aggression* scores for hubristic language, we note that the associated wordlist contains words with negative connotations, such as "defeat", "challenging" and "turbulence". For CEO letters showing a larger photograph, the tone is significantly more aggressive, less concrete (consistent with narcissism), and more inspired; connotes more motion, and contains more plural self-references. Contrary to expectations, the tone also reflects more ambivalence and more denial. Especially *Denial* may be noisy as negations may convey less optimism on the one hand, but also be used defensively to justify certain actions or reject criticism.

The above findings are corroborated in tests of Pearson correlations between *HubrisTone* and the above variables (untabulated). We find that a hubristic tone is positively associated with the likelihood of undertaking M&A (coeff.: 0.11; p-value < 0.001) and there is a positive correlation between hubristic tone and CEO picture size (coeff.: 0.09; p-value = 0.01). We cannot establish, however, that there is a linear relationship between CEO overpay and hubristic tone.

In Panel B, we investigate the effect of *HubrisTone* on the probability of firms engaging in M&A (Model 1: *dMA*) and on the size of the acquisitions (Model 2: *PPA_Price*). *HubrisTone* is positively and significantly associated with the dependent variables in both models. Given the range of values *HubrisTone* can take on, the reported coefficients (marginal effects for Model 1) indicate an economically significant effect. For example, the marginal effect of a one-point increase in *HubrisTone* yields, on average, an increase of 0.25 percentage points in the probability of M&A. This means that when the hubristic tone score increases by one standard deviation, the probability of M&A increases by 5 percentage points. These results add to findings in prior studies that examine hubris using other related constructs (e.g., Brown and Sarma, 2007; Chatterjee and Hambrick, 2007).

Next, we investigate the relationship between hubristic tone and past successes, as proxied by past earnings performance, as well as the relationship between hubristic tone and CEO time in power, as proxied by CEO tenure. This is based on the notion that past successes or attainment of power can trigger hubris in a leader (Owen and Davidson, 2009). Carrying out a mean comparison test (untabulated), we find that CEOs in firms with five consecutive years of non-negative earnings score significantly higher on hubristic tone (e.g., mean diff.: 2.79, *t*-stat.: 2.13). Furthermore, we analyze hubristic tone for different levels of tenure (see Fig. 1). Prior literature indicates that tenure captures a CEO's power (see, e.g., Hill and Phan, 1991), and predicts that hubris increases with tenure (Owen and Davidson, 2009; Brennan and Conroy, 2013). Our findings corroborate this prediction, but suggest that the relationship is not fully linear. On average, hubristic tone is high at the beginning of a CEO's tenure,[12] diminishes over the next few years, and increases again for those who sit longer than the average term (of five years). We believe that this is consistent with the view that hubris is triggered in individuals who have just ascended to a position of power, as well as when an individual has been in such a position for an extended period of time.

Descriptive statistics of regression variables

Table 5 presents summary statistics of all variables used in our sample. The underlying DICTION score *(H_DICTION)* is 80.6 on average and ranges from −21.26 to 164.22.[13] Our main measure of hubris (*HubrisTone*) is a standardized score, mean-adjusted by industry and year. By construction, the mean of *HubrisTone* approaches zero (mean = 0.629), with values above (below) zero representing observations that are above (below) the year-industry mean. The standard deviation is approximately 20, indicating that there is considerable variation within the sample data. On average, goodwill constitutes 23.1 % of the total purchase price (*PPA_GW*), taking into account firm-years with no M&A. The mean value of *dGWimp* is 0.134, which indicates that, on average, roughly 13 % of firm-year observations contain a goodwill write-down.

CEO-related variables indicate that the average CEO is 50 years old, has been in office for five years and on average receives bonuses equivalent to approximately 17 % of total cash compensation. The CEO picture size in centimeters squared is approximately 132 (=exp(4.884)) on average, which is about one third of an A4-sized page. Return on assets (*RoA*) has a mean value of 4.5 %, the annual stock return of firms (*Ret*) is 13.8 % on average, and the mean value of *dMA* indicates that M&A occur in around 46 % of firm-year observations.

Regression analysis

Table 6 reports regression results pertaining to our first hypothesis (H1), which tests whether hubristic tone at the top can explain the proportion of goodwill recognized in business combinations. Model 1 shows the association between hubristic tone in the CEO letter (*HubrisTone)* and goodwill in relation to the total purchase price (*PPA_GW*). Model 2 provides results using an alternative goodwill variable specification, i.e. goodwill as a percentage of the fair value of total intangible assets

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[12] The mean value of hubristic tone in turnover years is 1.30, compared to −0.16 in non-turnover years. Although a *t*-test cannot confirm that these are statistically different from each other, a Wilcoxon-Mann-Whitney test that compares the rank sum yields a z-score of 2.1 (p-value: 0.037), indicating that ranked scores differ between the groups.

