CEO OVERCONFIDENCE AND TONE OF ANNUAL REPORT

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Abstract

I examine the impact of CEO overconfidence on the sentimental tones used by firms in the annual reports. Following Loughran & McDonald's sentiment word list, the thesis investigates whether firms headed by overconfident CEOs tend to use more favorably or tend to avoid positive, strong, moderate, negative, uncertain, litigious, constraining and weak tones while filing 10-K reports. The thesis provides strong evidence of lesser instances of negative and strong tones in annual reports of the firms headed by overconfident CEOs and weak evidence of lesser instances of litigious tone. The thesis also provides strong evidence of firms headed by overconfident CEOs with higher levels of cash increasing the use of strong tone in annual reports, and more valued decreasing the use of litigious tone. Also, the results show weak evidence of firms headed by overconfident CEOs with higher capital expenditure increasing the use of negative tone and highly leveraged firms headed by overconfident CEOs decreasing the use of litigious tone.

Key Words: overconfidence, tone, annual report, CEO, textual analysis, 10-K, negative tone, litigious tone, strong tone, strong modal words, strong modal verbs.

Acknowledgment

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Chapter 1
INTRODUCTION

In the span of the last two decades, there have been quite a few papers investigating managerial overconfidence and its effects on corporate finance policies. Textual analysis has also been a buzzword in this era and has been explored from a behavioral finance perspective. Motivated by the researches conducted by Huang et al. (2014) and Mayew & Venkatachalam (2012) that looked into managers' use of language during earnings press releases, and their content and pitch of voice during discussion with analysts to investigate managers' probable attempts to inform/mislead the investors and/or to render insights on firms' future returns and performances; by Merrienboer (2016) that the impact of such tones matters more when the CEO is overconfident; and by Aghazadeh et al. (2018) who suggest that a higher level of disclosures might be associated with CEO overconfidence as perceived by the investors and overconfident managers may adopt an aggressive reporting style, in this study I link CEO overconfidence with tones of 10-K corporate filings .

The findings suggest that firms headed by overconfident CEOs tend to avoid negative tone in their annual reports more than firms headed by non-overconfident CEOs. Firms head by such CEOs also refrain from using a strong tone in annual reports. Apart from this, I also observe weak evidence supporting a negative association between CEO overconfidence and use of litigious tone in 10-K filings.

The contribution of this research is twofold. First, the study bridges corporate finance and behavioral finance. Overconfidence has been mostly investigated in terms of other corporate finance issues, such as – investment decisions, capital budgeting, cost of capital, etc. But I work with overconfidence from a behavioral finance perspective. Second, it contributes to the growing literature on textual analysis and its effects. Prior studies primarily examined annual report tones, primarily positive and negative tone, with market reaction. This is the first study involving annual report tones in an expanded range based on textual analysis with managerial psychological makeup, such as managerial overconfidence. Also, this research is the first to explain the reasons behind the influence of CEO overconfidence on the tone of the annual report based on prior literature.

CEO overconfidence stems from 'better-than-average' effect, explained in a psychology paper by Alicke et al. (1995). Hirshleifer, Low & Teoh (2012) defines an overconfident CEO as an individual posing an idea about herself/himself being better than (s)he really is, the criteria being ability, judgment, or prospect for a favorable outcome. Malmendier & Tate (2005) constructs the definition of overconfidence as such that overconfident CEOs overestimate future firm performance driven by their delusion of being in control of favorable outcomes, an extensive level of commitment to a positive outcome and vague criterion for comparing performance. In the process, they increase their exposure to firm-specific risk intentionally.

Overconfidence is a widely discussed topic in concurrent finance literature. Although the term has a general negative vibe attached to it, literatures show both congenial as well as detrimental effects that come along with an overconfident CEO. Most prominent researchers on overconfidence, Malmendier & Tate (2005), argue that overconfident CEOs tend to overinvest when their firms have ample internal funds, but they underinvest when internal funds are scarce. Following the pecking order theory, overconfident CEOs prefer cash, followed by debt, over equity financing in the belief that investors won't perceive the true value of their firms in accordance with their expectations. They even tend to finance projects internally which had been more feasible to finance externally. Overconfident CEOs indulge in significantly more M&A (Rovenpor, 1993). According to Malmendier & Tate (2008), their overpaying nature for targets during an acquisition deal often lead to suboptimal merger synergy. As a result, the stock market reacts more sensitively (in a negative manner) to the merger announcements made by an overconfident CEO.

Because overconfident CEOs overestimate their capability of keeping a leash on the outcome and underestimate the probability of random events, their forecasts reflect an optimistic bias impacting the precision. Tied up in a situation to meet their initial forecasts, overconfident CEOs are more likely to be compelled to walk toward a slippery slope of financial misreporting that begins with an optimistic-but-unintentional forecast. Ahmed & Duellman (2012) find overconfident CEOs to take up aggressive accounting techniques such as earnings management more than their non-overconfident counterparts. Being forced to reach to the level of their minor optimistic bias while reporting financial statements, overconfident CEOs are more likely to misstate financial reports and commit frauds, especially when they have a significant portion of in-the-money unexercised exercisable options (Efendi, Srivastava & Swanson, 2007; Schrand & Zechman, 2012). An

overconfident CEO faces more restrictive debt covenants in terms of investment, M&A activities, and refinancing, due to concerns with future realization. These restrictions loosen if the CEO has superior prior performance, transparency in financial reports and higher delivered profitability. Thus, CEO overconfidence contributes to a suboptimal operating, investing, and financing business scenario increasing the business risk (Aghazadeh et al., 2018).

In contrast, overconfidence can also be instrumental in reducing business risk. Overconfident CEOs possess innovational excellence. They are more likely to approve risky but innovative projects which allow them to tap into firms' growth opportunities more efficiently (Hirshleifer et al., 2012). Consequently, researchers have found overconfidence to be positively associated with a number of patents, citations per issued patents and R&D expense (Galasso & Simcoe, 2011). Slothouber (2010) denotes a positive relationship between CEO overconfidence and firm value.

According to Druz (2015), managers reveal information regarding their firms, sometimes intentionally (tips) and sometimes unintentionally (tell). Huang et al. (2014) found substantial evidence that managers may misdirect or mislead investors through the tone they use during earnings press releases by using Loughran-McDonald's positive and negative words from their word list. They associate an abnormal positive tone with lower earnings and cash flows up to three (3) years. The LM dictionary has been used in various literature to evaluate the tones reflected in mutual fund letters, IPO prospectuses, analyst reports, business documents, newspaper articles, and columns, etc. Mayew & Venkatachalam (2012) also associate positive words with higher returns and negative words with negative returns, indicating that the content and pitch of managers' conference calls with analysts provide insight on future company performance. Feldman et al. (2010) show that a positive change in the tone of MD&A section triggers a positive reaction in the market. While Garcia (2013) shows the impact of newspaper sentiment on market returns, Dougal et al. (2012) associate a pessimistic tone in the newspapers about a firm affecting the next-day market return. Liu & McConnell (2013) conclude that cancellation of acquisitions is also probable contingent upon media attention toward that deal. Merrienboer (2016) suggests that the impact of information managers choose to reveal through tips or tells matter more when the CEO is overconfident. Previous literature shows how LM word list is associated with returns, trading volume, subsequent volatility of stock returns, earnings surprises, and also, material weakness and frauds. Many of the papers show how negative tone affects the market sentiment unfavorably. Sell-

side analysts correct their forecasts downward when they address an excessive negative tone leading to tinier future earnings. Loughran & McDonald (2011) found that the use of more negative words leads to lower excess return.

A higher proportion of litigious words used by the firms denotes stock return volatility as evident by literature findings. Using more negative words or more strong modal words is positively related to a material weakness in financial reporting. Negative and litigious tone also harms a firm's reputation as concluded by Barakat et al. (2019), and the capital market participants penalize the firm as well, especially in Anglo-Saxon countries with an efficient capital market. Negative sentiment has a proportionate relationship with higher delisting probability, lower possibility of paying dividends, higher provision of loan loss and lower ROA. When managers use more uncertain or more strong/weak modal words, confusion is created among the analysts in their predictions and forecasts affecting the influence on the market negatively. Managers' tones are associated with the company life cycle as well. According to Bakarich et al. (2017), a firm entering a declining stage will bear more negative words reflecting a downward growth potential as well as act more confidently via the use of more strong modal words as opposed to a firm not in its declining stage. Lopatta et al. (2014) find chances of firms having more negative and litigious words in their 10-K filings of violating FCPA, 1977 are probabilistically higher.

To test how overconfident CEOs tend to use different categories of words, I analyze eight (8) categories of words following Loughran & McDonald's word list of sentiments in their 10-X file summaries. I analyze the net positive, strong, moderate, negative, uncertain, litigious, constraining and weak tones in the 10-K filings by 3,118 firms over the 24 years from 1993 to 2016 to find their association with CEO overconfidence in anticipation that I will be able to portray which type of sentiments firms headed by overconfident CEOs tend to use more favorably when producing their annual reports. I remove total number of negation words, such as - 'No,' 'Not,' 'None,' 'Neither,' 'Never,' 'Nobody' etc., appearing within proximity of four or less words of a positive word in a sentence from the total number of positive words since use of such negation tone alongside a positive tone changes the meaning from positive to negative entirely.

Then I proceed to measure overconfidence. My research builds upon the definition of overconfidence being the intentional exposure of the CEOs to the firm-specific risk of their firms. Since there are quite a lot of methods to measure overconfidence as used in various previous

literature, and not one of them is proven to be better than the other, I measure overconfidence in two ways and then take the 1st principal component of those two to reflect a weighted index. The first approach I follow is Malmendier & Tate (2005)'s "Holder67" approach in terms of CEOs' unexercised exercisable call options. Malmendier & Tate argue a CEO to be overconfident if during the first five (5) years as the CEO, (s)he has the options 67% in-the-money at least twice but does not exercise. The rationale is that, when the options are in-the-money, the market price is higher than the strike price for call options, and a rational CEO is supposed to exercise her/his options in this favorable scenario. Instead, an overconfident CEO refrains from exercising the options because (s)he has a belief in the firm's prospect and intends to exercise at a later point of time when the market price is even higher. Following Aghazadeh et al. (2018), as a typical CEO does not vary her/his behavior over time and instead shows a persistent exercise behavior as implied by Malmendier & Tate (2005) and Hirshleifer, Low & Teoh (2012), I tweak the Holder67 approach a bit to form the *confident67* variable. Instead of calling a CEO overconfident if their options are 67% in-the-money at least twice during the first five (5) years and does not exercise the option, I call a CEO overconfidence from the first time after the vesting period her/his options are 67% in-the-money and (s)he does not exercise the options. I define a CEO to be overconfident if (s)he holds more unexercised exercisable options than the industry median in the second approach following Aghazadeh et al. (*optdelay*).

Using the eight (8) dependent variables and the overconfidence measure, 1st principal component of *confident67* and *optdelay*, I run a fixed-effects regression model controlling for year and firm fixed effects with cluster robust standard error to conclude on the research question. Since, overconfident CEOs think they are better in terms of ability and judgment as explained by better-than-average effect, I hypothesize that the tones reflecting a positive environment from Loughran-McDonald's dictionary may be more favorably used by the overconfident CEOs and the tones reflecting a negative environment may be generally avoided because overconfident CEOs would rationally want to portray and convey their belief of future prospect to the stakeholders as well. I include variables representing CEOs' personal traits as well as firms' characteristics following previous studies, such as Phua et al. (2018), Muslu et al. (2015), Li (2008), Aghazadeh et al. (2018) and Malmendier & Tate (2008), as the control variables. Since overconfidence is a behavioral trait of the CEOs, I understand the potential endogeneity issues. I address these issues by adding on

additional CEO characteristic variables as well as using year and firm fixed effects to address CEO-specific and firm-specific unobserved heterogeneity.

Prior literature can be instrumental to possibly explain the findings from the multivariate regression results. Malmendier & Tate (2005) explain why overconfident CEOs also follow pecking order for capital budgeting decisions. They prefer internal funds, and between debt and equity of external funds, they prefer debt over equity since they believe the investors won't perceive the potential and value of their firms as they do. Although there's contrasting evidence, literature found overconfident CEOs to face a higher cost of debt as the creditors are concerned about future realization of their money, more so for overconfident CEOs. Bondholders recognize the implications of overconfidence. They tighten the debt covenants for overconfident CEOs to restrict their investing, merger, and refinancing activities. These restrictions are tamed down if the CEOs behold superior prior performance, transparency in financial reports, and higher delivered profitability, which restraining the optimism by overconfident CEOs can help achieve more efficiently. Consequently, since overconfident CEOs prefer debt, they have the incentive to curb their level of overconfidence and portray moderation in their behavior as found from the results. Aghzadeh et al. (2018) showed a moderate level of overconfidence being optimal in terms of cost of equity as well. Malmendier & Tate argued that overconfidence matters more in equity-dependent firms. So, for an equity-dependent firm, a tamed down level of overconfidence is more significant by means of lower cost of equity. So, overall, exercising a moderate level of overconfidence is in the best interest of the overconfident CEOs when it comes to the cost of capital. A lower cost of capital leads to a higher firm value, which is ideally very important to a rational CEO. Since they have their unexercised exercisable options tied to the firm value, it's in their personal interest as well when an increased firm value increases the value of those options.

