Oh What a Beautiful Morning!

Diurnal Influences on Executives and Analysts:
Evidence from Conference Calls

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Abstract

This study provides novel evidence that expert economic agents' work-related activities are systematically influenced by the time of day. We use archival data derived from time-stamped quarterly earnings conference calls together with linguistic algorithms to measure and track the moods of executives and analysts at different times of the day. The evidence indicates that the tone of conference call discussions deteriorates markedly over the course of the trading day, with both analysts' and executives' moods becoming more negative as the day wears on. Capital market pricing tests reveal that the time-of-day-induced negative tone leads to temporary stock mispricings. Our findings are relevant because the diurnal variations in behavior documented in the context of quarterly earnings calls are likely to extend across other important corporate communication, decision making, and performance situations, leading to potentially significant economic consequences.

1. Introduction

Most of us sense that our moods, physical energy levels, and cognitive functioning skills vary over the course of the day, and a substantial body of psychological and physiological literature scientifically confirms this (e.g., Freeman and Hovland (1930); Folkard (1975); Watts, Cox and Robson (1983); Wood and Magnello (1992); Stone, Smyth, Pickering and Schwartz (1996); and Blatter and Cajochen (2007)). Due to a confluence of factors including mental fatigue, declining glucose levels, and the impact of circadian rhythms on brain wave activity, hormone production, cell regeneration and other aspects of cognitive function and biological activity, human functioning is decidedly variable along many dimensions over the 24-hour circadian cycle. Although this time-induced variability is likely to have significant economic implications when considered in the context of managerial communications, negotiations, decision making, and other aspects of professional performance, we are unaware of any prior studies that have examined the influence of diurnal variations in a corporate setting. We address this deficiency in the literature by investigating the impact of the time of day on expert economic agents in one very significant corporate-capital markets context: the regularly recurring and highly consequential quarterly earnings conference call discussions between the firm's top executives and their most important investors and analysts. Our extensive archival study relies upon more than 18,000 conference call transcripts and provides the first evidence of systematic diurnal influences on economic agents engaged in a major corporate activity.

The routine and ubiquitous earnings conference calls are a main channel of communications between companies and investors, and prior studies establish that these events have important economic consequences. The calls are associated with increased stock trading, volatility, and abnormal price changes (Frankel, Johnson and Skinner (1999); and Bushee, Matsumoto and Miller (2003), amongst others), and they also affect the post-call price formation process (Kimbrough (2005)) because the call conversations elicit new information about the firm's economic prospects (Matsumoto, Pronk and Roelofsen (2011)). Thus, the earnings calls underlying our sample involve economically sophisticated, highly motivated, and presumed rational expert economic agents engaged in an important aspect of their professional duties. Given this, our setting may be considered, *a priori,* an unlikely one in which to detect diurnal influences (i.e., call participants represent the near embodiment of the idealized *homo economicus*). Notwithstanding this, we find

strong evidence that the activities of even these expert economic agents are significantly influenced by the time of day.

Our enquiry into the impact of the time of day in an economic setting is motivated by the burgeoning research related to biological rhythms (Foster and Kreitzman (2005)), which documents the influence of diurnal variations in various general or particular contexts. Recent studies in communications, for example, use hundreds of millions of "tweets" to document that tweeters' moods vary throughout the day, with early morning and late evening showing the highest levels of happy tweets[1] (Mislove, Lehmann, Ahn, Onnela and Rosenquist (2010); Golder and Macy (2011)). Diurnal variations also have important consequences in the context of more professional decision making and performance situations, such as the judiciary and medicine. Danziger, Levav and Avnaim-Pesso (2011), for example, find that judges' parole decisions vary in a predictable manner over the course of the day, while Dai, Milkman, Hofmann, and Staats (2015) and Linder, Doctor, Friedberg, Nieva, Birks, Meeker and Fox (2014) respectively document the disturbing finding that each of nurses' and doctors' professional performances deteriorate as the day wears on.

The influence of the time of day documented in these and other studies is explained in part by two lines of research in the fields of psychology and physiology: "personal resources" theory and the study of circadian rhythms' influence on human biology and behavior. A core underlying assumption of the personal resources framework is that individuals have a limited "reservoir" of resources from which to draw in order to adequately perform the variety of demands and activities that they face throughout the day. As these resources are depleted over the course of the work-day, individuals exhibit poorer task performance, greater hostility, and more aggressive interaction and communication (DeWall, Baumeister, Stillman and Gailliot (2007); Hagger, Wood, Stiff and Chatzisarantis (2010); Stucke and Baumeister (2006)). In addition to our limited resources, humans (like most other living beings, including plants, animals, fungi, and cyanobacteria) are also significantly affected by the roughly 24-hour circadian (*circa,* about; *diem,* a day) cycle. Circadian rhythms affect human biology, emotions, and cognitive function, and the diurnal variations that they induce are not trivial; by some estimates, depending on the task, the

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[1] A "tweet" is a text message of 140 characters or less sent on Twitter, an online social networking and microblogging service. As of August 2014, Twitter has 271 million monthly active users who send 500 million tweets per day (source: https://about.twitter.com/company, referenced August 28th, 2014).

performance change between the daily high and low points can be equivalent to the effect on performance of drinking the legal limit of alcohol (Foster and Kreitzman (2005)). The potential economic consequences associated with decision making and performance under the influence of these diurnal variations are therefore likely to be significant.

Our setting of corporate earnings conference calls is an excellent context in which to investigate the potential influence of diurnal variations on economic agents' activities for at least the following reasons: i) the calls are extremely important corporate communication events (Frankel, et al. (1999); Skinner (2003)), evidenced by the fact that practically all calls are conducted by the CEO and CFO – i.e., there is no delegation to underlings when it comes to conference calls (Lev (2012)); ii) they are reliably time-stamped; iii) call transcripts are readily available for linguistic sentiment analysis, enabling us to capture the mood of these communications using scientific methods; iv) the calls have important economic consequences (i.e., share price effects); v) all parties to the call conversations can be presumed to be economically sophisticated and highly motivated; and vi) as an important complement to the prior research related to diurnal influences on human behavior, which is typically based upon small sample simulated situations in the laboratory or reconstructed from self-reported diaries, our findings are derived from a large sample of *archival* data consisting of actual, regularly recurring discussions between public company executives and Wall Street analysts.

Using a sample of more than 18,000 earnings call transcripts, we find reliable evidence that the expert economic agents participating in these quarterly earnings conference calls are significantly influenced by the time of day. Specifically, the mood of participants on calls deteriorates during the day, becoming increasingly negative as the trading day wears on. Furthermore, the influence of these diurnal variations on the tone of conversation is apparent for both analysts and executives. Extensive specification checks establish that our key results are robust to controls for potential endogeneity in the self-selection of afternoon call times and to the omission of firm-specific variables that may be correlated with call start times. Further tests show that the effect of the time of day on mood is present for West Coast calls, and indeed the tone of conversation is more negative than that for East Coast calls at similar times of day, a finding that we attribute to the more advanced body clocks of these call participants and/or higher levels of frustrations and other annoyances that have accumulated given that they are likely to be deeper into their schedules at the same local hour. Perhaps more consequentially, our results are

confirmed by market pricing tests. 5-hour intraday returns tests show that share prices decline in response to the negative mood of Q&A discussions. However, consistent with the tone of calls held later in the day being "excessively" negative (i.e., in the sense that a portion of it is driven by human mood rather than economic fundamentals), our longer-term stock return analyses indicate that the market eventually realizes that the portion of call tone that is due to diurnal influences is value-irrelevant. Accordingly, the initial negative returns associated with the time-of-day-induced negativity, what we label "diurnal tone," are subject to subsequent price reversals. Thus, an important insight that emerges from our study is that investors do not quickly sort between human-mood- versus economics-driven tone, which leads to economic consequences in the form of temporary stock mispricings for firms hosting earnings calls later in the day. By implication, a critical takeaway from our study for corporate executives is that communications with investors, and probably other important managerial decisions and negotiations, should be conducted earlier in the day. Unlike for stock mispricings, however, other managerial decisions and negotiations may be conclusive rather than subject to subsequent readjustments. It is therefore even more imperative that corporate executives be aware of body clock influences on judgment and decision making because in other managerial contexts the suboptimal diurnal influences may never become apparent or, even if they do, may not be corrigible.

Both the diurnal variations being investigated in our study, as well as seasonal influences on human psychology, are intimately intertwined with the effects of daylight on moods and biological processes. Thus, in addition to its obvious relation to the conference call and financial linguistics literatures, our study is also closely related to the strand of behavioral economics research that documents the effects of seasonal variations on financial market participants. Kamstra, Kramer and Levi (2000), for example, present evidence to suggest that daylight savings time changes affect stock trading, while Hirshleifer and Shumway (2003) and deHaan, Madsen and Piotroski (2017) document relations between stock returns and analyst behavior, respectively, and the weather. Kamstra, Kramer and Levi (2003), amongst others, also find that seasonal affective disorder (SAD) influences behavior in financial settings. Our study builds upon this literature in several important ways. First, most of the prior studies in this area relate seasonal variations in

the weather or daylight hours to a *summary measure* of beliefs (e.g., stock returns).[2] By contrast, the composition of our data enables us to examine the moods of the actual call participants (as a group) whose behavior is hypothesized to be affected by the time of day, rather than relying upon an aggregated outcome measure from which to draw inferences. Second, as an important complement to the prior studies related to *seasonal* influences on financial market participants, our study provides novel evidence related to the influence of the shorter and much more regularly recurring *diurnal* cycle on economic agents.

Based upon the results presented, we conclude that even expert economic agents operating in highly incentivized situations are subject to significant diurnal influences. Our particular setting enables us to establish reliable associations between the time of day and the moods of executives and analysts on conference calls, and between the tone of their conversations and stock returns. While our findings in this context are important in their own right, we believe that our results may have considerably greater significance. When considered together with extensive prior psychological evidence from the laboratory, our archival findings indicate the potential for a much more pervasive phenomenon of the time of day influencing corporate communication, decision making and performance at all hierarchical levels and across diverse business enterprises.

The remainder of the paper is organized as follows: Section 2 discusses prior related psychological and physiological literature, provides some institutional background related to corporate conference calls, and motivates our principal research question. Section 3 describes our sample, data sources and variable measurements. Section 4 provides empirical evidence, including a battery of robustness checks, that the time of day influences analysts and executives participating in corporate conference calls. Section 5 summarizes and concludes the study.

2.   Background and Hypothesis Development

2.1   Seasonal Variations and Financial Market Participants

Our study relates closely to the behavioral finance literature that documents the influence of seasonal variations on financial market participants. Kamstra, et al. (2000), for example, present

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[2] One exception to this is deHaan, et al. (2017) who examine directly analysts' earnings updates and relate differences in their performance to the differential weather conditions being experienced in the analysts' home office locations. We discuss this study further in Section 2.

evidence of an anomalous daylight savings effect on stock returns. They conjecture that the sleep disruption induced by a changing of the clock (known to sleep experts as a desynchronosticity in circadian rhythm) causes market participants to suffer greater anxiety, ultimately leading them to shun risk during the trading day following a time change.

Kamstra, et al. (2003) and Kamstra, Kramer and Levi (2012), amongst others, document a relation between seasonal affective disorder (SAD) and stock market cycles. Relying on the established psychological links between reduced daylight hours and depression, and between depression and risk aversion, these authors present evidence that reduced daylight hours help to explain lower returns in winter months. Dolvin, Pyles and Qun (2009) suggest that SAD also affects analysts' decision making, as they present evidence that analyst estimates are significantly less optimistic during SAD months, and especially so for analysts in northern states who are most likely to be impacted by this disorder.

In a similar vein, Hirshleifer and Shumway (2003) establish a strong correlation between stock returns and the weather, which they attribute to the well-known psychological result that sunny weather is associated with an upbeat mood. Relatedly, deHaan, et al. (2017) document that analysts experiencing unpleasant weather are less likely to update their reports following an earnings announcement, a finding that they attribute to weather-induced bad moods impeding the efficiency of market participants' response to earnings news.

All of these studies suggest that, contrary to the notions of *homo economicus* and efficient capital markets, even financial experts are vulnerable to seasonally-induced variations in their decision making and performance. Our study builds upon this literature by considering the influence of the more regularly recurring *daily* rhythms on economic behavior, and by establishing a more direct link between these rhythms and the moods of actual economic agents behaving extemporaneously in an important corporate setting.

2.2 Diurnal Variations

A substantial body of psychological and physiological research documents that human emotions, energy, mental reasoning, physiological processes, and other aspects of performance are characterized by significant diurnal variations (e.g., Freeman and Hovland (1934); Colquhoun (1971); Folkard (1975); Minors and Waterhouse (1981); Watts, Cox and Robson (1983); Wood and Magnello (1992); Stone, et al. (1996); Foster and Kreitzman (2005)). Two principal areas of

research in the fields of psychology and physiology that help to explain the impact of the time of day are "personal resources theory" and the study of circadian rhythms' effects on human emotions, biology, cognitive functioning, and other aspects of performance.

