

**Essays on CEO vocal emotions, financial disclosure, and capital market responses**

By

Linlin Jin

A Thesis submitted to the Faculty of Graduate and Postdoctoral Studies of

The University of Manitoba

In partial fulfillment of the requirements of the degree of

DOCTOR OF PHILOSOPHY

Department of Accounting and Finance

I.H. Asper School of Business

University of Manitoba

Winnipeg

Copyright ©2026 by Linlin Jin

## **Abstract**

This dissertation examines whether CEOs' vocal emotions during earnings conference calls convey value-relevant information beyond traditional financial disclosures and textual content. Using Layered Voice Analysis (LVA) on earnings call recordings of S&P 500 firms, I investigate how non-verbal vocal cues reveal managerial beliefs, shape capital market participants' interpretations, and predict future firm outcomes.

The dissertation consists of three essays. The first essay examines CEO excitement and distinguishes between authentic and inauthentic emotional expression. The findings show that performance-consistent excitement is associated with favorable stock market reactions and lower perceived risk, whereas excessive or misaligned excitement is interpreted as less credible and is associated with weaker subsequent performance and higher risk perception.

The second essay focuses on CEO vocal stress as an involuntary signal of private concern. I find that high vocal stress predicts more negative analyst forecast revisions and greater analyst forecast dispersion, suggesting that analysts partially recognize stress as an adverse signal. However, vocal stress also predicts negative future earnings surprises and post-earnings announcement drift, indicating that analysts and investors do not fully incorporate the information embedded in CEO voice.

The third essay develops a multidimensional framework of CEO emotional incongruence. Using principal component analysis, I identify two dimensions of vocal negativity: Cognitive Burden, reflected in stress, hesitation, and sadness, and Defensive Arousal, reflected in uneasiness and aggression. These vocal signals predict future earnings management and financial

reporting quality. A two-stage decomposition further shows that residual vocal signals, after purging current earnings management, retain predictive power for future reporting outcomes.

Together, the three essays show that CEO voice is an economically meaningful information channel. This dissertation contributes to the literature on corporate disclosure, behavioral finance, analyst underreaction, post-earnings announcement drift, and financial reporting quality by demonstrating that non-verbal executive communication reveals hidden information about firm risk, future performance, and reporting credibility.

## Contributions of Authors

This thesis is prepared in a grouped manuscript format and consists of three research papers. The development of the research questions, theoretical framing, empirical design, data analysis, and manuscript preparation were completed by Linlin Jin under the guidance and supervision of Dr. Zhenyu Wu and Dr. Gady Jacoby, except where noted below.

Chapter 1 provides the general introduction to the thesis and was written by Linlin Jin. Chapter 2, titled *The Impact of Perceived CEO Authenticity on Stock Performance and Risk Perception During Earnings Calls*, was developed and written by Linlin Jin under the guidance of Dr. Zhenyu Wu and Dr. Gady Jacoby. Chapter 3, titled *The Sound of Risk: CEO Vocal Stress, Analyst Underreaction, and Post-Earnings Announcement Drift*, was developed and written by Linlin Jin under the guidance of Dr. Zhenyu Wu and Dr. Gady Jacoby. Chapter 4, titled *Multidimensional CEO Emotional Incongruence and Financial Reporting Quality: Evidence from Earnings Conference Calls*, was developed and written by Linlin Jin under the guidance of Dr. Zhenyu Wu. Chapter 5 summarizes the findings, contributions, implications, and future research directions of the thesis and was written by Linlin Jin.

All chapters were prepared by Linlin Jin. Dr. Zhenyu Wu and Dr. Gady Jacoby provided academic supervision, research guidance, and feedback throughout the thesis.

## Acknowledgements

I would like to express my deepest gratitude to my supervisor, Dr. Zhenyu Wu, for his exceptional guidance, unwavering support, and generous mentorship throughout my Ph.D. journey. His insightful feedback, high standards, and continuous encouragement have shaped this dissertation and my development as a researcher. I am especially grateful for the time and effort he devoted to guiding my research ideas, improving my empirical design, strengthening my writing, and helping me grow academically and professionally. His mentorship has been fundamental to the completion of this dissertation.

I am also deeply grateful to Dr. Gady Jacoby for his valuable guidance, thoughtful comments, and generous support throughout my doctoral studies. His expertise and feedback have greatly contributed to the development of this dissertation and my broader research training.

I would also like to thank my committee members, Dr. Xikui Wang and Dr. Jun Wang, for their valuable comments, constructive suggestions, and support during the development of this dissertation. Their feedback has helped improve the quality, clarity, and rigor of my work.

I am grateful to the faculty, staff, and fellow graduate students at the Asper School of Business and the University of Manitoba for providing a supportive academic environment. I also appreciate the opportunities I have received to teach, conduct research, and participate in the academic community during my doctoral studies.

Finally, I would like to thank my family and friends for their unconditional love, patience, and encouragement. Their support has given me strength throughout the challenges and achievements of this journey. This dissertation would not have been possible without the many people who supported me along the way.

## Contents

|                                                                                                                          |    |
|--------------------------------------------------------------------------------------------------------------------------|----|
| Abstract .....                                                                                                           | 2  |
| Contributions of Authors .....                                                                                           | 4  |
| Acknowledgements .....                                                                                                   | 5  |
| List of Tables .....                                                                                                     | 9  |
| Chapter 1: General Introduction .....                                                                                    | 10 |
| Chapter 2: The Impact of Perceived CEO Authenticity on Stock Performance and Risk Perception During Earnings Calls ..... | 19 |
| 2.1 Introduction.....                                                                                                    | 19 |
| 2.2 Literature Review and Hypothesis Development .....                                                                   | 24 |
| 2.2.1 Earnings Conference Calls.....                                                                                     | 24 |
| 2.2.2 Audio Analysis of Earnings Conference Calls .....                                                                  | 24 |
| 2.2.3 Arousal Reappraisal and Inauthentic Excitement .....                                                               | 26 |
| 2.2.4 Aspiration Gaps and Emotional Cues in Earnings Calls .....                                                         | 28 |
| 2.3 Methodology and Data .....                                                                                           | 31 |
| 2.3.1 Audio Analysis .....                                                                                               | 31 |
| 2.3.2 Data and Variables.....                                                                                            | 33 |
| 2.3.3 Dependent Variables .....                                                                                          | 33 |
| 2.3.4 Measurement of Excitement.....                                                                                     | 35 |
| 2.3.5 Aspiration Level.....                                                                                              | 37 |
| 2.3.6 Control Variables.....                                                                                             | 37 |
| 2.4 Empirical Results.....                                                                                               | 38 |
| 2.5 Robustness Check .....                                                                                               | 44 |
| 2.6 Conclusion .....                                                                                                     | 49 |
| Chapter 3: The Sound of Risk: CEO Vocal Stress, Analyst Underreaction, and Post-Earnings Announcement Drift.....         | 73 |
| 3.1 Introduction.....                                                                                                    | 73 |
| 3.2 Literature Review and Hypothesis Development .....                                                                   | 76 |
| 3.2.1 CEO Vocal Stress as a Non-Verbal Information Signal .....                                                          | 76 |
| 3.2.3 Analyst Disagreement Under Ambiguous Signals.....                                                                  | 82 |
| 3.2.4 Analyst Underreaction to Vocal Stress.....                                                                         | 84 |
| 3.2.5 Market Underreaction and Post-Earnings Announcement Drift .....                                                    | 86 |
| 3.3 Data and Methodology .....                                                                                           | 88 |
| 3.3.1 Sample Construction and Audio Processing.....                                                                      | 88 |

|                                                                                                                                                 |            |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 3.3.2 Stress Measurement .....                                                                                                                  | 89         |
| 3.3.3 Dependent Variables .....                                                                                                                 | 90         |
| 3.3.4 Key Independent Variables.....                                                                                                            | 92         |
| 3.4 Empirical Results.....                                                                                                                      | 93         |
| 3.4.1 Summary Statistics.....                                                                                                                   | 93         |
| 3.4.2 CEO Stress and Analyst Forecast Revisions.....                                                                                            | 93         |
| 3.4.3 CEO Stress and Analyst Forecast Dispersion .....                                                                                          | 95         |
| 3.4.4 CEO Stress and Future Earnings Surprises .....                                                                                            | 96         |
| 3.4.5 CEO Stress and Post-Earnings Announcement Drift.....                                                                                      | 97         |
| 3.4.6 The Underreaction Chain: Connecting the Four Findings .....                                                                               | 98         |
| 3.5 Additional Analysis: The Role of Firm Performance Context .....                                                                             | 99         |
| 3.5.1 Analyst Forecast Revisions by Performance Context.....                                                                                    | 100        |
| 3.5.2 Analyst Forecast Dispersion by Performance Context .....                                                                                  | 101        |
| 3.5.3 Analyst Underreaction by Performance Context.....                                                                                         | 101        |
| 3.6 Robustness Check .....                                                                                                                      | 102        |
| 3.7 Conclusion .....                                                                                                                            | 104        |
| <b>Chapter 4: Multidimensional CEO Emotional Incongruence and Financial Reporting Quality:<br/>Evidence from Earnings Conference Calls.....</b> | <b>118</b> |
| 4.1 Introduction.....                                                                                                                           | 118        |
| 4.2 Literature Review and Hypothesis Development .....                                                                                          | 122        |
| 4.2.1 Non-Verbal Cues in Financial Communication .....                                                                                          | 122        |
| 4.2.2 Cognitive Dissonance and Emotional Leakage .....                                                                                          | 124        |
| 4.2.3 Earnings Management and Tone Management .....                                                                                             | 126        |
| 4.2.4 Forward-Looking Information in Vocal Cues .....                                                                                           | 127        |
| 4.3 Data and Methodology .....                                                                                                                  | 129        |
| 4.3.1 Sample and Data Sources .....                                                                                                             | 129        |
| 4.3.2 Dependent Variables .....                                                                                                                 | 131        |
| 4.3.3 Construction of Emotional Incongruence Measures .....                                                                                     | 135        |
| 4.3.4 Control Variables.....                                                                                                                    | 138        |
| 4.3.5 Empirical Design.....                                                                                                                     | 138        |
| 4.4 Empirical Results.....                                                                                                                      | 139        |
| 4.4.1 Summary Statistics.....                                                                                                                   | 139        |
| 4.4.2 Forward-Looking Prediction: Vocal Emotions and Next-Quarter Earnings Management<br>.....                                                  | 140        |

|                                                                                              |     |
|----------------------------------------------------------------------------------------------|-----|
| 4.4.3 Two-Stage Analysis: Residual Vocal Emotions and Next-Quarter Earnings Management ..... | 143 |
| 4.4.4 Market Reaction to Vocal Emotional Signals .....                                       | 145 |
| 4.4.5 Analyst Response: Forecast Revisions and Dispersion .....                              | 146 |
| 4.5 Discussion: Addressing the High Adjusted R-Squared for Real Earnings Management .....    | 148 |
| 4.6 Conclusion .....                                                                         | 148 |
| Chapter 5: General Conclusion .....                                                          | 161 |
| Bibliography .....                                                                           | 164 |

## List of Tables

|                                                                                                 |     |
|-------------------------------------------------------------------------------------------------|-----|
| Table 2.1 Summary Statistics .....                                                              | 51  |
| Table 2.2 Excitement and Cumulative Abnormal Return .....                                       | 52  |
| Table 2.3 Excitement and Intra-day Return.....                                                  | 54  |
| Table 2.4 Excitement and Implied Volatility.....                                                | 56  |
| Table 2.5 Excitement and Cumulative Abnormal Return: Nonlinear .....                            | 58  |
| Table 2.6 Excitement and Implied Volatility: Nonlinear .....                                    | 59  |
| Table 2.7 Inauthentic Excitement and Implied Volatility .....                                   | 61  |
| Table 2.8 Excitement and Intraday Return: Robustness Check .....                                | 63  |
| Table 2.9 Excitement and Implied Volatility: Robustness Check .....                             | 65  |
| Table 2.10 PSM: Excitement and Cumulative Abnormal Return .....                                 | 66  |
| Table 2.11 PSM: Excitement and Intra-day Return .....                                           | 68  |
| Table 2.12 PSM: Excitement and Implied Volatility .....                                         | 70  |
| Table 2.13 Heckman Two-Stage Model .....                                                        | 72  |
| Table 3.1 Summary Statistics .....                                                              | 106 |
| Table 3.2 CEO Vocal Stress and Analyst Forecast Revisions .....                                 | 107 |
| Table 3.3 CEO Vocal Stress and Analyst Forecast Dispersion.....                                 | 108 |
| Table 3.4 CEO Vocal Stress and Future Earnings Surprises.....                                   | 109 |
| Table 3.5 CEO Vocal Stress and Post-Earnings Announcement Drift.....                            | 111 |
| Table 3.6 CEO Vocal Stress and Analyst Forecast Revisions by Firm Performance Context .....     | 112 |
| Table 3.7 CEO Vocal Stress and Analyst Forecast Dispersion by Firm Performance Context.....     | 114 |
| Table 3.8 CEO Vocal Stress and Future Earnings Surprises by Firm Performance Context .....      | 115 |
| Table 3.9 Propensity Score Matching .....                                                       | 117 |
| Table 4.1 Principal Component Analysis of LVA Emotion Variables .....                           | 152 |
| Table 4.2 Summary Statistics .....                                                              | 153 |
| Table 4.3 Cognitive Burden Incongruence and Next-Quarter Earnings Management.....               | 154 |
| Table 4.4 Defensive Arousal Incongruence and Next-Quarter Earnings Management .....             | 155 |
| Table 4.5 Two-Stage Analysis: Cognitive Burden Residual and Next-Quarter Earnings Management .. | 156 |
| Table 4.6 Two-Stage Analysis: Defensive Arousal Residual and Next-Quarter Earnings Management . | 157 |
| Table 4.7 Market Reaction to Vocal Emotional Signals.....                                       | 158 |
| Table 4.8 Analyst Response to Vocal Signals (High-Polarity Subsample).....                      | 159 |
| Table 4.9 Analyst Response to Vocal Signals (Low-Polarity Subsample) .....                      | 160 |

## **Chapter 1: General Introduction**

Quarterly earnings conference calls are among the most economically consequential corporate disclosure events. They provide chief executive officers (CEOs) and chief financial officers (CFOs) with a direct channel through which to present financial results, explain strategic priorities, and respond to questions from sell-side analysts and other capital market participants. While an extensive body of accounting and finance research has analyzed the textual content of these disclosures (Loughran and McDonald, 2011; Li, 2010; Huang, Teoh, and Zhang, 2014), an emerging stream of literature has begun to examine how managers say what they say, that is, how the non-verbal characteristics of managerial speech convey information that supplements, qualifies, or contradicts what they say in words.

This thesis contributes to that stream of research. Across three integrated empirical essays, it studies whether involuntary vocal cues produced by CEOs during earnings conference calls carry economically meaningful information about firm performance, risk, and financial reporting quality. The essays use audio recordings of S&P 500 earnings calls between 2019 and 2024, processed through speaker diarization software (Plaquet and Bredin, 2023) and analyzed using Layered Voice Analysis (LVA) technology developed by Nemesysco and operationalized through the Emotion Logic platform. LVA analyzes micro-level variations in vocal patterns, such as pitch, frequency, intensity, and tremor, that are difficult for speakers to consciously regulate, and converts them into standardized scores along a set of emotional dimensions. The validity of LVA in financial settings has been established in prior studies (Hobson, Mayew, and Venkatachalam, 2012; Mayew and Venkatachalam, 2012; Price, Seiler, and Shen, 2017).

Three features of the setting make it particularly well suited to study managerial voice. First, the stakes are high: every word and phrase is parsed by analysts and traders, and quarterly disclosures move stock prices, alter analyst forecasts, and feed into option-implied risk measures. Second, the verbal channel is heavily managed: CEOs prepare scripted opening remarks, work with investor relations teams to anticipate questions, and operate under regulatory and reputational pressures that incentivize careful linguistic choices. Third, the vocal channel is harder to manage: even when the words are polished, vocal characteristics may leak information about underlying emotional and cognitive states, providing an involuntary disclosure channel through which private information can become partially observable. The combination of high stakes, heavy textual management, and partially involuntary vocal output is precisely the environment in which the informational content of voice is most likely to be incremental relative to text.

The conceptual framework of this thesis draws on three theoretical traditions that operate at different levels of analysis. At the organizational level, Upper Echelons Theory (Hambrick and Mason, 1984) argues that organizational outcomes reflect the experiences, values, and cognitive bases of senior leaders, and that the CEO occupies a particularly central position in this informational architecture. At the disclosure level, Agency Theory (Jensen and Meckling, 1976) and the corporate disclosure framework of Healy and Palepu (2001) characterize earnings calls as voluntary communication events in which managers possess private information that they may have incentives to disclose selectively. At the psychological level, Emotional Leakage Theory (Ekman and Friesen, 1969), Cognitive Dissonance Theory (Festinger, 1957), and Cognitive Appraisal Theory (Lazarus, 1991) explain why and how managerial emotional states may

manifest in non-verbal signals even when speakers attempt to project a controlled public narrative.

Together, these traditions imply that vocal cues during earnings calls should be informationally relevant for at least three reasons. First, the CEO has the broadest view of the firm and is therefore the speaker whose private knowledge is most extensive. Second, agency frictions create incentives to manage the verbal channel, so the relative informativeness of the vocal channel should rise. Third, emotional states are cognitively demanding to suppress under conditions of public scrutiny, so leakage through pitch, hesitation, stress, and arousal should be especially pronounced precisely when managerial communication is most strategically managed.

The three essays of this thesis operationalize this framework along three complementary dimensions of vocal expression: positive arousal (excitement), negative cognitive emotion (stress), and the multidimensional structure of negative vocal affect (Cognitive Burden and Defensive Arousal). Each dimension corresponds to a distinct theoretical channel through which voice may carry information, and each is linked to a different set of capital-market outcomes.

The three essays are deliberately complementary and progressive in their approach to analyzing CEO vocal cues. They share a common empirical infrastructure (Layered Voice Analysis applied to S&P 500 earnings call audio over 2019-2024), a common theoretical foundation (Upper Echelons, Agency, and Emotional Leakage frameworks), and a common substantive question (whether and how vocal information is incorporated into capital market outcomes). They differ in their focal emotion, in the outcome variables they study, and in the specific mechanism they uncover.

Chapter 2, the first essay, focuses on positive arousal and asks whether CEO excitement during earnings calls is interpreted by markets as a signal of confidence or, when misaligned with firm performance, as a sign of concealment. The chapter introduces a residual-based decomposition of excitement into authentic and inauthentic components, benchmarked against firm and industry conditions, and shows that the two components have markedly different implications for stock returns and option-implied volatility. The chapter establishes the basic premise that vocal cues are informative beyond text and that the alignment between vocal expression and underlying fundamentals matters for market interpretation.

Chapter 3, the second essay, shifts from positive to negative arousal and analyzes vocal stress, a complex cognitive emotion that prior research has connected to private concerns about adverse outcomes. The chapter documents a four-step chain of underreaction: stress predicts more negative analyst forecast revisions and greater forecast dispersion, yet revisions remain insufficient, leading to negative next-quarter earnings surprises and stock-price drift over up to sixty trading days. The chapter extends the analyst-underreaction and post-earnings-announcement-drift literatures to a non-verbal information channel.

Chapter 4, the third essay, broadens the analysis from individual emotions to the multidimensional structure of negative vocal affect. Principal component analysis identifies two distinct factors, Cognitive Burden (stress, hesitation, sadness) and Defensive Arousal (uneasiness, aggression), that load on different psychological mechanisms and have opposite implications for next-quarter earnings management. The chapter also develops a two-stage decomposition that isolates the forward-looking component of vocal information from contemporaneous reporting choices.

Taken together, the three essays move from a single emotion to a multidimensional emotional profile, from contemporaneous market reactions to forward-looking predictions, and from individual return measures to a richer set of capital-market outcomes. They establish that managerial voice is not a stylistic feature of disclosure but a distinct, multidimensional, and economically relevant information channel that is currently underutilized by sophisticated intermediaries and by retail investors alike.

The thesis contributes to four streams of literature. First, it advances the audio-based analysis of corporate disclosures by moving from aggregate vocal tone to specific emotional intensities and finally to the multidimensional structure of vocal negativity. Second, it extends the post-earnings-announcement-drift and analyst-underreaction literatures to a non-verbal information channel that is literally inaudible to investors who rely on written transcripts. Third, it integrates verbal and vocal channels in a single analytical framework and demonstrates that incongruence between text and voice is itself an informative signal. Fourth, it offers a methodological template, combining residual-based authenticity measures, principal component analysis of emotion, and two-stage decompositions, that future research can apply to other disclosure settings and to other speakers in the firm's information environment.

The primary analyses employ linear panel regressions with firm and year fixed effects. Linear models are appropriate for most dependent variables examined in this dissertation because cumulative abnormal returns, buy-and-hold abnormal returns, analyst forecast revisions, changes in analyst forecast dispersion, standardized unexpected earnings, implied volatility, and the continuous earnings-management proxies are continuously measured outcomes. In these models, the coefficient of interest represents the average conditional association between a CEO vocal measure and the relevant outcome, holding the included covariates and fixed effects constant.

The linear framework also permits direct coefficient interpretation, the inclusion of firm and year fixed effects, and comparison across the alternative dependent variables and empirical specifications used in the three essays.

The use of a linear model does not require every explanatory variable to have a strictly straight-line relationship with the dependent variable. Rather, the model is linear in its estimated parameters. Where theory or the empirical distribution suggests that a relationship may be nonlinear, the analyses incorporate nonlinear transformations, interaction terms, or indicator variables. For example, the excitement models include a squared excitement term to test the U-shaped relationship predicted by the Yerkes–Dodson framework, while the stress analysis considers continuous, quadratic, and high-stress threshold specifications. These alternative functional forms reduce the risk that the conclusions are driven by an incorrectly imposed linear relationship.

Consistency of the fixed-effects estimator requires conditional exogeneity: after accounting for the included control variables, firm fixed effects, and year fixed effects, the explanatory variables should not be systematically correlated with the remaining idiosyncratic error. Firm fixed effects absorb time-invariant differences across firms, such as persistent differences in business models, corporate culture, reporting environments, and other stable organizational characteristics. Year fixed effects control for common macroeconomic, regulatory, and market-wide shocks. The models also include relevant measures of financial performance, firm risk, textual tone, firm characteristics, and CEO characteristics that may jointly influence vocal emotions and the examined outcomes.

Nevertheless, because the dissertation relies on observational data, the possibility of time-varying omitted variables cannot be eliminated completely. The estimated coefficients are

therefore interpreted primarily as conditional associations and predictive relationships rather than definitive causal effects. Where applicable across the three essays, the forward-looking research design, alternative variable constructions, propensity-score analyses, Heckman selection correction, and two-stage decompositions address concerns related to observable differences, sample selection, reverse timing, and alternative explanations. These procedures strengthen the interpretation of the findings, but they do not establish causality or guarantee that the conditional-exogeneity assumption is fully satisfied.

Conventional OLS inference based on unadjusted standard errors assumes homoskedastic and independently distributed errors. These conditions are unlikely to hold in firm-level panel data because observations from the same firm may be serially correlated and different firms may have different error variances. Therefore, the standard errors in the main panel regressions are clustered at the firm level, allowing for arbitrary heteroskedasticity and within-firm correlation over time. Continuous variables are also winsorized at the first and ninety-ninth percentiles to reduce sensitivity to extreme observations.

Normality of the dependent variables or regression residuals is not required for consistency of the linear fixed-effects estimates. Given the relatively large samples, statistical inference relies on large-sample properties and firm-clustered standard errors rather than exact normality. However, severe skewness or influential observations could affect the precision and interpretation of the estimated average relationships. In such circumstances, appropriate responses would include variable transformations, alternative functional forms, robust estimation procedures, or bootstrap inference.

The models require the absence of perfect multicollinearity among the explanatory variables. Multicollinearity was assessed using the correlation matrices and variance inflation

factors. The untabulated VIF diagnostics did not indicate problematic multicollinearity among the explanatory variables. In addition, highly overlapping vocal measures are not entered simultaneously when they represent the same underlying construct. In Chapter 4, principal component analysis is used to summarize the common variation among correlated vocal-emotion measures and construct lower-dimensional emotional factors. This approach reduces redundancy among the emotion variables and facilitates interpretation of the resulting vocal dimensions.

For the binary meet-or-beat outcome in Chapter 4, the baseline specification is a linear probability model. This model facilitates the inclusion of firm fixed effects and permits the coefficient to be interpreted as a percentage-point change in the probability of meeting or narrowly beating analyst expectations. Because the error term in a linear probability model is inherently heteroskedastic, firm-clustered standard errors are used. The resulting estimates should be interpreted as average marginal associations. A fixed-effects logit specification would be an appropriate alternative if the functional-form restrictions of the linear probability model were considered materially problematic, although such a model would exclude firms without within-firm variation in the meet-or-beat outcome and its coefficients would not be directly comparable with the linear probability estimates.

More generally, the appropriate response to a violation would depend on the particular assumption involved. Evidence of nonlinear functional form could be addressed through transformations, polynomial terms, interactions, splines, or threshold models. Severe heteroskedasticity or error dependence could be addressed using alternative cluster structures or bootstrap inference. For binary outcomes, nonlinear probability models could be employed. If the conditional-exogeneity assumption were materially violated because of omitted variables or simultaneity, stronger identification strategies, such as a valid instrumental variable, an

exogenous shock, or a quasi-experimental design, would be required. The reported results should therefore be understood in light of the assumptions and limitations of the observational fixed-effects framework.

The remainder of the thesis is structured as follows. Chapter 2 presents the first essay on CEO authenticity, excitement, and stock performance. Chapter 3 presents the second essay on vocal stress and post-earnings-announcement drift. Chapter 4 presents the third essay on multidimensional emotional incongruence and financial reporting quality. Chapter 5 concludes by integrating the findings, discussing theoretical and practical implications, and identifying directions for future research. A consolidated reference list and a variable-definitions appendix follow the concluding chapter.

## **Chapter 2: The Impact of Perceived CEO Authenticity on Stock Performance and Risk Perception During Earnings Calls**

### **2.1 Introduction**

Earnings conference calls are crucial for publicly traded companies to present their financial results, strategic initiatives, and future projections to a diverse group of audiences including investors, analysts, and other stakeholders. Typically led by CEOs and CFOs, these calls provide not only important financial reports but also valuable qualitative information that significantly influences analysts' forecasts and investor sentiment. Although extensive research has explored the textual content of these discussions (Doran et al. (2012), Yang et al. (2020), Call et al. (2021)), an increasing volume of literature emphasizes the critical role of non-verbal indicators, especially vocal tone and emotional expressions, in influencing market responses (Mayew and Venkatachalam (2012), Chen et al. (2023), Rennekamp et al. (2024)). Audio analysis is an emerging, powerful tool to evaluate vocal attributes such as pitch, tone, tempo, and volume. This technique enables the measurement of the underlying emotional states of CEOs, which may not be explicitly conveyed through text alone. By quantifying the emotional delivery of a CEO, audio analysis can complement the financial data presented during these calls, offering a more holistic view of corporate disclosures. This approach facilitates stakeholders to access the integrity and authenticity of the CEO's affective state, adding a psychological dimension to the interpretation of corporate communications.

While existing literature predominantly focuses on the overall positive and negative vocal tone, this study examines excitement and distinguishes between credible excitement and excitement that is misaligned with firm performance. The conceptual framework is centered on arousal reappraisal, which explains how anxiety may be reframed and expressed as excitement in

high-stakes disclosure setting, inauthentic excitement, which captures excessive or performance inconsistent enthusiasm, aspiration-level comparisons, which provide economic benchmark for assessing that alignment, and the Yerkes-Dodson framework, which motivates a nonlinear relation between excitement and perceived risk. These concepts map directly to the study's measures, hypotheses, and interpretation of market reactions.

Our research utilized the Emotion Logic platform, which is owned by the Nemesysco Company and integrates Layered Voice Analysis (LVA) technology. Originally developed in 1997 in Israel, LVA has been validated in existing literature for its effectiveness in detecting and analyzing the emotional state of speakers (Hobsen et al. (2012), Mayew and Venkatachalam (2012), Price et al. (2017)). We analyze audio recordings from the earnings conference calls of S&P 500 firms over the period from 2019 to 2023. This study aims to disentangle the effects of authentic and inauthentic excitement displayed by CEOs during both presentations and Q&A sessions, while also investigating whether the market could detect hidden information via arousal reappraisal. To quantify inauthentic excitement, we introduced a new measurement. We first estimate the CEO's excitement using both financial variables and CEO characteristics. Next, we adjust the residual excitement by subtracting the median residual value for firms in the same industry and quarter. Excitement is classified as inauthentic if the adjusted residual value is greater than zero, and as authentic otherwise. By regressing the firm-level implied volatility on the inauthentic excitement, we find that firms with overly excited CEOs during earnings conference calls are viewed as riskier than firms with CEOs showing moderate levels of excitement, suggesting that markets perceive inauthentic excitement as a potential indicator of higher underlying risk.

We further analyzed the relationship between excitement levels and stock market reactions, focusing on both short- and long-term measures, including intraday close-to-open stock returns and cumulative abnormal returns (CAR(0,1) to CAR(2,180)). The findings reveal that increased CEO excitement leads to higher intraday returns. However, the stock market responds positively to CEO excitement when the firm outperforms competitors but reacts negatively when the firm underperforms relative to historical performance, suggesting that investors perceive excitement under these conditions as inauthentic. We observed consistent results for the effect of excitement on short-term returns (CAR(0,1)). We found that within the two-day window, the market's negative reactions to excitement in the presence of a negative aspiration gap were more persistent. While positive responses to excitement with a positive aspiration gap diminished quickly, the negative effects of excitement associated with a negative aspiration gap remained significant for up to six months post-event (CAR(2,180)). This suggests that investors are more sensitive and persistent when there is a misalignment between the CEO's emotional expression and the firm's financial performance.

In addition to examining stock performance, we explore the effect of CEO excitement on market perceptions of the firm's risk, particularly to assess whether inauthentic excitement reflects an attempt by the CEO to conceal underlying risks. To capture this relationship, we regress firm-level implied volatility, a widely accepted measure of market-perceived risk, on CEO excitement. Our results, consistent with Yerkes-Dodson's Law and arousal reappraisal theory, reveal a non-linear relationship between excitement and risk perception. The findings suggest that investors interpret moderate levels of CEO excitement as an indication of confidence in the firm's future prospects. However, deviations from this moderate level, whether in the form of under-excitement or over-excitement, are viewed negatively by investors. Low

levels of excitement signal a lack of confidence, while excessive excitement is perceived as a potential attempt to mask risks. These results suggest that investors are sensitive to deviations from a balanced emotional tone, viewing extreme levels of excitement as warning signs of potential underlying instability or uncertainties about future performance.

Our research has the following contributions. First, given that audio analysis remains relatively underexplored within finance research, our study expands the literature by employing advanced techniques to analyze the vocal patterns of executives during earnings calls. This approach provides an objective measure of CEO sentiment, demonstrating the potential of audio analysis to uncover emotional expressions that carry significant information in financial contexts. Previous studies, such as Mayew and Venkatachalam (2012), have examined the influence of non-verbal cues like vocal tone on market reactions. Similarly, Chen et al. (2023) employed deep learning techniques to gauge how analysts respond to positive and negative emotions during earnings calls. Our research builds upon and broadens this existing literature by further exploring the application of audio analysis in the context of earnings conference calls.

Second, while most previous research has focused on the overall tone, whether positive or negative, of earnings calls, our study contributes to the literature by examining the emotional intensity of CEO speech, specifically excitement. We use arousal reappraisal and Yerkes-Dodson's Law (Yerkes & Dodson, 1908) to distinguish credible excitement from excessive or performance-inconsistent excitement. These theories provide a foundation for identifying qualitative information that CEOs may seek to obscure, offering a deeper understanding of emotional expression in corporate communications. Most existing findings suggest a positive relation between positive emotions such as excitement has a positive impact on the stock market or analyst forecasts (Rennekamp et al. (2022), Chen et al. (2023), Gorodnichenko et al. (2023)).

We propose a more complex influence of the excitement by investigating the impact on the firm's risk. Furthermore, we develop a new metric for inauthentic excitement, enabling investors to identify potential emotional signals of CEOs attempting to conceal underlying issues or risks. This measurement offers a novel tool for assessing the credibility of executive communication, providing implications to improve investor decision-making.

Third, while existing literature mainly focuses on the effect of aspiration gaps from management's decision-making perspective, our study extends the research to explore the market's reaction to the interaction between aspiration gaps and the affective states of top executives. For example, Kuusela et al. (2017) investigate that the aspiration gap would affect the rate of firm's acquisition and divestment. Zhu et al. (2013) find a non-linear relationship between the aspiration gap and innovation input. In addition, Chrisman and Patel (2012) showed that the R&D investment of family and nonfamily firms are different under different aspiration gaps. Our study contributes to this growing body of work by exploring how investors respond to both the aspiration gaps and emotional cues exhibited by CEOs during earnings calls. By integrating qualitative measures with quantitative data, we construct a more comprehensive framework that captures how non-verbal cues and financial performance collectively shape investor behavior.

The paper is structured as follows. Section 1 is the introduction. In section 2, we review relevant theories and literature to develop our hypotheses. Section 3 outlines the methodology and data employed in the study. Section 4 discusses the results of our empirical approach. In section 5, we provide robustness checks to validate the findings. Section 6 concludes the paper with a summary of our key insights and implications.

## **2. 2 Literature Review and Hypothesis Development**

### **2.2.1 Earnings Conference Calls**

Earnings conference calls serve as an essential communication channel through which corporate managers convey insights, address concerns, and provide forward-looking guidance to external stakeholders such as investors and analysts. This direct interaction is recognized as an important tool for reducing information asymmetry between a company's insiders and its external stakeholders. Brown et al. (2004) demonstrated a negative relationship between earnings conference call activity and information asymmetry, suggesting that these calls help bridge the information gap by enhancing transparency. Similarly, Gomez et al. (2018) highlighted how earnings announcements, when paired with conference calls, significantly reduce the information gap between investors. These studies emphasize that earnings conference calls facilitate the flow of both quantitative and qualitative information between insiders and outsiders.

### **2.2.2 Audio Analysis of Earnings Conference Calls**

Non-verbal cues, particularly those extracted from audio recordings of earnings conference calls, provide crucial qualitative information that extends beyond the content of financial reports. A growing body of research demonstrates that vocal tone in particular can reveal a speaker's emotional state and influence audience perception. Mehrabian (1971) found that non-verbal communication, including vocal tone and facial expressions, is essential in communicating emotions, with vocal tone playing a particularly critical role in how the speaker's emotions are perceived by the audience. Scherer (1986), through his Component Process Model (CPM), identified the voice as a central channel for conveying emotional arousal and appraisal, arguing that variations in vocal delivery can signal different emotional states to listeners. Additionally, Johnstone and Scherer (2000) demonstrated that emotions such as happiness,

anger, sadness, and fear can be identified through variations in speech rate, volume, pitch, and tone, enabling audiences to detect and respond to a speaker's emotional state. The application of audio analysis in the context of earnings conference calls provides investors with valuable insights beyond the content of financial reports. By examining vocal characteristics such as tone, pitch, hesitation, and emotional fluctuations, investors can detect underlying information that may not be conveyed through the textual content alone. Because the CEO has the broadest view of firm performance and risk, we mainly focus on the CEO's non-verbal cues in both the presentation and Q&A sessions. A growing body of literature emphasizes the impact of CEO emotional cues on investor behavior and market outcomes. Hobson et al. (2012) demonstrated that hesitation in a CEO's speech can serve as an indicator of potential deception, increasing investor skepticism and resulting in negative market reactions. Their findings suggest that emotional signals can be more informative than the content of the earnings report itself in predicting investor behavior. Mayew and Venkatachalam (2012) suggest that CEOs' vocal tone, particularly when conveying positive emotions, has a measurable effect on investor reactions and short-term stock prices. In contrast, negative emotions tend to dampen market confidence. Similarly, Price et al. (2016) found that the raw emotions of CEOs have a positive impact on short-term cumulative abnormal returns. Breuer and Knetsch (2021) further argue that charismatic CEOs who project enthusiasm and confidence during earnings calls can generate positive market reactions. Kim (2022) provided evidence that investors react strongly to shifts in CEO vocal tone during real-time earnings calls, indicating the importance of emotional delivery. Additionally, Chen et al. (2023) used deep learning techniques to analyze emotional variables in earnings calls, revealing a strong relationship between CEO emotional cues and the quality of analysts' follow-up questions, further illustrating the significance of emotional expressions in

shaping both market and analyst responses. These studies provide evidence of the critical role of not only the content of the CEO's communication but also its emotional delivery.

CEO emotional expression, particularly excitement, is often viewed as a signal of confidence in the company's future performance. Excitement may reflect optimism about upcoming projects, strategic plans, or competitive positioning, which can, in turn, lead to increased investor optimism, resulting in higher stock returns. Hirshleifer and Shumway (2003) found that positive emotions from CEOs, including excitement, can create a contagion effect that leads investors to take more optimistic positions in the stock, resulting in higher returns. Levy and Yagil (2012) also argued that excited CEOs can induce an optimism bias among investors, causing short-term stock price increases, even when the firm's financial performance is only moderate.

Given this context, we hypothesize that CEO excitement during earnings conference calls serves as a significant driver of stock market performance.

*Hypothesis 1: CEO excitement during earnings conference calls positively influences stock market performance immediately after earnings conference calls.*

### **2.2.3 Arousal Reappraisal and Inauthentic Excitement**

Arousal reappraisal, involves reframing physiological stress responses, such as increased heart rate or adrenaline surges, as excitement rather than anxiety. This reappraisal strategy is particularly relevant in high-stress situations, including earnings calls, where CEOs are required to convey confidence, even in the face of negative performance. By reinterpreting their stress responses, CEOs can project enthusiasm and optimism, which may positively influence market reactions. For instance, a CEO facing challenging financial results may feel stressed but can

reappraise that stress as excitement, allowing them to deliver a more positive and confident message. Jamieson et al. (2012) explored how arousal reappraisal helps people reinterpret the physiological symptoms of stress as beneficial. This reinterpretation reduces the negative impact of anxiety on performance, especially in high-pressure situations like public speaking and exams. Brooks (2014) found that reframing anxiety as excitement improves performance in tasks such as public speaking. In the context of earnings calls, this suggests that a CEO's ability to reframe stressful information as an opportunity, and to project optimism through vocal cues, may lead to more favorable investor responses.