Literature provides evidence of investors reacting negatively to CEO overconfidence. They respond more negatively to a merger announcement by an overconfident CEO and the annual reports of the firms headed by overconfident CEOs. Sell-side analysts seem to revise their forecast downward if there's a negative tone portrayed. By virtue of a positive reaction in the market environment resulted in by a moderate level of overconfidence and avoidance of negative tone in annual reports as explained earlier, overconfident CEOs will be able to attract more targets for

M&A as they seem to be active in the M&A market as a resultant characteristic of their overconfidence, as well as investors.

Prior studies have shown CEO overconfidence to be positively associated with misstating financial reports. They start from a position where these misstatements are not intentional and geared more towards an optimistic bias. But eventually, to match up to their optimism, they might be in a position to intentionally misstate. Some short-term benefits may derive from these misstatements. But they put the CEOs at odds with long-term stock and bondholders. Restatement announcements have been seen to cause loss in market capitalization and substantially reduced public confidence. A moderation in overconfidence eradicates all these potential issues.

Aside from a negative tone, literature also reveals why overconfident CEOs may choose to avoid a strong tone. The market reacts to the use of more strong modal words with a confused state as if uncertainty has risen due to the disparity in different analysts' predictions (Druz, 2015). When a firm uses a strong tone, analysts differ in their interpretations and thus in their predictions and forecasts. When there are mismatches in analysts' evaluations, the market reacts negatively even though the CEOs display confidence through the use of more strong modal words. A firm in its entering phase into the declining stage of the business life cycle acts more ambiguous and confident through the use of a more negative, uncertain, weak or strong tone (Bakarich et al., 2017). A declining phase affects the firm value negatively because of the relationship of the business life cycle with accounting information, investment, financing, cash policy, risk-seeking/averting behavior and extent of analyst-following. To portray upside growth potential, an overconfident CEO has reason to avoid negative and strong tone in their 10-K filings. Lopatta et al. (2014) find firms using more negative and litigious words in their financial disclosures having a higher probability of violating the Foreign Corrupt Practices Act (FCPA), 1977. Litigious words in annual reports also hamper the reputation of the firm. In short, avoiding negative, litigious as well as strong tone in their annual reports has incentives for overconfident CEOs.

In order to find some alternative explanations as to the sensitivity of negative, strong and litigious tone to CEO overconfidence, I investigate the heterogeneous nature of these significant dependent variables across the higher and lower level of some CEO- and firm-specific characteristics from our research model. I create dummy variable based on the median value of the variables. I find strong evidence of firms headed by overconfident CEOs with higher levels of cash using more

strong tone in annual reports, and more valued firms (measured by market to book value) using lesser litigious tone. I also find weak evidence of firms headed by overconfident CEOs with higher capital expenditure using more negative tone and highly leveraged firms headed by overconfident CEOs using lesser litigious tone.

The remainder of the paper is organized as follows. Chapter 2 discusses the previous literature on overconfidence and the use of different tones in various business documents as well as how the market reacts to them. Chapter 3 describes the data I used alongside the methodology. Chapter 4 summarizes the results and findings, while Chapter 5 concludes the thesis.

Chapter 2
LITERATURE REVIEW AND RESEARCH QUESTION

CEO overconfidence, in a broader term, managerial overconfidence, is an aspect of behavioral finance that reflects "the tendency of individuals to think that they are better than they are in terms of characteristics such as ability, judgment, or prospects for successful life outcomes" (Hirshleifer, Low, & Teoh, 2012).

Malmendier & Tate (2005) build their definition of overconfidence that overconfident CEOs tend to overestimate the future performance of the company based on the 'better-than-average' effect, as explained in Alicke et al. (1995). Three (3) main factors – delusion of being in control, an extensive level of commitment to a positive outcome, and vague parameters for comparison of performance – basically leads to overconfidence (Malmendier & Tate, 2005). In other words, CEO overconfidence is the intentional exposure of the CEOs to the idiosyncratic risk of the firm.

The word 'overconfidence' in general has a negative vibe attached to it. But is overconfidence a bad trait to possess for the top management? How do investors perceive overconfidence in top management? Previous literature point in both directions.

On one hand, firstly, overinvestment is attributed to CEO overconfidence. Malmendier & Tate (2005) demonstrate the overinvesting nature of overconfident CEOs when internal funds are not scarce. They even finance feasible projects internally while they should have been financed externally instead. The frequency of mergers and acquisitions (M&A) are more prevalent when the CEOs are overconfident. And also, an increased number of M&As generating subpar, or even no merger synergy results from CEO overconfidence (Billett & Qian, 2008). Malmendier & Tate (2008) further conclude that overconfident CEOs overpay merger premiums. Several prior empirical studies, not only limited to the aforementioned ones but also including Heaton (2002), Benson & Ziedonis (2010), Shu et al. (2013), thus believe CEO overconfidence leads to suboptimal operating, investing and financing decisions which eventually result in increased business risk (Aghazadeh, Sun, Wang, & Yang, 2018).

On the other hand, investors may have reasons to believe that CEO overconfidence leads to decreased business risk and will turn out to be instrumental to an organization's betterment in the

sense that overconfident CEOs are more likely to consider taking on riskier or innovative projects. They might as well be willing to allocate budgets to investigate the feasibility of these sort of precarious investment projects (Hirshleifer, Low, & Teoh, 2012). Galasso & Simcoe (2011) show that overconfidence is positively related to a number of patents, research, and development (R&D) expenses and citations per issued patent. The perception of effort and innovational excellence among investors will, therefore, derive a reduced level of business risk.

From a forecasting point of view, an overconfident CEO is likely to reflect an optimistic bias in her/his forecasts. Because (s)he overrates her/his ability to control the outcomes and/or underestimates the probability of random events, CEO overconfidence results in an overestimation of forecasts by affecting the forecast decisions. CEO overconfidence effects even forecast precision as well. An overconfident CEO is more likely to make forecasts with a shrunk range i.e. narrower width with respect to range forecasts. They even go with point estimates sometimes, which restrains the accuracy of forecasts to a great deal (Hribar & Yang, 2010).

Under an imperfect contract setup, an overconfident manager destroys corporate value while making in-house capital budgeting decisions. Ben-David, Graham & Harvey (2013) find that managerial overconfidence leads to overinvestment. Heaton (2002) present a reasonable explanation for this alleged overinvestment argument. Since overconfident managers underestimate a project's volatility and believe that their predictions are mostly accurate, they perceive negative NPV projects as positive NPV projects. Simon & Houghton (2003), using field study methodology, find evidence that overconfident managers are more likely to endorse pioneer products that later on receive a lukewarm response. Malmendier & Tate (2005) conclude that overconfident managers' overinvestment level is positively related to the level of financial slack. Higher the financial slack, higher will be the value destroyed through overinvestment in capital budgeting decisions. They tend to overinvest for a project when they have abundant internal funds but at the same time trim down their investment when they have to take resort to external funds. When external financing is required, overconfident CEOs prefer debts over equity, second to cash, maintaining a pecking order. Because they overestimate the prospect and value of their companies, they believe that the market participants would not similarly view their firms and hence undervalue.

Before Richard Roll, academicians have attributed M&A to either synergy or agency (personal diversification, building empire, entrenchment, etc.) motive. Roll (1986) concluded for the first

time that overinvestment in mergers and acquisitions and subsequent value destruction could simply be attributed to managers' bias/hubris/overconfidence.

Malmendier & Tate (2008) show that overconfident CEOs have, on average, 65% higher possibility of making a value-destroying acquisition. Stock manager participants also react far more sensitively to M&A announcement by overconfident managers (Doukas & Petmezas, 2007). Further researches show a positive relationship between managerial overconfidence and number of completed M&A deal (Rovenpor, 1993) and also the number of M&A offers (Ferris, Jayaraman, & Sabherwal, 2013). Although they take on more M&A deals, they also take on a greater number of subpar M&A deals by overpaying for targets who do not warrant for that premium resulting in poor M&A synergy. Also, overconfident CEOs are more likely to close M&A deals quickly (Doukas & Petmezas, 2007). Overconfident CEOs are more likely to pursue diversifying acquisitions (Brown & Sarma, 2007) and are more likely to offer cash to finance the deal (Ferris, Jayaraman, & Sabherwal, 2013).

Since overconfident managers overestimate future returns, they might delay recognition of losses (Hribar & Yang, 2010). To meet or beat their optimistic forecasts, overconfident CEOs might be in a position that compels them toward aggressive accounting techniques such as greater earnings management (Ahmed & Duellman, 2012). Efendi, Srivastava, & Swanson (2007) find when CEOs have a sizeable quantity of in-the-money unexercised exercisable options, the probability of them misstating a financial report increases. They are more likely to walk down the slippery path of financial fraud, beginning with an optimistically biased but unintentional misstatement. It then grows bigger with intentional but very minor misstatement, believing that they will be able to cover that up with future earnings pretty soon because of their overestimating nature of future returns. Eventually, failing to catch up with their initial level of forecast, they are forced to commit fraudulent financial activities. Schrand & Zechman (2012) analyze 49 firms and find approximately one-fourth of them to involve themselves in misstatements of financial reports that satisfy the legal definition of intent. Although the rest of them were unintentional, they bear the potential to head toward the same road being compelled later on.

In terms of market reaction, capital market investors react negatively if an overconfident CEO heads a firm. The underlying cause behind this negativity is the tendency of overconfident CEOs

to overestimate financial numbers based on their excessive optimism (Merrienboer, 2016). He measures this negative effect based on cumulative abnormal return (CAR).

The bond market penalizes an overconfident CEO with more restrictive debt covenants. Sunder, Sunder & Tan (2010) suggest that the creditors in the market are aware of the detrimental implications of overconfidence. Because they are concerned with the future realization of the loans they extend, they monitor the activities of overconfident CEOs by containing their investing, M&A, and refinancing activities. In comparison to non-overconfident CEOs, overconfident CEOs face 7.1% tighter restrictions for investment activities and 15.8% more for M&A activities. By also limiting overconfident CEOs' ability to raise further debt in the future, they indirectly impact investing and M&A decisions as well. The restrictive covenants loosen up when the CEOs have displayed superior prior performance, inclination toward transparency in financial reports and higher delivered profitability coupled with firms' higher growth and investment potential.

To focus more on the congenialities of overconfidence, as measured by R&D expenditure, overconfident CEOs lead their companies to a heightened position in terms of innovation. They are apter in tapping the growth opportunities of their firms in innovative industries (Hirshleifer, Low, & Teoh, 2012). Slothouber (2010) finds a positive relationship between CEO overconfidence and firm value as measured by modified Tobin's Q (market value to book value of assets). Overconfident CEOs enjoy a lower cost of debt, which helps to explain Malmendier & Tate's (2005) finding that overconfident CEOs are less likely to issue equity (30 cents more debt for every $1 of equity) supporting the pecking order theory. Chen, Ho, Lin & Yen (2016) study how banks react to overconfidence in CEOs concerning issuing loans to them. They find that banks prefer overconfident CEOs and incentivize them by offering lower loan rates and higher approval rates keeping in mind their upside potential since they bring them more business. There are contrasting papers as well, which show that the cost of debt for overconfident CEOs is higher than their non-overconfident counterparts. Overconfident CEOs are more interested in short term loans up to 3 years, more so if the maturity period is up to 1 year. There is evidence, as found by Huang, Tan & Faff (2015) that creditors are more reluctant to offer long term loans to firms headed by overconfident CEOs. Aghazadeh, Sun, Wang & Yang (2018) conclude that the benefits of CEO overconfidence are optimal when the extent of overconfidence is moderate; their test shows a moderate level of overconfidence resulting in the lowest cost of equity. In their words, the benefits

of overconfidence erode with an extreme level of overconfidence being dominated by the detrimental effects of overconfidence.

Malmendier & Tate (2005) counter some of the alternative explanations that may arise while trying to explain or dealing with the effects of overconfidence. People may casually associate overconfidence with either insider information or signaling or lesser degree of risk aversion or deferral of taxes or even procrastination.

Malmendier & Tate (2005) argue that if insider information had been the reason why CEOs exhibit an overconfident behavior, the CEOs should have earned a positive abnormal return in comparison to the return while they diversify their portfolio and choose not to increase idiosyncratic risk by emphasizing on a specific firm. They compare the returns from not exercising their options in the fifth year to the hypothetical returns if they invested in S&P500, and do not find any evidence to believe that the CEOs acted on insider information.

It may occur that CEOs hold onto their exercisable options even if they are in-the-money to signal the investors of a positive and favorable prospect of the firms. However, Malmendier & Tate (2005) discard this notion and argue that financial services companies and financial presses generally prioritize vesting and expiration times while following the transaction of insiders instead of option exercises for determination of future stock prices.

Risk-seeking behavior of the CEOs can also be associated with overconfidence. What if the CEOs do not exercise and hold onto their options because they are characteristically less risk-averse and thus do not get affected due to under-diversification? Malmendier & Tate (2005) introduce a new measure for overconfidence, *netbuyer*, which denotes whether a CEO bought more shares than they sold during the first five (5) years, increasing their exposure to idiosyncratic risk even more on top of their overconfident trait. The introduction of this variable allowed them to explain that higher risk tolerance may intrigue CEOs to delay exercising their options, but they need to be risk-seeking on average by becoming a "net buyer".

Similarly, delaying exercising the options may be due to the intended deferral on payment of personal income taxes, but at the same time, it does not apply to additional stock purchases. Lastly, a CEO might portray inertia and keeps on holding to her/his exercisable options. But, if the argument holds, this reluctance on their portfolio should reflect on their corporate portfolio as well.

