Market Reactions to Gendered Speech Patterns: Uptalk, Earnings Calls, and the #MeToo Movement

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Abstract

Information is revealed by *how* people speak, as well as by what they say. Using audio recordings, we study uptalk (rising intonation) by executives in earnings calls. Unexpected uptalk by female, but not male, executives predicts lower earnings. Analysts respond to female uptalk with lower recommendations and earnings forecasts, and bid-ask spreads widen when female executives speak and use uptalk. These results are consistent with sociolinguistic studies which find that uptalk is a female-typed characteristic that signals uncertainty. #MeToo did not alter the market response to female uptalk, but it engendered a favorable response to male uptalk.

Keywords: Gender, uptalk, earnings, stereotyping, social movements

JEL Codes: D91, J16, G17, G41

Gender is the original social fact. It mediates access to educational opportunities, economics resources and the levers of power (Wollstonecraft, 1792; Bohnet, van Geen, and Bazerman, 2016; Baldiga and Coffman, 2018; Alesina, Giuliano, and Nunn, 2013; Santacreu-Vasut, Shoham, and Gay, 2013; Manning and Saidi, 2010; Bailey, 2006; Albanesi and Olivetti, 2009). Widespread internalisation of gendered social norms affects the way that people both understand themselves and behave (de Beauvoir, 1949; Giuliano, 2020; Marianne, 2011); in this paper, we are concerned with the interpretation of the resultant gendered behavior in a setting where people are concerned about the reputational consequences of their behavior.

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Our analysis exploits two gendered phenomena. First, we use audio recordings of earnings calls to quantify tonal variation in speech using a variable called *uptalk*. Uptalk is a speech pattern characterized by a rising intonation in the speaker's voice at the end of a declarative utterance. [1] Uptalk has been the subject of sociolinguistic research for over 50 years (Lakoff, 1973) and is identified as a female-typed characteristic across different varieties of English and elsewhere. Uptalk is exhibited particularly by women (including transgender women) (Hancock, Colton, and Douglas, 2014; Hazenberg, 2012; Hazenberg, 2013) and associated with stereotypically female characteristics, both negative, e.g. uncertainty, diffidence, and lack of expertise, and positive, e.g. solidarity, empathy, and friendliness (Warren, 2016). In this paper we analyze two types of market response to uptalk in general and uptalk by women in particular: first, in analysts' recommendations and earnings forecasts following the call and, secondly, in the bid-ask spreads of the firm's share price during the earnings call itself.

The second gendered phenomenon in our dataset is the #MeToo social movement. #MeToo highlighted widespread unjust and exploitative treatment of women, especially in the workplace. The movement began at an identified time and was largely unanticipated and thus constitutes a plausibly exogenous change in social attitudes towards gender. Board-level gender diversity is a proxy for attitudes towards gender at the firm level, and an extensive literature examines its relationship with firm performance (Faccio, Marchica, and Mura, 2016; Adams and Ferreira, 2009; Adams and Funk, 2012; Adams, 2017; Matsa and Miller, 2011; Adams and Kirchmaier, 2016; Kim and Starks, 2016) but, as yet, few papers have attempted directly to relate social gender attitudes to performance. A recent exception is Lins, Roth, Servaes, and Tamayo (2019), which studies share price performance around the start of the #MeToo movement and finds that firms with proxies for a more gender-diverse culture experience significant positive abnormal returns around this date.

Our data are audio recordings and transcripts of quarterly earnings earnings calls for 2,993 US-listed companies between 2010 and 2019. In these calls, analysts from investors and investment banks quiz CEOs and other senior executives about their firms' current and future performance. We know the gender and job description of the participants in these calls, as well as the recommendations of stock analysts and the trading performance of the company's shares during the call.