[13] The scores are based on word frequencies, statistically corrected for homographs and built-in norms based on a database of some 50,000 previously processed passages. The scores are meaningfully interpreted only in relative terms. This simply means that a higher score indicates a more hubristic tone.
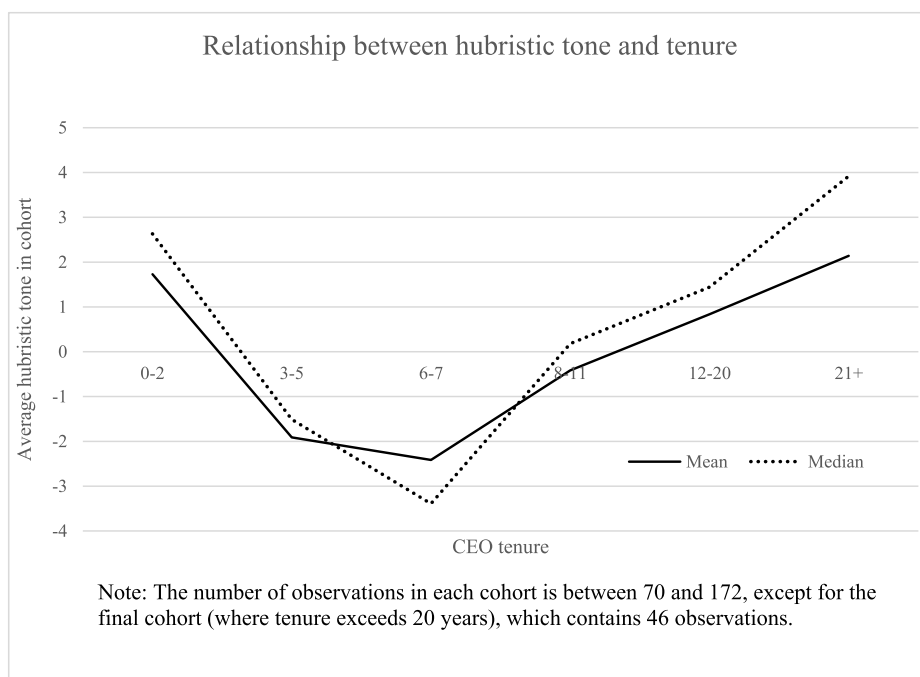
Note: The number of observations in each cohort is between 70 and 172, except for the final cohort (where tenure exceeds 20 years), which contains 46 observations.

Fig. 1. Relationship between hubristic tone and tenure.

Table 5
Summary statistics of the variables.

Regression variables:	n	Mean	Median	Std Dev.	Min	Max
H_DICTION	909	80.625	82.26	21.011	−21.26	164.22
HubrisTone	909	0.629	1.264	19.966	−102.256	77.203
PPA_GW	885	0.231	0	0.317	0	1
PPA_GW^{intang}	863	0.306	0	0.400	0	1
dGWimp	909	0.134	0	0.341	0	1
lnTA	909	14.801	14.516	2.035	10.244	22.579
Lev	909	63.245	35.04	114.237	0	1465.530
RoA	909	0.045	0.063	0.159	−1.262	0.673
Loss	909	0.197	0	0.398	0	1
Ret	909	0.138	0.05	0.624	−0.930	4.560
ΔRev	905	0.177	0.074	1.212	−0.869	28.286
lnMB	909	0.766	0.765	0.822	−1.897	4.117
MA	909	0.879	0	1.936	0	29
GWTA	909	0.204	0.130	0.266	0	4.202
CEObonus	909	0.167	0.163	0.156	0	0.802
CEOage	908	49.960	50	6.380	25	66
CEOturnover	909	0.154	0	0.361	0	1
CEOtenure	908	5.224	4	5.576	0	29
sameCEO	909	0.661	1	0.474	0	1
Validity test variables:						
CEOoverpay	909	0.000	−0.005	0.142	−0.303	0.596
lnCEOpicsize	782	4.884	4.933	0.937	1.305	7.862
dMA	902	0.456	0	0.498	0	1
PPA_Price	902	0.063	0	0.246	−1.365	4.334

Notes: This table presents summary statistics of all the variables used in our sample. All variables are defined in Table 2.

including goodwill (*PPA_GW^{intang}*). Consistent with expectations, we find that the coefficient of *HubrisTone* is positive and significant at conventional levels in both models. For example, the coefficient in Model 1 is 0.0016 (*t*-stat. 2.76), meaning a one-point increase in *HubrisTone* is associated with a 0.16 percentage point increase in the proportion of the purchase price that is allocated to goodwill. Given the range of possible *HubrisTone* values, this may be considered an economically significant effect. When the score increases by one standard deviation ($\approx$20), the percentage of the price allocated to goodwill increases by 3.2 percentage points.

Table 6
Hubristic tone and the purchase price allocation (Test of H1).

Regression results (Eq. (1)):

	Model 1 (PPA_GW)		Model 2 (PPA_GW^intang)	
Dependent variable:	Coeff.	t-stat.	Coeff.	t-stat.
HubrisTone	0.0016***	(2.76)	0.0019***	(2.68)
lnTA	0.0406***	(5.22)	0.0575***	(5.10)
lnMB	−0.0027	(−0.16)	−0.0089	(−0.44)
RoA	0.0921	(1.45)	0.1071	(1.37)
Ret	0.0033	(0.17)	0.0128	(0.50)
Lev	0.000	(0.40)	0.000	(0.16)
CEObonus	0.0608	(0.74)	−0.0183	(−0.18)
CEOage	0.000	(−0.02)	−0.0015	(−0.56)
CEOtenure	0.0008	(0.33)	0.0034	(1.05)
Intercept	−0.3621**	(−2.40)	−0.4003**	(−1.98)
Industry fixed effects	Yes		Yes	
Year fixed effects	Yes		Yes	
Adjusted R²	0.1537		0.1492	
N	877		856	

Notes: This table presents tests of H1 (Eq. (1)) regarding the effect of hubristic tone on the amount of goodwill recorded following a business combination. Model 1 shows the association between hubristic tone in the CEO letter (*HubrisTone)* and goodwill in relation to the total purchase price (*PPA_GW)*. Model 2 provides results using an alternative goodwill variable specification, i.e. goodwill as a percentage of the fair value of total intangible assets including goodwill (*PPA_GW^intang)*. t-statistics are based on standard errors clustered at the firm level (*** p < 0.01, **p < 0.05, * p < 0.10). All variables are defined in Table 2.

Table 7
Hubristic tone and the probability of goodwill impairment loss recognition over time (Test of H2).