But Malmendier & Tate (2008) find that CEOs who hold their options till the last year they expire carries on significantly more merger and acquisition activities than their peers, a tendency which refutes their inertial nature. Also, Malmendier & Tate found those CEOs conducting other transactions on their portfolio even within two years to the expiration of the options.

History of textual analysis lies way back in or around 1300 A.D. when members of the Dominican religious group created a concordance of Latin Vulgate to present a list of commonly used phrases. At the outset of the 19th century, even William Shakespeare's works were evaluated following a textual analysis approach to examine whether they were written by Francis Bacon. During world wars, political speeches were dissected to find and investigate any pattern of carefully scripted rhetorical choices to interpret diplomatic trends. In the past few decades, the publication of significant literature from the Wall Street Journal in this area enhanced the statistical precision of textual analysis way more. The availability of news articles, earnings conferences, Securities and Exchange Commission (SEC) filings and opinionated writings in social media online in recent times triggered textual analysis to become an emerging area in the arena of Accounting and Finance.

Initially in 2011, Loughran & McDonald created a dictionary of various types of words representing manifold sentiments consisting of six (6) major categories – positive, negative, uncertainty, litigious, strong modal, and weak modal. The exclusivity of their approach was the fit in a business context. For this, they analyzed the words used in 10-K filings from 1994 through 2008. The dictionary contained 354 positive and 2,329 negative words. The upper hand of the LM dictionary is twofold – firstly, its extensiveness and comprehensiveness (no common positive or negative word is missing), and secondly, its orientation toward financial communication. Only the words used in 10-Ks by the managers were included in their dictionary. Later on, they expanded their listing of words to incorporate a couple more categories, such as – constraining and moderate modal. They also tweaked their algorithm to add the number of negation words, such as - No, Not, None, Neither, Never, Nobody etc., appearing within four or fewer words in a sentence of a positive word in the document. Then they calculate net positive words by deducting the number of negation words from the number of positive words.

For a better understanding, few examples are listed beneath from each category of words:

Table 2.1: Examples of categories of words in the LM dictionary

This table shows the examples of different categories of words Loughran & McDonald segregate their list of sentiments into.

Positive	Accomplish, Advantage, Honor, Popularity, Regain, Stabilize, Strong etc.
Negative	Abandon, Bankruptcy, Bribe, Burden, Collapse, Malice, Scrutiny etc.
Uncertainty	Alternation, Anticipate, Deviate, Doubt, Likelihood, Reconsider etc.
Litigious	Abrogate, Absolve, Acquit, Appeal, Claim, Depose, Hereof etc.
Constraining	Bound, Commit, Confine, Comply, Entail, Inhibit, Oblige etc.
Strong modal	Almost, Always, Clearly, Definitely, Must, Never, Undisputedly etc.
Weak modal	Apparently, May, Occasionally, Perhaps, Seldom, Sometimes etc.
Moderate modal	Can, Generally, Likely, Often, Tends, Usually, Would etc.

To answer the ambiguity of whether managers misdirect and misinform investors by how they use the language in earning press releases, Huang, Teoh & Zhang (2014) figure out pretty strong evidence to substantiate this question. They use Loughran & McDonald's (LM) positive and negative words on their sample from 1997 to 2007 and find that an abnormal positive tone is associated with subpar earnings and cash flows up to three (3) years after the initial release. Mayew & Venkatachalam (2012) utilize a sample of audio files from 2007 of the earnings conference calls to assess the positive and negative emotional states of the managers and regressed with concurrent stock returns. They were able to associate higher returns with LM positive words, and conversely, lower returns with LM negative words – which answers whether or not the content and the way managers pitch during conference calls with analysts indicate or to the least deliver some insight on future performance.

Feldman, Govindaraj, Livnat & Segal (2010) use positive and negative words from LM word list to evaluate the market's response to changes in tones in the Management Discussion and Analysis (MD&A) sections of corporate filings. They factored in earnings surprises and accruals and found a positive correlation between high stock market return and positive change in tone. LM dictionary has also been used to assess the tone of mutual fund letters (Hillert, Niessen-Ruenzi, & Ruenzi, 2014), Initial Public Offering (IPO) prospectus [(Ferris, Hao, & Liao, 2013) and (Loughran & McDonald, 2013)] and analyst reports (Twedt & Rees, 2012).

Alongside business documents, newspaper articles/columns have also been analyzed using LM positive and negative words to assess market perception for investment. Dougal, Engelberg, Garcia & Parsons (2012) conclude that a pessimistic tone in the newspapers results in a more negative market return on the next day. Liu & McConnell (2013) state that media attention measured by a number of columns/articles appearing regarding an acquisition, as well as the tone used in those articles/columns can significantly influence the probability of cancellation of the acquisition deal. Even during times of recession, Garcia (2013) shows that newspaper sentiment plays a role in predicting future returns of the stocks. Not only in determining the future performance of the stocks, but media sentiment can also modify how investors look at building their portfolio. Solomon, Soltes & Sosyura (2014) argue that investors go after certain funds that have a track record of high returns only if those funds attain some level of media coverage.

Besides using newspaper articles, past studies, such as Chen, De, Hu & Hwang (2014) also look at Seeking Alpha, a website intended to deliver financial analyses and news regarding the financial markets and their conditions, to find that tones used by analysts to express their opinions have an impact on future returns and earnings surprises. Solomon (2012) investigate the investor relations firms to see how they handle their clients' media coverage. He figured that the firms emphasize on publicizing the good news relative to negative news to boost the media coverage.

Druz (2015) suggests that managers, often intentionally or unintentionally, leak financial information with a hint to future returns based on the tone they use. Firms tend to reveal financial information with a positive tone, which could be even more significant for CEOs who are overconfident (Merrienboer, 2016). Researches find the relationship between LM word list and returns, trading volume, subsequent volatility of return, unexpected earnings, fraud, and material weakness. Quite a few papers associate the negative tone with market sentiment. Druz (2015) shows how sell-side analysts lower their forecast for the subsequent quarter when the manager reflects an excessive negative tone. His results support such behavior by the analysts by showing that an excessive negative tone leads to smaller future earnings. Loughran & McDonald (2011) show that a higher proportion of negative words resonates with lower excess returns. Firms that use more litigious words face increased levels of stock return volatility. Increased use of negative words or strong modal words warrants a material weakness in internal accounting controls. Negative and litigious tones have an adverse impact on firm reputation as well. Barakat, Ashby,

Fenn, & Bryce (2019) investigate equity and debt-based reputational damages concerning negative and litigious tone and found conclusive evidence in favor. According to their study, capital market investors penalize firms when they use negative and litigious words during operational risk event announcements. These effects on reputation are even more significant for Anglo-Saxon countries such as the USA, UK, Canada, etc. where market-based economy due to efficient capital market prevails. On a sample of US banks, Gandhi, Loughran & McDonald (2018) associate negative sentiment in annual reports with higher delisting probability, lower possibility of paying dividends in subsequent period, higher provision of loan loss in the subsequent period and lower return on asset in future. There is a reason why managers are more concerned with negative tone than positive tone. Avoidance of negative tone affects the reaction of market participants more favorably than taking resort to a positive tone. When the managers use more uncertain words or more strong modal words or weaker modal words, there occurs a disparity among the analysts with their predictions, which can create confusion in the market (Druz, 2015). Tones used by managers play a significant role in the portrayal of firms' upside growth potential reflected by the company life cycle. Bakarich, Hossain, Hossain & Weintrop (2017) argue that a firm about to enter the declining phase of its business life cycle tends to be more ambiguous and more confident in its tone. In contrast, firms that are not in a decline stage do the opposite. This argument is important since various stages of a company's life cycle have been shown to affect the firm value in terms of accounting information, investment, financing, cash policy, risk-seeking/averting behavior and extent of analyst-following due to change in firm's internal environment. Forming the sentiment variables with uncertain tone, weak tone, and strong tone, they show that a firm in decline stage uses more strong modal words to display confidence. These firms have a more negative tone as well in their 10-K filings. Lopatta, Jaeschke & Yi (2014) find that firms with more negative and litigious words in their financial disclosures have a higher probability of violating the Foreign Corrupt Practices Act (FCPA), 1977.

The question may arise whether evaluating the Management Discussing and Analysis (MD&A) section of a 10-K filing would have been a more focused analysis of the tones used by overconfident CEOs. I shift my focus on the whole 10-k filing because MD&A section does not help to examine the tones in a clearer manner, as shown by Loughran & McDonald (2011). They showed that only the MD&A section does not produce any noticeable impact on excess returns in comparison to 10-K filings (Loughran & McDonald, 2011, p. 36).

Apropos of the literatures reviewed, I can clearly state that the tones used by personnel in a managerial position in an organization at major points of time, such as – MD&A sections in corporate filings, earnings releases, mutual fund letters, telephone conversations to analysts, etc., affect market sentiment, which eventually affects market returns. The tones also play a role in forming clientele relations, guiding media attention, and henceforth media coverage. Even the articles/columns published in the newspapers/websites or other print media direct the market returns. There is hardly any doubt among the researchers who explored this area of textual analysis and investigated its association with market returns that a positive vibe from the managerial position triggers a positive result even when controlled for earning surprises, and similarly, a negative vibe leads to a negative market return.

Eventually, the researches by Huang, Teoh & Zhang (2014) and Mayew & Venkatachalam (2012) that look into managers' use of language during earnings press releases and their content and pitch of voice during discussion with analysts to investigate managers' probable attempts to inform/mislead the investors and/or to render insights on firms' future returns and performances inspired us to venture further into this area. The idea to associate managerial overconfidence, in specific, CEO overconfidence, with the sentiment analysis aspect of textual analysis came basically from Merrienboer (2016) who tells impact of these tones matter more when a firm is headed by an overconfident CEO and Aghazadeh, Sun, Wang & Yang (2018) who try to tell that a higher level of disclosures might be associated with CEO overconfidence as perceived by the investors and overconfident managers may adopt an aggressive reporting leading to subpar quality. Thus, I am led to the research question - *"Does CEO overconfidence influence the use of tones in annual reports?"*

Chapter 3
DATA DESCRIPTION AND RESEARCH METHODOLOGY

3.1   Data Sources and Variable Description

The sample comprises Loughran-McDonald's 10-K file summaries from the year 1993 to 2016, which has been retrieved from Software Repository for Accounting and Finance of the University of Notre Dame. The sample period is restricted because of Loughran & McDonald's compilation of tonal information for only these many years. Since I am interested in the tones reflected in the annual reports, I include only the 10-K filings and exclude the quarterly submissions from the companies. In case there is an amendment in the filing, later on, I get rid of the duplication. I do not exclude financial services and utility firms following other prior studies, not necessarily exploring a similar area of research, since I do not have reason to believe the regulatory nature and the generally high leveraged situation (for the financial serviced sector) will have an impact on the dependent variables, the tones of annual reports. I study 3,088 firms in my research.

Table 3.1.1 entails the definitions and/or formula I use to construct the variables. The independent variables can be categorized into two (2) major segments – CEO characteristics and firm characteristics. The first set of variables takes into account different characteristics a CEO might have, such as – gender, age, and tenure with the company. The second set of variables consists of different characteristics that their firms may have – total assets, level of cash holdings, happenings of mergers and acquisitions, capital expenditure, firms' age, beta and idiosyncratic volatility of the firms. I also incorporate a few firm-specific accounting ratios, such as – book value of leverage, market value to book value and return on asset inspired from previous studies.

Table 3.1.1: Variable Description and Data Sources

This table describes the variables used in the research design and their sources.