In the first stage of our analysis we document the distinct patterns of uptalk in our data set. Earnings calls are typically held in two consecutive phases. In the first "presentation" phase, executives make scripted remarks about the firm's recent performance and future prospects, whereas in the next "Q&A" phase they respond to analysts' questions. We find

[1] The term "intonation" refers to variations in a speaker's voice intensity that can convey a range of emotions such as surprise, anger, or delight. Intonation plays a critical role in communication because it not only expresses emotions but also helps convey the intended message accurately (Banziger and Scherer, 2005).

uptalk to be nearly absent in the presentation phase, but is widespread during Q&A, and significantly more so among female executives (and analysts) than in their male counterparts. We therefore focus on the Q&A part of earnings calls for the rest of our analyses. Among executives, this gendered difference shows up at the level of chief executive officer (CEO), chief financial officer (CFO), and chairperson. Female executives respond to the presence of more female executives on the call with more uptalk. By contrast, the incidence of uptalk by men decreases with the fraction of female executives present on the call. Uptalk by women increases when the firm's financial constraints are greater and decreases when analysts' recent and/or next recommendations are higher, but uptalk by male executives does not exhibit similar effects. These results are consistent with findings in the sociolinguistics literature that uptalk is a female-typed behavior which signals a lack of confidence.

We perform two sets of analyses to understand market responses to uptalk among executives. In the first set, we examine market reactions to uptalk over the entire sample period. In the second set, we analyze how the #MeToo movement, which began during our sample period, affected these market reactions. In both cases, we are interested in the market response to the unexpected incidence of uptalk rather than just the incidence of uptalk. We thus carry out regression analyses in two stages. In the first stage we regress the mean level of uptalk that occurs during a call against the gender composition of participating executives, as well as a range of firm and market characteristics such as firm size, recent performance, and analysts' recommendations. Since analysts must register their participation shortly before each call and signal their interest in asking questions during the call, there is quasi-exogenous variation in the number and gender composition of participating analysts which cannot be determined precisely until shortly before the call commences. Similarly, the number and gender composition of participating executives are not known to the analysts in advance, thus serving as an additional source of quasi-exogenous variation. In the second stage we test for market responses to the unexpected incidence of uptalk that is not explained by these first-stage regressions.

Across our entire sample we find that analysts make lower recommendations in response to uptalk by female executives; in particular, more unexpected female executive uptalk increases the likelihood of analyst sell recommendations and decreases the likelihood of buy recommendations. Unexpected uptalk by male executives has no such effects. The lower analyst recommendations may be a biased response to a female-typed behavior or a rational response to an informative signal. To decide between these possibilities, we use two measures of unexpected earnings for the next quarter. The first, *Standardized Unexpected Earnings* (SUE), is a normalised measure of the extent to which the year-on-year change in earnings per share (EPS) for the firm exceeds its trend level. We find a significant negative relationship between unexpected female executive uptalk and SUE in the next quarter, and no relation-

ship with uptalk by male executives. This suggests that analysts' lower recommendations are a rational response to unexpected female executive uptalk in that they correctly forecast the drop in earnings signaled by it. Our second measure of unexpected earnings, *Standardized Unexpected Earnings relative to Consensus Analyst Estimates* (SUEC), is a normalized measure of the extent to which the difference between realized EPS and the consensus analyst EPS forecast differs from its trend level. We find that SUEC, which captures the accuracy of analyst EPS forecasts, is affected by the incidence of unexpected female executive uptalk in earnings calls in a way that indicates that the analysts who downgrade earnings forecasts in response to uptalk are underreacting. This indicates that female uptalk is a signal of worse-than-expected performance in the next quarter, and that analysts respond to that signal.

We then use the width of the bid-ask spread in the firm's share price as a measure of market risk perceptions during the earnings call. We find that this spread widens by 37% on average when the responding speaker switches from a male to a female executive. Furthermore, if the corresponding difference in uptalk also increases by one standard deviation during this switch, then the spread widens by a further 4.9%: this is 13% higher than the widening that occurs when the gender of the speaker changes from a male to a female executive speaker. A possible explanation for these results is that, first, dealers make defensive quotes when a female executives starts to speak, because they anticipate that she might reveal information that lowers the firm's share price and, second, that the spreads are further widened when uptalk occurs.