Panel A: Regression results (Eq. (2))

	t + 1		t + 2		t + 3		t + 4	
Dependent variable: Pr[dGWimp]	ME	z-stat	ME	z-stat	ME	z-stat	ME	z-stat
HubrisTone	**0.001**	**(0.98)**	**0.001***	**(1.73)**	**0.002****	**(2.45)**	**0.003****	**(2.78)**
GWTA	0.161**	(2.26)	0.159**	(1.97)	0.225***	(2.42)	0.243**	(2.18)
MA_{t-1}	0.001	(0.13)	−0.005	(−0.62)	−0.017	(−1.47)	−0.016	(−1.29)
lnTA	0.023**	(2.20)	0.016	(1.35)	0.014	(1.26)	0.021*	(1.61)
lnMB	−0.016	(−0.62)	−0.012	(−0.50)	−0.004	(−0.15)	0.008	(0.28)
Ret	0.034	(1.10)	0.025	(0.89)	0.009	(0.35)	0.014	(0.39)
RoA	0.031	(0.22)	−0.017	(−0.09)	0.079	(0.47)	0.195	(1.08)
Loss	0.049	(1.13)	0.033	(0.59)	0.069	(1.16)	0.021	(0.34)
ΔRev	−0.033	(−0.59)	−0.015	(−0.54)	−0.088	(−1.05)	−0.068	(−0.67)
Lev	0.000	(0.00)	0.000**	(2.36)	0.000	(1.09)	0.000**	(2.33)
CEObonus	0.064	(0.57)	0.038	(0.30)	0.048	(0.30)	−0.113	(−0.78)
CEOage	−0.002	(−0.72)	−0.002	(−0.57)	−0.001	(−0–0.39)	−0.001	(−0.13)
CEOturnover	−0.008	(−0.22)	0.036	(0.79)	0.085*	(1.49)	0.064	(1.12)
sameCEO	−0.023	(−0.79)	−0.016	(−0.50)	0.026	(0.63)	0.017	(0.46)
Industry fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
Pseudo R²	0.091		0.084		0.124		0.142	
N	724		594		487		375	

Panel B: Comparisons of coefficients

	Coefficients		Difference	Chi-sq.	p-value
λ_{1,t+4} > λ_{1,t+2}	0.025	0.009	0.015**	3.46	0.063
λ_{1,t+4} > λ_{1,t+1}	0.025	0.006	0.018**	4.31	0.038
λ_{1,t+3} > λ_{1,t+2}	0.017	0.009	0.008	1.36	0.243
λ_{1,t+3} > λ_{1,t+1}	0.017	0.006	0.01	2.07	0.150

Notes: This table presents tests of H2 (Eq. (2)) and logistic regression results of the effect of hubristic tone on the probability of recognizing a goodwill impairment loss at time $t + 1$, $t + 2$, $t + 3$, and $t + 4$, respectively. The dependent variable, *dGWimp,* is an indicator variable taking the value of "1″ when a goodwill write-down has taken place, and "0" otherwise. The variable of interest is *HubrisTone,* which indicates the effect of hubristic tone on recognizing goodwill impairment losses in each respective period. In Panel A, marginal effects are reported and z-statistics, shown in parentheses, are based on standard errors that are clustered at the firm level (*** p < 0.01 **p < 0.05, * p < 0.10). All variables are defined in Table 2. Panel B shows tests of the differences between coefficients of *HubrisTone* in different periods. Positive differences signal delays.

These results lend support to H1, that the hubristic tone in CEO letters can help predict purchase price allocation, adding to findings in prior studies that have focused on economic factors and managerial incentives as determinants of purchase price allocation to goodwill (see, e.g., Detzen and Zülch, 2012; Shalev et al., 2013; Zhang and Zhang, 2017). Notably, while

the size of the firm is a determinant of the goodwill allocation, we do not observe any association between other firm- or CEO-related variables and the dependent variable.

Table 7 reports the results from the logistic regression on the probability that a firm recognizes a goodwill impairment loss in any of the four years following the acquisition (Eq. (2)). Panel A shows the association between hubristic tone and the probability of a firm writing down goodwill, and Panel B contains tests of differences between coefficients across models.[14] The coefficient of *HubrisTone* in Panel A is consistently positive and increases over time (ME: 0.001, z-stat: 0.98 in $t + 1$; ME: 0.001, z-stat: 1.73 in $t + 2$; ME: 0.002, z-stat: 2.45 in $t + 3$; and ME: 0.003, z-stat: 2.78 in $t + 4$). In other words, the effect of *HubrisTone* on write-downs is more pronounced in later periods than in earlier periods, and the difference is statistically significant (see Panel B). For example, when *HubrisTone* increases by one standard deviation, the average increase in the probability of a goodwill write-down is 4 percentage points higher in $t + 4$ compared to $t + 1$ ($\approx 20 \times [0.003–0.001]$). These results, indicating a delay in goodwill write-downs in firms with a more hubristic tone at the top, are robust to controlling for *sameCEO*[15] and *CEOturnover*.

According to Malmendier and Tate (2008), a lower average value is created from acquisitions made by overconfident CEOs (indicating lower-quality acquisitions). Analogously, hubris-driven acquisitions, characterized by an underestimation of risks and uncertainties facing the firm, should be followed by a higher probability of writing down goodwill. On average, we find this to be true, as evidenced by the positive correlation between hubristic tone and goodwill write-downs. However, the write-down occurs with a delay (in the third and fourth period relative to the acquisition), providing some indication that hubris leads to impairment avoidance. The observed delay is consistent with the belief that hubristic managers are reluctant to recognize negative outcomes due their unshakable belief in their own abilities and an unwillingness to acknowledge faults in their judgment (Owen & Davidson, 2009).

Turning to the CEO turnover model in Table 8 (Eq. (3)), we observe a positive and significant coefficient on the interaction variable, indicating that as the hubristic tone in departing CEOs' letters increases, the probability of writing down goodwill upon the appointment of a new CEO, increases (coeff.: 0.04, z-stat: 2.02). Panel B shows the probabilities of a write-down in firm-years with and without CEO turnover and with low and high levels of (departing CEO) hubristic tone. For example, when the departing CEO's hubristic tone is low (one standard deviation below average), the probability of a goodwill write-down in the turnover year goodwill is 7 %. This may be contrasted to a probability of 26 % when the departing CEO has a high *HubrisTone* score (one standard deviation above the average). Overall, results are consistent with a hubristic tone at the top being associated with delayed write-downs (and inflated goodwill values).