Notation	Variable Name	Description	Data Source
netpositive	Positive Tone	Percentage of words in 10-K filing reflecting a positive tone	Loughran and McDonald's 10X File Summaries, Software Repository for Accounting and Finance, University of Notre Dame
strong	Strong Tone	Percentage of modal words in 10-K filing reflecting a strong tone	Loughran and McDonald's 10X File Summaries, Software Repository for Accounting and Finance, University of Notre Dame
moderate	Moderate Tone	Percentage of modal words in 10-K filing reflecting a moderate tone	Loughran and McDonald's 10X File Summaries, Software Repository for Accounting and Finance, University of Notre Dame
negative	Negative Tone	Percentage of words in 10-K filing reflecting a negative tone	Loughran and McDonald's 10X File Summaries, Software Repository for Accounting and Finance, University of Notre Dame
uncertain	Uncertain Tone	Percentage of words in 10-K filing reflecting an uncertain tone	Loughran and McDonald's 10X File Summaries, Software Repository for Accounting and Finance, University of Notre Dame
litigious	Litigious Tone	Percentage of words in 10-K filing reflecting a litigious tone	Loughran and McDonald's 10X File Summaries, Software Repository for Accounting and Finance, University of Notre Dame
constraining	Constraining Tone	Percentage of words in 10-K filing reflecting a constraining tone	Loughran and McDonald's 10X File Summaries, Software Repository for Accounting and Finance, University of Notre Dame
weak	Weak Tone	Percentage of modal words in 10-K filing reflecting a weak tone	Loughran and McDonald's 10X File Summaries, Software Repository for Accounting and Finance, University of Notre Dame
overconfidence	1st Principal Component	1st principal component of the test variables, *confident67* and *optdelay*	-
confident67	Holder 67	If a CEO has 67% in-the-money unexercised exercisable options, then *confident67*=1, otherwise zero	S&P Execucomp Annual Compensation AND S&P Execucomp Stock Options Grant - 1992 Format

optdelay	Options Delay	If a CEO has in-the-money unexercised exercisable options greater than the industry median, then *optdelay*=1, otherwise zero	S&P Execucomp Annual Compensation AND S&P Execucomp Stock Options Grant - 1992 Format
female	Gender	If the gender of the CEO is female, then *female*=1, otherwise zero	S&P Execucomp Annual Compensation AND S&P Execucomp Stock Options Grant - 1992 Format
age	Age	Age of the CEO	S&P Execucomp Annual Compensation AND S&P Execucomp Stock Options Grant - 1992 Format
tenure	Tenure	Tenure in years the CEO has been with the firm	S&P Execucomp Annual Compensation AND S&P Execucomp Stock Options Grant - 1992 Format
logassets	Firm Size	Natural logarithm of one plus the total assets in USD millions of the firm	Compustat - Capital IQ North America Annual Fundamentals Updates
cash	Cash Level	Cash and short-term investments scaled by total assets in USD millions	Compustat - Capital IQ North America Annual Fundamentals Updates
ma	M&A Occurrence	Occurrence of merger and acquisition; *ma*=1 if acquisition expenditure is greater than zero, and zero otherwise	Compustat - Capital IQ North America Annual Fundamentals Updates
capex	Capital Expenditure	Capital expenditure scale by total assets in USD millions	Compustat - Capital IQ North America Annual Fundamentals Updates
firmage	Firm's Age	Difference between the panel year and the year of firm's first appearance in CRSP	CRSP
beta	Beta	Systematic risk	WRDS Beta Suite
ivol	Idiosyncratic Volatility	Firm-specific/idiosyncratic risk	WRDS Beta Suite
leverage	Book Value of Leverage	Total long-term debt plus debt in current liabilities, divided by total assets in USD millions	Compustat - Capital IQ North America Annual Fundamentals Updates
mvbv	Market Value to Book Value	Common shares outstanding multiplied by annual closing price, divided by common shares outstanding multiplied by book value per share	Compustat - Capital IQ North America Annual Fundamentals Updates
roa	Return on Asset	Operating income before depreciation, divided by total assets in USD millions	Compustat - Capital IQ North America Annual Fundamentals Updates

Table 3.1.2:   Variable Summary Statistics

This table presents the summary statistics of the primary dependent and independent variables. Total assets (firm size) in the variable has been measured by taking the natural logarithm of total assets.

	N	MEAN	STD DEV	MIN	MAX
Tone Variables					
netpositive	33,010	0.635611	0.179752	-0.11074	2.283372
strong	33,010	0.273928	0.104388	0	1.721012
moderate	33,010	0.276343	0.082735	0	0.679331
negative	33,010	1.590556	0.448306	0	4.654384
uncertain	33,010	1.208738	0.342469	0	2.997502
litigious	33,010	1.672472	0.870701	0	7.025741
constraining	33,010	0.732769	0.19522	0	1.910828
weak	33,010	0.487815	0.178229	0	1.706017
Overconfidence Variables					
overconfidence	33,011	-5.93E-10	1.123571	-1.39965	1.429306
confident67	33,011	0.503287	0.499997	0	1
optdelay	33,011	0.486232	0.499818	0	1
CEO Characteristic Variables					
female	33,011	0.022538	0.148427	0	1
age	32,147	55.74396	7.333382	28	96
tenure	33,011	11.30363	10.66172	0	61
Firm-level Variables					
logassets	33,011	7.592953	1.693541	1.488851	11.19793
cash	33,007	0.145913	0.170942	0.000302	0.916104
ma	33,011	0.440914	0.496504	0	1
capex	33,011	0.04761	0.053337	0	0.388874
firmage	33,011	23.25658	18.49252	0	91
beta	33,002	1.102942	0.644071	-2.33487	7.116969
ivol	33,002	0.048929	0.029259	0.0054	0.4958
leverage	33,011	0.215935	0.176831	0	0.961051
mvbv	33,011	4.233684	52.82945	0.027701	6526.163
roa	31,932	0.121868	0.11065	-1.37331	0.421687

3.1.1 Dependent Variables

I take eight (8) dependent variables from Loughran-McDonald's 10-K filings dataset to portray the tones used in annual reports – positive, negative, uncertain, litigious, constraining, strong modal, weak modal and moderate modal.

I tweak the variable positive tone by deducting the number of negation words from the number of positive words and define them as a net positive tone following Loughran & McDonald. Negation words are words such as 'No,' 'Not,' 'None,' 'Neither,' 'Never,' 'Nobody' etc. Because these words being placed in proximity of a positive word change the meaning from positive to negative, it's rational to modify the initial positive tone variable for greater accuracy. I scale the dependent variables by the number of total words to show the percentage of a certain variable in proportion to the total number of words in the filing.

Table 3.1 presents the statistical properties of all the variables used in the study. The number of observations for each dependent variable is 33,010 found from 1993 to 2016. The mean, median and standard deviations are also noted in the table for each of the dependent variables along with the minimum and maximum values. The formulas used to calculate the dependent variables are such:

$$Net\ Positive\ Tone = \left(\frac{Total\ number\ of\ net\ positive\ tone\ words}{Total\ number\ of\ words} \right) \times 100 \dots\dots\dots\dots\dots\dots\dots\dots \ (3.1.1.1)$$

$$where, Net\ positive\ tone = Total\ number\ of\ positive\ words - Total\ number\ of\ negation\ words$$

$$Strong\ Tone = \left(\frac{Total\ number\ of\ storng\ modal\ words}{Total\ number\ of\ words} \right) \times 100 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (3.1.1.2)$$

$$Moderate\ Tone = \left(\frac{Total\ number\ of\ moderate\ modal\ words}{Total\ number\ of\ words} \right) \times 100 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (3.1.1.3)$$

$$Negative\ Tone = \left(\frac{Total\ number\ of\ negative\ words}{Total\ number\ of\ words} \right) \times 100 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (3.1.1.4)$$

$$Uncertain\ Tone = \left(\frac{Total\ number\ of\ uncertain\ words}{Total\ number\ of\ words} \right) \times 100 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (3.1.1.5)$$

$$Litigious\ Tone = \left(\frac{Total\ number\ of\ litigious\ words}{Total\ number\ of\ words} \right) \times 100 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (3.1.1.6)$$

$$Constraining\ Tone = \left(\frac{Total\ number\ of\ constraining\ words}{Total\ number\ of\ words} \right) \times 100 \dots\dots\dots\dots\dots\dots\dots\dots\dots \ (3.1.1.7)$$

$$Weak\ Tone = \left(\frac{Total\ number\ of\ weak\ modal\ words}{Total\ number\ of\ words} \right) \times 100 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (3.1.1.8)$$

3.1.2 Key Explanatory Variables

To construct the overconfidence variable, I firstly take the resort of the most common approach to measure overconfidence following Malmendier & Tate (2005)'s holder67 approach with a little variation following Hirshleifer, Low & Teoh (2012). Instead of following Malmendier & Tate who define an overconfident CEO such that at least twice during the first five (5) years as CEO, (s)he does not exercise his/her call option while the option is 67% in-the-money, I call the CEO overconfident from the first time after the vesting period her/his options are 67% in-the-money and (s)he does not exercise the options, and assign the variable *confident67* with a value of 1, or else zero. The rationale behind this modification is that overconfidence is a persistent trait (Hirshleifer, Low, & Teoh, 2012) and an overconfident CEO continues to portray overconfidence in his/her behavior over the time devoid of any deviation in actions. I extract necessary data from S&P Execucomp Annual Compensation database and S&P Execucomp Stock Option Grants – 1992 Format database to construct this variable. Standard & Poor's (S&P) Executive Compensation database provides time-series data since 1992 and it provides detailed information regarding executives' salary, bonus, options, and stock awards, non-equity incentive plans, pensions and such by collecting the data directly from each company's annual proxy (Form DEF14A SEC). I filter the dataset to represent only CEOs and not other managerial positions. If for any firm, the CEO gets replaced during any year, I take the CEO at the year-end and remove the other CEO from the dataset.

Secondly, I follow Aghazadeh, Sun, Wang & Yang (2018) and measure CEO overconfidence in terms of their possession of in-the-money options in comparison to the industry median. If in-the-money options held by the CEO is greater than the median in-the-money options held by the CEOs in that industry, I categorize the CEO as overconfident as assign as the value of 1 to the variable *optdelay*, and otherwise zero. I use the data I retrieved from S&P Execucomp Annual Compensation database and S&P Execucomp Stock Option Grants – 1992 Format database for this purpose too.

Since it has been established by Aghazadeh et al. (2018) that no overconfidence measure is necessarily better than the other because of the procedures being related but distinct, following their approach, I run a principal component factor analysis of these two constructed variables and use the first principal component (*overconfidence*) as the primary test variable. The objective of

creating the first principal component is to capture the variances between these two primary test variables to measure overconfidence. By using a linear combination (weighted averages), this method creates an optimal choice to measure the variables with optimal weights. For robustness, I show results using *confident67* and *optdelay* as well.

There are several methods to measure CEO overconfidence. The reasons why I choose to follow the options-based methodology of Malmendier & Tate (2005) are twofold. First, this method by Malemndier & Tate (2005) is a widely used approach to measure overconfidence and most of the papers that dealt with CEO overconfidence incorporated this process in their methodologies. Second, this options-based measure of overconfidence examines the behavior of the CEOs at their total discretion. An alternative approach could be the press-based (media publications in journals, articles, newspapers etc.) approach also introduced by Malmendier & Tate (2005) that reflects outsiders' opinion about a CEO. Malmendier & Tate (2005) analyze the articles on a specific CEO in a specific year in popular publications such as The New York Times, Business Week, Financial Times, The Economist and The Wall Street Journal in search of words such as 'confident/confidence,' 'optimistic/optimism' to attach these words to overconfident CEOs and words such as 'reliable,' 'cautious,' 'conservative,' 'practical,' 'frugal' or 'steady' to attach them with non-overconfident CEOs. However, given the scope of my research, this is something I could not have done because of the time restrictions and the tedious nature of generating the data. Since Malmendier & Tate (2005) find high correlation between the press-based measure and the measure they primarily followed, this should not be of much concern.

3.1.3   Control Variables

Following a few major papers conducted on overconfidence and on textual analysis in a broader term, I incorporate few independent variables in the study.

CEO Characteristics:

According to Malmendier, Tate & Yan (2011), various quantifiable traits of a CEO can significantly affect corporate decision making and hold explanatory power, especially when overconfidence is associated. Malmendier & Nagel (2011) also argue that age can, in some ways, mirror the CEO's experience, and thus an older CEO, due to his experience, will tend to be more

overconfident. Henceforth, following Malmendier & Tate (2008), I incorporate the CEO's age as a control variable in the study. While Fox, Lundenberg & Puncochar (1994) argue men and women vary in terms of the characteristics they bear, Shefrin (2005) establish that psychological difference between them can be reflected from their interpretations of things from an overconfidence point of view, which lead us to include the gender as a dummy variable in the regression. The variable takes a value of 1 if the CEO is female, and zero otherwise. Tenure can also measure experience in a better way, especially in the case of industry-specific experience (Cremers & Grinstein, 2009). But due to insufficient data in the dataset for the years an executive acted as a CEO leading to a significant loss of observations in the regression, I proxy with CEO's overall tenure with the firm instead. All CEO characteristics data are extracted from the S&P Execucomp Annual Compensation database.

Firm Characteristics:

In order to construct firm-specific control variables I follow Malmendier & Tate (2005); Malmendier & Tate (2008); Li (2008); Muslu, Radhakrishnan, Subramanyam & Lim (2015); Boubakri & Mishra (2017); Phua, Tham & Wei (2018) and Aghazadeh, Sun, Wang & Yang (2018). Except for the betas and firm's age, all other information is retrieved from Compustat – Capital IQ North American Annual Fundamentals Updates database. Beta and idiosyncratic volatility of the firms are taken from WRDS Beta Suite while firms' age was calculated from CRSP data. Natural logarithm of one plus total asset in USD millions is taken to proxy for a firm's size following quite a few previous studies. The sample is restricted based on total assets being greater than USD 1 million. Cash and capital expenditure are scaled by total assets, the units being USD millions. To indicate an acquisition, I form a dummy variable *ma* which takes a value of 1 if the acquisition cost was greater than zero in any year, and otherwise zero. I incorporate three (3) accounting ratios in the control variables – book value of leverage, market value to book value and return on asset. I calculate the book value of leverage by dividing current liabilities added with long-term debt by total assets, the unit being USD millions. To calculate market value to book value, I first calculate the market value by multiplying a number of outstanding common shares with an annual closing price. Then I calculate the book value by multiplying common shares outstanding with book value per share. Finally, I divide the market value by the book value to find out the ratio. For return on assets, I divide the operating income before depreciation from the cash flow statement by total

assets, the unit being USD millions. Because it is a herculean job to find out the establishment years for this many firms, the proxy for a firm's age by deducting their first appearance year on CRSP from the current year, which I found several other previous literature doing as well. Finally, I extract risk information from WRDS Beta Suite and add beta and idiosyncratic volatility of the firms in the list of control variables. I use a 52-weeks' window to calculate the beta. All these datasets are match-merged using GVKEY and CUSIP as the company identifier.

