

Managers set the tone: Equity incentives and the tone of earnings press releases[☆]

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ABSTRACT

Earnings press releases, as a timely vehicle for communicating a firm's performance to third parties, can be used by managers to influence the perception of the firm's achievements. Taking the stock price reaction to the tone of earnings press releases at earnings announcements into account, we argue that equity-based incentives induce managers to inflate the tone. We further posit that the impact of tone on the abnormal stock returns at the earnings announcements depends on the magnitude of the equity-based incentives. Based on over 26,000 earnings press releases of S&P1500 firms between 2004Q4 and 2012Q4, we find that the tone of earnings press releases tends to be more positive when the managerial portfolio value is more closely tied to the firm's stock price. We also find that investors react proportionally less to the tone as managers' equity incentives increase.

KEYWORDS: Equity incentives, Market efficiency, Textual tone, Voluntary disclosure

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1 Introduction

The use of performance-based executive compensation schemes has increased significantly in the last decade. Although these compensation schemes are clearly intended to align managers' and shareholders' incentives, there is ample empirical evidence that stock-based compensation contracts increase managers' incentives to manipulate earnings numbers in accounting statements (see e.g. [Bergstresser and Philippon, 2006](#); [Burns and Kedia, 2006](#); [Gaver, Gaver, and Austin, 1995](#); [Ke, 2003](#); [Yermack, 1997](#)).¹ However, it remains an open question whether

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¹Throughout the paper, we refer to managers as the group of CEO, CFO and other top executive officers, as reported in the Execucomp database. One exception is that in Subsection 4.1.1 we do the the analysis for the CEO and the

equity-based incentives also influence managers' reporting behaviour of qualitative financial information, and in particular the tone of the earnings press releases.

Since quantitative information provides investors with an incomplete picture of a firm's economic performance, the analysis of the narrative disclosure in earnings press releases is of utmost importance. Prior research shows that the tone of earnings press releases - measured as the spread in the proportion of positive and negative words - provides a signal regarding managers' future earnings expectations to the market, explaining why the market tends to react positively to the tone in a short window around the earnings announcement date (Davis, Piger, and Sedor, 2012; Davis and Tama-Sweet, 2012; Henry, 2008). In the same way as managers may manipulate earnings numbers to maximize their compensation package, this evidence suggests that managers can opportunistically influence stock prices by inflating the tone of their narrative disclosures to increase their compensation. Moreover, words are more elastic than numbers in conveying an impression. Whereas quantitative disclosures are subject to GAAP enforced by independent auditors or the SEC monitoring of periodic filings, the key feature of earnings press releases is that they are unregulated voluntary disclosures, giving the management almost full discretion on what information to disclose to investors.² Such disclosures are thus harder to regulate or to litigate against and offer managers an opportunity to more subtly manipulate market participants' perceptions of future firm performance.

Based on a sample of 26,000 earnings press releases written by managers of the S&P 1500 firms between 2004 and 2011, we first investigate whether highly incentivized managers - those whose wealth is tied to the firm's share price - inflate the tone of words in earnings press releases. We find that, irrespective of the library used to measure the tone, incentivized managers appear to use positive words more aggressively in press releases and that this effect cannot be explained by differences in past performance, information asymmetry, industry or time fixed effects. In addition to showing that the propensity for tone inflation is higher for managers whose wealth is more tied to the stock price, we also show that managers whose portfolio value increases when

remainder of the team, separately.

²There exist only a few general guidelines that advise managers on how to best report qualitative information to investors. Earnings press releases are required to be "accurate and complete so as not to mislead" (Trautmann and Hamilton, 2003). The National Investor Relations Institute and the Financial Executives Institute also recommend that "managers present in earnings press releases a reasonably balanced perspective of operating performance". Additionally, New York Stock Exchange rules require that press releases place news in the "proper perspective" and that managers avoid "overly optimistic forecasts, exaggerated claims and unwarranted promises" (NYSE manual).

the stock return volatility increases have a lower tendency to inflate the tone of the earnings press release. We thus conclude that measures of tone in earnings press releases do not simply reflect the economic events of the firm but also managers' incentives to increase the value of their stock and option portfolio.

The critical question is how investors react to this incentive for tone inflation. We examine this question by studying the effect of the equity incentives on the impact of abnormal tone on the immediate and delayed stock price reaction following the earnings announcement. We find that the immediate stock price reaction remains a positive function of the abnormal tone in the earnings press release, but that the marginal price effect of abnormal tone decreases as managers' equity incentives increase. We interpret this result as evidence that investors can (partially) see through the tone inflation in the earnings press release, and therefore discount the information signal in the abnormal tone for the presence of managers' opportunistic motives. Consistent with [Huang, Teoh, and Zhang \(2014\)](#), we find that, at high levels of equity incentives for tone inflation, the delayed impact of abnormal tone on the return in the 60-day window starting two days after the announcement, can even become negative.

The bottom line of our analysis is that equity-based compensation induces managers to engage more in self-service disclosure practices and that investors anticipate this by reducing the influence of the tone in the earnings press release on the firm valuation for firms where the managerial compensation is strongly dependent on the value of the stock price. These results contribute to the compensation literature by providing further evidence on compensation-related opportunistic behavior. While stock-based compensation can provide positive incentive alignment effects, compensation contracts should reflect the consequences of tone inflation practices arising from these equity incentives.

The rest of the paper is organized as follows. In [Section 2](#), we discuss prior literature on managers' compensation and earnings management. In [Section 3](#), we describe the data and the variables used. [Section 4](#) describes our results. Finally, [Section 5](#) concludes and suggests directions for further research.

2 Literature review and hypothesis development

We extend the prior literature by investigating the impact of the stock price sensitivity of managerial equity incentives on the information transmission from managers to investors through earnings press releases.³ Equity incentives often result from the firm's actions to reward and stimulate managerial good performance by granting managers options and shares at a discount compared to the market price. However there is abundant evidence provided by the literature on the distorting effects this type of performance-based compensation can have on managerial decisions. [Bergstresser and Philippon \(2006\)](#) and [Peng and Roell \(2003\)](#), among others, focus on the impact of equity-based incentives on managers' strategic misreporting behaviour of earnings numbers and conclude that managerial equity-based incentives increase the likelihood of earnings management practices.

This paper considers the tone in narrative disclosures as a potentially new channel through which the compensation of managers can influence their behaviour. We argue that managers inflate the tone for at least two reasons. First, they are risk averse and want to maximize the firm's value by minimizing the potential negative value effects that their tone can have on their portfolio value ([Markowitz, 1952](#)). Second, from a short term value maximization perspective, managers have an interest in diffusing information such that investors are overoptimistic about the future prospects of the firm and therefore overvalue the stock price around the earnings announcements, leading to a higher stock-based compensation. At the same time, we hypothesize that investors are aware of this inflation and will react proportionally less to the tone of the earnings press release when the price sensitivity of the manager's stock-based compensation is higher. In Subsection 2.1 we discuss the main findings of prior literature on the predictive power of textual sentiment for the future stock price performance.

The remaining sections develop our hypotheses regarding the following two questions: (i) whether a manager, whose compensation is positively dependent on the stock price, inflates the textual tone in voluntary disclosures and (ii) how do investors react to the tone of earnings press releases, given that they know managers' incentives.

³We focus on the manager's private benefits of influencing the stock's valuation and refer to [Baker and Wurgler \(2002\)](#) for an alternative theory in which the manager aims at exploiting stock mispricing to issue shares at high prices and repurchase them at low prices, or to [Salomon \(2012\)](#) for a theory in which more incentivized managers have already spun the good news before the earnings press release, which induces a smaller price reaction at earnings announcement.

2.1 The information content of textual sentiment for firm valuation

Managers acquire private information about the firm's future expected cash flows and risk through their proximity to operating activities. There exists strong evidence that the market uses qualitative information from earnings press releases to infer the manager's private information about the firm's prospects and value.⁴ For instance, [Davis et al. \(2012\)](#) document the immediate effect of the tone of earnings press releases on the perception of investors about its future performance. They show that the three-day cumulative abnormal return around the earnings announcement increases with the tone of earnings press releases. [Henry \(2008\)](#), [Demers and Vega \(2010\)](#) and [Price, Doran, Peterson, and Bliss \(2012\)](#) also conclude that the tone of earnings press releases is significantly positively correlated with short window contemporaneous returns around the date that the disclosures are made even after controlling for a firm's financial information and earnings surprises. [Engelberg \(2008\)](#) finds that, over longer horizons, qualitative earnings information embedded in Dow Jones News Service stories about a firm's earnings announcements has additional predictability for asset prices beyond the predictability of hard financial information, such as the unexpected earnings surprise, return-on-assets or analyst dispersion. He explains that qualitative information has a higher processing cost than quantitative information over longer horizons, which explains why it diffuses slowly into asset prices. This evidence, either over short or longer periods, supports the fact that the qualitative information contained in earnings releases provides a signal regarding managers' future earnings expectations to the market, to which the market responds on and after the earnings announcement day.

Early research on the qualitative information of earnings press releases mainly interprets the tone as an unbiased signal of a manager's private information about future corporate performance and generally ignores the managerial incentives to inflate the tone of corporate disclosures (see e.g. [Davis et al., 2012](#); [Henry, 2008](#)). It is only recently that increasing evidence shows that managers can intentionally affect the optimistic language in earnings press releases. For instance, [Huang et al. \(2014\)](#) provide evidence that managers manipulate investors' perceptions to hype a stock before important events. They find that the textual tone in earnings press releases is,

⁴This evidence is in line with the results on the information value of tone of other corporate disclosures, such as corporate news items ([Tetlock, 2007](#); [Tetlock, Saar-Tsechansky, and Macskassy, 2008](#)), CEO letters ([Abrahamson and Amir, 1996](#); [Boudt and Thewissen, 2014](#); [Clatworthy and Jones, 2006](#); [McConnell, Haslem, and Gibson, 1986](#); [Patelli and Pedrini, 2013](#); [Smith and Taffler, 2000](#); [Swales Jr, 1988](#)), annual report narratives ([Li, 2010](#); [Loughran and McDonald, 2011](#)), earnings calls ([Blau, DeLisle, and Price, 2015](#)), or news stories about firm events such as mergers ([Ahern and Sosyura, 2014](#)).

on average, more positive when firms are issuing new equity or undertaking mergers and acquisitions, and more negative when granting stock options. Similarly, [Davis and Tama-Sweet \(2012\)](#) argue that managers act strategically in choosing the narrative outlets to describe firm performance, e.g., Management, Discussion & Analysis (MD&A) vs. earnings press releases. They show that, because investors react more strongly to the information disclosed at the time of the earnings press release relative to the market reaction at the time of the 10-K or 10-Q filings (which includes MD&A), managers use less pessimistic language and more optimistic language in earnings press releases relative to the MD&A. Finally, [Schleicher and Walker \(2010\)](#) study the tone in the outlook section of the annual reports of UK firms and find evidence that firms with an impending performance decline tend to bias the tone in the outlook section upwards. We extend this research by investigating the impact of equity incentives on the propensity of managers to increase the stock price by inflating the tone of the earnings release.

2.2 Textual tone and the sensitivity of managers' equity-based compensation to the stock price (delta) and return volatility (vega)

Stock-based compensation aims at aligning managers' and shareholders' interests. The basic premise is that by making managers' compensation positively dependent on the firm's stock price, managers will maximize shareholders' long run value. After a series of accounting scandals such as Enron, it has become clear that stock-based compensation can also fail in aligning the interests and lead to self-opportunistic behavior of the manager.

Several authors have provided evidence on managers' strategic misreporting behaviour of earnings numbers with the attempt to maximize their performance-based compensation. For instance, [Gaver et al. \(1995\)](#), [Ke \(2003\)](#), [Peng and Roell \(2003\)](#), [Burns and Kedia \(2006\)](#) and [Bergstresser and Philippon \(2006\)](#) all show that firms with more incentivized managers have higher levels of earnings management and that firm managers tend to trade an unusually large amount of stocks and options in periods of overstated earnings. [Cheng and Warfield \(2005\)](#) make a similar point and provide evidence that stock-based compensation induces managers to meet or just beat analysts' forecasts. [Gao and Shrieves \(2002\)](#) also find that the propensity to engage in earnings management is significantly and positively associated with the sensitivity of the CEO's compensation package to the firm's stock price.