The concept of personal resources has found growing attention in research on emotion and performance. A core underlying assumption of this framework is that individuals have a limited "reservoir" of resources from which to draw in order to adequately perform the variety of demands and activities that they face throughout the day. Expending effort on work results in load reactions that deplete energy resources over time (Meijman and Mulder (1998)). As these resources are depleted over the course of the work-day, individuals exhibit poorer task performance, greater hostility, and more aggressive interaction and communication (DeWall, et al. (2007); Hagger, et al. (2010); Stucke and Baumeister (2006)). Furthermore, people are motivated to protect their personal resources, such that the reduction and loss of resources creates tension and stress because resource loss is more salient than resource gain (Hobfoll (1989); Hobfoll (1998)). Another prominent theory of personal resources is the strength model of self-control (Baumeister, Bratslavksy, Muraven and Tice (1998); Muraven and Baumeister (2000); Baumeister (2002)), which argues that an individual's capacity to regulate the self and maintain deliberate control over their actions is a limited commodity. As this capacity is depleted over time, self-regulation is reduced and there is an increased risk of unconstrained and impulsive behavior (Muraven and Baumeister (2000)). This finding is particularly relevant to our context of earnings conference calls because of the importance of these calls and their share price effects, which presumably motivates participants to exhibit restraint and self-control. All of these theories suggest that as individuals' resources become depleted over the course of the workday, their performance will decline and their moods will become more negative.

In addition to the effects of depleting resources, the circadian clock also influences human functioning over the course of a day. Circadian rhythms affect brain wave activity, hormone production, cell regeneration and other human biological processes. Moods, or positive and negative affects, are similarly influenced by the time of day (Stone, et al. (1996)). Wood and Magnello (1992) document self-reported deterioration in the moods of their subjects as the day wears on, for example, while Hasler, Mehl, Bootzin and Vazire (2008) find that utterances and verbal behavior associated with positive affect (such as laughing or singing) recorded in natural settings show systematic time-of-day variation. Circadian rhythms are also inherent in basic

neurobehavioral measures such as attention, working memory, and executive function (Blatter and Cajochen (2007)), and therefore influence performance on tasks requiring cognitive skills (see, e.g., Freeman and Hovland (1930); Colquhoun (1971); Folkard (1975); or Foster and Kreitzman (2005) for a summary).

In the specific context of communications, Mislove, et al. (2010) use over 300 million "tweets" to document that tweeters' moods vary throughout the day, with early morning and late evening showing the highest levels of happy tweets. They further show that West Coast tweets follow a pattern that is consistently three hours behind that of the East Coast, strongly suggesting that individuals' moods are affected by the diurnal cycle. In a related study, Golder and Macy (2011) document similar patterns from the Twitter messages of 2.4 million people in 84 countries. Their cross-cultural findings confirm that people around the world experience similar moods at similar times of day.

Numerous studies have also established that even highly trained professionals are subject to the influences of resource depletion and circadian rhythms in their work-related performance. For example, Danziger, et al. (2011) hypothesize and find that judges are more likely to deny parole (i.e., to take the safer, easier decision option) as court sessions wear on, a finding that they attribute to the judges' mental and physical depletion. Similarly, Dai, Milkman, Hofmann and Staats (2015) investigate the influence of time-at-work on "one of the most significant compliance challenges in health care today: hand hygiene" (page 846) and find that compliance rates drop significantly from the beginning to the end of nurses' work shifts. Perhaps most disturbingly, Linder, et al. (2014) document that the cumulative cognitive demand of repeated decisions throughout the day seems to erode medical clinicians' abilities to resist making potentially inappropriate choices. In their study of more than 20,000 acute respiratory infections, they find that as the day wears on, doctors become increasingly more likely to prescribe antibiotics even when they are not indicated. All of these studies support the notion that the work-related performance of even the most highly trained experts varies – and notably that judgment and decision-making skills deteriorate - over the course of the workday. To the best of our knowledge, however, ours is the first study to investigate these diurnal influences on expert economic agents acting in a real and important corporate setting.

2.3   Corporate Conference Calls

A unique feature of our study is that our subjects, corporate top executives, in particular, are *a priori* the least expected to be subject to time-of-day effects. They are well aware of the importance of conference calls, and prepare themselves meticulously for this engagement, often with the help of specialized coaches. One would not expect these agents to be subject to diurnal influences. Earnings-related conference calls are ubiquitous and typically conducted within a few hours to a day following the much anticipated quarterly earnings press release.

Independent of their timing, earnings calls are considered to be one of the most important corporate communication events (Frankel, et al. (1999); Skinner (2003); Corbin Perception (2015)), and consist of an uninterrupted managerial presentation followed by a question-and-answer ("Q&A") session with analysts and investors. The presentation portion of the call is usually prepared in advance of the call by investor communications experts and/or corporate council, and typically involves several of the company's top executives reading from a script that largely rehashes the main content of the earnings press release (Kimbrough (2005)). By contrast, the Q&A consists of a live discussion between agents who are internal and external to the firm, and because of its conversational nature, the Q&A elicits new information beyond that contained in the earnings press release. Indeed, studies have shown that the Q&A discussion is the most economically important aspect of earnings calls. Matsumoto, et al. (2011) report, for example, that while both the management presentation and Q&A portions of the call offer some incremental information beyond the earnings announcement (as evidenced by intraday abnormal returns during the call period), the Q&A offers relatively more new information content. Furthermore, the more extemporaneous quality of the Q&A lends it greater power as a setting in which to detect diurnal influences. Accordingly, we use this conversational component of earnings calls to investigate the influence of the time of day on economic agents, with the pre-scripted presentation portion serving as a control.

2.4   Hypothesis Formulation

When applied to our setting, the theories and empirical findings discussed above lead us to hypothesize that executives and analysts participating in quarterly conference calls will be subject to diurnal influences. Whether due to the depletion of their personal resources later in the day and

the resulting inability of call participants to regulate their disposition and thus the tone of their discourse, or due to human physiological factors associated with circadian rhythms such as declining cortisol levels or a reduction in cognitive function, we expect to find differences between the tone of earlier and later call Q&A discussions. Specifically, we predict that the tone of management-analyst conversations will deteriorate, becoming more negative as the trading day wears on.

We note, of course, that our investigations can only document the hypothesized effect *on average,* across call participants. We cannot preclude the possibility that some call participants begin their work days in particularly good moods, which Rothbard and Wilk (2011) show has an impact on how they perceive and respond to events later in the day. Similarly, some call participants might restore their glucose levels with food and/or refresh themselves with a walk, a vigorous physical workout, or take some form of rest from their intensely concentrated work prior to participating in later calls. Any such influences would mitigate the potential for greater negativity to occur on conference calls that are initiated later in the day. In addition, our tests assume a reasonable degree of body clock synchronicity on the part of EST (eastern standard time) and CST (central standard time) call participants (i.e., that none of the speakers are phoning in from Europe or Asia, e.g.).[3] Any noise in the relation between call tone and time of day that is induced by extraneous (i.e., non-diurnal) influences such as start-of-day moods and pre-call restorations, or by discussions on the calls stemming from speakers who are not in EST or CST zones, works against our finding evidence in favor of our hypothesis. Notwithstanding this potential for noisy relations due to call participants' varying susceptibilities and/or mitigating behaviors, we present robust evidence of a time-of-day effect on our large sample of conference call conversations.

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[3] It is reasonable to assume that most of the executives on the calls will be situated in the time zone from which the call is being hosted. It was less obvious to us where the analysts may be located. We therefore manually tracked the home office location of all analysts participating on a small sample of calls, and found that even for high-tech firms that are based on the West Coast, the majority of analysts listed on the calls were attached to office branches that are based in Eastern Time zone locations. Our small sample evidence is consistent with large sample descriptive statistics reported by Malloy (2005) and O'Brien and Tan (2015) who document that a majority of the analysts in their respective samples are based in/around New York City and other Eastern and Central time zone locations (e.g., Florida, Illinois, Massachusetts, and Maryland).

3. Sample, Call Transcripts, Tone Measurement, and Descriptive Statistics

3.1 Data Sources and Sample Determination

We obtain conference call transcripts, spanning the period of January 2001 to June 2007, from Thomson StreetEvents, a division of the Thomson Reuters news service and database vendor. We first restrict our sample to transcripts that are identified in the StreetEvents database as earnings related, and to those for which we are able to extract a reliable call start time, city, and company name and/or firm ticker information. We further restrict the sample to transcripts in which each of the management address, analyst question, and management answer portions of the call exceed 50 words, and to firms that are publicly-traded and headquartered in the United States. We focus on conference calls that we are able to confirm to be related to earnings announcements, which we define as falling into a window of [0, 2] days relative to the t=0 earnings announcement day (as defined by either Compustat or I/B/E/S), and for which we are able to extract location time zone. We require firms' annual and quarterly financial data to be available from Compustat, their stock data to be available from Center for Research in Security Prices (CRSP) and Trade and Quote (TAQ), and their analyst forecast and manager guidance data to be available from I/B/E/S. We exclude the conference calls of firm-quarters characterized as having a negative common book value of equity. We require some uniformity in call participants' presumed body clocks and thus focus on calls that are initiated in Eastern or Central time zones. In our calculations of residual tone (discussed in detail in Section 3.2), we make use of the entire sample of available Eastern and Central time zone call transcripts (i.e., spanning all call start times). For our primary time-of-day tests, however, we restrict the sample to calls initiated during the window of 08:00 to 15:59 Eastern Time (i.e., calls initiated prior to the close of trading). The imposition of all of these constraints yields a sample of 18,408 calls initiated by 1,865 distinct firms. In some robustness checks, we also include calls initiated in Pacific Time locations. Details related to the impact of each of the sample inclusion criteria on the final determination of the sample are summarized in Table 1.

3.2 Measuring Call Mood

As noted earlier, a major design strength of our study relative to the earlier literature that examines seasonal influences on summary measures of market activity (e.g., share prices) is that

we can observe and track the mood of the underlying agents (as a group) in our setting. In light of this, and considering the particularly strong incentives and thus pre-call preparation involved for the firm's executives, it is interesting to consider whether both executives and analysts are affected by diurnal influences. These investigations necessitate the separation of thousands of sample call transcripts into three component parts: i) management's presentation; ii) analyst questions; and iii) management's answers. The methodology that we use to arrive at this parsing of the text is described in detail in Appendix A.

Prior evidence (e.g., Loughran and McDonald (2011); Demers and Vega (2014)) suggests that generic linguistic algorithms such as Diction or General Inquirer may yield noisy measures of "positive" and "negative" tone in the context of financially oriented textual passages. Accordingly, and consistent with other recent accounting and finance studies (e.g., Engelberg, Reed and Ringgenberg (2012); Huang, Teoh and Zhang (2014); Davis, Ge, Matsumoto and Zhang (2015); and Baginski, Demers, Wang and Yu (2016)), we rely on the Loughran and McDonald (2011) ("L&M") finance-oriented dictionaries to calculate the *Positivity* and *Negativity* scores of each of the three components of the conference calls.[4] Specifically, the scores are calculated as the number of incidences of words from each respective dictionary that are cited in the relevant text passage. Following the prior literature, we then take the difference between *Negativity* and *Positivity* and scale this by the sum of negative and positive words, in order to capture the net tone or mood of the call passage.[5] We refer to this measure as *NetNegativity*.[6, 7]

Starting with the *NetNegativity* measure from each call passage, we seek to separate tone into that which is driven by economic news and fundamentals from that which is driven by the time-of-day effect or random noise. Our approach is analogous in spirit to that of Davis, et al. (2015) who separate tone into economics-driven sentiment and manager-specific optimism, but

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[4] See also Loughran and McDonald (2015) for further discussion.

[5] Our results are robust to alternatively scaling (*Negativity – Positivity*) by total words.

[6] Technically speaking, the prior literature takes the difference between optimism and pessimism (or positivity and negativity) and refers to this as net optimism (or net positivity). Because our principal hypothesis relates to deteriorating moods over the course of the day, for tractability in the text we have simply inverted the subtraction and defined mood in terms of net negativity, renaming the variable accordingly.

[7] Because some prior studies focus on negativity to the exclusion of positivity, in untabulated analyses we also investigate separately the relation between the time of day and each of residual negativity and residual positivity, where these residual sentiment variables are determined as the residuals from Equation (1) estimated with, respectively, negative tone and positive tone as the dependent variable. We find that each dimension of our net sentiment measure is reliably related to the time of day, the coefficients on these variables are of the expected opposite sign, and the magnitudes of the coefficients are insignificantly different. As a consequence, we use the more parsimonious but multi-faceted "net" sentiment measure as our proxy for caller mood in all of the reported tests.

our empirical design is closer to that of Huang, et al. (2014) who also use a first-stage regression to separate tone into two components, "normal" (or economics-driven) tone and "residual" tone. We begin with a first-stage regression that allows tone to be explained by firm fundamentals and economic news that are *known* at the time of the call's initiation. Specifically, the regression is:

$$Tone = \alpha + \beta_1 SUE + \beta_2 BadNews + \beta_3 Loss + \beta_4 FQ1GuideNews + \beta_5 PreCallAbnRet +$$
$$\beta_6 Prior3MthAbnRet + \beta_7 Size + \beta_8 MTB + \beta_9 SalesGrowth + \beta_{10} FirmAge +$$
$$\beta_{11} Leverage + \beta_{12} CurrentRatio + \theta_{i=1}^{12} FFindustry_i + \varepsilon, \tag{1}$$

where the dependent variable, *Tone,* is alternatively the *NetNegativity* from the management presentation, analyst questions, management answers, or combined Q&A portions of the call. We include the following explanatory variables to capture the economic news related to the earnings announcement: *SUE,* the earnings news for the quarter to which the earnings conference call relates (i.e., the standardized unexpected earnings relative to the most recent analysts' consensus estimate); *BadNews,* an indicator that is set to one if the firm reports earnings that are below the analyst consensus; *Loss,* an indicator variable that is set to one if the firm reports a loss for the quarter; *FQ1GuideNews,* the one-quarter ahead management earnings forecast surprise for firms issuing forecasts within a 3-day window ending on the conference call day, and zero otherwise; *PreCallAbnRet*, the pre-call firm-specific abnormal stock returns, measured from the start of trading on the day prior to the call and ending at the conference call start time, where "normal" returns are defined as the average returns to the firm's stock over the identical period (i.e., ending on the same time of day and on the same day of the week) over the prior month (i.e., the average of the four prior weeks' observations); and *Prior3MthAbnRet* are the buy-and-hold size- and book-to-market-adjusted returns for the 3-month period ending on the last date of the fiscal quarter to which the conference call relates. Together these variables capture historical and forward-looking earnings-related news that has been released to the market prior to, and during, the period of the earnings announcement.