While these results indicate a rational, rather than biased, market response to female uptalk, they still allow for the existence of gender bias within firms themselves. This is because an organizational procedure that we cannot capture in our dataset may assign female executives responsibility for answering questions associated with more bad news, and that this, rather than uptalk, is driving the market response. We cannot rule out this possibility entirely, but we can say that, if such bias exists, it is unlikely to affect very senior corporate executives like the CEO. When we regress bid-ask spreads on uptalk by female and male CEOs, the effect of unexpected uptalk on bid-ask spreads is qualitatively unchanged. Moreover, it seems unlikely that female CEOs impart more bad news than male CEOs. Even if this were the case, we find that uptalk is uncorrelated with the positive or negative content of the utterance, indicating that uptalk is a distinct signal from the content of the utterance itself.

The #MeToo movement, triggered by a social media post on 15 October 2017, drew worldwide attention to gender discrimination, particularly in the workplace. The second part of our analysis acknowledges that, while market responses to gendered speech patterns may be rational, those patterns might reflect the injustice of established social structures. We

investigate whether the cultural shock of #MeToo, which highlighted such injustice, affected the incidence of uptalk and the responses to it.

In the aftermath of #MeToo, uptalk by all participants in earnings calls declines significantly. There are also changes in the factors explaining uptalk. Before #MeToo, uptalk by female executives increased (and uptalk by male executives decreased) in the fraction of female executives participating in the call. After #MeToo this effect is reversed for women, suggesting that women executives become more certain in the presence of other women. The response of executive uptalk to the fraction of female analysts also changes after #MeToo. Previously, female uptalk decreased in the fraction of female analysts, while after #MeToo uptalk by female executives become indifferent to the fraction of female analysts. As for male executives, before #MeToo their uptalk level was unaffected by the fraction of female analysts, while afterwards it increased in this fraction. These results can be explained if we assume that #MeToo emboldened female analysts to ask more difficult questions, leading to more uptalk by executives of both genders.

Next we compare the market responses to uptalk before and after #MeToo. We find that #MeToo had a no marginal effect on the relationship between female executive uptalk and analyst recommendations, in that more female executive uptalk continued to lead to worse recommendations and to lower, but no less accurate, earnings forecasts. However, #MeToo brought about a change in analysts' response to male uptalk. Previously uptalk by male executives had no effect, but post-#MeToo the response by analysts to male uptalk is positive, with male executive uptalk making buy (sell) recommendations more (less) likely. This finding is consistent with the conclusion of Lins, Roth, Servaes, and Tamayo (2019) that the shares of firms that do not discriminate on grounds of gender experience positive excess returns around #MeToo. Altogether our results suggest that, following #MeToo, uptalk by female and male executives is interpreted by analysts as different signals. Female uptalk continues to be perceived as a signal of lower future short-term earnings, while male uptalk is viewed as a positive signal. In keeping with these different interpretations of female and male uptalk, while female executive uptalk indicates lower unexpected earnings in the next quarter, male executive uptalk has no such short-term effect. Finally, we analyze the effect of #MeToo on bid-ask spreads and find that the increase in spreads in response to female uptalk continues after #MeToo and there continues to be no response to male uptalk. These results are also consistent a post-#MeToo interpretation of female executive uptalk as a marker of low confidence about the firm's immediate prospects, and of male executive uptalk as an indicator of a corporate culture in which gender discrimination is less likely.

1. Literature Review

1.1 *Uptalk*

In this section we summarize the literature on uptalk as a female-typed speech characteristic signaling uncertainty, on gender equality in firms, on natural language processing in finance, and on earnings conference calls as a source of data. We use Warren's definition of uptalk as "a marked rising intonation pattern found at the ends of intonation units realised on declarative utterances" (Warren, 2016, p.2), which makes declaratives sound like questions (even though not all questions have rising intonation). In particular, we identify uptalk with high tonal intensity (relative to the speaker's normal tonal intensity) at the end of the final stressed syllable of a declarative utterance. For more details, see section 3.