In this paper, a more subtle form of overoptimistic communication to investors is examined,

namely the inflation of the tone in earnings press releases. Language in earnings press releases may be particularly susceptible to the influence of managers' stock-based incentives because the choice of language is relatively unconstrained and difficult to verify *ex post* when compared to audited financial statements and explicit earnings numbers. Managers are obviously constrained from making statements that are false, but positioning factual statements in a more positive way is less likely to cause regulatory intervention. In addition, it is common practice in many large listed firms to reward their managers using a variety of stock-based compensation plans, such as stock or stock-option grants. Given the positive linkage between the tone contained in earnings press releases and firm value over the short and long term, one can expect that managers whose private portfolio value is positively dependent on the stock price, will engage in the inflation of the tone in voluntary disclosures to maximize their wealth.

A related theoretical framework to analyze the strategic transmission of information between managers and investors is [Kartik \(2009\)](#)'s *Almost-cheap talk* model. Under this model, inflated language naturally arises in a situation of strategic communication between an informed sender (aka the manager) and an uninformed receiver (aka the investor). [Kartik \(2009\)](#) shows that the sender will always claim to be a higher type than he would under complete information. A practical example that [Kartik \(2009\)](#) gives for his model is the one of inflated stock recommendations by analysts at brokerage firms that have an underwriting relationship with the stock. The position of the firm manager writing the earnings press release and being exposed to a price sensitivity of his portfolio is similar to the situation of the analyst.

In the remainder of the paper, we focus on the managerial incentive to inflate the tone in the earnings press release. This incentive arises when the firm management holds shares and options of the firms, whose value directly depends on the stock price. This incentive is quantified as the managerial delta, defined as the *ceteris paribus* effect of a one per cent change in the stock price on the value of the managers' holding of the firm's stock and options. In other words, the managerial delta is defined as the partial derivative of the portfolio value with respect to the firm price, multiplied with the dollar value of a 1 per cent change in the stock price. This leads us to formulate the following as our main hypothesis regarding the effect of equity incentives on tone inflation.

Hypothesis 1. Ceteris paribus, the more sensitive the managerial equity-based compensation is to the firm's stock price, the higher is the manager's incentive for tone inflation in earnings

press releases.

There are of course limits to tone inflation. The manager is expected to balance the benefits of tone inflation with the costs of doing so. There exist various costs that temper managers' over-optimism in narrative disclosures. Probably the most important cost a manager would bear is his loss of credibility. Credibility has been shown to be an important factor for investors in reacting to financial disclosures. For instance, [Gordon, Henry, Peytcheva, and Sun \(2008\)](#) study whether management credibility is associated with a less negative market reaction to restatements. They find that greater management credibility is associated with a less negative market reaction at the time of the restatement. Litigation risk also constitutes an important cost to tone inflation in qualitative disclosures. [Rogers, Van Buskirk, and Zechman \(2011\)](#) provide evidence that managers' use of optimistic language increases litigation risk. They show that plaintiffs target optimistic statements in their lawsuits and that, controlling for a firm's economic condition, sued firms have unusually linguistically optimistic earnings announcements. The fear of litigation based on voluntary disclosures that are *ex post* overly optimistic can thus reduce managers' tendency towards over-optimism in voluntary outlets.⁵ Similarly, [Baginski, Demers, Wang, and Yu \(2011\)](#) argue that optimism in financial disclosures is also costly because it signals high industry profitability, which in turn may encourage entry into the industry by potential competitors.

In addition to the portfolio delta being an incentive for tone inflation, there is also an equity incentive for tone deflation, namely the portfolio vega, defined as the change in the managerial portfolio value due to an increase in the annualized stock return volatility with one percent. The vega will typically be a positive number, as the value of the stock options (and the shares themselves, which can be seen as European options) tends to increase when the return volatility increases. By deflating the tone and thus presenting the firms more negative than fundamentally should be, the uncertainty about the future firm prospects will increase. The tone deflation incentive induced by the portfolio vega is also consistent with the so-called leverage effect of negative news on volatility, as presented first by [Black \(1976\)](#). It states that, keeping the debt constant, a pessimistic tone will tend to lead to a negative stock price reaction and thus an increase in the firm's debt/equity leverage ratio. This directly results in an increase in the risk

⁵The firm may suffer what stock traders call a "liar's discount", which is the discounting of a firm's stock price below that of its competitors when analysts refuse to trust a firm's management after its prior voluntary disclosure is exposed to misleading ([King, 1988](#)).

of default on debt, which leads to an increase in the stock price volatility and thus an increase in wealth for the portfolio managers with a positive vega. The objective of tone inflation coming from the portfolio delta is in conflict with the aim of tone deflation to increase the stock return volatility. The presence of a large managerial vega thus represents an additional cost of tone inflation. It will be important to control for vega in order to quantify the impact of managerial delta on the equity incentive for tone inflation. The sign of the impact of vega on tone is expected to be negative, since firm managers with a higher vega are thus expected to be less inclined to inflate the tone of the earnings press release.

Hypothesis 2. Ceteris paribus, the more sensitive the managerial equity compensation is to the firm's stock price volatility, the lower is the manager's incentive for tone inflation in earnings press releases.

As mentioned by [Core, Guay, and Larcker \(2003\)](#), in almost all cases, the incentive to increase the stock price dominates the incentive to take on risk. We therefore expect that the incentive for tone inflation, induced by a positive managerial delta, is dominated by the incentive for tone deflation coming from a positive vega. For this reason, we focus our research design on the impact of the portfolio delta on the tone in the earnings press release and the stock price reaction, while controlling for vega in order to disentangle the differential effects of the incentive to increase the stock price from the incentive to increase the stock return volatility.

2.3 Feedback effects between tone inflation and investors' reaction to textual tone

Next, we present our hypotheses for the immediate and delayed (abnormal) stock market reaction to the abnormal tone in the earnings press release. Throughout the paper, the immediate effect on abnormal stock returns is measured using the cumulative abnormal return of the window that starts the day preceding the announcement and ends the day following the announcement; denoted as $CAR[-1, +1]$. Throughout the paper, abnormal returns are computed based on the market model calibrated on the estimation window that starts 315 days before the announcement and ends 62 days before that announcement date. The use of a 3-day event window to capture the effect of news on stock prices is a standard choice in event studies examining the market response to financial and other information disclosed in earnings press releases (see, e.g., [Davis et al., 2012](#); [Henry, 2008](#)). The window starts the day prior to the announcement date (as published in

the Compustat database) to ensure that the price impact is still captured in the case the earnings reports is already available to (some or all) investors the day before the official announcement date of the press release. This choice is supported by prior research showing that the market exhibits significant reaction to earnings announcements beginning on day $t - 1$ when day 0 is the announcement date (see, e.g., [Ball and Kothari, 1991](#); [Patell and Wolfson, 1981](#)). Symmetrically, there is usually also a price impact on the day following the announcement, explaining why the window consists also of the day following the Compustat announcement date.

The delayed effect is measured over the 60-day window starting on the second day after the announcement, denoted as $CAR[+2, +61]$. The distinction between the immediate and delayed effects of abnormal tone on the firm's abnormal returns follows closely the framework of [Huang et al. \(2014\)](#). They show that, while the immediate effect is positive, the delayed effect of abnormal tone on the firm's abnormal returns is negative. We extend the analysis of [Huang et al. \(2014\)](#) by conditioning the abnormal return impact of abnormal tone on the managerial equity incentives. In fact, it is natural to expect that, both the immediate and delayed market reaction to a positive abnormal tone will be higher for firms for which the management has less equity incentives to engage in tone inflation.

2.3.1 Market reaction to abnormal tone at the time of earnings announcement

The earnings press release is a major news event and is often associated with significant abnormal returns around the announcement day. Prior literature has shown that the language used by managers in the earnings press release has a significant and positive impact on how investors react to the news. For instance, [Davis et al. \(2012\)](#) and [Henry \(2008\)](#) show that the tone in the earnings press release is positively related to this abnormal return. Based on a sample of 23,017 quarterly earnings announcements between 1998 and 2003, [Davis et al. \(2012\)](#) find that managers use language throughout an earnings press release to signal their expectations for future firm performance to the market, and that it generates a market response around the earnings announcement day. Similarly, [Henry \(2008\)](#) uses a sample of 1,366 firm-year observations in the telecommunications and computer services industries, and related equipment manufacturers between 1998 and 2002. They find that a the tone of earnings press releases generates a positive investor reaction at earnings announcement.

Huang et al. (2014) also investigate the impact of the tone of earnings press releases on stock prices, but focus on a more fine-grained measure, the abnormal level of tone. They decompose the tone level into two components. The normal component reflects a neutral tone that is commensurate with concurrent information about current and expected future firm quantitative performance and the residual component, the abnormal tone, is intended to capture the discretionary and inflated component of tone. Huang et al. (2014) also find that investors positively react to the tone at earnings announcement and conclude that investors do not immediately discount for the tone manipulation in earnings press releases. As in prior literature, we expect that the abnormal level of tone in an earnings press release is predominantly informative and that investors initially positively react to it. We first replicate this result and test to what extent investors react to the abnormal tone in earnings press releases.

Hypothesis 3. Ceteris paribus, the abnormal level of tone in earnings press releases is positively associated with abnormal returns on the firm's stock price around the earnings announcement date.

We contribute to Huang et al. (2014)'s model and investigate whether investors anticipate managers' incentive to opportunistically set the tone of their report. If investors anticipate managers' opportunistic bias, they should therefore react proportionally less to the abnormal tone in the earnings press release, as managers' delta increases. According to the *Almost-cheap talk* model, the receiver is not systematically deceived by the sender's language inflation (deflation), because he recognizes that the sender is inflating his messages and adjusts his decision accordingly. While this equilibrium may appear paradoxical at first glance, the key point is that if the sender were to tell the truth (i.e. send a message with no inflation), the receiver would infer that his type is in fact lower than it actually is, since the receiver expects messages to be inflated. There is thus an inescapable inefficiency for the sender in equilibrium.⁶

Hypothesis 4. Ceteris paribus, the sensitivity of managerial compensation to the stock price weakens the association between abnormal level of tone in earnings press releases and the

⁶Alternative models exist on the idea of strategic information transmission between a sender and a receiver. Although the assumptions differ, the main results remain the same: while the message sent by the sender is biased, at the equilibrium, the receiver is able to process this information efficiently. See for instance the Signal Jamming theory between investors and managers modeled by Stein (1989) or the misreporting bias model defined by Fischer and Verrecchia (2000).

abnormal return on the stock price around the earnings announcement date.

This hypothesis is related to the notion that investors are aware of managers' strategic biases and discount what they view as opportunistically motivated. For instance, [Balsam, Batov, and Marquard \(2002\)](#) investigate the stock price reaction to quarterly earnings news for a sample of firms for which there is *ex post* evidence of earnings management. They find evidence of a negative association between the degree of accruals management and the stock price reaction around the 10-Q filing date.

However, we cannot argue that investors fully adjust for managers' opportunistic bias in earnings press releases. While the long-standing assumption in both economics and accounting is that investors fully adjust for known biases in reported information, recent evidence shows that investors underweight the impact that managerial bias has on information and are largely unable to correct their expectations. [Smith \(2012\)](#) experimentally documents that investors are behaving contrary to economic theory as they are not able to fully adjust for known biases in managerial communications, although they know the quantitative amount of the manager's bias. Drawing on insights from psychology, he argues that individuals have a tendency to believe plausible information, even when other evidence suggests the information is unreliable or false ([Evans, Barston, and Pollard, 1983](#); [Markovits and Nantel, 1989](#)). His result occurs because, as individuals comprehend the information, they overly focus on the content of the information and are not sufficiently attentive to indicators of the veracity of the information ([Burgoon, Blair, and Strom, 2008](#); [Gilbert, Tafarodi, and Malone, 1993](#)). Based on [Smith \(2012\)](#), we expect that investors, *at least partly*, correct for managers' opportunistic motives in earnings press releases.