We also include additional explanatory variables related to the economics of the firm as follows: *Size,* measured as the natural log of the firm's market capitalization at the end of the quarter to which the call relates; *MTB,* or the market-to-book ratio, an expected growth measure; *SalesGrowth,* the percentage change in sales for the quarter to which the conference call relates relative to sales for the same fiscal quarter in the prior year; *FirmAge,* the natural log of one plus

the number of years since the firm first appeared in CRSP; *Leverage*, a continuous variable capturing the firm's financial leverage (calculated as (DLCQ+DLTTQ)/CEQQ); *CurrentRatio*, a variable capturing the firm's liquidity situation, defined as current assets over current liabilities; and *FFindustry$_i$,* an indicator variable for each of the 12 Fama-French industry classifications. These and all other variables used in this study are defined in greater detail in Appendix B.

Our first-stage regression thus includes explanatory variables that capture the current quarter's news (i.e., *SUE*, the loss indicator, and pre-call stock returns), forward-looking managerial guidance, firm size and life stage, industry norms, past and future growth prospects, as well as the financial health of the firm. The fitted values of *Tone* deriving from the parameter estimates from Equation (1) are referred to as "economics-driven tone," and we label these variables as *EconTonePresent, EconToneQuestion, EconToneAnswer* and *EconToneQ&A* for each of the executive presentation, analyst questions, management answers, and combined Q&A segments of the call, respectively. The residuals from these respective regressions (i.e., the ε's in Equation (1)) represent that portion of the call tone that is not explained by the economic news or other firm fundamentals. We refer to this as "residual tone" and label these variables *ResidTonePresent, ResidToneQuestion, ResidToneAnswer* and *ResidToneQ&A*, respectively.

Results from the Equation (1) *Tone* regressions for our primary EST/CST time zone sample are presented in Panel A of Table 2.[8, 9] As shown, the earnings surprise (*SUE*), the earnings guidance surprise (*FQ1GuideNews*), past and future growth prospects (*SalesGrowth* and *MTB*), and prior stock returns (*PreCallAbnRet* and *Prior3MthAbnRet*) are all negatively associated with *NetNegativity* for each portion of the call. Also consistent with expectations, the bad news, loss and leverage variables are positively associated with the net negative tone of discussions in almost all cases. Higher current ratios (i.e., greater short-term liquidity) are associated with less negative managerial presentations. Thus, as expected, positive (negative) earnings-related news and economic indicators are associated with positive (negative) discussion tone. Although we did not

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[8] Untabulated results for separate first-stage regressions using the PST time zone call sample are substantively similar, but the coefficient values are not identical. As a consequence, separate regressions for EST/CST and PST samples, respectively, lead to better fitting models (i.e., higher R^2), and thus we choose to estimate the fitted coefficients that determine *EconTone* and *ResidTone* separately for these two call samples.

[9] Unless otherwise noted, all of the continuous variables in the reported regressions are winsorized at the top and bottom one percentiles. In addition, we drop all observations that are influential in the determination of the regression coefficients, where influential observations are defined to be those for which the studentized residual exceeds 2, the Cook's D exceeds 1, or DFBETA exceeds 2, as recommended by Belsley, Kuh and Welsch (1980).

have directional priors for the relations between tone and firm size or firm age, we find that larger firms have more negatively toned questions and answers, but less negatively toned presentations. Older firms are associated with more negative presentations, but more positive questions. The fact that virtually all of the candidate economic variables are significant and that all of those for which we have predictions take the expected signs, together with R^2s in the range of 7.1% to 19.1% for these first-stage regressions (i.e., markedly higher than the 4% reported by Huang, et al. (2014)), provide strong reassurance that the fitted variables from our first-stage regressions have good construct validity.

Panel B of Table 2 presents descriptive statistics for raw positivity and negativity, as well as for the estimated measures of residual tone for each component of the call. Interestingly, the tone of the initial management presentation is significantly more positive than that of the analyst questions (i.e., 1.78% and 1.33 % positive words for the presentation and questions, respectively; two-tailed p-value < 0.01), while the percentage of negative words in the analysts' questions is significantly higher than the rate of negativity in managers' presentations and responses (i.e., 1.28% in the questions versus 0.86% and 0.77% in the presentation and answers, respectively; two-tailed p-value < 0.01). Thus, consciously or otherwise, executives are, on average, more positive and less negative than analysts in their discussions on the calls. Also apparent from the table, and consistent with the estimation procedure described above, the *ResidTone* measures are all mean zero, and each exhibits a good deal of variation.

3.3 Descriptive Statistics

Panel A of Table 3 presents descriptive statistics for the firm characteristics of our primary EST/CST sample. As shown, sample firms have significantly higher market-to-book ratios and are larger (measured by total assets, sales, or market capitalization), more profitable (based upon incidence of loss quarters), less likely to miss analyst estimates, and have a larger analyst following than the CRSP/Compustat/I/B/E/S universe (two-tailed p-value < 0.01). Because we focus on

Eastern and Central time zone calls for our primary tests, this sample also naturally has disproportionately more (fewer) manufacturing (high-tech) firms than the database universe.[10]

The remaining panels of Table 3 provide descriptive statistics related to conference call start times and their "stickiness" for 22,239 calls initiated in EST/CST time zones by 1,969 firms.[11] The top results in Panel B show that 40% of firms consistently hold their conference call at the same time of day, while 60% of firms vary the timing of their calls. In the lower set of results in Panel B, we find that 70.8% of firms "typically" hold their calls at the same hour of the day, where "typically" is defined as 75% of the time.[12] Panel C shows that 55.2% of firms consistently hold their calls in the morning whereas only 13.9% of firms hold their calls exclusively in the afternoon. The remaining 30.9% of firms alternate between morning and afternoon call start times.

Panel D of Table 3 provides a transition matrix for firms that we characterize as having a high degree of stickiness (i.e., firms that hold their conference calls at precisely the same time with at least 75% frequency). As shown, 7.1% of "bad news" firm-quarters (i.e., those that miss analyst estimates) are associated with a change in the time of their conference call compared to the firm's typical call time, whereas 6.7% of "good news" firm-quarters involve a change in the time of their call relative to the firm's typical call time. The difference between these two rates is not statistically significant, indicating that the good versus bad news flavor of the earnings news is not an important factor in "sticky" firms' decisions to change the time of their calls from the typical call time. Panel E of Table 3 indicates insignificantly different propensities for firms that "meet or beat" versus those that "miss" analyst estimates to hold their calls in the afternoon. Our descriptive results are broadly consistent with the evidence presented in Doyle and Magilke (2009) who conclude that there is a lack of evidence to support the notion that managers time their earnings announcements to hide bad news or to promote good news, but they are in contrast to the findings of deHaan, Shevlin and Thornock (2015) who find that managers try to "hide" bad news by reporting bad news after market hours, on busy days, with less advance notice, and on Fridays.

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[10] We define high-tech firms to include 3 of the 12 Fama-French industry categories: business equipment; telecommunications; and healthcare, medical equipment and drugs.

[11] Firms initiating calls outside of market hours are included in this analysis, while firms with only one call in our original dataset are necessarily excluded. Consequently, the number of firms and call observations underlying the "stickiness" descriptive statistics differs from that underlying our primary regression sample.

[12] In untabulated results we also find that 65.3% of firms "typically" hold their conference calls at exactly the same hour of the day, where "typically" is defined as 80% of time.

Overall, the descriptive evidence presented in Panels B through E of Table 3 indicates that there is a high degree of "stickiness" in the timing of conference calls. Furthermore, the sign of the earnings news does not appear to be related to the timing of the calls or the firm's decision to switch their call time.

4. Empirical Results

4.1 Diurnal Variations in the Residual Tone of Conference Calls

We begin by investigating trends in the mean hourly net negativity of call tone. Specifically, Figure 1 presents a graphical depiction of *residual tone* (i.e., the net negativity that is not explained by economic news or firm fundamentals, estimated as the residual from the first-stage model depicted by Equation (1)) for each of the presentation, question, answer, and combined Q&A portions of the calls that are held in Eastern and Central time zones.[13] The lines through the graphs are fitted for calls initiated from 8:00 through 15:59 (i.e., to the closing of the market). As can be seen in Figure 1, the non-economics-driven net negativity of the various segments of the calls is increasing almost monotonically throughout the day. The graphs also show a significant drop in residual tone for presentation, management answers, or combined Q&A portions of calls held during the after-market hours of 16:00 to 17:59 (two-tailed p-values < 0.05 or 0.01), indicating that the stress relief from the close of the trading day results in a positive affect for these call participants.[14] We therefore limit the observations in our primary regression analyses to calls that are initiated prior to the close of trading. In general, the positive slope of the fitted lines captures well the deteriorating mood of conference call tones over the course of the pre-market and trading periods of the day. Furthermore, a similar pattern is evident for each portion of the calls, indicating that both analysts' and executives' moods are systematically varying with the time of day. This preliminary descriptive evidence indicates that there is a clear pattern of diurnal variations in the moods of the expert economic agents - both analysts and executives - participating in our large sample of calls. Notably in these results, however, is the existence of a time-related pattern in the

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[13] Call times for both CST and EST calls are defined on the basis of the EST hour during which the call began.

[14] The removal of a stressor reduces the load being born by personal resource-constrained individuals, leading to an improvement in mood. The outward display of this more positive mood (as captured by language tone in our setting), is known in the psychology literature as a "positive affect."

tone of the presentation portion of the calls. Because the management address is presumed to be largely scripted, such a time trend is not exactly as expected. Rather, the observed trend signals the possible existence of some unspecified firm-specific tone-related factor(s) that are associated with the firms' call start time but omitted from our first-stage regression model. In light of this, we control for the tone of the presentation in all subsequent analyses.[15]

In order to address our hypothesis related to diurnal influences on the extemporaneous Q&A discussions, we regress the Q&A-related residual call tone measures on the time of day, after controlling for the residual tone in the presentation portion of the call. Specifically, we run the following regression:

$$ResidTone = \delta_0 + \delta_1 EST\_Hour + \delta_2 ResidTonePresent + \varphi, \qquad (2)$$

where the dependent variable is alternatively *ResidToneQuestion, ResidToneAnswer*, and *ResidToneQ&A; EST_Hour* is the hour during which the call begins measured in EST time;[16] and *ResidTonePresent* is the residual tone of the management address portion of the call.[17] The inclusion of *ResidTonePresent* in the Q&A-related tone regressions enables the firm to serve as its own control. In other words, any firm-specific, negativity-related soft information related to the earnings announcement that may have been omitted from the first-stage regression is now captured by the inclusion of *ResidTonePresent* such that any remaining association between Q&A call tone and the time of day can be reliably attributed to diurnal influences.

The results of the Equation (2) regressions are presented in Table 4. Consistent with the descriptive evidence in Table 3, the positive coefficient on *EST_Hour* in the *ResidTonePresent* regression indicates that the net negativity of the management presentation that is not explained by our first-stage economic news and other firm fundamental variables is increasing as the day wears on, indicating that the inclusion of *ResidTonePresent* as a control variable in the other

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[15] Using the residual tone from the presentation portion of the call allows the firm to serve as its own control in terms of capturing "soft" information in the subsequent Q&A-related tone regressions. Our approach is similar in spirit to that followed by Dikolli, Keusch, Mayew and Steffen (2016) who use MD&A disclosures to extract firm-specific information from shareholder letters, leaving the desired CEO-specific characteristics in the residual that is used in subsequent tests.

[16] Our reported results are not affected when we alternatively regress the *ResidTone* Q&A-related measures on the estimated start time of the Q&A session (i.e., rather than the start time of the call), where Q&A start times are estimated based upon word counts using the methodology proposed by Matsumoto et al. (2011).

[17] We also report the results of this regression using *ResidTonePresent* as the dependent variable in Table 4 in order to confirm the statistical significance of the association between the presentation tone and the time of day.