The meaning and function of uptalk have been the subject of extensive sociolinguistic research, as well as media comment, since the early 1970s (Lakoff, 1973). Uptalk has been interpreted under three broad headings: as a signal of a lack of confidence, as a signal of solidarity, and as a female speech characteristic.

Numerous academic works have found a strong association between uptalk and a lack of confidence (Barr, 2003; Brennan and Williams, 1995; Conley, O'Barr, and Lind, 1979; Guy and Vonwiller, 1984; Spindler, 2003; Tomlinson Jr and Tree, 2011; Warren, 2016). Many researchers include uptalk as part of a range of features typifying a powerless or low-status speech style (Conley, O'Barr, and Lind, 1979; Lakoff, 1973; Loyd, Phillips, Whitson, and Thomas-Hunt, 2010; Parton, Siltanen, Hosman, and Langenderfer, 2002; Wiley and Eskilson, 1985). Loyd, Phillips, Whitson, and Thomas-Hunt (2010) note that people with speech characteristics signalling low status such as uptalk may not be expected to have expert knowledge, and that the expert knowledge they do possess may be 'undervalued by others' (2010: 380).

Most studies that deal with the incidence of uptalk amongst men and women agree that uptalk is particularly a feature of female speech (Warren, 2016; McConnell-Ginet, 1978; Henton, 1995; Henton, 1989; Daly and Warren, 2001). The higher incidence of uptalk in females has been observed in a wide range of English-speaking communities.[2] One of the earliest researchers to suggest that uptalk is one of a set of features that characterise women's speech was Robin Lakoff (1973). She argued that uptalk is a feature of 'women's language', and that 'these sorts of speech-patterns are taken to reflect something real about character and play a part in not taking a woman seriously or trusting her with any real responsibilities', since 'she can't make up her mind', and 'isn't sure of herself'. The negative associations of female uptalk have been linked to negative female stereotypes and misogyny. Levon (2016; 2020) finds that uptalk is characterised by stereotypical associations with young women and

[2]For evidence on the incidence of uptalk in the United States, see Barry (2008), Ritchart and Arvaniti (2014), and Clopper and Smiljanic (2011).

a lack of authority or credibility generally. Eckert and McConnell-Ginet (2003)[394] observe that the "construct of inarticulate female/adolescent language is popular in the media," with uptalk used as a token to justify negative views of women's speech or youth speech, and vice versa. These negative views are reflected in guides for professional women, who are cautioned against using uptalk if they want to be perceived as competent in the workplace (DiResta, 2010).

The association of uptalk with female speakers is supported by transgender studies. Hancock, Colton, and Douglas (2014) report that male-to-female transgender speakers who are perceived by listeners as female are more likely to use more uptalk than those who are not so perceived. These results are consistent with Hazenberg (2012; 2013), who finds that male-to-female transgender speakers embrace uptalk and that female-to-male transgender speakers tend to avoid it.

Some studies have noted an increasing incidence of uptalk among men. Lowry (2011) echoes comments by (Eckert and McConnell-Ginet, 2003). that uptalk is heard much more often than when it was commented on by Lakoff in the earlier 1970s, and that its semantic and pragmatic connotations may have changed, reflecting a change in women's position in society. A consequence of this may be more ready adoption of uptalk by male as well as female speakers. Loviglio (2008), in an analysis of gender differences in public broadcasting in the United States, likewise comments on an increase in male speakers' use of uptalk.

In this paper we focus on two stylised facts about uptalk which emerge from the sociolinguistics literature: first, that it is a signal of a lack of confidence in the speaker and, secondly, that it is a female-typed characteristic. The first of these stylised facts is important because uptalk as a signal of a lack of confidence in an executive may reveal something about the future performance of the firm. The second is important because we are interested in whether the market responds in different ways to the use of uptalk by female and male executives.