2.3.2 Delayed market reaction to abnormal tone after earnings announcements

When abnormal tone has both an informative and biased components, the delayed effect of abnormal tone can be positive or negative, depending on investors' reaction at the announcement and the relative importance of the tone inflation. We expect a delayed effect, but the magnitude of the delayed effect is expected to be smaller than the instantaneous effect.

Assume first that the abnormal tone reflects the private information of the manager on the future firm performance. In efficient markets, the investor reaction to the tone should be immediate. However, because information is costly to process and investors are conservative,

investors tend to underreact to the fundamental news component in tone, which leads to a positive drift in prices (Engelberg, 2008). This is consistent with the behavioral finance literature on investors' underreaction to news as an explanation for the profitability of momentum strategies that buy stocks with high returns over the previous three to 12 months and sell stocks with poor returns over the same time period (Barberis, Shleifer, and Vishny, 1998; Daniel, Hirshleifer, and Subrahmanyam, 1998; Hong and Stein, 1999; Jegadeesh and Titman, 1993).

In case of tone inflation, it could be that the abnormal tone is no longer perceived as informative by the investors. Consistent with our previous hypotheses, we expect a downward effect of price sensitivity of the managers' compensation on the delayed effect of abnormal tone on the future abnormal stock return performance. Huang et al. (2014) provide evidence of the extreme scenario in which abnormal positive tone misleads investors at the time of earnings announcements to temporarily over-value the firm and the market subsequently corrects the mispricing. In this case, we should see a negative effect of abnormal tone on future returns. We argue that this is more likely to happen when managers have a higher incentive to inflate tone.

Hypothesis 5. Ceteris paribus, the magnitude of the delayed effect of abnormal tone on the firm's stock price is smaller than the instantaneous effect. The less sensitive is managers' compensation to the firm's stock price, the more informative the abnormal tone is and the more positive will be the impact of abnormal tone on the abnormal returns on the firm's stock price over the following quarters after the earnings announcement.

3 Sample and variable description

We now describe the longitudinal sample of quarterly earnings press releases and define the tone, equity-incentive and control variables used in our tests. Table 1 provides a synthesis of the main variables.

3.1 Sample selection

Our analysis focuses on the 2004Q4-2012Q4 earnings press releases issued by the universe of US firms covered by Execucomp as of December 2013. This corresponds to the current and past members of the S&P 1500 constituents, for which, according to Compustat, there is a

Table 1: Variable definitions

Variable	Variable Description
<i>Panel A – Compustat/CRSP/IBES items</i>	
$A_{j,q,t}$	Total assets of firm j at the beginning of quarter q of year t (Compustat #6)
$Y_{j,q,t}$	Income before extraordinary items of firm j at the end of quarter q of year t (Compustat #18)
$CSHO_{j,q,t}$	Number of common shares outstanding of firm j at the end of quarter q of year t (Compustat #25)
$B_{j,q,t}$	Book value of equity of firm j at the end of quarter q of year t (Compustat #60)
$P_{j,d,q,t}$	Price of firm j on day d , quarter q of year t (CRSP)
$R_{j,d,q,t}$	Stock return of firm j on day d of quarter q of year t (CRSP)
$VOL_{j,d,q,t}$	Volume of firm j on day d of quarter q of year t (CRSP)
$R_{M,d,q,t}$	S&P500 return on day d of quarter q of year t (CRSP)
$Actual_{j,q,t}$	Actual earnings-per-share realized by firm j in fiscal quarter q of year t (IBES)
$Forecast_{i,j,q,t}$	Forecast made by analyst i for firm j in fiscal quarter q of year t (IBES)
$Consensus_{j,q,t}$	Average of analysts' (last) forecast for firm j in fiscal quarter q of year t (IBES)
<i>Panel B – Dependent variables</i>	
$Tone_{j,q,t}$ (in %)	Tone in the earnings press release of firm j of quarter q of year t ; See (3.1)
$CAR[-1, +1]_{j,q,t}$	Cumulative abnormal return for firm j for the $[d - 1, d + 1]$ trading day window, under the market model approach, with parameters $\alpha_{j,q}$ and $\beta_{j,q}$ estimated on the $[d - 315, d - 62]$ time window; i.e. $\sum_{d=-1}^1 E[R_{j,d,q,t}] - \alpha_{j,q,t} - \beta_{j,q,t} \cdot E[R_{M,d,q,t}]$
$CAR[+2, +61]_{j,q,t}$	Cumulative abnormal return for firm j for the $[d + 2, d + 61]$ trading day window, i.e. $\sum_{d=2}^{61} R_{j,d,q,t} - \alpha_{j,q,t} - \beta_{j,q,t} \cdot R_{M,d,q,t}$, with $\alpha_{j,q,t}$ and $\beta_{j,q,t}$ as defined for for $CAR[-1, +1]_{j,q,t}$.
<i>Panel C – Managerial portfolio sensitivity to the firm's stock price and annualized volatility</i>	
$\Delta_{j,t}$ (Delta)	Sensitivity of the stock-based compensation of firm j 's team of executives to the stock price (in \$ mil.); See (3.4)-(3.5)
$\Delta_{Stck,j,t}$	Delta of the stock portfolio of firm's j team of executives in year t (in \$ mil.); See (3.4)-(3.5)
$\Delta_{Opt,j,t}$	Delta of the option portfolio of firm's j team of executives in year t (in \$ mil.) See (3.4)-(3.5)
$\nu_{j,t}$ (Vega)	Sensitivity of the stock-based compensation of firm j 's team of executives to the stock price volatility (in \$ mil.); See (3.7)
<i>Panel D – Control variables</i>	
$MC_{j,q,t}$	Market capitalization of firm j on the last day d of the quarter q of year t (in \$ mil), i.e. $P_{j,d,q,t} \cdot CSHO_{j,q,t}$
$BTM_{j,q,t}$	Book-to-market ratio of firm j for quarter q of year t , i.e. $B_{j,q,t}/MC_{j,q,t}$
$ROA_{j,q,t}$ (in %)	Return on assets of firm j for quarter q of year t , i.e. $100 \cdot Y_{j,q,t}/A_{j,q,t}$
$\alpha_{j,q,t}$ (in %)	Intercept of the market model, estimated over the $[d - 315, d - 63]$ time window, where $d = 0$ is the earnings announcement day of quarter q of year t
$CAR[-62, -2]_{j,q,t}$ (in %)	Cumulative abnormal return of firm j for the $[d - 62, d - 2]$ trading day window, where $d = 0$ is the earnings announcement day of quarter q of year t , i.e. $\sum_{d=-62}^{-2} [R_{j,d,q,t} - \alpha_{j,q,t} - \beta_{j,q,t} \cdot R_{M,d,q,t}]$
$FE_{j,q,t}$ (in %)	Analyst' forecast error for stock j in quarter q of year t , i.e. $100 \cdot (Actual_{j,q,t} - Consensus_{j,q,t})/P_{j,d,q,t}$
$NegFE_{j,q,t}$	Dummy indicator, which is zero, except when $FE_{j,q,t} < 0$
$NOA_{j,q,t}$	Number of analysts' forecasts for stock j in quarter q of year t
$Volume_{j,q,t}$	Stock j 's share turnover over fiscal quarter q of year t , standardized by the number of shares outstanding on the last day of fiscal quarter q , i.e. $(\sum_{d=0}^{250} VOL_{j,d,q,t})/CSHO_{j,q,t}$
$Disp_{j,q,t}$	Dispersion of analysts' (last) forecasts for stock j in fiscal quarter q of year t , measured as $\sigma_{Forecast,i,j,q,t}/P_{j,d,q,t}$
$\sigma_{ROA,j,q,t}$	Standard deviation of ROA over the four quarter preceding the end of fiscal quarter q of year t , i.e. $[\frac{1}{4} \cdot \sum_{i=1}^4 (ROA_{j,q-i,t} - \widehat{ROA}_{j,q-i,t})]^{\frac{1}{2}}$

$\beta_{j,q,t}$	Systematic risk of stock j in quarter q of year t , based on the market model that spans the $[d - 315, d - 63]$ time window, where $d = 0$ is the earnings announcement day of quarter q of year t , i.e. $\beta_{j,q,t} = cov(R_{j,t}, R_{M,q,t})/var(R_{M,q,t})$
Qtr_q^l	Dummy indicator, which is zero, except when the quarter q corresponds to fiscal quarter l is defined as the fiscal quarter of the earnings press release
$Year_t^y$	Dummy indicator, which is zero, except when the year t corresponds to the fiscal year y
Ind_j^s	Dummy indicator, which is zero, except when the firm j operates in industry s (defined as the first two digits of the Global Industry Classification Standard)

total 63,687 quarterly earnings press releases. The latter can be retrieved from various sources, among which the Edgar website of the SEC.⁷ The SEC publishes the earnings press releases, in accordance to Section 409 of the Sarbanes-Oxley Act requiring that public companies that issue earnings releases furnish them to the SEC on a Form 8-K within four business days. This leads to a sample of earnings press releases that corresponds to 91.32% of the initial total of 63,687 quarterly earnings press releases.

We then parse the 8-K documents into vectors of words, retaining only the text within the tag "<TYPE> EX 99.1". We hereby follow standard practice of parsing the text through the following sequence of steps (see e.g. [Davis et al., 2012](#); [Davis and Tama-Sweet, 2012](#); [Henry, 2008](#); [Loughran and McDonald, 2011](#)): (i) Remove graphics; (ii) Re-encode characters such as &NBSP (blank space) or & (&) back to their original ACSII form; (iii) Remove all text appearing within <TABLE> HTML tags, where more than 10% of the nonblank characters are numbers; (iv) Remove HTML; (v) Parse into tokens. For the parsing we use a regular expression (regex) to parse the remaining string variable into all collections of two or more alphabetic characters.

In addition, content and minimum length conditions are imposed to ensure that the tone estimate obtained from the textual analysis of the earnings press release is reliable. More precisely, following [Davis et al. \(2012\)](#), we impose that there is a minimum text length of 100 words in the earnings press release. To further ensure that the sample includes only earnings press releases, we manually read all the press releases with a size of less than 10 kilobytes and eliminate those that are not relevant.⁸ After these content and size verifications, we are left with a sample of 40,735 firm-quarter observations, for which the equity incentives can be computed using

⁷Other sources include Businesswire, used e.g. in [Huang et al. \(2014\)](#), and Newswire, used in [Davis et al. \(2012\)](#), among others. See also [Henry and Leone \(2009\)](#) for other research on the information content of earnings press releases based on the information provided by the SEC's Edgar platform.

⁸It is also possible that larger electronic files are not earnings press releases. However, when we collect Compustat data, we require that firms have a report date that falls within three days of the press release date. Thus, any

the data on Execucomp for 37,015 firm-quarter observations. As described below, our analysis needs to control for a number of accounting and financial market variables from Compustat and I/B/E/S. To study the market impact of tone and equity incentives, we further need the adjusted price data from CRSP. This leads to our final sample, consisting of 26,432 firm year-quarter observations.