ResidTone regressions is essential.[18] The subsequent columns show that, even after controlling for the tone of the presentation portion of the call, there remains a significant positive association between the time of day and each of the analyst question, management answer, and combined Q&A segments of the calls. Our findings thus strongly suggest that the non-economics-driven mood of call conversations is not just random noise. Rather, the tone of extemporaneous Q&A discussions on earnings calls, a proxy for callers' moods, exhibits a significant association with the time of day, suggesting that the analysts and executives participating in the more than 18,000 calls in our sample evince a significant susceptibility to time-of-day-related variations in the performance of their work.[19] These results are consistent with our hypothesis and with a large body of prior research in non-financial, and typically experimental rather than archival contexts. Our findings provide novel evidence that even highly trained expert economic agents acting in an important incentive-laden setting are impacted by the time of day. Furthermore, the unlikely presence of these effects in the context of such an important corporate event suggests that similar diurnal influences are likely to be at play in other economic decision making and performance situations throughout business enterprises.

4.2   Diurnal Variations in Residual Tone: Robustness Checks

In this section, we present a number of robustness checks on our finding that the tone of conference calls is subject to deterioration as the trading day wears on.

4.2.1 West Coast Calls

The previous results are based upon the available sample of EST and CST calls, a research design choice that was made in order to maximize the degree of body clock synchronicity of the

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[18] Davis, et al. (2015) provide evidence of manager-specific optimism in the tone of conference call communications. The inclusion of *ResidTonePresent* in the Q&A-related tone regressions also helps to control for any such effects.

[19] Prior studies suggest that there is a "Friday effect" in firms' news disclosure strategies, with bad news being more likely to be released on Fridays (e.g., Damodaran (1989)). By contrast, Michaely, Rubin and Vedrashko (2016) suggest that Friday disclosures themselves are not different, but rather that firms that sometimes release information on Fridays are different than firms that never release information on Fridays. In untabulated analyses we rerun each of our Equation (2) *ResidTone* regressions augmented by a *Friday* indicator variable. The *Friday* indicator is significant only in the *ResidTonePresent* regressions (and this holds for both the EST/CST sample as a whole as well as for the subsample that excludes firms that never hold Friday calls). Most importantly, however, the *Friday* indicator neither loads in the Q&A-related tone regressions, nor does it affect the coefficient on the *EST_Hour* test variable.

call participants. Of course, diurnal influences on human moods and performance are not restricted to persons in the Eastern and Central parts of the U.S.[20] Indeed, in our setting we expect that the tone of PST calls may even be more negative than that of EST calls at similar times of day for several reasons. First, most of the analysts on the calls are based on the East Coast, and hence at 10:00 a.m. PST, it is already 13:00 EST for most of the analysts, a time at which their mood is expected to have significantly deteriorated (i.e., relative to what it would have been on a 10:00 a.m. EST call). Second, managers on the West Coast are keeping earlier local hours relative to their East Coast counterparts because they're working and interacting with stakeholders during EST-based market hours. Thus, by 10:00 a.m. PST, West Coast managers are likely to be further into their day (i.e., more fatigued, etc.), on average, than are East Coast managers at 10:00 a.m. EST.[21]

In order to incorporate West Coast calls, we first develop a pooled sample of calls originating in EST and PST time zones. More specifically, because of the imbalance between the frequency of EST- and PST-originated calls in local hour time, we create a matched sample by matching all available EST-originated calls with PST-originated calls on the basis of market capitalization (nearest match not exceeding a differential of $200 million) and the local hour of the call start time.[22] Using this matched sample, we run the regression depicted by Equation (2) augmented with a PST indicator that is set to one for calls initiated on the West Coast, and using *Local_Hour* (i.e., the local time at which the call is originated) instead of *EST_Hour* to capture the start time of the call.[23]

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[20] As discussed earlier, Mislove, et al. (2010) document patterns in West Coast tweets that are similar to, albeit three hours behind, those of East Coast tweets, and a related study by Golder and Macy (2011) document diurnal patterns in the Twitter messages of 2.4 million people in 84 countries, confirming that people around the world experience similar moods at similar times of day.

[21] The earlier schedule of PST managers is supported by the pattern of their conference calls, which tend to be held earlier in the day (measured in local time) relative to their East Coast counterparts' calls. For example, only 0.1% of EST calls are initiated before 8:00 a.m. whereas 8.3% of PST calls are initiated between 5:00-7:59 PST, while 19.2% of EST calls are initiated during the 15:00-17:59 (local time) period versus just 0.8% for PST calls.

[22] In unreported tabulations, we find that there is a significant difference in the distribution of EST and PST calls when considered in local time. For example, there are many more East Coast firms originating calls at 9:00 EST than there are West Coast firms originating calls at 9:00 PST, and the same is true for other hours of the day.

[23] We omit the CST calls from this analysis in order to obtain a starker contrast between EST and PST call observations. In untabulated specification tests, we find that the inclusion of CST calls in the available EST/CST pool of match candidates does not change our inferences.

The results of this test are reported in Table 5.[24] As shown, the coefficient on *Local_Hour* is significant and positive in each regression, indicating that, not surprisingly, the non-economics-driven tone of call participants is increasingly negative for calls being hosted in both time zones, even after controlling for the presentation tone. In other words, participants on calls initiated on either coast are subject to diurnal influences. More importantly, the significantly positive coefficient on the *PST* indicator in all three tone regressions indicates that the tone of West Coast calls is, on average, more negative than that of East Coast calls that are held at the equivalent local time of day, and the results hold for both managers and analysts. The relatively higher negativity of West Coast calls may be explained either by the more advanced body clocks of West Coast call participants (i.e., a physiological explanation) and/or due to higher levels of frustrations and other annoyances that have accumulated over the course of their day given that West Coast call participants are likely to be deeper into their schedules at the same local hour (i.e., related to limited personal resources theory). Indeed, the literature would suggest that both of these effects are influencing call participants, but it is beyond the scope of our study to attempt to separate the combined sources of causality.[25]

4.2.2 Omitted Variables – Incentives to Hype

Huang, et al. (2014) establish an association between residual tone in earnings press releases and each of post-announcement mergers and acquisitions ("M&As") and seasoned equity offerings ("SEOs"). Their evidence suggests that firms that anticipate using their own stock as currency within a year from the press release date have a tendency to "hype" (i.e., use excess optimistic tone) in their announcements. Although there is no a priori reason to expect that the morning call firms in our sample are more likely to hype in relation to such anticipated transactions relative to afternoon call firms, we nevertheless run a specification check that involves including indicator variables for M&As and SEOs in the regression depicted by Equation (2). Specifically, following Davis et al. (2015), we set the M&A indicator to one if the firm makes a merger or acquisition announcement during the twelve months after the call, and we set the SEO indicator to one if the

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[24] Because the sample of matched EST and PST calls is small, influential observations are likely to skew the regression fit. We therefore exclude observations that are influential in the determination of the regression coefficients as recommended by Belsley, et al. (1980).

[25] Forthcoming specification tests related to analyst busyness provide a novel opportunity for us to observe the separate influences of limited personal resources and circadian rhythms on call tone.

firm has a seasoned equity offering within twelve months of the call date, both based upon data from Thomson Reuters' SDC Platinum.[26] The results from these regressions are reported in Table 6. Similar to the findings of Davis et al. (2015), the coefficient estimate on seasoned equity offerings (*SEO*) is not significant in any of our tone regressions. By contrast, the coefficient estimate on the *M&A* indicator is significantly negative in the tests of *ResidToneQuestion* and *ResidToneQ&A*. Most importantly, the magnitude and significance of the coefficients on the *EST_Hour* test variable of interest are entirely unchanged after the inclusion of these variables, and thus we conclude that incentives to hype are not driving our results related to the diurnal variation in call tone.

4.2.3 Omitted Variables – Analysis of Switching Firms

We address the potential concern of correlated omitted variables influencing our primary results in one further way, which is by focusing on firms that switch their call times. Similar to the inclusion of *ResidTonePresent,* the examination of the change in Q&A tone for switching firms allows the firm to serve as its own control, thereby mitigating the potential for unspecified firm-specific factors to be driving the systematic time-of-day variations documented earlier for the Q&A discussions.

We identify 2,575 call observations out of our primary EST/CST sample that involve the firm switching the hour of their call relative to the previous quarter ("time switchers"). Using this sample, we regress the change in the residual Q&A-related tone (*delta_ResidTone*) on the change in the start time of the call (*delta_Hour*), and we include the change in *ResidTonePresent* as a control (i.e., a parallel regression to Equation (2), except that the time and tone variables are all in changes). We allow for an asymmetric response to the change in tone for firms switching to an earlier versus a later time of day by including *EarlierCall*delta_Hour,* where *EarlierCall* is an indicator set to one if the call is held earlier in the day during the current quarter relative to last quarter, and we also include *EarlierCall* as a main effect to allow for a different intercept.

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[26] We find robust results on our test variables of interest if instead we define M&A and SEO following Huang et al. (2014), which entails setting the M&A indicator to one if the amount of acquisitions (AQC from Compustat) in the four quarters after the call is greater than 10 percent of lagged total assets, and setting the SEO indicator to one when proceeds from the sale of common and preferred stock (SSTK from Compustat) in the four quarters after the call is greater than 10 percent of lagged total assets.

The results of this regression are presented in Table 7.[27] Despite the significantly reduced sample, the results indicate that the change in residual tone for all three components of the Q&A is significantly positively associated with *delta_Hour*. These findings indicate that tone becomes reliably more (less) negative when firms switch to later (earlier) call times, and this finding holds even after controlling for the change in the residual tone of the presentation. Interestingly, there is no evidence of an asymmetric response in tone for firms switching to an earlier versus a later call time. We conclude from these differences tests that our finding of a relation between the time of day and non-economics-driven call negativity is not due to firm-specific variables having been omitted from the main test regressions reported in Table 4.

4.2.4 Endogeneity

Although our earlier descriptive statistics on the stickiness of conference call times do not support the notion of managers' strategic timing of conference calls, considering evidence in deHaan, et al. (2015) that managers hide bad news by announcing earnings in periods of low attention, we address the potential for endogeneity between the firm's choice of call time and the tone of the conversations that ensues in two alternative ways. In the first robustness check, we introduce the inverse Mills ratio (*Lambda*) from a parsimonious probit regression of the decision to initiate an *afternoon call* into the Equation (2) tone regressions. The first-stage model includes all significant candidate variables for explaining the afternoon call choice. Aside from the conventional wisdom that calls should be held after market hours in order to allow investors and analysts time to digest the information before making injudicious trades (Bragg (2014)) or, for international firms, e.g., at an hour when analysts in New York are able to participate (Guimard (2013)), little is known about the determinants of firms' call times.[28] Accordingly, we begin with an exploratory probit regression modeling this decision, the results from which are presented in first column of Panel A of Table 8. As shown, and consistent with the descriptive evidence presented earlier that call start times are relatively "sticky" and that call start times are not driven

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[27] Because the sample of switching firms is small, influential observations are likely to skew the regression fit. We therefore exclude observations that are influential in the determination of the regression coefficients as recommended by Belsley, et al. (1980).

[28] In an informal survey of about 30 investor relations executives polled by the authors, common reasons cited for their choice of afternoon call start time were that they had held their call at this time in the previous quarter and that they held their call after the market's close in order to avoid a knee-jerk response.

by the flavor of the quarterly earnings news, the firm's experience of having held an afternoon call in the prior quarter, as captured by the *Lag_Afternoon* indicator, is by far the most important determinant of the likelihood that the firm will host an afternoon call in the current quarter. Once *Lag_Afternoon* is included in the decision model, the magnitude of the earnings surprise (*absSUE*), an indicator set to one for firms reporting "bad news" (*BadNews*), firm size (*Size*), the number of analysts following the firm (*logAnalyst*), and a variable capturing the firm's dependence on equity financing (*EquiDepend*) are all insignificant. Only *HighTech*, an indicator set to one if the firm is in a high-tech industry, *InvestIntense*, a variable capturing the firm's investment intensity (Rajan and Zingales (1998)), and *FQ4*, an indicator set to one if the call relates to the firm's fiscal fourth quarter earnings, remain significant with the inclusion of *Lag_Afternoon*.

The second column of Panel A of Table 8 presents the results of the first-stage probit regression that includes only the aforementioned significant variables. We use this fitted model to estimate the *Lambda* to be used in the second stage. The pseudo-R^2 of 49% suggests that our decision model does a very good job of explaining the afternoon call time choice.

The first set of key results from this endogeneity test are presented in Panel B of Table 8. As shown there, when the Equation (2) residual tone regressions are augmented to include the estimated first-stage *Lambda*, our key inferences related to a diurnal effect on call participants' moods remain intact as *EST_Hour* remains significant in each residual tone regression.

We undertake a second robustness check following the methodology proposed by Lennox, Francis and Wang (2012) who suggest that it may be better in some cases to avoid a two-stage approach, as described above, due to the potential for mis-specification of the first-stage selection model. Specifically, Lennox, et al. (2012) recommend including the significant determinants of the potentially endogenous variable (i.e., afternoon call time choice in our case) directly in the would-be second-stage regression (i.e., the residual tone regressions in our setting) rather than to include the estimated *Lambda* because the latter fitted value may be subject to undesirable measurement error. Accordingly, in our second robustness test we augment the Equation (2) residual tone regressions with the variables that were significant in the afternoon call choice model (i.e., *Lag_Afternoon*, *HighTech*, *InvestIntense*, and *FQ4*). The results from this test are presented in Panel C of Table 8. As shown, the significant positive relations between the time of day at which the call is held (*EST_Hour*) and the net negative tone of the call still hold for the analyst

question, management answer, and combined Q&A portions of the conference call discussions, even after these control variables have been included.

In summary, we conclude from these two tests that our key finding of a significant diurnal effect on analyst and executive behavior remains robust to controlling for the potential for endogeneity in the afternoon call time decision.