3.2   Research Design

I undertake two approaches to test the research question. Firstly, I test the differences of means of the eight (8) tones I use as the dependent variables. The two groups I compare are overconfident CEOs and not-overconfident CEOs. Initially, I use *overconfidence*, the 1st principal component of *confident67* and *optdelay*, as the key explanatory variable. For robustness, I also show the results using *confident67* and *optdelay* separately as the key explanatory variable. If the means are different, I can conclude that overconfidence can be the sole factor responsible for causing differences in tones used in annual reports by the CEOs.

My second approach is to run a fixed-effects (year and firm) multivariate regression where I use the dependent variables separately in a series of regressions with *overconfidence* as the major explanatory variable and add CEO and firm characteristics control variables. A multivariate analysis will allow us to control for the effects of CEOs' traits and the characteristics of the firm and observe the impact of overconfidence on tones of annual report independent of CEO and firm characteristics. The regressions comprise two (2) dummy variables – *female* and *ma*. Later on, while testing for robustness, I replace *overconfidence* with *confident67* and *optdelay* in turns, which are dummy variables as well portraying whether or not the CEO is overconfident. In the regressions, I take year and firm fixed effects, since I believe they will capture the variation in the panels over time and across firms.

Following is the regression model I run of the dependent variables representing various tones in the annual reports on CEO overconfidence variable along with other control variables with the year and firm fixed effects using cluster-robust standard error:

$$tone_{i,t} = \beta_0 + \beta_1 comp1_{i,t} + \beta_2 female_{i,t} + \beta_3 age_{i,t} + \beta_4 tenure_{i,t} + \beta_5 logassets_{i,t} + \beta_6 cash_{i,t} +$$
$$\beta_7 ma_{i,t} + \beta_8 capex_{int_{i,t}} + \beta_9 firmage_{i,t} + \beta_{10} marketbeta_{i,t} + \beta_{11} ivol_{i,t} + \beta_{12} bleverage_{i,t} +$$
$$\beta_{13} mvbv_{i,t} + \beta_{14} roa_{i,t} + \in_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.2.1)$$

CEO overconfidence is a behavioral trait. There could be concerns with potential endogeneity. The endogenous nature of various other CEO traits or due to CEO-firm matching could affect the interpretation of results I get. Being aware of this issue with observed CEO-specific omitted variables or unobserved firm-specific heterogeneity, from the very beginning of my analysis, I incorporate additional CEO characteristic variables and use year and firm fixed effects in anticipation that doing so will let us comment on the findings in a more appropriate way. Although according to Malmendier & Tate (2005), the results should not be affected because of issues with endogeneity since the stakeholders should be aware of the negative effects of overconfidence and take additional steps while making decisions involving overconfident CEOs.

Chapter 4
RESULTS AND SUMMARY OF FINDINGS

4.1 Univariate Test Results

4.1.1 Pearson Correlation Matrix

Table 4.1.1.1 presents the Pearson Correlation Matrix of the variables used in the study. From the table, I can see that two (2) measures of overconfidence – *overconfidence,* and *optdelay* are positively correlated with a net positive tone in a highly significant manner. So, I might expect that overconfident CEOs will tend to use more positive words in the annual reports. As for strong and moderate modal words, I can see that all three (3) overconfidence measures show a highly significant negative correlation with the dependent variable. Henceforth, I might not be able to see a favorable result in terms of the hypotheses encompassing strong and moderate tones. The correlation table shows a highly significant negative association between negative tone and overconfidence. Henceforth, it might appear in the results that overconfident CEOs tend to avoid negative words in the annual reports. While it comes to uncertainty words in the annual reports, the table portrays that overconfidence measures are negatively associated with it. So, I might see from the results later that when CEOs are overconfident, they refrain from using uncertain tone in the 10-K filings. The correlation between overconfidence and litigious tones shows a positive sign which denotes that overconfident CEOs will prefer to use a more litigious tone. A very highly significant negative association of overconfidence with constraining and weak tone denote the overconfident CEOs to be negligent in using constraining and weak modal words in the annual report filings.

From the magnitude of the correlations among the independent variables used in the study, as seen from the correlation matrix, I can tell that multicollinearity among the variables is not going to be an issue for the analysis part. The signs of the correlations, along with the significance levels, tell how the variables are associated with each other if roughly investigated. Later on, the multivariate regression results will tell the story in a precise manner.

Table 4.1.1.1: Pearson Correlation Matrix

This table presents the correlations between all dependent and independent variables with the significance levels.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	*netpositive*	1.0000											
(2)	*strong*	0.0883***	1.0000										
(3)	*moderate*	0.1900***	0.0854***	1.0000									
(4)	*negative*	-0.0468***	0.1408***	0.2979***	1.0000								
(5)	*uncertain*	0.1896***	0.0038	0.6759***	0.3807***	1.0000							
(6)	*litigious*	-0.3493***	0.0094*	-0.5618***	0.1573***	-0.5724***	1.0000						
(7)	*constraining*	-0.2851***	0.0380***	0.0993***	0.3790***	0.1350***	0.1991***	1.0000					
(8)	*weak*	0.0642***	0.1425***	0.4371***	0.4390***	0.6991***	-0.1518***	0.2742***	1.0000				
(9)	*overconfidence*	0.0273***	-0.0668***	-0.1015***	-0.1296***	-0.0918***	0.0514***	-0.1182***	-0.1342***	1.0000			
(10)	*confident67*	0.0068	-0.0620***	-0.1296***	-0.1301***	-0.1428***	0.0736***	-0.1318***	-0.1911***	0.7945***	1.0000		
(11)	*optdelay*	0.0366***	-0.0441***	-0.0317***	-0.0758***	-0.0030	0.0081	-0.0561***	-0.0222***	0.7945***	0.2624***	1.0000	
(12)	*logassets*	0.0037	-0.1294***	-0.0457***	0.0492***	0.0229***	0.0706***	0.0796***	-0.1087***	0.2423***	0.1681***	0.2169***	1.0000
(13)	*female*	0.0232***	0.0079	0.0185***	0.0229***	0.0345***	-0.0350***	0.0345***	0.0389***	-0.0532***	-0.0573***	-0.0273***	-0.0181***
(14)	*age*	-0.0387***	-0.0776***	-0.0232***	-0.0629***	-0.0316***	-0.0034	-0.0224***	-0.0855***	0.0782***	0.1062***	0.0181***	0.1202***
(15)	*tenure*	-0.0133**	-0.0760***	-0.0625***	-0.1476***	-0.0879***	-0.0074	-0.1257***	-0.0997***	0.1710***	0.1900***	0.0818***	0.0672***
(16)	*cash*	0.1107***	0.1748***	0.1992***	0.2174***	0.2152***	-0.1042***	-0.0602***	0.3241***	-0.0461***	-0.0647***	-0.0086	-0.3530***
(17)	*leverage*	-0.1250***	-0.0395***	-0.1425***	-0.1178***	-0.1388***	0.0933***	0.1468***	-0.1163***	-0.0077	-0.0226***	0.0104*	0.2808***
(18)	*mvbv*	-0.0008	0.0022	-0.0072	0.0024	-0.0040	0.0105*	-0.0008	0.0082	0.0133**	0.0026	0.0186***	-0.0156***
(19)	*ma*	0.0314***	-0.0559***	-0.0593***	-0.0340***	0.0003***	0.0240***	-0.0385***	-0.0351***	0.1070***	0.0766***	0.0934***	0.0489***
(20)	*roa*	0.0220***	-0.1004***	-0.0989***	-0.2259***	-0.0952***	0.0041	-0.1525***	-0.0970***	0.1828***	0.1308***	0.1598***	-0.0081
(21)	*capex*	-0.0774***	0.0450***	-0.1162***	-0.2018***	-0.1513***	0.0671***	-0.0744***	-0.0848***	0.0292***	0.0377***	0.0087	-0.1316***
(22)	*firmage*	0.0832***	-0.1137***	-0.1074***	-0.0801***	-0.1014***	0.0585***	-0.0852***	-0.1808***	0.1312***	0.1342***	0.0743***	0.3735***
(23)	*beta*	0.0271***	0.0435***	0.1388***	0.1628***	0.1707***	-0.1168***	0.1030***	0.1767***	-0.0364***	-0.0282***	-0.0297***	-0.0602***
(24)	*ivol*	-0.0339***	0.1650***	-0.0033	0.1187***	-0.0262***	0.0414***	0.0042	0.0623***	-0.1557***	-0.0923***	-0.1551***	-0.4202***

		(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(13)	*female*	1.0000											
(14)	*age*	-0.0430***	1.0000										
(15)	*tenure*	-0.0511***	0.3603***	1.0000									
(16)	*cash*	0.0219***	-0.1310***	-0.0510***	1.0000								
(17)	*leverage*	-0.0272***	0.0410***	-0.0228***	-0.4088***	1.0000							
(18)	*mvbv*	-0.0010	-0.0080	-0.0001	0.0140**	0.0429***	1.0000						
(19)	*ma*	-0.0144***	-0.0136**	-0.0073	-0.0735***	0.0375***	-0.0049	1.0000					
(20)	*roa*	0.0114**	0.0285***	0.0911***	-0.1226***	-0.0332***	0.0265***	0.0992***	1.0000				
(21)	*capex*	0.0004	-0.0225***	0.0428***	-0.1249***	0.0311***	0.0043	-0.0849***	0.2528***	1.0000			
(22)	*firmage*	0.0177***	0.1437***	0.0923***	-0.2210***	0.1229***	0.0011	0.0303***	0.0497***	0.0019	1.0000		
(23)	*beta*	-0.0068	-0.0580***	-0.0449***	0.2178***	-0.0824***	0.0038	-0.0179***	-0.1218***	-0.0074	-0.1227***	1.0000	
(24)	*ivol*	0.0033	-0.1450***	-0.0972***	0.2740***	-0.0890***	0.0073	-0.0832***	-0.2390***	0.0811***	-0.2908***	0.3415***	1

*** , ** , * indicate significance at 1% , 5% and 10% levels respectively

4.1.2 Univariate Analysis Results

Table 4.1.2.1 presents the univariate analysis results of the association between the dependent variables, the tones used in annual reports by the CEOs, and the overconfidence variables. Firstly, I create two panels based on how overconfidence is measured. For the first panel, I consider overconfidence measured by *confident67* variable; and for the second panel, I take overconfidence as measured by *optdelay*. I divide the panel based on whether the CEO is overconfident or not. I then proceed to calculate the mean along with a few other descriptive statistics. For each pair of overconfident and not-overconfident CEOs for each of the dependent variables, I calculate the difference in mean and approach to show if the means are significantly different from each other or not by using t-tests. A significantly different means will tell us if overconfidence can solely be responsible for explaining the dependent variable or not.

As I see from the t-values, *confident67* cannot explain positive tones in the annual reports, while *optdelay* can, in a statistically significant manner. But both the overconfidence measures can explain the use of strong and moderate tones in the annual reports by the overconfident CEOs since the means are significantly different between overconfident and not-overconfident CEOs. Both *confident67* and *optdelay* can solely impact the negative tones in the 10-K filings in a statistically significant manner. But, while *confident67* can impact uncertain tone significantly, *optdelay* cannot. When it comes to litigious tones, I see, *confident67* as an explanatory variable can explain the dependent variable, while *optdelay* fails to explain the dependent variable. Again, in the case of constraining and weak tones, both *confident67* and *optdelay* have the explanatory power to explain or have the power to impact the dependent variable solely.

Table 4.1.2.1: Univariate Analysis Results

This table presents the univariate analysis results of the primary dependent and primary independent variables. I take the dependent variables and see in turns how the two major overconfidence variables impact the dependent variables. I segregate the observations based on whether or not the CEOs are overconfident. Then I look at the difference of the means in pair and the statistical significance of each pair.

Dependent Variable	*confident67* vs. Tones of Annual Report							*optdelay* vs. Tones of Annual Report						
	Overconfidence	N	Std Dev	Mean	Diff. of Mean	t-value	p-value	Overconfidence	N	Std Dev	Mean	Diff. of Mean	t-value	p-value
netpositive	Yes	16,613	0.1846	0.6368	0.0025	1.2400	0.2149	Yes	16,051	0.1752	-0.0024	0.0132	6.6580	0.0000
	No	16,397	0.1747	0.6344				No	16,959	0.1717	-0.0146			
strong	Yes	16,613	0.1085	0.2675	-0.0129	-11.2900	0.0000	Yes	16,051	0.1028	0.0007	-0.0092	-8.0260	0.0000
	No	16,397	0.0996	0.2804				No	16,959	0.1026	0.0107			
moderate	Yes	16,613	0.0806	0.2657	-0.0214	-23.7470	0.0000	Yes	16,051	0.0690	-0.0088	-0.0052	-5.7540	0.0000
	No	16,397	0.0835	0.2871				No	16,959	0.0706	-0.0035			
negative	Yes	16,613	0.4434	1.5326	-0.1167	-23.8470	0.0000	Yes	16,051	0.3702	-0.0446	-0.0680	-13.8080	0.0000
	No	16,397	0.4457	1.6493				No	16,959	0.3816	0.0292			
uncertain	Yes	16,613	0.3241	1.1601	-0.0978	-26.2180	0.0000	Yes	16,051	0.2610	-0.0387	-0.0021	-0.5490	0.5827
	No	16,397	0.3533	1.2580				No	16,959	0.2607	-0.0372			
litigious	Yes	16,613	0.8736	1.7362	0.1282	13.4130	0.0000	Yes	16,051	0.7923	0.1569	0.0140	1.4630	0.1434
	No	16,397	0.8630	1.6079				No	16,959	0.7983	0.1448			
constraining	Yes	16,613	0.1941	0.7072	-0.0515	-24.1530	0.0000	Yes	16,051	0.1767	0.0128	-0.0219	-10.2040	0.0000
	No	16,397	0.1930	0.7587				No	16,959	0.1758	0.0355			
weak	Yes	16,613	0.1599	0.4540	-0.0681	-35.3760	0.0000	Yes	16,051	0.1410	-0.0200	-0.0079	-4.0290	0.0001
	No	16,397	0.1890	0.5221				No	16,959	0.1420	-0.0116			

4.2   Multivariate Analysis Results

Table 4.2.1 shows the regression results of the dependent variables on the overconfidence variable and other control variables. For the main results, I use *overconfidence* as the overconfidence variable, which is the 1st principal component of *confident67* and *optdelay*, the main overconfidence variables, following Aghazadeh, Sun, Wang & Yang (2018). I run a fixed-effects regression model of the tones in the annual report on CEO overconfidence and other CEO characteristics and firm characteristics control variables. I use cluster robust standard error since I cannot possibly assume homoskedasticity. Thus, I run eight (8) regressions with eight (8) dependent variables. I control for firm and year fixed effects.