Additional analysis

The "high stakes" hypothesis

As additional analysis, we investigate how the association between hubristic tone at the top and goodwill write-downs is conditional on the actual allocated goodwill amount. We propose a "high stakes" hypothesis, which states that a reluctance to write down goodwill among hubristic CEOs increases as the share of the purchase price allocated to goodwill increases. This stems from the fact that larger goodwill raises the stakes for executives who are concerned with their image. By contrast, in firms whose CEO letter tone is not characterized by hubris, having more goodwill increases the probability of a write-down (consistent with a higher likelihood that goodwill is overvalued). To test this, we extend Eq. (2) to allow for an interaction between hubris and the purchase price allocated to goodwill $HubrisTone \times PPA\_GW_{it}$:

$$\Pr\left(dGWimp_{it+\tau} = 1\right) = \Lambda[\delta_0 + \delta_1 HubrisTone_{it} + \delta_2 PPA\_GW_{it} + \delta_3 HubrisTone \times PPA\_GW_{it}$$
$$+ \sum_{j=1}^{n} \varphi_{it}^j Control_{it+\tau}^j + \eta_{it+\tau}]\forall \tau = 1, 2, 3, 4 \tag{4}$$

A negative coefficient for the interaction variable (δ_3) indicates that as the size of goodwill and hubristic tone increase, the probability of writing down goodwill decreases.[16]

As predicted, significantly negative coefficients are observed on the interaction term $HubrisTone \times PPA\_GW_{it}$ in $t + 1$ and $t + 2$, but not $t + 3$ and $t + 4$ (see Table 9, Panel A). This points to a reluctance to write down goodwill when stakes are higher, and this is especially pronounced in earlier periods. A reluctance to write-down "bad goodwill" is then offset by the necessity of recognizing an impairment loss in later periods (see main results in Table 7).

Since the coefficients on interaction terms based on continuous variables cannot be meaningfully interpreted, we calculate marginal effects and plot them for $t + 1$ in Fig. 2a. Fig. 2b shows that the probability of goodwill write-downs at different combinations of hubristic tone and purchase price allocation to goodwill. Specifically, when *HubrisTone* is low (i.e., one standard deviation below the mean), the probability of recognizing an impairment loss increases as the purchase price allocation

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[14] Our logistic models are dependent across years and therefore have a joint bivariate normal distribution. A test of coefficient equality across models is problematic because the asymptotic covariance matrix is unknown, specifically the variance of the difference between the two relevant estimators. However, the variance is most likely to be overestimated, reducing our chances of rejecting of the null hypothesis that the two coefficients are equal (i.e., increasing of the probability of type II errors over type I errors).

[15] We also carry out tests on a restricted sample that requires the same CEO to be present in all years. Results remain robust.

[16] Note that the coefficient on *HubrisTone* represents the effect of hubris on the probability of recognizing an impairment loss *when the purchase price allocation to goodwill is zero*. More specifically, due to the presence of interaction terms, the regression coefficients of the lower-order (base) variables do not represent the unconditional effects of a unit-change in the given independent variables.

Table 8

Hubristic tone and the probability of goodwill impairment loss recognition in CEO turnover years (Test of H2).

Panel A: Regression results (Eq.3)		
Dependent variable: Pr[*dGWimp*]	Coeff.	z-stat.
HubrisTone$_{t-1}$	0.000	(0.03)
CEOturnover	−0.001	(−0.00)
HubrisTone$_{t-1}$ × CEOturnover	0.040**	(2.02)
GWTA	1.558**	(2.25)
MA$_{t-1}$	0.005	(0.07)
lnTA	0.211**	(2.11)
lnMB	−0.274	(−1.02)
Ret	0.339	(1.31)
RoA	1.431	(0.91)
Loss	0.715	(1.60)
∆Rev	−0.578	(−0.97)
Lev	0.001	(0.33)
CEObonus	0.69	(0.61)
CEOage	−0.027	(−1.25)
CEOhubris	0.004	(0.63)
Industry and year fixed effects	Yes	Yes
Pseudo R^2	0.106	
N	680	

Panel B: Estimated margins			
	CEO turnover	Probability of goodwill writedown	p-value
Low level of departing CEO's tone	No	12 %	<0.001
	Yes	7 %	0.048
High level of departing CEO's tone	No	14 %	<0.001
	Yes	26 %	0.001

Notes: This table presents tests of H2 (Eq. (3)) and logistic regression results of the effect of hubristic tone on the probability of recognizing a goodwill impairment conditional on CEO turnover. The dependent variable, *dGWimp*, is an indicator variable taking the value of "1" when a goodwill write-down has taken place. The variable of interest is the interaction between the hubristic tone score related to the departing CEO and CEO turnover (*HubrisTone$_{t-1}$* × *CEOturnover*). In Panel A, the coefficients from logistic regressions are reported, and in Panel B the corresponding margins are calculated for different values of *HubrisTone* and *CEOturnover*. A high (low) level of the departing CEO's hubristic tone is defined as a *HubrisTone$_{t-1}$* score of 1 std. dev. above (below) the mean; z-statistics, shown in parentheses, are based on standard errors that are clustered at the firm level (*** p < 0.01 **p < 0.05, * p < 0.10). All variables are defined in Table 2.

Table 9

Hubristic tone and the probability of goodwill impairment loss recognition in conditional on the amount of the purchase price allocated goodwill.