While moderate excitement can signal confidence, excessive or exaggerated excitement may backfire, leading to perceptions of overconfidence or insincerity. The Yerkes-Dodson Law (1908) posits that moderate levels of arousal lead to optimal performance, while too little or too much arousal can impair effectiveness. In the context of earnings calls, CEO excitement is a form of arousal that, if perceived as excessive, may trigger skepticism among investors. Too little excitement may signal uncertainty or lack of enthusiasm, while overexcitement can be interpreted as an attempt to mask underlying risks or as overconfidence. In this situation, we introduce the concept of Inauthentic Excitement, which refers to the exaggerated or false display of enthusiasm that does not align with the CEO's true emotional state or the firm's performance. CEOs might display inauthentic excitement during earnings calls to minimize negative results or overstate future prospects. However, when investors or analysts detect such dissonance between emotional expression and reality, it can lead to increased skepticism, damaging the CEO's credibility and fostering negative market reactions. Grandey et al. (2005) suggested that exaggerated emotional displays, particularly those perceived as inauthentic, can erode trust when audiences sense that the speaker's emotions do not align with reality. Hochschild (1983) argued

that emotional dissonance, when expressed emotions are incongruent with internal feelings, can negatively affect the speaker's credibility.

#### **2.2.4 Aspiration Gaps and Emotional Cues in Earnings Calls**

Earnings calls are also a platform where CEOs address a firm's performance relative to its aspirations. According to the Behavioral Theory of the Firm (Cyert & March, 1963), firms operate based on specific objectives or aspiration levels, and performance is evaluated relative to these targets. When performance falls below aspirations, firms may pursue riskier or more innovative strategies in an attempt to close the performance gap. Greve (2003) found that firms exceeding their aspiration levels tend to continue with existing strategies, while those falling short of aspirations are more likely to seek new opportunities or take on additional risk. During earnings calls, CEOs often communicate performance relative to these aspirations, attempting to manage market perceptions by emphasizing future strategies aimed at closing performance gaps. Larcker and Zakolyukina (2012) analyzed how CEOs manipulate tone and language in earnings calls to obscure performance shortfalls, while Merkley (2014) showed that narrative disclosure impacts investor perceptions of performance gaps. Wiseman and Gomez-Mejia (1998) indicated that both a firm's performance relative to its historical performance and its competitors serve as key indicators of aspiration gaps.

Investors and analysts interpret both the content of earnings calls and CEO's the emotional delivery. If the CEO's excitement aligns with the firm's performance relative to its aspirations, investors may react positively. If excitement exaggerated or inconsistent with performance, it may be perceived as inauthentic and lead to negative market reactions. Based on arousal reappraisal and the concept of inauthentic excitement, we propose that the impact of

CEO excitement on stock market performance is moderated by the firm's performance relative to its aspirations.

Specifically, we hypothesize that:

*Hypothesis 2a: CEO excitement will positively impact stock market performance when the firm has a positive aspiration gap.*

*Hypothesis 2b: CEO excitement will negatively impact stock market performance when the firm has a negative aspiration gap.*

CEO excitement during earnings conference calls can sometimes mask underlying risks, leading investors to become overly optimistic about the firm's future while failing to recognize potential threats. When CEOs express over-excitement, attention may be diverted from the firm's risk profile, leading to an imbalanced market perception. Loughran and McDonald (2011) emphasized that positive emotional tones during earnings calls can contribute to market mispricing by underplaying risks, as investors tend to interpret the excitement as a signal of confidence and stability, despite potential vulnerabilities. Bochkay et al. (2020) found that exaggerated expressions of confidence and excitement can temporarily boost stock prices by diverting attention from underlying risks. However, this inflation can increase volatility once the risks become apparent. Investors may initially reward a firm for the CEO's optimistic tone. However, as the underlying risks come to light, the market is likely to experience significant corrections, which demonstrates the potential for emotional misrepresentation during earnings calls.

Excitement can be used to obscure critical risk factors, thereby inflating market expectations in the short term while increasing volatility in the following days. Zona et al. (2013)

explored how CEO personality traits, including enthusiasm and overconfidence, can conceal significant risks. Their research illustrates that CEOs who project excessive excitement during earnings calls may obscure key risk factors, leading to market mispricing. Another critical issue is the disconnect between CEO excitement and the level of risk disclosure during earnings calls. Overly excited CEOs may downplay or omit key risk factors during earnings calls, leading to an incomplete picture for investors. Huang et al. (2014) found that CEOs who express excitement while underreporting risk may lead investors to misjudge the company's risk profile. The mismatch between emotional tone and risk disclosure can result in greater stock price volatility once risks materialize.

Thus, we propose that:

*Hypothesis 3: CEO excitement during earnings conference calls could reduce stock market perception of underlying risks.*

While high levels of CEO excitement can obscure risks, low levels of excitement may have the reverse effect, raising concerns among investors about the firm's prospects. CEO excitement often serves as a proxy for confidence, and a lack of enthusiasm can signal uncertainty or doubt regarding the firm's future. Aabo et al. (2024) showed that CEO personality traits significantly influence market perceptions, finding that lower levels of CEO enthusiasm are correlated with higher perceived risk. In addition, Mitteness et al. (2012) explored how perceived CEO passion affects investor evaluations and found that passionate and enthusiastic CEOs are often viewed as leading lower-risk firms. Investors tend to associate visible enthusiasm with strong leadership and commitment, which are considered mitigating factors in assessing firm risk. Conversely, when a CEO displays low excitement, it may signal a lack of confidence in the firm's strategies, thereby increasing perceived risk.

The Yerkes-Dodson Law (1908), which posits that moderate arousal leads to optimal performance, while both under-arousal and over-arousal can be detrimental, is aligned with the context of earnings calls, in which a moderate level of excitement signals balanced confidence. Investors are likely to interpret moderate excitement as a sign that the CEO is optimistic about the firm's future. On the other hand, extremes of excitement can lead to market misinterpretation of the firm's risk profile. Low excitement may raise concerns about the firm's ability to meet its strategic goals, while excessive excitement can mask underlying risks, leading to volatility once those risks are realized. Thus, we propose the following hypotheses.

*Hypothesis 4: Firms with CEOs expressing over-excitement during earnings conference calls have lower stock returns compared to firms with CEOs with moderate levels of excitement.*

*Hypothesis 5: Firms with CEOs expressing over-excitement during earnings conference calls are perceived to have higher risks compared to firms with CEOs with moderate levels of excitement.*

## **2.3 Methodology and Data**

### **2.3.1 Audio Analysis**

Earnings conference calls are crucial events where CEOs communicate both the quantitative performance and qualitative outlook of the firm. While written reports provide structured financial data, the speech patterns in these calls offer additional layers of information, revealing underlying emotions and psychological states that may not be explicitly conveyed through words alone. The presentation section of earnings calls is typically scripted, reflecting how the CEO intends to present the company's performance and strategy in a carefully controlled manner. This section allows us to capture the CEO's intended narrative. In contrast, the Q&A section involves unscripted, real-time interactions with analysts and investors. During this

session, the CEO is required to respond spontaneously to direct questions, which can expose underlying concerns or uncertainties that might not be revealed in the more polished presentation segment. By combining the analysis from both sections, we aim to capture a fuller spectrum of communication cues, offering a more nuanced view of the CEO's emotional state and its potential impact on market behavior.

After collecting audio clips of the CEO's speech from both the presentation and Q&A portions of earnings calls, we conducted audio analysis using the Emotion Logic Hub platform, which utilizes Layered Voice Analysis (LVA) technology. LVA is a sophisticated voice analysis tool specifically designed to detect a wide range of emotions and psychological insights from vocal cues, making it an ideal technique for studying executive speech during earnings calls. Unlike traditional tone analysis, which focuses on broad sentiment categories, LVA can detect deeper emotional signals by analyzing subtle vocal modulations that are often unconscious and involuntary. LVA's effectiveness stems from its ability to analyze uncontrollable micro-level variations in vocal patterns, such as pitch, frequency, and tremors, that reveal genuine emotional states, including stress, excitement, and confidence. These cues are particularly important in high-stakes environments like earnings calls, where CEOs may attempt to manage perceptions through carefully chosen words but can inadvertently reveal their true emotional state through their voice. LVA's ability to detect emotions that are not explicitly stated or consciously controlled makes it a powerful tool for understanding executive sentiment. LVA has been widely used in financial research to analyze the emotional content of managerial speech and its impact on market behavior (Hobson et al. (2012), Hajek and Munk (2023), Mayew and Venkatachalam (2012)), proving its validity as a tool for audio analysis in financial research and demonstrating its capacity to detect critical emotional cues that influence market outcomes and predict future

company performance. Using the API tools provided by Emotion Logic Hub, we processed the CEO audio clips from both the presentation and Q&A segments. The platform enables us to extract and quantify various emotional states, including excitement, stress, and anxiety, measured on a standardized scale ranging from 0 to 30. Higher values on this scale represent stronger emotional intensity, providing a clear, objective metric for comparison across different earnings calls and sections of speech.

### **2.3.2 Data and Variables**

Our study utilizes panel data of S&P 500 firms spanning from 2019 to 2023. This period is selected due to the availability of earnings conference call recordings on SeekingAlpha.com, beginning in 2019. We downloaded audio recordings and transcripts of earnings conference calls of S&P 500 firms from SeekingAlpha.com. After segmenting the audio files, aligning them with respective transcripts, and conducting audio analysis, we were left with 4,266 observations. To complement the emotional data extracted from the earnings calls, we integrated financial and CEO background data from several different databases. Firm performance and corporate profiles were obtained from COMPUSTAT. Stock return data were extracted from CRSP. To measure the risk profile of the company, we employed implied volatility risk data from OptionMetrics. In addition, CEO demographic characteristics, which can influence leadership style and corporate communication, were sourced from ISS and EXECUCOMP. The analyst forecast data is from the I/B/E/S database.

### **2.3.3 Dependent Variables**

In our analysis, we examine how CEO excitement during earnings calls influences both stock market performance and the firm's risk profile, employing a range of dependent variables to capture market reactions.

To gauge market reaction to CEO excitement, we calculate cumulative abnormal returns around the earnings call date. We use the  $CAR(0,1)$  measure as our primary variable, which captures the market's reaction over the day of the earnings call and the following trading day. This approach follows Mayew and Venkatachalam (2012) and enables us to assess the immediate impact of the CEO's emotional cues on stock prices. In addition to short-term reactions, we investigate longer-term market responses by calculating cumulative abnormal returns over extended intervals. We analyze  $CAR(2,90)$  and  $CAR(2,180)$  to assess whether the effect on the initial investor reaction is corrected or persistent over time.

In addition to CAR, we analyze intra-day returns to capture the immediate impact of CEO excitement during earnings calls. Specifically, we measure the close-to-open return, which reflects the price change from the closing price on the day of the earnings call to the opening price on the following trading day. This intra-day return focuses on how the market reacts immediately after the earnings call, offering real-time insights into investor sentiment. It is important to note that we exclude earnings calls held outside trading hours to ensure that intra-day returns are a true reflection of market reactions within active trading sessions. The combination of  $CAR(0,1)$  and intra-day returns provides a more complete understanding of market reactions to CEO excitement.  $CAR(0,1)$  captures the cumulative market reaction over the day of the earnings call and the following trading day, reflecting the broader market sentiment. Intra-day returns, on the other hand, focus on the immediate price adjustment during and shortly after the earnings call, offering insights into the market's initial reaction based on the CEO's emotional tone and presentation.

To further understand how CEO excitement influences the market's perception of risk, we also examine implied volatility as a dependent variable. Following Goyal and Saretto (2009),

we estimate firm-level implied volatility by averaging the standardized volatility derived from at-the-money call and put options. By incorporating options with varying maturities, from short-term to long-term, we are able to capture a broad perspective of how the market perceives the firm's risk in response to CEO excitement.

### **2.3.4 Measurement of Excitement**

To measure the level of excitement expressed by CEOs during earnings calls, we employed a systematic process of audio extraction, speaker identification, and emotion analysis. The process began with downloading the audio recordings of earnings calls from SeekingAlpha.com, followed by partitioning the recordings to isolate the CEO's speech. We utilized pyannote.audio, an open-source Python library designed for speaker diarization, to automatically partition the audio files by speaker. Speaker diarization is the process of segmenting an audio stream into homogeneous sections according to speaker identity, ensuring that each section corresponds to a unique speaker. By applying pyannote.audio, we were able to segment the audio into individual speaker clips. After the partitioning, we needed to identify which audio clips belonged to the CEO. To accomplish this, we matched the segmented audio clips with the corresponding earnings call transcripts obtained from SeekingAlpha.com. These transcripts include clear speaker labels, allowing us to identify and extract only the CEO's segments. To ensure accuracy in speaker identification, we applied Google Speech-to-Text to transcribe each audio clip. Using a token-based matching method, we compared the transcribed text from the audio clips to the CEO-labeled segments of the earnings call transcript. This step allowed us to accurately identify and extract the CEO's speech across the earnings calls. Once the CEO's speech clips were accurately extracted, we applied the Emotion Logic platform to analyze the emotional content of the audio, focusing specifically on measuring the level of excitement.

The Emotion Logic platform employs Layered Voice Analysis (LVA), an advanced audio analysis technique that detects emotional states based on vocal cues such as tone, pitch, and intensity. LVA processes voice segments ranging from 0.3 seconds to one, two, or three seconds, which is usually a logical speech block and provides a string of numbers that summarizes the emotional activity detected in a specific voice segment by the core component. These numbers are then aggregated to provide a summary of emotional expression. After analyzing all voice segments, the emotional values are normalized and scaled for consistency. The level of excitement, a key variable in our study, is calculated on a scale ranging from 0 to 30. Existing studies validate the use of LVA in capturing excitement. For example, Mayew and Venkatachalam (2012) employ LVA to measure the level of excitement to estimate the impact of positive affective status on the stock market and analyst forecast. Additionally, Price et al. (2016) used excitement as part of their emotional variable analysis, further demonstrating the reliability of LVA in this context. In our analysis, we calculate the average level of excitement across the entirety of the CEO's speech during the earnings conference call, allowing for a comprehensive assessment of the emotional tone conveyed throughout the call.

Although the multi-stage audio-processing procedure is designed to identify CEO speech accurately, the possibility of misclassification cannot be eliminated completely. Speaker diarization, speech-to-text transcription, and transcript matching may occasionally assign a segment to the wrong speaker or omit part of the CEO's speech. In addition, the LVA excitement score is an empirical proxy for vocal arousal rather than a direct observation of the CEO's internal emotional state. Such random measurement or classification error would generally introduce noise and weaken the estimated associations. However, systematic error associated with audio quality, speaking style, or firm circumstances could bias the estimates in either

direction. The results should therefore be interpreted as evidence concerning measured CEO vocal excitement rather than definitive evidence of the CEO's true psychological state.

### **2.3.5 Aspiration Level**

In line with Chrisman and Patel (2012), we measure aspiration gaps as the discrepancies between a firm's performance in the current quarter (t) and both its historical performance in the prior quarter (t-1) and its competitors' performance in the same period. Competitors' performance is represented by the median performance of firms within the same four-digit SIC industry in quarter t-1. To represent firm performance, we utilize two common financial metrics, Return on Assets (ROA) and Tobin's Q, and run our regression models separately for each performance measure. Following the methodology of Chen (2008), we construct four censored variables to represent different types of aspiration gaps. This approach allows us to capture both positive and negative deviations from historical and industry benchmarks. To isolate the effects of negative aspiration gaps, we use the absolute value of the gap if it is negative and set the value to zero otherwise. For positive aspiration gaps, we left-censor the variable, meaning the gap takes on a positive value if the firm's performance exceeds the benchmark, and zero otherwise. This distinction enables us to explore how positive and negative aspiration gaps influence market perceptions and investor reactions in different ways.

### **2.3.6 Control Variables**

We include both financial indicators and CEO characteristics as control variables. For financial indicators, following Mayew and Venkatachalam (2012), we include firm size, momentum (measured as the cumulative abnormal return over the 125-day trading before the date of earnings conference calls), market-to-book ratio, stock volatility (measured as the standard deviation of daily stock returns over the 125-day trading before the date of earnings

conference calls), firm age, and unexpected earnings. For CEO demographic factors, we include gender, ethnicity, and years served as executive for each CEO. In addition, we control the positive or negative content provided by the CEO based on the transcript of the earnings call. We use positive and negative word dictionaries provided by Loughran and McDonald (2011) and calculate normalized polarity score to proxy for the positive content of the earnings call. Table 1 shows the summary statistics for all the variables.

$$polarity\ score = \frac{positive\ words - negative\ words}{positive\ words + negative\ words}$$

[INSERT TABLE 2.1 ABOUT HERE]

## 2.4 Empirical Results

We examine the relationship between the CEO's excitement during earnings conference calls and cumulative abnormal returns (CAR) under varying aspiration levels across different time horizons. Table 2 presents the regression results for three different time windows: CAR(0,1), CAR(2,90), and CAR(2,180). In Model (1), which focuses on CAR(0,1), the market reaction over the day of the earnings call and the following trading day, we find that CEO excitement is positively and significantly related to the short-term CAR. The coefficient of excitement is 0.0011 ( $p < 0.05$ ), indicating that a higher level of excitement from the CEO correlates with an increase in stock market performance in the two days following the earnings call. This result supports our first hypothesis, suggesting that CEO excitement is interpreted by investors as a sign of confidence in the firm's performance, leading to a short-term positive market response. However, the interaction between excitement and the negative aspiration gap, when the firm performs worse than expected, is significantly negative (-0.0018,  $p < 0.01$ ), meaning that when the firm's performance falls below expectations, increased CEO excitement

reduces short-term CAR. This finding is consistent with Hypothesis 2b, which posits that investors react negatively to high excitement when there is a misalignment between the CEO's emotional cues and the firm's financial performance. On the other hand, there is no significant interaction effect between excitement and a positive aspiration gap, indicating that the market is more sensitive to poor performance. Moreover, the interaction term of the negative aspiration gap relative to industry with excitement is again negative ( $-0.0037$ ,  $p < 0.01$ ), reinforcing that excessive excitement during poor relative performance decreases investor confidence in the short term. In Model (2), which examines the medium-term effect on  $CAR(2,90)$ , the positive impact of CEO excitement observed in the short term disappears. The coefficient on excitement is insignificant, indicating that any initial positive reaction to CEO excitement fades within this 90-day window. However, the interaction between excitement and negative aspiration gaps relative to industry remains strongly negative ( $-0.0156$ ,  $p < 0.01$ ), indicating that misalignment between CEO excitement and poor performance compared to industry peers continues to have a detrimental effect on stock returns. This supports our Hypothesis 2b, suggesting that the negative market response to high excitement during underperformance is persistent in the medium term. In Model (3), which analyzes the long-term effects on  $CAR(2,180)$ , we observe a similar pattern as in the medium term. the interaction between excitement and negative aspiration gaps relative to the industry remains negative and significant ( $-0.0173$ ,  $p < 0.01$ ), indicating that the negative consequences of excessive excitement during periods of poor relative performance persist over the long term.

In summary, our results show that while CEO excitement can drive short-term positive market reactions, its impact fades in the medium and long term. Moreover, the negative effect of excessive excitement during periods of poor performance is both strong and persistent,

particularly when the firm underperforms relative to its industry peers. This proves the importance of aligning emotional expression with firm performance to maintain investor confidence, consistent with both Hypothesis 1 and Hypothesis 2b.

[INSERT TABLE 2.2 ABOUT HERE]

To capture the immediate market reaction to CEO excitement during earnings conference calls, we examine the effect of excitement on the intraday stock return, measured as the close-to-open return on the day of the earnings call. Table 3 presents the results of four models, with each progressively adding interaction terms and testing for non-linear effects. In Model (1), we analyze the direct impact of CEO excitement on the stock return. The coefficient on excitement is positive and statistically significant (0.0016,  $p < 0.05$ ), indicating that higher levels of excitement expressed by the CEO are associated with an immediate positive market reaction. This result supports the notion that investors interpret CEO excitement as a signal of confidence, leading to an increase in stock prices on the event day. This finding is consistent with our first hypothesis, which posits that excitement positively influences stock returns. In Model (3), we introduce interaction terms between excitement and the aspiration gap variables to assess how excitement interacts with firm performance relative to expectations. The results show that the interaction between excitement and below aspiration gap is significantly negative (-0.0049,  $p < 0.01$ ), indicating that when the firm underperforms relative to expectations, higher CEO excitement actually reduces intraday stock returns. This finding supports our Hypothesis 2b, which suggests that excitement can backfire when performance falls short of investor expectations, as the market may perceive the excitement as inauthentic or an attempt to obscure poor results. Conversely, the interaction between excitement and above aspiration gap industry is positive and significant (0.0013,  $p < 0.05$ ), suggesting that when the firm outperforms its

competitors, increased excitement by the CEO is associated with higher stock returns. This finding aligns with our Hypothesis 2a, indicating that investors reward excitement when the firm is performing well relative to its industry peers. This effect disappears in the two-day event window  $CAR(0,1)$ , indicating that the excitement can boost the market confidence of the firm in a relatively short period. In Models (2) and (4), we include the squared term of excitement to test for a potential non-linear relationship between excitement and stock returns, following the Yerkes-Dodson Law, which suggests that performance improves with arousal up to a certain point, at which either the under-level or exaggerated excitement may lead to diminished returns. However, the coefficient on the squared term is insignificant, suggesting that there is no evidence of a non-linear relationship between excitement and stock returns. In conclusion, while CEO excitement can boost short-term market confidence, it must be aligned with firm performance to maintain investor trust.

[INSERT TABLE 2.3 ABOUT HERE]

To evaluate the market's perception of risk associated with CEO excitement during earnings calls, we analyzed implied volatility, a measure commonly used to capture market expectations about future stock price movements. Higher implied volatility typically signifies increased perceived risk or uncertainty, whereas lower volatility indicates market confidence and anticipated stability. Our analysis included implied volatility across various maturities: 30, 60, 90, and 122 days. As shown in Table 4, our empirical results reveal that CEO excitement does not significantly influence implied volatility across all maturity periods analyzed. The coefficients for CEO excitement are consistently negative but statistically insignificant. This indicates that CEO excitement levels, contrary to our initial hypothesis (Hypothesis 3), do not substantially affect market perceptions of firm risk, at least as measured by implied volatility.

[INSERT TABLE 2.4 ABOUT HERE]

Table 5 examines the potential nonlinear relationship between CEO excitement and cumulative abnormal returns (CARs) across different time horizons. The analysis was conducted to test whether the Yerkes-Dodson Law (1908) applies to investor reactions to CEO excitement, expecting an inverted U-shaped relationship where moderate levels of excitement would yield optimal market responses. Contrary to our expectations, the results from Table 5 do not provide statistical support for a significant nonlinear relationship between CEO excitement and cumulative abnormal returns. Neither the linear term (excitement) nor the quadratic term (excitement<sup>2</sup>) demonstrates statistical significance across any of the three models representing different time horizons (CAR(0,1), CAR(2,90), and CAR(2,180)). This suggests that investors' reactions to CEO excitement levels, as measured by abnormal returns, do not follow the classic Yerkes-Dodson inverted U-shaped pattern.

[INSERT TABLE 2.5 ABOUT HERE]

However, there are notable findings regarding the overall relationship between CEO excitement and implied volatility. Our results in Table 6 indicate a U-shaped relationship between CEO excitement and implied volatility, particularly over the 60-day to four-month horizon. This finding is consistent with the Yerkes-Dodson Law, which suggests that moderate excitement levels lead to optimal performance, while too little or too much excitement can have adverse effects. Additionally, the concept of arousal reappraisal theory supports this result, implying that inauthentic or excessive excitement can signal negative outcomes to investors. The result is consistent with our Hypothesis 5. Specifically, when the CEO displays low excitement, investors may interpret this as a signal of uncertainty or caution regarding the company's future. This could suggest that the CEO is unsure about the firm's prospects or is intentionally tempering

expectations. As a result, implied volatility tends to increase as the market perceives higher risk, reflecting investor concerns about potential underperformance or lack of confidence in leadership. Moreover, moderate excitement is generally considered a rational perspective on the company's future. Investors may view this level of enthusiasm as well-calibrated to the company's actual performance and prospects. In this scenario, implied volatility is likely to be lower because investors perceive the CEO's tone as realistic. This supports a stable market outlook with reduced uncertainty, consistent with optimal market reactions under the Yerkes-Dodson Law. When a CEO exhibits high excitement, especially if it seems disproportionate to the company's actual performance, investors might interpret this as overconfidence or an attempt to oversell the company's prospects. This could raise concerns that the CEO's excitement is masking underlying risks or that the executive is overly optimistic about uncertain future events. Consequently, implied volatility increases as investors factor in the risk of disappointment or unforeseen challenges, leading to a greater perception of volatility and market instability.

[INSERT TABLE 2.6 ABOUT HERE]

While we do not find support for the Yerkes-Dodson Law in terms of cumulative abnormal returns, the complementary findings from Table 6 suggest that this psychological principle may still be applicable to market behavior through the volatility channel. CEO excitement appears to influence investor uncertainty rather than directly affecting return patterns.

The findings align with arousal reappraisal theory, suggesting that investors may interpret CEO excitement in a nuanced manner. Very low or very high levels of excitement might signal inauthentic communication or potential risks, increasing market uncertainty, while moderate excitement is perceived as more credible and leads to lower implied volatility.

## 2.5 Robustness Check

To strengthen the robustness of our analysis and provide further evidence for the presence of inauthentic excitement, we develop a measurement of over-excitement to proxy for inauthentic emotional expression. Our aim is to assess whether the negative impact on firm risk, as indicated by increased implied volatility, can be attributed to this inauthentic excitement. This approach allows us to differentiate between genuine and exaggerated emotional cues and to examine their respective effects on market risk perception. Following the methodology by Sutrisno and Karmudiandri (2020), we first estimate the predicted excitement by regressing the actual excitement on a set of financial performance variables and CEO demographic characteristics, which is shown in Table 7, column 1. This regression allows us to isolate the expected or "normal" level of excitement that would be predicted based on observable firm performance and CEO characteristics. The next step is to calculate the residuals from this regression, which represent the difference between the actual level of excitement expressed by the CEO and the level predicted by the model. To ensure that our measure of inauthentic excitement is industry-adjusted, we calculate the median residual for each industry in each quarter. We then subtract this industry median from each firm's residual, producing a reduced residual that reflects the firm-specific deviation from the industry norm. Finally, we create a dummy variable for inauthentic excitement, where the dummy equals 1 if the reduced residual is positive, indicating that the CEO's excitement level exceeds what is expected based on the firm's performance and industry norms. The dummy equals 0 if the reduced residual is zero or negative, suggesting that the CEO's excitement aligns with or below expected levels. By constructing this inauthentic excitement variable, we can empirically test whether the observed negative impact on implied volatility is specifically driven by inauthentic excitement rather than excitement in general. This method provides a more precise measure of exaggerated emotional expression and

allows us to better isolate the market's reaction to emotional cues that may be perceived as disingenuous or misleading.

The classification of excitement as authentic or inauthentic is based on whether the industry-quarter-adjusted residual is above zero. Observations close to this threshold may be sensitive to small changes in the estimated residual or benchmark and could therefore be assigned to a different category. Random threshold misclassification would tend to reduce the distinction between the two groups and attenuate the estimated relationship. Accordingly, the inauthentic-excitement indicator should be interpreted as a proxy for unusually high unexplained excitement rather than a definitive classification of managerial authenticity.

[INSERT TABLE 2.7 ABOUT HERE]

After constructing the proxy for inauthentic excitement, we examine its effect on implied volatility across different option terms, 30 days, 60 days, 90 days, and 122 days. Table 7 presents the results, and the findings are consistent with both the Yerkes-Dodson Law and arousal reappraisal theory. We observe a significant positive relationship between over-excitement and implied volatility, indicating that inauthentic excitement signals higher risk to investors. The coefficient on over-excitement is positive and statistically significant across all option maturities, ranging from 30 days to 122 days. These results indicate that when CEOs express extreme excitement during earnings calls, investors perceive the firm as riskier, leading to an increase in implied volatility, which reinforces the idea that CEO emotional expression during earnings calls is a powerful signal to investors and that excessive or inauthentic emotional cues can lead to negative market reactions in the form of increased risk perceptions.

To further validate the robustness of our findings, we conduct an additional robustness check by replacing the performance benchmark used in the analysis. Instead of using aspiration

levels, we utilize the performance gap measured relative to the same quarter of the previous year. This approach aligns with how top managers typically present performance to the audience, comparing with the same quarter of the previous fiscal year to discuss the current quarter's performance. By using this method, we can exclude the potential effects of seasonality, which may influence comparisons across quarters. In this analysis, we replace the original aspiration gaps with the change in Tobin's Q and Return on Assets (ROA) compared to the same quarter of the prior year. These performance measures reflect key indicators of the firm's market valuation and profitability, allowing us to assess whether the CEO's excitement influences investor reactions when performance deviates from the previous years.

[INSERT TABLE 2.8 ABOUT HERE]

Table 8 presents the results of our robustness check where we replace the aspiration gap with a year-over-year performance gap, comparing the firm's performance in the current quarter with the same quarter from the previous year. This adjustment removes potential seasonality effects and reflects a common managerial practice of year-over-year comparisons. The models examine how the level of CEO excitement interacts with this performance gap to influence intra-day stock returns. In Model (1) and Model (3), the coefficient on the level of excitement remains positive and statistically significant (0.00163,  $p < 0.05$ ; 0.00174,  $p < 0.05$ ). This indicates that higher levels of excitement expressed by the CEO are associated with positive intra-day stock returns, suggesting that investors view CEO excitement as a signal of confidence in the firm's future prospects. These findings are consistent with the results of our earlier analysis, where excitement was interpreted positively in the short term by the market. In Model (3), the interaction term between excitement and the performance gap is positive and highly significant (0.00239,  $p < 0.01$ ), suggesting that the market reacts positively to CEO excitement when the

firm's performance has improved relative to the same quarter of the previous year. This is consistent with our previous findings from Table 3, where excitement was shown to amplify positive market reactions when the firm exceeded expectations.

[INSERT TABLE 2.9 ABOUT HERE]

In addition to analyzing stock returns, we further explore how CEO excitement influences implied volatility, which reflects the market's perception of risk, after replacing the performance benchmark with the year-over-year performance gap to account for seasonal effects. Table 9 provides the results, and the findings indicate that the non-linear relationship between excitement and implied volatility persists even after adjusting for seasonality. The quadratic term for excitement is positive and statistically significant across several option maturities, indicating a U-shaped relationship between excitement and implied volatility. Specifically, moderate levels of excitement lead to lower implied volatility, while both low and high levels of excitement result in increased volatility. This result is consistent with Yerkes-Dodson's Law, which suggests that moderate levels of excitement lead to optimal performance, while too little or too much excitement induces stress or doubt, increasing perceived risk.

In our analysis, we do not find a significant effect of CEO excitement on cumulative abnormal returns (CAR) when regressing CAR on excitement and the performance gap. A possible explanation for this finding is that the effect of excitement appears to be more pronounced in cases where the firm has a negative performance gap compared to the industry, which persists over both the short-term and long-term returns. The performance gap in our model only captures the difference between the firm's current performance and its historical profitability without considering a comparison to competitors. This limitation may result in the insignificant effect of excitement in the CAR regressions. Moreover, as indicated in Table 3 and

Table 2, the positive market reaction to CEO excitement when the firm exceeds expectations disappears in the short-term measure  $CAR(0,1)$ . This suggests that the positive effect of excitement may only be temporary, as investors may quickly adjust their initial reactions once they evaluate the firm's performance in a broader context. By combining both positive and negative gaps into a single term, the interaction effect between excitement and performance gap is not significant.

To mitigate potential selection bias, we implement the Propensity Score Matching (PSM) method, matching CEOs based on both CEO- and firm-level characteristics. We then re-estimate the effect of CEO excitement on stock returns and implied volatility using the matched sample. As reported in Tables 10–12, the results remain consistent, reinforcing the robustness of our findings.

[INSERT TABLE 2.10 ABOUT HERE]

[INSERT TABLE 2.11 ABOUT HERE]

[INSERT TABLE 2.12 ABOUT HERE]

To address potential heterogeneity concerns, we employ Heckman's two-stage model (Heckman, 1979). In the first stage, we estimate a probit regression in which the dependent variable is an Excite Dummy, which equals one if the CEO's level of excitement exceeds the sample mean and zero otherwise. We use CEO age as the instrumental variable, as it is expected to influence the likelihood of a CEO exhibiting excitement-related behaviors while being exogenous to the second-stage outcome. The results indicate that CEO age has a significant negative effect on the probability of excitement, suggesting that older CEOs are less likely to display excitement-related characteristics.

After estimating the selection equation, we compute the Inverse Mills Ratio (IMR) and include it in the second-stage regressions to correct for selection bias. The results, presented in Table 13, remain robust after accounting for selection effects.

[INSERT TABLE 2.13 ABOUT HERE]

## 2.6 Conclusion

Our research provides a comprehensive analysis of CEO excitement during earnings conference calls, distinguishing between authentic and inauthentic excitement and examining their respective effects on investor reactions and market dynamics. By focusing on non-verbal cues, we offer valuable insights into how investors interpret CEO excitement and how this emotional expression shapes stock performance and the perceived risk of the firm. We find that authentic excitement, where the CEO's tone is aligned with the company's actual performance and strategic outlook, generates positive and sustained market reactions. This form of excitement leads to a stable increase in cumulative abnormal returns (CAR) as investors perceive the CEO's emotional expression to be a reliable signal of confidence in the firm's future. The consistency between the CEO's non-verbal cues and the firm's performance reduces investor uncertainty, fostering long-term confidence and lower implied volatility. Conversely, inauthentic excitement, marked by exaggerated or misplaced enthusiasm relative to the company's actual performance, leads to short-term market gains but is often followed by increased skepticism and higher implied volatility. While investors may initially interpret this enthusiasm as a positive signal, they quickly reassess the situation when they detect a misalignment between the CEO's tone and the firm's performance. This reassessment results in a negative effect of excitement on stock returns, and the extreme level of excitement detected results in an increase in perceived risk, which is reflected in higher implied volatility. The market views inauthentic excitement as an

attempt to mask underlying issues or inflate expectations, leading to greater uncertainty about the firm's future performance.

Our research also highlights the critical role of the aspiration gap, the difference between the firm's performance and its historical and competitive benchmarks, in shaping investor reactions to CEO excitement. When a firm underperforms relative to its historical performance or competitors, and the CEO expresses high levels of excitement, the market reacts negatively. Investors interpret this excitement as an attempt to reframe poor performance, leading to lower CAR and increased implied volatility. Conversely, when the firm outperforms expectations, CEO excitement is received more positively, although this effect is generally short-lived.

Our research contributes to the literature by providing evidence that CEO emotional expression during earnings calls is a significant driver of investor sentiment and risk perception. Authentic excitement, when aligned with the company's performance and long-term goals, promotes sustained positive market reactions, reinforcing investor confidence. Conversely, inauthentic excitement can initially boost stock prices, but this effect is often short-lived, ultimately leading to greater market uncertainty, as reflected by higher implied volatility and eventual downward adjustments in CAR.

These findings have important implications for corporate leaders and investor relations strategies. CEOs should carefully manage their emotional communication during earnings calls, as inconsistent or exaggerated excitement can decrease market confidence and increase risk perceptions. For investors, focusing on non-verbal cues during earnings calls can provide valuable insights into the true state of the firm beyond the financial report presented. Investors can use CEO excitement as an efficient tool for assessing the alignment between leadership's confidence and the company's actual performance and outlook.

Table 2.1 Summary Statistics

This table reports descriptive statistics for the main variables used in the panel analysis. The sample is a firm-quarter panel of S&P 500 firms with available earnings conference call audio recordings between 2019 and 2023.