4.2.5 Analyst Busyness

As discussed earlier, one of the hypothesized explanations for the observed diurnal variation in net negativity is the concept of limited personal resources – as individuals deplete their limited reservoir over the course of the day, the saliency of resource loss leads to tension, stress, and general deterioration in mood (as well as in cognitive function and task performance). In order to investigate whether our results are principally driven by such task-induced fatigue (to the exclusion, e.g., of circadian influences), we develop a measure that is designed to capture the load being borne by analysts prior to the firm's call and we include this as a competing explanatory variable, in addition to *EST_Hour,* for residual tone. Our proxy for *AnalystBusyness* is the abnormal trading volume in the call firm's stock measured from the start of trading on the day prior to the call and ending at the conference call start time, with the reasoning being that abnormal trading volume captures the amount of firm-related news that is being released and processed during this interval, and the expected relation is that more pre-call news processing will lead to greater analyst fatigue and thus increased negativity.[29]

Results for regressions of *ResidTone* on *AnalystBusyness* are presented in Table 9. As shown, and consistent with (limited) personal resources theory, net negative tone is increasing in this proxy for the workload that analysts and management may have been subject to prior to the call. Most importantly, *EST_Hour* remains significant in each regression, indicating that there is both a circadian rhythm effect and a workload-induced fatigue factor impacting call moods.

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[29] Results are identical if we instead measure *AnalystBusyness* as the abnormal volume from the start of trading on the day of the call to the start time of the call.

4.2.6 Summary of Robustness Tests

Our main tests include a firm-specific control for the tone of soft information in the earnings call (i.e., *ResidTonePresent*) and our robustness tests have addressed the potential effects of other correlated omitted variables, analyst workload, and firm self-selection into afternoon call timeslots on inferences related to diurnal influences on conference call Q&A tone. Combined analyses of calls initiated in Eastern and Pacific time zones establish that diurnal influences also exist for West Coast calls and indeed the tone of conversation is more negative compared to that for East Coast calls at similar times of day, a finding that we attribute to the more advanced body clocks of these call participants and/or higher levels of frustrations and other annoyances that have accumulated over the course of their day. All of these robustness tests support our conclusion that there are strong and reliable diurnal patterns in the moods of both managers and analysts during earnings conference call discussions. Specifically, the tone of manager-analyst communications becomes more negative as the day wears on, and this appears to be attributable to both limited personal resources as well as the influence of circadian rhythms.

4.3. Impact on Share Prices

We now consider an important consequence of our key finding that conference call participants' moods are subject to systematic diurnal variations by investigating whether there is a differential investor response associated with the tone of earlier versus later calls. In an efficient market, the stock price should not respond to the portion of call tone that is unrelated to economic news or firm fundamentals. In other words, "excess" net negativity on later calls that arises due to the influence of limited personal resources and/or circadian rhythms on human moods should not be priced. And yet, doubts about the extent of market efficiency linger.

In order to investigate this issue, we first develop a measure of the Q&A call tone that is due to diurnal influences. Following a methodology developed by Gong, Li and Wang (2011) in the context of management forecast errors, we use the predicted value of *NetNegativityQ&A* based upon the estimated coefficient on *EST_Hour*. Specifically, we include *EST_Hour* as an additional explanatory variable for *NetNegativityQ&A* in Equation (1), and we then compute the diurnal tone measure as the estimated coefficient on *EST_Hour* multiplied by the *EST_Hour* start time of the call for each observation. We refer to this value as *DiurnalToneQ&A*.

We examine the market's pricing of *DiurnalToneQ&A* using the following regression:

$$AbnRet = \theta_0 + \theta_1 DiurnalToneQ\&A + \theta_2 EconToneQ\&A + \theta_3 ResidTonePresent + \vartheta \quad (3)$$

where the dependent variable, *AbnRet,* is the abnormal return measured over various intraday and longer post-call intervals as defined below, and all other variables are as defined earlier or in greater detail in Appendix B. [30]

Our first abnormal returns period is the 5-hour call window. The accumulation of returns for this window begins with the estimated start time of the Q&A discussions and closes at the end of the 5th hour of trading (i.e., a period that may extend into the next day's trading).[31] Specifically, the abnormal returns are calculated as the difference between the firm's returns during the 5-hour call window minus the average returns during the corresponding 5-hour window on the same day of the week over the previous month (i.e., the average of four weekly observations).

The results from this abnormal returns regression are presented in the first column of Panel A in Table 10. As shown, 5-hour abnormal returns are negatively associated with each of *EconToneQ&A* and *ResidTonePresent*. In other words, the negative "soft" information that is elicited on the call is quickly, and negatively, priced by the market. This general finding of an association between linguistic tone and stock returns is consistent with the prior literature that has found linguistic tone to be contemporaneously informative and/or to have predictive content for stock prices in numerous other managerial communications or conference call settings (e.g., Davis, Piger and Sedor (2012); Price, Doran, Peterson and Bliss (2012); Mayew and Venkatachalam (2012); Demers and Vega (2014); Huang, et al. (2014); Baginski, et al. (2016); and Mayew, Sethuraman and Venkatachalam (2015), amongst others). More importantly, however, we find that 5-hour abnormal returns are negatively associated with the estimated non-value-relevant tone that is attributable to diurnal influences, *DiurnalToneQ&A* (two tailed p-value < 0.10). Furthermore, the market's response to *DiurnalToneQ&A* in the 5-hour window is not significantly different from its response to the economics-driven tone, *EconToneQ&A* (two tailed p-value = 0.2875). This novel result suggests that investors don't meaningfully distinguish between that

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[30] Equation (3) is estimated using the previously derived *EconToneQ&A* from the regression of Equation (1). Returns results are robust to alternatively estimating *EconToneQ&A* as the predicted value of *NetNegativityQ&A* from the regression of Equation (1) augmented by *EST_Hour*.

[31] We estimate the Q&A start time following the methodology outlined by Matsumoto, et al. (2011), which assumes that 160 words are spoken per minute during the presentation portion of the call, that the presentation begins approximately 116 seconds after the stated call start time, and that the Q&A begins 28 seconds after the end of the management presentation.

portion of call tone that is conveying economically-relevant news from that which is induced by diurnal influences.

In the remaining columns of Panel A of Table 10 we present the associations between longer term abnormal returns for various periods and the three respective measures of call tone. As shown, we find that *EconToneQ&A* and *ResidTonePresent* are both subject to post-call drift during the 30-trading-day period subsequent to the close of the 5-hour intraday call window, as indicated by the significant negative coefficient on these variables over this longer returns interval. This finding is consistent with the notion that "soft" textual (or verbal) tone-based news is more difficult to process than "hard" earnings (and other quantitative) news and thus takes longer to be impounded into prices, evidence of which has previously been provided by Engelberg (2008), Price, et al. (2012), and Demers and Vega (2014). As evidenced by the final column in Panel A, which presents results for the period beginning with the estimated Q&A start time and ending 60 trading days after the call, both *EconToneQ&A* and *ResidTonePresent* have a long-lasting effect on prices, consistent with the notion that earnings news and other quantitative measures do not capture all value-relevant information being released on the call date such that the tone of the language on the earnings call has a role to play in conveying additional price-relevant information.

Focusing on the test variable of interest, *DiurnalToneQ&A,* the results for the [31, 50] trading day period show a positive coefficient on the tone that is induced by diurnal influences during the call Q&A period, indicating a reversal of this dimension of tone that was initially priced during the 5-hour returns interval. The combined findings indicate that the "excessive" call negativity that is induced by the influences of the time of day on mood doesn't have a sustained, long-term effect on share prices. Consistent with this, the final column of Panel A shows that *DiurnalToneQ&A* has a zero net effect upon returns over the longer term as it is not significantly associated with returns for the period beginning with the estimated Q&A start time and ending 60 trading days after the call.

In terms of economic significance, the median 5-hour returns of the highest *DiurnalToneQ&A* quintile are more negative than those of the lowest *DiurnalToneQ&A* quintile by 13 basis points (two tailed p-value < 0.10), as reported in Panel B of Table 10. Thus, time-of-day-induced negative tone leads to an economically material level of short-term mispricing. Consistent with the returns regressions reported in Panel A, the difference in event period through 60-trading day returns reported in Panel B is not significantly different for the high and low

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DiurnalToneQ&A quintiles (two tailed p-value = 0.2421), indicating again that the diurnal tone is not economics-driven (i.e., it is not fundamentally value-relevant and therefore has no lasting impact on price), but rather that it is driven by more spontaneous, contextual, and time-dependent human moods.

In summary, these market-based tests support our finding that executives and analysts exhibit excessive later day conversational negativity that is unrelated to the firm's economics, which initially impacts share prices, but over a longer term is discounted by investors. Thus, in addition to corroborating our main finding regarding the time of day impacting executives and analysts in an important corporate communications setting, these returns analyses also reveal that there are significant short-term economic consequences in the form of temporary but material stock mispricings associated with the time of day at which the calls are held.

5. Summary and Conclusion

A significant body of psychological and physiological research has documented the role of diurnal influences on human moods and performance. Due to limited personal resources and/or the multi-faceted effects of circadian rhythms, the time of day influences human emotions, biology, cognitive function, and other aspects of performance. While the time of day has been shown to influence both human mood in casual settings such as in Twitter communications, and decision making and compliance with professional standards in settings such as the judiciary and medicine, to the best of our knowledge no prior study has investigated diurnal influences on expert economic agents' mood or performance.

We conduct a large sample investigation into this issue by applying linguistic algorithms to over 18,000 time-stamped actual earnings conference call transcripts and find that the time of day influences the tone of corporate communications between executives and investors. Our study presents novel and robust evidence of the time of day impacting expert economic agents acting in a real and important corporate context. Specifically, we show that the non-economics-driven, or "residual" tone of conference call Q&A discussions exhibits significant diurnal patterns, with tone becoming more negative as the day wears on, even after controlling for other firm-specific soft news released by the firm during the call (i.e., as captured by the residual tone of the presentation). Furthermore, both executives and analysts on the calls are subject to these diurnal influences. Our

results are robust to controls for potential endogeneity in the self-selection of afternoon callers and to the omission of firm-specific variables that may be correlated with the time of day. Tests using a bi-coastal sample establish that diurnal influences also exist for West Coast calls, and indeed the tone of conversations is more negative than that of East Coast calls at similar times of day, which is presumably due to the more advanced body clocks and/or higher levels of frustrations and other accumulated annoyances on the part of West Coast call participants given that they are likely to be deeper into their schedules at the same local hour. Further specification checks that control for analyst busyness indicate that the time-of-day effects documented here are likely to be due to both limited personal resources (i.e., a decline in mood induced by the cumulative cognitive load borne by analysts over the course of their workday) as well as by circadian rhythms as proxies for both constructs significantly explain the non-economics driven tone of Q&A call conversations. Finally, abnormal stock return tests confirm that there is excess negative conversational tone later in the day that the market understands over the longer-term to be value-irrelevant. In the short-term, however, this diurnal tone leads to economically significant mispricing.

In summary, we contribute to the accounting, behavioral economics, financial linguistics, and corporate communications literatures by presenting novel and surprising evidence that sophisticated economic agents acting in real and highly incentivized settings are subject to time-of-day effects in the performance of their professional duties. In addition, our evidence suggests that there are potentially important economic consequences associated with this phenomenon. Aside from the measurable effects in terms of temporary stock mispricings, excess negativity on the calls may also affect executives' relations with their analysts and/or their reputations with other firm constituents who listen to, later read the transcript of, or otherwise become aware of the calls' negativity (e.g., via press reports, social media blogs, etc.). Furthermore, when considered together with the prior literature related to limited personal resources and the effect of circadian rhythms on human emotions, cognitive function, and other dimensions of performance, our evidence in the context of measurable attributes of conference calls and their consequences is suggestive of a potentially much broader phenomenon of the time of day impacting many other communications, decision making and/or managerial performance situations at all hierarchical levels and throughout diverse business enterprises. Finally, on a practical level, our findings alert executives to the advantage of conducting early day communications with investors.

Appendix A
Methodology Used to Parse Conference Call Transcripts

The conference call transcripts are furnished to us by Thomson StreetEvents, a division of the Thomson Reuters news service and database vendor, in .html format. The files include time-stamps and dates, firm identifiers and other file formatting detail, as well as the verbatim transcripts of the call conversations (i.e., including operator instructions and other opening/closing remarks). Our empirical analyses require that we develop algorithms to separate the thousands of call transcripts into three separate components of speech: i) management's opening address; ii) analysts' questions; and iii) management's answers. The methodology that we use to effect this is as described below.

First, we need to separate the conversational elements of the call from the firm identifiers, list of call participants, and other formatting detail included in each file. To do so, we include only the text body between "<Body>" and "</Body>", the markers for the start and end of the call contents, respectively. Second, to identify the beginning of the conference call content, we search the file for "Presentation---" or "Transcript---". If there is no such "Presentation---" or "Transcript---" indicator, then we allow the first time the operator speaks to mark the introduction of the management presentation portion of the call.