In the regression of *strong* on *overconfidence* and other control variables, I find the coefficient to bear a negative relationship with the dependent variable similar to what was expected from the univariate test results, and the association is statistically significant as well. As a result, I conclude that overconfident CEOs do not prefer to use a strong tone in comparison to the extent non-overconfident CEOs do. I also find that firms with higher capital expenditure and higher firm-specific risk use more strong words in their annual reports.

The result could seem a little counter-intuitive at first since overconfident CEOs natural traits go in line with showing the strength of their companies' prospects in the annual reports. But Druz et al. (2015) explain from the perspective of analyst perception why it could be opposite in reality. Analysts get confused on how to forecast based on the use of more strong modal words in annual reports. It puts them in a situation where one analyst interprets the tone in one way while the other interprets it in a different way. When the market participants observe that a misaligned analyst perception regarding a company, they get confused as well and eventually end up penalizing the firm with a negative reaction. Apart from that, according to Bakarich et al. (2017), a firm entering its declining stage shows some extent of ambiguity and confidence at the same time with the use of a more negative, uncertain, weak and strong tone.

The univariate test results lead us to direct that overconfident CEOs might tend to avoid a negative tone in their annual reports. From the regression of negative tone on overconfidence and other variables, I see a statistically significant negative relationship between negative tone and CEO overconfidence, which supports the direction from univariate test results. While testing, I found that female CEOs tend to use more positive words. The result from this test of hypothesis also

supports the previous finding that female CEOs tend to avoid negative tone. Additionally, CEOs with a longer tenure in a company tend to avoid using a negative tone in their 10-K filings. Firms with lower levels of merger activity, a lower level of capital expenditure, and a lower level of return of assets avoid negative wordings in their annual reports as well. Interestingly, I find that firms with more leverage, more cash level, more age, and more idiosyncratic risk, i.e., firm-specific risk, tend to use a negative tone.

Prior literature clearly states that a negative tone impacts the market reaction in a negative manner. Sell-side analysts seem to correct their forecasts downward while they encounter a negative tone. The same finding from Bakarich et al. (2017) stands true here as well that a firm in its declining phase tends to exhibit a more negative tone and to reflect upside growth prospects, CEOs will prefer to avoid such tone. Lopatta et al. (2014) found that firms that have more negative words in their 10-K filing have a significantly higher probability of violating FCPA, 1977.

At 10% level of significance, I can say that overconfident CEOs tend to avoid a litigious tone. This finding does not support the expectation as the expected sign on the coefficient that they will do so. I also find the size of the firm, the tenure a CEO is working with the company, cash level, firm age, and capital expenditure statistically significant. The results show that the bigger a firm is, the likelier it is to use litigious words in its annual report. And the longer a CEO is working with the firm, the higher the chance is (s)he is likely not to use a litigious tone while filing the annual report. Firms with higher capital expenditure as well as lower cash levels and lower firm age tend to favor a litigious tone. This result strengthens to 95% confidence level in the robustness check using *optdelay* as the measure of overconfidence.

Same as negative tone, a firm bearing more litigious words in their annual report has a higher probability of violating FCPA, 1977, according to Lopatta et al. (2014). Also, litigious words harm a firm's reputation in the market. (Barakat et al., 2019) For the rest of the dependent variables, i.e. annual report tones, I could not find any statistical significance to be able to conclude on those.

Table 4.2.1: Multivariate Analysis Results

This table presents the multivariate analysis results of the primary dependent and all the independent variables in a regression setup. I run fixed effects regression model with cluster robust standard error of eight (8) different tones used in annual reports by the CEOs on overconfidence (as measured by *overconfidence*, the 1st principal component of *confident67* and *optdelay*) and other control variables.

VARIABLES	(1) netpositive	(2) strong	(3) moderate	(4) negative	(5) uncertain	(6) litigious	(7) constraining	(8) weak
overconfidence	-0.0006	-0.0026***	0.0000	-0.0211***	0.0030	-0.0136*	-0.0011	0.0005
	(-0.400)	(-2.833)	(0.008)	(-6.233)	(1.326)	(-1.897)	(-0.749)	(0.417)
logassets	-0.0110***	-0.0033*	-0.0063***	-0.0102	0.0131***	0.0475***	-0.0098***	0.0095***
	(-3.138)	(-1.784)	(-4.618)	(-1.296)	(2.636)	(2.957)	(-2.859)	(3.280)
female	0.0253**	0.0063	-0.0036	-0.0634**	0.0043	-0.0586	0.0036	0.0058
	(2.066)	(0.797)	(-0.891)	(-2.317)	(0.286)	(-1.292)	(0.351)	(0.551)
age	-0.0009***	-0.0002	0.0000	0.0000	-0.0002	0.0005	-0.0003	-0.0001
	(-3.355)	(-1.196)	(0.398)	(0.076)	(-0.539)	(0.397)	(-1.065)	(-0.467)
tenure	0.0003	-0.0002	0.0001	-0.0016***	0.0003	-0.0026***	-0.0005**	0.0001
	(1.335)	(-1.290)	(1.312)	(-3.103)	(0.856)	(-2.661)	(-2.506)	(0.777)
cash	0.0409***	0.0131*	0.0204***	0.0747**	0.0318	-0.1350**	-0.0467***	0.0440***
	(2.964)	(1.710)	(3.399)	(2.260)	(1.526)	(-2.038)	(-3.346)	(3.564)
leverage	-0.0387***	-0.0027	-0.0226***	0.0696**	-0.0343*	0.0873	0.0791***	0.0050
	(-2.970)	(-0.373)	(-4.180)	(2.293)	(-1.751)	(1.359)	(5.937)	(0.485)
mvbv	-0.0000***	-0.0000	-0.0000	0.0000	-0.0000***	0.0001	0.0000	0.0000
	(-2.699)	(-0.038)	(-1.359)	(0.533)	(-2.847)	(1.424)	(0.385)	(1.157)
ma	-0.0058**	-0.0018	-0.0034***	-0.0302***	-0.0032	0.0127	-0.0048*	-0.0076***
	(-2.442)	(-1.240)	(-3.719)	(-5.833)	(-0.901)	(1.071)	(-1.953)	(-4.199)
roa	0.0530***	-0.0131	0.0104	-0.3185***	0.0045	-0.0745	-0.0733***	-0.0072
	(3.481)	(-1.300)	(1.381)	(-6.711)	(0.159)	(-0.956)	(-4.799)	(-0.436)
capex	-0.0591*	0.0535**	-0.0070	-0.2621***	-0.0342	0.4255**	0.0190	0.0014
	(-1.672)	(2.255)	(-0.466)	(-3.024)	(-0.654)	(2.103)	(0.437)	(0.051)
firmage	0.0049***	0.0003	0.0054***	0.0279***	0.0264***	-0.0326***	0.0108***	0.0093***
	(7.228)	(0.896)	(24.247)	(20.644)	(31.918)	(-10.720)	(16.811)	(18.349)
beta	0.0014	0.0003	0.0016*	0.0050	0.0103***	-0.0095	0.0021	0.0050***
	(0.725)	(0.246)	(1.911)	(1.164)	(3.419)	(-0.907)	(1.057)	(3.393)
ivol	-0.0667	0.0969***	0.0178	1.0751***	-0.1186	0.2295	0.2236***	-0.0618

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(-1.393)	(2.900)	(0.798)	(7.606)	(-1.362)	(0.786)	(3.683)	(-1.577)
Constant	0.6463***	0.2917***	0.1836***	0.9610***	0.4515***	2.0763***	0.5620***	0.2219***
	(21.370)	(17.301)	(16.904)	(14.730)	(11.355)	(14.636)	(18.356)	(9.488)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,069	31,069	31,069	31,069	31,069	31,069	31,069	31,069
Number of gvkey_n	3,088	3,088	3,088	3,088	3,088	3,088	3,088	3,088
Adjusted R-squared	0.031	0.010	0.245	0.265	0.370	0.093	0.153	0.290

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

However, endogeneity issues may exist in the result. Because, personal traits that can be observed, such as – employment history or ethnicity, could be responsible for the recruitment of the CEOs. Also, the Board of Directors may take into account the overconfident nature of the CEO while appointing her/him, although the board should also be aware of the negative impacts of overconfidence on investment and such. I try to alleviate the issue with observed CEO-specific omitted variables or firm-specific unobserved heterogeneity by controlling for year and firm fixed effects, and by adding measurable CEO and firm characteristics in the control variable to some extent.

To begin discussing and explaining the findings, I restate that the results might seem a little counterintuitive since overconfident CEOs are supposed to appear strong and extremely positive, highly optimistic in their tones in the annual reports. Studying previous literature, I generally state a few perspectives why overconfident CEOs would advocate moderation in their tones instead from the perspectives of capital budgeting, cost of capital, market reaction, firm value, attractiveness to M&A target, and investors, misstatement and restatement cost.

The results somewhat support what Aghazadeh et al. (2018) mentioned – that the overall effect of CEO overconfidence is optimal when the level of overconfidence is moderate since the benefits of overconfidence erode when the level is in the extremes. I find that overconfident CEOs do not favor a strong tone. They also maintain avoiding negative tone while avoiding the use of an extreme positive tone. They avoid using litigious tone as they might convey an extremely unfavorable impression of the condition of the firm.

Malmendier & Tate (2005) argue that overconfident CEOs prioritize internal funds, but when it comes to external funds, they prefer debt to equity. Several studies found a higher cost of debt to be associated with CEO overconfidence, although there's contrasting evidence. Bondholders have been seen to put forward more restrictive debt covenants for overconfident CEOs to limit their investing, merger, and refinancing activities. These restrictions loosen up when the CEOs can provide superior prior performance, transparency in financial reports and higher delivered profitability. As a result, being overconfident CEOs who prefer debt, they have the incentive to tame down their level of overconfidence and mirror a moderate level of overconfidence.

According to Malmendier & Tate (2005), overconfidence is more important for an equity-dependent firm. Since Aghazadeh et al. (2018) show that a moderate level of overconfidence results

in the lowest cost of equity, exercising such moderation is in the best interest of overconfident CEOs while it comes to the cost of capital. Because a lower cost of capital leads to higher firm value and overconfident CEOs have more unexercised exercisable options tied to the firm value, as a rational CEO, it is in their best interest to portray a moderate level of overconfidence.

Prior studies have found a negative correlation between market reaction and CEO overconfidence. The market participants react more negatively to the merger announcements and annual reports of the firms headed by overconfident CEOs. Sell-side analysts have been found to tame down their forecasts if they see a negative tone. Overconfident CEOs will be able to draw more targets and investors for M&A through a positive market reaction toward their firms.

Studies have shown the possibility of overconfident CEOs to be more involved in financial misstatements. The argument behind is that overconfident CEOs tend to have an optimistic bias in their forecasts, which may not be intentional in the beginning and may not meet the legal standard of financial fraud. But, if they fail to meet their forecasts in subsequent performance, they might be in a position where they then intentionally start misstating financial reports being in the pressure of meeting the expectation. They may derive some short-term benefits from these misstatements. But such behavior puts those CEOs at odds with long-term bond and stockholders. Restatement costs have been seen to soar up to $100 billion alongside degraded public confidence. Exercising moderation in their overconfidence, overconfident CEOs have avoided such a dilemma in the very first place.

As Druz et al. (2015) mention, when a firm uses a more strong tone, the analysts become perplexed with how to interpret such tone resulting in disparity in their forecasts. The market, consequently, gets confused and ends up reacting negatively despite the confidence overconfident CEOs reflect via strong modal verbs in their annual reports. Notwithstanding, a firm entering its declining phase reveals ambiguity and confidence by using more negative, uncertain, weak and strong tones (Bakarich et al., 2017). To signal the market regarding the potential upside growth, an overconfident CEO thus has the incentive to avoid negative and strong tone in their 10-K filings. Lopatta et al. (2014) find evidence of the violation of FCPA (1977) within firms that use more negative and litigious tone. In a nutshell, by avoiding negative, strong as well as litigious tone in their annual reports, overconfident CEOs can be in a favorable position as opposed to appearing highly overconfident. And since the impact of tones of the information managers reveal matters

more when the CEO is overconfidence as stated by Merrienboer (2016), overconfident CEOs have more incentive to avoid negative, litigious, and strong tone in contrast to their non-overconfident counterparts, as evident from the results I get.