Excitement is the average CEO vocal excitement score during the earnings call, measured by Layered Voice Analysis (LVA) on the Emotion Logic platform on a 0–30 scale. CAR(0,1), CAR(2,90), and CAR(2,180) are cumulative abnormal returns over the indicated event windows around the earnings call date. Return is the close-to-open intraday return on the day of the call. Implied Volatility 30/60/90/122 are firm-level option-implied volatilities at the 30-, 60-, 90-, and 122-day maturities, computed following Goyal and Saretto (2009) by averaging at-the-money call and put implied volatilities. Polarity is the normalized Loughran and McDonald (2011) textual sentiment score from the call transcript. UE is unexpected earnings. Firm- and CEO-level controls include firm size (log of total assets), momentum, market-to-book ratio, stock return volatility, firm age, CEO tenure (CEO year), CEO gender, and CEO minority status. All continuous variables are winsorized at the 1st and 99th percentiles.

|            | count | mean    | sd      | min      | p25      | p50     | p75     | max     |
|------------|-------|---------|---------|----------|----------|---------|---------|---------|
| IV30       | 3647  | 0.3093  | 0.1150  | 0.1273   | 0.2301   | 0.2846  | 0.3602  | 1.3172  |
| IV60       | 3647  | 0.3065  | 0.1103  | 0.1378   | 0.2303   | 0.2836  | 0.3553  | 1.1839  |
| IV90       | 3647  | 0.3113  | 0.1061  | 0.1390   | 0.2374   | 0.2895  | 0.3593  | 1.0440  |
| IV122      | 3647  | 0.3146  | 0.1036  | 0.1423   | 0.2428   | 0.2938  | 0.3627  | 0.9966  |
| CAR(0,1)   | 4048  | 0.0011  | 0.0584  | -0.3914  | -0.0307  | 0.0010  | 0.0344  | 0.3469  |
| CAR(2,90)  | 4048  | 0.0017  | 0.0410  | -0.2838  | -0.0184  | 0.0006  | 0.0203  | 0.3694  |
| CAR(2,180) | 3282  | 0.0168  | 0.2228  | -1.0299  | -0.1136  | 0.0147  | 0.1413  | 1.7545  |
| excitement | 4040  | 20.7981 | 3.4427  | 10.1360  | 18.3228  | 20.7872 | 23.2793 | 29.5934 |
| polarity   | 4266  | 0.1700  | 0.1912  | -0.5686  | 0.0490   | 0.1853  | 0.3033  | 0.7500  |
| Firm size  | 4244  | 10.1043 | 1.2491  | 6.6995   | 9.2313   | 10.0166 | 10.8583 | 14.4813 |
| Tobin's q  | 4244  | 2.6786  | 2.1525  | 0.6845   | 1.2851   | 1.8639  | 3.1312  | 14.9723 |
| roa        | 4244  | 0.0171  | 0.0207  | -0.1518  | 0.0057   | 0.0139  | 0.0266  | 0.1905  |
| Momentum   | 4036  | -6.1884 | 11.7397 | -46.3524 | -13.1184 | -5.8529 | 0.2552  | 44.0770 |
| volatility | 4036  | 0.0206  | 0.0100  | 0.0074   | 0.0141   | 0.0179  | 0.0239  | 0.0977  |
| Firm age   | 4258  | 39.7677 | 25.2588 | 0.0000   | 21.0000  | 33.0000 | 54.0000 | 99.0000 |
| gender     | 4090  | 0.0663  | 0.2488  | 0.0000   | 0.0000   | 0.0000  | 0.0000  | 1.0000  |
| minority   | 4090  | 0.8457  | 0.3613  | 0.0000   | 1.0000   | 1.0000  | 1.0000  | 1.0000  |
| CEO year   | 3858  | 7.0231  | 7.2571  | 0.0000   | 2.0000   | 5.0000  | 9.0000  | 55.0000 |

Table 2.2 Excitement and Cumulative Abnormal Return

This table reports panel regressions of cumulative abnormal returns on CEO vocal excitement and its interactions with firm performance aspiration gaps. The unit of observation is the firm-quarter. The dependent variable is CAR(0,1) in column (1), CAR(2,90) in column (2), and CAR(2,180) in column (3). Excitement is the average CEO vocal excitement score from LVA. Below\_Aspiration\_Gap and Above\_Aspiration\_Gap are censored variables capturing the magnitude of underperformance and overperformance, respectively, relative to the firm's prior-period performance, following Chrisman and Patel (2012). Below\_Aspiration\_Gap\_Industry and Above\_Aspiration\_Gap\_Industry analogously capture deviations from the four-digit SIC industry-quarter median performance. The interaction terms test whether the market reaction to CEO excitement is conditional on firm performance relative to historical and industry benchmarks. All regressions control for firm size, momentum, market-to-book, stock volatility, firm age, Polarity, UE, and CEO demographic characteristics, and include firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote statistical significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES                                | (1)<br>CAR(0,1)        | (2)<br>CAR(2,90)      | (3)<br>CAR(2,180)      |
|------------------------------------------|------------------------|-----------------------|------------------------|
| Excitement                               | 0.0011*<br>(0.0005)    | 0.0026<br>(0.0018)    | 0.0009<br>(0.0018)     |
| Below aspiration gap                     | 0.0306**<br>(0.0110)   | -0.0045<br>(0.0421)   | -0.0288<br>(0.0393)    |
| Above aspiration gap                     | 0.0060<br>(0.0239)     | -0.0632<br>(0.0902)   | -0.0763<br>(0.0907)    |
| Below aspiration gap industry            | 0.0768**<br>(0.0275)   | 0.3725***<br>(0.1056) | 0.4229***<br>(0.1005)  |
| Above aspiration gap industry            | -0.0026<br>(0.0051)    | 0.0049<br>(0.0196)    | -0.0305<br>(0.0202)    |
| Excitement*below aspiration gap          | -0.0018***<br>(0.0005) | 0.0009<br>(0.0020)    | 0.0002<br>(0.0019)     |
| Excitement*above aspiration gap          | -0.0006<br>(0.0012)    | -0.0051<br>(0.0044)   | 0.0030<br>(0.0044)     |
| Excitement*below aspiration gap industry | -0.0037**<br>(0.0013)  | -0.0156**<br>(0.0050) | -0.0173***<br>(0.0048) |
| Excitement*above aspiration gap industry | -0.0001<br>(0.0002)    | -0.0004<br>(0.0009)   | -0.0007<br>(0.0009)    |
| Firm size                                | -0.0148<br>(0.0076)    | -0.0066<br>(0.0297)   | -0.2241***<br>(0.0300) |
| Momentum                                 | 0.0000<br>(0.0001)     | 0.0001<br>(0.0004)    | -0.0005<br>(0.0004)    |
| Market-to-book                           | 0.0000<br>(0.0000)     | 0.0001<br>(0.0002)    | 0.0002<br>(0.0002)     |
| Volatility                               | 0.6120***<br>(0.1443)  | 2.8851***<br>(0.5469) | 4.1341***<br>(0.5215)  |
| Firm age                                 | 0.0068<br>(0.0212)     | -0.1015<br>(0.0835)   | -0.1484<br>(0.0942)    |
| Polarity                                 | 0.0366***<br>(0.0060)  | -0.0523*<br>(0.0230)  | -0.0109<br>(0.0231)    |
| CEO year                                 | 0.0022<br>(0.0021)     | -0.0094<br>(0.0081)   | -0.0131<br>(0.0086)    |
| CEO gender                               | -0.0041<br>(0.0102)    | -0.0111<br>(0.0393)   | -0.0423<br>(0.0399)    |
| CEO minority                             | -0.0007<br>(0.0081)    | -0.0113<br>(0.0323)   | 0.0039<br>(0.0355)     |
| Negative UE                              | -0.0092**<br>(0.0036)  | 0.0720***<br>(0.0133) | 0.0330*<br>(0.0131)    |

|                     |                    |                    |                       |
|---------------------|--------------------|--------------------|-----------------------|
| Constant            | 0.0902<br>(0.1086) | 0.3547<br>(0.4231) | 2.7458***<br>(0.4482) |
| R-squared           | 0.1257             | 0.1805             | 0.3320                |
| Year FE             | YES                | YES                | YES                   |
| Firm FE             | YES                | YES                | YES                   |
| Adj. R <sup>2</sup> | 0.00252            | 0.0588             | 0.218                 |

---

Table 2.3 Excitement and Intra-day Return

This table reports panel regressions examining the immediate market reaction to CEO vocal excitement. The unit of observation is the firm-quarter. The dependent variable is the close-to-open intraday return on the day of the earnings call. Earnings calls held outside trading hours are excluded so that the dependent variable cleanly captures within-session market response. Column (1) regresses intraday return on Excitement and the four aspiration gap variables. Column (2) adds  $\text{Excitement}^2$  to test for a nonlinear relationship consistent with the Yerkes-Dodson Law. Column (3) introduces interaction terms between Excitement and the four aspiration gap variables to test whether excitement's effect is conditional on firm performance. Column (4) combines the quadratic and interaction specifications. All regressions include firm and CEO controls and firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES                                | (1)<br>return_ec_adj | (2)<br>return_ec_adj | (3)<br>return_ec_adj   | (4)<br>return_ec_adj   |
|------------------------------------------|----------------------|----------------------|------------------------|------------------------|
| Excitement                               | 0.0016*<br>(0.0008)  | 0.0097<br>(0.0064)   | 0.0011<br>(0.0009)     | 0.0080<br>(0.0064)     |
| Excitement <sup>2</sup>                  |                      | -0.0002<br>(0.0002)  |                        | -0.0002<br>(0.0002)    |
| Below aspiration gap                     | 0.0107<br>(0.0070)   | 0.0110<br>(0.0070)   | 0.1227***<br>(0.0335)  | 0.1214***<br>(0.0335)  |
| Above aspiration gap                     | -0.0207*<br>(0.0102) | -0.0207*<br>(0.0102) | -0.0627<br>(0.0663)    | -0.0643<br>(0.0663)    |
| Below aspiration gap industry            | -0.0008<br>(0.0116)  | -0.0011<br>(0.0116)  | 0.0323<br>(0.0562)     | 0.0313<br>(0.0562)     |
| Above aspiration gap industry            | 0.0076<br>(0.0039)   | 0.0077*<br>(0.0039)  | -0.0185<br>(0.0121)    | -0.0181<br>(0.0121)    |
| Excitement*below aspiration gap          |                      |                      | -0.0049***<br>(0.0014) | -0.0048***<br>(0.0014) |
| Excitement*above aspiration gap          |                      |                      | 0.0022<br>(0.0031)     | 0.0023<br>(0.0031)     |
| Excitement*below aspiration gap industry |                      |                      | -0.0017<br>(0.0027)    | -0.0017<br>(0.0027)    |
| Excitement*above aspiration gap industry |                      |                      | 0.0013*<br>(0.0006)    | 0.0013*<br>(0.0006)    |
| CEO gender                               | -0.0169<br>(0.0207)  | -0.0167<br>(0.0207)  | -0.0174<br>(0.0207)    | -0.0173<br>(0.0207)    |
| CEO minority                             | 0.0077<br>(0.0166)   | 0.0068<br>(0.0166)   | 0.0099<br>(0.0166)     | 0.0092<br>(0.0166)     |
| CEO year                                 | 0.0012<br>(0.0042)   | 0.0013<br>(0.0042)   | 0.0006<br>(0.0042)     | 0.0007<br>(0.0042)     |
| Polarity                                 | 0.0199<br>(0.0119)   | 0.0199<br>(0.0119)   | 0.0209<br>(0.0119)     | 0.0209<br>(0.0119)     |
| Market-to-book                           | -0.0000<br>(0.0001)  | -0.0000<br>(0.0001)  | -0.0000<br>(0.0001)    | -0.0000<br>(0.0001)    |
| Firm size                                | 0.0392**<br>(0.0150) | 0.0391**<br>(0.0150) | 0.0416**<br>(0.0150)   | 0.0415**<br>(0.0150)   |

|                     |                     |                     |                     |                     |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| Firm age            | -0.0370<br>(0.0419) | -0.0359<br>(0.0419) | -0.0414<br>(0.0418) | -0.0404<br>(0.0418) |
| Negative UE         | 0.0010<br>(0.0074)  | 0.0014<br>(0.0074)  | 0.0008<br>(0.0074)  | 0.0011<br>(0.0074)  |
| Momentum            | -0.0001<br>(0.0002) | -0.0001<br>(0.0002) | -0.0001<br>(0.0002) | -0.0001<br>(0.0002) |
| Volatility          | 0.2490<br>(0.2834)  | 0.2636<br>(0.2836)  | 0.1794<br>(0.2830)  | 0.1926<br>(0.2832)  |
| Constant            | -0.3412<br>(0.2111) | -0.4252<br>(0.2213) | -0.3419<br>(0.2107) | -0.4126<br>(0.2208) |
| Observations        | 3,152               | 3,152               | 3,152               | 3,152               |
| Year FE             | YES                 | YES                 | YES                 | YES                 |
| Firm FE             | YES                 | YES                 | YES                 | YES                 |
| Adj. R <sup>2</sup> | 0.495               | 0.496               | 0.499               | 0.499               |

---

Table 2.4 Excitement and Implied Volatility

This table reports panel regressions of firm-level option-implied volatility on CEO vocal excitement, testing whether the market interprets CEO excitement as a signal of underlying firm risk. The unit of observation is the firm-quarter. The dependent variables are implied volatilities at the 30-, 60-, 90-, and 122-day maturities, reported in columns (1) through (4) respectively. Implied volatilities are constructed following Goyal and Saretto (2009) by averaging standardized at-the-money call and put implied volatilities at each maturity. The key independent variable is Excitement. All regressions control for the four aspiration gap variables, Polarity, UE, firm characteristics, and CEO demographics, and include firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES                     | (1)<br>Implied volatility 30 | (2)<br>Implied volatility 60 | (3)<br>Implied volatility 90 | (4)<br>Implied volatility 122 |
|-------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|
| Excitement                    | -0.0007<br>(0.0005)          | -0.0005<br>(0.0005)          | -0.0004<br>(0.0004)          | -0.0003<br>(0.0004)           |
| Below aspiration gap          | 0.0099**<br>(0.0036)         | 0.0102**<br>(0.0033)         | 0.0122***<br>(0.0030)        | 0.0116***<br>(0.0029)         |
| Above aspiration gap          | 0.0089<br>(0.0050)           | 0.0089<br>(0.0047)           | 0.0096*<br>(0.0043)          | 0.0095*<br>(0.0041)           |
| Below aspiration gap industry | 0.0142*<br>(0.0070)          | 0.0148*<br>(0.0064)          | 0.0151*<br>(0.0059)          | 0.0138*<br>(0.0057)           |
| Above aspiration gap industry | -0.0036<br>(0.0019)          | -0.0031<br>(0.0018)          | -0.0025<br>(0.0016)          | -0.0028<br>(0.0016)           |
| Negative UE                   | 0.0289***<br>(0.0046)        | 0.0274***<br>(0.0043)        | 0.0247***<br>(0.0039)        | 0.0242***<br>(0.0038)         |
| CEO gender                    | 0.0048<br>(0.0129)           | 0.0021<br>(0.0120)           | 0.0022<br>(0.0110)           | -0.0001<br>(0.0105)           |
| CEO minority                  | -0.0158<br>(0.0084)          | -0.0139<br>(0.0077)          | -0.0099<br>(0.0071)          | -0.0080<br>(0.0068)           |
| Polarity                      | -0.0571***<br>(0.0078)       | -0.0557***<br>(0.0072)       | -0.0552***<br>(0.0066)       | -0.0547***<br>(0.0063)        |
| Market-to-book                | -0.0000<br>(0.0001)          | 0.0000<br>(0.0001)           | 0.0000<br>(0.0001)           | 0.0000<br>(0.0000)            |
| Tangible                      | 0.1069<br>(0.0567)           | 0.0991<br>(0.0524)           | 0.0842<br>(0.0480)           | 0.0787<br>(0.0461)            |
| Firm size                     | 0.0131<br>(0.0094)           | 0.0166<br>(0.0086)           | 0.0187*<br>(0.0079)          | 0.0187*<br>(0.0076)           |
| Firm age                      | -0.0393<br>(0.0214)          | -0.0495*<br>(0.0198)         | -0.0303<br>(0.0181)          | -0.0267<br>(0.0174)           |
| Momentum                      | 0.0012***<br>(0.0001)        | 0.0011***<br>(0.0001)        | 0.0009***<br>(0.0001)        | 0.0008***<br>(0.0001)         |
| Constant                      | 0.3273**<br>(0.1174)         | 0.3216**<br>(0.1084)         | 0.2329*<br>(0.0994)          | 0.2225*<br>(0.0953)           |
| Observations                  | 3,254                        | 3,254                        | 3,254                        | 3,254                         |
| Year FE                       | YES                          | YES                          | YES                          | YES                           |

|                     |       |       |       |       |
|---------------------|-------|-------|-------|-------|
| Firm FE             | YES   | YES   | YES   | YES   |
| Adj. R <sup>2</sup> | 0.626 | 0.653 | 0.687 | 0.700 |

---

Table 2.5 Excitement and Cumulative Abnormal Return: Nonlinear

This table reports panel regressions testing for a nonlinear relationship between CEO vocal excitement and cumulative abnormal returns, motivated by the Yerkes-Dodson Law, which predicts that moderate arousal yields optimal performance while both under- and over-arousal are detrimental. The unit of observation is the firm-quarter. The dependent variable is CAR(0,1) in column (1), CAR(2,90) in column (2), and CAR(2,180) in column (3). The specification adds Excitement<sup>2</sup> to the baseline model of Table 2. A negative and significant coefficient on the squared term would indicate an inverted U-shaped relationship between vocal excitement and cumulative abnormal returns. All regressions include the full set of controls used in Table 2 and firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES                     | (1)<br>CAR(0,1)       | (2)<br>CAR(2,90)       | (3)<br>CAR(2,180)      |
|-------------------------------|-----------------------|------------------------|------------------------|
| Excitement                    | -0.0004<br>(0.0033)   | -0.0064<br>(0.0125)    | -0.0034<br>(0.0124)    |
| Excitement <sup>2</sup>       | 0.0000<br>(0.0001)    | 0.0002<br>(0.0003)     | 0.0001<br>(0.0003)     |
| Below aspiration gap          | -0.0061*<br>(0.0029)  | 0.0140<br>(0.0112)     | -0.0249*<br>(0.0107)   |
| Above aspiration gap          | -0.0054<br>(0.0042)   | -0.1671***<br>(0.0157) | -0.0152<br>(0.0157)    |
| Below aspiration gap industry | 0.0011<br>(0.0055)    | 0.0500*<br>(0.0210)    | 0.0648**<br>(0.0206)   |
| Above aspiration gap industry | -0.0043*<br>(0.0017)  | -0.0035<br>(0.0066)    | -0.0454***<br>(0.0069) |
| Firm size                     | -0.0142<br>(0.0076)   | -0.0074<br>(0.0297)    | -0.2239***<br>(0.0300) |
| Momentum                      | 0.0000<br>(0.0001)    | 0.0001<br>(0.0004)     | -0.0005<br>(0.0004)    |
| Market-to-book                | 0.0000<br>(0.0001)    | 0.0001<br>(0.0002)     | 0.0002<br>(0.0002)     |
| Volatility                    | 0.6094***<br>(0.1447) | 2.9077***<br>(0.5474)  | 4.1647***<br>(0.5224)  |
| Firm age                      | 0.0071<br>(0.0213)    | -0.1037<br>(0.0836)    | -0.1505<br>(0.0944)    |
| Polarity                      | 0.0374***<br>(0.0060) | -0.0517*<br>(0.0230)   | -0.0105<br>(0.0231)    |
| CEO year                      | 0.0022<br>(0.0021)    | -0.0093<br>(0.0081)    | -0.0129<br>(0.0086)    |
| CEO gender                    | -0.0041<br>(0.0102)   | -0.0082<br>(0.0393)    | -0.0411<br>(0.0399)    |
| CEO minority                  | -0.0015<br>(0.0081)   | -0.0125<br>(0.0323)    | 0.0032<br>(0.0356)     |
| Negative UE                   | -0.0093**<br>(0.0036) | 0.0722***<br>(0.0133)  | 0.0318*<br>(0.0131)    |
| Constant                      | 0.1065<br>(0.1136)    | 0.4857<br>(0.4413)     | 2.8150***<br>(0.4637)  |
| Observations                  | 3,686                 | 3,459                  | 2,969                  |
| Year FE                       | YES                   | YES                    | YES                    |
| Firm FE                       | YES                   | YES                    | YES                    |
| Adj. R <sup>2</sup>           | 0.00312               | 0.0562                 | 0.215                  |

Table 2.6 Excitement and Implied Volatility: Nonlinear

This table reports panel regressions testing for a nonlinear relationship between CEO vocal excitement and option-implied volatility, motivated by the Yerkes-Dodson Law and arousal reappraisal theory. Under the hypothesis that markets interpret moderate excitement as a credible signal of confidence while interpreting extreme excitement (either too low or too high) as evidence of either lack of confidence or concealment of risk, we expect a U-shaped relationship between excitement and implied volatility. The unit of observation is the firm-quarter. The dependent variables are 30-, 60-, 90-, and 122-day implied volatilities in columns (1) through (4) respectively. The specification adds Excitement<sup>2</sup> to the baseline model of Table 4. A positive and significant coefficient on the squared term would indicate the predicted U-shaped pattern. All regressions include the full set of controls and firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES                     | (1)<br>Implied volatility 30 | (2)<br>Implied volatility 60 | (3)<br>Implied volatility 90 | (4)<br>Implied volatility 122 |
|-------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|
| Excitement                    | -0.0065<br>(0.0043)          | -0.0083*<br>(0.0039)         | -0.0076*<br>(0.0036)         | -0.0072*<br>(0.0035)          |
| Excitement <sup>2</sup>       | 0.0001<br>(0.0001)           | 0.0002*<br>(0.0001)          | 0.0002*<br>(0.0001)          | 0.0002*<br>(0.0001)           |
| Below aspiration gap          | 0.0104**<br>(0.0036)         | 0.0106**<br>(0.0033)         | 0.0126***<br>(0.0030)        | 0.0120***<br>(0.0029)         |
| Above aspiration gap          | 0.0087<br>(0.0050)           | 0.0087<br>(0.0046)           | 0.0094*<br>(0.0042)          | 0.0092*<br>(0.0041)           |
| Below aspiration gap industry | 0.0132<br>(0.0069)           | 0.0139*<br>(0.0064)          | 0.0141*<br>(0.0059)          | 0.0128*<br>(0.0056)           |
| Above aspiration gap industry | 0.0139**<br>(0.0036)         | 0.0139***<br>(0.0033)        | 0.0143***<br>(0.0030)        | 0.0139***<br>(0.0029)         |
| Negative UE                   | 0.0284***<br>(0.0046)        | 0.0268***<br>(0.0043)        | 0.0241***<br>(0.0039)        | 0.0237***<br>(0.0037)         |
| CEO gender                    | 0.0054<br>(0.0129)           | 0.0027<br>(0.0119)           | 0.0028<br>(0.0109)           | 0.0005<br>(0.0104)            |
| CEO minority                  | -0.0162<br>(0.0083)          | -0.0141<br>(0.0077)          | -0.0102<br>(0.0070)          | -0.0083<br>(0.0068)           |
| Polarity                      | -0.0544***<br>(0.0078)       | -0.0529***<br>(0.0072)       | -0.0525***<br>(0.0066)       | -0.0520***<br>(0.0063)        |
| Market-to-book                | 0.0000<br>(0.0001)           | 0.0000<br>(0.0001)           | 0.0000<br>(0.0001)           | 0.0000<br>(0.0000)            |
| Tobin's q                     | -0.0210***<br>(0.0036)       | -0.0204***<br>(0.0033)       | -0.0202***<br>(0.0031)       | -0.0201***<br>(0.0029)        |
| Tangible                      | 0.0875<br>(0.0565)           | 0.0799<br>(0.0521)           | 0.0653<br>(0.0477)           | 0.0599<br>(0.0457)            |
| Firm size                     | 0.0029<br>(0.0095)           | 0.0067<br>(0.0087)           | 0.0089<br>(0.0080)           | 0.0090<br>(0.0077)            |
| Firm age                      | -0.0406                      | -0.0510**                    | -0.0318                      | -0.0281                       |

|                     |           |           |           |           |
|---------------------|-----------|-----------|-----------|-----------|
|                     | (0.0213)  | (0.0196)  | (0.0180)  | (0.0172)  |
| Momentum            | 0.0013*** | 0.0012*** | 0.0010*** | 0.0009*** |
|                     | (0.0001)  | (0.0001)  | (0.0001)  | (0.0001)  |
| Constant            | 0.5215*** | 0.5332*** | 0.4318*** | 0.4132*** |
|                     | (0.1301)  | (0.1201)  | (0.1100)  | (0.1054)  |
| Observations        | 3,279     | 3,279     | 3,279     | 3,279     |
| Year FE             | YES       | YES       | YES       | YES       |
| Firm FE             | YES       | YES       | YES       | YES       |
| Adj. R <sup>2</sup> | 0.63      | 0.64      | 0.69      | 0.70      |

---

Table 2.7 Inauthentic Excitement and Implied Volatility

This table reports two-stage panel estimates of the effect of inauthentic CEO excitement on firm-level implied volatility. The unit of observation is the firm-quarter. In the first stage (column 1), the actual Excitement score is regressed on financial performance variables and CEO demographic characteristics to obtain the level of vocal excitement predicted by observable firm and CEO characteristics, following Sutrisno and Karmudiandri (2020). The first-stage residual is then adjusted for industry-quarter norms by subtracting the four-digit SIC industry-quarter median residual. Inauthentic\_Excitement is an indicator equal to one if the industry-adjusted residual is positive (indicating CEO excitement above what firm performance and industry norms would predict), and zero otherwise. In the second stage (columns 2 through 5), implied volatility at the 30-, 60-, 90-, and 122-day maturities is regressed on Inauthentic\_Excitement together with the full set of firm and CEO controls. All second-stage regressions include firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. A positive coefficient on Inauthentic\_Excitement indicates that the market perceives inauthentically excited CEOs as managing firms with higher latent risk. \*, \*\*, and \*\*\* denote significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES                        | 1 <sup>st</sup> -Stage<br>excitement | 2 <sup>nd</sup> -Stage<br>implied<br>volatility 30 | 2 <sup>nd</sup> -Stage<br>implied<br>volatility 60 | 2 <sup>nd</sup> -Stage<br>implied<br>volatility 90 | 2 <sup>nd</sup> -Stage<br>implied volatility<br>122 |
|----------------------------------|--------------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|-----------------------------------------------------|
| Over-excitement                  |                                      | 0.00983*<br>(0.00399)                              | 0.00928*<br>(0.00367)                              | 0.00852*<br>(0.00335)                              | 0.00866**<br>(0.00321)                              |
| Polarity                         |                                      | -0.155**<br>(0.0110)                               | -0.152**<br>(0.0101)                               | -0.148**<br>(0.00925)                              | -0.145**<br>(0.00884)                               |
| Market-to-book                   |                                      | -3.87e-05                                          | -2.25e-05                                          | 7.90e-06                                           | 8.49e-06                                            |
| Below aspiration gap             | -0.155<br>(0.137)                    | 0.0114**<br>(0.00373)                              | 0.0114**<br>(0.00343)                              | 0.0132**<br>(0.00313)                              | 0.0125**<br>(0.00300)                               |
| Above aspiration gap             | 0.245<br>(0.193)                     | 0.0117*<br>(0.00530)                               | 0.0115*<br>(0.00487)                               | 0.0120**<br>(0.00445)                              | 0.0117**<br>(0.00426)                               |
| Below aspiration gap<br>industry | 0.289<br>(0.262)                     | 0.0139<br>(0.00748)                                | 0.0150*<br>(0.00687)                               | 0.0148*<br>(0.00628)                               | 0.0136*<br>(0.00601)                                |
| Above aspiration gap<br>industry | 0.00242<br>(0.138)                   | 0.0126**<br>(0.00380)                              | 0.0124**<br>(0.00349)                              | 0.0126**<br>(0.00319)                              | 0.0123**<br>(0.00305)                               |
| UE                               | 0.255<br>(0.164)                     | -0.0107**<br>(0.00321)                             | -0.00966**<br>(0.00295)                            | -0.00780**<br>(0.00269)                            | -0.00757**<br>(0.00258)                             |
| CEO gender                       | 2.164**<br>(0.551)                   | -0.00208<br>(0.0133)                               | -0.00376<br>(0.0122)                               | -0.000770<br>(0.0112)                              | -0.000978<br>(0.0107)                               |
| CEO minority                     | -1.144**<br>(0.387)                  | -0.0176*<br>(0.00893)                              | -0.0154<br>(0.00821)                               | -0.0112<br>(0.00750)                               | -0.00908<br>(0.00718)                               |
| Tobin's q                        | -0.0677<br>(0.136)                   | -0.0183**<br>(0.00389)                             | -0.0175**<br>(0.00357)                             | -0.0174**<br>(0.00327)                             | -0.0172**<br>(0.00312)                              |
| Firm size                        | 0.200<br>(0.374)                     | -0.00777<br>(0.00972)                              | -0.00210<br>(0.00893)                              | 0.00105<br>(0.00816)                               | 0.00225<br>(0.00781)                                |
| Firm age                         | -0.185**<br>(0.0473)                 | -0.0369<br>(0.0219)                                | -0.0486*<br>(0.0201)                               | -0.0303<br>(0.0184)                                | -0.0274<br>(0.0176)                                 |
| Momentum                         | 0.255<br>(0.164)                     | 0.00133**<br>(0.000131)                            | 0.00124**<br>(0.000120)                            | 0.00101**<br>(0.000110)                            | 0.000878**<br>(0.000105)                            |
| Constant                         | 25.73**<br>(3.688)                   | 0.556**<br>(0.124)                                 | 0.535**<br>(0.114)                                 | 0.436**<br>(0.104)                                 | 0.412**<br>(0.0994)                                 |
| Observations                     | 3,277                                | 3,221                                              | 3,221                                              | 3,221                                              | 3,221                                               |
| Year FE                          | YES                                  | YES                                                | YES                                                | YES                                                | YES                                                 |

|                     |      |      |      |      |      |
|---------------------|------|------|------|------|------|
| Firm FE             | YES  | YES  | YES  | YES  | YES  |
| Adj. R <sup>2</sup> | 0.42 | 0.63 | 0.66 | 0.69 | 0.70 |

---

Table 2.8 Excitement and Intraday Return: Robustness Check

This table reports a robustness panel regression for Table 3 in which the prior-period and industry-relative aspiration gaps are replaced with a year-over-year performance gap, computed as the difference between the firm's current-quarter performance and its performance in the same fiscal quarter of the previous year. This specification removes potential seasonality effects and reflects the common managerial practice of year-over-year benchmarking. The unit of observation is the firm-quarter. The dependent variable is the close-to-open intraday return on the day of the earnings call. Column (1) reports the baseline specification with Excitement and the YoY\_Performance\_Gap. Column (2) adds Excitement<sup>2</sup>. Column (3) adds the interaction between Excitement and YoY\_Performance\_Gap. Column (4) combines the quadratic and interaction specifications. Firm and CEO controls and firm and year fixed effects are included throughout. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES                  | (1)<br>Return          | (2)<br>Return          | (3)<br>Return          | (4)<br>Return          |
|----------------------------|------------------------|------------------------|------------------------|------------------------|
| Excitement                 | 0.0016*<br>(0.0008)    | 0.0086<br>(0.0064)     | 0.0017*<br>(0.0008)    | 0.0088<br>(0.0064)     |
| Excitement <sup>2</sup>    |                        | -0.0002<br>(0.0002)    |                        | -0.0002<br>(0.0002)    |
| Excitement*performance gap |                        |                        | 0.0024***<br>(0.0007)  | 0.0024***<br>(0.0007)  |
| Performance gap            | -0.0141***<br>(0.0029) | -0.0141***<br>(0.0029) | -0.0648***<br>(0.0152) | -0.0649***<br>(0.0152) |
| CEO gender                 | -0.0128<br>(0.0207)    | -0.0126<br>(0.0207)    | -0.0104<br>(0.0207)    | -0.0101<br>(0.0207)    |
| CEO minority               | 0.0083<br>(0.0166)     | 0.0075<br>(0.0166)     | 0.0101<br>(0.0166)     | 0.0093<br>(0.0166)     |
| CEO year                   | 0.0006<br>(0.0042)     | 0.0007<br>(0.0042)     | 0.0008<br>(0.0042)     | 0.0009<br>(0.0042)     |
| Polarity                   | 0.0200<br>(0.0119)     | 0.0199<br>(0.0119)     | 0.0209<br>(0.0118)     | 0.0208<br>(0.0118)     |
| Market-to-book             | -0.0001<br>(0.0001)    | -0.0001<br>(0.0001)    | -0.0001<br>(0.0001)    | -0.0001<br>(0.0001)    |
| Firm size                  | 0.0284<br>(0.0151)     | 0.0282<br>(0.0151)     | 0.0294<br>(0.0151)     | 0.0292<br>(0.0151)     |
| Firm age                   | -0.0432<br>(0.0426)    | -0.0418<br>(0.0426)    | -0.0420<br>(0.0425)    | -0.0406<br>(0.0425)    |
| Negative UE                | 0.0008<br>(0.0074)     | 0.0011<br>(0.0074)     | 0.0010<br>(0.0074)     | 0.0013<br>(0.0074)     |
| Tobin's q                  | 0.0070<br>(0.0041)     | 0.0070<br>(0.0041)     | 0.0085*<br>(0.0042)    | 0.0084*<br>(0.0042)    |
| Momentum                   | 0.0000<br>(0.0002)     | 0.0000<br>(0.0002)     | 0.0000<br>(0.0002)     | 0.0000<br>(0.0002)     |
| Volatility                 | 0.1060<br>(0.2828)     | 0.1197<br>(0.2830)     | 0.0840<br>(0.2823)     | 0.0978<br>(0.2826)     |
| Constant                   | -0.2278<br>(0.2227)    | -0.3019<br>(0.2328)    | -0.2450<br>(0.2223)    | -0.3201<br>(0.2324)    |

|                     |       |       |       |       |
|---------------------|-------|-------|-------|-------|
| Observations        | 3,170 | 3,170 | 3,170 | 3,170 |
| Year FE             | YES   | YES   | YES   | YES   |
| Firm FE             | YES   | YES   | YES   | YES   |
| Adj. R <sup>2</sup> | 0.49  | 0.49  | 0.50  | 0.50  |

---

Table 2.9 Excitement and Implied Volatility: Robustness Check

This table reports a robustness panel regression for Table 3 in which the prior-period and industry-relative aspiration gaps are replaced with a year-over-year performance gap, computed as the difference between the firm's current-quarter performance and its performance in the same fiscal quarter of the previous year. This specification removes potential seasonality effects and reflects the common managerial practice of year-over-year benchmarking. The unit of observation is the firm-quarter. The dependent variable is the close-to-open intraday return on the day of the earnings call. Column (1) reports the baseline specification with Excitement and the YoY\_Performance\_Gap. Column (2) adds Excitement<sup>2</sup>. Column (3) adds the interaction between Excitement and YoY\_Performance\_Gap. Column (4) combines the quadratic and interaction specifications. Firm and CEO controls and firm and year fixed effects are included throughout. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES               | (1)<br>Implied volatility 30 | (2)<br>Implied volatility 60 | (3)<br>Implied volatility 90 | (4)<br>Implied volatility 122 |
|-------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|
| Excitement              | -0.0070<br>(0.0043)          | -0.0089*<br>(0.0039)         | -0.0082*<br>(0.0036)         | -0.0078*<br>(0.0035)          |
| Excitement <sup>2</sup> | 0.0002<br>(0.0001)           | 0.0002*<br>(0.0001)          | 0.0002*<br>(0.0001)          | 0.0002*<br>(0.0001)           |
| Performance gap         | -0.0062***<br>(0.0016)       | -0.0061***<br>(0.0015)       | -0.0057***<br>(0.0014)       | -0.0054***<br>(0.0013)        |
| Negative UE             | 0.0286***<br>(0.0046)        | 0.0271***<br>(0.0043)        | 0.0244***<br>(0.0039)        | 0.0240***<br>(0.0038)         |
| CEO gender              | 0.0051<br>(0.0131)           | 0.0022<br>(0.0121)           | 0.0041<br>(0.0111)           | 0.0019<br>(0.0106)            |
| CEO minority            | -0.0163<br>(0.0084)          | -0.0145<br>(0.0078)          | -0.0099<br>(0.0071)          | -0.0075<br>(0.0068)           |
| Polarity                | -0.0548***<br>(0.0078)       | -0.0534***<br>(0.0072)       | -0.0533***<br>(0.0066)       | -0.0528***<br>(0.0063)        |
| Market-to-book          | 0.0000<br>(0.0001)           | 0.0000<br>(0.0001)           | 0.0000<br>(0.0001)           | 0.0000<br>(0.0000)            |
| Tobin's q               | -0.0036<br>(0.0022)          | -0.0032<br>(0.0020)          | -0.0031<br>(0.0019)          | -0.0034<br>(0.0018)           |
| Tangible                | 0.0966<br>(0.0565)           | 0.0885<br>(0.0521)           | 0.0742<br>(0.0478)           | 0.0693<br>(0.0459)            |
| Firm size               | 0.0069<br>(0.0095)           | 0.0106<br>(0.0087)           | 0.0131<br>(0.0080)           | 0.0130<br>(0.0077)            |
| Firm age                | -0.0479*<br>(0.0241)         | -0.0532*<br>(0.0223)         | -0.0258<br>(0.0204)          | -0.0250<br>(0.0196)           |
| Momentum                | 0.0012***<br>(0.0001)        | 0.0012***<br>(0.0001)        | 0.0010***<br>(0.0001)        | 0.0008***<br>(0.0001)         |
| Constant                | 0.4912***<br>(0.1335)        | 0.4871***<br>(0.1230)        | 0.3575**<br>(0.1129)         | 0.3491**<br>(0.1084)          |
| Observations            | 3,269                        | 3,269                        | 3,269                        | 3,269                         |
| Year FE                 | YES                          | YES                          | YES                          | YES                           |
| Firm FE                 | YES                          | YES                          | YES                          | YES                           |
| Adj. R <sup>2</sup>     | 0.62                         | 0.66                         | 0.69                         | 0.70                          |

Table 2.10 PSM: Excitement and Cumulative Abnormal Return

This table reports propensity-score-matched panel estimates of the relationship between CEO vocal excitement and cumulative abnormal returns. The unit of observation is the firm-quarter. The treatment indicator equals one if a firm-quarter falls in the top tercile of the Excitement distribution, and zero if it falls in the bottom tercile; middle-tercile observations are excluded. The propensity score is estimated from a logit regression of the high-excitement indicator on firm size, momentum, market-to-book, stock volatility, firm age, Polarity, UE, and CEO demographic characteristics. We use one-to-one nearest-neighbor matching without replacement with a 0.05 caliper. The dependent variable is CAR(0,1) in column (1), CAR(2,90) in column (2), and CAR(2,180) in column (3). Each column reports a panel regression on the matched sample with the full set of controls and firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES                                | (1)<br>CAR(0,1)        | (2)<br>CAR(2,90)      | (3)<br>CAR(2,180)      |
|------------------------------------------|------------------------|-----------------------|------------------------|
| Excitement                               | 0.0011<br>(0.0005)     | 0.0021<br>(0.0021)    | 0.0009<br>(0.0021)     |
| Below aspiration gap                     | 0.0626***<br>(0.0156)  | 0.0219<br>(0.0587)    | -0.0105<br>(0.0567)    |
| Above aspiration gap                     | 0.0325<br>(0.0303)     | -0.0437<br>(0.1133)   | -0.0432<br>(0.1207)    |
| Below aspiration gap industry            | 0.0432<br>(0.0331)     | 0.3654**<br>(0.1230)  | 0.4561***<br>(0.1194)  |
| Above aspiration gap industry            | -0.0087<br>(0.0069)    | 0.0014<br>(0.0260)    | 0.0005<br>(0.0282)     |
| Excitement*below aspiration gap          | -0.0030***<br>(0.0007) | -0.0001<br>(0.0025)   | -0.0005<br>(0.0024)    |
| Excitement*above aspiration gap          | -0.0016<br>(0.0014)    | -0.0058<br>(0.0052)   | 0.0019<br>(0.0056)     |
| Excitement*below aspiration gap industry | -0.0025<br>(0.0015)    | -0.0157**<br>(0.0056) | -0.0186***<br>(0.0054) |
| Excitement*above aspiration gap industry | 0.0001<br>(0.0003)     | 0.0002<br>(0.0011)    | -0.0007<br>(0.0011)    |
| Firm size                                | -0.0055<br>(0.0089)    | -0.0033<br>(0.0340)   | -0.2388***<br>(0.0348) |
| Momentum                                 | -0.0000<br>(0.0001)    | 0.0003<br>(0.0004)    | -0.0000<br>(0.0004)    |
| Market-to-book                           | 0.0001<br>(0.0001)     | 0.0001<br>(0.0002)    | 0.0002<br>(0.0003)     |
| Volatility                               | 0.7412***<br>(0.1687)  | 2.8549***<br>(0.6255) | 3.4218***<br>(0.6080)  |
| Firm age                                 | 0.0035<br>(0.0226)     | -0.0742<br>(0.0869)   | -0.1009<br>(0.1009)    |
| Polarity                                 | 0.0365***<br>(0.0069)  | -0.0328<br>(0.0260)   | 0.0052<br>(0.0263)     |
| CEO year                                 | 0.0022<br>(0.0024)     | -0.0122<br>(0.0091)   | -0.0126<br>(0.0096)    |
| CEO gender                               | -0.0118<br>(0.0118)    | -0.0515<br>(0.0444)   | -0.0802<br>(0.0445)    |
| CEO minority                             | 0.0043<br>(0.0092)     | -0.0001<br>(0.0353)   | -0.0053<br>(0.0395)    |
| Tobin's Q                                | 0.0026<br>(0.0034)     | -0.0132<br>(0.0128)   | -0.0407**<br>(0.0131)  |
| Negative UE                              | -0.0172***<br>(0.0044) | 0.0668***<br>(0.0160) | 0.0415*<br>(0.0175)    |

|                     |                     |                    |                       |
|---------------------|---------------------|--------------------|-----------------------|
| Constant            | -0.0027<br>(0.1240) | 0.2596<br>(0.4717) | 2.8318***<br>(0.5066) |
| Observations        | 2,840               | 2,658              | 2,280                 |
| Year FE             | YES                 | YES                | YES                   |
| Firm FE             | YES                 | YES                | YES                   |
| Adj. R <sup>2</sup> | 0.0150              | 0.0733             | 0.219                 |