Within each call transcript, and at every change in speaker, the new speaker is normally identified by their proper name or as the operator/moderator before they speak.[32] It is typically possible to cleanly separate the operator's introductory remarks from the beginning of the management presentation portion of the call by denoting the management address to be the first speech that occurs on the call after the operator's opening remarks and instructions to participants. Similarly, there is commonly an identifiable separator between management's address and the Q&A portion of the call, which we're able to locate by searching for "Questions and Answers". If such an indicator does not exist, then because the operator speaks at the conclusion of the management address in order to open the Q&A session, we take the first occurrence of "Operator" (or another operator-related alias) as speaker after the first 500 words of the management address to mark the introduction of the Q&A session. Naturally, we exclude the operator/moderator's speech that opens and closes the conference calls or that prompts analysts for questions from our

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[32] Numerous aliases were found to be used to identify the operator on the call, including the following: operator, moderator, female speaker, male speaker, and editor.

linguistic analyses and word counts. Similarly, the list of call participants at the start of the transcripts, and all of the other labels and speaker names inserted into the transcripts by Thomson Reuters are excluded from text files that are processed through the linguistic algorithms.

Separating the text of the Q&A into analyst questions and managerial answers is a more difficult undertaking. Our first step is to identify the proper names of all of the executive speakers on the call so that we can classify all of the speech attributed to these individuals to the "answers" portion of the Q&A. If the call transcript lists the corporate participants separately from analyst participants, then we use this list to identify the firm's executives. If there is no such list provided in the transcript, then we create a list of executive participants using the names collected from the management presentation session through a two-step procedure, as follows. First, we collect each of the names that prefaces an element of speech in the management presentation session. This will not produce a complete list of corporate participants, however, because not all executives on the call speak during the initial address. As a complement to this list, therefore, we scan the beginning of the first executive's speech for proper names and compare this to the combined list of all call participants, where such a list is available, and identify any matched names to be corporate executives (i.e., this procedure recognizes that at the start of the management address, the speaking executive will typically introduce the other executives who are on the call with him/her). In addition to this list of the proper names of corporate executives, we add speakers identified as "unidentified company ---" and "unidentified corporate ---" to the list of corporate participants. All speech attributed to any of these parties is considered to be part of the "answers" portion of the Q&A. Any speech that is not attributed to corporate participants using this algorithm, and that is not labeled as being from the operator/moderator, is likely to come from the analysts. However, in order to assign this speech to the analyst question portion of the call, we require that it either be attributed to a particular person (i.e., be prefaced by a proper name) or to "unidentified audience ---". There are elements of some calls' transcripts, however, that we cannot reliably identify as either managers' or analysts' speech. For example, a portion of speech may be prefaced by "unidentified speaker" or "unidentified participant" rather than by either "operator" or "unidentified corporate" or a proper name that would enable us to identify the speaker as a member

of the management team versus an analyst. Given the potential for noise or error in attributing the speech in these cases to one party or another, we drop these observations.[33]

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[33] In untabulated specification checks, we find that all of our main results are unaffected by including these observations in the analyses while excluding the unidentified portions of speech from the calculation of the managerial and analyst tone variables.

Appendix B
Variable Definitions

Variable	Definition
NetNegativity	*Negativity* minus *Positivity,* scaled by the sum of negative and positive words. *Positivity* equals Loughran and McDonald (2011) positivity score in the relevant portion of the call, and *Negativity* equals Loughran and McDonald (2011) negativity score in the relevant portion of the call. We calculate this variable for the management presentation, analyst questions, management answers, and the Q&A combined segments of the call. We refer to these variables as *NetNegativityPresent, NetNegativityQuestion*, *NetNegativityAnswer*, and *NetNegativityQ&A*, respectively.
EST_Hour	The hour of the call's initiation, measured in Eastern Standard Time.
SUE	Standardized unexpected earnings for the quarter to which the conference call relates. Unexpected earnings are calculated as reported earnings per share (EPS) minus the analyst consensus one day prior to the earnings announcement. We standardize the unexpected earnings by dividing it by the standard deviation of realized EPS in the prior 20 quarters.
BadNews	An indicator variable set equal to one if the firm misses the analyst consensus forecast for the quarter to which the call relates, and zero otherwise.
Loss	An indicator variable set equal to one if the firm reports a loss (NIQ from Compustat) for the fiscal quarter to which the conference call relates, and zero otherwise.
FQ1GuideNews	Standardized one-quarter-ahead management earnings forecast surprise for firms issuing forecasts within the window of [-2, 0] days around the t=0 call date. Guidance news is calculated as EPS guidance minus prior prevailing analyst consensus EPS forecast, and we standardize this by the standard deviation of realized EPS in the prior 20 quarters.
PreCallAbnRet	Pre-call firm-specific abnormal stock returns, measured from the start of trading on the day prior to the call and ending at the conference call start time, where "normal" returns are defined as the average returns to the firm's stock over the identical period (i.e., ending on the same time of day and on the same day of the week) over the prior month (i.e., the average of the four prior weeks' observations).
Prior3MthAbnRet	Buy-and-hold size- and book-to-market-adjusted returns for the 3-month period ending on the last date of the fiscal quarter to which the conference call relates.
Size	Log of the market capitalization (CSHOQ*PRCCQ from Compustat) of the firm at the end of quarter to which the conference call relates.
MTB	Market-to-book ratio at the end of the quarter to which the conference call relates.
SaleGrowth	Percentage change in sales (SALEQ from Compustat) for the quarter to which the conference call relates relative to sales for the same fiscal quarter in the prior year.
FirmAge	Log of one plus the number of years since the firm first appears in CRSP.
Leverage	The debt (DLCQ + DLTTQ from Compustat) to equity (CEQQ from Compustat) ratio at the end of the quarter to which the conference call relates.
CurratioRatio	Firm's current assets (ACTQ from Compustat) divided by current liabilities (LCTQ from Compustat) at the end of the quarter to which the conference call relates.
EconTone	*EconTonePresent, EconToneQuestion, EconToneAnswer,* and *EconToneQ&A* for each of the management presentation, the analyst question, management answer, and combined Q&A segments of the call, respectively, represent the portion of the call tone that is explained by the economic news and other firm fundamentals.
ResidTone	*ResidTonePresent, ResidToneQuestion, ResidToneAnswer,* and *ResidToneQ&A* for each of the management presentation, the analyst question, management answer, and combined Q&A segments of the call, respectively, represent the portion of the call tone that is not explained by the economic news or other firm fundamentals (i.e., *NetNegativity* minus *EconTone*).

PST	An indicator variable set equal to one for calls initiated in the Pacific Time zone, and zero otherwise.
SEO	An indicator set equal to one when the firm has seasoned equity offering in the twelve months after the call, and zero otherwise.
M&A	An indicator set equal to one when the firm makes a merger or acquisition announcement within twelve months of the call date, and zero otherwise.
delta_Hour	A change in *EST_hour* of the call.
delta_ResidTonePresent	A change in the residual tone of the presentation portion of the call.
EarlierCall	An indicator set to one if the firm chooses an earlier conference call time compared to the previous quarter, and zero otherwise.
Afternoon	An indicator variable set equal to one for conference calls initiated at, or after, 12:00 p.m. EST, and zero otherwise.
Lag_Afternoon	An indicator variable set equal to one when the firm's prior conference call was held at, or after, 12:00 p.m., and zero otherwise.
HighTech	An indicator variable set equal to one when the firm operates in the following Fama-French industries: business equipment (code 6); telecommunications (code 7); and healthcare, medical equipment and drugs (code 10).
InvestIntense	The sum of capital expenditures (CAPX from Compustat) over the prior three years divided by the sum of property, plant and equipment (PPENT from Compustat) over the prior three years.
FQ4	An indicator variable set equal to one if the conference call relates to the company's fiscal fourth quarter, and zero otherwise.
absSUE	The absolute value of *SUE*.
logAnalyst	The natural log of one plus the number of analysts following the firm.
EquiDepend	The sum of the net amount of equity issuances (SSTK – PRSTKC from Compustat) in the prior three fiscal years divided by the sum of capital expenditures (CAPX from Compustat) over the prior three fiscal years.
AnalystBusyness	Abnormal trading volume in the call firm's stock measured from the start of trading on the day prior to the call and ending at the conference call start time, where "normal" trading volume is defined as the average volume of the firm's stock over the identical period (i.e., ending on the same time of day and on the same day of the week) over the prior month (i.e., the average of the four prior weeks' observations).
DiurnalToneQ&A	A measure of the conference call tone that is attributable to the time of day at which the call is initiated.
5-hour event AbnRet	The difference between the firm's returns during the 5-hour conference call window minus the average returns during the corresponding window on the same day of the week over the previous month (i.e., the average of four weekly observations). The 5-hour event window begins at the start time of the Q&A session, which is approximated following the methodology and parameters suggested by Matsumoto et al. (2011), and may roll into the subsequent trading day (i.e., in the case of later day calls).
Post call AbnRet	Cumulative abnormal returns for various periods subsequent to the end of the 5-hour event window. [5-hour event end, 30 trading days] denotes the period from the end of the 5-hour event window through to, and including, the 30th subsequent trading days, while [31, 50] represents the window beginning with the 31st through 50th trading days, inclusive, relative to *day 0*, the day on which the 5-hour abnormal returns event window is closed. [51, 60] represents the window beginning with the 51st through 60th trading days, inclusive, relative to *day 0*. For intraday returns on *day 0* to the end of the 5-hour event window, the "normal" return equals the average returns during the corresponding window on the same day of the week over the previous month (i.e., the average of four weekly observations). For daily returns subsequent to *day 0*, the "normal" return is the daily value-weighted return to a corresponding portfolio based on size and the book-to-market ratio.

| *[Q&A start, 60 trading days] AbnRet* | Cumulative abnormal returns from the start time of the Q&A through to, and including, 60th trading-days subsequent to *day 0* as defined above. |

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Figure 1: Residual Tone
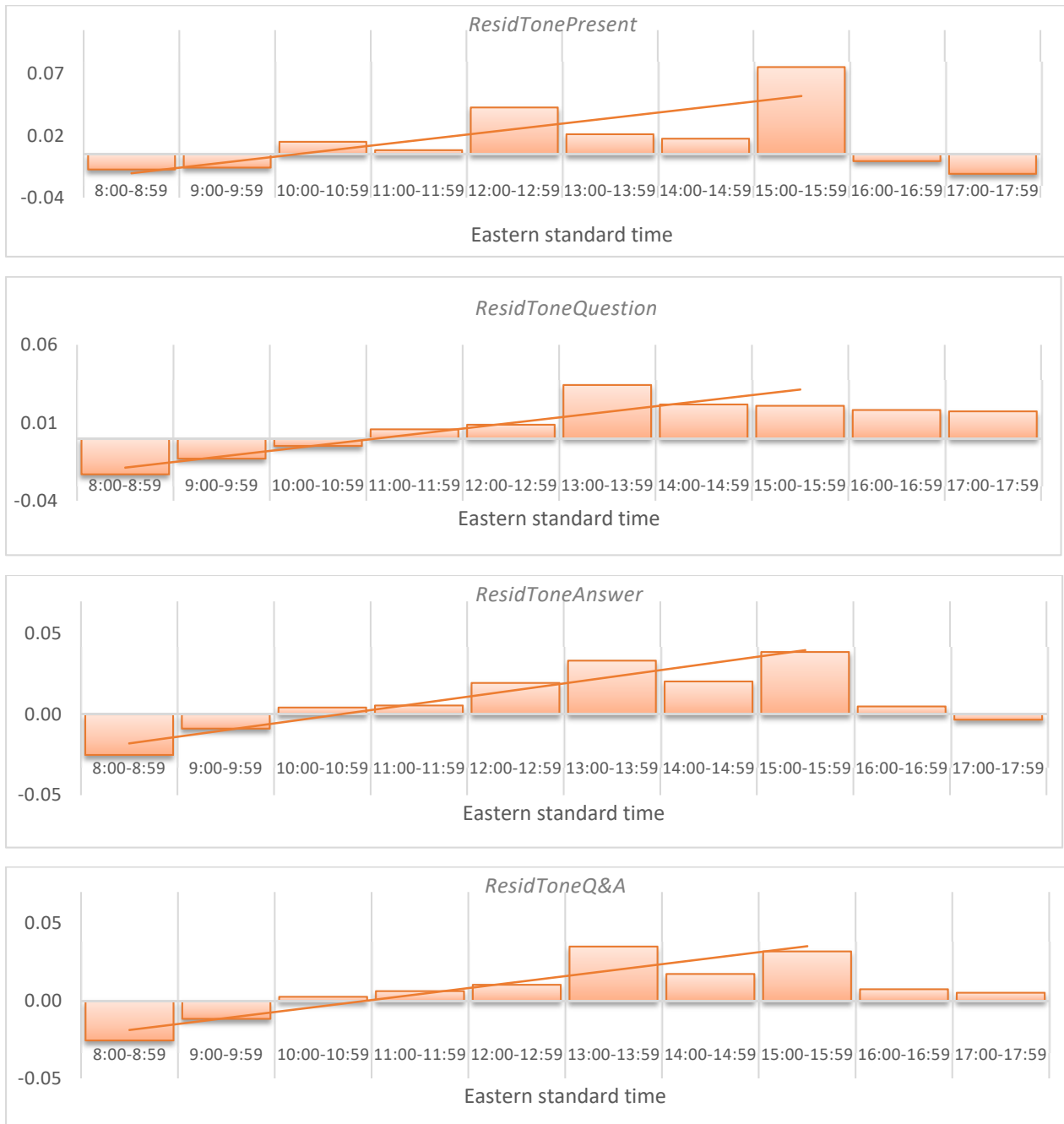
Note:

This figure presents a graphical depiction of residual tone for the presentation, question, answer, and combined Q&A portions of the calls that are held in Eastern and Central time zones, with calls being categorized according to the EST hour during which the call began. The lines through the graphs are fitted for calls initiated from 8:00 through 15:59 (i.e., to the closing of the market).