Panel A: Regression results (Eq. (4))	t + 1		t + 2		t + 3		t + 4	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
HubrisTone	0.016**	(2.18)	0.020**	(2.41)	0.019*	(1.74)	0.032**	(2.20)
PPA_GW	0.399**	(2.12)	0.375**	(2.10)	0.209	(1.12)	0.093	(0.47)
HubrisTone × PPA_GW	−0.028**	(−2.13)	−0.029**	(−2.08)	−0.009	(−0.47)	−0.02	(−0.90)
Control vars. (Eq. (4))	Yes		Yes		Yes		Yes	
Industry and year fixed effects	Yes		Yes		Yes		Yes	
Pseudo R^2	0.109		0.097		0.12		0.147	
N	722		591		485		374	

Panel B: Estimated margins (t + 1)		
Percentage of PPA allocated to goodwill	Probability of goodwill write-down	
	Low level of hubristic tone	High level of hubristic tone
1 %	10 %	16 %
25 %	11 %	15 %
50 %	12 %	13 %
75 %	14 %	12 %
99 %	15 %	10 %

Notes: This table presents the additional analysis regarding the effect of hubristic tone on the probability of recognizing a goodwill write-down conditional on the allocated goodwill amount in business combinations (Eq. (4)). The dependent variable, *dGWimp*, is an indicator variable taking on the value of "1" when a goodwill impairment loss has been recorded at time *t* + 1, *t* + 2, *t* + 3, *and t* + 4. The variable of interest is the interaction between hubristic tone and goodwill as a percentage of the total purchase price (*HubrisTone* × *PPA_GW*). In Panel A, the coefficients from logistic regressions are reported and in Panel B the corresponding margins (at *t* + 1) are calculated for different percentages of purchase price allocated to goodwill. z-statistics, shown in parentheses, are based on standard errors that are clustered at the firm level (*** p < 0.01 **p < 0.05, * p < 0.10). All variables are defined in Table 2.
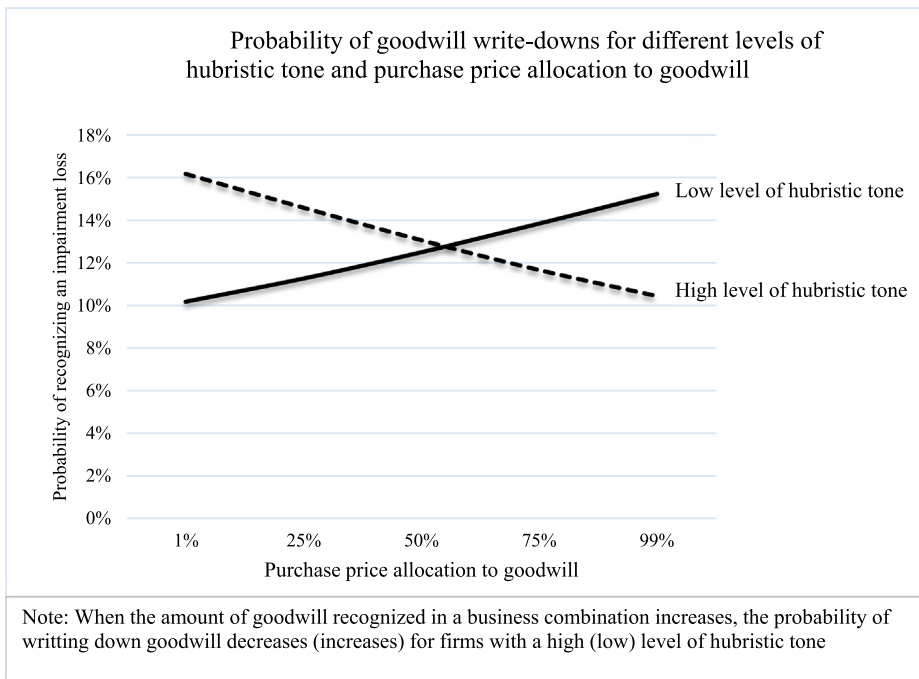
Note: When the amount of goodwill recognized in a business combination increases, the probability of writting down goodwill decreases (increases) for firms with a high (low) level of hubristic tone

Fig. 2. Marginal effects pertaining to the probability of recognizing a goodwill impairment. **(a).** Probability of goodwill write-downs for different levels of hubristic tone and purchase price allocation to goodwill. Note: When the amount of goodwill recognized in a business combination increases, the probability of writing down goodwill decreases (increases) for firms with a high (low) level of hubristic tone **(b).** Change in the probability of a goodwill write-down as the purchase price allocation to goodwill increases by one percentage point. *Note*: As the purchase price allocation to goodwill increases by one percentage point, the probability of recognizing an impairing loss increases at a decreasing rate the more hubristic the tone is. At the mean value of hubristic tone (*HubrisTone = 0*), the probability of recognizing an impairment loss starts to *decrease*.

Note: As the purchase price allocation to goodwill increases by one percentage point, the probability of recognizing an impairing loss increases at a decreasing rate the more hubristic the tone is. At the mean value of hubristic tone (*HubrisTone=0*), the probability of recognizing an impairment loss starts to *decrease*.
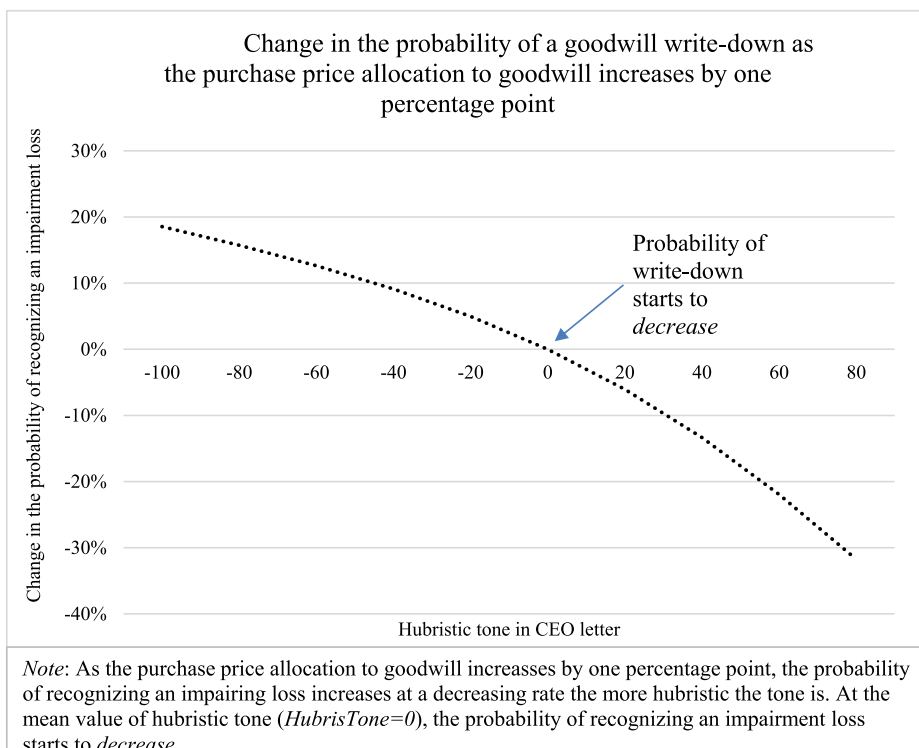
Fig. 2 (*continued*)