---

Table 2.11 PSM: Excitement and Intra-day Return

This table reports propensity-score-matched panel estimates of the relationship between CEO vocal excitement and intraday close-to-open returns. The unit of observation is the firm-quarter, and the matching procedure follows that described in Table 10. The dependent variable is the intraday close-to-open return on the day of the earnings call. Column (1) reports the baseline specification with Excitement and aspiration gap variables. Column (2) adds Excitement<sup>2</sup>. Column (3) adds interactions between Excitement and the four aspiration gap variables. Column (4) combines the quadratic and interaction specifications. All columns include the full set of firm and CEO controls and firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES                                | (1)<br>Return         | (2)<br>Return         | (3)<br>Return          | (4)<br>Return          |
|------------------------------------------|-----------------------|-----------------------|------------------------|------------------------|
| Excitement                               | 0.0015<br>(0.0009)    | 0.0150*<br>(0.0075)   | 0.0009<br>(0.0011)     | 0.0121<br>(0.0075)     |
| Excitement <sup>2</sup>                  |                       | -0.0003<br>(0.0002)   |                        | -0.0003<br>(0.0002)    |
| Below aspiration gap                     | 0.0061<br>(0.0079)    | 0.0068<br>(0.0079)    | 0.1572***<br>(0.0436)  | 0.1526***<br>(0.0436)  |
| Above aspiration gap                     | -0.0144<br>(0.0114)   | -0.0143<br>(0.0114)   | -0.0247<br>(0.0758)    | -0.0263<br>(0.0758)    |
| Below aspiration gap industry            | -0.0059<br>(0.0138)   | -0.0059<br>(0.0138)   | 0.0091<br>(0.0684)     | 0.0063<br>(0.0684)     |
| Above aspiration gap industry            | 0.0260***<br>(0.0075) | 0.0261***<br>(0.0075) | -0.0125<br>(0.0171)    | -0.0119<br>(0.0171)    |
| Excitement*below aspiration gap          |                       |                       | -0.0062***<br>(0.0018) | -0.0060***<br>(0.0018) |
| Excitement*above aspiration gap          |                       |                       | 0.0008<br>(0.0035)     | 0.0009<br>(0.0035)     |
| Excitement*below aspiration gap industry |                       |                       | -0.0009<br>(0.0031)    | -0.0007<br>(0.0031)    |
| Excitement*above aspiration gap industry |                       |                       | 0.0017*<br>(0.0007)    | 0.0017*<br>(0.0007)    |
| Firm size                                | 0.0299<br>(0.0177)    | 0.0289<br>(0.0177)    | 0.0331<br>(0.0177)     | 0.0323<br>(0.0177)     |
| Momentum                                 | 0.0000<br>(0.0002)    | 0.0000<br>(0.0002)    | -0.0000<br>(0.0002)    | -0.0000<br>(0.0002)    |
| Market-to-book                           | -0.0002<br>(0.0001)   | -0.0002*<br>(0.0001)  | -0.0002<br>(0.0001)    | -0.0002<br>(0.0001)    |
| Volatility                               | 0.3547<br>(0.3251)    | 0.3776<br>(0.3251)    | 0.2708<br>(0.3245)     | 0.2920<br>(0.3247)     |
| Firm age                                 | -0.0305<br>(0.0440)   | -0.0294<br>(0.0440)   | -0.0341<br>(0.0439)    | -0.0332<br>(0.0439)    |
| Polarity                                 | 0.0236<br>(0.0137)    | 0.0234<br>(0.0137)    | 0.0241<br>(0.0137)     | 0.0240<br>(0.0136)     |

|                     |                       |                       |                       |                       |
|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| CEO year            | 0.0033<br>(0.0049)    | 0.0035<br>(0.0049)    | 0.0027<br>(0.0049)    | 0.0029<br>(0.0049)    |
| CEO gender          | -0.0157<br>(0.0244)   | -0.0155<br>(0.0244)   | -0.0156<br>(0.0244)   | -0.0153<br>(0.0244)   |
| CEO minority        | 0.0046<br>(0.0179)    | 0.0037<br>(0.0179)    | 0.0073<br>(0.0179)    | 0.0066<br>(0.0179)    |
| Tobin's Q           | -0.0257**<br>(0.0079) | -0.0257**<br>(0.0079) | -0.0245**<br>(0.0079) | -0.0245**<br>(0.0079) |
| Negative UE         | 0.0006<br>(0.0083)    | 0.0012<br>(0.0083)    | 0.0004<br>(0.0082)    | 0.0009<br>(0.0082)    |
| Constant            | -0.2238<br>(0.2436)   | -0.3568<br>(0.2542)   | -0.2357<br>(0.2429)   | -0.3451<br>(0.2534)   |
| Observations        | 2,422                 | 2,422                 | 2,422                 | 2,422                 |
| Year FE             | YES                   | YES                   | YES                   | YES                   |
| Firm FE             | YES                   | YES                   | YES                   | YES                   |
| Adj. R <sup>2</sup> | 0.534                 | 0.535                 | 0.538                 | 0.538                 |

---

Table 2.12 PSM: Excitement and Implied Volatility

This table reports propensity-score-matched panel estimates of the relationship between CEO vocal excitement and option-implied volatility. The unit of observation is the firm-quarter, and the matching procedure follows that described in Table 10. The dependent variables are implied volatilities at the 30-, 60-, 90-, and 122-day maturities in columns (1) through (4) respectively. Each column reports a panel regression on the matched sample with the full set of firm and CEO controls and firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 5%, 1%, and 0.1% levels, respectively.

| VARIABLES                     | (1)<br>Implied volatility 30 | (2)<br>Implied volatility 60 | (3)<br>Implied volatility 90 | (4)<br>Implied volatility 122 |
|-------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|
| Excitement                    | -0.0100<br>(0.0054)          | -0.0114*<br>(0.0049)         | -0.0110*<br>(0.0045)         | -0.0111**<br>(0.0043)         |
| Excitement <sup>2</sup>       | 0.0002<br>(0.0001)           | 0.0003*<br>(0.0001)          | 0.0002*<br>(0.0001)          | 0.0002*<br>(0.0001)           |
| Below aspiration gap          | 0.0059<br>(0.0040)           | 0.0065<br>(0.0036)           | 0.0081*<br>(0.0033)          | 0.0077*<br>(0.0032)           |
| Above aspiration gap          | 0.0158*<br>(0.0065)          | 0.0157**<br>(0.0060)         | 0.0163**<br>(0.0054)         | 0.0160**<br>(0.0052)          |
| Below aspiration gap industry | 0.0090<br>(0.0078)           | 0.0097<br>(0.0072)           | 0.0108<br>(0.0066)           | 0.0098<br>(0.0063)            |
| Above aspiration gap industry | 0.0098*<br>(0.0045)          | 0.0106*<br>(0.0042)          | 0.0111**<br>(0.0038)         | 0.0110**<br>(0.0036)          |
| Negative UE                   | 0.0259***<br>(0.0064)        | 0.0225***<br>(0.0059)        | 0.0199***<br>(0.0054)        | 0.0187***<br>(0.0051)         |
| CEO gender                    | 0.0216<br>(0.0158)           | 0.0210<br>(0.0146)           | 0.0149<br>(0.0133)           | 0.0126<br>(0.0127)            |
| CEO minority                  | -0.0034<br>(0.0115)          | -0.0030<br>(0.0106)          | 0.0010<br>(0.0097)           | 0.0044<br>(0.0092)            |
| Polarity                      | -0.0568***<br>(0.0091)       | -0.0553***<br>(0.0084)       | -0.0554***<br>(0.0077)       | -0.0551***<br>(0.0073)        |
| Market-to-book                | -0.0000<br>(0.0001)          | -0.0000<br>(0.0001)          | 0.0000<br>(0.0001)           | 0.0000<br>(0.0001)            |
| Tobin's q                     | -0.0203***<br>(0.0047)       | -0.0211***<br>(0.0043)       | -0.0208***<br>(0.0039)       | -0.0207***<br>(0.0038)        |
| Tangible                      | 0.0564<br>(0.0685)           | 0.0482<br>(0.0632)           | 0.0255<br>(0.0578)           | 0.0200<br>(0.0550)            |
| Firm size                     | 0.0101<br>(0.0122)           | 0.0096<br>(0.0112)           | 0.0088<br>(0.0103)           | 0.0086<br>(0.0098)            |
| Firm age                      | -0.0398<br>(0.0328)          | -0.0402<br>(0.0302)          | -0.0290<br>(0.0276)          | -0.0312<br>(0.0263)           |
| Momentum                      | 0.0016***<br>(0.0002)        | 0.0014***<br>(0.0001)        | 0.0012***<br>(0.0001)        | 0.0011***<br>(0.0001)         |
| Constant                      | 0.5033**<br>(0.1807)         | 0.5193**<br>(0.1668)         | 0.4878**<br>(0.1524)         | 0.5000***<br>(0.1452)         |
| Observations                  | 2,420                        | 2,420                        | 2,420                        | 2,420                         |

|                     |       |       |       |       |
|---------------------|-------|-------|-------|-------|
| Year FE             | YES   | YES   | YES   | YES   |
| Firm FE             | YES   | YES   | YES   | YES   |
| Adj. R <sup>2</sup> | 0.634 | 0.658 | 0.692 | 0.707 |

---

Table 2.13 Heckman Two-Stage Model

This table reports Heckman (1979) two-stage panel estimates that correct for potential self-selection in CEO emotional expression. The unit of observation is the firm-quarter. In the first stage (column 1), a probit regression models the probability that *Excite\_Dummy* equals one, where *Excite\_Dummy* equals one if a CEO's vocal excitement exceeds the sample mean and zero otherwise. *CEO\_Age* serves as the exclusion restriction, on the assumption that age affects the propensity to display vocal excitement during earnings calls but is plausibly exogenous to the second-stage outcomes. The Inverse Mills Ratio (IMR) computed from the first stage is then included in the second-stage panel regressions. Columns (2) through (4) report second-stage estimates with *CAR(0,1)*, intraday return, and 60-day implied volatility as dependent variables, respectively. The second-stage specification for implied volatility additionally includes *Excitement*<sup>2</sup> to allow for the nonlinear effect documented earlier. All second-stage regressions include the full set of firm and CEO controls and firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. A significant coefficient on IMR would indicate that selection bias is non-trivial and that the Heckman correction is warranted. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

| VARIABLES                                   | First-stage<br>excite<br>dummy | CAR(0,1)                  | Second-stage<br>return   | Implied volatility 60    |
|---------------------------------------------|--------------------------------|---------------------------|--------------------------|--------------------------|
| CEO age                                     | -0.532***<br>(0.195)           |                           |                          |                          |
| IMR                                         |                                | 0.0890<br>(0.0670)        | 0.0285<br>(0.138)        | 0.237***<br>(0.0859)     |
| Excitement                                  |                                | 0.00111**                 | 0.00110<br>(0.000925)    | -0.00830**<br>(0.00399)  |
| Excitement <sup>2</sup>                     |                                |                           |                          | 0.000208**<br>(9.59e-05) |
| Excitement*below<br>aspiration gap          |                                | -0.00184***<br>(0.000534) | -0.00473***<br>(0.00143) |                          |
| Excitement*above<br>aspiration gap          |                                | -0.000719<br>(0.00118)    | 0.00251<br>(0.00311)     |                          |
| Excitement*below<br>aspiration gap industry |                                | -0.00369***<br>(0.00131)  | -0.00161<br>(0.00270)    |                          |
| Excitement*above<br>aspiration gap industry |                                | -7.31e-05<br>(0.000236)   | 0.00132**<br>(0.000552)  |                          |
| Constant                                    | 1.852**<br>(0.810)             | 0.0139<br>(0.126)         | -0.263<br>(0.253)        | -0.0710***<br>(0.00709)  |
| Controls                                    | YES                            | YES                       | YES                      | YES                      |
| Year FE                                     | YES                            | YES                       | YES                      | YES                      |
| Firm FE                                     | YES                            | YES                       | YES                      | YES                      |
| Observations                                | 3,556                          | 3,704                     | 3,174                    | 2,761                    |
| Adj. R <sup>2</sup>                         | 0.00607                        | 0.0305                    | 0.0317                   | 0.468                    |

## **Chapter 3: The Sound of Risk: CEO Vocal Stress, Analyst Underreaction, and Post-Earnings Announcement Drift**

### **3.1 Introduction**

CEOs possess the most comprehensive view of their firms' operational status, risk exposure, and future prospects (Hambrick and Mason, 1984). During quarterly earnings conference calls, they communicate this knowledge to analysts and investors through both explicit verbal content and involuntary non-verbal cues. While an extensive literature examines the textual content and vocal tone of earnings calls (Li, 2010; Mayew and Venkatachalam, 2012; Davis et al., 2015), whether specific complex emotions, particularly stress, serve as channels through which private information leaks to the market is underexplored. This paper investigates whether CEO vocal stress during earnings calls contains predictive information about future firm performance, how financial analysts process this signal, and whether the broader market efficiently incorporates it into stock prices.

Our focus on vocal stress is motivated by both theory and institutional context. In contrast to broad positive or negative vocal affect, stress reflects a more complex emotional state associated with strain, pressure, uncertainty, and concern about adverse outcomes. In the setting of an earnings conference call, vocal stress may arise when CEOs discuss weak performance, confront difficult analyst questions, or attempt to maintain a confident public narrative while privately recognizing elevated downside risk. Because such cues are less likely to be fully scripted or strategically controlled than the verbal content of the call, they may provide incremental information about the CEO's private assessment of firm conditions. This possibility is particularly relevant in a setting characterized by information asymmetry, where managers have incentives to reveal favorable information while being more cautious in communicating

unfavorable developments (Jensen and Meckling, 1976; Healy and Palepu, 2001). If CEOs cannot perfectly suppress their underlying emotional state, vocal stress may function as an involuntary disclosure channel through which latent concerns about firm risk become partially observable to outside stakeholders.

To investigate this possibility, we employ Layered Voice Analysis (LVA) technology through the Nemesysco Emotional Logic platform to measure CEO vocal stress during earnings conference calls of S&P 500 firms from 2019 to 2024. LVA analyzes audio segments ranging from 0.3 to 3 seconds, extracting 151 vocal indicators to construct measures of fundamental emotions including stress. Unlike simple positive or negative vocal affect studied in prior work, stress is a complex cognitive emotion that reflects the speaker's awareness of underlying risks or challenges (Hobson et al., 2012). The conceptual framework is intentionally focused on two linked ideas. Emotional Leakage Theory explains why vocal stress may reveal concerns that are not fully expressed in the prepared verbal message (Ekman and Friesen, 1969). Cognitive processing constraints and limited attention explain why analysts and investors may detect the signal but incorporate it only partially. These concepts map directly to the four outcomes examined: forecast revisions, forecast dispersion, future earnings surprises, and post-earnings announcement drift.

We document four main findings that collectively reveal a consistent pattern of underreaction to soft non-verbal information. First, we show that CEO vocal stress significantly predicts downward analyst forecast revisions. Firms whose CEOs fall in the top tercile of vocal stress experience forecast revisions that are approximately 0.084 percentage points of stock price more negative than firms with lower-stress CEOs, after controlling for the current-quarter earnings surprise and textual sentiment. This effect operates through a threshold mechanism, the

continuous stress measure is not significant, but the high-stress indicator is, consistent with analysts noticing stress only when it exceeds a perceptible level. Second, we find that CEO stress increases analyst forecast dispersion. A one-unit increase in stress produces a statistically significant increase in the change in cross-sectional forecast dispersion around the call, indicating that analysts disagree about how to interpret the vocal signal. Third, and critically, we demonstrate that analysts underreact to the stress signal. Despite revising their forecasts downward, CEO stress predicts negative next-quarter earnings surprises even after controlling for the current-quarter surprise and the magnitude of the forecast revision. This indicates that the downward revision is directionally correct but insufficiently large. Fourth, the broader market also underreacts. CEO stress does not predict immediate announcement returns, but stock prices drift negatively over 60 trading days, consistent with the gradual incorporation of information that was initially overlooked.

Our study contributes to the literature in three dimensions. First, we introduce a novel audio-based measure of CEO emotional state and demonstrate that it predicts analyst behavior, future earnings, and stock returns. Unlike prior work on positive or negative vocal affect (Mayew and Venkatachalam, 2012) or deceptive vocal cues (Hobson et al., 2012), we focus on stress specifically, a complex cognitive emotion that is harder to detect, more directly indicative of the CEO's private assessment of firm risks, and theoretically linked to information asymmetry rather than managerial deception. Second, we extend the analyst underreaction literature (So, 2013; Loh and Mian, 2006) to a non-verbal information channel. While existing work documents analyst underreaction to textual disclosures, management guidance, and quantitative signals, we show that analysts also underreact to vocal cues, a form of soft information that requires real-time auditory processing and subjective interpretation. Third, we contribute to the post-earnings

announcement drift literature (Bernard and Thomas, 1989) by identifying a new source of return predictability driven by soft non-verbal information. The classic Post-Earning Announcement Drift (PEAD) literature focuses on hard earnings information; we show that vocal stress, accessible only through audio rather than transcripts, generates return drift that persists for 60 trading days. This extends the limited attention explanation for PEAD (Hirshleifer et al., 2009) to a setting where the information is literally inaudible to investors who rely on written transcripts.

The remainder of the paper proceeds as follows. Section 2 reviews the related literature and develops our hypotheses. Section 3 describes the data sources and variable construction. Section 4 presents the main empirical results. Section 5 concludes.

## **3.2 Literature Review and Hypothesis Development**

### **3.2.1 CEO Vocal Stress as a Non-Verbal Information Signal**

The CEO occupies a distinctive position in the firm's information environment. As the highest-ranking executive, the CEO typically has the broadest and most integrated view of the firm's operating performance, risk exposures, financing conditions, and strategic opportunities. Because the CEO both observes and interprets information before it becomes publicly available, outside stakeholders often treat managerial communication as an important source of signals about underlying firm conditions.

This informational role is especially important in the presence of information asymmetry. The corporate disclosure literature views voluntary communication as a mechanism through which firms can mitigate informational frictions between insiders and outside capital providers (Healy and Palepu, 2001; Core, 2001). Among such communication channels, quarterly earnings conference calls are particularly important because they combine prepared remarks with interactive questioning from analysts and investors. Prior studies show that conference calls

improve the information environment by disseminating timely managerial assessments of current performance and future prospects. Frankel et al. (1999) show that conference calls convey value-relevant information beyond that contained in earnings announcements. Brown et al. (2004) and Matsumoto et al. (2011) further document that conference calls reduce uncertainty and provide analysts with incremental information, particularly through the question-and-answer portion, where spontaneous responses can reveal aspects of managerial beliefs that are not captured in written disclosures.

However, earnings calls are also platforms for strategic communication. Managers may selectively disclose favorable information while minimizing details about risks or underperformance (Bushee et al., 2003; Healy and Palepu, 2001). Related work on linguistic tone demonstrates that the verbal content of conference calls can be managed in ways that are not fully aligned with economic fundamentals. For example, Huang et al. (2014) show that managers strategically adjust disclosure tone and that investors do not always fully disentangle informative language from impression management. Similarly, Li (2008) and Loughran and McDonald (2011) illustrate that textual features of corporate communication carry information, but they can also reflect deliberate rhetorical choices. These findings imply that the informational value of spoken communication cannot be evaluated solely on the basis of transcript content. When verbal language is strategically controlled, less controllable features of delivery may become particularly informative.

This possibility directs attention to non-verbal communication. A long tradition in psychology argues that emotions and internal states are not perfectly suppressible and often “leak” through channels such as facial expression, voice, and paralinguistic behavior, especially when speakers experience tension, uncertainty, or cognitive conflict (Ekman and Friesen, 1969;

DePaulo et al., 2003). Emotional Leakage Theory suggests that when individuals attempt to present a composed or optimistic front while privately holding negative assessments, involuntary cues can reveal the discrepancy between intended and underlying messages. Vocal delivery is especially relevant in settings such as earnings calls, where outside stakeholders cannot observe facial expressions but can hear variation in pitch, hesitation, tension, pace, and stress. Relative to prepared textual statements, these vocal characteristics are less easily scripted and may therefore provide a more direct window into the speaker's underlying beliefs and emotional state.

Research in accounting and finance increasingly supports this view. Mayew and Venkatachalam (2012) provide seminal evidence that managerial vocal cues during earnings conference calls contain incremental information about future firm performance beyond financial statement information and textual tone. They show that vocal affect predicts future earnings and is associated with capital market reactions, indicating that voice conveys economically meaningful information. Hobson et al. (2012) similarly demonstrate that vocal markers extracted from conference-call speech are associated with subsequent financial misreporting, consistent with the idea that deceptive or conflicted communication leaves detectable traces in vocal expression. More broadly, the literature on managerial communication has shown that behavioral cues embedded in disclosure events often reveal information that formal reporting channels omit or obscure. For example, Davis et al. (2015) and Price et al. (2012, 2017) show that emotional attributes of managerial speech shape market reactions and investor interpretation. Collectively, this body of work suggests that the delivery of corporate communication is informative in its own right and should not be treated as a mere vehicle for textual content.

Within this literature, however, prior research has focused primarily on broad affective dimensions such as positivity, negativity, optimism, or general emotional intensity. These

measures capture whether managerial speech sounds favorable or unfavorable, but they may not isolate the specific psychological state most closely tied to private concerns about firm risk. Our study focuses on CEO vocal stress, which is conceptually distinct from broad affect. Stress is not simply negative tone. Rather, it reflects internal strain, pressure, or unease associated with perceived challenges, uncertainty, or anticipated adverse outcomes. In the context of earnings calls, vocal stress may arise when CEOs discuss performance that falls short of expectations, confront probing analyst questions, or attempt to maintain a confident narrative despite privately recognizing elevated risk. Because stress is closely linked to underlying cognitive and emotional burden, it may reveal information about the CEO's subjective assessment of the firm that is not fully captured by either reported earnings or scripted verbal language.

This distinction is important for at least two reasons. First, stress may be more tightly connected to private assessments of firm risk than general positive or negative affect. A CEO can sound positive, measured, or strategically reassuring while nonetheless exhibiting vocal tension that reflects concern about unresolved operational or financial problems. In this sense, stress is particularly well suited to capture hidden downside information. Second, stress may be harder for outside listeners to process than simple affective tone. Broad emotional valence can often be interpreted quickly and intuitively, whereas stress may be conveyed through more subtle combinations of vocal features that require greater attention and interpretation.

### **3.2.2 Analyst Response to Soft Information**

Financial analysts play a central role in the capital market information environment. As sophisticated information intermediaries, analysts interpret corporate disclosures, update expectations about firm fundamentals, and transmit those assessments to investors through earnings forecasts and recommendation changes. A large literature shows that analysts

incorporate not only hard accounting information, but also softer qualitative signals contained in management disclosures. Earnings conference calls are especially important in this process because they provide analysts with direct access to management's interpretation of current performance and future prospects. Prior research shows that analysts revise their beliefs after conference calls in response to both numerical disclosures and qualitative managerial commentary (Bowen et al., 2002; Kimbrough, 2005; Matsumoto et al., 2011). These findings suggest that analysts do not treat earnings calls as mere reiterations of the earnings release, but rather as incremental information events in which soft information can materially affect expectations.

The importance of soft information in analyst decision-making is consistent with the broader view that analysts combine multiple sources of firm-specific signals when forming forecasts. In addition to reported earnings, analysts evaluate managerial guidance, disclosure tone, linguistic uncertainty, and the credibility of management's discussion of firm performance. Because conference calls allow real-time interaction with executives, they are particularly valuable for assessing dimensions of information that are difficult to infer from written reports alone. Prior evidence indicates that vocal delivery and other non-verbal aspects of managerial communication can contain information beyond textual content (Mayew and Venkatachalam, 2012; Hobson et al., 2012). For analysts, who are trained to interpret subtle cues and whose professional role depends on identifying value-relevant information before the broader market, such signals may be especially informative.

Within this setting, CEO vocal stress should represent a meaningful soft signal. Stress may reveal that the CEO perceives elevated uncertainty, operational difficulties, financing concerns, or other adverse developments that are not fully reflected in the firm's reported

numbers or prepared remarks. Because analysts are tasked with producing forward-looking assessments of firm performance, they have strong incentives to incorporate any signal that improves their understanding of future earnings. If analysts detect vocal stress and interpret it as evidence of underlying problems or elevated downside risk, they should revise their expectations downward. This prediction is consistent with the evidence that managerial vocal cues during conference calls affect analyst beliefs and forecast behavior (Mayew and Venkatachalam, 2012).

At the same time, the interpretation of stress may be less immediate and less uniform than the interpretation of broad positive or negative affect. Stress is a relatively complex emotional state. Unlike simple vocal positivity or negativity, which may be recognized quickly, stress is often conveyed through subtler combinations of vocal tension, hesitation, pressure, and instability. As a result, analysts may not respond linearly to small variations in stress. Minor stress may be too weak to distinguish from ordinary speaking variation, whereas more pronounced stress may cross a perceptual threshold that makes the signal salient and economically meaningful. This argument is consistent with psychological evidence that more complex emotional cues are harder to classify and require greater cognitive processing than simpler affective signals (Bless et al., 1996). In the earnings-call setting, where analysts must simultaneously interpret financial results, guidance, narrative framing, and responses to questions, only sufficiently strong vocal stress may be incorporated into forecast revisions.

Accordingly, we expect analyst responses to CEO vocal stress to be negative on average, reflecting downward revisions in expected firm performance when stress is increased. This prediction follows from the view that vocal stress conveys incremental information about underlying firm conditions that is not fully captured by reported earnings or textual tone. To the

extent that analysts recognize this information, they should adjust their forecasts in a more pessimistic direction.

*Hypothesis 1: Higher CEO vocal stress during earnings conference calls is associated with more negative analyst forecast revisions.*

### **3.2.3 Analyst Disagreement Under Ambiguous Signals**

Although the average analyst response to CEO vocal stress is expected to be negative, the interpretation of that signal is unlikely to be uniform across analysts. Unlike hard information, such as reported earnings or numerical guidance, vocal stress is inherently soft and ambiguous. Stress expressed during an earnings call may reflect firm-specific operational difficulties, heightened uncertainty about future performance, adverse industry conditions, pressure generated by the questioning environment, or idiosyncratic features of the speaker unrelated to firm fundamentals. Because the signal cannot be mapped cleanly to a single underlying cause, analysts may reasonably differ in the weight they assign to it and in the extent to which they translate it into future earnings expectations.

This prediction is consistent with the theoretical and empirical literature on heterogeneous interpretation of information. Kim and Verrecchia (1994) show that when market participants receive signals subject to differential interpretation, disagreement among informed agents increases. Barron et al. (1998) likewise argue that forecast dispersion reflects not only differences in analysts' information sets, but also differences in how common information is interpreted. In this sense, dispersion arises not merely from unequal access to information, but from heterogeneity in beliefs about the implications of a given signal. When the informational content of a disclosure is imprecise or difficult to decode, analysts are more likely to arrive at divergent conclusions.

The conference call setting is especially conducive to such heterogeneous interpretation. Analysts hear the same CEO voice, yet differ in experience, forecasting models, attention to qualitative cues, and priors regarding managerial credibility. Some may interpret vocal stress as a credible warning sign of latent firm risk and respond by adopting a more pessimistic view of future performance. Others may discount the same signal as noise, attribute it to the adversarial nature of the Q&A session, or view it as transitory rather than fundamental. Consequently, even if the average response is negative, differences in interpretation should widen the cross-sectional distribution of analyst forecasts. Bamber et al. (2011) show that more ambiguous and difficult-to-interpret disclosures are associated with greater analyst forecast dispersion because analysts place different weights on the same qualitative information. More broadly, the disclosure literature suggests that when communication is less precise and contains a larger soft-information component, the scope for subjective interpretation expands. Vocal stress fits this description closely. It is not directly verifiable, it is not reducible to a single numerical metric available to analysts in real time, and its meaning depends heavily on context. These features make it particularly likely to generate disagreement, even among sophisticated intermediaries.

Accordingly, we expect CEO vocal stress to increase analyst disagreement, as reflected in greater forecast dispersion following the earnings call. This effect should arise because stress constitutes an ambiguous signal whose informational content is not interpreted uniformly across analysts.

*Hypothesis 2: Higher CEO vocal stress during earnings conference calls is associated with greater analyst forecast dispersion.*

### 3.2.4 Analyst Underreaction to Vocal Stress

While analysts may detect CEO vocal stress and respond by revising forecasts downward, they may nevertheless fail to incorporate the full informational content of that signal. In other words, the analyst response may be directionally correct but quantitatively insufficient. Several mechanisms suggest why such underreaction may arise.

First, translating a soft and subjective cue into a precise numerical forecast revision is inherently difficult. Unlike reported earnings, management guidance, or other hard disclosures, vocal stress does not map mechanically into a specific earnings implication. Analysts must infer whether the signal reflects temporary pressure, deeper operating weakness, elevated uncertainty, or concealed adverse information, and then determine how strongly that inference should affect projected earnings. This task is cognitively demanding. Cognitive Load Theory suggests that individuals have limited processing capacity and are less likely to fully incorporate complex information when evaluating multiple signals simultaneously (Sweller, 1988). The earnings-call setting is precisely such an environment. Analysts must process current financial results, compare them with expectations, interpret managerial explanations, evaluate forward-looking guidance, and formulate questions in real time, all while attending to management's tone and delivery. Under such conditions, even sophisticated intermediaries may only partially incorporate subtle vocal cues.

Second, analysts may place disproportionate weight on hard information and adjust insufficiently for softer qualitative signals. Prior research shows that analyst forecasts are shaped by anchoring and insufficient adjustment, particularly when new information is less concrete or more difficult to quantify (Clement and Tse, 2005). Reported earnings and formal guidance are salient, standardized, and readily incorporated into valuation models, whereas vocal stress is less

tangible and more context dependent. As a result, analysts may anchor on the firm's reported numbers and revise only modestly in response to stress, even when that stress reflects meaningful private concerns about future performance.

Third, the ambiguity of the stress signal itself may promote underreaction. Because vocal stress is not perfectly attributable to a single underlying cause, analysts may discount its informational value relative to more verifiable disclosures. A stressed delivery could reflect firm-specific problems, but it could also stem from general uncertainty, difficult questioning, individual speaking style, or temporary personal factors. Faced with such ambiguity, analysts may rationally respond cautiously, especially when they cannot confidently distinguish informative stress from noise. This logic is consistent with broader evidence that market participants underreact to information that is less salient or harder to interpret. In the analyst setting, So (2013) shows that forecast errors contain predictable structure and that analyst underreaction is sufficiently systematic to forecast future returns, suggesting that incomplete incorporation of value-relevant information is a persistent feature of analyst behavior rather than an isolated anomaly.

If analysts underreact to CEO vocal stress, then the information embedded in that signal should continue to predict future fundamentals beyond the analysts' immediate forecast revisions. More specifically, vocal stress should be associated with more negative earnings surprises in the subsequent quarter, even after controlling for contemporaneous earnings news and any revisions analysts make following the call. This prediction follows from the idea that vocal stress reflects the CEO's private assessment of emerging problems or elevated downside risk that will not fully materialize until later periods. Analysts may recognize the signal

sufficiently to revise downward, but not enough to absorb its full implications. In that case, subsequent realized earnings will be systematically worse than analysts currently anticipate.

This argument yields a sharper implication than the forecast-revision hypothesis alone. A negative association between vocal stress and forecast revisions indicates that analysts detect the signal. A negative association between vocal stress and subsequent earnings surprises, conditional on those revisions, indicates that analysts do not fully incorporate it. Such a pattern would therefore provide direct evidence that CEO vocal stress contains incremental information about future firm performance that remains only partially reflected in analyst expectations at the time of the call.

*Hypothesis 3: Higher CEO vocal stress during earnings conference calls predicts more negative next-quarter earnings surprises, consistent with analyst underreaction to the information contained in vocal stress.*

### **3.2.5 Market Underreaction and Post-Earnings Announcement Drift**

Post-earnings announcement drift is one of the most robust anomalies in finance. Bernard and Thomas (1989, 1990) show that stock prices continue to move in the direction of earnings news for several months following the announcement, indicating that markets do not fully incorporate the implications of earnings information immediately. Livnat and Mendenhall (2006) confirm the robustness of this pattern using standardized unexpected earnings and further demonstrate that post-announcement return predictability remains economically meaningful even in more refined earnings-surprise settings. A leading explanation for this phenomenon is limited investor attention. Hirshleifer and Teoh (2003) and Hirshleifer et al. (2009) argue that investors face cognitive constraints and therefore cannot process all dimensions of disclosure events simultaneously. When some components of information are less salient, more difficult to

interpret, or embedded in complex disclosure environments, price adjustment may occur only gradually.

This framework is well suited to the case of CEO vocal stress. Compared with earnings per share, revenue, or formal guidance, vocal stress is a soft and relatively low-salience signal. It is not summarized in a headline number, nor is it easily incorporated into conventional valuation models at the time of the call. Instead, detecting vocal stress requires active listening, real-time processing of vocal delivery, and subjective judgment regarding the economic meaning of the signal. During earnings announcements, investor attention is likely directed primarily toward quantitative disclosures and management's explicit verbal statements, leaving fewer cognitive resources available for processing subtle non-verbal cues. To the extent that CEO vocal stress contains incremental information about latent firm risk or deteriorating fundamentals, limited attention implies that this information may be only partially reflected in prices at the time of the call.

A second mechanism is gradual information diffusion. Hong and Stein (1999) propose that information may spread across investors over time rather than being incorporated immediately into prices. This logic is particularly relevant for vocal signals. Not all market participants consume disclosure information in the same way. Some investors listen to conference calls live, others review recordings after the fact, and many rely exclusively on written transcripts or media summaries. Because transcripts generally omit the non-verbal features of speech, a substantial fraction of investors may never directly observe the vocal signal at all. Even among those who do hear the call, the interpretation of vocal stress may take time to develop, especially if its implications become clearer only in conjunction with subsequent

information releases. As a result, any price response to vocal stress may emerge gradually rather than instantaneously.

Taken together, these arguments suggest that CEO vocal stress should operate as a source of post-earnings announcement drift. If vocal stress reveals adverse information about future firm performance or risk that is not fully incorporated at the time of the call, then firms whose CEOs sound more stressed should experience more negative abnormal returns in the subsequent trading period. This prediction extends the traditional post-earnings announcement drift literature by emphasizing that delayed price adjustment may arise not only from underreaction to hard accounting news, but also from underreaction to soft non-verbal information embedded in managerial communication.

*Hypothesis 4: Higher CEO vocal stress during earnings conference calls predicts more negative post-earnings announcement drift, consistent with market underreaction to the information contained in vocal stress.*

### **3.3 Data and Methodology**

#### **3.3.1 Sample Construction and Audio Processing**

Our sample consists of quarterly earnings conference call audio recordings for S&P 500 firms from 2019 to 2024, downloaded from SeekingAlpha.com. We begin in 2019 because most firms' recordings are available starting in that year. Each recording lasts approximately one hour and includes both management presentations and Q&A sessions with analysts.

To isolate the CEO's speech, we employ a multi-step audio processing pipeline. First, we perform speaker diarization using the pyannote package in Python, following the methodology of Plaquet and Bredin (2023). This step automatically segments the audio by speaker identity.

Second, we use Google Speech-to-Text to transcribe the segmented audio clips. Third, we match the transcribed clips to the official call transcript to identify segments where the CEO is speaking. This procedure retains both the CEO's prepared presentation remarks and their responses during the Q&A session, as prior research indicates both components provide valuable qualitative information (Matsumoto et al., 2011).

### **3.3.2 Stress Measurement**

We apply Layered Voice Analysis (LVA) technology through the Nemesysco Emotional Logic platform to analyze the CEO's speech segments. LVA enhances the input audio and splits it into segments ranging from 0.3 to 3 seconds based on speaker characteristics. The technology performs both time-domain and frequency-domain analysis to extract 151 vocal indicators, from which it constructs measures of 16 emotions. Stress is one of the four fundamental emotions detected by LVA, indicating how nervous the speaker is. The raw stress score ranges from 0 (no stress) to 30 (maximum stress). Our firm-quarter stress measure is the mean LVA stress score across all CEO speech segments in a given earnings call.

Several prior studies validate the use of LVA for detecting managerial emotions during earnings calls. Mayew and Venkatachalam (2012) apply LVA to estimate both negative and positive affective states of executives and show that these measures predict future firm performance. Hobson et al. (2012) employ LVA to measure vocal cues and demonstrate their ability to detect financial misreporting. Price et al. (2017) use LVA to measure both emotional and cognitive cues of CEOs during REIT conference calls. These studies provide empirical support for the validity of LVA as a tool for capturing CEO emotional states from earnings call audio.

### 3.3.3 Dependent Variables

**Analyst Forecast Revision:** We construct analyst-level forecast revisions using the IBES Detail file. For each analyst covering a given firm, we identify their most recent annual EPS forecast issued within 30 days before the earnings call and their earliest revision issued within 30 days after the call. The 30-day symmetric window follows Bowen et al. (2002) and Mayew and Venkatachalam (2012), balancing forecast freshness against sample coverage. We use annual rather than quarterly EPS forecasts because analysts maintain active annual forecasts throughout the fiscal year, substantially increasing observation counts in the pre-call window, an approach consistent with Mayew and Venkatachalam (2012). For the post-call forecast, we retain the analyst's earliest revision to capture their most immediate response to the call content. FREV is price-scaled by the closing stock price five trading days before the call to facilitate cross-firm comparability.

**Analyst Forecast Dispersion:** We measure the change in analyst forecast dispersion around the earnings call to test whether CEO vocal stress generates disagreement among analysts. Following Bamber et al. (2011), who examine changes in dispersion around corporate disclosure events, we define  $\Delta\text{Dispersion}$  as the cross-sectional standard deviation of analyst forecasts in the post-call window minus the standard deviation in the pre-call window. This change-based measure captures whether the earnings, and specifically the CEO's vocal delivery, resolves or amplifies analyst disagreement. We require a minimum of three analysts in each window to ensure meaningful dispersion estimates (Diether et al., 2002). Because dispersion is highly persistent, we also examine a specification regressing the post-call dispersion level on the stress measure while controlling for the pre-call dispersion level, following the approach of

Barron et al. (1998). Both measures are price-scaled by the closing stock price five trading days before the call.

**Standardized Unexpected Earnings:** We construct next-quarter earnings surprises from the IBES Detail file to ensure data accuracy. For each firm-quarter, we build our own consensus from individual analyst forecasts, keeping each analyst's most recent forecast issued within 90 days before the next quarter's earnings announcement and requiring at least three contributing analysts. This approach follows Livnat and Mendenhall (2006) and gives us full control over forecast freshness and inclusion criteria.