Table 1: Sample Determination

	No. Obs.	No. Firms
Transcripts provided by Thomson StreetEvents from Jan2001 to Jun2007	96,892	
Transcripts that StreetEvents identifies as earnings-related	76,406	5,016
Exclude calls for which separation of managers' answers from analysts' questions cannot be reliably performed due to the structure of the transcript files	65,218	4,949
Word count exceeds 50 words for each of the management presentation, management answers, and analyst questions elements of the call	62,226	4,877
Firms that are publicly-traded and headquartered in the United States[1]	47,732	3,972
Earnings release conference calls held within [0,2] trading days around earnings announcements[2]	44,524	3,851
Locations of conference calls can be identified as being held in U.S. cities	42,005	3,614
Regression variables calculated using Compustat, I/B/E/S, CRSP, TAQ are non-missing	35,456	3,043
Firm quarters with non-negative book value of common equity	34,575	2,999
Calls in Eastern and Central time zone[3]	24,628	2,113
Delete influential observations in the first-stage regression separating net negativity of calls into economic tone and residual tone	22,368	2,098
Calls with start times between 8:00 to 15:59 Eastern Time	**18,408**	1,865

Notes:

1. Merged with Compustat NA database based on ticker symbol and/or firm name.

2. We retain conference calls that we are able to confirm to be related to earnings announcements by requiring the date of the call to be in the range of [0, 2] days of an earnings announcement date reported in either Compustat (RDQ) or I/B/E/S.

3. The transcripts provided by Thomson StreetEvents include the start time of the conference call stated in Greenwich mean time (GMT) format, which we extract together with the name of the city where the call is initiated (the state and the country of call origination are not provided). We then use the sashelp.zipcode file, which provides detailed location and time zone information for U.S. cities, to translate the GMT start times into Eastern Time for consistency with the market hours being investigated in our study. For those cases where multiple cities of the same name confound the use of the SAS zip code function, we refer to the Compustat NA company file to identify the location of the firm's headquarter (CITY) and principal location (STATE). We use these Compustat variables together with the assumption that the call is originated at the firm's headquarters or principal location to infer the time zone in which the call was originated. We refer to official daylight savings start and end dates in each of GMT and Eastern Time zones in order to ensure that all GMT times extracted from the call transcripts have been correctly restated into Eastern Time.

Table 2: Linguistic Measures

Panel A: First-stage Regressions Dichotomizing Tone into *EconTone* and *ResidTone*

	NetNegativityPresent		*NetNegativityQuestion*		*NetNegativityAnswer*		*NetNegativityQ&A*	
SUE	-0.028	***	-0.038	***	-0.023	***	-0.026	***
	(-7.55)		(-8.90)		(-5.91)		(-8.00)	
BadNews	0.054	***	0.042	***	0.035	***	0.036	***
	(13.47)		(9.10)		(8.51)		(10.39)	
Loss	0.109	***	0.038	***	0.037	***	0.036	***
	(26.58)		(8.22)		(8.79)		(10.26)	
FQ1GuideNews	-0.022	***	-0.047	***	-0.010	*	-0.020	***
	(-4.00)		(-7.67)		(-1.80)		(-4.24)	
PreCallAbnRet	-0.128	***	-0.361	***	-0.111	***	-0.186	***
	(-3.90)		(-9.64)		(-3.33)		(-6.54)	
Prior3MthAbnRet	-0.090	***	-0.109	***	-0.062	***	-0.076	***
	(-10.85)		(-11.48)		(-7.28)		(-10.55)	
Size	-0.013	***	0.015	***	0.006	***	0.008	***
	(-11.96)		(12.08)		(5.37)		(8.56)	
MTB	-0.009	***	-0.002	***	-0.005	***	-0.004	***
	(-17.13)		(-2.99)		(-8.83)		(-8.14)	
SalesGrowth	-0.081	***	-0.012	**	-0.021	***	-0.018	***
	(-17.57)		(-2.28)		(-4.55)		(-4.56)	
FirmAge	0.009	***	-0.005	**	0.002		-0.001	
	(4.51)		(-2.42)		(0.78)		(-0.73)	
Leverage	0.008	***	0.001		0.004	***	0.003	***
	(9.24)		(1.17)		(4.96)		(4.76)	
CurrentRatio	-0.005	***	-0.001		-0.001		-0.001	
	(-5.98)		(-1.17)		(-1.55)		(-1.39)	
Intercept	-0.257	***	-0.134	***	-0.298	***	-0.236	***
	(-28.57)		(-13.01)		(-32.49)		(-30.23)	
FF 12 Industry FE	Yes		Yes		Yes		Yes	
N	22,368		22,368		22,368		22,368	
R-square	0.1911		0.0712		0.0864		0.1052	

Table 2: Linguistic Measures (Continued)

Panel B: Tone Measure Statistics

Tone	N	Mean	Std Dev	25th Pctl	Median	75th Pctl
Negative words in manager presentation	22,368	25.78	15.68	15.00	22.00	33.00
Negative words in analyst questions	22,368	16.06	9.17	9.00	15.00	21.00
Negative words in manager answers	22,368	23.80	14.54	13.00	21.00	32.00
Negative words in Q&A combined	22,368	39.89	21.53	24.00	37.00	52.00
Positive words in manager presentation	22,368	54.05	28.74	33.00	49.00	70.00
Positive words in analyst questions	22,368	16.21	8.85	10.00	15.00	22.00
Positive words in manager answers	22,368	39.96	22.05	23.00	37.00	53.00
Positive words in Q&A combined	22,368	56.20	27.92	35.00	53.00	73.00
%Negative words in manager presentation	22,368	0.86	0.39	0.57	0.80	1.07
%Negative words in analyst questions	22,368	1.28	0.44	0.98	1.24	1.53
%Negative words in manager answers	22,368	0.77	0.29	0.57	0.74	0.94
%Negative words in Q&A combined	22,368	0.92	0.28	0.73	0.89	1.08
%Positive words in manager presentation	22,368	1.78	0.58	1.36	1.72	2.14
%Positive words in analyst questions	22,368	1.33	0.51	0.97	1.28	1.63
%Positive words in manager answers	22,368	1.32	0.42	1.01	1.27	1.57
%Positive words in Q&A combined	22,368	1.32	0.37	1.06	1.28	1.54
Residual net negativity in manager presentation	22,368	0.00	0.21	-0.16	-0.01	0.15
Residual net negativity in analyst questions	22,368	0.00	0.24	-0.16	0.01	0.17
Residual net negativity in manager answers	22,368	0.00	0.22	-0.15	0.00	0.15
Residual net negativity in Q&A combined	22,368	0.00	0.18	-0.13	0.00	0.13

Note:

Panel A of Table 2 presents the results of a first-stage regression using all EST and CST call observations to dichotomize tone into two distinct components: the net negativity that is explained by economic news and firm fundamentals; and the "residual" tone, which is the tone that is not explained by the depicted regression (i.e., the regression residuals). *SUE* is the standardized unexpected earnings; *Size* is the natural log of the market capitalization of the firm; *BadNews* is an indicator that is set to one if the firm misses the analyst consensus forecast for the quarter to which the call relates; *Loss* is an indicator that is set to one if the firm reports a loss for the fiscal quarter to which the call relates; *FQ1GuideNews* is the one-quarter-ahead management earnings forecast surprise for firms issuing forecasts within the window of [-2,0] days around the t=0 call date, and zero for firms that don't offer such guidance within the window; *PreCallAbnRet* is the pre-call firm-specific abnormal return cumulated from the beginning of the trading day preceding the conference call through to the conference call initiation time; *Prior3MthAbnRet* is the buy-and-hold size- and book-to-market-adjusted abnormal returns for the 3-month period ending on the last date of the fiscal quarter to which the conference call relates; *MTB* is the market-to-book ratio; *SalesGrowth* is the percentage change in sales for the quarter to which the conference call relates relative to sales for the same fiscal quarter in the prior year; *FirmAge* is the natural log of one plus the number of years since the firm first appeared in the CRSP database; *Leverage* is the debt to equity ratio; and *CurrentRatio* is current assets divided by current liabilities. T-statistics are shown in parentheses. *, **, *** indicate coefficients that are significantly different from zero at the 0.10, 0.05, and 0.01 level, respectively, using a two-tailed test. Panel B shows the descriptive statistics of tone measures. All variables are defined in greater detail in Appendix B.

Table 3: Descriptive Statistics

Panel A: Sample Characteristics

Sample	N	Mean	Std Dev	25th Pctl	Median	75th Pctl
Total Assets	18,408	8,825.92	23,377.74	462.59	1,419.85	5,126.48
Sales	18,408	1,303.98	4,013.71	93.83	272.45	927.26
Market Value	18,408	5,555.78	13,285.69	456.82	1,275.51	3,797.01
Market to Book	18,408	3.13	3.08	1.57	2.24	3.48
Analyst Following	18,408	8.25	6.07	4.00	7.00	11.00
CRSP/Compustat/ I/B/E/S Population	N	Mean	Std Dev	25th Pctl	Median	75th Pctl
Total Assets	93,174	4,918.54	14,873.82	195.57	718.81	2,572.50
Sales	93,107	633.07	1,683.41	26.20	102.56	387.75
Market Value	91,761	3,383.76	9,624.90	201.22	601.19	1,955.97
Market to Book	91,529	2.89	3.41	1.40	2.11	3.41
Analyst Following	93,317	4.73	4.64	1.00	3.00	6.00

	Sample		CRSP/Compustat/ I/B/E/S Population	
	N	Percentage	N	Percentage
Incidence of loss	3,114	17%	25,559	27%
Incidence of missing analyst consensus	5,677	31%	31,809	34%
Industry composition:				
Consumer non-durables	964	5%	4,007	4%
Consumer durables	477	3%	2,111	2%
Manufacturing	2,559	14%	8,124	9%
Energy	1,002	5%	3,642	4%
Chemicals and allied products	640	3%	1,806	2%
Business equipment	1,924	10%	19,726	21%
Telecommunications	592	3%	3,175	3%
Utilities	720	4%	2,653	3%
Wholesale and retail	2,281	12%	8,488	9%
Healthcare, medical equip., drugs	1,854	10%	10,594	11%
Finance	2,774	15%	17,697	19%
Other	2,621	14%	11,294	12%
	18,408		93,317	

Table 3: Descriptive Statistics (Continued)

Panel B: Stickiness of Call Initiation Time

Define stickiness as 100% consistency	no. of firms	percentage
stickiness	788	40.0%
no stickiness	1,181	60.0%
Total	1,969	
Define stickiness as 75% of frequency	no. of firms	percentage
stickiness	1,394	70.8%
no stickiness	575	29.2%
Total	1,969	

Panel C: Firms Holding Exclusively Morning Calls or Afternoon Calls

	no. of firms	percentage
Only in morning (before 12:00)	1,086	55.2%
Only in afternoon	274	13.9%
no stickiness	609	30.9%
Total	1,969	

Panel D:

For Firms with Sticky Calls Time, Incidence of Holding Call at Atypical Time by News Types

	Change time	No change
miss	330	4,310
	7.1%	92.9%
meet-or-beat	736	10,305
	6.7%	93.3%
Chi-square=1.03, p= 0.3112		

Panel E: Call Time Related to Meet/Beat or Miss

	Morning	Afternoon
miss	5,073	1,728
	74.6%	25.4%
meet-or-beat	11,598	3,840
	75.1%	24.9%
Chi-square=0.72, p=0.3967		

Note:

Table 3 presents sample descriptive statistics. Panel A compares sample firms to the CRSP/Compustat/I/B/E/S universe. Panels B through E show descriptive statistics related to conference call start times and their "stickiness". Beginning with 22,368 calls initiated in Eastern and Central time zones by 2,098 firms, we exclude firms with only one call, leaving 22,239 calls by 1,969 firms available for this analysis.

Table 4: Time of Day as a Determinant of Residual Tone

	ResidTonePresent	ResidToneQuestion	ResidToneAnswer	ResidToneQ&A
EST_Hour	0.007 ***	0.007 ***	0.006 ***	0.006 ***
	(3.06)	(4.17)	(3.70)	(4.63)
ResidTonePresent		0.173 ***	0.319 ***	0.275 ***
		(16.96)	(31.54)	(32.28)
Intercept	-0.067 ***	-0.074 ***	-0.063 ***	-0.067 ***
	(-2.93)	(-4.29)	(-3.71)	(-4.70)
Std. Errors Clustered by Firm	Yes	Yes	Yes	Yes
N	18,408	18,408	18,408	18,408
R-square	0.0024	0.0261	0.1034	0.1076

Note:

This table presents the results from the regressions of residual tone against the time of the call (measured in Eastern Standard Time) for all EST and CST calls initiated from 8:00 to 15:59. In regressions of the residual tone of the question, answer, and Q&A portions of the call, we control for *ResidTonePresent*, the residual tone of the presentation portion. T-statistics are shown in parentheses. All variables are defined in greater detail in Appendix B. *, **, *** indicate coefficients that are significantly different from zero at the 0.10, 0.05, and 0.01 level, respectively, using a two-tailed test with standard errors clustered by firm.