3.2 Measure of tone of the earnings press release

The tone of the earnings press releases is measured through a content analysis in which the tone is defined as the spread between the percentage of positive and negative words, relatively to the total number of words:

$$Tone_{j,q,t} = 100 \cdot \frac{PW_{j,q,t} - NW_{j,q,t}}{TW_{j,q,t}}, \quad (3.1)$$

with $TW_{j,q,t}$ the total number of words in the earnings press release of firm j in quarter q of year t , and $PW_{j,q,t}$ and $NW_{j,q,t}$ are the number of positive and negative words, respectively. This approach thus treats a document as a “bag of words”, and counts the number of times a word appears in a list of positive words and negative words. As a robustness check, we will also consider an alternative aggregation proposed by [Henry \(2008\)](#). It consists of estimating the tone as the spread between the percentage of positive and negative words, expressed in terms of the sum of the number of positive and negative words, i.e. $100 \cdot (PW_{j,q,t} - NW_{j,q,t}) / (PW_{j,q,t} + NW_{j,q,t})$, provided $PW_{j,q,t} + NW_{j,q,t} > 0$; otherwise the tone is set to 0.

Several lists of words, called dictionaries, exist but there is no consensus in the literature regarding which wordlist is more appropriate for the analysis of language in corporate financial disclosures. As argued by [Rogers et al. \(2011\)](#), among others, the tone obtained by using a single wordlist should be seen as a (noisy) proxy for the true, but unknown, tone of the text. To avoid the model risk of choosing an inappropriate library, we average over the (standardized) tone obtained by using three established lists of words, namely the positive and negative wordlists defined by [Henry \(2008\)](#), the positive and negative wordlists defined by [Loughran and McDon-](#)

non-earnings-related press releases that have been misspecified in EDGAR will remain in our final sample only if the press release date is within three days of the report date, which generally corresponds to the earnings announcement date. This data restriction ensures that non-earnings-related press releases are unlikely to be included in our final sample and thus unlikely to influence our results.

ald (2011) and the so-called “optimism-increasing” and “optimism-decreasing” word lists in the DICTION 7.0 software.⁹ All three of them are already popular choices in practice. The optimism-in/decreasing wordlists in DICTION were used by Davis et al. (2012) and Davis and Tama-Sweet (2012) to analyze earnings press releases. A limitation of general word lists such as DICTION is that they do not analyze language in the context of financial disclosures. Prior studies (see e.g. Demers and Vega, 2010; Henry and Leone, 2009; Loughran and McDonald, 2011) suggest that generic linguistic algorithms such as DICTION may yield noisy measures of linguistic tone in the context of financially-oriented text passages. To overcome this, we also use the Henry (2008) and Loughran and McDonald (2011) word lists specifically designed for financial disclosures. We find that the tone measure based on the three lists are significantly positively correlated (between 50% and 90%) but not perfectly. This high level of correlation is consistent with each measure capturing the underlying construct of tone plus some idiosyncratic error.¹⁰ While correlations between the tone from individual libraries are between 53 and 60%, we find that the correlation of each library with our standardized average measure of tone ($Tone_{j,q,t}^{EW}$) is between 83% and 85%. In the following sections, we focus our discussion on the standardized average tone measure and test for the robustness of our results to the different libraries. Unless specified differently, $Tone_{j,q,t}$ corresponds to $Tone_{j,q,t}^{EW}$.

Implicit in Hypotheses 1 and 2 is the fact that investors develop expectations regarding managers’ earnings press release language (i.e. managers likely to develop reputations for language use), and that the market response around the earnings announcement will be limited to the abnormal language use. To capture the tone inflation in earnings releases, we need to control for the informative part contained in the release. Just as a firm’s voluntary disclosure behavior is influenced by its economic performance (Miller, 2002), we expect disclosure tone to be correlated with a variety of economic attributes, such as firm characteristics, earnings uncertainty and the

⁹More precisely, the “optimism-increasing” wordlists in DICTION are the lists labeled “Praise”, “Satisfaction” and “Inspiration”, while the “optimism-decreasing” word list is the union of the words in the word lists “Blame”, “Hardship” and “Denial”. As in Davis et al. (2012), the tone measure $Tone_{j,q,t}^{DIC}$ is then defined as the difference in the percentage of words in the press release that are “optimism increasing” and the percentage of words in the press release that are “optimism decreasing”, all relatively to the total number of words in the press release.

¹⁰An alternative is to use the scores of the first principal component factor analysis (PCA) as in Rogers et al. (2011). Since the PCA loads almost equally on the three sentiment measures, this leads to almost identical results as with the average (standardized) sentiment approach, but the average sentiment approach has the advantage that the resulting tone is easier to interpret. Results are qualitatively similar when defining tone as the first PCA of the three sentiment measures.

firm's informational environment.¹¹ Similar to Huang et al. (2014), we then measure the abnormal level of tone ($AbTone_{j,q,t}$) as the residual component $\epsilon_{j,q,t}$ of a least squares regression of tone on the above mentioned control variables:

$$Tone_{j,q,t} = \alpha + \gamma' Controls_{j,q,t} + \epsilon_{j,q,t}, \quad (3.2)$$

with all relevant variables grouped in the vector $Controls_{j,q,t}$ consisting of $\ln MC_{j,q,t}$, $\ln BTM_{j,q,t}$, $ROA_{j,q,t}$, $\alpha_{j,q,t}$, $CAR[-62, -2]_{j,q,t}$, $FE_{j,q,t}$, $negFE_{j,q,t}$, $\ln NOA_{j,q,t}$, $\ln Volume_{j,q,t}$, $Disp_{j,q,t}$, $\sigma_{ROA,j,q,t}$ and $\beta_{j,q,t}$, as well as the dummy variables per quarter, year and industry. The expected tone from the regression model yields the “normal” tone, i.e. the tone that is expected when the managers' equity incentives have no influence on the tone. Column 1 of Table 3 reports the estimation results of the Normal Tone Model. We find that $Tone_{j,q,t}$ is more positive when the firm is large, profitable and growing, and more pessimistic when the firm's earnings are more uncertain and when information asymmetries are lower. We also find that managers are more optimistic as the firm's performance is better than expected by financial analysts. Our abnormal measure of tone, $AbTone_{j,q,t}$, is the residual of Regression (3) and, by construction, therefore designed to be unrelated to the firm's fundamentals, information uncertainty and environment.

¹¹Industry dummies, firm size (measured as the log of the firm's market capitalization ($\ln MC_{j,q,t}$)) and the firm's book-to-market (in logs) are included to control for firm characteristics. Additionally, five variables are included to control for a firm's concurrent and past performance: (i) the firm's return on assets reported for that quarter ($ROA_{j,q,t}$), (ii) the analysts' forecast error ($FE_{j,q,t}$), (iii) the dummy $negFE_{j,q,t}$ to indicate a negative earnings surprise for firm j in quarter q of year t , (iv) the cumulative abnormal return from the $[d - 62, d - 2]$ trading day window ($CAR[-62, -2]$) and (v) the estimated intercept from the event study regression that spans the $[d - 315, d - 63]$ time window ($\alpha_{j,q,t}$), where $d = 0$ is the earnings announcement day of quarter q in year t . As proxies for information asymmetry, we include the logarithm of the number of financial analysts following in quarter q of year t ($\ln NOA_{j,q,t}$) and the logarithm of share turnover ($\ln Volume_{j,q,t}$) measured over quarter q of year t , standardized by the number of shares outstanding. Firms with high information asymmetry have a lower analyst coverage (Roulstone, 2003), as well as a lower share turnover because uninformed traders are less likely to trade in these shares, knowing that they will lose to informed traders (Mohd, 2005). We expect firms with less information asymmetry to engage less in tone inflation and thus be on average less optimistic in their earnings press releases. Three variables are included to control for information uncertainty: (i) analyst forecast dispersion ($DISP_{j,q,t}$) as defined by Das, Levine, and Sivaramakrishnan (1998), (ii) the standard deviation of $ROA_{j,q,t}$ over the four quarters preceding the end of fiscal year q of year t , as defined by Core and Guay (2002) and (iii) the firm's systematic risk ($\beta_{j,q,t}$), estimated in the event study regression that spans the $[d - 315, d - 63]$ time window, where $d = 0$ is the earnings announcement day of quarter q in year t .

3.3 Managers' equity incentives

The portfolio of stocks and options held by the firm management creates incentives for the management to manage the earnings or proceed in tone inflation. Several variables can be used to proxy the economic size of the managerial equity incentives. Burns and Kedia (2006) test several proxies and find that especially the sensitivity of the CEO's option portfolio to the firm's stock price is strongly related to the propensity to misreport, while equity, restricted stock, long-term incentive payouts, and salary plus bonus do not seem to have any significant impact on the propensity to misreport. Efendi, Srivastava, and Swanson (2007) consider the bonus compensation, option grants, in-the-money option holdings, restricted stock grants and restricted stock holdings for CEO (all relative to the salary for CEOs). They also find that the value of in-the-money options is a good predictor of the likelihood of misreporting.

In our analysis, we follow the approach in Core and Guay (2002) and Coles, Daniel, and Naveen (2006) and focus on the monetary values of influencing the share prices. Indeed, managerial compensation often includes financial assets (stocks and/or options) whose value increases when the firm's share price increases. The portfolio's delta (incremental portfolio value when the share price increases with one percent) is the most important channel through which tone inflation is expected to have an effect direct. A secondary channel is the portfolio's vega, which measures the impact on the portfolio value when the volatility of the share price increases with one percent. The portfolio delta and vega are of course continuously changing and defined under parametric assumptions linking the stock price and volatility to the managerial wealth.

We follow the approach in Core and Guay (2002) and Coles et al. (2006) in measuring the managerial delta as the dollar change in the value of executives' stock and option holdings that would come from a one percent increase in the firm stock price at the end of that year. Because the equity incentive variables are measured during or at the end of fiscal year t and are made available one to four months after the fiscal-year end (Cheng and Warfield, 2005), we consider a one-year lag in the sensitivity of managers' stock-based compensation variables.

More formally, the manager's delta is the delta of the stock times the number of shares executive k holds in stocks, plus the delta of the option portfolio times the number of shares of options in option portfolio for executive k 's stock-based compensation in firm j for fiscal year-end t

$$\Delta_{j,k,t} = \Delta_{Stk,j,k,t} + \Delta_{Opt,j,k,t}, \quad (3.3)$$

with $\Delta_{Stk,j,k,t}$ and $\Delta_{Opt,j,k,t}$ the price sensitivity of the stock and option portfolio, respectively:

$$\Delta_{Stk,j,k,t} = N_{j,k,t} \left(\frac{S_{j,t}}{100} \right) , \quad \Delta_{Opt,j,k,t} = \left[\frac{\partial V_{Opt,j,k,t}}{\partial S_{j,t}} \right] \left(\frac{S_{j,t}}{100} \right). \quad (3.4)$$

The variable $N_{j,k,t}$ denotes the number of stocks that manager k of firm j has in his portfolio at the end of year t , $S_{j,t}$ is firm's j stock price at the year-end of year t and $V_{Opt,j,k,t}$ is the value of the option portfolio for manager k of firm j at the end of year t . We then compute the option value using the [Black and Scholes \(1973\)](#) option valuation model as modified by [Merton \(1973\)](#) to account for dividends. Under this approach, there exists an explicit function for the option portfolio price sensitivity, which is given in the Appendix of [Core and Guay \(2002\)](#).

To compute the overall delta for firm j in fiscal year t , we then sum over the entire management team:

$$\Delta_{j,t} = \sum_{k=1}^K \Delta_{j,k,t}, \quad (3.5)$$

which gives the total compensation sensitivity to a 1% change in stock price for the executives of firm j at time t . The compensation of the CEO is substantially different in structure and magnitude from that of other executives. In robustness checks, we thus further distinguish the effect of the CEO from the rest of the team of executives on the tone of earnings press releases.