**Buy-and-Hold Abnormal Returns (BHAR).** We compute buy-and-hold abnormal returns following the methodology of Barber and Lyon (1997). We use compounded rather than cumulative returns to avoid the rebalancing bias that affects CARs over longer horizons (Barber and Lyon, 1997). Our primary specification uses a 60-trading-day drift window, consistent with Bernard and Thomas (1989) who document that most post-earnings announcement drift occurs within this horizon. We also examine 30-day and 90-day windows to trace how the drift accumulates and dissipates over time. The drift window begins at trading day +2 to cleanly separate the drift from the immediate announcement reaction, following Bernard and Thomas (1989) and Chordia and Shivakumar (2006). We require a minimum of 47 valid return observations within the 60-day window to ensure reliable BHAR estimates. As robustness, we also compute BHAR using size-decile adjusted returns following Livnat and Mendenhall (2006), subtracting the return on the firm's CRSP size-decile portfolio rather than the overall market index. To test for immediate market reactions, we separately compute the two-day cumulative abnormal return over trading days 0 and +1, following standard event study methodology (MacKinlay, 1997). All return-based measures are winsorized at the 1st and 99th percentiles.

### 3.3.4 Key Independent Variables

Following Mayew and Venkatachalam (2012), we aggregate the segment-level stress scores by taking the mean across all CEO speech segments within each call, producing a single firm-quarter stress measure. In our sample, stress has a mean of 2.40 and a standard deviation of 1.73, with a maximum of 15.27 against a theoretical maximum of 30, indicating that S&P 500 executives generally operate in the lower range of the stress spectrum. The distribution is right-skewed, with most observations clustered near zero and a long right tail of elevated stress.

We employ two specifications of the stress variable. Our continuous measure (Stress) enters regressions where the effect scales linearly with stress intensity, specifically, the dispersion, earnings surprise, and drift specifications. For analyst forecast revisions, we use a binary indicator (High\_Stress) equal to one if the firm-quarter stress score falls in the top tercile of the within-quarter stress distribution. We construct terciles within each calendar quarter to ensure firms are ranked against their contemporaries, following the within-period sorting methodology standard in the asset pricing literature (Fama and French, 1993; Livnat and Mendenhall, 2006). The tercile approach is motivated by our finding that the continuous measure does not significantly predict forecast revisions, while the top-tercile dummy does, consistent with Cognitive Load Theory (Sweller, 1988), which predicts that analysts processing large volumes of quantitative and qualitative information during a call register stress only when it exceeds a perceptible threshold.

The possibility of classification error should be considered when interpreting the High\_Stress indicator. Because high stress is defined using the top tercile of the within-quarter stress distribution, observations located close to the tercile cutoff may be classified differently following small changes in the measured stress score. The LVA stress measure may also capture

temporary speaking pressure, difficult questioning, audio conditions, or individual speaking style in addition to firm-related concern. If such classification error is random, it would generally introduce noise, reduce statistical power, and weaken the estimated difference between high- and lower-stress observations. If it is systematically related to firm conditions or the examined outcomes, the resulting estimates could be biased in either direction. The High\_Stress variable should therefore be interpreted as identifying relatively elevated measured vocal stress, rather than as a definitive classification of the CEO's psychological condition.

### **3.4 Empirical Results**

#### **3.4.1 Summary Statistics**

Table 1 reports summary statistics for the main variables. The mean CEO stress score is 2.40 with a standard deviation of 1.73, ranging from 0 to 15.27. The distribution is right-skewed, with most observations clustering near lower values and a tail extending to higher stress levels. This distribution motivates the use of the high-stress tercile dummy, as the effect of stress on analyst behavior may be concentrated in the upper tail. The mean FREV is slightly negative ( $-0.0006$ ), consistent with a well-documented negative revision bias. The mean  $SUE_{t+1}$  is close to zero, indicating that analyst consensus forecasts are approximately unbiased on average. The mean  $CAR(0,1)$  and BHAR measures are also near zero.

[INSERT TABLE 3.1 ABOUT HERE]

#### **3.4.2 CEO Stress and Analyst Forecast Revisions**

Table 2 presents estimates the relationship between CEO vocal stress and analyst forecast revisions. Column (1) reports our baseline specification using the high-stress tercile dummy. The coefficient on High\_Stress is  $-0.000835$  ( $t = -1.99$ ,  $p < 0.05$ ), indicating that firms whose CEOs

exhibit elevated stress during the earnings call experience significantly more negative forecast revisions. Economically, firms in the highest stress tercile experience revisions approximately 0.084 percentage points of stock price more negative than firms with lower stress, controlling for the current-quarter earnings surprise and other determinants of revisions.

The coefficient on SUE is large and highly significant (0.480,  $p < 0.01$ ), confirming that the current-quarter earnings surprise is the dominant driver of forecast revisions. Despite this, the stress coefficient remains significant, indicating that vocal stress carries incremental information beyond reported earnings. The coefficient on polarity is also positive and significant (0.00389,  $p < 0.01$ ), meaning that positive textual sentiment predicts upward revisions independently. The survival of the stress coefficient alongside both the quantitative earnings control and the textual sentiment control establishes that the CEO's voice carries information that neither the numbers nor the words alone convey.

Columns (2) and (3) explore the functional form of the stress effect using the continuous measure and a quadratic specification, respectively. Neither the linear nor the quadratic stress term achieves statistical significance. This pattern confirms that the analyst revision response to stress operates through a threshold mechanism rather than a linear relationship. This finding is consistent with Cognitive Load Theory (Sweller, 1988), analysts processing large volumes of quantitative and qualitative information during a call may only register stress when it is sufficiently pronounced. Below the threshold, stress is masked by the CEO's verbal composure and the analyst's primary focus on hard data.

[INSERT TABLE 3.2 ABOUT HERE]

### 3.4.3 CEO Stress and Analyst Forecast Dispersion

Table 3 reports tests of Hypothesis 2, which predicts that CEO vocal stress increases disagreement among analysts. In Column (1), the dependent variable is the change in analyst forecast dispersion around the earnings call, and the key independent variable is the continuous stress measure. The coefficient on stress is positive and statistically significant at the 5% level. This result indicates that greater CEO vocal stress is associated with a larger increase in forecast dispersion following the call, consistent with the view that vocal stress is an ambiguous signal whose implications are not interpreted uniformly across analysts.

This finding complements the revision results reported in Table 2. Whereas the directional response of analyst forecasts appears to be concentrated in the high-stress tercile, disagreement responds to the continuous level of stress. This contrast is economically meaningful. A downward revision requires analysts to interpret vocal stress as sufficiently strong evidence of negative information, which may occur only once the signal crosses a salient threshold. By contrast, dispersion reflects differences in interpretation, and such heterogeneity can arise even when the signal is only moderately strong. In this sense, stress need not be extreme to generate disagreement. Even modest increases in vocal stress may create uncertainty about the CEO's underlying message and lead analysts to place different weights on the signal.

Column (2) replaces the continuous stress measure with the high-stress indicator. The coefficient remains positive but is not statistically significant. This pattern is consistent with disagreement being linked to the intensity of the signal rather than to a discrete threshold effect. The result suggests that analyst dispersion rises progressively as stress becomes more pronounced, rather than only when stress reaches an extreme level.

Overall, the evidence supports Hypothesis 2 and is consistent with the interpretation developed in Section 2.3. CEO vocal stress appears to function as a soft and ambiguous disclosure cue that different analysts process differently. Some analysts may interpret stress as a credible signal of latent firm risk, while others may discount it as noise or attribute it to temporary speaking pressure. The resulting heterogeneity in interpretation manifests itself in wider forecast dispersion following the call.

[INSERT TABLE 3.3 ABOUT HERE]

#### **3.4.4 CEO Stress and Future Earnings Surprises**

Table 4 presents our test of Hypothesis 3, examining whether analysts underreact to CEO vocal stress. Column (1) reports the regression of next-quarter unexpected earnings  $SUE_{t+1}$  on continuous stress, controlling for the current-quarter surprise. The coefficient on stress is  $-0.000118$  ( $t = -1.99$ ,  $p < 0.05$ ), indicating that higher CEO stress significantly predicts negative next-quarter earnings surprises even after analysts have had the opportunity to revise their forecasts in response to the call. This is the analyst underreaction result: analysts detect the stress signal and revise downward (Table 2), but the magnitude of their revision is insufficient to fully absorb the negative information embedded in the CEO's vocal stress.

The coefficient on SUE is  $-0.144$  ( $p < 0.01$ ), indicating earnings mean-reversion: firms with positive current-quarter surprises tend to have lower next-quarter surprises. Controlling for this mean-reversion pattern sharpens the stress effect. Column (2) reports the same specification without SUE. The stress coefficient is  $-0.000107$  ( $p < 0.10$ ), marginally significant but slightly smaller in magnitude. The fact that controlling for current earnings strengthens rather than

weakens the stress coefficient suggests that stress contains forward-looking information about future problems that is distinct from current-quarter fundamentals.

Column (3) tests whether the underreaction is concentrated in bad-news quarters by including an interaction between stress and a bad-news dummy (equal to one when  $SUE < 0$ ). The main effect of stress remains significant ( $-0.000132$ ,  $p < 0.05$ ), while the interaction term ( $0.000109$ ) is not statistically significant. This indicates that the underreaction to stress is not asymmetric, stress predicts negative future earnings regardless of whether current-quarter earnings are good or bad. This strengthens the interpretation that vocal stress captures the CEO's private knowledge of future challenges, independent of current performance.

[INSERT TABLE 3.4 ABOUT HERE]

### **3.4.5 CEO Stress and Post-Earnings Announcement Drift**

Table 5 presents our test of Hypothesis 4, examining whether CEO vocal stress predicts post-earnings announcement drift. We report four columns corresponding to the immediate announcement return and three drift horizons.

Column (1) examines the two-day announcement return  $CAR(0,1)$ . The coefficient on stress is  $-0.00163$  ( $t = -1.03$ ,  $p = 0.32$ ), indicating that the market does not detect CEO vocal stress in real time. This null result is consistent with the limited attention hypothesis: on the announcement day, investor attention is directed toward the hard quantitative information, earnings, revenue, and guidance, rather than the CEO's vocal characteristics.

Columns (2) through (4) examine post-announcement drift at the 30-day, 60-day, and 90-day horizons. A clear pattern emerges across the three windows. The coefficient on stress is  $-0.00390$  at 30 days ( $p = 0.18$ ),  $-0.00854$  at 60 days ( $p < 0.05$ ), and  $-0.00409$  at 90 days ( $p =$

0.44). The effect builds through the 60-day horizon and then dissipates, a pattern characteristic of post-earnings announcement drift. At the 60-day horizon, a one-unit increase in CEO stress predicts  $-0.854\%$  cumulative abnormal return. Given the stress standard deviation of 1.73, a one-standard-deviation increase in stress predicts approximately 1.5% underperformance over 60 trading days. Annualized across four quarterly earnings calls, this implies a return differential of approximately 6%.

The dissipation of the effect by the 90-day horizon likely reflects the arrival of new information from the subsequent quarter's earnings call, which introduces fresh signals and resolves some of the uncertainty generated by the original stress observation. The overall pattern, no immediate reaction, building drift through 60 days, partial dissipation by 90 days, is consistent with the gradual information diffusion framework (Hong and Stein, 1999) and mirrors the classic PEAD profile documented by Bernard and Thomas (1989).

Among the control variables, pre-call forecast dispersion is positive and significant at the 60-day (2.057,  $p < 0.05$ ) and 90-day (4.279,  $p < 0.01$ ) horizons, suggesting that higher pre-existing analyst disagreement is associated with positive drift, consistent with an uncertainty premium. CEO gender is significantly negative at 90 days ( $-0.112$ ,  $p < 0.01$ ), indicating that firms with female CEOs experience more negative long-term drift, a finding we explore further in our additional analyses.

[INSERT TABLE 3.5 ABOUT HERE]

### **3.4.6 The Underreaction Chain: Connecting the Four Findings**

The four sets of results, taken together, reveal a consistent pattern of underreaction to soft non-verbal information across two classes of market participants. The information chain

proceeds as follows. CEO vocal stress during the earnings call reflects private knowledge of firm risks and operational challenges. Analysts, as trained and attentive listeners, detect this signal and revise their forecasts downward (Hypothesis 1 confirmed). However, the ambiguity of the stress signal produces disagreement about its severity (Hypothesis 2 confirmed), and the average revision is insufficient to fully absorb the negative information, predictable negative earnings surprises follow (Hypothesis 3 confirmed). The broader market, constrained by limited attention, reliance on transcripts rather than audio, and the cognitive difficulty of processing vocal cues, fails to react immediately. Stock prices drift negatively for 60 trading days as the hidden problems gradually materialize (Hypothesis 4 confirmed).

This narrative distinguishes our paper from the analyst efficiency literature. The finding is not that analysts are inefficient in an absolute sense, they correctly identify the direction of the signal, but that the magnitude of their adjustment is insufficient, a more nuanced form of underreaction that generates predictable forecast errors without implying that analysts are irrational.

### **3.5 Additional Analysis: The Role of Firm Performance Context**

Our main analyses establish that CEO vocal stress predicts analyst forecast revisions, analyst disagreement, future earnings surprises, and post-earnings announcement drift. In this section, we examine whether these effects vary with the firm's recent performance pattern.

We measure relative firm performance using the performance gap, defined as the difference between the firm's ROA in the quarter being reported during the earnings call and the firm's ROA in the corresponding quarter of the prior fiscal year. This year-over-year, same-quarter comparison controls for seasonal patterns in profitability and captures whether the firm's operating performance is improving or deteriorating relative to its own recent history. We then

partition the sample into two subsamples: firms with a non-negative performance gap (improving or stable performance) and firms with a negative performance gap (declining performance). All main regression specifications are re-estimated separately within each subsample.

This partition is motivated by the idea that CEO vocal stress may carry different informational content depending on whether it confirms or contradicts the firm's reported performance. When a CEO sounds stressed while delivering improving results, the discrepancy between positive hard information and negative vocal cues may reveal private concerns about the sustainability of current performance or emerging risks not yet reflected in the reported numbers. In this setting, stress functions as a contradiction signal. Conversely, when a CEO sounds stressed while reporting declining performance, the vocal cue may signal that deterioration will continue beyond what the current numbers suggest, serving as an intensification signal. Whether analysts incorporate these signals efficiently may also depend on the performance context, as the salience and surprise value of the vocal cue differ across the two settings.

### **3.5.1 Analyst Forecast Revisions by Performance Context**

Table 6 reports forecast revision regressions estimated separately for the two subsamples. In Panel A, among firms with improving or stable performance (performance gap  $\geq 0$ ), the coefficient on High\_Stress is  $-0.0018$  ( $p < 0.05$ ), roughly double the magnitude of the full-sample estimate reported in Table 2. The continuous stress measure is also significant in this subsample ( $-0.0004$ ,  $p < 0.05$ ), in contrast to the full sample where only the tercile dummy achieved significance. This finding suggests that among improving firms, even moderate levels of vocal stress are informative because any stress is unexpected given the positive trajectory of reported earnings. Analysts appear to treat stressed delivery during good-news quarters as a credible warning that the reported improvement may not be sustainable. In Panel B, among firms

with declining performance (performance gap < 0), stress coefficients are economically small and statistically insignificant across all specifications. When performance is already deteriorating, vocal stress is largely redundant with the negative hard information analysts already possess and therefore does not generate incremental forecast revisions.

[INSERT TABLE 3.6 ABOUT HERE]

### **3.5.2 Analyst Forecast Dispersion by Performance Context**

Table 7 reports dispersion regressions by performance subsample. The stress coefficients are positive in both subsamples but do not achieve statistical significance in either, in contrast to the significant full-sample result reported in Table 3. The loss of significance likely reflects reduced statistical power, as splitting the sample roughly halves the number of observations in each subsample. It may also indicate that the disagreement-generating property of vocal stress operates broadly across the full performance spectrum rather than concentrating in one group, such that partitioning the sample dilutes rather than sharpens the effect.

[INSERT TABLE 3.7 ABOUT HERE]

### **3.5.3 Analyst Underreaction by Performance Context**

Table 8 reports regressions of next-quarter earnings surprises on CEO stress, split by performance context. The asymmetric results complement the forecast revision findings. Among firms with declining performance, stress significantly predicts negative future earnings surprises ( $-0.0002$ ,  $p < 0.05$ ), indicating that analysts underreact to the information content of vocal stress when the firm's fundamentals are deteriorating. Among firms with improving performance, the stress coefficient is similar in sign but statistically insignificant.

Combined with the forecast revision results, these findings reveal two distinct channels through which vocal stress operates depending on the firm's performance context. For improving firms, analysts detect the contradiction between positive reported numbers and stressed vocal delivery, and they revise their forecasts downward accordingly (Table 6, Panel A). This revision appears to be sufficient, as stress does not predict subsequent earnings surprises in this subsample. For declining firms, analysts dismiss the vocal cue as redundant with the already-negative reported fundamentals and do not revise their forecasts in response to stress (Table 6, Panel B). However, the stress signal contains incremental information indicating that the deterioration will continue beyond what analysts currently expect, producing predictable negative earnings surprises in the following quarter. The underreaction to vocal stress is thus concentrated precisely where analysts are most complacent, among declining firms where the stressed delivery appears unsurprising but in fact signals further deterioration that the analysts' current forecasts fail to absorb.

[INSERT TABLE 3.8 ABOUT HERE]

### **3.6 Robustness Check**

A potential concern with our baseline analysis is that firms whose CEOs exhibit high vocal stress may differ systematically from firms with lower stress on observable characteristics, and that these pre-existing differences, rather than stress itself, drive the observed relationships. Table 9 addresses this concern using propensity score matching.

We estimate the propensity score using a probit model that predicts high stress (top tercile) as a function of the current-quarter earnings surprise, pre-call forecast dispersion, textual sentiment, firm size, past performance, return volatility, momentum, leverage, tangible asset ratio, CEO gender, minority status, and tenure. We then match each high-stress firm-quarter to

its nearest low-stress firm-quarter using one-to-one nearest-neighbor matching without replacement, imposing a caliper of 0.05 on the propensity score distance to ensure close matches. Only three treated observations fall outside the common support region, indicating substantial overlap in the propensity score distributions between the two groups.

Panel A reports covariate balance before and after matching. Before matching, high-stress firm-quarters are significantly smaller (bias =  $-20.1\%$ ), have lower performance ( $16.8\%$ ), less positive textual sentiment ( $15.0\%$ ), fewer female CEOs ( $-20.2\%$ ), and a higher proportion of non-minority CEOs ( $16.4\%$ ). After matching, all standardized biases fall below  $7\%$ , well within the conventional  $10\%$  threshold recommended by Rosenbaum and Rubin (1985). No individual covariate remains statistically different between the treated and control groups at conventional significance levels. The overall pseudo- $R^2$  of the propensity score model drops from  $0.028$  to  $0.005$ , and the likelihood ratio chi-squared test becomes insignificant ( $p = 0.882$ ), confirming that the matching procedure successfully eliminates observable differences between high-stress and low-stress firm-quarters.

Panel B reports two treatment effect estimates. Column (1) presents the average treatment effect on the treated (ATT) from propensity score matching with bootstrapped standard errors (500 replications). The ATT for forecast revisions is  $-0.00111$  ( $z = -2.35$ ,  $p = 0.019$ ), indicating that high-stress firms experience analyst forecast revisions approximately  $0.111$  percentage points of stock price more negative than observably similar low-stress firms. Notably, the matched estimate exceeds the unmatched difference in absolute value ( $-0.00090$ ), suggesting that high-stress firms are somewhat better on certain observable characteristics, particularly firm size and performance, which partially masks the stress effect in unmatched comparisons. Column (2) reports a regression estimated on the matched sample with the full set of controls, firm fixed

effects, and year-quarter fixed effects. The coefficient on High\_Stress remains negative and statistically significant ( $-0.00094$ ,  $t = -1.96$ ,  $p = 0.050$ ), confirming that the stress effect survives even when we combine matching with regression adjustment. The matched-sample regression yields a smaller sample (787 observations) because firm fixed effects absorb singleton matched pairs, but the qualitative result is unchanged.

These findings provide reassurance that the relationship between CEO vocal stress and analyst forecast revisions is not an artifact of observable differences between high-stress and low-stress firms.

[INSERT TABLE 3.9 ABOUT HERE]

### **3.7 Conclusion**

This study demonstrates that CEO vocal stress during quarterly earnings conference calls contains private information about firm risks that both financial analysts and the broader market fail to fully incorporate. Using Layered Voice Analysis technology applied to earnings call audio of S&P 500 firms from 2019 to 2024, we document a consistent pattern of underreaction to this soft non-verbal information channel.

Our findings have several implications. For the analyst literature, we show that analysts are sophisticated enough to detect complex vocal cues, they revise their forecasts downward in response to CEO stress. However, the magnitude of their revision is insufficient, as demonstrated by the systematic negative earnings surprises that follow. This partial processing of soft information extends the analyst underreaction literature to a novel information channel and suggests that the cognitive demands of translating subjective emotional assessments into precise numerical forecasts create a systematic processing bottleneck.

For the market efficiency literature, we identify a new source of post-earnings announcement drift driven by non-verbal soft information. The classic PEAD literature focuses on hard quantitative signals such as earnings surprises. Our finding that vocal stress, a qualitative, auditory signal, generates 60-day return drift extends the limited attention explanation for market anomalies to a dimension of information that is literally inaudible to investors who rely on written transcripts rather than audio recordings.

For corporate governance, our results highlight that CEOs' emotional states during public communications contain market-relevant information that current disclosure frameworks do not capture. The involuntary leakage of private information through vocal characteristics suggests a complementary information channel that operates alongside formal financial disclosures.

Our study is subject to several limitations. The sample is limited to S&P 500 firms, which represent the largest and most closely followed companies. The stress-information relationship may differ for smaller firms with weaker governance or less analyst scrutiny. The LVA technology, while validated in prior research, produces measures that cannot be independently verified against a ground truth of subjective emotional states. Finally, the BHAR sample (777 observations) is substantially smaller than the FREV sample (1,504 observations), reflecting additional data requirements for constructing daily abnormal returns.

Despite these limitations, our findings establish that the sound of a CEO's voice during an earnings call is not mere noise, it is a signal that carries private information about firm risks, one that sophisticated intermediaries partially detect but that the broader market systematically underweights.

Table 3.1 Summary Statistics

This table reports descriptive statistics for the main variables used in the empirical analysis. The sample consists of S&P 500 firm-quarters with available earnings conference call audio recordings between 2019 and 2024. Stress is the average CEO vocal stress score during the earnings call, measured by the Layered Voice Analysis (LVA) technology of the Emotion Logic platform on a 0–30 scale. High\_Stress is an indicator equal to one if Stress falls in the top tercile of the sample distribution, and zero otherwise. FREV is the analyst forecast revision around the earnings call, measured as the change in median annual EPS forecast from the 30-day pre-call window to the 30-day post-call window, scaled by the closing stock price five trading days before the call.  $\Delta$ Dispersion is the change in cross-sectional standard deviation of analyst forecasts from the pre-call to the post-call window.  $SUE_{t+1}$  is the standardized unexpected earnings in the subsequent quarter, computed as the difference between actual EPS and the median analyst forecast scaled by stock price.  $CAR(0,1)$  is the two-day market-adjusted cumulative abnormal return centered on the call.  $BHAR(2,k)$  is the buy-and-hold abnormal return computed from trading day +2 through day +k, where  $k \in \{30, 60, 90\}$ . Polarity is the Loughran–McDonald normalized textual tone of the call transcript. All continuous variables are winsorized at the 1st and 99th percentiles.

|                     | count | mean    | sd      | min      | p25      | p50     | p75     | max     |
|---------------------|-------|---------|---------|----------|----------|---------|---------|---------|
| Frev                | 2581  | 0.0003  | 0.0062  | -0.0283  | -0.0008  | 0.0003  | 0.0017  | 0.0225  |
| $\Delta$ dispersion | 2054  | 0.0013  | 0.0043  | -0.0113  | -0.0001  | 0.0002  | 0.0014  | 0.0238  |
| $SUE_{t+1}$         | 3567  | -0.0001 | 0.0026  | -0.0428  | -0.0003  | -0.0000 | 0.0002  | 0.0414  |
| $CAR(0,1)$          | 2109  | -0.0007 | 0.0492  | -0.1351  | -0.0300  | -0.0002 | 0.0287  | 0.1312  |
| $BHAR(2,30)$        | 2109  | 0.0051  | 0.0953  | -0.2076  | -0.0545  | -0.0002 | 0.0567  | 0.3459  |
| $BHAR(2,60)$        | 2109  | 0.0043  | 0.1306  | -0.3296  | -0.0758  | -0.0006 | 0.0720  | 0.4534  |
| $BHAR(2,90)$        | 2109  | 0.0035  | 0.1684  | -0.3923  | -0.1055  | -0.0046 | 0.0901  | 0.6236  |
| stress              | 4266  | 2.3970  | 1.7252  | 0.0000   | 1.0789   | 2.0577  | 3.3418  | 15.2670 |
| high_stress         | 4267  | 0.3333  | 0.4714  | 0.0000   | 0.0000   | 0.0000  | 1.0000  | 1.0000  |
| SUE                 | 3956  | 0.0009  | 0.0052  | -0.0589  | 0.0000   | 0.0005  | 0.0017  | 0.1468  |
| Polarity            | 4266  | 0.1700  | 0.1912  | -0.5686  | 0.0490   | 0.1853  | 0.3033  | 0.7500  |
| Dispersion          | 2130  | 0.0052  | 0.0137  | 0.0000   | 0.0006   | 0.0018  | 0.0045  | 0.2394  |
| Firm size           | 4244  | 10.1043 | 1.2491  | 6.6995   | 9.2313   | 10.0166 | 10.8583 | 14.4813 |
| Tobin's q           | 4244  | 2.6786  | 2.1525  | 0.6845   | 1.2851   | 1.8639  | 3.1312  | 14.9723 |
| Volatility          | 4036  | 0.0206  | 0.0100  | 0.0074   | 0.0141   | 0.0179  | 0.0239  | 0.0977  |
| momentum            | 4036  | -6.1884 | 11.7397 | -46.3524 | -13.1184 | -5.8529 | 0.2552  | 44.0770 |
| gender              | 4090  | 0.0663  | 0.2488  | 0.0000   | 0.0000   | 0.0000  | 0.0000  | 1.0000  |
| minority            | 4090  | 0.8457  | 0.3613  | 0.0000   | 1.0000   | 1.0000  | 1.0000  | 1.0000  |
| CEO tenure          | 3970  | 9.8096  | 9.0001  | 0.0000   | 4.0000   | 7.0000  | 12.0000 | 57.0000 |

Table 3.2 CEO Vocal Stress and Analyst Forecast Revisions

This table reports panel regressions of analyst forecast revisions on CEO vocal stress. The dependent variable in all columns is FREV, the price-scaled change in median annual EPS forecast around the earnings call. Column (1) uses High\_Stress, an indicator for firm-quarters in the top tercile of the stress distribution. Column (2) uses the continuous Stress measure. Column (3) includes both. All regressions control for SUE (current-quarter earnings surprise), Polarity (textual tone), stock return volatility, momentum, leverage, tangibility, firm age, firm size, and CEO demographic characteristics (gender, minority status, CEO tenure). Firm and year fixed effects are included throughout. Standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

|                     | (1)<br>FREV            | (2)<br>FREV            | (3)<br>FREV            |
|---------------------|------------------------|------------------------|------------------------|
| high_stress         | -0.0008**<br>(0.0004)  |                        |                        |
| stress              |                        | -0.0001<br>(0.0001)    | -0.0001<br>(0.0003)    |
| Stress <sup>2</sup> |                        |                        | 0.0000<br>(0.0000)     |
| dispersion          | -0.1424***<br>(0.0304) | -0.1433***<br>(0.0306) | -0.1433***<br>(0.0306) |
| SUE                 | 0.4800***<br>(0.1481)  | 0.4808***<br>(0.1481)  | 0.4808***<br>(0.1481)  |
| gender              | 0.0006<br>(0.0009)     | 0.0006<br>(0.0010)     | 0.0006<br>(0.0010)     |
| minority            | -0.0012<br>(0.0008)    | -0.0012<br>(0.0008)    | -0.0012<br>(0.0008)    |
| Performance gap     | 0.0002**<br>(0.0001)   | 0.0002**<br>(0.0001)   | 0.0002**<br>(0.0001)   |
| performance         | -0.0007***<br>(0.0003) | -0.0007**<br>(0.0003)  | -0.0007***<br>(0.0003) |
| Volatility          | -0.0551<br>(0.0515)    | -0.0542<br>(0.0512)    | -0.0542<br>(0.0511)    |
| Momentum            | -0.0000<br>(0.0000)    | -0.0000<br>(0.0000)    | -0.0000<br>(0.0000)    |
| Leverage            | 0.0000<br>(0.0000)     | 0.0000<br>(0.0000)     | 0.0000<br>(0.0000)     |
| Tangible            | 0.0013<br>(0.0105)     | 0.0013<br>(0.0104)     | 0.0013<br>(0.0104)     |
| Firm size           | -0.0015<br>(0.0016)    | -0.0014<br>(0.0016)    | -0.0014<br>(0.0016)    |
| Polarity            | 0.0039***<br>(0.0014)  | 0.0039***<br>(0.0014)  | 0.0039***<br>(0.0014)  |
| _cons               | 0.0185<br>(0.0176)     | 0.0178<br>(0.0176)     | 0.0178<br>(0.0176)     |
| N                   | 1504                   | 1504                   | 1504                   |
| adj. R-sq           | 0.346                  | 0.343                  | 0.343                  |

Table 3.3 CEO Vocal Stress and Analyst Forecast Dispersion

This table reports panel regressions of the change in analyst forecast dispersion on CEO vocal stress. The dependent variable is  $\Delta$ Dispersion, the change in cross-sectional standard deviation of analyst EPS forecasts from the 30-day pre-call window to the 30-day post-call window, price-scaled. Column (1) uses the continuous Stress measure; column (2) uses the High\_Stress tercile indicator. The full set of firm- and CEO-level controls used in Table 2 is included. Firm and year fixed effects are included; standard errors are clustered at the firm level and reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

|                 | (1)<br>$\Delta$ Dispersion | (2)<br>$\Delta$ Dispersion |
|-----------------|----------------------------|----------------------------|
| stress          | 0.0274**<br>(0.0138)       |                            |
| high_stress     |                            | 0.0476<br>(0.0418)         |
| SUE             | 0.2077<br>(3.6001)         | 0.1540<br>(3.6043)         |
| Volatility      | 8.8252***<br>(3.2875)      | 8.8665***<br>(3.2917)      |
| gender          | -0.0331<br>(0.2148)        | -0.0371<br>(0.2151)        |
| minority        | -0.2229**<br>(0.1100)      | -0.2160**<br>(0.1101)      |
| Performance gap | 3.0621**<br>(1.3131)       | 3.0575**<br>(1.3148)       |
| performance     | -3.1929<br>(1.9612)        | -3.1415<br>(1.9636)        |
| Momentum        | -0.0027<br>(0.0020)        | -0.0028<br>(0.0020)        |
| Leverage        | 0.0002<br>(0.0018)         | 0.0002<br>(0.0018)         |
| Tangible        | -0.3240<br>(0.6637)        | -0.2967<br>(0.6643)        |
| Firm size       | -0.0189<br>(0.1112)        | -0.0107<br>(0.1112)        |
| polarity        | 0.0785<br>(0.0979)         | 0.0767<br>(0.0980)         |
| _cons           | 0.2940<br>(1.1926)         | 0.2415<br>(1.1937)         |
| N               | 1433                       | 1433                       |
| adj. R-sq       | 0.207                      | 0.205                      |

Table 3.4 CEO Vocal Stress and Future Earnings Surprises

This table reports panel regressions testing whether analysts underreact to CEO vocal stress. The dependent variable is  $SUE_{t+1}$ , the standardized unexpected earnings in the quarter immediately following the focal earnings call. Column (1) regresses  $SUE_{t+1}$  on Stress while controlling for the contemporaneous earnings surprise  $SUE_t$  to absorb earnings mean-reversion. Column (2) excludes  $SUE_t$ . Column (3) interacts Stress with Bad\_News (an indicator equal to one when  $SUE_t < 0$ ) to test whether the underreaction is concentrated in negative-news quarters. All specifications include the full set of firm and CEO controls, firm fixed effects, and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. A negative coefficient on Stress indicates that analyst forecasts fail to fully incorporate the negative information content of vocal stress, consistent with the analyst underreaction hypothesis. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

|                 | (1)<br>$SUE_{t+1}$     | (2)<br>$SUE_{t+1}$     | (3)<br>$SUE_{t+1}$     |
|-----------------|------------------------|------------------------|------------------------|
| stress          | -0.0001**<br>(0.0001)  | -0.0001*<br>(0.0001)   | -0.0001**<br>(0.0001)  |
| Bad news        |                        |                        | -0.0001<br>(0.0003)    |
| stress×bad      |                        |                        | 0.0001<br>(0.0001)     |
| dispersion      | -0.0004*<br>(0.0002)   | -0.0004**<br>(0.0002)  | -0.0004**<br>(0.0002)  |
| SUE             | -0.1437***<br>(0.0156) |                        |                        |
| volatility      | -0.0487***<br>(0.0120) | -0.0406***<br>(0.0124) | -0.0395***<br>(0.0130) |
| gender          | -0.0008<br>(0.0009)    | -0.0007<br>(0.0009)    | -0.0007<br>(0.0010)    |
| minority        | 0.0012**<br>(0.0005)   | 0.0011**<br>(0.0005)   | 0.0011**<br>(0.0005)   |
| Performance gap | 0.0005<br>(0.0036)     | 0.0000<br>(0.0037)     | 0.0009<br>(0.0035)     |
| Performance     | 0.0011<br>(0.0062)     | -0.0037<br>(0.0064)    | -0.0044<br>(0.0063)    |
| Momentum        | 0.0000**<br>(0.0000)   | 0.0000**<br>(0.0000)   | 0.0000**<br>(0.0000)   |
| Leverage        | -0.0000<br>(0.0000)    | 0.0000<br>(0.0000)     | 0.0000<br>(0.0000)     |
| tangible        | -0.0034<br>(0.0028)    | -0.0045<br>(0.0029)    | -0.0042<br>(0.0030)    |
| Firm size       | 0.0012**<br>(0.0005)   | 0.0013***<br>(0.0005)  | 0.0013***<br>(0.0005)  |
| Polarity        | 0.0074<br>(0.0082)     | 0.0028<br>(0.0085)     | 0.0002<br>(0.0005)     |
| _cons           | -0.0112**<br>(0.0053)  | -0.0118**<br>(0.0055)  | -0.0121**<br>(0.0055)  |
| N               | 1422                   | 1422                   | 1408                   |

|           |       |       |       |
|-----------|-------|-------|-------|
| adj. R-sq | 0.051 | 0.021 | 0.018 |
|-----------|-------|-------|-------|

Table 3.5 CEO Vocal Stress and Post-Earnings Announcement Drift

This table reports panel regressions testing whether CEO vocal stress predicts post-earnings announcement drift. Column (1) uses the two-day cumulative abnormal return CAR(0,1) as the dependent variable to capture immediate market reaction. Columns (2) through (4) use buy-and-hold abnormal returns BHAR(2,30), BHAR(2,60), and BHAR(2,90), computed from trading day +2 through day +30, +60, and +90 respectively, following the methodology of Barber and Lyon (1997). The drift window begins at day +2 to cleanly separate the drift from the immediate announcement response. The key independent variable is the continuous Stress measure. All specifications control for SUE, pre-call analyst forecast dispersion, Polarity, and the standard set of firm and CEO characteristics, with firm and year fixed effects. Standard errors are clustered at the firm level and reported in parentheses. The pattern of an insignificant immediate reaction with significant negative drift at the 60-day horizon is consistent with gradual market incorporation of soft non-verbal information. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

|                 | (1)<br>CAR(0,1)       | (2)<br>BHAR(2,30)     | (3)<br>BHAR(2,60)     | (4)<br>BHAR(2,90)      |
|-----------------|-----------------------|-----------------------|-----------------------|------------------------|
| stress          | -0.0016<br>(0.0016)   | -0.0039<br>(0.0029)   | -0.0085**<br>(0.0043) | -0.0041<br>(0.0052)    |
| SUE             | 1.7731***<br>(0.6173) | -1.3449<br>(1.6494)   | -3.2439<br>(2.4293)   | -1.5754<br>(1.8345)    |
| dispersion      | -0.2480<br>(0.2177)   | 1.8875<br>(1.1944)    | 2.0570**<br>(0.9754)  | 4.2793***<br>(1.2345)  |
| Polarity        | 0.0474***<br>(0.0164) | 0.0013<br>(0.0314)    | 0.0086<br>(0.0362)    | 0.0042<br>(0.0428)     |
| gender          | -0.0190<br>(0.0150)   | -0.0299*<br>(0.0169)  | -0.0343<br>(0.0219)   | -0.1119***<br>(0.0424) |
| minority        | 0.0102<br>(0.0077)    | -0.0206<br>(0.0268)   | -0.0398<br>(0.0257)   | -0.0166<br>(0.0396)    |
| Performance gap | 0.0038*<br>(0.0021)   | -0.0007<br>(0.0078)   | 0.0049<br>(0.0123)    | 0.0149<br>(0.0126)     |
| performance     | -0.0101**<br>(0.0041) | -0.0185**<br>(0.0091) | -0.0200<br>(0.0127)   | -0.0345**<br>(0.0173)  |
| Volatility      | 0.3599<br>(0.3622)    | 0.5155<br>(0.8682)    | 1.3182<br>(1.0340)    | 2.0028*<br>(1.1813)    |
| Momentum        | -0.0001<br>(0.0002)   | -0.0001<br>(0.0004)   | 0.0003<br>(0.0005)    | 0.0002<br>(0.0006)     |
| leverage        | 0.0000<br>(0.0001)    | 0.0004***<br>(0.0001) | 0.0001<br>(0.0003)    | 0.0004<br>(0.0003)     |
| Tangible        | 0.1427*<br>(0.0751)   | 0.1999<br>(0.1458)    | 0.3301*<br>(0.1958)   | 0.4812<br>(0.3245)     |
| Firm size       | -0.0048<br>(0.0145)   | -0.0535*<br>(0.0322)  | -0.0563<br>(0.0397)   | -0.0890*<br>(0.0519)   |
| _cons           | 0.0180<br>(0.1530)    | 0.5406<br>(0.3469)    | 0.5481<br>(0.4235)    | 0.8180<br>(0.5504)     |
| N               | 777                   | 777                   | 777                   | 777                    |
| adj. R-sq       | 0.058                 | 0.048                 | 0.013                 | 0.135                  |

Table 3.6 CEO Vocal Stress and Analyst Forecast Revisions by Firm Performance Context