4.3   Alternative Explanations

Next I ask whether the sensitivity of negative, strong and litigious tones to CEO overconfidence is heterogeneous across the higher and lower level of a particular CEO or firm characteristic. For this analysis, I divide the sample into two groups at median by respective characteristics used as control variables and examine if the sensitivity of CEO overconfidence to negative, strong and litigious tones varies across these sub-samples. I observe the coefficients of the interaction between *overconfidence* and the variable based on which the sample is divided to shed light on possible drivers of annual report tone–CEO overconfidence sensitivity.

First, Malmendier, Tate & Yan (2011) argue that various quantifiable traits of a CEO can influence corporate decision making and bear explanatory power, especially when it relates to overconfidence. According to Malmendier & Nagel (2011), an older CEO, because of her/his experience, might be more overconfident. Also, experience can be measured with tenure, especially for industry-specific experience (Cremers & Grinstein, 2009). This is why, I divide my sample into two (2) groups respectively at the median of these CEO-specific control variables whether or not they are higher or lower than the median and then run fixed effects regression model with year and firm fixed effects along with the control variables included in the main model with cluster-robust standard error.

I also divide the sample based on firm-specific control variables, such as – firm size (*logassets*), cash, leverage, market to book value, age of CEOs, merger occurrences, ROA, capital expenditure, firm's age, beta and idiosyncratic volatility as well. Except for mergers, other variables are categorized as a dummy variable based on whether the value of classifying the control variable is higher (=1) or lower (=0) than the median in the dataset. Since the merger variable is a dummy, I segregate the sample based on whether there has been any merger activity or not contingent upon the value of *ma* variable being 1 or 0.

Table 4.3.1: **Analysis of Negative Tone–CEO Overconfidence sensitivity to CEO- and firm-specific control variables**

This table presents the multivariate analysis results of the dependent variable, negative tone, and all the independent variables in a regression setup. I run fixed effects regression model with cluster robust standard error of negative tone used in annual reports by the CEOs on overconfidence (as measured by *overconfidence*) and the interaction between *overconfidence* and the variable based on different CEO- and firm-specific control variables included in the primary research model, based on whether these variables are higher or lower than the sample median.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	logassets	tenure	cash	leverage	mvbv	age
overconfidence	-0.0210***	-0.0223***	-0.0187***	-0.0250***	-0.0198***	-0.0245***
	(-4.827)	(-5.717)	(-4.442)	(-5.945)	(-4.705)	(-6.197)
Interaction between *overconfidence* and sub-sampling variable	-0.0002	0.0031	-0.0048	0.0076	0.0037	0.0077
	(-0.037)	(0.580)	(-0.968)	(1.487)	(0.824)	(1.557)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,069	31,069	31,069	31,069	31,069	31,069
Number of gvkey_n	3,088	3,088	3,088	3,088	3,088	3,088
Adjusted R-squared	0.265	0.265	0.265	0.265	0.268	0.265

	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	roa	capex	firmage	beta	ivol	ma
overconfidence	-0.0224***	-0.0258***	-0.0216***	-0.0185***	-0.0219***	-0.0207***
	(-5.270)	(-6.158)	(-4.699)	(-4.620)	(-5.305)	(-5.176)
Interaction between *overconfidence* and sub-sampling variable	0.0042	0.0089*	0.0012	-0.0051	0.0020	-0.0009
	(0.876)	(1.850)	(0.199)	(-1.332)	(0.457)	(-0.223)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,069	31,069	31,069	31,069	31,069	31,069
Number of gvkey_n	3,088	3,088	3,088	3,088	3,088	3,088
Adjusted R-squared	0.267	0.266	0.265	0.265	0.266	0.265

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table 4.3.1, I present the variation in sensitivity of negative tone to CEO overconfidence across various CEO and firm characteristics. In Column 8, the result suggests that the negative tone–CEO overconfidence sensitivity of firms headed by overconfident CEOs with higher capital expenditure tend to increase the use of negative tone in 10-K filings by 0.89% at 10% level of significance.

Table 4.3.2:   **Analysis of Strong Tone–CEO Overconfidence sensitivity to CEO- and firm-specific control variables**

This table presents the multivariate analysis results of the dependent variable, strong tone, and all the independent variables in a regression setup. I run fixed effects regression model with cluster robust standard error of strong tone used in annual reports by the CEOs on overconfidence (as measured by *overconfidence*) and the interaction between *overconfidence* and the variable based on different CEO- and firm-specific control variables included in the primary research model, based on whether these variables are higher or lower than the sample median.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	logassets	tenure	cash	leverage	mvbv	age
overconfidence	-0.0018	-0.0018	-0.0040	-0.0019	-0.0022	-0.0021
		*	***	*	*	*
	(-1.489)	(-1.668)	(-3.255)	(-1.686)	(-1.901)	(-1.835)
Interaction between *overconfidence* and sub-sampling variable	-0.0017	-0.0022	0.0027	-0.0014	-0.0007	-0.0012
			**			
	(-1.087)	(-1.553)	(1.981)	(-1.035)	(-0.572)	(-0.937)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,069	31,069	31,069	31,069	31,069	31,069
Number of gvkey_n	3,088	3,088	3,088	3,088	3,088	3,088
Adjusted R-squared	0.010	0.011	0.011	0.010	0.010	0.010

	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	roa	capex	firmage	beta	ivol	ma
overconfidence	-0.0020	-0.0025	-0.0031	-0.0030	-0.0027	-0.0019
	*	**	**	**	**	*
	(-1.768)	(-2.291)	(-2.474)	(-2.576)	(-2.419)	(-1.718)
Interaction between *overconfidence* and sub-sampling variable	-0.0011	-0.0003	0.0008	0.0007	0.0002	-0.0016
	(-0.841)	(-0.228)	(0.498)	(0.595)	(0.179)	(-1.352)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,069	31,069	31,069	31,069	31,069	31,069
Number of gvkey_n	3,088	3,088	3,088	3,088	3,088	3,088
Adjusted R-squared	0.010	0.010	0.010	0.010	0.010	0.010

Robust t-statistics in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

In Table 4.3.2, I present the variation in sensitivity of strong tone to CEO overconfidence across different CEO and firm characteristics. In Column 3, the result suggests that the level of cash a firm holds seems to drive the strong tone–CEO overconfidence sensitivity and firms headed by overconfident CEOs with higher levels of cash tend to increase the use of strong tone in annual reports by 0.27%.

Table 4.3.3: **Analysis of Litigious Tone–CEO Overconfidence sensitivity to CEO- and firm-specific control variables**

This table presents the multivariate analysis results of the dependent variable, litigious tone, and all the independent variables in a regression setup. I run fixed effects regression model with cluster robust standard error of litigious tone used in annual reports by the CEOs on overconfidence (as measured by *overconfidence*) and the interaction between *overconfidence* and the variable based on different CEO- and firm-specific control variables included in the primary research model, based on whether these variables are higher or lower than the sample median.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	logassets	tenure	cash	leverage	mvbv	age
overconfidence	-0.0111	-0.0183**	-0.0157*	-0.0033	0.0007	-0.0209**
	(-1.169)	(-2.190)	(-1.743)	(-0.359)	(0.081)	(-2.435)
Interaction between *overconfidence* and sub-sampling variable	-0.0047	0.0119	0.0041	-0.0200*	-0.0226**	0.0163
	(-0.391)	(1.059)	(0.391)	(-1.843)	(-2.199)	(1.593)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,069	31,069	31,069	31,069	31,069	31,069
Number of gvkey_n	3,088	3,088	3,088	3,088	3,088	3,088
Adjusted R-squared	0.093	0.093	0.093	0.093	0.094	0.093

	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	roa	capex	firmage	beta	ivol	ma
overconfidence	-0.0105	-0.0103	-0.0193**	-0.0126	-0.0188**	-0.0128
	(-1.166)	(-1.119)	(-2.020)	(-1.467)	(-2.259)	(-1.516)
Interaction between *overconfidence* and sub-sampling variable	-0.0048	-0.0058	0.0107	-0.0021	0.0105	-0.0018
	(-0.449)	(-0.544)	(0.877)	(-0.244)	(1.152)	(-0.180)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,069	31,069	31,069	31,069	31,069	31,069
Number of gvkey_n	3,088	3,088	3,088	3,088	3,088	3,088
Adjusted R-squared	0.093	0.094	0.093	0.093	0.093	0.093

Robust t-statistics in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

In Table 4.3.3, I present the variation in sensitivity of litigious tone to CEO overconfidence across several CEO and firm characteristics. In Column 4, the result suggests that leverage seems to drive the litigious tone–CEO overconfidence sensitivity and firms headed by overconfident CEOs with higher leverage tend to reduce the use of litigious tone in annual reports by 2.00% at 90% confidence level. In Column 5, result suggests that the market to book value also seems to drive

the sensitivity of litigious tone to overconfidence. More valued firms headed by overconfident CEOs tend to decrease the use of litigious tone in annual reports by 2.26%.

In short, I find strong evidence of firms headed by overconfident CEOs with higher levels of cash increasing the use of strong tone in annual reports, and more valued firms (measured by market to book value increasing the use of litigious tone. I also find weak evidence of firms headed by overconfident CEOs with higher capital expenditure increasing the use of negative tone and highly leveraged firms headed by overconfident CEOs decreasing the use of litigious tone.

4.4   Robustness Test Results

I begin designing the research model as compact as possible from the very first go by adding a substantial number of control variables and also using year and firm fixed effects. Since Aghazadeh et al. (2018) argue that no overconfidence measure is better than the other, I capture the variance between two different measures of overconfidence; I introduce the 1st principal component of those two in the model, to begin with.

Some questions might be raised to question the validity of principal component factor analysis as well. For example, it deals only with large variances, and in the process, compresses noise in the dataset. Secondly, results obtained from principal component factor analysis can be scale-variant. Changing the scales can affect the results. This is why, to show that the results hold in different circumstances as well, I check the robustness of the results by taking the overconfidence measures I considered individually.

For the robustness check, I firstly take this approach – I try to run the same regression model as I have done for the main result, with the exception of the choice of overconfidence variable. First, I take *optdelay* as the measure of overconfidence, and then I use *confident67* as the overconfidence measure. I try to see if the results hold.

Table 4.4.1:   Robustness Check 1 – Regression on *optdelay*

This table presents the multivariate analysis results of the primary dependent and all the independent variables in a regression setup. I run fixed effects regression model with cluster robust standard error of eight (8) different tones used in annual reports by the CEOs on overconfidence (as measured by *optdelay*) and other control variables.

VARIABLES	(1) netpositive	(2) strong	(3) moderate	(4) negative	(5) uncertain	(6) litigious	(7) constraining	(8) weak
optdelay	0.0012	-0.0035**	0.0002	-0.0404***	0.0059	-0.0305***	-0.0019	-0.0006
	(0.502)	(-2.363)	(0.172)	(-7.189)	(1.530)	(-2.599)	(-0.792)	(-0.298)
logassets	-0.0111***	-0.0033*	-0.0063***	-0.0095	0.0130***	0.0482***	-0.0097***	0.0095***
	(-3.171)	(-1.781)	(-4.618)	(-1.206)	(2.609)	(2.998)	(-2.853)	(3.296)
female	0.0256**	0.0069	-0.0036	-0.0598**	0.0038	-0.0566	0.0038	0.0056
	(2.092)	(0.877)	(-0.888)	(-2.184)	(0.253)	(-1.251)	(0.371)	(0.531)
age	-0.0009***	-0.0002	0.0000	-0.0001	-0.0002	0.0004	-0.0003	-0.0001
	(-3.382)	(-1.347)	(0.399)	(-0.215)	(-0.471)	(0.302)	(-1.106)	(-0.449)
tenure	0.0003	-0.0002	0.0001	-0.0017***	0.0003	-0.0027***	-0.0005**	0.0001
	(1.281)	(-1.490)	(1.310)	(-3.387)	(0.922)	(-2.750)	(-2.552)	(0.830)
cash	0.0406***	0.0131*	0.0204***	0.0768**	0.0315	-0.1330**	-0.0466***	0.0441***
	(2.943)	(1.711)	(3.397)	(2.324)	(1.510)	(-2.006)	(-3.340)	(3.576)
leverage	-0.0383***	-0.0024	-0.0225***	0.0699**	-0.0343*	0.0868	0.0791***	0.0048
	(-2.945)	(-0.340)	(-4.175)	(2.309)	(-1.753)	(1.353)	(5.936)	(0.466)
mvbv	-0.0000***	-0.0000	-0.0000	0.0000	-0.0000***	0.0001	0.0000	0.0000
	(-2.740)	(-0.062)	(-1.363)	(0.556)	(-2.861)	(1.441)	(0.385)	(1.191)
ma	-0.0059**	-0.0019	-0.0034***	-0.0303***	-0.0032	0.0128	-0.0048*	-0.0076***
	(-2.482)	(-1.283)	(-3.724)	(-5.862)	(-0.897)	(1.079)	(-1.957)	(-4.166)
roa	0.0515***	-0.0137	0.0103	-0.3155***	0.0040	-0.0697	-0.0733***	-0.0063
	(3.398)	(-1.366)	(1.369)	(-6.669)	(0.142)	(-0.891)	(-4.789)	(-0.379)
capex	-0.0601*	0.0532**	-0.0071	-0.2584***	-0.0348	0.4299**	0.0191	0.0021
	(-1.697)	(2.241)	(-0.471)	(-2.979)	(-0.664)	(2.127)	(0.439)	(0.073)
firmage	0.0049***	0.0004	0.0054***	0.0280***	0.0264***	-0.0325***	0.0108***	0.0093***
	(7.221)	(0.929)	(24.257)	(20.780)	(31.889)	(-10.687)	(16.821)	(18.344)
beta	0.0014	0.0003	0.0016*	0.0049	0.0103***	-0.0096	0.0021	0.0050***
	(0.720)	(0.225)	(1.911)	(1.123)	(3.427)	(-0.918)	(1.053)	(3.396)
ivol	-0.0638	0.0981***	0.0180	1.0697***	-0.1177	0.2206	0.2235***	-0.0636
	(-1.331)	(2.945)	(0.808)	(7.605)	(-1.353)	(0.755)	(3.684)	(-1.618)

Constant	0.6474***	0.2952***	0.1836***	0.9872***	0.4477***	2.0926***	0.5634***	0.2211***
	(21.583)	(17.642)	(16.954)	(15.252)	(11.291)	(14.822)	(18.498)	(9.472)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,069	31,069	31,069	31,069	31,069	31,069	31,069	31,069
Number of gvkey_n	3,088	3,088	3,088	3,088	3,088	3,088	3,088	3,088
Adjusted R-squared	0.031	0.010	0.245	0.265	0.370	0.093	0.153	0.290

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.4.2: Robustness Check 2 – Regression on *confident67*

This table presents the multivariate analysis results of the primary dependent and all the independent variables in a regression setup. I run fixed effects regression model with cluster robust standard error of eight (8) different tones used in annual reports by the CEOs on overconfidence (as measured by *confident67*) and other control variables.