Following [Guay \(1999\)](#), the portfolio vega is similarly defined as the partial derivative of the portfolio's value with respect to a one percent increase in the annualized standard deviation of the stock returns. For the option portfolio of manager k of firm j at the end of year t , the vega is given by:

$$\nu_{Opt,j,k,t} = \left[\frac{\partial V_{Opt,j,k,t}}{\partial \sigma_{j,t}} \right] \left(\frac{\sigma_{j,t}}{100} \right), \quad (3.6)$$

where, as above, $V_{Opt,j,k,t}$ is the value of the option portfolio for manager k of firm j at the end of year t , computed using the [Black and Scholes \(1973\)](#) option valuation model as modified by [Merton \(1973\)](#) to account for dividends. [Guay \(1999\)](#) obtains the vega of the portfolio of stock holdings by modeling the stock portfolio as a European call option to buy the firm at an exercise price equal to the face value of debt. [Guay \(1999\)](#) shows that, because the corresponding price-to-stock ratio tends to be relatively high, the vega of the stock portfolio is in general negligible

compared to the vega of the option portfolio. We therefore proxy the managerial vega by the vega of their option portfolio:

$$\nu_{j,t} = \sum_{k=1}^K \nu_{Opt,j,k,t}. \quad (3.7)$$

Executive compensation data are from ExecuComp database. ExecuComp compiles annual salary and bonus information as well as annual stock and option grant data for the top five executives. We have ExecuComp data for the years 2004-2011 for firms in the S&P 1500. These years and firms define our sample. ExecuComp recently changed its compensation data reporting, after the accounting changes imposed by the Financial Accounting Standards Board as well as expanded compensation disclosure requirements imposed by the SEC. The new rule requires that equity-based compensation awards must be expensed based on the fair value at the grant date. Thus, for fiscal years 1992-2005, all firms on ExecuComp report by using the old format. For fiscal years after 2007, all firms on ExecuComp report their compensations under the new requirements. To measure executives' portfolio delta in the pre-2006 format, we follow the [Core and Guay \(2002\)](#) methodology. For the new format, we follow the approach adopted by [Coles et al. \(2006\)](#) and [Daniel, Li, and Naveen \(2013\)](#) and distinguish between managers' stock and option portfolios.¹²

3.4 Descriptive statistics

The distribution of the resulting sample of tone measures, equity incentives and stock price reactions around the earnings announcement is summarized in Table 2.¹³ Panel A describes the summary statistics of the overall distribution, while panel B shows the time series evolution of the tone measures.

We see in panel A that the average (median) delta of managers' portfolio equals 1.718 (0.504), which means that if stock prices increase by 1%, managers' portfolio value increases by \$1.718 (0.504) mil. The average delta equals \$1.108 mil. and \$0.610 mil. for the stock and option port-

¹²The following discussion focuses on the new format only. The pre-2006 format is extensively described in [Core and Guay \(2002\)](#).

¹³To save space, summary statistics on the control variables are omitted. The average firm in the sample is large with a market capitalization of \$7.60 bil., profitable with a return on assets of 1.283%, and covered by 12 analysts. The average book to market value of the firms is 0.572.

folios, respectively. The distribution of managers' delta is highly skewed. The change in managers' total compensation for a 1% change in share price is also highly skewed, with an average that equals 13.5% and a median of 5.2%. The average (median) value of vega is substantially smaller with 0.317 (0.145) mil.. In relative terms, the change in the managerial portfolio value to a 1% change in return volatility is equal to 2.3% of their total compensation. Regarding the distribution of tone, we see that the equally-weighted measure of tone ($Tone_{j,q,t}$) has a positive average (median) of 0.05% (0.010) and an interquartile range of 1.011%. While the tone measures of the Henry (2008) and DICTION libraries are positive, the average and median of the tone measure based on the Loughran and McDonald (2011) library is negative. From panel B of Table 2 it is clear that the negative average value of $Tone_{j,q,t}^{LM}$ is mainly driven by the bearish market conditions in the period of 2008–2011.¹⁴ Finally, note in panel A that the average immediate market reaction to the earning press release ($CAR[-1, +1]_{j,q,t}$) over the sample is positive (0.341%), while the delayed reaction ($CAR[-2, -6]_{j,q,t}$) is on average negative, with a large standard deviation.

4 Results

Do equity-incentives lead to tone inflation and how does the presence of equity incentives influence the market reaction to the abnormal tone in the earnings press release? These are the two critical issues that we investigate.

In Subsection 4.1, we evaluate executives' tone inflation and test the relation between managers' equity incentives and the tone in earnings press releases across the S&P 1500 firms between 2004 and 2011. We find that both the sensitivity of the manager's wealth to changes in stock price (portfolio delta) and the sensitivity of the manager's wealth to changes in risk (portfolio vega) affect the inflation of tone of earnings press releases, but not in the same manner. Managers will trade off any expected reward associated with inflating the tone of earnings press releases by deflating the tone of earnings press releases as the sensitivity of their portfolio to changes in stock price volatility (portfolio vega) increases.

In Subsection 4.1.1, we disentangle the managerial equity incentives into the stock price sensitivity of the CEO's portfolio and the stock price sensitivity of the portfolio of the team of

¹⁴The negative average and median of $Tone_{j,q,t}^{LM}$ is consistent with prior research (Baginski et al., 2011).

Table 2: Summary statistics for the main tone, equity incentives and market impact variables

<i>Panel A – Summary statistics</i>					
	Mean	St. Dev.	Q1	Median	Q3
$\Delta_{j,t-1}$	1.718	11.450	0.211	0.504	1.227
$\Delta_{Stck,j,t-1}$	1.108	10.930	0.055	0.150	0.432
$\Delta_{Opt,j,t-1}$	0.610	1.181	0.106	0.269	0.661
$Tone_{j,q,t}(in\%)$	0.050	0.848	-0.473	0.010	0.538
$AbTone_{j,q,t}(in\%)$	-0.0002	0.774	-0.480	-0.031	0.453
$CAR[-1, +1]_{j,q,t}(in\%)$	0.341	8.651	-3.787	0.166	4.643
$CAR[+2, +61]_{j,q,t}(in\%)$	-0.102	15.218	-7.485	-0.187	6.889
<i>Panel B – Number of observations and average tone by fiscal year</i>					
Year	N. obs.	$Tone_{j,q,t}^{LM}$	$Tone_{j,q,t}^{DIC}$	$Tone_{j,q,t}^{HEN}$	$Tone_{j,q,t}$
2004	1,181	-0.016	0.187	1.414	0.179
2005	2,762	0.029	0.211	1.422	0.211
2006	2,757	0.034	0.190	1.354	0.181
2007	3,069	-0.001	0.231	1.321	0.172
2008	3,735	-0.187	0.126	1.103	-0.027
2009	3,571	-0.283	0.025	0.700	-0.251
2010	3,486	-0.075	0.146	1.237	0.075
2011	3,307	-0.061	0.168	1.268	0.102
2012	2,521	-0.146	0.110	1.063	-0.031

executives. We find that it is the CEO equity incentives that is the primary driving force behind the observed tone inflation within earnings press releases.

Finally, Subsection 4.2 examines the immediate and delayed reaction of the firm's stock price to the abnormal tone in earnings press releases. We find that in general the market reacts positively to the abnormal tone of earnings press releases, but less so when the executives' compensation is more sensitive to changes in stock prices. We however find no significant impact of managers' portfolio vega on investors' reaction at earnings announcement. Taken together, these results suggest that highly incentivized managers are more likely to inflate the tone of their earnings press releases, but investors appear to correct for this bias by discounting for the uninformative opportunistic component of the tone in the earnings press release.

4.1 The effect of managers' equity incentives on the tone in earnings press releases

In our first hypothesis, we test whether incentivized managers inflate the tone of earnings press releases to increase the value of their stock and option portfolios. We define the following

linear least-squares model in which we regress the tone on managers' stock-based compensation ($\Delta_{j,t-1}$) and expect the β coefficient to be positive:

$$Tone_{j,q,t} = \alpha + \beta \cdot \ln \Delta_{j,t-1} + \vartheta \cdot \ln \nu_{j,t-1} + \gamma' Controls_{j,q,t} + \epsilon_{j,q,t},$$

where $Controls_{j,q,t}$ is as defined in Equation 3.2.

Table 3 presents the estimation results for Equation 4.1, where we have suppressed the estimated coefficients on the industry, quarter and year dummy variables for presentation purposes. We test for the significance of the coefficients using Newey-West standard errors. In Panel A of Table 3, Model (1) presents the results based on Equation 4.1 estimated without control variables. Consistent with Hypothesis 1, we find a positive coefficient for the $\ln \Delta_{j,t-1}$ variable, which suggests that a higher sensitivity of managers' portfolio value to a change in stock price is associated with a significant increase in the tone of earnings press releases. In Model (1) of Panel B, we add the control variables to exclude a potential alternative explanation for our findings, which substantially increase the Adj. R^2 from 4 to 18%. After controlling for the book-to-market ratio, past performance, information environment, earnings uncertainty, our results suggests that our results are not driven by the more volatile operating environment of firms that use a high amount of stock-based compensation. In fact, we find that the estimated coefficient of $\ln \Delta_{j,t-1}$ is substantially smaller but remains highly significant at a 1% level.

Model (2) controls for managers' portfolio sensitivity to changes in return volatility and shows that managers' portfolio vega has a mitigating effect on managers' incentive to inflate the tone of earnings press releases. In line with Hypothesis 2, we find that, *ceteris paribus*, $\ln \nu_{j,t-1}$ variable has a negative and significant coefficient, even after controlling for the firm's performance, information environment and earnings uncertainty (Panel B). This result suggests that managers with a higher portfolio vega are less inclined to inflate the tone of earnings press releases, as an inflation of tone increases firm value and, keeping the debt constant, decreases the firm's debt/equity leverage ratio. This directly results in a reduction in the risk to default on debt, which leads to a decrease in the stock price volatility. A comparison of the magnitude of the $\ln \Delta_{j,t-1}$ and $\ln \nu_{j,t-1}$ coefficients shows that the impact of vega on tone inflation is a second-order effect, as the magnitude of $\ln \Delta_{j,t-1}$ coefficient equals 0.131 (0.052) and is substantially larger than the $\ln \nu_{j,t-1}$ -0.007 (-0.005) coefficient for Model (2) of Panel A (B).

We then proceed in Model (3) with some sensitivity tests by disintegrating the $\Delta_{j,t-1}$ between the stock and option portfolios. We find that both variables are positive and highly significant. However, once we control for the firm's performance, information environment and earnings uncertainty, only the stock portfolio's delta ($\Delta_{Stck,j,t-1}$) remains positive and highly significant at a 1% confidence level.

In Model (4) we examine whether the delta of vested options ($\Delta_{OptVested,j,t-1}$) are associated with greater incentives for tone inflation than the delta of unvested options ($\Delta_{OptUnvested,j,t-1}$). If managers who inflate the tone are focusing on the short-term, then vested options should be relatively more important in influencing managers' incentives to inflate the tone of earnings press releases. In the baseline regression without control variables, we see that the coefficients of the vested and unvested delta variables are individually significant and positive, but their difference is not statistically significant. When control variables are added to the model, both coefficients are positive but become insignificant at conventional levels.

The bottom line of the analysis of equity incentives and the tone of earnings press releases in Table 3 is that we contribute to the existing literature on the role of managerial equity incentives on misreporting earnings numbers (see, e.g., [Bergstresser and Philippon, 2006](#); [Burns and Kedia, 2006](#)) by showing that it increases managers' incentives to inflate the tone of the narrative section of earnings press releases. Both the sensitivity of the manager's wealth to changes in stock price (portfolio delta) and the sensitivity of the manager's wealth to changes in risk (portfolio vega) affect the opportunistic use of tone in earnings press releases, but in opposite ways. Managers are thus expected to trade off any expected reward and risk associated with inflating the tone of earnings press releases by deflating the tone of earnings press releases as the sensitivity of their portfolio to changes in stock price volatility (portfolio vega) increases. This result is consistent with the *Almost-Cheap Talk* theory suggested by [Kartik \(2009\)](#).

4.1.1 Robustness checks

Our main findings that the price sensitivity of managers' stock-based compensation induces tone inflation completely align with our initial expectations. However we bear in mind that the exact quantification of this effect depends on the measurement of tone and price sensitivity, as well as the control variables and model specification used. Therefore, we now test the robustness of our findings.