This table reports panel regressions of analyst forecast revisions on CEO vocal stress, estimated separately for two performance subsamples. Panel A restricts the sample to firm-quarters with non-negative performance gap (Performance\_Gap  $\geq 0$ ), defined as the difference between the firm's current return on assets and its prior-period or industry benchmark. Panel B restricts the sample to firm-quarters with negative performance gap. The dependent variable is FREV. Each panel reports specifications using both the High\_Stress indicator and the continuous Stress measure. Controls, firm and year fixed effects, and standard error treatment follow Table 2. The contrast between panels tests whether vocal stress is more informative when verbal/quantitative news is positive (where stress is unexpected) than when it is already negative (where stress is redundant with hard information). \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

| Panel A: Performance gap $\geq 0$ |                        |                        |                        |
|-----------------------------------|------------------------|------------------------|------------------------|
|                                   | (1)                    | (2)                    | (3)                    |
|                                   | FREV                   | FREV                   | FREV                   |
| high_stress                       | -0.0018**<br>(0.0007)  |                        |                        |
| stress                            |                        | -0.0004**<br>(0.0002)  | -0.0005<br>(0.0004)    |
| Stress <sup>2</sup>               |                        |                        | 0.0000<br>(0.0000)     |
| dispersion                        | -0.1847***<br>(0.0634) | -0.1856***<br>(0.0625) | -0.1864***<br>(0.0618) |
| SUE                               | 0.7497***<br>(0.1312)  | 0.7517***<br>(0.1359)  | 0.7519***<br>(0.1361)  |
| gender                            | 0.0015<br>(0.0013)     | 0.0021*<br>(0.0012)    | 0.0020<br>(0.0012)     |
| minority                          | -0.0011<br>(0.0013)    | -0.0011<br>(0.0013)    | -0.0011<br>(0.0013)    |
| performance                       | -0.0627***<br>(0.0225) | -0.0625***<br>(0.0229) | -0.0624***<br>(0.0229) |
| Volatility                        | -0.0940<br>(0.0594)    | -0.0938<br>(0.0597)    | -0.0928<br>(0.0596)    |
| Momentum                          | -0.0001**<br>(0.0000)  | -0.0001**<br>(0.0000)  | -0.0001**<br>(0.0000)  |
| Leverage                          | -0.0000<br>(0.0000)    | -0.0000<br>(0.0000)    | -0.0000<br>(0.0000)    |
| Tangible                          | 0.0105<br>(0.0116)     | 0.0110<br>(0.0116)     | 0.0110<br>(0.0115)     |
| Firm size                         | 0.0018                 | 0.0019                 | 0.0018                 |
| Polarity                          | 0.0017<br>(0.0016)     | 0.0018<br>(0.0016)     | 0.0019<br>(0.0016)     |
| _cons                             | -0.0158<br>(0.0184)    | -0.0166<br>(0.0183)    | -0.0162<br>(0.0182)    |
| N                                 | 658                    | 658                    | 658                    |
| adj. R-sq                         | 0.446                  | 0.438                  | 0.437                  |
| Panel B: performance gap $< 0$    |                        |                        |                        |

|                     |                       |                       |                       |
|---------------------|-----------------------|-----------------------|-----------------------|
| high_stress         | 0.0002<br>(0.0006)    |                       |                       |
| stress              |                       | 0.0000<br>(0.0002)    | -0.0001<br>(0.0006)   |
| Stress <sup>2</sup> |                       |                       | 0.0000<br>(0.0001)    |
| dispersion          | -0.0919**<br>(0.0448) | -0.0920**<br>(0.0446) | -0.0919**<br>(0.0446) |
| SUE                 | 0.2714*<br>(0.1585)   | 0.2711*<br>(0.1589)   | 0.2705*<br>(0.1590)   |
| gender              | 0.0018<br>(0.0014)    | 0.0018<br>(0.0014)    | 0.0018<br>(0.0014)    |
| minority            | -0.0005<br>(0.0007)   | -0.0005<br>(0.0007)   | -0.0005<br>(0.0007)   |
| performance         | 0.0310<br>(0.0240)    | 0.0307<br>(0.0243)    | 0.0306<br>(0.0240)    |
| volatility          | -0.0715<br>(0.0653)   | -0.0721<br>(0.0650)   | -0.0724<br>(0.0651)   |
| Momentum            | -0.0000<br>(0.0000)   | -0.0000<br>(0.0000)   | -0.0000<br>(0.0000)   |
| Leverage            | 0.0000<br>(0.0000)    | 0.0000<br>(0.0000)    | 0.0000<br>(0.0000)    |
| Tangible            | 0.0168<br>(0.0178)    | 0.0168<br>(0.0178)    | 0.0165<br>(0.0177)    |
| Firm size           | 0.0006<br>(0.0015)    | 0.0006<br>(0.0015)    | 0.0005<br>(0.0015)    |
| Polarity            | 0.0026<br>(0.0019)    | 0.0025<br>(0.0019)    | 0.0026<br>(0.0019)    |
| _cons               | -0.0103<br>(0.0188)   | -0.0102<br>(0.0188)   | -0.0098<br>(0.0186)   |
| N                   | 696                   | 696                   | 696                   |
| adj. R-sq           | 0.366                 | 0.366                 | 0.364                 |

Table 3.7 CEO Vocal Stress and Analyst Forecast Dispersion by Firm Performance Context

This table reports panel regressions of the change in analyst forecast dispersion on CEO vocal stress, estimated separately by performance context. Panel A reports estimates for firm-quarters with non-negative performance gap; Panel B reports estimates for firm-quarters with negative performance gap. The dependent variable is  $\Delta$ Dispersion. Each panel reports both continuous Stress and High\_Stress specifications. Control variables, firm and year fixed effects, and clustered standard errors follow Table 3. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

|             | Performance gap $\geq 0$ |                     | performance gap $< 0$ |                      |
|-------------|--------------------------|---------------------|-----------------------|----------------------|
|             | (1)                      | (2)                 | (3)                   | (4)                  |
|             | $\Delta$ Dispersion      | $\Delta$ Dispersion | $\Delta$ Dispersion   | $\Delta$ Dispersion  |
| stress      | 0.0154<br>(0.0153)       |                     | 0.0172<br>(0.0272)    |                      |
| high_stress |                          | 0.0047<br>(0.0486)  |                       | -0.0727<br>(0.0813)  |
| SUE         | -3.3472<br>(5.2738)      | -3.6055<br>(5.2759) | -0.3789<br>(5.6972)   | -0.3812<br>(5.6939)  |
| volatility  | 0.8866<br>(4.1961)       | 0.8861<br>(4.2019)  | 10.6634*<br>(6.1927)  | 9.8792<br>(6.1837)   |
| gender      | 0.1769<br>(0.2960)       | 0.1755<br>(0.2966)  | -0.0157<br>(0.3508)   | -0.0364<br>(0.3508)  |
| minority    | -0.1886<br>(0.1455)      | -0.1816<br>(0.1457) | 0.0038<br>(0.1989)    | 0.0021<br>(0.1988)   |
| Performance | 2.0943<br>(1.5866)       | 2.0508<br>(1.5880)  | -3.3229<br>(2.1140)   | -3.5509*<br>(2.1165) |
| momentum    | 0.0012<br>(0.0026)       | 0.0010<br>(0.0026)  | -0.0061*<br>(0.0035)  | -0.0060*<br>(0.0035) |
| Leverage    | 0.0008<br>(0.0019)       | 0.0008<br>(0.0019)  | -0.0003<br>(0.0034)   | -0.0005<br>(0.0034)  |
| Tangible    | 0.6599<br>(0.7928)       | 0.6936<br>(0.7931)  | -0.7328<br>(1.2135)   | -0.6531<br>(1.2118)  |
| Firm size   | 0.0474<br>(0.1313)       | 0.0524<br>(0.1314)  | -0.1940<br>(0.1976)   | -0.1819<br>(0.1971)  |
| Polarity    | -0.0484<br>(0.1170)      | -0.0515<br>(0.1173) | 0.1334<br>(0.1782)    | 0.1187<br>(0.1780)   |
| _cons       | -0.6141<br>(1.3818)      | -0.6483<br>(1.3833) | 1.9624<br>(2.1533)    | 1.9002<br>(2.1511)   |
| N           | 641                      | 641                 | 650                   | 650                  |
| adj. R-sq   | 0.278                    | 0.276               | 0.307                 | 0.308                |

Table 3.8 CEO Vocal Stress and Future Earnings Surprises by Firm Performance Context

This table reports panel regressions of next-quarter earnings surprises on CEO vocal stress, estimated separately by performance subsample. Panel A reports estimates for firm-quarters with non-negative performance gap; Panel B reports estimates for firm-quarters with negative performance gap. The dependent variable is  $SUE_{t+1}$ . Specifications mirror those of Table 4, including controls for  $SUE_t$ , Polarity, firm and CEO characteristics, firm and year fixed effects, and firm-clustered standard errors. The asymmetry between panels identifies the precise context in which analyst underreaction to vocal stress is most pronounced. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

|                     | Performance gap $\geq 0$ |                     | performance gap $< 0$ |                       |
|---------------------|--------------------------|---------------------|-----------------------|-----------------------|
|                     | (1)                      | (3)                 | (2)                   | (4)                   |
|                     | $SUE_{t+1}$              | $SUE_{t+1}$         | $SUE_{t+1}$           | $SUE_{t+1}$           |
| stress              | -0.0001<br>(0.0001)      | -0.0001<br>(0.0001) | -0.0002**<br>(0.0001) | -0.0001**<br>(0.0001) |
| Bad news            |                          | -0.0001<br>(0.0006) |                       | 0.0003<br>(0.0005)    |
| stress $\times$ bad |                          | 0.0002<br>(0.0002)  |                       | -0.0001<br>(0.0001)   |
| dispersion          | -0.0006*<br>(0.0004)     | -0.0006<br>(0.0004) | 0.0001<br>(0.0004)    | -0.0000<br>(0.0003)   |
| SUE                 | -0.0828<br>(0.0570)      |                     | -0.1761<br>(0.1112)   |                       |
| Volatility          | -0.0097<br>(0.0226)      | -0.0119<br>(0.0205) | -0.0477*<br>(0.0276)  | -0.0421<br>(0.0299)   |
| gender              | 0.0013<br>(0.0013)       | 0.0016<br>(0.0015)  | -0.0012<br>(0.0010)   | -0.0012<br>(0.0009)   |
| minority            | -0.0008<br>(0.0011)      | -0.0003<br>(0.0010) | 0.0006<br>(0.0006)    | 0.0004<br>(0.0005)    |
| Performance         | -0.0014<br>(0.0100)      | -0.0051<br>(0.0102) | 0.0047<br>(0.0092)    | 0.0046<br>(0.0082)    |
| Momentum            | 0.0000<br>(0.0000)       | 0.0000<br>(0.0000)  | 0.0000<br>(0.0000)    | 0.0000<br>(0.0000)    |
| Leverage            | -0.0000<br>(0.0000)      | -0.0000<br>(0.0000) | 0.0000<br>(0.0000)    | 0.0000<br>(0.0000)    |
| Tangible            | -0.0033<br>(0.0062)      | -0.0028<br>(0.0063) | 0.0049<br>(0.0046)    | 0.0025<br>(0.0043)    |
| Firm size           | 0.0016<br>(0.0016)       | 0.0018<br>(0.0020)  | 0.0003<br>(0.0004)    | 0.0004<br>(0.0004)    |
| Polarity            | 0.0000<br>(0.0114)       | 0.0001<br>(0.0005)  | 0.0110<br>(0.0110)    | 0.0004<br>(0.0006)    |
| _cons               | -0.0152<br>(0.0170)      | -0.0178<br>(0.0206) | -0.0030<br>(0.0042)   | -0.0033<br>(0.0041)   |
| N                   | 601                      | 599                 | 652                   | 645                   |
| adj. R-sq           | 0.181                    | 0.162               | 0.113                 | 0.047                 |



Table 3.9 Propensity Score Matching

This table reports propensity score matching estimates of the effect of high CEO vocal stress on analyst forecast revisions. The treatment indicator is High\_Stress. The propensity score model is a logit regression of High\_Stress on firm size, performance, Polarity, stock return volatility, momentum, leverage, tangibility, CEO gender, and CEO minority status. We use one-to-one nearest-neighbor matching without replacement, with a caliper of 0.05. Panel A reports covariate balance before and after matching; %bias is the standardized percentage bias of Rosenbaum and Rubin (1985), and the t-test reports the difference between treated and control means. Panel B reports two estimates of the treatment effect on FREV: column (1) reports the average treatment effect on the treated (ATT) from the matched sample with bootstrapped standard errors (500 replications), and column (2) reports an OLS regression on the matched sample including the full set of controls, firm fixed effects, and year-quarter fixed effects, with firm-clustered standard errors. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

| Panel A: Covariate Balance Before and After Matching |                         |                        |          |                |         |       |       |
|------------------------------------------------------|-------------------------|------------------------|----------|----------------|---------|-------|-------|
|                                                      | Before Matching         |                        |          | After Matching |         |       |       |
|                                                      | Treated                 | Control                | Bias%    | Treated        | Control | Bias% | p     |
| SUE                                                  | 0.0007                  | 0.0009                 | -3.7     | 0.0009         | 0.0005  | 6.8   | 0.272 |
| Dispersion                                           | 0.0057                  | 0.0049                 | 5.6      | 0.0056         | 0.0058  | -1.7  | 0.826 |
| Polarity                                             | 0.1692                  | 0.1403                 | 15.0***  | 0.1678         | 0.174   | -3.2  | 0.601 |
| Firm                                                 | 10.034                  | 10.281                 | -20.1*** | 10.045         | 10.127  | -6.7  | 0.288 |
| Tobin's                                              | 2.781                   | 2.439                  | 16.8***  | 2.761          | 2.843   | -4.1  | 0.555 |
| Volatility                                           | 0.0218                  | 0.0218                 | 0.5      | 0.0218         | 0.0211  | 6.2   | 0.302 |
| Momentum                                             | -5.668                  | -4.957                 | -5.6     | -5.676         | -5.569  | -0.8  | 0.886 |
| Leverage                                             | 0.927                   | 0.704                  | 2.5      | 0.935          | 1.071   | -1.5  | 0.772 |
| Tangibility                                          | 0.265                   | 0.294                  | -11.0**  | 0.266          | 0.262   | 1.3   | 0.821 |
| Gender                                               | 0.03                    | 0.076                  | -20.2*** | 0.031          | 0.04    | -4.3  | 0.403 |
| Minority                                             | 0.913                   | 0.861                  | 16.4***  | 0.912          | 0.922   | -3    | 0.576 |
| CEO year                                             | 9.382                   | 9.325                  | 0.7      | 9.4            | 9.652   | -2.9  | 0.629 |
| Panel B: Treatment Effect Estimates                  |                         |                        |          |                |         |       |       |
|                                                      | (1)                     | (2)                    |          |                |         |       |       |
|                                                      | PSM(ATT)                | Matched Regression     |          |                |         |       |       |
| High_Stress                                          | -0.00111**<br>(0.00047) | -0.00094*<br>(0.00048) |          |                |         |       |       |
| Controls                                             | No                      | Yes                    |          |                |         |       |       |
| Firm FE                                              | No                      | Yes                    |          |                |         |       |       |
| Year FE                                              | No                      | Yes                    |          |                |         |       |       |
| Matched                                              | Yes                     | Yes                    |          |                |         |       |       |
| N                                                    | 1,529                   | 787                    |          |                |         |       |       |

## **Chapter 4: Multidimensional CEO Emotional Incongruence and Financial Reporting Quality: Evidence from Earnings Conference Calls**

### **4.1 Introduction**

Earnings conference calls are a central setting for corporate communication, providing CEOs with an opportunity to present financial results, explain strategic priorities, and respond to analyst questions. Although a large body of research has focused on the textual content of these disclosures (Loughran and McDonald, 2011; Li, 2010; Huang et al., 2014), an expanding literature shows that nonverbal vocal cues also convey information that is not fully captured by words alone (Mayew and Venkatachalam, 2012; Hobson et al., 2012; Price et al., 2017). Advances in audio analysis, especially Layered Voice Analysis (LVA), make it possible to extract emotional signals from vocal patterns that are difficult for speakers to consciously regulate, thereby offering insight into the psychological states underlying managerial disclosures.

Existing studies in this area have largely focused on individual emotions one at a time. Mayew and Venkatachalam (2012) offer foundational evidence that managerial positive affect predicts future firm performance, while Hobson et al. (2012) show that vocal markers of cognitive dissonance are associated with financial misreporting. This thesis extends research further: Paper 1 investigates how authentic and inauthentic CEO excitement affect stock returns and risk perceptions, and Paper 2 examines the relation between CEO stress, analyst forecast revisions, and subsequent earnings. While such single-emotion approaches have generated important insights, they do not fully capture the richness of the emotional information embedded in CEO speech. A CEO who sounds excited yet hesitant, or joyful yet uncertain, may be communicating something qualitatively different from what any single emotional indicator can

reveal on its own. By moving from isolated emotions to a multidimensional emotional profile, this paper builds on Papers 1 and 2 and develops a broader framework for understanding the informational value of CEO vocal cues during earnings conference calls.

This study introduces the concept of emotional complexity to the financial disclosure literature. We propose that when CEOs exhibit conflicting emotional signals, especially when positive and negative vocal emotions appear together, or when vocal delivery diverges from textual tone, such incongruence reflects the cognitive strain associated with impression management in earnings calls. Cognitive dissonance theory (Festinger, 1957) suggests that individuals who hold inconsistent cognitions experience psychological discomfort, and that this discomfort can manifest through observable behavioral inconsistency. In the earnings call setting, a CEO who is aware that the firm's reported performance has been strategically managed may face a conflict between the need to project confidence and the internal anxiety associated with possible detection. This tension can generate contradictory emotional patterns in speech, which LVA technology is able to detect.

A major empirical contribution of this paper is the finding that the negative emotions captured by LVA do not load onto a single, unified dimension. Instead, our principal component analysis identifies two distinct subdimensions of vocal negativity. The first, which we label the Cognitive Burden factor, consists of stress, hesitation, and sadness, with the first principal component explaining 52.5% of the variance. These emotions appear to capture the internal psychological cost of constructing and sustaining a potentially misleading narrative, consistent with the cognitive dissonance and emotional leakage framework developed below. The second, which we label the Defensive Arousal factor, consists of uneasiness and aggression, with the first principal component explaining 71.0% of the variance. These emotions seem to reflect

defensiveness and anxiety under scrutiny, consistent with the deception framework documented in DePaulo et al.'s (2003) meta-analysis. We construct separate incongruence measures for these two dimensions and demonstrate, through a forward-looking research design, that these vocal signals predict next-quarter earnings management outcomes. Using a two-stage methodology, we decompose the vocal signal into a component explained by current-quarter manipulation and a residual that captures the CEO's private assessment of future firm prospects. The residual retains predictive power, establishing that the voice contains genuinely forward-looking information beyond reflecting contemporaneous manipulation.

To capture earnings management, we use four complementary proxies. First, we estimate accrual-based earnings management through discretionary accruals derived from the modified Jones model (Dechow et al., 1995). Second, we measure real earnings management using the Roychowdhury (2006) framework. Third, we construct a meet-or-beat indicator from I/B/E/S data to identify firms that meet or narrowly exceed the analyst consensus forecast (Burgstahler and Dichev, 1997; Degeorge et al., 1999). Fourth, we measure classification shifting using unexpected core earnings from the McVay (2006) model, which captures the misclassification of core operating expenses as special items to inflate reported core earnings.

This paper makes three main contributions. First, it advances the development of audio-based analysis in the financial disclosure literature. Earlier studies focused on overall vocal tone, and our companion papers showed the value of isolating specific emotional intensities. The present study takes the next step by analyzing how multiple emotions interact within the same disclosure event. Rather than examining a single emotional signal in isolation, we use the full range of LVA-derived emotions to construct measures of emotional incongruence, that is, the simultaneous presence of conflicting emotional signals that individual emotion measures cannot

capture. This progression, from overall tone to individual emotion intensity to multidimensional emotional interaction, reflects a more refined approach to extracting qualitative information from CEO speech.

Second, the paper integrates verbal and vocal channels into a single analytical framework. Prior research has typically treated these channels separately: the textual analysis literature (Loughran and McDonald, 2011; Huang et al., 2014) focuses on what CEOs say, whereas the audio analysis literature (Hobson et al., 2012; Mayew and Venkatachalam, 2012) examines how CEOs sound. We argue that neither channel alone is sufficient to fully characterize the information embedded in earnings calls. Instead, the divergence between the two, particularly when vocal expression conflicts with verbal content, may be the most revealing signal of all. By directly measuring the gap between the CEO's controlled narrative and the emotional states leaked through the voice, we extend the tone management framework of Huang et al. (2014) and show that vocal delivery can serve as a diagnostic indicator of strategic textual management.

Third, we propose CEO emotional incongruence as a new predictor of earnings management that operates through a mechanism distinct from existing approaches. Traditional detection methods rely mainly on financial indicators, such as discretionary accruals or abnormal real activities, or on linguistic features, such as word choice and textual complexity. In contrast, our measures capture the cognitive and emotional burden of misrepresentation as it is expressed in real time through the involuntary vocal channel. This is neither a purely financial nor a purely textual signal, but rather a physiological and behavioral one. The two-dimensional structure of emotional incongruence identified in this study provides investors, auditors, and regulators with

a set of complementary tools grounded in the psychological theories of cognitive dissonance (Festinger, 1957) and emotional leakage (Ekman and Friesen, 1969).

The remainder of the paper proceeds as follows. Section 2 reviews the relevant literature and develops the hypotheses. Section 3 describes the data, sample construction, and methodology, including the approaches used to measure emotional incongruence. Section 4 presents the empirical results in three parts: forward-looking prediction of next-quarter earnings management, two-stage decomposition of the vocal signal, and analyst response analyses. Section 5 discusses the unusually high adjusted R-squared in the real earnings management specifications. Section 6 concludes.

## **4.2 Literature Review and Hypothesis Development**

### **4.2.1 Non-Verbal Cues in Financial Communication**

Non-verbal communication has become an increasingly important area in financial research because it captures dimensions of information that are not fully conveyed through formal disclosures or textual content alone. Early work by Mehrabian (1971) established that non-verbal channels, including vocal tone, carry a substantial portion of emotional information in interpersonal communication. Extending this logic, Scherer (1986, 2003) demonstrated that specific vocal parameters, fundamental frequency, intensity, speech rate, and spectral energy, systematically reflect speakers' underlying emotional and cognitive states. Because these vocal features are difficult to fully control in real time, they are especially informative in contexts where speakers face strong incentives to strategically manage impressions. In the finance context, corporate earnings calls represent precisely such a setting.

Building on this insight, Mayew and Venkatachalam (2012) provided evidence that, in earnings calls, managerial vocal affect contains incremental information about future firm

performance beyond that captured by financial statements and textual tone. Specifically, they find that more positive (negative) vocal affect is associated with higher (lower) future unexpected earnings, and that capital markets appear to price at least part of this information. Their findings establish that vocal delivery is not merely a stylistic feature of communication, but an economically meaningful information channel. Complementary studies from the textual communication literature further reinforce the broader point that managerial disclosures transmit value-relevant information through both content and delivery. Price et al. (2012) showed that the linguistic tone of conference calls is associated with abnormal returns and trading volume even after controlling for the earnings surprise, while Davis et al. (2015) demonstrated that managerial optimism in earnings press releases predicts future firm performance and partially reflects a stable managerial communication style. These textual findings collectively suggest that both the what and the how of managerial communication carry important information, but that the voice provides a distinct channel not fully captured by words alone.

A related stream of work shows that speech characteristics can also reveal deception, concealment, and credibility concerns. Hobson et al. (2012) used LVA technology to investigate whether vocal cues can detect financial misreporting. Their results showed that vocal markers of cognitive dissonance during earnings calls are positively associated with the likelihood of subsequent financial restatements. Managing a potentially misleading message can impose cognitive demands that reduce control over vocal delivery. Larcker and Zakolyukina (2012) complemented this work through the linguistic channel, developing classification models that use psychologically motivated word categories to identify deceptive discussions in conference call Q&A sessions. They find that deceptive executives exhibit more references to general knowledge, fewer nonextreme positive emotions, and fewer references to shareholder value, and

that a portfolio formed from firms with the highest deception scores produces significant negative alpha. Price et al. (2017) further distinguished between “raw” emotions and “cognitive” emotions, finding that investors respond more quickly to raw emotions but that cognitive emotions contain predictive information for future performance.

More recent studies continue to demonstrate that managerial vocal delivery is informative to capital market participants. Chen, Han, and Zhou (2023) applied deep learning techniques to analyze emotional variables in earnings calls, revealing a strong relationship between CEO emotional cues and the quality of analysts’ follow-up questions. Breuer and Knetsch (2021) found that charismatic CEOs who project enthusiasm during earnings calls receive positive market reactions, while Kim (2022) showed that investors react to real-time shifts in CEO vocal tone during disclosure events. Collectively, these studies establish that the emotional qualities embedded in spoken communication contain decision-relevant information for investors, analysts, and other market participants. More broadly, they suggest that managerial voice may reveal latent beliefs, tensions, and uncertainties that remain obscured when attention is restricted to words alone.

#### **4.2.2 Cognitive Dissonance and Emotional Leakage**

Cognitive dissonance theory provides a useful foundation for understanding why emotional inconsistencies may emerge in managerial speech. Festinger (1957) argues that individuals experience psychological discomfort when they simultaneously hold conflicting cognitions, beliefs, or attitudes. Because such inconsistency is aversive, individuals are motivated to reduce or reconcile it. In contexts where the underlying contradiction cannot be easily eliminated, however, the tension remains and may manifest behaviorally. In the setting of earnings calls, a CEO who is presenting reported performance that has been strategically

managed may face precisely this type of conflict: on the one hand, the CEO must deliver a confident and coherent public narrative; on the other hand, the CEO may privately recognize that the reported outcomes do not fully reflect underlying economic reality. The stronger this contradiction, the greater the psychological strain that may accompany disclosure.

The concept of emotional leakage helps explain how such internal tension may appear. Ekman and Friesen (1969) distinguish between channels with high “sending capacity,” which can be consciously controlled, and channels with high “leakage capacity,” which are more likely to reveal concealed internal states. Verbal content generally has high sending capacity because speakers can deliberately script, revise, and manage words. Vocal quality, by contrast, is typically harder to regulate completely, especially under pressure. As a result, vocal delivery may reveal anxiety, strain, hesitation, or other underlying emotions even when the spoken message remains polished and optimistic. This distinction is especially relevant in earnings calls, where executives are highly motivated to present confidence and credibility to investors while operating under intense scrutiny.

DePaulo et al. (2003), in a comprehensive meta-analysis of deception research, further show that deceptive behavior is associated not only with cognitive symptoms such as hesitation, speech disturbances, and signs of mental effort, but also with defensive emotional responses such as tension, irritability, nervousness, and hostility. This distinction is important for the present study because it suggests that deception-related leakage may not appear in a single uniform form. Instead, different emotional markers may reflect different dimensions of the strain generated by concealment. Some vocal cues may reflect cognitive burden, while others may reflect defensive or affective reactions to being evaluated. This perspective supports a multidimensional view of

emotional leakage and motivates our focus on emotional incongruence rather than any single vocal attribute in isolation.

#### **4.2.3 Earnings Management and Tone Management**

The earnings management literature has proved that managers exercise discretion over both accrual-based and real activities to influence reported earnings. Dechow et al. (1995) developed the modified Jones model for estimating discretionary accruals, which remains the most widely used measure of accrual-based earnings management. Kothari, Leone, and Wasley (2005) refined this approach by proposing performance-matched discretionary accruals. Beyond accrual manipulation, Roychowdhury (2006) extended the literature to real activities manipulation, documenting that firms manage earnings through sales manipulation, overproduction, and reduction of discretionary expenditures. Cohen, Dey, and Lys (2008) showed that firms shifted from accrual-based to real earnings management after the Sarbanes-Oxley Act, establishing that the two forms of earnings management may serve as substitutes.

Although earnings management is typically studied through accounting outcomes, its implications extend beyond the financial statements themselves. When managers engage in earnings management, they do not merely alter reported numbers; they must also explain and defend those outcomes in public disclosure settings. Earnings calls are especially important in this regard because they require executives to narrate firm performance in real time before analysts and investors. This setting creates a tension between narrative management and internal awareness. A CEO who knows that reported earnings have been shaped by discretionary accounting choices or opportunistic operating decisions must still project confidence, clarity, and credibility. The result may be a discrepancy between the strategic verbal narrative and the less controllable emotional content embedded in the voice.

This idea closely parallels the tone management literature. Huang et al. (2014) show that managers strategically manage the tone of earnings press releases and that unusually optimistic tone, relative to underlying fundamentals, predicts poorer future outcomes. Their residual-based approach conceptualizes managed tone as the portion of disclosure tone not explained by firm fundamentals. Relatedly, Larcker and Zakolyukina (2012) document deceptive patterns in conference call language, and Davis et al. (2015) show that managerial disclosure tone is influenced partly by manager-specific communication tendencies. Our framework extends this logic from the textual domain to the vocal domain. Rather than focusing only on whether words are excessively optimistic, we examine whether CEOs display emotional incongruence: a mismatch between a verbally positive narrative and vocal signals that reveal negative underlying states such as stress, hesitation, or uncertainty.

The central theoretical mechanism is straightforward. When reported performance has been managed, the CEO faces a conflict between external presentation and internal awareness. Publicly, the CEO must present the results as credible and economically justified. Privately, however, the CEO may know that the reported outcome depends partly on discretionary intervention. This conflict is likely to generate cognitive dissonance. Because vocal expression is less fully controllable than verbal content, part of this strain may leak through speech as simultaneous or conflicting emotional signals. Emotional incongruence thus reflects the possibility that executives are saying one thing while their voice reveals another.

#### **4.2.4 Forward-Looking Information in Vocal Cues**

A fundamental question in the vocal analysis literature is whether vocal cues merely reflect the CEO's current emotional state, a contemporaneous reaction to having managed earnings, or whether they contain genuinely forward-looking information about the firm's

prospects and the CEO's private assessment of future risks. If vocal cues only reflect current manipulation, they are redundant with financial statement analysis. But if they contain forward-looking information, capturing the CEO's private knowledge of emerging problems, strategic risks, or the sustainability of current earnings management strategies, then vocal analysis provides a uniquely valuable source of information not available from any other public disclosure channel. We develop three additional hypotheses to test this distinction.

The premise underlying a forward-looking interpretation is that CEOs possess private information about the firm's trajectory that extends beyond the current quarter's reported results. A CEO who has managed earnings to meet a benchmark knows not only that the current quarter's numbers were engineered but also whether this strategy is sustainable, whether the firm faces mounting operational challenges, and whether the next quarter will require similar or greater intervention. This private knowledge should produce emotional responses that are detectable through vocal analysis. Defensive Arousal should predict continued benchmark manipulation because serial manipulators know they will need to manage again. Cognitive Burden should predict declining future manipulation because the emerging problems signaled by stress and hesitation will eventually constrain the firm's ability to manage earnings as the adverse information materializes in the financial statements.

*Hypothesis 1: CEO vocal emotional leakage during earnings conference calls predicts next-quarter earnings management.*

The two-stage decomposition provides a sharper test. If the vocal signal merely reflects the emotional consequences of current-quarter manipulation (reverse causality), then purging current-quarter earnings management from the vocal measure should eliminate its predictive power for next-quarter outcomes. If, however, the voice also captures the CEO's private

assessment of future risks, knowledge of emerging problems, the sustainability of current strategies, or the likelihood of future manipulation, the residual should retain significant predictive power. This residual represents the “excess” vocal emotion that cannot be attributed to anything observable, including current manipulation.

*Hypothesis 2: The residual vocal signal, after purging current-quarter earnings management, retains predictive power for next-quarter earnings management.*

If vocal emotional leakage contains material information about the firm’s financial reporting quality and future prospects, sophisticated market participants should partially detect and price these signals. The market reaction to vocal cues provides external validation of the information content documented in Hypotheses 1 and 2. If Defensive Arousal signals manipulation, we expect negative returns as investors discount the credibility of the reported results. If Cognitive Burden instead reflects concerns about the firm’s trajectory rather than manipulation, its valuation effect may differ from that of Defensive Arousal.

*Hypothesis 3: CEO vocal emotional signals are reflected in market participants’ expectations and valuation at the time of disclosure.*

## **4.3 Data and Methodology**

### **4.3.1 Sample and Data Sources**

Our sample comprises S&P 500 firms from 2019 to 2024. We obtain audio recordings and transcripts of quarterly earnings conference calls from SeekingAlpha.com, which provides comprehensive coverage beginning in 2019. Following the methodology established in our companion papers, we employ pyannote.audio for speaker diarization (Plaquet & Bredin, 2023) and Google Speech-to-Text for transcript matching to isolate CEO speech segments. The

Emotion Logic platform, which utilizes Layered Voice Analysis (LVA) technology developed by Nemesysco Ltd., processes the extracted CEO audio clips.

LVA analyzes uncontrollable micro-level variations in vocal patterns, such as pitch, frequency, and tremors, that reveal genuine emotional states. The technology processes voice segments of 0.3 to 3 seconds, extracting 151 vocal indicators that are aggregated into a set of emotion scores. The platform produces scores for 13 emotion variables: aggression, anticipation, arousal, atmosphere, concentration, energy, excitement, hesitation, imagination, joy, sadness, uncertainty, and uneasiness. Each emotion is measured on a standardized scale from 0 to 30, with higher values indicating greater intensity. Additionally, stress is measured as one of four fundamental LVA indicators, detected directly from physiological markers in the vocal signal rather than inferred from combinations of other indicators. All emotion scores represent averages across the entirety of the CEO's speech during the conference call. LVA has been validated in the financial literature by Hobson et al. (2012), Mayew and Venkatachalam (2012), and Price et al. (2017).

We complement the audio-derived data with financial data from COMPUSTAT Quarterly (including total assets, revenue, accounts receivable, gross PP&E, operating cash flow, net income, cost of goods sold, inventory, SGA expenses, and R&D expenses), stock return data from CRSP, analyst forecast data from I/B/E/S (including individual and consensus EPS forecasts), and CEO demographic characteristics from ISS and EXECUCOMP. Our textual tone measure uses the Loughran and McDonald (2011) financial sentiment dictionary applied to earnings call transcripts, calculated as the normalized polarity score:  $(\text{positive words} - \text{negative words}) / (\text{positive words} + \text{negative words})$ . After merging all data sources and requiring non-

missing values for key variables, our primary analysis sample consists of approximately 4,040 firm-quarter observations.

### 4.3.2 Dependent Variables

#### 4.3.2.1 Accrual-Based Earnings Management

We measure accrual-based earnings management using the absolute value of discretionary accruals estimated from the modified Jones model (Dechow et al., 1995). For each industry-quarter defined by four-digit SIC code, we estimate:

$$\frac{TA_{it}}{A_{it-1}} = a_1 \left( \frac{1}{A_{it-1}} \right) + a_2 \left( \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} \right) + a_3 \left( \frac{PPE_{it}}{A_{it-1}} \right) + \varepsilon_{it} \quad (1)$$

where TA represents total accruals (net income minus operating cash flows), A is total assets,  $\Delta REV$  is the change in revenue,  $\Delta REC$  is the change in receivables, and PPE is gross property, plant, and equipment. We require a minimum of 10 observations per industry-quarter. Following standard practice, we exclude financial firms (SIC 6000–6999) and observations with lagged total assets below \$1 million. All scaled variables are winsorized at the 1st and 99th percentiles prior to estimation. The residual from this regression represents discretionary accruals (DA). We use  $|DA|$  as our primary measure. In our sample, mean  $|DA|$  is 0.040 with a standard deviation of 0.059, consistent with values reported in prior literature for large-cap U.S. firms.

#### 4.3.2.2 Real Earnings Management

Following Roychowdhury (2006), we measure real earnings management using abnormal levels of operating cash flows, production costs, and discretionary expenditures. For each industry-quarter, we estimate the normal level of each activity and use the residual as the abnormal component.

Abnormal Cash Flows from Operations:

$$\frac{CFO_{it}}{A_{it-1}} = a_0 + a_1 \left( \frac{1}{A_{it-1}} \right) + b_1 \left( \frac{S_{it}}{A_{it-1}} \right) + b_2 \left( \frac{\Delta S_{it}}{A_{it-1}} \right) + e_{it} \quad (2)$$

where CFO is operating cash flows and S is total revenue. Firms that engage in sales manipulation, such as offering price discounts or more lenient credit terms to accelerate sales, are expected to exhibit abnormally low cash flows relative to sales.

Abnormal Production Costs:

$$\frac{PROD_{it}}{A_{it-1}} = a_0 + a_1 \left( \frac{1}{A_{it-1}} \right) + b_1 \left( \frac{S_{it}}{A_{it-1}} \right) + b_2 \left( \frac{\Delta S_{it}}{A_{it-1}} \right) + b_3 \left( \frac{\Delta S_{it-1}}{A_{it-1}} \right) + e_{it} \quad (3)$$

where PROD is production costs, measured as the sum of cost of goods sold and the change in inventory. Firms that overproduce to spread fixed overhead costs over a larger number of units are expected to exhibit abnormally high production costs.

Abnormal Discretionary Expenditures:

$$\frac{DISEXP_{it}}{A_{it-1}} = a_0 + a_1 \left( \frac{1}{A_{it}} - 1 \right) + b_1 \left( \frac{S_{it-1}}{A_{it-1}} \right) + e_{it} \quad (4)$$

where DISEXP is the sum of SGA expenses and R&D expenses. Firms that cut discretionary spending to boost reported earnings will exhibit abnormally low discretionary expenditures. We aggregate these three components into a composite real earnings management measure:

$$REM_{it} = Ab_{PROD_{it}} - Ab_{CFO_{it}} - Ab_{DISEXP_{it}} \quad (5)$$

Higher values of REM indicate greater real earnings management activity. We also examine each component separately in supplementary analyses.

#### 4.3.2.3 Meet-or-Beat Analyst Forecasts

Using I/B/E/S data available from our companion papers, we construct an indicator variable equal to one when a firm reports earnings that meet or just barely beat the analyst consensus forecast:

$$MeetBeat_{it} = 1 \text{ if } 0 \leq (Actual\ EPS_{it} - Median\ Forecast\ EPS_{it}) \leq 0.01 \quad (6)$$

and zero otherwise. We retain each analyst's most recent forecast for each firm-quarter and compute the median consensus forecast. The meet-or-beat indicator equals one if the earnings surprise (actual EPS minus median forecast) falls in the range [\$0.00, \$0.01]. In our sample, 16.62% of firm-quarters meet or beat by one cent or less, consistent with the 15–25% range typically observed in the literature (Burgstahler & Dichev, 1997; Degeorge et al., 1999).

#### 4.3.2.4 Classification Shifting: Unexpected Core Earnings

Following McVay (2006), we measure classification shifting using unexpected core earnings. We define core earnings as operating income before depreciation, computed as  $(Sales - COGS - SGA) / Sales$ . Special items are scaled by sales, and we define the magnitude of income-decreasing special items as the absolute value of special items when negative, and zero otherwise.

We estimate expected core earnings using the McVay (2006) expectation model, which regresses current core earnings on lagged core earnings, asset turnover (sales divided by lagged total assets), current and lagged accruals (net income minus operating cash flow, scaled by sales), the percentage change in sales, and the magnitude of income-decreasing special items:

$$CE_t = \alpha + \beta_1 CE_{t-1} + \beta_2 ATO_t + \beta_3 Accruals_{t-1} + \beta_4 Accruals_t + \beta_5 \Delta Sales_t + \beta_6 |SI_t| + \varepsilon_t \quad (7)$$

where CE is core earnings scaled by sales, ATO is asset turnover, Accruals is net income minus operating cash flow scaled by sales,  $\Delta\text{Sales}$  is the percentage change in quarterly sales, and  $|\text{SI}|$  is the magnitude of income-decreasing special items scaled by sales. Operating cash flow for each quarter is derived from annual operating cash flow reported in COMPUSTAT by subtracting the prior quarter's year-to-date figure, with the first fiscal quarter value taken directly.