1.2 *Gender and the Firm*

Our analysis also bears on gender equality within firms. Recent studies report that gender equality at board level can lead to increased firm value. For Kim and Starks (2016), this is because women directors provide skills complementary to those otherwise available to the board, while Adhikari, Agrawal, and Malm (2019) find that firms in which women executives' representation and compensation are greater face fewer operational lawsuits. Lins, Roth, Servaes, and Tamayo (2020) study the effect of the #MeToo movement on the share price of firms is mediated by the gender mix of top executive teams. They find that firms with more women among their highest paid executives experienced significant excess returns and increased institutional ownership around the beginning of #MeToo; the effect

was most pronounced in industries with few women executives or based in states with a greater gender pay gap. In a setting close to that of the current paper, Francis, Shohfi, and Xin (2020) report that greater female participation by executives on earnings conference calls is associated with a positive market reaction and narrower bid-ask spreads.

Not all research has found that greater gender equality leads to improved firm performance. Ahern and Sosyura (2015) study the effects of a Norwegian law mandating a board quota of 40% women and report a fall in share prices on the announcement of the law and a deterioration in operating performance following its implementation. However, they attribute this to the appointment of younger and less experienced board members rather than to the appointment of women per se.

Studies have shown that women in top positions can lead to a more women-friendly culture throughout the firm. Tate and Yang (2015) find that firms with more female leadership exhibit a smaller gender pay gap in their hiring, while Kunze and Miller (2017) report a similar effect for existing staff: greater female representation higher up in the organization leads to a narrower promotion gap between the genders. We are not aware of work relating relate firm performance to gender equality throughout the firm rather than just among board members or top executives. However, the importance of firm culture in general, and not specifically in relation to gender, has been widely acknowledged (Edmans, 2011; Guiso, Sapienza, and Zingales, 2015; Sapienza, Zingales, and Maestripieri, 2009; Graham, Grennan, Harvey, and Rajgopal, 2022).

Most of the work done by economists using natural language processing (NLP) techniques uses text, rather than audio, data. That data is of four types: (i) news articles (Ke, Kelly, and Xiu, 2019; Ahern and Sosyura, 2015; Manela and Moreira, 2017; Loughran, McDonald, and Pragidis, 2019); (ii) financial disclosures (Loughran and Mcdonald, 2014; Jiang, Lee, Martin, and Zhou, 2019; Brown, Crowley, and Elliott, 2020; Joenväärä, Karppinen, Teo, and Tiu, 2019); (iii) Federal Open Market Committee minutes (Hansen, McMahon, and Prat, 2018; Boukus and Rosenberg, 2006; López-Moctezuma, 2016); and (iv) earnings conference calls (Gow, Larcker, and Zakolyukina, 2021; Larcker and Zakolyukina, 2012; Hassan, Hollander, van Lent, and Tahoun, 2019; Chen, Nagar, and Schoenfeld, 2018). A small number of studies have, like ours, also used audio data. Mayew and Venkatachalam (2012) integrate vocal markers of cognitive dissonance during earnings conference calls to detect financial misreporting. Gorodnichenko, Pham, and Talavera (2023) apply a deep learning model to detect emotions in press conferences following Federal Open Market Committee meetings and find that a positive vocal tone from Federal Reserve chairs leads to significant increases in share prices.

Earnings conference calls have been a popular source of data among researchers because transcripts are publicly available, longitudinal, and can be cleanly matched with market

reactions. Earnings call data have been used to examine the impact of a range of textual features on share price, including deception (Larcker and Zakolyukina, 2012), non-answers (Gow, Larcker, and Zakolyukina, 2021), political risk (Hassan, Hollander, van Lent, and Tahoun, 2019), commonality of CEO first names (Even-Tov, Huang, and Trueman, 2020), and conversation tone (Chen, Nagar, and Schoenfeld, 2018). Of particular relevance to our analysis are recent papers on the impact of gender in the context of earnings conference calls. To our knowledge, only one such paper has used textual analysis, that is Francis, Shohfi, and Xin (2020), which investigates gender and earnings call participation. The authors find that female analysts participate less during calls and, conditional on participation, ask fewer follow-up questions. They also speak with a more positive tone and less uncertainty. However, the paper uses only textual transcripts, rather than audio files, and is silent on the conversational dynamics during the call; nor does it establish a causal relationship between gender and market reaction. Cook, Esplin, Glass, Judd, and Olsen (2019) use earnings call data, but not textual analysis, to study the impact of gender on the likelihood that management issues forecasts, the properties of those forecasts, and the resultant market reactions. They find that analysts and investors react more moderately to positive forecasts by female CEOs than male CEOs.