Table 3: Tone in earnings press releases and managers' compensation sensitivity to the stock price (Δ) and stock volatility (ν)

	Normal tone <i>model</i>	Panel A – Base-line regressions				Panel B – With control variables			
		Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
(Intercept)	-0.197 (0.208)	0.138*** (0.019)	0.126*** (0.018)	0.251*** (0.025)	0.327*** (0.029)	0.232 (0.242)	0.188 (0.243)	0.245 (0.250)	0.252 (0.254)
<i>Managerial compensation sensitivity to changes in stock price and stock price sensitivity</i>									
$\ln \Delta_{j,t-1}$		0.126*** (0.011)	0.131*** (0.011)			0.049*** (0.015)	0.052*** (0.015)		
$\ln \nu_{j,t-1}$			-0.007** (0.003)	-0.009** (0.004)	-0.009** (0.004)		-0.005* (0.003)	-0.005* (0.003)	-0.005* (0.003)
$\ln \Delta_{Stock,j,t-1}$				0.048*** (0.010)	0.051*** (0.010)			0.040*** (0.010)	0.039*** (0.010)
$\ln \Delta_{Opt,j,t-1}$				0.091*** (0.011)				0.014 (0.013)	
$\ln \Delta_{OptVested,j,t-1}$					0.040*** (0.011)				0.012 (0.011)
$\ln \Delta_{OptUnvested,j,t-1}$					0.045*** (0.011)				0.003 (0.011)
<i>Control variables</i>									
$\ln MC_{j,q,t}$		0.047*** (0.015)				0.022 (0.017)	0.024 (0.017)	0.024 (0.017)	0.024 (0.017)
$\ln BTM_{j,q,t}$		-0.159*** (0.025)				-0.152*** (0.025)	-0.150*** (0.025)	-0.151*** (0.025)	-0.151*** (0.025)
$ROA_{j,q,t}$		0.025*** (0.008)				0.024*** (0.008)	0.024*** (0.008)	0.024*** (0.008)	0.024*** (0.008)
$\alpha_{j,q,t}$		0.316*** (0.049)				0.350*** (0.050)	0.348*** (0.050)	0.344*** (0.050)	0.345*** (0.050)
$CAR[-62, -2]_{j,q,t}$		0.001*** (0.000)				0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
$FE_{j,q,t}$		-0.016 (0.018)				-0.011 (0.018)	-0.010 (0.018)	-0.011 (0.018)	-0.010 (0.018)
$NegFE_{j,q,t}$		-0.192*** (0.024)				-0.188*** (0.024)	-0.187*** (0.024)	-0.189*** (0.024)	-0.188*** (0.024)
$\ln NOA_{j,q,t}$		-0.017 (0.027)				-0.021 (0.027)	-0.021 (0.027)	-0.021 (0.027)	-0.021 (0.027)
$\ln Trading_{j,q,t}$		-0.102*** (0.019)				-0.106*** (0.019)	-0.106*** (0.019)	-0.105*** (0.019)	-0.105*** (0.019)
$Disp_{j,q,t}$		-0.009 (0.005)				-0.009 (0.005)	-0.009 (0.005)	-0.009 (0.005)	-0.009 (0.005)
$\sigma_{ROA,j,q,t}$		-1.524** (0.658)				-1.451** (0.648)	-1.449** (0.645)	-1.424** (0.639)	-1.419** (0.638)
$\beta_{j,q,t}$		-0.012 (0.025)				-0.004 (0.025)	-0.005 (0.025)	-0.007 (0.025)	-0.006 (0.025)
Quarter and year fixed effects	Yes	No	No	No	No	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	No	No	No	Yes	Yes	Yes	Yes
VIF	1.845	-	1.054	1.395	2.272	1.846	1.846	1.847	1.847
R ²	17.4	3.7	3.8	4.2	4.2	17.6	17.7	17.9	17.9
Adj. R ²	17.2	3.7	3.8	4.2	4.2	17.5	17.6	17.7	17.7

Note: This table presents the results of the Normal Tone Model in Eq. 3.2 and the extended tone model in Eq. 4.1 testing Hypotheses 1 and 2 about the effects of equity incentives on tone inflation. The significance of the coefficients is tested using Newey-West standard errors, which are reported in parentheses. *, **, and *** denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively, based on a two-sided t-test. VIF is the largest variance inflation factor for all covariates (excluding the dummy variables). Goodness of fit is evaluated by the R² and Adj. R².

As a first robustness check, we re-estimate Model 4.1 and control for managers' fixed effects such as managerial overconfidence. CEOs that are more (over)confident are also more likely to inflate the tone of earnings releases.¹⁵ Because overconfidence is a permanent attribute of the CEO, inflation of the tone may not be entirely due to their high delta but also due to specific characteristics of the CEO that are fixed over time. To correct for managers' overconfidence, we therefore include CEO fixed effects in our regressions. Overall, Model (1) of Panel A in Table 4 shows that our conclusions remain qualitatively similar: the higher is the portfolio delta, the more tone inflation there is, as indicated by the positive and significant impact of the portfolio delta $\ln \Delta_{j,t-1}$ on the tone of the earnings press release. The equity incentive related to the stock price volatility impact on the managerial portfolio also remains highly significant and negative.

The second robustness check considers a standardized version of the equity incentives of managers, namely the price sensitivity of managers' stock-based compensation, relatively to the total yearly compensation of the management. More precisely, we use $\bar{\Delta}_{j,t} = \Delta_{j,t}/TotComp_{j,t}$, which measures the dollar change in wealth for a one percent change in firm value, divided by annual compensation $TotComp_{j,t}$ (i.e. the total annual compensation of executives of firm j in fiscal year t , including salary, bonus, total value of restricted stock granted, total value of stock options granted and long-term incentive payouts). Similarly, we define managers' relative vega $\bar{\nu}_{j,t}$ as the managerial vega, divided by the total compensation, i.e. $\bar{\nu}_{j,t} = \nu_{j,t}/TotComp_{j,t}$. Model (2) of Panel A in Table 4 shows the results obtained by replacing $\ln \Delta_{j,t-1}$ and $\ln \nu_{j,t-1}$ in Equation 4.1 by the corresponding $\ln \bar{\Delta}_{j,t-1}$ and $\ln \bar{\nu}_{j,t-1}$ variables. We see that the results are qualitatively similar.

In Model (3) of Panel A, we further distinguish between the impact of equity incentives on tone inflation of firms with a positive and negative earnings surprise ($NegFE_{j,q,t}$). We see that the positive impact of equity incentives on tone is robust to the $NegFE$ dummy variable.¹⁶ We next consider the Henry (2008) method to measure the tone of earnings press releases. Instead of normalizing the spread of positive and negative words by the total number of words, she divides the spread by the sum of positive and negative words. Model (4) of Panel A reports the

¹⁵We thank the anonymous referee for this suggestion.

¹⁶For the different libraries considered, the interaction variable with the $NegFE$ dummy variable is always insignificant at the 5% level. This is however not the case for the $(Tone_{j,q,t}^{LM})$ measure of tone. The interaction variable is significant at a 90% confidence level, which indicates that tone inflation is statistically lower for firms that report earnings that are lower than expected. Yet, the overall effect of sentiment still remains statistically significant and positive.

Table 4: Robustness checks – Tone in earnings press releases and managers’ equity-based incentives

<i>Panel A – Managerial overconfidence (Model 1), equity incentives standardized by yearly total compensation (Model 2), correction for negative earnings surprises (Model 3) and the Henry (2008) method to measure tone (Model 4)</i>				
	Model 1	Model 2	Model 3	Model 4
$\ln \Delta_{j,t-1}$	0.023** (0.010)		0.054*** (0.016)	0.059*** (0.015)
$\ln \nu_{j,t-1}$	-0.025*** (0.006)		-0.004 (0.003)	-0.007* (0.004)
$\ln \bar{\Delta}_{j,t-1}$		0.063*** (0.014)		
$\ln \bar{\nu}_{j,t-1}$		-0.003 (0.002)		
$\ln \Delta_{j,t-1} \cdot NegFE_{j,q,t}$			-0.006 (0.011)	
$\ln \nu_{j,t-1} \cdot NegFE_{j,q,t}$			-0.004 (0.003)	
CEO fixed effects	Yes	No	No	No
Adj. R ²	65.74	18.0	17.6	15.3
<i>Panel B – By library</i>				
	$Tone_{j,q,t}$	$Tone_{j,q,t}^{HEN}$	$Tone_{j,q,t}^{DIC}$	$Tone_{j,q,t}^{LM}$
$\ln \Delta_{j,t-1}$	0.052*** (0.015)	0.031* (0.016)	0.042*** (0.015)	0.054*** (0.013)
$\ln \nu_{j,t-1}$	-0.005* (0.003)	-0.007** (0.003)	-0.002 (0.002)	-0.005 (0.003)
Adj. R ²	17.6	17.9	11.8	13.6
<i>Panel C – By quarter</i>				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
$\ln \Delta_{j,t-1}$	0.045*** (0.017)	0.044*** (0.016)	0.067*** (0.017)	0.043** (0.021)
$\ln \nu_{j,t-1}$	-0.005 (0.004)	-0.005* (0.003)	-0.004 (0.004)	-0.006*** (0.002)
Adj. R ²	18.6	18.2	16.1	19.8
Num. obs.	7,097	7,081	7,480	4,774
<i>Panel F – CEO’s vs. team of executives’ equity incentives and the tone in earnings press releases</i>				
	Model 1	Model 2	Model 3	Model 4
$\ln \Delta_{CEO,j,t-1}$	0.043*** (0.005)			0.032* (0.017)
$\ln \nu_{CEO,j,t-1}$	-0.005*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	0.000 (0.011)
$\ln \Delta_{CEO,Stck,j,t-1}$		0.037*** (0.003)	0.037*** (0.003)	
$\ln \Delta_{CEO,Opt,j,t-1}$		0.002 (0.004)		
$\ln \Delta_{CEO,OptVested,j,t-1}$			0.000 (0.003)	
$\ln \Delta_{CEO,OptUnvested,j,t-1}$			0.003 (0.004)	
$\ln \Delta_{Team,j,t-1}$				0.022 (0.019)
$\ln \nu_{Team,j,t-1}$				-0.006 (0.012)
$\ln Tenure_{j,t-1}$	-0.002 (0.002)	-0.001 (0.002)	-0.001 (0.002)	0.001 (0.005)
$IsCHMN_{j,t-1}$	0.038*** (0.012)	0.031*** (0.012)	0.031*** (0.012)	0.040 (0.032)
Adj. R ²	17.0	17.2	17.2	17.0

Note: This table presents the estimation results of the robustness checks of Model (4.1). The significance of the coefficients is tested using Newey-West standard errors, which are reported in parentheses. All models include the intercept (except for the model with CEO fixed effects) and the control variables in Eq. 3.2. *, **, and *** denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively, based on a two-sided t-test.

results using the Henry (2008) tone measure. We see that the main results in terms of an inflating impact of manager's delta on tone and deflating impact of the manager's vega also hold for this alternative measure of tone.¹⁷

In Panel B of Table 4, we report the results for each list of words included in the $Tone_{j,q,t}$ measure, namely the DICTION 7.0, Henry (2008) and Loughran and McDonald (2011) libraries.¹⁸ We find that, for each library, the tone in earnings press releases is significantly related to managers' portfolio sensitivity to changes in stock price and stock price volatility. However, the DICTION and Loughran and McDonald (2011) libraries do not report a significant negative coefficient for $\ln \nu_{j,t-1}$.

We also verify in Panel C whether working with a quarterly frequency does not alter our results. We show that our main conclusion concerning the impact of delta on tone inflation also holds on a quarterly frequency and that the magnitude of the coefficients for managers' compensation sensitivity to changes in stock price is the largest for quarter 3. However, our conclusions for managers' portfolio vega only remain for quarter 2 and 4, quarter 4 being the most significant.