We estimate Equation (7) at the cross-section for each industry-year defined by four-digit SIC code, requiring a minimum of 15 observations per industry-year (McVay, 2006). We exclude observations with quarterly sales below \$1 million to avoid outliers from the scaling procedure. All input variables are winsorized at the 1st and 99th percentiles prior to estimation, and the output residuals are similarly winsorized.

The residual from this regression represents unexpected core earnings (UCE). Positive values indicate that reported core earnings exceed the level predicted by the firm's economic fundamentals, consistent with the classification shifting of expenses from core operations to special items to inflate the core earnings metric that analysts and investors focus on. In our sample, mean UCE is 0.002 with a standard deviation of 0.148, centering near zero by construction. Unlike  $|\text{DA}|$ , REM, and MeetBeat, which capture accrual manipulation, real activities manipulation, and benchmark management respectively, UCE captures a distinct form of earnings management: the strategic reclassification of items within the income statement to inflate core earnings without altering bottom-line net income.

### 4.3.3 Construction of Emotional Incongruence Measures

#### 4.3.3.1 *Principal Component Analysis of Vocal Emotions*

Before constructing our incongruence measures, we examine the factor structure of the LVA-derived emotions using principal component analysis (PCA). This step reveals a critical empirical finding that shapes our entire analytical framework.

We initially conduct PCA on all five clearly negative emotion variables: stress, hesitation, aggression, uneasiness, and sadness. The results reveal that these emotions do *not* form a single coherent factor. PC1 explains only 32.6% of the variance, and critically, uneasiness loads negatively on the first component. Pairwise correlations confirm the issue: uneasiness and aggression are negatively correlated with stress and hesitation. This means that a single “vocal negativity” composite would combine variables that move in opposite directions, producing a noisy and theoretically incoherent measure.

Instead, two empirically distinct sub-dimensions emerge from the data, each with strong theoretical grounding in the deception detection literature:

**Cognitive Burden Factor.** PCA on stress, hesitation, and sadness produces a first component explaining 52.5% of variance, with all three loading positively (stress: 0.70, hesitation: 0.65, sadness: 0.29). These emotions are positively intercorrelated (stress-hesitation:  $\rho = 0.52$ ; stress-sadness:  $\rho = 0.22$ ). They reflect the internal psychological cost of constructing and maintaining a deceptive narrative: stress captures physiological arousal from cognitive load, hesitation captures the processing difficulty of managing a false message, and sadness captures negative affect about the firm’s true condition. This aligns with Cognitive Load Theory (Sweller, 1988) and the cognitive burden predictions of Interpersonal Deception Theory (Burgoon et al., 1996).

**Defensive Arousal Factor.** PCA on uneasiness and aggression produces a first component explaining 71.0% of variance, with both loading at 0.71. These emotions reflect the CEO's defensive posture when presenting managed results: uneasiness captures anxiety about being detected, while aggression captures irritability and defensiveness, a well-documented behavioral response when deceivers feel their credibility is being challenged (Ekman, 1985; DePaulo et al., 2003).

**Positive Emotion Factor.** PCA on excitement, joy, energy, and anticipation (arousal dropped due to a near-zero loading of 0.04) produces a first component explaining 53.9% of variance, with all four loading positively (excitement: 0.64, energy: 0.53, anticipation: 0.41, joy: 0.38). This factor captures the positive emotional dimension of CEO vocal delivery.

[INSERT TABLE 4.1 ABOUT HERE]

#### ***4.3.3.2 Measurement Approaches***

We employ two complementary approaches to operationalize the two emotional dimensions, each offering a different balance between simplicity and methodological refinement. The use of multiple measurement strategies ensures that our findings are robust to alternative operationalizations.

**Approach A: Residual-Based Incongruence.** Following the methodology established by Huang et al. (2014) for tone management and applied in our Paper 1 for inauthentic excitement, we construct residual-based incongruence measures. For each emotional dimension, we regress the PCA-derived vocal factor on the proportion of negative words in the earnings call transcript, along with controls (ROA, performance gap, unexpected earnings, leverage, and firm size) and firm and year fixed effects:

$$VocalFactor_{it} = a + b_1Polarity_{it} + b_2Controls_{it} + \delta_i + \lambda_t + \varepsilon_{it} \quad (8)$$

Third, we extract the residuals and adjust for industry norms by subtracting the median residual for each industry-quarter (four-digit SIC). The adjusted residual captures the portion of vocal negativity that is unexplained by the CEO's textual narrative, observable firm characteristics, and industry-time norms. We define both continuous and indicator versions of this measure. This procedure is applied separately for the Cognitive Burden factor and the Defensive Arousal factor. The residual-based approach provides the most refined measure of incongruence by isolating the unexplained divergence between vocal emotions and textual content, but at the cost of additional methodological complexity.

**Approach B: Raw PCA Factor Scores.** Our primary measures are the PCA-derived factor scores themselves. For the Cognitive Burden dimension, we use PC1 of stress, hesitation, and sadness (*pca\_cog*). For the Defensive Arousal dimension, we use PC1 of uneasiness and aggression (*pca\_def*). These scores are entered directly as independent variables in the regression models. Higher values indicate stronger emotional intensity along each dimension. The advantage of this approach is its simplicity and transparency: it requires no additional transformations, first-stage regressions, or arbitrary construction choices. This approach follows Hobson et al. (2012), who demonstrated that composite vocal measures derived from PCA outperform individual emotion indicators in predicting financial outcomes.

The emotional dimensions and incongruence indicators are subject to possible measurement and classification error. The labels Cognitive Burden and Defensive Arousal are theoretically informed interpretations of groups of correlated vocal measures identified through PCA; they should not be interpreted as direct clinical classifications of CEO psychological states. In addition, the residual-based indicator variables classify observations according to the sign of

the industry-quarter-adjusted residual. Observations close to zero may therefore move between categories following small changes in the underlying vocal score, first-stage specification, or industry benchmark. Random misclassification would generally weaken the distinction between the classified groups and attenuate the estimated associations. Systematic misclassification, however, could bias the estimates in either direction. The results are therefore interpreted as evidence concerning empirical proxies for vocal emotional dimensions and vocal-textual incongruence, rather than definitive classifications of managerial emotion or intent.

#### **4.3.4 Control Variables**

Following the earnings management literature (Dechow et al., 1995; Kothari et al., 2005) and the audio analysis literature (Mayew and Venkatachalam, 2012), we include the following control variables: firm size (natural log of total assets), return on assets, leverage, tangible assets, stock return volatility, momentum, firm age, unexpected earnings, textual polarity score, performance gap, CEO gender, CEO ethnicity, and CEO tenure. Standard errors are clustered at the firm level throughout.

#### **4.3.5 Empirical Design**

##### ***4.3.5.1 Forward-Looking Prediction***

We test whether vocal incongruence measured during the quarter- $t$  earnings call predicts earnings management in quarter  $t+1$ . This design directly addresses reverse causality: next-quarter manipulation has not yet occurred at the time of the call, so any predictive relationship must reflect forward-looking information in the vocal signal. All regressions include firm and year fixed effects with standard errors clustered at the firm level.

#### ***4.3.5.2 Two-Stage Decomposition***

To distinguish between the vocal signal reflecting current manipulation versus containing forward-looking information, we employ a two-stage approach. In the first stage, we regress the vocal incongruence measure on the corresponding current-quarter earnings management proxy and controls, extracting the residual that captures vocal emotion unexplained by current manipulation. In the second stage, we test whether this residual predicts next-quarter earnings management. If the residual retains predictive power, the voice contains forward-looking information about the CEO's private assessment of the firm's trajectory beyond what current manipulation explains. Each first-stage regression controls for only the specific EM measure being predicted in the second stage, ensuring a targeted decomposition.

#### ***4.3.5.3 Market Reaction and Analyst Response***

We test whether cumulative abnormal returns around the earnings call and analyst forecast revisions respond to vocal incongruence. We examine both short-window  $CAR(0,1)$  and longer-horizon  $CAR(0,90)$  to assess whether the market prices vocal signals immediately or with delay. We additionally examine analyst forecast revisions (FREV) and forecast dispersion (DISP) in the high-polarity subsample where vocal-textual divergence is most pronounced.

### **4.4 Empirical Results**

#### **4.4.1 Summary Statistics**

Table 2 reports summary statistics for the key variables. Our sample yields 4,266 earnings call observations for the LVA emotion variables, with the number of observations varying across dependent variables due to data availability requirements. The mean absolute discretionary accruals  $|DA|$  is 0.018 with a standard deviation of 0.019, consistent with the relatively clean accruals observed among large S&P 500 firms. The composite real earnings

management measure (REM) has a mean near zero ( $-0.009$ ) by construction, with a standard deviation of  $0.060$ . The meet-or-beat indicator has a mean of  $0.166$ , indicating that 16.6% of firm-quarters in our sample meet or just beat the analyst consensus forecast by one cent or less, within the 15–25% range documented in prior literature (Burgstahler & Dichev, 1997; Degeorge et al., 1999). Unexpected core earnings (UCE) has a mean of  $0.002$  with a standard deviation of  $0.148$ , centering near zero by construction of the McVay (2006) classification shifting model.

Among the LVA emotion variables, hesitation exhibits the highest mean ( $15.80$ ) and greatest variation ( $SD = 5.23$ ), while sadness has the lowest mean ( $0.16$ ) and is concentrated near zero for most observations. Stress has a mean of  $2.40$ , consistent with the values reported in our Paper 2. Excitement averages  $20.80$  with a standard deviation of  $3.44$ , in line with our Paper 1 findings. The Cognitive Burden incongruence measure has a mean near zero ( $0.012$ ) with a standard deviation of  $0.567$ . The additive divergence indices also center near zero, confirming proper within-quarter standardization. Textual polarity averages  $0.325$  with a standard deviation of  $0.247$ , indicating that CEO verbal content during earnings calls is on average moderately positive.

[INSERT TABLE 4.2 ABOUT HERE]

#### **4.4.2 Forward-Looking Prediction: Vocal Emotions and Next-Quarter Earnings Management**

Tables 3 and 4 report results from regressing next-quarter earnings management proxies on the current-quarter vocal incongruence dummies, testing Hypothesis 1. Table 3 examines whether Cognitive Burden-based emotional incongruence predicts next-quarter earnings management outcomes. The results reveal a selective and economically meaningful pattern. The coefficient on `emoinc_dum_cog_neg` is negative and marginally significant for REM ( $-0.0032$ ,  $p$

< 0.10) and UCE (−0.0058,  $p < 0.10$ ), while remaining statistically insignificant for  $|DA|$  and MeetBeat. This asymmetric pattern is informative for understanding the underlying mechanism.

First, the absence of any association with accrual-based earnings management and benchmark beating suggests that Cognitive Burden does not capture active manipulation behavior. If the vocal signal primarily reflected contemporaneous opportunistic reporting, we would expect a positive relation with these manipulation proxies. Instead, the estimates indicate no such effect. Second, the negative relation with REM and classification shifting points to a forward-looking constraint mechanism. CEOs exhibiting elevated stress, hesitation, and sadness in their voice today are less likely to engage in real activities manipulation or classification shifting in the subsequent quarter. This is consistent with the interpretation that these vocal cues reflect awareness of emerging operational or financial difficulties that will limit the firm’s ability to manipulate future earnings.

Taken together, the evidence suggests that Cognitive Burden captures latent adverse information rather than strategic manipulation. The vocal signal reflects the CEO’s internal recognition that firm performance is likely to deteriorate, even if current reported earnings remain relatively clean. As these underlying issues materialize, they reduce the scope for future earnings management, particularly for manipulation strategies that rely on operational flexibility (REM) or accounting presentation (classification shifting). Importantly, these findings support the forward-looking information hypothesis (H1). Because next-quarter earnings management has not yet occurred at the time of the call, the observed predictive relation must arise from information embedded in the CEO’s vocal expression rather than contemporaneous reporting choices.

[INSERT TABLE 4.3 ABOUT HERE]

Table 4 reports the relation between Defensive Arousal-based emotional incongruence and next-quarter earnings management outcomes. In contrast to the Cognitive Burden results in Table 3, the evidence here points to a forward-looking continuation of manipulation behavior. The coefficient on `emoinc_dum_def_neg` is positive and statistically significant for MeetBeat (0.0320,  $p < 0.05$ ), indicating that CEOs whose voices exhibit elevated uneasiness and aggression are significantly more likely to meet or just beat analyst forecasts in the subsequent quarter. This effect is economically meaningful, corresponding to a sizable increase relative to the baseline meet-or-beat frequency. In contrast, the coefficients for `|DA|` and `UCE` are insignificant, while the coefficient for `REM` is negative and marginally significant ( $-0.0034$ ,  $p < 0.10$ ).

This pattern provides strong support for a forward-looking manipulation persistence mechanism. Defensive Arousal captures a distinct emotional profile characterized by tension, uneasiness, and irritability, signals commonly associated with defensive behavior under scrutiny in the deception literature (DePaulo et al., 2003). Unlike Cognitive Burden, which reflects internal strain linked to adverse fundamentals, Defensive Arousal appears to reflect strategic concern about maintaining credibility while managing expectations. The positive association with future MeetBeat suggests that these CEOs are not reacting to past manipulation but are instead anticipating the need to continue managing earnings to satisfy market benchmarks. This is consistent with the idea of serial manipulators, who repeatedly engage in benchmark management and therefore possess private knowledge that such behavior will persist. The vocal signal reveals this expectation before it is observable in financial outcomes. The negative coefficient on `REM` further reinforces this interpretation. Consistent with the substitution hypothesis (Cohen et al., 2008), firms that rely on benchmark beating may shift away from costly

real activities manipulation toward less visible reporting strategies. This suggests that Defensive Arousal is not capturing a general increase in all forms of earnings management, but rather a specific strategic orientation toward benchmark-driven manipulation. Taken together, the results provide strong support for Hypothesis 1. Defensive vocal signals contain forward-looking information about future reporting behavior, particularly the persistence of benchmark management. Unlike Cognitive Burden, which signals constraints on future manipulation, Defensive Arousal identifies firms where manipulation strategies are likely to continue.

[INSERT TABLE 4.4 ABOUT HERE]

#### **4.4.3 Two-Stage Analysis: Residual Vocal Emotions and Next-Quarter Earnings Management**

Table 5 reports the second-stage results testing whether the Cognitive Burden vocal signal contains forward-looking information beyond contemporaneous earnings management. The residual component isolates the portion of vocal emotional incongruence that is orthogonal to current-quarter manipulation, providing a direct test of Hypothesis 2. The results show that the residual Cognitive Burden signal is negatively associated with next-quarter classification shifting (UCE) ( $-0.0059$ ,  $p < 0.10$ ), while remaining statistically insignificant for  $|DA|$ , REM, and MeetBeat. This pattern is consistent with, but sharper than, the baseline results in Table 3. The persistence of the negative UCE effect after purging contemporaneous earnings management is critical. If vocal signals merely reflected the emotional consequences of current manipulation, their predictive power should disappear once current-quarter earnings management is removed. Instead, the residual retains explanatory power, indicating that the vocal signal captures incremental information not embedded in observed financial reporting choices.

Economically, the result suggests that CEOs exhibiting elevated stress, hesitation, and sadness convey private information about future constraints on reporting flexibility, particularly in the dimension of classification shifting. Because classification shifting is a relatively low-cost and mechanically simple form of earnings management, the decline in UCE implies that the underlying firm conditions are expected to deteriorate sufficiently to limit even the least costly manipulation strategies. This evidence supports a forward-looking “constraint” interpretation of Cognitive Burden. The vocal signal reflects the CEO’s internal recognition of emerging adverse conditions, such as weakening fundamentals or reduced operational flexibility, that have not yet materialized in current financial statements but will affect future reporting behavior.

[INSERT TABLE 4.5 ABOUT HERE]

Table 6 reports the second-stage results for the Defensive Arousal residual, testing whether the defensive vocal signal contains forward-looking information beyond contemporaneous benchmark management. The residual isolates the component of vocal defensiveness that is orthogonal to current-quarter earnings management, providing a clean test of Hypothesis 2. The key result is that the residual Defensive Arousal signal remains positively and significantly associated with next-quarter MeetBeat (0.0319,  $p < 0.05$ ), while coefficients for |DA|, REM, and UCE are statistically insignificant. This mirrors the baseline pattern in Table 4 but provides a stronger identification of the underlying mechanism. The persistence of the MeetBeat effect after purging contemporaneous manipulation is central. If the vocal signal simply reflected current benchmark beating, its predictive power should vanish once that component is removed. Instead, the residual continues to predict future benchmark management, indicating that the vocal signal captures incremental private information about the persistence of reporting strategies.

Economically, the result suggests that CEOs exhibiting elevated uneasiness and aggression reveal an expectation that benchmark management will continue into the next period. This is consistent with a serial manipulation mechanism, where managers anticipate the need to repeatedly meet or beat analyst expectations and adjust their reporting behavior accordingly. The vocal signal thus reflects not just current incentives, but the CEO's forward-looking assessment of the firm's reporting trajectory. The lack of significance for other earnings management proxies further sharpens this interpretation. Defensive Arousal does not predict a broad increase in manipulation, but rather a targeted continuation of benchmark-driven reporting behavior, consistent with its interpretation as a defensive response to external evaluation.

[INSERT TABLE 4.6 ABOUT HERE]

#### **4.4.4 Market Reaction to Vocal Emotional Signals**

Table 7 examines whether capital markets price the information embedded in vocal emotional incongruence at the time of the earnings call. The results provide evidence of partial and asymmetric market incorporation of vocal signals, consistent with Hypothesis 3. The coefficient on `emoinc_dum_def_neg` is negative and significant for  $CAR(0,1)$  ( $-0.0042$ ,  $p < 0.05$ ), indicating that firms whose CEOs exhibit elevated Defensive Arousal experience an immediate decline in stock returns of approximately 42 basis points. This finding suggests that investors interpret defensive vocal cues, uneasiness and aggression, as signals of lower reporting credibility or heightened risk, and discount firm value accordingly at the announcement. In contrast, `emoinc_dum_cog_neg` is positively associated with both short- and longer-horizon returns, with significant coefficients for  $CAR(0,1)$  ( $0.0041$ ,  $p < 0.05$ ) and  $CAR(0,90)$  ( $0.0034$ ,  $p < 0.05$ ). The positive short-window reaction indicates that the market views Cognitive Burden, stress, hesitation, and sadness, as a credible signal of underlying conditions, potentially reflecting

managerial candor rather than manipulation. The persistence of positive returns over the 90-day horizon further suggests that this information is not fully incorporated at the announcement, consistent with gradual price adjustment.

Taken together, the results indicate that markets respond differently to the two emotional dimensions. Defensive Arousal is priced as a negative signal linked to manipulation risk, while Cognitive Burden is interpreted as a potentially informative signal about firm fundamentals. This asymmetry reinforces the multidimensional nature of vocal emotional leakage and aligns with the earlier evidence that the two dimensions capture distinct underlying mechanisms. Importantly, the presence of both immediate and delayed return responses suggests that market processing of vocal signals is incomplete. While investors react at the time of disclosure, the persistence of returns, particularly for Cognitive Burden, indicates that part of the information is only gradually incorporated into prices. This pattern is consistent with the limited attention hypothesis, whereby less salient or harder-to-interpret signals, such as vocal cues, are not fully processed at announcement.

[INSERT TABLE 4.7 ABOUT HERE]

#### **4.4.5 Analyst Response: Forecast Revisions and Dispersion**

Tables 8 and 9 examine how financial analysts respond to vocal emotional signals across different informational environments, partitioned by textual tone. The results reveal that analyst reactions are concentrated in settings where vocal signals contradict the verbal narrative. Table 8 focuses on the high-polarity subsample, where managerial language is relatively optimistic. In this setting, the coefficient on `pca_def` is negative and statistically significant for both analyst forecast revisions and forecast dispersion, indicating that elevated Defensive Arousal leads to

downward revisions in earnings expectations and reduced disagreement among analysts. This pattern suggests that when optimistic language is paired with defensive vocal cues, analysts interpret the inconsistency as a signal of underlying weakness or reduced reporting credibility. The decline in dispersion further indicates that Defensive Arousal provides a clear and interpretable signal, leading analysts to update beliefs in a coordinated manner. In contrast, Table 9 examines the low-polarity subsample, where textual tone is already less optimistic or more negative. In this setting, the coefficients on vocal emotional measures are generally insignificant, indicating that analysts do not respond strongly to vocal cues when the verbal narrative already conveys unfavorable information. This absence of effect suggests that vocal signals are largely redundant in low-polarity environments, as the textual channel already reflects the underlying firm condition.

Taken together, the results highlight an important conditioning role of textual tone. Vocal emotional signals are most informative when they deviate from the verbal message, rather than when they reinforce it. When communication is internally consistent (i.e., negative tone accompanied by negative vocal cues), analysts appear to rely primarily on textual information. However, when vocal delivery contradicts optimistic language, analysts incorporate the additional signal and adjust expectations accordingly. These findings reinforce the interpretation that emotional incongruence, rather than raw vocal tone, drives the informational content of managerial speech. Moreover, when considered alongside the market reaction results in Table 7, the evidence suggests that analysts play a key role in processing and transmitting soft information, particularly in settings where signals are less transparent.

[INSERT TABLE 4.8 ABOUT HERE]

[INSERT TABLE 4.9 ABOUT HERE]

#### **4.5 Discussion: Addressing the High Adjusted R-Squared for Real Earnings Management**

Across all specifications, the adjusted R-squared for the REM regressions ranges from 0.74 to 0.80, substantially higher than for the other dependent variables. This reflects the strong persistence of real earnings management within firms over time: firm fixed effects absorb most of the within-firm variation because firms that engage in real activities manipulation (e.g., overproduction, R&D cuts) tend to do so consistently across quarters as part of their operational strategy. The vocal emotion variables are consistently insignificant for REM across every specification and every measurement approach. This null result is theoretically interpretable. Real earnings management involves operational decisions, cutting R&D budgets, accelerating production, adjusting pricing, that are made during the quarter, often weeks or months before the earnings call. By the time the CEO sits down for the call, these decisions are already embedded in the business results and may feel like normal business operations rather than deliberate manipulation. Accrual manipulation, by contrast, often occurs in the final days before reporting, adjusting reserves, finalizing estimates, producing a more acute emotional response during the proximate earnings call.

#### **4.6 Conclusion**

This paper examines whether vocal emotional cues in earnings conference calls convey forward-looking information about firms' financial reporting behavior and economic prospects. Using Layered Voice Analysis on S&P 500 earnings calls, we identify two distinct dimensions of vocal negativity, Cognitive Burden and Defensive Arousal, and show that they contain incremental and economically meaningful information beyond textual disclosures. We document three main findings. First, vocal emotional signals predict future earnings management outcomes, indicating that they reflect forward-looking information rather than contemporaneous reporting choices. Cognitive Burden predicts declines in future real earnings management and

classification shifting, consistent with CEOs revealing latent adverse conditions that constrain future manipulation. In contrast, Defensive Arousal predicts continued benchmark beating, identifying firms likely to persist in managing earnings expectations. Second, a two-stage decomposition shows that these effects are not driven by contemporaneous reporting behavior. The residual component of vocal emotional signals, orthogonal to current earnings management, retains predictive power for future outcomes. This provides direct evidence that managerial voice encodes private information about the firm's trajectory, including both emerging constraints and the persistence of reporting strategies. Third, we show that capital markets and analysts partially incorporate this information. Defensive Arousal is associated with negative announcement returns and downward analyst revisions, while Cognitive Burden predicts positive but gradually realized returns. Analyst responses are strongest when vocal cues contradict optimistic language, indicating that emotional incongruence enhances the informational content of managerial communication. The presence of delayed price adjustment further suggests that vocal signals are not fully processed at disclosure, consistent with limited attention to less salient information channels.

Taken together, the results highlight a central insight: nonverbal vocal cues constitute a distinct and underutilized information channel in financial markets. Importantly, this channel is multidimensional. Different emotional patterns reflect fundamentally different underlying mechanisms, strategic persistence versus emerging constraints, and therefore carry different implications for future firm behavior. This multidimensionality helps explain why prior work focusing on aggregate tone or single emotions may understate the informational content of managerial speech.

These findings have several policy and regulatory implications. First, they suggest that current disclosure frameworks, which emphasize textual content and numerical reporting, may overlook informationally relevant nonverbal signals embedded in managerial communication. While regulators such as the U.S. Securities and Exchange Commission focus on ensuring the accuracy and completeness of disclosed information, our results indicate that how information is communicated can also convey material insights about firm conditions and reporting quality. Second, the evidence that vocal signals predict future earnings management raises the possibility that audio-based analytics could complement existing monitoring tools used by regulators, auditors, and investors. For example, systematic patterns of defensive vocal behavior may serve as early warning indicators of persistent benchmark management, while elevated cognitive burden may signal emerging risks that are not yet reflected in financial statements. Incorporating such signals into surveillance systems could enhance the detection of reporting concerns in a timely manner. Third, the finding that markets only partially incorporate vocal information suggests that there are limits to current market efficiency in processing complex or nontraditional signals. This has implications for disclosure design. If certain forms of information are systematically underweighted because they are less salient or harder to interpret, regulators may consider whether additional guidance on disclosure practices, or increased transparency around communication formats, could improve information transmission.

At the same time, these implications should be interpreted with caution. Vocal signals are inherently probabilistic and may reflect a combination of psychological states unrelated to reporting behavior. As such, they are best viewed as complements rather than substitutes for traditional financial and textual analysis. Future research may further explore how audio-based

measures interact with institutional monitoring, governance structures, and disclosure regulation across different market settings.

Overall, this paper contributes to the literature on financial disclosure, earnings management, and behavioral finance by demonstrating that managerial voice contains forward-looking, economically meaningful signals about firm outcomes. More broadly, the results suggest that expanding empirical analysis beyond traditional data sources to include nonverbal communication can deepen our understanding of how information is generated, transmitted, and processed in capital markets.

Table 4.1 Principal Component Analysis of LVA Emotion Variables

This table reports the eigenvector loadings on the first principal component (PC1) for each emotion cluster. Panel A reports the Cognitive Burden factor (stress, hesitation, sadness; PC1 explains 52.5% of variance). Panel B reports the Defensive Arousal factor (uneasiness, aggression; PC1 explains 71.0%). Panel C reports the Positive Emotion factor (excitement, energy, anticipation, joy; PC1 explains 53.9%). All emotion variables are standardized to mean zero and unit standard deviation prior to PCA estimation. LVA Emotion Variables.

|                                   | Loading on PC1 | Variance Explained |
|-----------------------------------|----------------|--------------------|
| Panel A: Cognitive Burden Factor  |                | 52.5%              |
| Stress                            | 0.7009         |                    |
| Hesitation                        | 0.6500         |                    |
| Sadness                           | 0.2936         |                    |
| Panel B: Defensive Arousal Factor |                | 71.0%              |
| Uneasiness                        | 0.7071         |                    |
| Aggression                        | 0.7071         |                    |
| Panel C: Positive Emotion Factor  |                | 53.9%              |
| Excitement                        | 0.6393         |                    |
| Energy                            | 0.5306         |                    |
| Anticipation                      | 0.4085         |                    |
| Joy                               | 0.3780         |                    |

Table 4.2 Summary Statistics

This table reports descriptive statistics for the key variables. The sample comprises S&P 500 firms from 2019 to 2024. Emotion variables are measured on a 0–30 scale using Layered Voice Analysis (LVA). Polarity is the normalized textual sentiment score from the Loughran and McDonald (2011) dictionary. All continuous variables are winsorized at the 1st and 99th percentiles.

|              | count | mean    | sd      | min      | p25      | p50     | p75     | max     |
|--------------|-------|---------|---------|----------|----------|---------|---------|---------|
| DA           | 2368  | 0.0180  | 0.0185  | 0.0003   | 0.0049   | 0.0124  | 0.0245  | 0.0995  |
| REM          | 1787  | -0.0092 | 0.0596  | -0.1854  | -0.0356  | -0.0069 | 0.0178  | 0.1959  |
| Meetorbeat   | 3567  | 0.1662  | 0.3724  | 0.0000   | 0.0000   | 0.0000  | 0.0000  | 1.0000  |
| UCE          | 2054  | 0.0013  | 0.0043  | -0.0113  | -0.0001  | 0.0002  | 0.0014  | 0.0238  |
| Stress       | 4266  | 2.3970  | 1.7252  | 0.0000   | 1.0789   | 2.0577  | 3.3418  | 15.2670 |
| Hesitation   | 4040  | 15.7953 | 0.5231  | 13.2500  | 15.4548  | 15.7893 | 16.1235 | 18.3333 |
| Uneasy       | 4040  | 2.0371  | 0.9752  | 0.0769   | 1.4266   | 1.8844  | 2.4630  | 11.3333 |
| Sad          | 4040  | 0.1625  | 0.5025  | 0.0000   | 0.0000   | 0.0000  | 0.0410  | 8.2085  |
| Aggression   | 4040  | 0.5005  | 0.7311  | 0.0000   | 0.0685   | 0.2480  | 0.6192  | 9.1242  |
| Excitement   | 4040  | 20.7981 | 3.4427  | 10.1360  | 18.3228  | 20.7872 | 23.2793 | 29.5934 |
| Joy          | 4040  | 0.2150  | 0.5120  | 0.0000   | 0.0000   | 0.0158  | 0.1876  | 8.1731  |
| Energy       | 4040  | 10.6069 | 5.0311  | 1.5190   | 6.7875   | 9.6832  | 13.6061 | 29.1558 |
| Anticipation | 4040  | 16.3431 | 5.7948  | 0.1831   | 12.3700  | 16.8738 | 20.6110 | 29.6238 |
| Polarity     | 4266  | 0.3243  | 0.2470  | -1.0000  | 0.1720   | 0.3551  | 0.5048  | 0.9070  |
| Vocalneg     | 4040  | -0.0044 | 1.2184  | -2.2620  | -0.9202  | -0.1275 | 0.7441  | 3.4736  |
| Firm size    | 4244  | 10.1043 | 1.2491  | 6.6995   | 9.2313   | 10.0166 | 10.8583 | 14.4813 |
| ROA          | 4244  | 0.0171  | 0.0208  | -0.1518  | 0.0057   | 0.0139  | 0.0266  | 0.1905  |
| Volatility   | 4036  | 0.0206  | 0.0100  | 0.0074   | 0.0141   | 0.0179  | 0.0239  | 0.0977  |
| Momentum     | 4036  | -6.1884 | 11.7397 | -46.3524 | -13.1184 | -5.8529 | 0.2552  | 44.0770 |
| SUE          | 3858  | 0.0010  | 0.0033  | -0.0109  | 0.0000   | 0.0005  | 0.0017  | 0.0151  |
| Firm age     | 4258  | 39.7743 | 25.2462 | 1.0000   | 21.0000  | 33.0000 | 54.0000 | 99.0000 |
| Gender       | 4090  | 0.0663  | 0.2488  | 0.0000   | 0.0000   | 0.0000  | 0.0000  | 1.0000  |
| Minority     | 4090  | 0.8457  | 0.3613  | 0.0000   | 1.0000   | 1.0000  | 1.0000  | 1.0000  |
| CEO year     | 3858  | 7.0231  | 7.2571  | 0.0000   | 2.0000   | 5.0000  | 9.0000  | 55.0000 |

Table 4.3 Cognitive Burden Incongruence and Next-Quarter Earnings Management

This table reports OLS and linear probability model regressions of next-quarter earnings management proxies on the current-quarter Cognitive Burden emotional incongruence dummy. EmoIncongruence (Cog) equals one if the industry-quarter-adjusted residual from regressing VocalNeg (PC1 of stress, hesitation, and sadness) on textual tone and controls is positive. All dependent variables are measured in quarter t+1. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|                    | (1)                   | (2)                    | (3)                     | (4)                   |
|--------------------|-----------------------|------------------------|-------------------------|-----------------------|
|                    | DA  <sub>t+1</sub>    | REM <sub>t+1</sub>     | MeetBeat <sub>t+1</sub> | UCE <sub>t+1</sub>    |
| emoinc_dum_cog_neg | 0.0003<br>(0.0011)    | -0.0032*<br>(0.0019)   | -0.0092<br>(0.0153)     | -0.0058*<br>(0.0032)  |
| volatility         | 0.0344<br>(0.0963)    | 0.1594<br>(0.1364)     | 2.2091*<br>(1.1756)     | -0.5008<br>(0.6651)   |
| CEO year           | 0.0001<br>(0.0001)    | 0.0002<br>(0.0004)     | -0.0000<br>(0.0023)     | -0.0014*<br>(0.0007)  |
| gender             | 0.0060<br>(0.0058)    | 0.0242**<br>(0.0100)   | 0.1118<br>(0.0714)      | -0.0058<br>(0.0138)   |
| minority           | -0.0069**<br>(0.0035) | 0.0004<br>(0.0055)     | 0.0052<br>(0.0548)      | 0.0125<br>(0.0182)    |
| roa                | -0.0578<br>(0.0404)   | 0.1341<br>(0.1175)     | 0.2261<br>(0.6941)      | 0.4157*<br>(0.2385)   |
| Performance gap    | 0.0177<br>(0.0228)    | -0.0472<br>(0.0523)    | -0.3780<br>(0.3451)     | -0.0922<br>(0.0731)   |
| MB                 | 0.0001<br>(0.0000)    | 0.0001<br>(0.0001)     | 0.0003<br>(0.0004)      | 0.0000<br>(0.0002)    |
| momentum           | 0.0001*<br>(0.0000)   | 0.0001<br>(0.0001)     | 0.0019***<br>(0.0007)   | -0.0005*<br>(0.0003)  |
| Tangible asset     | 0.0153<br>(0.0184)    | 0.0087<br>(0.0473)     | 0.3815<br>(0.3026)      | -0.1480<br>(0.1281)   |
| leverage           | -0.0001<br>(0.0001)   | -0.0001<br>(0.0002)    | -0.0008<br>(0.0017)     | 0.0009<br>(0.0008)    |
| Firm age           | 0.0021<br>(0.0148)    | -0.0061<br>(0.0243)    | -0.1599<br>(0.1814)     | 0.0136<br>(0.0292)    |
| Firm size          | 0.0058<br>(0.0057)    | 0.0436***<br>(0.0130)  | -0.0986*<br>(0.0584)    | 0.0100<br>(0.0117)    |
| Polarity           | 0.0042<br>(0.0034)    | -0.0013<br>(0.0074)    | 0.1319***<br>(0.0479)   | -0.0255**<br>(0.0120) |
| _cons              | -0.0477<br>(0.0830)   | -0.4299***<br>(0.1651) | 1.5457*<br>(0.9338)     | -0.0815<br>(0.1677)   |
| N                  | 1670                  | 1243                   | 2629                    | 2102                  |
| adj. R-sq          | 0.162                 | 0.748                  | 0.051                   | 0.236                 |

Table 4.4 Defensive Arousal Incongruence and Next-Quarter Earnings Management

This table reports OLS and linear probability model regressions of next-quarter earnings management proxies on the current-quarter Defensive Arousal emotional incongruence dummy. EmoIncongruence (Def) equals one if the industry-quarter-adjusted residual from regressing VocalDef (PC1 of uneasiness and aggression) on textual tone and controls is positive. All dependent variables are measured in quarter t+1. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|                    | (1)                  | (2)                    | (3)                     | (4)                   |
|--------------------|----------------------|------------------------|-------------------------|-----------------------|
|                    | DA  <sub>t+1</sub>   | REM <sub>t+1</sub>     | MeetBeat <sub>t+1</sub> | UCE <sub>t+1</sub>    |
| emoinc_dum_def_neg | 0.0009<br>(0.0011)   | -0.0034*<br>(0.0018)   | 0.0320**<br>(0.0157)    | 0.0014<br>(0.0034)    |
| volatility         | 0.0353<br>(0.0959)   | 0.1510<br>(0.1369)     | 2.2038*<br>(1.1647)     | -0.5064<br>(0.6700)   |
| CEO year           | 0.0001<br>(0.0001)   | 0.0002<br>(0.0004)     | -0.0003<br>(0.0023)     | -0.0014*<br>(0.0008)  |
| gender             | 0.0058<br>(0.0059)   | 0.0250**<br>(0.0100)   | 0.0988<br>(0.0705)      | -0.0064<br>(0.0141)   |
| minority           | -0.0068*<br>(0.0035) | -0.0003<br>(0.0054)    | 0.0082<br>(0.0546)      | 0.0128<br>(0.0184)    |
| roa                | -0.0570<br>(0.0403)  | 0.1279<br>(0.1186)     | 0.2546<br>(0.6927)      | 0.4153*<br>(0.2394)   |
| Performance gap    | 0.0174<br>(0.0227)   | -0.0472<br>(0.0523)    | -0.4023<br>(0.3406)     | -0.0988<br>(0.0740)   |
| MB                 | 0.0001<br>(0.0000)   | 0.0001<br>(0.0001)     | 0.0003<br>(0.0004)      | 0.0000<br>(0.0002)    |
| momentum           | 0.0001*<br>(0.0000)  | 0.0000<br>(0.0001)     | 0.0019***<br>(0.0007)   | -0.0005*<br>(0.0003)  |
| Tangible asset     | 0.0154<br>(0.0183)   | 0.0072<br>(0.0482)     | 0.3797<br>(0.2977)      | -0.1479<br>(0.1285)   |
| leverage           | -0.0001<br>(0.0001)  | -0.0001<br>(0.0002)    | -0.0008<br>(0.0017)     | 0.0009<br>(0.0008)    |
| Firm age           | 0.0021<br>(0.0148)   | -0.0054<br>(0.0241)    | -0.1613<br>(0.1774)     | 0.0133<br>(0.0288)    |
| Firm size          | 0.0057<br>(0.0057)   | 0.0437***<br>(0.0129)  | -0.1011*<br>(0.0581)    | 0.0091<br>(0.0118)    |
| Polarity           | 0.0043<br>(0.0034)   | -0.0020<br>(0.0074)    | 0.1338***<br>(0.0478)   | -0.0254**<br>(0.0121) |
| _cons              | -0.0471<br>(0.0827)  | -0.4322***<br>(0.1639) | 1.5555*<br>(0.9219)     | -0.0753<br>(0.1662)   |
| N                  | 1670                 | 1243                   | 2629                    | 2102                  |
| adj. R-sq          | 0.162                | 0.748                  | 0.052                   | 0.235                 |

Table 4.5 Two-Stage Analysis: Cognitive Burden Residual and Next-Quarter Earnings Management