Table 5: Comparison of East Coast to West Coast Calls

	ResidToneQuestion		ResidToneAnswer		ResidToneQ&A	
PST	0.008	*	0.007	*	0.009	**
	(1.31)		(1.30)		(1.96)	
Local_Hour	0.005	***	0.006	***	0.005	***
	(3.90)		(4.99)		(5.51)	
ResidTonePresent	0.191	***	0.355	***	0.302	***
	(12.04)		(26.05)		(26.51)	
Intercept	-0.068	***	-0.061	***	-0.062	***
	(-4.88)		(-5.15)		(-6.23)	
N	4,815		4,815		4,815	
R-square	0.0326		0.1279		0.1329	

Note:

This table presents the results of residual tone regressions on the local start time of the calls (i.e., EST for East Coast calls and PST for West Coast calls) for EST and PST calls initiated during the 8:00 to 15:59 local time window. Each EST call observation is matched to a PST call on the basis of market capitalization (with a maximum difference of $200 million), and the hour of the local start time of the call. We control for *ResidTonePresent*, the residual tone of the presentation portion of the call, in regressions. T-statistics are shown in parentheses. All variables are defined in greater detail in Appendix B. *, **, *** indicate coefficients that are significantly different from zero at the 0.10, 0.05, and 0.01 level, respectively, using a one-tailed test.

Table 6: Controlling for Managerial Incentives to Hype

	ResidToneQuestion		ResidToneAnswer		ResidToneQ&A	
EST_Hour	0.007	***	0.006	***	0.006	***
	(4.11)		(3.69)		(4.61)	
M&A	-0.016	***	-0.003		-0.008	*
	(-3.12)		(-0.68)		(-1.94)	
SEO	-0.001		0.001		0.002	
	(-0.11)		(0.19)		(0.35)	
ResidTonePresent	0.172	***	0.319	***	0.275	***
	(16.86)		(31.52)		(32.25)	
Intercept	-0.069	***	-0.062	***	-0.065	***
	(-4.00)		(-3.64)		(-4.53)	
Std. Errors Clustered by Firm	Yes		Yes		Yes	
N	18,408		18,408		18,408	
R-square	0.0269		0.1034		0.1079	

Note:

This table presents results of residual tone regressed against the time of the call (measured in Eastern Standard Time) for all EST and CST calls initiated from 8:00 to 15:59 Eastern Time after controlling managerial incentives to hype (future mergers and acquisitions or seasoned equity offerings). *M&A* indicates that the firm makes a merge and acquisition announcement in the twelve months after the call; *SEO* indicates that the firm has seasoned equity offering in the twelve months after the call. We control for *ResidTonePresent*, the residual tone of the presentation portion that is not driven by economic news and firm fundamentals. All variables are defined in greater detail in Appendix B. *, **, *** indicate coefficients that are significantly different from zero at the 0.10, 0.05, and 0.01 level, respectively, using a two-tailed test with standard errors clustered by firm.

Table 7: Switcher Analyses

	delta_ResidToneQuestion		delta_ResidToneAnswer		delta_ResidToneQ&A	
delta_Hour	0.011	*	0.008	*	0.008	**
	(1.64)		(1.44)		(1.67)	
EarlierCall	0.025		0.017		0.018	
	(1.19)		(1.01)		(1.27)	
EarlierCall*delta_Hour	-0.004		-0.005		-0.003	
	(-0.39)		(-0.70)		(-0.52)	
delta_ResidTonePresent	0.182	***	0.218	***	0.199	***
	(6.09)		(9.05)		(9.87)	
Intercept	-0.048	***	-0.041	***	-0.041	***
	(-3.17)		(-3.35)		(-4.01)	
N	2,362		2,362		2,362	
R-square	0.0177		0.0348		0.0417	

Note:

These analyses use the subsample of EST and CST calls initiated from 8:00 to 15:59 that involve the firm switching the hour of their call relative to the previous quarter ("time switchers"). The change-in-tone on change-in-time specification allows the firm to serve as its own control, implicitly holding constant all firm characteristics other than call start time. *delta_Hour* is the change in *EST_hour* of the call, and *EarlierCall* is an indicator variable that is set equal to one if the firm chooses an earlier conference call time compared to the previous quarter. In parallel with the earlier regressions of Equation (2) (as reported in Table 4), in this changes regression we also control for *delta_ResidTonePresent*, the change in the residual tone of the presentation portion of the call. All variables are defined in greater detail in Appendix B. *, **, *** indicate coefficients that are significantly different from zero at the 0.10, 0.05, and 0.01 level, respectively, using a one-tailed test.

Table 8: Controlling for the Potential Endogeneity of the Call Time Decision

Panel A: Determinants of the Decision to Hold an Afternoon Conference Call

	Prob(*Afternoon*=1)			
Lag_Afternoon	2.581	***	2.585	***
	(34.50)		(34.68)	
HighTech	-0.172	**	-0.176	***
	(-2.48)		(-2.63)	
InvestIntense	-0.703	***	-0.712	***
	(-4.17)		(-4.34)	
FQ4	0.096	*	0.095	*
	(1.87)		(1.86)	
absSUE	-0.015			
	(-0.28)			
BadNews	0.025			
	(0.60)			
Size	-0.010			
	(-0.48)			
logAnalyst	-0.025			
	(-0.55)			
EquiDepend	-0.009			
	(-1.27)			
Intercept	-1.716	***	-1.840	***
	(-12.37)		(-39.61)	
Std. Errors Clustered by Firm	Yes		Yes	
N	16,543		16,543	
Pseudo R-square	0.4919		0.4914	

Panel B: Second Stage of the Heckman Model

	ResidToneQuestion		*ResidToneAnswer*		*ResidToneQ&A*	
EST_Hour	0.007	***	0.007	***	0.007	***
	(3.57)		(3.41)		(4.32)	
ResidTonePresent	0.169	***	0.315	***	0.271	***
	(15.47)		(29.55)		(30.19)	
Lambda	-0.002		-0.004		-0.006	
	(-0.30)		(-0.97)		(-1.43)	
Intercept	-0.077	***	-0.072	***	-0.075	***
	(-3.72)		(-3.59)		(-4.54)	
Std. Errors Clustered by Firm	Yes		Yes		Yes	
N	16,543		16,543		16,543	
R-square	0.0251		0.1008		0.1047	

Table 8: Controlling for the Potential Endogeneity of the Call Time Decision (Continued)

Panel C: Regressions Including the Potentially Endogenous Variables

	ResidToneQuestion		ResidToneAnswer		ResidToneQ&A	
EST_Hour	0.008	***	0.006	***	0.006	***
	(3.72)		(2.93)		(3.91)	
ResidTonePresent	0.170	***	0.315	***	0.271	***
	(15.57)		(29.54)		(30.27)	
Lag_Afternoon	-0.003		0.003		-0.001	
	(-0.34)		(0.35)		(-0.10)	
HighTech	-0.004		0.003		0.000	
	(-0.53)		(0.38)		(0.06)	
InvestIntense	0.050	***	-0.018		0.005	
	(2.90)		(-1.07)		(0.37)	
FQ4	0.008	*	-0.006	*	-0.000	
	(1.89)		(-1.74)		(-0.14)	
Intercept	-0.094	***	-0.057	***	-0.071	***
	(-4.35)		(-2.83)		(-4.13)	
Std. Errors Clustered by Firm	Yes		Yes		Yes	
N	16,543		16,543		16,543	
R-square	0.0263		0.1010		0.1046	

Note:

In this table, we address the potential endogeneity between the firm's choice of call time and the tone of their call conversations. Panel A reports the results of a probit regression of the firm's choice to hold an afternoon call. *Lag_Afternoon* is an indicator variable that is set equal to one if the firm's conference call was held in the afternoon in the previous quarter; *HighTech* is an indicator that is set equal to one if the firm operates in the business equipment, telephone and television transmission, healthcare, medical equipment, and drugs industries within the Fama-French 12-industry classification; *InvestIntense* captures the firm's investment intensity; *FQ4* is an indicator that is set equal to one if the call relates to the earnings of the firm's fiscal fourth quarter; *Size* is the natural log of the market capitalization of the firm; *absSUE* is the magnitude of the standardized unexpected earnings; *BadNews* is an indicator that is set equal to one if the firm misses the analyst consensus forecast for the quarter to which the call relates; *logAnalyst* is the natural log of one plus the number of analysts that follow the firm; and *EquiDepend* measures the firm's dependence on equity financing. Panel B presents the results of the second stage of the Heckman model that includes the inverse Mills ratio computed from the regressions reported in Panel A. Panel C presents the results from regressions that include the significant determinants of the afternoon call time choice (from the Panel A probit model) directly in the residual tone regressions. In regressions of the residual tone of the question, answer, and Q&A portions of the call, we control for *ResidTonePresent*, the residual tone of the presentation portion of the call. In order to be included in these analyses, the *Lag_Afternoon* variable must be available. Because the first observation for each firm is lost in creating the lag variable, the number of observations available for the regressions in this table is somewhat reduced relative to earlier tests of the influence of the time of day on residual call tone. T-statistics are shown in parentheses. All variables are defined in greater detail in Appendix B. *, **, *** indicate coefficients that are significantly different from zero at the 0.10, 0.05, and 0.01 level, respectively, using a two-tailed test with standard errors clustered by firm.

Table 9: Regressions Controlling for Analyst Busyness

	ResidToneQuestion	ResidToneAnswer	ResidToneQ&A
EST_Hour	0.006 ***	0.006 ***	0.006 ***
	(3.77)	(3.40)	(4.23)
ResidTonePresent	0.173 ***	0.319 ***	0.275 ***
	(17.02)	(31.58)	(32.36)
AnalystBusyness	0.006 ***	0.005 ***	0.005 ***
	(3.38)	(2.94)	(3.99)
Intercept	-0.077 ***	-0.066 ***	-0.069 ***
	(-4.47)	(-3.86)	(-4.91)
Std. Errors Clustered by Firm	Yes	Yes	Yes
N	18,408	18,408	18,408
R-square	0.0268	0.1039	0.1086

Note:

This table presents the results from the regressions of residual tone against the time of the call (measured in Eastern Time) for all EST and CST calls initiated from 8:00 to 15:59. We separately control for *AnalystBusyness,* a proxy for the cognitive load borne by the firm's analysts during the period preceding the call, allowing us to document the likely effects of both limited personal resource depletion and circadian rhythms on call participants' moods. We control for *ResidTonePresent*, the residual tone of the presentation portion of the call that is not driven by economic news and firm fundamentals. All variables are defined in greater detail in Appendix B. *, **, *** indicate coefficients that are significantly different from zero at the 0.10, 0.05, and 0.01 level, respectively, using a two-tailed test with standard errors clustered by firm.

Table 10: Stock Return Response Tests

Panel A: Abnormal Returns Regressions

	Five-hour event		(Five-hour event end, 30 trading days]		[31, 50] trading days		[51,60] trading days		[Q&A start,60 trading days]	
DiurnalToneQ&A	-0.034	*	-0.004		0.091	**	-0.022		0.023	
	(-1.75)		(-0.07)		(2.06)		(-0.63)		(0.25)	
EconToneQ&A	-0.013	***	-0.061	***	-0.033	***	-0.031	***	-0.138	***
	(-2.90)		(-4.68)		(-3.07)		(-3.83)		(-6.82)	
ResidTonePresent	-0.002	*	-0.011	***	-0.002		-0.001		-0.017	***
	(-1.79)		(-3.00)		(-0.77)		(-0.27)		(-2.92)	
Intercept	0.001		-0.002		-0.013	***	-0.003		-0.016	*
	(0.48)		(-0.42)		(-2.87)		(-0.99)		(-1.84)	
Std. Errors Clustered by Firm	Yes		Yes		Yes		Yes		Yes	
N	18,408		18,408		18,408		18,408		18,408	
R-square	0.0009		0.0019		0.0008		0.0010		0.0035	

Panel B: Event Window and Full Period Returns by Quintiles of *DiurnalToneQ&A*

			Median of abnormal return		
Quintiles of *DiurnalToneQ&A*		N	5 Hour event	[Q&A start, 60 trading days]	
Highest	1	1,661	-0.09%	-0.70%	
	2	5,193	-0.01%	-0.14%	
	3	5,747	-0.04%	-0.05%	
	4	3,306	0.08%	-0.08%	
Lowest	5	2,501	0.05%	0.20%	
Highest-Lowest			-0.13%	*	-0.22%

Note:

Panel A examines the market's pricing of the two components of Q&A call tone, *EconToneQ&A*, which is the tone that is explained by economic news and firm fundamentals, and *DiurnalToneQ&A*, which is the tone that is attributable to diurnal influences, for all EST and CST calls initiated from 8:00 to 15:59 Eastern Time, after controlling for the residual tone of the presentation portion of the call, *ResidTonePresent*. The dependent variable in these regressions is the abnormal returns measured over various intraday and longer post-call intervals. In Panel B, we present medians of event window and full period returns by quintiles of *DiurnalToneQ&A*, and compare the difference between the highest and lowest quintiles using a Wilcoxon Sum Rank test. All variables are defined in greater detail in Appendix B. *, **, *** indicate coefficients that are significantly different from zero at the 0.10, 0.05, and 0.01 level, respectively, using a two-tailed test with standard errors clustered by firm for regression-based tests.