Thus far, we aggregated the equity incentives of the CEO, CFO and the highest-compensated named executive officers, as reported in ExecuComp, into an overall equity incentive.¹⁹ In practice, it is likely, however, that the CEO has more influence on the tone in the earnings press release than the other top managers. As final robustness check, we disentangle in Panel F the effects of managerial delta and vega by including separate variables for the CEO's and team of executives' delta and vega, and include two CEO-specific control variables, namely a dummy variable for the firms where the CEO is also the Chairman of the Board of Directors ($isCHMN_{j,t}$) and the CEO's tenure ($Tenure_{j,t}$, in logs), defined as the number of years an executive has served as CEO in firm j . There is ample evidence that longer-tenured executives

¹⁷One exception is that for the DICTION library, we find an insignificant impact of $\ln \nu_{j,q,t}$ on tone. We conjecture that this is a consequence of the higher inaccuracy of the DICTION based tone estimation for earnings press releases. The reason for this conjecture is that, in contrast with the more general purpose DICTION library, the word lists of Loughran and McDonald (2011) and Henry (2008) are specialized for the tone identification in corporate disclosures.

¹⁸Each library contains words that overlap with other lists, but the overlap is far from complete, as only 25% of the words in the Henry lists are contained in the DICTION list; 55% of the words in the Henry lists are contained in the Loughran and McDonald (2011) lists and 13% of the words in the Loughran and McDonald (2011) lists are contained in the DICTION lists.

¹⁹ExecuComp collects up to 13 executives for a given year, though most companies do only report five (the maximum number of executives reported of 13 was reported for Execlon Corp. in 2009 and 2010). Hence, per company we obtain several entries depending on how many executives they file in their proxy statement.

may be less willing to engage in unethical or fraudulent behaviors that might ruin their established reputations (Gray and Cannella, 1997; Zhang, Bartol, Smith, Pfarrer, and Khanin, 2008). In addition, there is evidence that new CEOs may have less to lose and may be more aggressive and take chances in order to build their personal wealth (Brouthers, Brouthers, and Werner, 2000). We thus expect tenure to interact negatively with linguistic optimism in earnings releases. Dechow, Sloan, and Sweeney (1996) find that having a Chairman who is also simultaneously the CEO increases the likelihood of manipulating earnings.

Models (1)-(3) in Panel F show that the CEO's portfolio sensitivity to changes in stock price (changes in stock price volatility) has a significant positive (negative) impact on the tone included in earnings press releases. In terms of the CEO-specific control variables, we find that, while $\ln Tenure_{j,t-1}$ is negatively correlated with the tone in earnings press releases but insignificant, tone inflation is more prevalent when the manager is both CEO and Chairman. To compare the influence of CEO's and the top executives' (other than the CEO) portfolios. We define the management team delta (vega) as the sum of the deltas (vegas) of the team of executives other than the CEO, divided by the number of executives in the team. Model (4) in Panel F shows that $\ln \Delta_{CEO,j,t-1}$ remains positive and significant. In fact, only the sensitivity of the CEO's stock portfolio to changes in stock price explains the tone inflation in earnings releases, as the coefficient of the CEO's vega ($\ln \nu_{CEO,j,t-1}$) and the team of executives' delta ($\ln \Delta_{Team,j,t-1}$) is substantially smaller and insignificant. Similarly, while significant in the first three models, the CEO-specific control variables become insignificant after controlling for the team of executive's delta and vega. The CEO's portfolio sensitivity to changes in stock price ($\Delta_{CEO,j,t-1}$) is thus the primary driving force behind the observed tone inflation within earnings press releases.

4.2 Managers' equity-based incentives and the nonlinearity in the market response to the tone of earnings press releases

We now extend the usual framework of assuming a linear effect between the abnormal tone in the earnings press release and the stock price reaction by including an interaction effect with the managerial portfolio's delta. We expect that the higher is the portfolio delta, the less positive will be the stock market reaction to abnormal tone. We investigate the presence of such potential non-

linearity for the immediate ($CAR[-1, +1]_{j,q,t}$) and delayed ($CAR[+2, +61]_{j,q,t}$) price reaction, separately.

4.2.1 The immediate market impact

Before introducing the interaction effect of equity incentives on the impact of tone on market returns, let us first consider the following linear base-line model, which replicates the results obtained by [Davis et al. \(2012\)](#) and [Henry \(2008\)](#):

$$CAR[-1, +1]_{j,q,t} = \alpha + \varsigma \cdot AbTone_{j,q,t} + \gamma' Controls_{j,q,t}^* + \epsilon_{j,q,t}. \quad (4.1)$$

where the vector of control variables $Controls_{j,q,t}^*$ consists of $\ln BTM_{j,q,t}$, $ROA_{j,q,t}$, $FE_{j,q,t}$, $NegFE_{j,q,t}$, and $Disp_{j,q,t}$, as well as the quarter, year and industry dummies. The variables are as defined in [Table 1](#) and significance is tested using Newey-West standard errors.

The results for the regression in [Eq. 4.1](#) are reported as Model (1) in [Panel A of Table 5](#). The main coefficient of interest is ς measuring the investor's reaction in terms of cumulative abnormal return over the three-day window centered on the earnings press release date to the abnormal tone $AbTone_{j,q,t}$ in the earnings press releases. Consistent with [Hypothesis 2](#) and previous results by [Davis et al. \(2012\)](#), [Davis and Tama-Sweet \(2012\)](#) and [Henry \(2008\)](#), the coefficient on $AbTone_{j,q,t}$ is positive and highly significant, suggesting that higher values of tone are associated with positive abnormal returns around the issuance of the earnings press release. It shows that managers use language in earnings press releases to signal their future expectations and that investors recognize the information value of earnings press releases and respond to managers' use of language as a voluntary disclosure mechanism.

In terms of control variables, we expect that the hard information in the earnings report as reflected in the earnings surprise is also a significant driver of the price reaction. This is confirmed by the estimation results showing that the earnings surprise, as measured by the analysts' forecast error ($FE_{j,q,t}$) (i.e. the extent to which firm's reported earnings beat financial analysts' predictions) leads to a significantly higher abnormal return around the announcement. We further find that the coefficients on $ROA_{j,q,t}$ and $\ln BTM_{j,q,t}$ are positive and highly significant. This positive coefficient on $\ln BTM_{j,q,t}$ confirms prior literature, which shows that high book-to-market stocks experience more positive surprises than low book-to-market stocks (see, e.g.,

Table 5: The market response to the tone of earnings press releases and managers' equity incentives

	Panel A – $CAR[-1, +1]_{j,q,t}$				Panel B – $CAR[+2, +61]_{j,q,t}$			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
(Intercept)	2.287*** (0.349)	2.286*** (0.349)	2.286*** (0.349)	2.283*** (0.349)	1.851*** (0.647)	1.880*** (0.616)	1.880*** (0.616)	1.875*** (0.616)
<i>Tone and executive compensation variables</i>								
$AbTone_{j,q,t}$	0.481*** (0.064)	0.367*** (0.072)	0.368*** (0.080)	0.370*** (0.080)	0.196 (0.119)	0.068 (0.127)	0.071 (0.140)	0.070 (0.141)
$AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1}$		-0.175*** (0.050)	-0.175*** (0.051)	-0.159** (0.062)		-0.169* (0.088)	-0.170* (0.090)	0.011 (0.109)
$AbTone_{j,q,t} \cdot \ln \nu_{j,t-1}$			0.001 (0.019)	-0.004 (0.021)			0.002 (0.033)	-0.005 (0.037)
$AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1} \cdot NegFE_{j,q,t}$				-0.054 (0.104)				-0.527*** (0.184)
$AbTone_{j,q,t} \cdot \ln \nu_{j,t-1} \cdot NegFE_{j,q,t}$				0.022 (0.040)				0.034 (0.070)
<i>Control variables</i>								
$ROA_{j,q,t}$	0.081*** (0.013)	0.078*** (0.013)	0.078*** (0.013)	0.078*** (0.013)	-0.154*** (0.025)	-0.132*** (0.024)	-0.132*** (0.024)	-0.131*** (0.024)
$\ln BTM_{j,q,t}$	0.731*** (0.075)	0.724*** (0.075)	0.724*** (0.075)	0.724*** (0.075)	3.405*** (0.139)	3.285*** (0.132)	3.284*** (0.132)	3.286*** (0.132)
$NegFE_{j,q,t}$	-5.224*** (0.110)	-5.226*** (0.110)	-5.226*** (0.110)	-5.222*** (0.110)	0.760*** (0.203)	0.778*** (0.194)	0.778*** (0.194)	0.802*** (0.194)
$FE_{j,q,t}$	0.061*** (0.007)	0.062*** (0.007)	0.062*** (0.007)	0.062*** (0.007)	-0.011 (0.013)	-0.005 (0.013)	-0.005 (0.013)	-0.005 (0.013)
$Disp_{j,q,t}$	0.119*** (0.024)	0.121*** (0.024)	0.121*** (0.024)	0.121*** (0.024)	0.200*** (0.044)	0.093** (0.042)	0.093** (0.042)	0.086** (0.042)
VIF	1.289	1.289	1.289	1.407	1.289	1.289	1.289	1.407
R ²	9.3	9.4	9.4	9.4	4.5	4.4	4.4	4.4
Adj. R ²	9.2	9.3	9.3	9.3	4.5	4.3	4.3	4.3
Num. obs.	26,414	26,414	26,414	26,414	26,414	26,414	26,414	26,414

Note: This table presents the results of Hypotheses 3, 4 and 5. The significance of the coefficients is tested using Newey-West standard errors, which are reported in parentheses. *, **, and *** denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively, based on a two-sided t-test. VIF is the largest variance inflation factor for all covariates (excluding the dummy variables). Goodness of fit is evaluated by the R² and Adj. R².

La Porta, Lakonishok, Shleifer, and Vishny, 1997) and should therefore on average lead to a more positive abnormal price reaction. The impact of analysts' forecast dispersion ($Disp_{j,q,t}$) on the $CAR[-1, +1]_{j,q,t}$, indicating that a higher information uncertainty concerning future firm performance leads to a larger stock price reaction.

Model (1) of Panel A in Table 5 thus confirms the standard results of Davis et al. (2012) and Henry (2008) that stock prices react positively to the abnormal tone in the earnings press release. Yet, this result does not rule out the potential for managers' opportunistic use of language in earnings press releases. In Hypothesis 4, we postulate that investors anticipate managers' op-

portunistic bias in the tone of earnings press releases and let their firm price evaluation depend less on the textual tone as managers' compensation sensitivity to the stock price increases. We thus include two interaction terms $\ln \Delta_{j,t-1} \cdot AbTone_{j,q,t}$ and $\ln \nu_{j,t-1} \cdot AbTone_{j,q,t}$ to Equation 4.1:

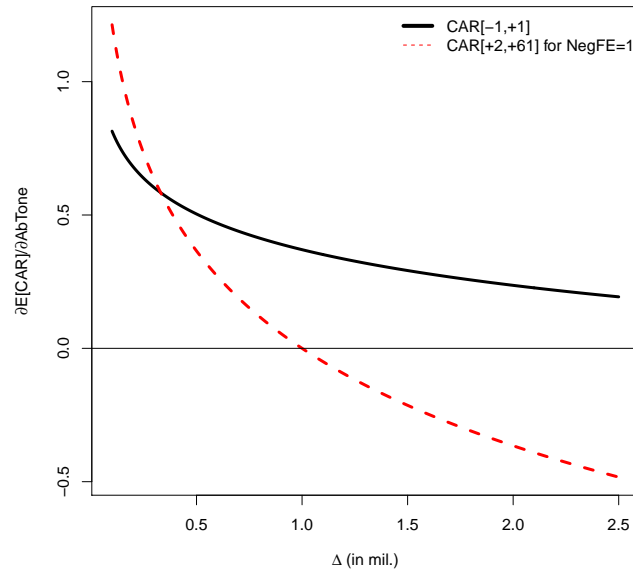
$$CAR[-1, +1]_{j,q,t} = \alpha + \varsigma AbTone_{j,q,t} + [\delta \cdot \ln \Delta_{j,t-1} + \chi \cdot \ln \nu_{j,t-1}] \cdot AbTone_{j,q,t} + \gamma' \mathbf{Controls}_{j,q,t}^* + \epsilon_{j,q,t}. \quad (4.2)$$

As expected, the coefficient on the interaction term $AbTone_{j,q,t} \cdot \ln \Delta_{j,q}$ is negative and significant at a 1% level. Consistent with the *Almost-cheap talk* model of Kartik (2009), this result suggests that investors interpret a high price sensitivity of managers' stock-based compensation as a signal that the tone of the earnings press release has been inflated by the management. Investors therefore react proportionally less to the tone in earnings press releases as the sensitivity of managers' stock-based compensation to changes in the firm's stock price increases. However, we find that investors do not adjust for managers' pessimism in the tone of earnings press releases as their portfolio's sensitivity to changes in stock price volatility increases. As shown in Model (3), the $AbTone_{j,q,t} \cdot \ln \nu_{j,q,t}$ coefficient is positive but insignificant at standard confidence levels. This result is consistent with the fact that the incentive for tone deflation when the managerial vega increases is of second-order importance compared to the incentive for tone inflation coming from managers' portfolio delta.