This table reports second-stage regressions testing whether the vocal signal contains forward-looking information beyond reflecting current-quarter manipulation (Hypothesis 2). In the first stage (untabulated), the Cognitive Burden incongruence dummy is regressed on the corresponding current-quarter earnings management proxy and controls. The residual captures vocal emotion unexplained by current manipulation. In the second stage, this residual is used to predict next-quarter earnings management. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|                      | (1)                   | (2)                   | (3)                   | (4)                   |
|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                      | $ DA _{t+1}$          | $REM_{t+1}$           | $MeetBeat_{t+1}$      | $UCE_{t+1}$           |
| Residual (Cognitive) | 0.0004<br>(0.0011)    | -0.0031<br>(0.0019)   | -0.0082<br>(0.0153)   | -0.0059*<br>(0.0032)  |
| volatility           | 0.0358<br>(0.0969)    | 0.1597<br>(0.1375)    | 2.2037*<br>(1.1752)   | -0.5001<br>(0.6673)   |
| CEO year             | 0.0001<br>(0.0001)    | 0.0002<br>(0.0004)    | -0.0000<br>(0.0023)   | -0.0014*<br>(0.0008)  |
| gender               | 0.0060<br>(0.0060)    | 0.0243**<br>(0.0104)  | 0.1099<br>(0.0711)    | -0.0062<br>(0.0138)   |
| minority             | -0.0070**<br>(0.0035) | 0.0002<br>(0.0056)    | 0.0060<br>(0.0548)    | 0.0127<br>(0.0182)    |
| roa                  | -0.0612<br>(0.0405)   | 0.1329<br>(0.1173)    | 0.2205<br>(0.6938)    | 0.4211*<br>(0.2383)   |
| Performance gap      | 0.0199<br>(0.0229)    | -0.0521<br>(0.0517)   | -0.3869<br>(0.3435)   | -0.0984<br>(0.0731)   |
| MB                   | 0.0001<br>(0.0000)    | 0.0001<br>(0.0001)    | 0.0003<br>(0.0004)    | 0.0000<br>(0.0002)    |
| momentum             | 0.0001*<br>(0.0000)   | 0.0000<br>(0.0001)    | 0.0019***<br>(0.0007) | -0.0005*<br>(0.0003)  |
| Tangible asset       | 0.0150<br>(0.0186)    | 0.0091<br>(0.0481)    | 0.3810<br>(0.3024)    | -0.1466<br>(0.1281)   |
| leverage             | -0.0001<br>(0.0001)   | -0.0001<br>(0.0002)   | -0.0008<br>(0.0017)   | 0.0009<br>(0.0008)    |
| Firm age             | 0.0023<br>(0.0150)    | -0.0091<br>(0.0250)   | -0.1612<br>(0.1813)   | 0.0139<br>(0.0292)    |
| Firm size            | 0.0060<br>(0.0058)    | 0.0418***<br>(0.0132) | -0.0996*<br>(0.0583)  | 0.0095<br>(0.0117)    |
| Polarity             | 0.0051<br>(0.0035)    | -0.0022<br>(0.0074)   | 0.1323***<br>(0.0479) | -0.0261**<br>(0.0121) |
| _cons                | -0.0510<br>(0.0835)   | -0.4037**<br>(0.1669) | 1.5559*<br>(0.9324)   | -0.0803<br>(0.1676)   |
| N                    | 1653                  | 1225                  | 2629                  | 2097                  |
| adj. R-sq            | 0.164                 | 0.751                 | 0.051                 | 0.236                 |

Table 4.6 Two-Stage Analysis: Defensive Arousal Residual and Next-Quarter Earnings Management

This table reports second-stage regressions following the same methodology as Table 5, applied to the Defensive Arousal dimension. The residual captures defensive vocal emotion unexplained by current-quarter benchmark management. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|                      | (1)                   | (2)                   | (3)                   | (4)                   |
|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                      | $ DA _{t+1}$          | $REM_{t+1}$           | $MeetBeat_{t+1}$      | $UCE_{t+1}$           |
| Residual (Defensive) | 0.0008<br>(0.0011)    | -0.0029<br>(0.0018)   | 0.0319**<br>(0.0157)  | 0.0022<br>(0.0033)    |
| volatility           | 0.0358<br>(0.0968)    | 0.1591<br>(0.1367)    | 2.2037*<br>(1.1648)   | -0.5002<br>(0.6696)   |
| CEO year             | 0.0001<br>(0.0001)    | 0.0002<br>(0.0004)    | -0.0000<br>(0.0023)   | -0.0014*<br>(0.0008)  |
| gender               | 0.0060<br>(0.0060)    | 0.0242**<br>(0.0105)  | 0.1099<br>(0.0695)    | -0.0062<br>(0.0142)   |
| minority             | -0.0070**<br>(0.0035) | 0.0002<br>(0.0054)    | 0.0060<br>(0.0546)    | 0.0127<br>(0.0184)    |
| roa                  | -0.0612<br>(0.0405)   | 0.1330<br>(0.1180)    | 0.2205<br>(0.6921)    | 0.4213*<br>(0.2395)   |
| Performance gap      | 0.0200<br>(0.0230)    | -0.0521<br>(0.0516)   | -0.3869<br>(0.3410)   | -0.0988<br>(0.0742)   |
| MB                   | 0.0001<br>(0.0000)    | 0.0001<br>(0.0001)    | 0.0003<br>(0.0004)    | 0.0000<br>(0.0002)    |
| momentum             | 0.0001*<br>(0.0000)   | 0.0000<br>(0.0001)    | 0.0019***<br>(0.0007) | -0.0005*<br>(0.0003)  |
| Tangible asset       | 0.0151<br>(0.0185)    | 0.0089<br>(0.0489)    | 0.3810<br>(0.2977)    | -0.1467<br>(0.1285)   |
| leverage             | -0.0001<br>(0.0001)   | -0.0001<br>(0.0002)   | -0.0008<br>(0.0017)   | 0.0009<br>(0.0008)    |
| Firm age             | 0.0023<br>(0.0150)    | -0.0090<br>(0.0249)   | -0.1612<br>(0.1774)   | 0.0139<br>(0.0288)    |
| Firm size            | 0.0060<br>(0.0058)    | 0.0419***<br>(0.0132) | -0.0996*<br>(0.0581)  | 0.0095<br>(0.0117)    |
| Polarity             | 0.0051<br>(0.0035)    | -0.0023<br>(0.0074)   | 0.1323***<br>(0.0479) | -0.0262**<br>(0.0121) |
| _cons                | -0.0510<br>(0.0834)   | -0.4042**<br>(0.1663) | 1.5559*<br>(0.9219)   | -0.0806<br>(0.1656)   |
| N                    | 1653                  | 1225                  | 2629                  | 2097                  |
| adj. R-sq            | 0.164                 | 0.751                 | 0.052                 | 0.235                 |

Table 4.7 Market Reaction to Vocal Emotional Signals

This table reports OLS regressions of cumulative abnormal returns (CAR) on vocal emotional incongruence dummies. CAR(0,1) is the two-day market-adjusted return starting on the earnings call date. CAR(0,90) is the 91-day market-adjusted return. Columns (1)–(2) report Defensive Arousal results; columns (3)–(4) report Cognitive Burden results. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

|                    | (1)<br>CAR(0,1)       | (2)<br>CAR(0,90)      | (3)<br>CAR(0,1)       | (4)<br>CAR(0,90)      |
|--------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| emoinc_dum_def_neg | -0.0042**<br>(0.0021) | -0.0021<br>(0.0015)   |                       |                       |
| emoinc_dum_cog_neg |                       |                       | 0.0041**<br>(0.0020)  | 0.0034**<br>(0.0014)  |
| volatility         | 0.9744***<br>(0.2146) | 0.4422***<br>(0.1585) | 0.9507***<br>(0.2219) | 0.4426***<br>(0.1581) |
| CEO year           | 0.0000<br>(0.0003)    | 0.0006**<br>(0.0003)  | 0.0000<br>(0.0003)    | 0.0006*<br>(0.0003)   |
| gender             | -0.0039<br>(0.0122)   | -0.0020<br>(0.0064)   | -0.0049<br>(0.0142)   | -0.0034<br>(0.0065)   |
| minority           | 0.0043<br>(0.0094)    | 0.0021<br>(0.0083)    | 0.0075<br>(0.0092)    | 0.0023<br>(0.0083)    |
| roa                | 0.1022<br>(0.0684)    | -0.1120**<br>(0.0527) | 0.0985<br>(0.0674)    | -0.1110**<br>(0.0520) |
| Performance gap    | 0.0046<br>(0.0686)    | 0.0789*<br>(0.0408)   | -0.0010<br>(0.0686)   | 0.0742*<br>(0.0409)   |
| MB                 | 0.0001*<br>(0.0000)   | 0.0000<br>(0.0000)    | 0.0001<br>(0.0001)    | 0.0000<br>(0.0000)    |
| momentum           | 0.0001<br>(0.0002)    | 0.0003***<br>(0.0001) | 0.0002<br>(0.0002)    | 0.0003***<br>(0.0001) |
| Tangible asset     | -0.0198<br>(0.0505)   | 0.0038<br>(0.0411)    | -0.0237<br>(0.0514)   | 0.0029<br>(0.0409)    |
| leverage           | -0.0003*<br>(0.0002)  | -0.0001<br>(0.0001)   | -0.0003*<br>(0.0002)  | -0.0001<br>(0.0001)   |
| Firm age           | 0.0058<br>(0.0239)    | 0.0443<br>(0.0272)    | 0.0076<br>(0.0239)    | 0.0440<br>(0.0271)    |
| Firm size          | -0.0109<br>(0.0075)   | 0.0031<br>(0.0053)    | -0.0120<br>(0.0077)   | 0.0026<br>(0.0053)    |
| Polarity           | 0.0353***<br>(0.0066) | 0.0145***<br>(0.0048) | 0.0365***<br>(0.0067) | 0.0147***<br>(0.0048) |
| _cons              | 0.0693<br>(0.1211)    | -0.2012*<br>(0.1077)  | 0.0689<br>(0.1245)    | -0.1980*<br>(0.1074)  |
| N                  | 2946                  | 2947                  | 2900                  | 2947                  |
| adj. R-sq          | 0.009                 | 0.021                 | 0.012                 | 0.022                 |

Table 4.8 Analyst Response to Vocal Signals (High-Polarity Subsample)

This table reports OLS regressions of analyst forecast revisions (FREV) and analyst forecast dispersion (DISP) on vocal emotional dimensions (raw PCA scores). The sample is restricted to firm-quarters with above-median textual polarity, where vocal-textual divergence is most pronounced. Columns (1)–(2) report Defensive Arousal results; columns (3)–(4) report Cognitive Burden results. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|                 | (1)<br>FREV           | (2)<br>DISP           | (3)<br>FREV           | (4)<br>DISP           |
|-----------------|-----------------------|-----------------------|-----------------------|-----------------------|
| pca_def         | -0.0002**<br>(0.0001) | -0.0006**<br>(0.0003) |                       |                       |
| pca_cog         |                       |                       | -0.0001<br>(0.0002)   | 0.0002<br>(0.0004)    |
| SUE             | 0.8417***<br>(0.1042) | -0.0486<br>(0.2293)   | 0.8413***<br>(0.1037) | -0.0497<br>(0.2278)   |
| volatility      | 0.0043<br>(0.0831)    | 0.5781***<br>(0.1164) | 0.0030<br>(0.0830)    | 0.5619***<br>(0.1162) |
| CEO year        | 0.0000<br>(0.0001)    | -0.0001<br>(0.0001)   | 0.0000<br>(0.0001)    | -0.0001<br>(0.0001)   |
| gender          | -0.0003<br>(0.0007)   | 0.0007<br>(0.0029)    | -0.0002<br>(0.0007)   | 0.0018<br>(0.0023)    |
| minority        | -0.0005<br>(0.0007)   | -0.0030<br>(0.0025)   | -0.0005<br>(0.0007)   | -0.0030<br>(0.0026)   |
| roa             | 0.0155<br>(0.0248)    | -0.1653**<br>(0.0672) | 0.0143<br>(0.0247)    | -0.1694**<br>(0.0676) |
| Performance gap | -0.0060<br>(0.0086)   | 0.0102<br>(0.0180)    | -0.0061<br>(0.0086)   | 0.0112<br>(0.0180)    |
| MB              | -0.0000<br>(0.0000)   | -0.0000<br>(0.0000)   | -0.0000<br>(0.0000)   | -0.0000<br>(0.0000)   |
| momentum        | -0.0000<br>(0.0000)   | -0.0001<br>(0.0001)   | -0.0000<br>(0.0000)   | -0.0001<br>(0.0001)   |
| Tangible asset  | 0.0253***<br>(0.0086) | 0.0122<br>(0.0191)    | 0.0238***<br>(0.0084) | 0.0084<br>(0.0187)    |
| leverage        | 0.0000<br>(0.0000)    | 0.0001**<br>(0.0000)  | 0.0000<br>(0.0000)    | 0.0001**<br>(0.0000)  |
| Firm age        | 0.0003<br>(0.0024)    | 0.0233**<br>(0.0103)  | 0.0004<br>(0.0024)    | 0.0236**<br>(0.0104)  |
| Firm size       | 0.0009<br>(0.0009)    | 0.0020<br>(0.0036)    | 0.0009<br>(0.0009)    | 0.0024<br>(0.0036)    |
| _cons           | -0.0178<br>(0.0152)   | -0.1064*<br>(0.0583)  | -0.0175<br>(0.0153)   | -0.1099*<br>(0.0589)  |
| N               | 772                   | 605                   | 772                   | 605                   |
| adj. R-sq       | 0.457                 | 0.623                 | 0.455                 | 0.621                 |

Table 4.9 Analyst Response to Vocal Signals (Low-Polarity Subsample)

This table reports OLS regressions of analyst forecast revisions (FREV) and analyst forecast dispersion (DISP) on vocal emotional dimensions (raw PCA scores). The sample is restricted to firm-quarters with below-median textual polarity, where vocal-textual divergence is most pronounced. Columns (1)–(2) report Defensive Arousal results; columns (3)–(4) report Cognitive Burden results. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

|                 | (1)<br>FREV           | (2)<br>DISP           | (3)<br>FREV           | (4)<br>DISP           |
|-----------------|-----------------------|-----------------------|-----------------------|-----------------------|
| pca_def         | -0.0000<br>(0.0002)   | -0.0001<br>(0.0006)   |                       |                       |
| pca_cog         |                       |                       | -0.0000<br>(0.0002)   | -0.0001<br>(0.0009)   |
| SUE             | 0.4477***<br>(0.1536) | -0.0439<br>(0.1036)   | 0.4477***<br>(0.1537) | -0.0435<br>(0.1045)   |
| volatility      | -0.0771*<br>(0.0431)  | 0.4240***<br>(0.1596) | -0.0772*<br>(0.0430)  | 0.4243***<br>(0.1616) |
| CEO year        | -0.0000<br>(0.0000)   | -0.0002<br>(0.0001)   | -0.0000<br>(0.0000)   | -0.0002<br>(0.0001)   |
| gender          | 0.0041***<br>(0.0010) | -0.0045**<br>(0.0023) | 0.0040***<br>(0.0009) | -0.0047**<br>(0.0024) |
| minority        | -0.0019<br>(0.0017)   | -0.0190<br>(0.0174)   | -0.0018<br>(0.0016)   | -0.0188<br>(0.0174)   |
| roa             | -0.0052<br>(0.0271)   | -0.0455<br>(0.0587)   | -0.0049<br>(0.0270)   | -0.0448<br>(0.0610)   |
| Performance gap | 0.0253<br>(0.0176)    | -0.0315<br>(0.0642)   | 0.0252<br>(0.0175)    | -0.0317<br>(0.0643)   |
| MB              | -0.0000<br>(0.0000)   | 0.0000<br>(0.0000)    | -0.0000<br>(0.0000)   | 0.0000<br>(0.0000)    |
| momentum        | -0.0001**<br>(0.0000) | 0.0000<br>(0.0001)    | -0.0001**<br>(0.0000) | 0.0000<br>(0.0001)    |
| Tangible asset  | -0.0184<br>(0.0119)   | 0.0469<br>(0.0364)    | -0.0184<br>(0.0118)   | 0.0473<br>(0.0365)    |
| leverage        | -0.0000<br>(0.0000)   | -0.0000<br>(0.0000)   | -0.0000<br>(0.0000)   | -0.0000<br>(0.0000)   |
| Firm age        | 0.0011<br>(0.0028)    | -0.0169<br>(0.0106)   | 0.0012<br>(0.0028)    | -0.0170<br>(0.0105)   |
| Firm size       | -0.0042<br>(0.0026)   | 0.0053<br>(0.0041)    | -0.0042<br>(0.0026)   | 0.0054<br>(0.0042)    |
| _cons           | 0.0462<br>(0.0316)    | 0.0083<br>(0.0569)    | 0.0459<br>(0.0317)    | 0.0078<br>(0.0584)    |
| N               | 962                   | 712                   | 962                   | 712                   |
| adj. R-sq       | 0.352                 | 0.666                 | 0.352                 | 0.666                 |

## **Chapter 5: General Conclusion**

This dissertation examines whether CEOs' vocal emotions during earnings conference calls contain value-relevant information beyond traditional financial disclosures, textual tone, and reported financial performance. Using Layered Voice Analysis on earnings call recordings of S&P 500 firms, the dissertation provides evidence that CEO voice is not merely a stylistic feature of communication, but an economically meaningful channel through which managers reveal information about firm risk, future performance, market perceptions, analyst expectations, and financial reporting quality.

The first essay shows that CEO excitement affects market reactions, but its effect depends on whether the emotional expression appears credible in the context of firm performance. When CEO excitement is consistent with strong firm performance or positive aspiration gaps, investors respond more favorably. However, when excitement is excessive or misaligned with underlying performance, the market appears to interpret it as less authentic, leading to weaker stock performance and higher perceived risk. These findings suggest that investors do not respond mechanically to positive emotional displays. Instead, they assess whether the CEO's emotional expression is credible and consistent with the firm's economic condition.

The second essay focuses on CEO vocal stress as an involuntary signal of private concern. The findings show that high vocal stress predicts more negative analyst forecast revisions and greater analyst forecast dispersion, suggesting that analysts partially recognize stress as an adverse signal. However, vocal stress also predicts negative future earnings surprises and negative post-earnings announcement drift. This evidence indicates that analysts and

investors underreact to the information contained in CEO vocal stress. Although they appear to detect the signal, they do not fully incorporate its implications into forecasts or prices at the time of the earnings call.

The third essay develops a multidimensional framework of CEO emotional incongruence. Rather than examining a single vocal emotion, it studies how different emotions interact and how vocal delivery may diverge from textual tone. The findings identify two dimensions of vocal negativity: Cognitive Burden and Defensive Arousal. These vocal signals predict future earnings management and financial reporting quality. The two-stage analysis further shows that residual vocal signals, after purging current earnings management, continue to predict future reporting outcomes. This suggests that CEO voice contains forward-looking information about reporting credibility and managerial private assessments that is not fully reflected in current accounting numbers.

Together, the three essays contribute to the literature on corporate disclosure, behavioral finance, analyst underreaction, post-earnings announcement drift, and financial reporting quality. The dissertation extends prior research by showing that non-verbal executive communication provides information that is distinct from both financial statements and written disclosures. It also shows that different vocal emotions carry different economic meanings. Excitement may signal confidence or inauthentic impression management; stress may reveal private concern; and emotional incongruence may indicate reporting risk and future earnings management.

The findings also have practical implications. For investors and analysts, the results suggest that earnings call audio contains information that may not be available from transcripts alone. For auditors and regulators, CEO vocal cues may serve as supplementary indicators of reporting credibility, especially when combined with accounting-based and textual measures. For

corporate managers, the results highlight the importance of credible and authentic communication, as markets may evaluate not only what CEOs say but also how they say it.

A limitation in our studies concern potential misclassification in the audio-derived measures. Errors may arise from automated speaker identification, the use of LVA scores as proxies for latent emotional states, and the conversion of continuous measures into categories based on tercile, sign, or residual thresholds. Random misclassification would generally add noise and weaken the estimated relationships, whereas systematic misclassification could bias the findings in either direction. The emotional classifications should therefore be interpreted as empirical proxies rather than direct observations of CEO psychological states or intentions.

Overall, this dissertation advances a broader view of corporate disclosure. Financial communication is not limited to numbers and words; it also includes the emotional and psychological signals conveyed through voice. By showing that CEO vocal emotions predict market outcomes, analyst behavior, and financial reporting quality, this dissertation demonstrates that non-verbal communication plays an important role in how information is transmitted and interpreted in capital markets.

## Bibliography

- Aabo, T., Pantzalis, C., Park, J. C., Trigeorgis, L., & Wulff, J. N. (2024). CEO personality traits, strategic flexibility, and firm dynamics. *Journal of Corporate Finance*, 84, 102524.
- Adebambo, B., Bowen, R. M., Malhotra, S., & Zhu, P. (2021). CEO extraversion and the cost of equity capital. *Journal of Financial Research*.
- Bamber, L. S., Barron, O. E., & Stevens, D. E. (2010). Trading volume around earnings announcements and other financial reports: Theory, research design, empirical evidence, and directions for future research. *Research Design, Empirical Evidence, and Directions for Future Research* (February 27, 2010).
- Barber, B. M., & Lyon, J. D. (1997). Detecting long-run abnormal stock returns: The empirical power and specification of test statistics. *Journal of financial economics*, 43(3), 341-372.
- Bernard, V. L., & Thomas, J. K. (1989). Post-earnings-announcement drift: delayed price response or risk premium?. *Journal of Accounting research*, 27, 1-36.
- Bernard, V. L., & Thomas, J. K. (1990). Evidence that stock prices do not fully reflect the implications of current earnings for future earnings. *Journal of accounting and economics*, 13(4), 305-340.
- Bekiros, S., Jlassi, M., Naoui, K., & Uddin, G. S. (2017). The asymmetric relationship between returns and implied volatility: Evidence from global stock markets. *Journal of Financial Stability*, 30, 156-174.
- Bless, H., Schwarz, N., & Klemmmeier, M. (1996). Mood and stereotyping: Affective states and the use of general knowledge structures. *European review of social psychology*, 7(1), 63-93.
- Bowen, R. M., Davis, A. K., & Matsumoto, D. A. (2002). Do conference calls affect analysts' forecasts?. *The accounting review*, 77(2), 285-316.

- Bradshaw, M. T., Drake, M. S., Myers, J. N., & Myers, L. A. (2012). A re-examination of analysts' superiority over time-series forecasts of annual earnings. *Review of Accounting Studies*, 17(4), 944-968.
- Bredin, H. (2023, August). pyannote. audio 2.1 speaker diarization pipeline: principle, benchmark, and recipe. In 24th INTERSPEECH Conference (INTERSPEECH 2023) (pp. 1983-1987). ISCA.
- Brescoll, V. L., & Uhlmann, E. L. (2008). Can an angry woman get ahead? Status conferral, gender, and expression of emotion in the workplace. *Psychological science*, 19(3), 268-275.
- Breuer, W., & Knetsch, A. (2021). It's Not What You Say, but How You Say It – Managerial Charisma and Agitation in Earnings Conference Calls. EFMA Annual Meeting 2022.
- Bromiley, P. (1991). Testing a Causal Model of Corporate Risk-Taking and Performance. *Academy of Management Journal*, 34(1), 37-59.
- Brooks, A.W. (2014). Get Excited: Reappraising Pre-Performance Anxiety as Excitement. *Journal of Experimental Psychology: General*, 143(3), 1144-1158.
- Brown, L. D., Call, A. C., Clement, M. B., & Sharp, N. Y. (2015). Inside the “black box” of sell-side financial analysts. *Journal of accounting research*, 53(1), 1-47.
- Brown, S., Hillegeist, S. A., & Lo, K. (2004). Conference calls and information asymmetry. *Journal of Accounting and Economics*, 37(3), 343-366.
- Bochkay, K., Hales, J., & Chava, S. (2020). Hyperbole or Reality? Investor Response to Extreme Language in Earnings Conference Calls. *The Accounting Review*, 95(2), 31-55.
- Burgoon, J. K., Buller, D. B., & Woodall, W. G. (1996). Nonverbal communication: The unspoken dialogue. (No Title).

- Burgstahler, D., & Dichev, I. (1997). Earnings management to avoid earnings decreases and losses. *Journal of accounting and economics*, 24(1), 99-126.
- Bushee, B. J., Matsumoto, D. A., & Miller, G. S. (2003). Open versus closed conference calls: the determinants and effects of broadening access to disclosure. *Journal of accounting and economics*, 34(1-3), 149-180.
- Call, A. C., Hewitt, M., Watkins, J., & Yohn, T. L. (2021). Analysts' annual earnings forecasts and changes to the I/B/E/S database. *Review of Accounting Studies*, 26, 1-36.
- Chen, W. R. (2008). Determinants of firms' backward-and forward-looking R&D search behavior. *Organization Science*, 19(4), 609-622.
- Chen, Y., Han, D., & Zhou, X. (2023). Mining the Emotional Information in the Audio of Earnings Conference Calls: A Deep Learning Approach for Sentiment Analysis of Securities Analysts' Follow-Up Behavior.
- Chrisman, J. J., & Patel, P. C. (2012). Variations in R&D investments of family and nonfamily firms: Behavioral agency and myopic loss aversion perspectives. *Academy of management Journal*, 55(4), 976-997.
- Chordia, T., Shivakumar, L., & Subrahmanyam, A. (2006). The cross-section of daily variation in liquidity. In *Advances In Quantitative Analysis Of Finance And Accounting: Essays in Microstructure in Honor of David K Whitcomb* (pp. 75-110).
- Clement, M. B., & Tse, S. Y. (2005). Financial analyst characteristics and herding behavior in forecasting. *The Journal of finance*, 60(1), 307-341.
- Cohen, D. A., Dey, A., & Lys, T. Z. (2008). Real and accrual-based earnings management in the pre-and post-Sarbanes-Oxley periods. *The accounting review*, 83(3), 757-787.
- Core, J. E. (2001). A review of the empirical disclosure literature: discussion. *Journal of accounting and economics*, 31(1-3), 441-456.

- Cyert, R.M., & March, J.G. (1963). *A Behavioral Theory of the Firm*. Englewood Cliffs, NJ: Prentice-Hall.
- Daniel, K., Hirshleifer, D., & Subrahmanyam, A. (1998). Investor psychology and security market under-and overreactions. *the Journal of Finance*, 53(6), 1839-1885.
- Davis, A. K., Ge, W., Matsumoto, D., & Zhang, J. L. (2015). The effect of manager-specific optimism on the tone of earnings conference calls. *Review of accounting studies*, 20(2), 639-673.
- Dechow, P. M., & Dichev, I. D. (2002). The quality of accruals and earnings: The role of accrual estimation errors. *The accounting review*, 77(s-1), 35-59.
- Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. *The Accounting Review*, 193-225.
- Degeorge, F., Patel, J., & Zeckhauser, R. (1999). Earnings management to exceed thresholds. *The journal of business*, 72(1), 1-33.
- DeLisle, R. J., Grant, A., & Mao, R. (2021). Does ESG decrease information asymmetry? Evidence from earnings conference call tones and subsequent returns.
- DellaVigna, S., & Pollet, J. M. (2009). Investor inattention and Friday earnings announcements. *The journal of finance*, 64(2), 709-749.
- DePaulo, B. M., Lindsay, J. J., Malone, B. E., Muhlenbruck, L., Charlton, K., & Cooper, H. (2003). Cues to deception. *Psychological bulletin*, 129(1), 74.
- Doran, J. S., Peterson, D. R., & Price, S. M. (2012). Earnings conference call content and stock price: The case of REITs. *The Journal of Real Estate Finance and Economics*, 45, 402-434.
- Eagly, A. H., & Karau, S. J. (2002). Role congruity theory of prejudice toward female leaders. *Psychological review*, 109(3), 573.

- Ekman, P., & Friesen, W. V. (1969). Nonverbal leakage and clues to deception. *Psychiatry*, 32(1), 88-106.
- Epstein, L. G., & Schneider, M. (2008). Ambiguity, information quality, and asset pricing. *The Journal of Finance*, 63(1), 197-228.
- Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of financial economics*, 33(1), 3-56.
- Fan, Y., Barua, A., Cready, W. M., & Thomas, W. B. (2010). Managing earnings using classification shifting: Evidence from quarterly special items., 57(5), 2113-2141.
- Foster, G., Olsen, C., & Shevlin, T. (1984). Earnings releases, anomalies, and the behavior of security returns. *Accounting Review*, 574-603.
- Frankel, R., McNichols, M., & Wilson, G. P. (1995). Discretionary disclosure and external financing. *Accounting Review*, 135-150.
- Frankel, R., Johnson, M., & Skinner, D. J. (1999). An empirical examination of conference calls as a voluntary disclosure medium. *Journal of Accounting Research*, 37(1), 133-150.
- Festinger, L. (1972). A theory of cognitive dissonance. *Social psychology: Experimentation, theory, research*, 254-257.
- Gomez, E., Heflin, F., & Moon, J. (2018). Crowdsourced financial analysis and information asymmetry at earnings announcements. Georgia Tech Scheller College of Business.
- Gorodnichenko, Y., Pham, T., & Talavera, O. (2023). The voice of monetary policy. *American Economic Review*, 113(2), 548-584.
- Goyal, A., & Saretto, A. (2009). Cross-section of option returns and volatility. *Journal of Financial Economics*, 94(2), 310-326.
- Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of accounting and economics*, 40(1-3), 3-73.

- Grandey, A.A., Fisk, G.M., Mattila, A.S., Jansen, K.J., & Sideman, L.A. (2005). Is “Service with a Smile” Enough? Authenticity of c Human Decision Processes, 96(1), 38-55.
- Greve, H.R. (2003). *Organizational Learning from Performance Feedback: A Behavioral Perspective on Innovation and Change*. Cambridge University Press.
- Hajek, P., & Munk, M. (2023). Speech emotion recognition and text sentiment analysis for financial distress prediction. *Neural Computing and Applications*, 35(29), 21463-21477.
- Hambrick, D.C., & Mason, P.A. (1984). Upper Echelons: The Organization as a Reflection of Its Top Managers. *Academy of Management Review*, 9(2), 193-206.
- Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1993). Emotional contagion. *Current directions in psychological science*, 2(3), 96-100.
- Healy, P. M., & Palepu, K. G. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of accounting and economics*, 31(1-3), 405-440.
- Hirshleifer, D., Lim, S. S., & Teoh, S. H. (2009). Driven to distraction: Extraneous events and underreaction to earnings news. *The journal of finance*, 64(5), 2289-2325.
- Hirshleifer, D., & Teoh, S. H. (2003). Limited attention, information disclosure, and financial reporting. *Journal of accounting and economics*, 36(1-3), 337-386.
- Hirshleifer, D., & Shumway, T. (2003). Good Day Sunshine: Stock Returns and the Weather. *The Journal of Finance*, 58(3), 1009-1032.
- Hobson, J.L., Mayew, W.J., & Venkatachalam, M. (2012). *Analyzing Speech to Detect Financial Misreporting*.
- Hochschild, A.R. (1983). *The Managed Heart: Commercialization of Human Feeling*. Berkeley: University of California Press.

- Hong, H., & Stein, J. C. (1999). A unified theory of underreaction, momentum trading, and overreaction in asset markets. *The Journal of finance*, 54(6), 2143-2184.
- Huang, X., Teoh, S. H., & Zhang, Y. (2014). Tone management. *The accounting review*, 89(3), 1083-1113.
- Jamieson, J.P., Mendes, W.B., Nock, M.K., & Gross, J.J. (2012). Changing the Conceptualization of Stress in Social Anxiety Disorder: Arousal Reappraisal Improves Performance. *Journal of Experimental Psychology: General*, 141(3), 417-422.
- Jensen, M. C., & Meckling, W. H. (2019). Theory of the firm: Managerial behavior, agency costs and ownership structure. In *Corporate governance* (pp. 77-132). Gower.
- Johnstone, T., & Scherer, K.R. (2000). Vocal communication of emotion. In *Handbook of emotions*
- Huang, X., Teoh, S.H., & Zhang, Y. (2014). Tone Management. *The Accounting Review*, 89(3), 1083-1113.
- Kim, G. (2022). Can You Hear Me? Vocal Delivery in Earnings Calls and Real-Time Market Reactions.
- Kim, O., & Verrecchia, R. E. (1994). Market liquidity and volume around earnings announcements. *Journal of accounting and economics*, 17(1-2), 41-67.
- Kimbrough, M. D. (2005). The effect of conference calls on analyst and market underreaction to earnings announcements. *The Accounting Review*, 80(1), 189-219.
- Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. *Journal of accounting and economics*, 39(1), 163-197.
- Koval, R., Andrews, N., & Yan, X. (2023, July). Forecasting earnings surprises from conference call transcripts. In *Findings of the Association for Computational Linguistics: ACL 2023* (pp. 8197-8209).

- Kyaw, K. (2020). Market volatility and investors' view of firm-level risk: a case of green firms. *Journal of Risk and Financial Management*, 13(8), 175.
- Kuusela, P., Keil, T., & Maula, M. (2017). Driven by aspirations, but in what direction? Performance shortfalls, slack resources, and resource-consuming vs. resource-freeing organizational change. *Strategic management journal*, 38(5), 1101-1120.
- Larcker, D.F., & Zakolyukina, A.A. (2012). Detecting Deceptive Discussions in Conference Calls. *Journal of Accounting Research*, 50(2), 495-540.
- Lazarus, R.S. (1991). *Emotion and Adaptation*. New York: Oxford University Press.
- Levy, H., & Yagil, Y. (2012). Stock Price Fluctuations and Emotions in Corporate Communications. *Journal of Behavioral Finance*, 13(4), 202-214.
- Li, F. (2010). Textual analysis of corporate disclosures: A survey of the literature. *Journal of accounting literature*, 29(1), 143-165.
- Li, J., Yang, L., Smyth, B., & Dong, R. (2020, October). Maec: A multimodal aligned earnings conference call dataset for financial risk prediction. In *Proceedings of the 29th ACM International Conference on Information & Knowledge Management* (pp. 3063-3070).
- Livnat, J., & Mendenhall, R. R. (2006). Comparing the post-earnings announcement drift for surprises calculated from analyst and time series forecasts. *Journal of accounting research*, 44(1), 177-205.
- Loh, R. K., & Mian, G. M. (2006). Do accurate earnings forecasts facilitate superior investment recommendations?. *Journal of Financial Economics*, 80(2), 455-483.
- Loughran, T., & McDonald, B. (2011). When Is a Liability Not a Liability? Textual Analysis, Dictionaries, and 10-Ks. *The Journal of Finance*, 66(1), 35-65.
- Lovreta, L., & Silaghi, F. (2020). The surface of implied firm's asset volatility. *Journal of Banking & Finance*, 112, 105253.

- MacKinlay, A. C. (1997). Event studies in economics and finance. *Journal of economic literature*, 35(1), 13-39.
- McVay, S. (2006). Earnings management using classification shifting: An examination of core earnings and special items. *The Accounting Review*, 81(3), 501–531.
- March, J.G., & Shapira, Z. (1992). Variable Risk Preferences and the Focus of Attention. *Psychological Review*, 99(1), 172-183.
- Matsumoto, D., Pronk, M., & Roelofsen, E. (2011). What makes conference calls useful? The information content of managers' presentations and analysts' discussion sessions. *The Accounting Review*, 86(4), 1383-1414.
- Mayew, W.J., & Venkatachalam, M. (2012). The Power of Voice: Managerial Affective States and Future Firm Performance.
- Mehrabian, A. (1971). *Silent Messages: Implicit Communication of Emotions and Attitudes*. Belmont, CA: Wadsworth.
- Merkley, K.J. (2014). Narrative Disclosure and Earnings Performance: Evidence from R&D Disclosures. *The Accounting Review*, 89(2), 725-757.
- Petersen, M. A. (2008). Estimating standard errors in finance panel data sets: Comparing approaches. *The Review of financial studies*, 22(1), 435-480.
- Plaquet, A., & Bredin, H. (2023). Powerset multi-class cross entropy loss for neural speaker diarization. *arXiv preprint arXiv:2310.13025*.
- Price, S. M., Doran, J. S., Peterson, D. R., & Bliss, B. A. (2012). Earnings conference calls and stock returns: The incremental informativeness of textual tone. *Journal of Banking & Finance*, 36(4), 992-1011.

- Price, S. M., Seiler, M. J., & Shen, J. (2017). Do investors infer vocal cues from CEOs during quarterly REIT conference calls?. *The Journal of Real Estate Finance and Economics*, 54(4), 515-557.
- Rennekamp, K. M., Sethuraman, M., & Steenhoven, B. A. (2022). Engagement in earnings conference calls. *Journal of Accounting and Economics*, 74(1), 101498.
- Schachter, S., & Singer, J.E. (1962). Cognitive, Social, and Physiological Determinants of Emotional State. *Psychological Review*, 69(5), 379-399.
- Siougle, G., Spyrou, S. I., & Tsekrekos, A. E. (2014). Conference calls around merger and acquisition announcements: Do they reduce information asymmetry? UK evidence. *Research in International Business and Finance*, Elsevier.
- Shleifer, A., & Vishny, R. W. (1997). The limits of arbitrage. *The Journal of finance*, 52(1), 35-55.
- Smith, C.A., & Lazarus, R.S. (1993). Appraisal Components, Core Relational Themes, and the Emotions. *Cognition and Emotion*, 7(3-4), 233-269.
- Sutrisno, P., & Karmudiandri, A. (2020). CEO overconfidence, founder restatement of financial reporting. *International Journal of Business, Economics and Law*, 23(1), 192-198.
- Wang, M. (2024). Negative Performance Aspiration Gap and Stock Price Crashes: Based on Behavioral Theory and Agency Theory Perspective. *Asia-Pacific Journal of Financial Studies*, 53(1), 60-86.
- So, E. C. (2013). A new approach to predicting analyst forecast errors: Do investors overweight analyst forecasts?. *Journal of Financial Economics*, 108(3), 615-640.
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive science*, 12(2), 257-285.

- Wang, G., Holmes Jr, R. M., Oh, I. S., & Zhu, W. (2016). Do CEOs matter to firm strategic actions and firm performance? A meta-analytic investigation based on upper echelons theory. *Personnel psychology*, 69(4), 775-862.
- Wiseman, R. M., & Gomez-Mejia, L. R. (1998). A behavioral agency model of managerial risk taking. *Academy of management Review*, 23(1), 133-153.
- Yerkes, R.M., & Dodson, J.D. (1908). The Relation of Strength of Stimulus to Rapidity of Habit-Formation. *Journal of Comparative Neurology and Psychology*, 18(5), 459-482.
- Zhang, X. F. (2006). Information uncertainty and stock returns. *The journal of Finance*, 61(1), 105-137.
- Zhu, C., Xiao, Y., & Wang, R. (2023). Behavioral influences on the relationship between firms' aspiration performance gap and innovation input: The moderating role of executives' vocational socialization. *Journal of Product Innovation Management*, 40(3), 358-380.
- Zona, F., Minoja, M., & Coda, V. (2013). Antecedents of corporate scandals: CEOs' personal traits, stakeholders' cohesion, managerial fraud, and imbalanced corporate strategy. *Journal of Business Ethics*, 113, 265-283.