to goodwill increases. For example, when the purchase price allocation increases from 25 % to 75 %, the probability of writing down goodwill increases by 3 percentage points (11 % compared to 14 %). By contrast, when *HubrisTone* is high (i.e., one standard deviation above the mean), the probability of recognizing an impairment *decreases* as the purchase price allocation to goodwill increases. Thus, when the purchase price allocation increases from 25 % to 75 %, the probability of writing down goodwill decreases by 3 percentage points (from 15 % to 12 %). Finally, and complementarily, we show in Fig. 2b that a one percentage point increase in *PPA_GW* increases the probability of recognizing an impairment loss at a *decreasing rate* when *HubrisTone* is below the mean. When *HubrisTone* is above the mean, a one percentage point increase in *PPA_GW* actually starts *reducing* the probability of recognizing an impairment loss.

CEO letters signed by allegedly hubristic CEOs

In testing the usefulness of DICTION dictionaries for identifying hubristic tone, we follow Craig and Amernic (2018) and specifically look at the CEO letters of firms with CEOs who are allegedly hubristic: BP (Lord Browne of Madingley), Royal Bank of Scotland (Sir Fred Goodwin) and News Corporation (Rupert Murdoch). We collect five letters signed by Browne between 2002 and 2006; nine letters signed by Goodwin between 2003 and 2012 (except for 2005); and six letters signed by Murdoch between 2002 and 2007. First, we calculate *H_DICTION* for all 20 CEO letters. The average score is 89.16 and this value is significantly higher than the mean (80.63) in our sample (*t*-stat: 2.00). Second, for each dictionary, DICTION reports scores that represent a normal range (between one standard deviation above and below the mean expected score). For all 20 CEO letters, we rank DICTION's 31 dictionaries based on the number of times that each dictionary score appears significantly outside the normal range. Dictionaries that appear most frequently (in over half of the CEO letters in this sample) are: *Ambivalence* (15 times), *Accomplishment* (14 times), *Denial* (14 times), *Tenacity* (13 times), *Numerical Terms* (12 times) and *Hardship* (10 times). All these dictionaries are used in *HubrisTone*, except *Numerical Terms* which reflect numeric features of CEO letters. Except for in the case of *Tenacity*, all the scores are outside the normal range in the expected direction.

Finally, we analyze the last three CEO letters in Enron (1998–2000) as these have been claimed to reflect hubristic leadership right before the accounting scandal occurred (Tourish and Vatcha, 2005). We calculate the mean value of *H_DICTION* for these letters and find it to be 93.58, which is again significantly higher than the mean in our sample (*t*-stat: 5.66).

Breakdown of HubrisTone

Since *HubrisTone* is a composite measure, we break down the variable into the individual dictionaries and document how they are interrelated, as well as whether their coefficient signs are consistent with expectations. We expect positive (negative) associations between dictionaries that have the same (opposite) sign in the hubris measure. We note from Table 10 that most associations are according to expectations. For example, *Accomplishment* is positively correlated with *Aggression*, *Self-reference*, *Inspiration*, *Praise* and *Spatial terms*; and negatively correlated with *Ambivalence*, *Concreteness*, *Denial*, and *Hardship*. By contrast, some dictionaries (especially *Aggression* and *Tenacity*) appear to capture hubris less consistently. While we posit that a hubristic individual is simultaneously more aggressive and prone to express satisfaction and praise, more aggressive language is generally associated with less praise and satisfaction. As also noted in section 5.1, we attribute this to the occurrence of negative words in this dictionary.

For tests of H1 in Table 11, all dictionaries have coefficients in the expected direction with the exception of *Aggression* and *Tenacity*. Moreover, we are able to confirm the individual contributions of the following dictionaries: *Concreteness*, *Denial, Hardship*, *Inspiration*, *Passivity*, *Spatial awareness* and *Tenacity*. With respect to H2, we look at the difference in coefficients from logistic tests of write-down probabilities over time. Specifically, we compare the fourth and first period ($\lambda_{1,t+4} - \lambda_{1,t+1}$), where a positive difference (indicating an increased probability) implies a delay. We find that eleven out of fourteen dictionaries carry the expected sign, but are not statistically significant. We note that the nature of the impairment model makes drawing statistical inferences about individual dictionaries' influence on the hubris measure less feasible. A low power of the test is attributable to a low variation in the dependent variable and a comparatively small sample in later periods ($t + 4$).

We further investigate the dictionary *Tenacity* as it may be considered noisy. *Tenacity,* according to the definition in DICTION, connotes confidence and totality and was suggested by Amernic et al. (2010) to be a relevant component of hubristic tone. However, upon closer inspection, this dictionary is composed of auxiliary verbs (forms of "be", "do" and "have"). While these are "no-nonsense" words, they are arguably very general. Furthermore, the analysis of CEO letters written by hubristic CEOs (see analysis above) shows that they all exhibit comparatively *low* tenacity. *Tenacity* is also not correlated with CEO photo size and is associated with M&A in the opposite direction to the expected. Therefore, we perform additional (untabulated) tests excluding *Tenacity*. Results corresponding to H1 are statistically stronger (confirming the potential noise in this dictionary), while they remain unaltered in all tests of H2.[17]

Furthermore, to eliminate any concerns that the hubris measure is merely a proxy for optimism or positive tone, a hubris measure that excludes all DICTION dictionaries that reflect optimism is constructed (i.e., *Praise*, *Satisfaction* and *Inspiration*

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[17] In section 5.1, the analysis of the tone measure provided inconsistent results across two of our benchmark measures (*CEOoverpay* and *lnCEOpicsize*) with respect to *Aggression* and *Denial.* In untabulated analysis, we therefore also exclude these dictionaries (jointly and individually) from the *HubrisTone* measure and repeat all tests. We obtain consistent results for H1 and the turnover hypothesis, but not with respect to the increasing probability of write-downs over a four-year period, suggesting that the contribution of these dictionaries to the aggregate measure varies across models.