VARIABLES	(1) netpositive	(2) strong	(3) moderate	(4) negative	(5) uncertain	(6) litigious	(7) constraining	(8) weak
confident67	-0.0053	-0.0056**	-0.0003	-0.0210**	0.0028	-0.0050	-0.0014	0.0034
	(-1.240)	(-2.093)	(-0.186)	(-2.158)	(0.452)	(-0.248)	(-0.336)	(1.001)
logassets	-0.0110***	-0.0035*	-0.0063***	-0.0117	0.0134***	0.0465***	-0.0099***	0.0095***
	(-3.160)	(-1.900)	(-4.624)	(-1.495)	(2.676)	(2.899)	(-2.886)	(3.295)
female	0.0247**	0.0063	-0.0037	-0.0596**	0.0038	-0.0548	0.0037	0.0061
	(2.012)	(0.798)	(-0.903)	(-2.158)	(0.248)	(-1.202)	(0.366)	(0.587)
age	-0.0009***	-0.0002	0.0000	-0.0000	-0.0002	0.0004	-0.0003	-0.0001
	(-3.237)	(-1.108)	(0.415)	(-0.002)	(-0.516)	(0.327)	(-1.057)	(-0.547)
tenure	0.0003	-0.0002	0.0001	-0.0018***	0.0003	-0.0028***	-0.0005**	0.0001
	(1.434)	(-1.318)	(1.335)	(-3.424)	(0.938)	(-2.827)	(-2.543)	(0.699)
cash	0.0407***	0.0125	0.0204***	0.0701**	0.0325	-0.1379**	-0.0469***	0.0441***
	(2.949)	(1.628)	(3.400)	(2.118)	(1.554)	(-2.077)	(-3.365)	(3.578)
leverage	-0.0388***	-0.0023	-0.0226***	0.0741**	-0.0349*	0.0906	0.0793***	0.0050
	(-2.984)	(-0.318)	(-4.189)	(2.438)	(-1.787)	(1.413)	(5.957)	(0.491)
mvbv	-0.0000***	-0.0000	-0.0000	0.0000	-0.0000***	0.0001	0.0000	0.0000
	(-2.701)	(-0.126)	(-1.357)	(0.399)	(-2.784)	(1.381)	(0.377)	(1.160)
ma	-0.0058**	-0.0019	-0.0034***	-0.0313***	-0.0030	0.0119	-0.0049**	-0.0076***
	(-2.421)	(-1.305)	(-3.714)	(-6.036)	(-0.854)	(0.999)	(-1.978)	(-4.210)
roa	0.0531***	-0.0153	0.0104	-0.3400***	0.0076	-0.0897	-0.0744***	-0.0072
	(3.484)	(-1.523)	(1.392)	(-7.032)	(0.273)	(-1.157)	(-4.878)	(-0.435)
capex	-0.0593*	0.0518**	-0.0070	-0.2763***	-0.0322	0.4160**	0.0183	0.0016
	(-1.679)	(2.185)	(-0.465)	(-3.188)	(-0.614)	(2.056)	(0.420)	(0.059)
firmage	0.0049***	0.0003	0.0054***	0.0278***	0.0264***	-0.0326***	0.0108***	0.0093***
	(7.210)	(0.856)	(24.224)	(20.618)	(31.934)	(-10.710)	(16.783)	(18.380)
beta	0.0015	0.0003	0.0016*	0.0049	0.0103***	-0.0097	0.0021	0.0050***
	(0.739)	(0.250)	(1.914)	(1.135)	(3.425)	(-0.920)	(1.055)	(3.382)
ivol	-0.0668	0.1010***	0.0177	1.1149***	-0.1243	0.2575	0.2255***	-0.0619
	(-1.398)	(3.032)	(0.796)	(7.835)	(-1.432)	(0.882)	(3.723)	(-1.586)

Constant	0.6475***	0.2960***	0.1836***	0.9944***	0.4467***	2.0974***	0.5638***	0.2210***
	(21.617)	(17.710)	(16.954)	(15.319)	(11.258)	(14.861)	(18.518)	(9.462)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,069	31,069	31,069	31,069	31,069	31,069	31,069	31,069
Number of gvkey_n	3,088	3,088	3,088	3,088	3,088	3,088	3,088	3,088
Adjusted R-squared	0.031	0.010	0.245	0.263	0.370	0.093	0.153	0.290

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Looking at Table 4.3.1 where I regress the dependent variables on *optdelay* instead of *overconfidence* or *optdelay*, I see some change. When I use *overconfidence* as the measure of overconfidence, I find the relationship between overconfidence and a strong and negative tone to be significant. I also find a litigious tone to be significant at 90% level of confidence. When I use *optdelay*, the results strengthen. Besides getting strong and negative tone to be statistically significant, I also get the litigious tone to be statistically significant now at 5% level of significance.

From Table 4.3.2 where I regress the dependent variables on *confident67* and other control variables, I see that the significant results I got for the two (2) dependent variables – strong tone and negative tone, at 5% level of significance, hold. There is no change in the sign on the coefficients. None of these two (2) regression setups could explain the association of overconfidence among CEOs with a positive tone, moderate tone, uncertain tone, constraining tone, and weak tone.

From the regression setup and the results, I can say *overconfidence* as the measure of overconfidence takes on a greater weight from *optdelay* and explains more, but not less, the same dependent variables, whereas *confident67* explains the same two dependent variables that both *overconfidence* and *optdelay* could explain.

Chapter 5
CONCLUSION

The objective of this research is to find out whether firms headed by overconfident CEOs favor or avoid certain tones while filing the annual reports of their respective firms. My sample ranges from 1993 to 2016, consisting of 3,088 panels with 6,213 CEOs over which I run fixed effects regression of different tones on CEO overconfidence with cluster robust standard error controlling for year and firm fixed effects including several other CEO characteristics and firm characteristic control variables.

5.1   Summary of Findings

From the results, I find strong evidence that firms headed by overconfident CEOs tend to avoid strong and negative tone in their annual report. While I regress using the overconfidence measure where CEOs hold more unexercised exercisable options than the industry median, I find that, apart from strong and negative tones, their firms also tend to avoid litigious tone (at 5% level of significance). When I proceed to regress using the overconfidence measure where CEOs do not exercise their options even when they are 67% in-the-money during the fifth year and onwards, I see that the firms headed by overconfident CEOs avoid using a negative and strong tone in their annual reports, same as the initial result.

Overconfident CEOs tend to get involved in more mergers and acquisitions. Because the investors react negatively to the merger announcements made by overconfident CEOs, it is in their best interest to reflect moderation. Also, by avoiding negative tone, they can create a positive reaction in the market. Since overconfident CEOs are more active in the M&A market, they can attract more targets by virtue of a positive environment. Sell-side analysts revise their forecast downward if there is a negative tone portrayed. Also, negative tone affects the firm reputation and has a higher probability of violating FCPA, 1977. A firm about to enter its declining stage, try to appear more ambiguous and more confident by using a more negative, uncertain, more strong and weaker tone. This undermines the growth prospect of their firms overconfident CEOs believe in. So, it is in the best interest of overconfident CEOs to avoid using a negative tone. Why would firms led by overconfident CEOs avoid a negative tone and not favor a positive tone instead? The reason is,

Druz (2015) shows that the positive effect of avoiding negative tone is larger than the effect of favoring a positive tone.

It may come surprising that overconfident CEOs will avoid strong tone as they are confident by nature. But literature show that when they use a more strong tone, the analysts get confused about how to interpret the tones and thus their predictions vary. When there is variation among the forecast analysts make, the market also gets confused and penalizes the firm in the process. So even avoiding a strong tone is in the best interest of overconfident CEOs. Also, the same as negative tone, a firm about to enter its declining stage uses more strong tone in their annual report giving the wrong signal contrary to the belief overconfident CEOs hold.

Previous literature associates litigious tone with stock return volatility. And similarly, as negative tone, litigious tone affects the firm reputation and has a higher probability of violating FCPA, 1977. Since the impact of tones matters more in case of overconfident CEOs in comparison to non-overconfident CEOs, overconfident CEOs have more incentive to avoid negative, strong and litigious tone in their annual reports.

I test the sensitivity of negative, strong and litigious tone to CEO overconfidence across high and low levels at median of some particular CEO- and firm-specific characteristics. Results show strong evidence of firms headed by overconfident CEOs with higher levels of cash increasing the use of strong tone in annual reports, and more valued firms (measured by market to book value decreasing the use of litigious tone. Results also show weak evidence of firms headed by overconfident CEOs with higher capital expenditure increasing the use of negative tone and highly leveraged firms headed by overconfident CEOs decreasing the use of litigious tone.

5.2   Limitation, Practical Implication, and Scope for Future Research

Major limitation of the study comes in terms of potential endogeneity. Since CEO overconfidence is a behavioral trait, and to measure overconfidence, my best bet is to use a proxy variable, for which in my case, I used an options-based measure coupled with an industry median-based measure, there might be endogeneity concerns – that is hard to identify. Endogenous CEO-firm matching, as well as CEO characteristics, can potentially make it difficult for us to interpret the

results between the tone of annual reports and CEO overconfidence due to observed CEO-specific omitted variables and unobserved firm-specific heterogeneity. Being aware of these endogeneity concerns, I limit the sources of endogeneity to some extent from the very beginning by using additional controls for CEO characteristics that may be related to overconfidence in the primary model along with some firm-specific control variables. Also, I use year and firm fixed effects to counter firm-specific unobserved heterogeneity concerns.

According to Malmendier & Tate (2005), the results should not be driven by endogeneity issues because the stakeholders should be aware of the detrimental effects of overconfidence and take resorts to supplemental steps while taking decisions while dealing with overconfident CEOs. And from the results, I also see that the results hold while I account for additional CEO characteristic variables, and year and firm fixed effects in order to respond to endogeneity issues.

The findings bear practical implications in the area of corporate and behavioral finance. Textual analysis is growingly being used on financial documents and proceedings. Since now, studies have looked mostly into positive and negative sentiments the texts incorporate and on their effects on market returns. I expand the range of sentiments even more. Also, until now, overconfidence has been looked into for its association with basically with corporate finance issues, such as – investment decisions, cost of equity, etc. But I try to work with overconfidence from a behavioral finance aspect. This is the first study that explains the influence of CEO overconfidence on tone of the annual report based on prior literature.

The research does consider some important aspects of textual analysis on overconfidence. Yet further research can be conducted on many other financial documents apart from annual reports. Also, overconfidence can be looked at more comprehensively, combining a few other measures. Also, textual analysis can be investigated from the perspective of information overload and ease of readability.

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Appendix
Data Loss Process

	# of Observations
Price data	440,399
Deleted missing closing prices	371,047
Options data	132,620
Merged price and options data	216,176
Removed duplicate values	132,620
Execucomp data	286,016
Filtered by annual CEO	45,696
LM data	192,117
Filtered by 10-K	152,938
Merged Execucomp & LM data	37,975
Fog data	86,540
Removed duplicate values	82,448
Merged Execucomp-LM-Fog data	37,975
Compustat data	484,878
Filtered by asset size and deleted missing total asset values	309,812
Merged Execucomp-LM-Fog-Compustat data	37,496
Deleted negative/missing tenure values	35,974
CRSP data	4,521,957
Kept first year data	404,396
Beta data	17,391,901
Kept last year	378,392
Merged CRSP & beta data	403,388
Merged Execucomp-LM-Fog-Compustat-CRSP-Beta data	34,014
Deleted negative firmage & mvbv values, and observations from 1992	33,011
Final regression	31,069