In Model (4), we further distinguish between positive and negative earnings surprises by introducing the dummy variable $NegFE_{j,q,t}$ to Equation 4.2. We find that investors' immediate reaction to tone is not affected by whether the earnings surprise is positive or negative. The interaction term $AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1}$ remains negative and highly significant, while the coefficient $AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1} \cdot NegFE_{j,q,t}$ and $AbTone_{j,q,t} \cdot \ln \nu_{j,t-1} \cdot NegFE_{j,q,t}$ are statistically insignificant at traditional confidence levels.

The interdependence between the abnormal tone, investors' reaction and the managerial equity incentives thus introduces a non-linearity in the market's response of investors' to the tone contained in earnings press releases. We illustrate this further in Figure 1, where the full line shows the marginal impact on the expected abnormal return around the earnings announcement due to a one unit increase of abnormal tone. We see that the impact is, for all reasonable val-

Figure 1: **Managers' portfolio delta and the marginal stock price reaction to a change in abnormal tone under the non-linear model**



Note: This figure reports the marginal stock price reaction to abnormal tone in function of manager's equity incentives. The red-dashed line reports the delayed marginal reaction for negative earnings surprises (*NegFE*) and the black full line the immediate reaction to abnormal tone.

ues of delta, positive. However, the higher is delta, the smaller is the increase in the abnormal return. Although investors are aware that the tone contains information about a firm's future performance and react positively to it, they also expect that the tone is biased and will thus adjust their reaction downward as the delta increases.

4.2.2 The delayed market impact

We thus find a clear confirmation of the downward effect of the equity incentives on the immediate market reaction of the firm's stock price to the abnormal tone in the earnings press release. We now further test whether this downward effect also exists for the delayed effect of abnormal tone on the firm's cumulative abnormal return over the 61 days starting one day after the announcement of earnings. We run the same regression as Equation 4.2, but replace the dependant variable with $CAR[+2, +61]_{j,q,t}$. Model (1) of Panel B of Table 5 shows that, *ceteris paribus*, the magnitude of the delayed effect of abnormal tone on the firm's stock price is smaller than its

associated instantaneous effect: the coefficient of $AbTone_{j,q,t}$ is more than three times smaller for the delayed term effect than for its associated short-term effect. In addition, once we correct for managers' equity incentives (δ) in Model (2), $AbTone_{j,q,t}$ becomes insignificant. The interaction term $\ln \Delta_{j,t-1} \cdot AbTone_{j,q,t}$ remains significant, negative but is of a lesser magnitude than over the short period considered in Panel A. This confirms Hypothesis 5 that, ceteris paribus, the magnitude of the delayed effect of abnormal tone on the firm's stock price is smaller than the instantaneous effect, and that the higher the managerial delta is, the less positive will be the impact of abnormal tone on the abnormal returns on the firm's stock price over the following quarters after the earnings announcement.

These effects lead to the dashed line in Figure 1 showing the marginal impact on the expected abnormal return on the 60 days following the second day after the earnings announcement, due to a one unit increase of abnormal tone. We observe that, above a managerial delta of \$1 mil., the effect becomes negative. This is in line with the results in Huang et al. (2014), who provide evidence of the extreme scenario in which abnormal positive tone misleads investors at the time of earnings announcements to temporarily over-value the firm, a mispricing subsequently corrected by the market. Finally, recall from Hypothesis 4, that we expect the impact of vega on the delayed stock price reaction to be of minor importance (Core et al., 2003). This is confirmed by Model (3) and (6), which show that the impact of $AbTone_{j,q,t} \cdot \ln \nu_{j,t-1}$ is insignificant.

In Model (8) of Panel B, we distinguish between positive and negative earnings surprises and see that the underreaction to $AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1}$ is concentrated in the releases of negative earnings surprises. In their immediate price reaction, investors anticipate that managers with a higher delta tend to inflate the tone (explaining the negative significant negative coefficient of $AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1}$ on $CAR[-1, +1]_{j,q,t}$), but, when the earnings surprise is negative, this discounting persists, which explains the negative coefficient of $AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1}$ on $CAR[+2, +61]_{j,q,t}$.

Overall, we find that the magnitude of the delayed effect of abnormal tone on the firm's stock price is smaller than the instantaneous effect. The less sensitive is managers' compensation to the firm's stock price, the more informative the abnormal tone is and the more positive will be the impact of abnormal tone on the abnormal returns on the firm's stock price over the following quarters after the earnings announcement.

4.2.3 Robustness checks

In Subsection 4.1.1 we show that the positive impact of equity-based compensation on tone inflation is robust to the choice of the library used and the frequency of the data analyzed. We now examine whether the results on the interaction effect of equity-based compensation and tone inflation on stock return on the announcement day is robust to the same methodological choices.

Panel A of Table 6 shows that the choice of the library does not change our main result that the immediate price reaction is negatively affected (at the 1% significance level) by the interaction variable $AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1}$, indicating that investors' immediate reaction to the tone in earnings press releases is significantly lower as the sensitivity of managers' compensation increases. Except for the DICTION library for the short term stock price reaction, the interaction between abnormal tone and managers' portfolio vega is insignificant at traditional levels. The results for the delayed stock price reaction also remain similar for all libraries.

Panel B of Table 6 splits the sample per quarter. Our results is robust to the choice of the quarter. In spite of the smaller number of observations in the split sample regression, the regression results show that a high level of equity-based compensation tends to reduce the positive impact of the optimism signal in earnings press releases on the stock's return on the day of the announcement. We find for all quarters a significantly positive impact of $AbTone_{j,q,t}$ on $CAR[-1, +1]_{j,q,t}$ (except for Quarter 4, which is insignificant) and a negative sign for the interaction variable $AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1}$. The negative coefficient on $AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1}$ is however only significant for quarters 2 and 3. The delayed effect of abnormal tone and equity incentives on $CAR[+2, +61]_{j,q,t}$ is less robust to the quarter division. We do find that the effect of $AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1}$ on $CAR[+2, +61]_{j,q,t}$ is negative for all quarters (except for quarter 2), but statistically insignificant. This quarter effect may be a direct consequence of the fact that these delayed effects are by nature smaller and more noisy and therefore more affected by the smaller sample sizes.

Table 6: **Robustness checks – The market response to net tone in earnings press releases and managerial equity incentives**

	$Tone_{j,q,t}$	$CAR[-1, +1]_{j,q,t}$			$Tone_{j,q,t}$	$CAR[+2, +61]_{j,q,t}$		
		Henry (2008)	DICTION 7.0	Loughran-MacDonald (2011)		Henry (2008)	DICTION 7.0	Loughran-MacDonald (2011)
<i>Panel A – By library</i>								
$AbTone_{j,q,t}$	0.368*** (0.080)	0.479*** (0.062)	0.011 (0.079)	0.242*** (0.080)	0.071 (0.140)	0.147 (0.109)	-0.113 (0.139)	-0.002 (0.141)
$AbTone_{j,q,t} \cdot \ln \Delta_{j,q,t}$	-0.175*** (0.051)	-0.184*** (0.049)	-0.245*** (0.050)	-0.198*** (0.051)	-0.170* (0.090)	-0.165* (0.087)	-0.201** (0.089)	-0.185** (0.091)
$AbTone_{j,q,t} \cdot \ln \nu_{j,q,t}$	0.001 (0.019)	0.013 (0.018)	-0.035* (0.018)	-0.019 (0.018)	0.002 (0.033)	0.010 (0.032)	-0.014 (0.032)	-0.005 (0.032)
Adj. R ²	9.2	9.4	9.2	9.2	4.3	4.3	4.3	4.3
<i>Panel B – By Quarter</i>	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4
$AbTone_{j,q,t}$	0.329* (0.172)	0.404** (0.165)	0.484*** (0.158)	0.119 (0.161)	-0.008 (0.316)	0.594** (0.293)	-0.261 (0.268)	0.088 (0.275)
$AbTone_{j,q,t} \cdot \ln \Delta_{j,t-1}$	-0.063 (0.098)	-0.216** (0.105)	-0.241** (0.099)	-0.147 (0.114)	-0.219 (0.180)	0.046 (0.186)	-0.394** (0.169)	-0.129 (0.195)
$AbTone_{j,q,t} \cdot \ln \nu_{j,t-1}$	-0.030 (0.063)	0.016 (0.040)	0.009 (0.036)	-0.013 (0.029)	0.044 (0.116)	0.021 (0.071)	0.022 (0.062)	-0.040 (0.049)
Adj. R ²	11.0	11.1	8.0	7.3	3.4	7.0	4.7	6.4
Num. obs.	7,102	7,083	7,456	4,773	7,102	7,083	7,456	4,773

Note: This table presents the robustness checks of Hypotheses 3, 4 and 5. All models include an intercept and the set of control variables in Table 1. The significance of the coefficients is tested using Newey-West standard errors, which are reported in parentheses. *, **, and *** denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively, based on a two-sided t-test.

5 Conclusion

Managers whose compensation depends on the firm's stock price wear two hats while writing an earnings press release. On the one hand, as the shareholders' agent, their goal is the reduction of information asymmetries. In this case, one could expect managers to disclose a credible signal regarding their future-earnings expectations. On the other hand, as an investor, they may opportunistically use these voluntary disclosures to influence investors' expectations of future earnings and maximize the value of their stock and option portfolios. As earnings press releases are often considered as a major news event for many firms and are generally accompanied by a large market response, we investigate whether managers inflate the tone of the narrative section of earnings press releases to maximize the value of their stock and option compensation.

We analyze over 26,000 earnings press releases of S&P 1500 firms between 2004Q4 and 2012Q4 and find that equity incentives increase managers' likelihood to inflate the tone of the narrative section of earnings press releases. This result is obtained using the managerial port-

folio's delta as the main proxy for equity incentives (measuring the impact of a one percent increase of the firm's stock price), and controlling for equity incentives related to the stock return volatility (vega).

Furthermore, we show that the impact of equity incentives on tone inflation is also relevant for understanding the price reaction around the earnings announcement. Motivated by the *Almost-Cheap Talk model* of Kartik (2009), we analyze the firm's abnormal returns to study whether investors anticipate the higher likelihood of tone inflation in the presence of strong equity incentives. We find that the impact of tone on the abnormal return weakens when the managerial equity incentives increase. This result suggests that investors anticipate the opportunistic behavior of managers with large equity incentives by discounting the (inflated) tone in their valuation of the firm's stock.

The main novelty of this paper is thus to complement the existing evidence that granting stock and option based compensation to the firm management increases the likelihood of earnings management by showing that it also tends to lead to a more subtle inflation of the tone in earnings press releases. An interesting direction for future research would be to examine the impact of equity incentives on the likelihood of earnings management and tone inflation jointly and study possible substitution effects between both.

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