Table 10
Pairwise correlations between underlying *HubrisTone* dictionaries.

	Accomplish.	Aggress.	Ambival.	Concrete.	Denial	Self-ref.	Hardship	Inspir.	Motion	Passiv.	Praise	Satisf.	Spatial
Aggression	**0.058**	1											
Ambivalence	**−0.208**	−0.007	1										
Concreteness	**−0.063**	**−0.067**	**−0.123**	1									
Denial	**−0.179**	0.044	**0.304**	−0.028	1								
Self-reference [pl.]	**0.066**	0.001	**0.114**	**−0.153**	**0.063**	1							
Hardship	**−0.137**	**0.250**	**0.089**	−0.041	**0.106**	**−0.064**	1						
Inspiration	**0.261**	−0.038	**−0.093**	**−0.053**	−0.039	0.032	**−0.076**	1					
Motion	0.022	−0.030	0.013	−0.018	−0.004	**0.075**	−0.01	0.016	1				
Passivity	**0.197**	−0.006	−0.013	−0.043	−0.002	0.039	−0.011	0.013	0.005	1			
Praise	**0.140**	**−0.055**	−0.015	0.034	**−0.056**	**0.074**	**−0.106**	**0.068**	0.034	0.016	1		
Satisfaction	**−0.055**	**−0.106**	**0.166**	**−0.095**	**−0.073**	**0.074**	−0.040	0.029	0.038	−0.002	0.029	1	
Spatial terms	**0.150**	−0.036	**−0.122**	**0.074**	**−0.056**	0.030	**−0.052**	**0.121**	**0.056**	0.033	−0.044	**−0.117**	1
Tenacity	−0.023	**0.073**	**0.251**	**−0.077**	**0.238**	**0.144**	0.029	**−0.109**	0.038	0.014	**0.160**	**−0.068**	0.020

Notes: This table presents pairwise correlations (Pearson) between the dictionaries underlying the tone measure. Boldface figures indicate significance at the 10% level.

Table 11
Hypothesis tests with a breakdown of *HubrisTone.*

		H1 (Eq. (1))	H2 (Eq. (2))
HubrisTone dictionaries	Expected sign	Coeff.	$\lambda_{1,t+4} - \lambda_{1,t+1}$
Accomplishment	+	**0.0006**	**0.035**
Aggression	+	−0.0015	**0.006**
Ambivalence	−	**−0.0054**	**−0.012**
Concreteness	−	**−0.0051*****	**−0.039**
Denial	−	**−0.0166****	**−0.185**
Hardship	−	**−0.0099***	**−0.004**
Inspiration	+	**0.0075****	−0.077
Motion	+	**0.0024**	**0.108**
Passivity	−	**−0.0065****	0.040
Praise	+	**0.0015**	**0.082**
Satisfaction	+	**0.0024**	**0.131***
Self-reference [pl.]	+	**0.0013**	**0.002**
Spatial awareness	+	**0.0049****	−0.021
Tenacity	+	−0.0044***	**0.019**

Notes: This table presents additional analyses regarding the individual dictionaries' effect for H1 (Eq.1) and H2 (Eq.2). For H1, the coefficients of corresponding dictionaries tested in separate regressions are presented. For H2, the tests of the differences between coefficients in $t + 1$ and $t + 4$ are shown. Boldface values show dictionaries that have the expected sign. Definitions of the dictionaries are presented Table 1.

are subtracted from, and *Denial* and *Hardship* are added back to, our hubris measure).[18] Results for H1 (Eq. (1)) are similar to those in Table 6 (coeff: 0.014, z-stat: 2.15). Results for H2, Eq. (2), are also qualitatively the same (with similar coefficients). Tests comparing the fourth and first period ($\lambda_{1,t+4} - \lambda_{1,t+1}$) indicate an increase in the probability of a write-down as hubris increases (Chi-sq. 2.83, p-value: 0.09). The coefficient of the interaction variable $HubrisTone_{t-1} \times CEOturnover$ (Eq. (3)) is similar but with larger standard errors (coeff: −0.037, *t*-stat: −1.64). In sum, results indicate that our findings are robust to alternative measures of hubris and that our conclusions do not solely rely on the presence of firm-specific or optimism factors.

Alternative econometric specifications

We consider a propensity score matched estimation approach to address the existence of a potential non-linear association and to help alleviate concerns about unobserved selection bias. We construct an alternative, binary measure of hubristic tone that considers tone scores above and below the median. Using a propensity score matching approach to investigate the average treatment effect of hubristic tone (ATT),[19] we compare hubristic (treated) and non-hubristic (control) tone with respect to our outcome variables in a matched sample. Using a probit model, we predict the likelihood of having a hubristic tone based on firm-specific and CEO-specific variables in order to generate a propensity score. The variables that are used in the model are: *ΔRev*, *RoA*, *Ret*, *lnMB*, *lnTA*, *CEObonus CEOtenure*, *CEOturnover*, *CEOage*, and year and industry indicators. Additionally, we consider the effect of past firm performance by including two indicator variables defined as whether the return on assets (*Past_perform*) or the stock market returns (*Past_Mperform*) exceed the sample median in each of the past five consecutive years.

When creating a matched sample, we apply the following criteria: a) matching without replacement (i.e., 1-to-1) and b) nearest-neighbor matching with and without specifying a caliper width (representing the maximum absolute difference in the propensity scores between matched subjects). We choose a caliper of 0.01 to create a contrast to the no-caliper specification.[20] These matching criteria limit the size of the sample to 574 (5 2 2) observations without (with) caliper restrictions.

Table 12 shows the average relative size of goodwill recognized following a business combination is significantly higher in firms with hubristic tone (ATT: 0.070, *t*-stat: 2.77 without caliper restriction; ATT: 0.051, *t*-stat: 1.83 with caliper restriction). Results related to H2 (Eq. (2)) indicate that the probability of writing down goodwill when the tone is hubristic is greater in all periods ($t + s$)—a reflection of having carried out unsuccessful acquisitions. Specifically, and consistent with expectations, comparing hubristic (treated) and non-hubristic (control) tone, we find that the difference in write-down probabilities is significant in the fourth period (ATT in $t + 4$: 0.038, *t*-stat: 2.70 without caliper restriction; ATT in $t + 4$: 0.059, *t*-stat: 2.28 with caliper restriction) but not in the first period.

In addition to propensity score matching, we test the models' sensitivity to other econometric variations. Specifically, a Tobit estimation may be considered preferable to OLS when applying Eq. (1) as it addresses the skewed distribution caused by the purchase price allocation data having a zero-inflated distribution (i.e., indicating a large number of corner responses, Wooldridge, 2010). When estimating a Tobit regression model and calculating the unconditional average partial effects

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[18] These dictionaries are included in the Master variable *Optimism* as defined by the DICTION software.

[19] The Average Treatment Effect on the Treated (ATT) represents the average causal effect of a hubristic tone at the top for a subgroup of treated (i.e., hubristic) individuals, the accuracy of which hinges on the inclusion of all relevant, confounding factors.

[20] The choice of caliper should reflect the variance-bias trade-off. A relatively narrow caliper results in closer matches and a smaller sample, which decreases bias but increases variance (see, e.g., Austin 2011).

Table 12
Propensity score matching.

Dependent variables:	Caliper (0.01)	Treated Group		Controls Group		Difference (ATT)	t-stat.
		N	ATE	N	ATE		
H1, Eq.1							
PPA_GW	Yes	235	0.225	287	0.174	0.051	1.83*
PPA_GW	No	287	0.233	287	0.164	0.070	2.77**
H2, Eq. (2):							
dGWimp ($t + 1$)	Yes	235	0.136	287	0.111	0.025	0.84
dGWimp ($t + 4$)	Yes	235	0.162	287	0.080	0.081	2.70**
dGWimp ($t + 1$)	No	287	0.140	287	0.101	0.038	1.41
dGWimp ($t + 4$)	No	287	0.139	287	0.080	0.059	2.28**

Notes: This table reports average treatment effects (ATE) based on a propensity score matching approach. We create an indicator variable equal to one if the hubristic tone score is above the median, and zero otherwise, to compare hubristic tone (treatment group) with non-hubristic tone (control group) in a matched sample. The table reports the number of observations in each group, average treatment effects and the differences between the treated and the control group (i.e. the Average Treatment Effect on the Treated, ATT) for outcome variables in our main models (i.e., Eq. (1) and Eq. (2)). The final column reports two-sided t-statistics based on tests of differences in means across groups (***p < 0.01 **p < 0.05, *p < 0.10).

(APE), we find that the observed association holds (ME: 0.0017, z-stat.: 2.98), indicating that results are not driven by observations taking the value of zero.

Finally, we consider the potential monitoring effect of the board on our results. Prior research suggests that the board of directors contribute to critical corporate decisions in firms by providing advice to management, for example in the context of M&A (Kim et al. 2014). In addition, the monitoring role of boards has been examined in relation to managerial disclosures (García Osma and Guillamón, 2008). We therefore include proxies for board impact in our models for a subsample of firms for which there is data. We find that board size, having the CEO on the board, and the number of outside directors on the board do not significantly explain hubristic tone, and the effect of hubristic tone on our dependent variables are robust to including these governance measures in our models.

Conclusions

In this study, we examine the level of hubris in the tone at the top (as conveyed via CEO letters) and its association with goodwill accounting. Goodwill is an accounting item that is subject to managerial discretion, which suggests that the effect of managers' personality traits and cognitive biases are more pronounced. We predict that hubristic tone is associated with both the proportion of the purchase price allocated to goodwill, and the likelihood of recognizing a goodwill impairment in future periods.

Our empirical results reveal that the amount of goodwill recognized in a business combination increases significantly as the tone becomes more hubristic. We also find that, as hubristic tone increases, there is an increasing probability of goodwill write-downs over time, indicating a delay in recognizing impairment losses. Furthermore, when a departing CEO exhibits a more hubristic tone, the probability of a goodwill write-down increases in the turnover year. This is consistent with hubristic CEOs' reluctance to recognize an impairment loss, impelling the new CEO to acknowledge a deterioration of the future prospects of the firm.

Overall, our findings contribute to research on the determinants of goodwill accounting. They indicate that goodwill resulting from hubristically driven business combinations becomes "no-will" that requires a write-down. Yet, impairment losses are not recognized in a timely manner because of hubristic individuals' tendency to let their broad vision of what is considered the correct course of action prevent them from implementing any necessary changes.

Our results have implications for those in charge of corporate governance and monitoring by showing that a managerial discourse characterized by hubris influences firm-level decisions. Extreme personality traits of the senior management, such as hubris and narcissism, should consequently be monitored. Our findings also inform the IASB as they continue to evaluate the status of goodwill accounting and the relative benefits of annual impairment tests compared to amortization plans (IASB, 2019; 2020).

This study is not without caveats. Although reliance on software-based textual analysis helps ensure objectivity in the measures, a weakness of this approach lies in its failure to recognize the context within which certain words are used. This creates noise in the measures, making the approach less suitable for the analysis of a single narrative piece. Furthermore, this study relies on only one CEO communication channel to analyze CEO-speak (i.e., the CEO letter). Future research may explore other channels, such as CEO speeches, conference calls and corporate texts other than the annual report. Finally, because narcissism is a trigger and prerequisite for hubris syndrome, we acknowledge that our results for hubristic tone can also be attributable to narcissism.

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