2. Data and Methodology

2.1 *Sample Construction*

This paper uses transcripts and audio recordings of quarterly earnings calls of publicly listed US firms. We begin by collecting tickers for all US firms listed on three largest exchanges in the US (NYSE, NASDAQ, and NYSE American) and then, using those tickers, retrieve transcripts of the quarterly earnings calls convened by these firms from the Refinitiv StreetEvents database. This yields a starting sample of 60,038 earnings calls covering 3,465 publicly listed US firms from October 2010 to April 2019. The sample includes details of the name, role, and employer of 154,988 executives (CEOs, CFOs, chairpersons, and board members) and 345,659 analysts that participated in these calls. We next retrieve audio recordings of every call in the sample from EarningsCast. For each call, we map the textual and audio segments of each dialogue (presentation, question, and answer) spoken by the call participants (analysts and executives).

We generate data on the gender of call participants in the following way. First, we use the Python package *genderize* to generate a probabilistic assessment of each person's gender based on his or her forename(s). Second, we check the gender classification that *genderize* yields by manually cross-checking each participant's name against publicly available information on them (LinkedIn profile, corporate webpages etc.). Out of the executives in our

call sample, 15,707 are female and 139,281 are male; there are 34,287 female analysts and 311,372 male analysts.

We obtain data on analyst stock recommendations and earnings per share (EPS) forecasts for our sample firms from I/B/E/S. We collect both consensus mean recommendations as well as individual analyst recommendations. I/B/E/S reports recommendations on a discrete five-point scale ranging from 1 (Strong Buy) to 5 (Strong Sell); we follow Loh (2011) and reverse this coding scheme so that, in our data, 1 denotes a "Strong Sell," and 5 denotes a "Strong Buy." We map every consensus and individual recommendation issued within the 90 days following a firm's earnings call to that earnings call. Consensus recommendations are reported per month, and we therefore interpret the consensus recommendation to be the mean of all consensus recommendations issued on the firm's stock during the 90-day period following the call. We then create dummy variables *Buy* and *Sell* that identify the general direction of each consensus recommendation. *Buy* is equal to 1 in case the consensus recommendation is 5 ("Strong Buy") or 4 ("Buy"), and is 0 otherwise. Similarly, *Sell* is equal to 1 if the consensus recommendation is 1("Strong Sell") or 2 ("Sell") and is otherwise equal to 0.

In order to compute bid-ask spreads for a firm's stock while its earnings call is in progress, we use national best bid and offer (NBBO) quotes from Polygon. A stock's NBBO quote uses data from all trading venues where the stock is traded, and comprises the highest bid price and the lowest ask price for a stock. Since Polygon reports NBBO quotes every microsecond, our trading data contain nearly 2 billion NBBO quotes made during the earnings calls in our sample.

Finally, we gather data on financial metrics and stock characteristics for each firm in our sample: our financial metrics data come from Compustat and our stock data from the Center of Research in Security Prices (CRSP). From Compustat, we retrieve information on firm size (*Assets*), book-to-equity ratio (*Book/Equity*), EBITDA margin (*Profitability*), and Return on Assets (*ROA*). We also use Compustat to compute the financial constraints metric (*FinConstraints*) created by Kaplan and Zingales (1997) and later refined by Lamont, Polk, and Saaá-Requejo (2001)[3] We use the Carhart four-factor model with CRSP data on daily closing and opening prices and stock returns to compute the volatility ($Volatility$) and cumulative abnormal returns on each firm's stock over the 89-day period preceding the call ($Momentum$).

[3] $FinConstraints$ is estimated as –1.0001909×[(IB+DP)/PPENTT–1] + 0.2826389×[(AT+(PRCC×CSHO)–CEQ–TXDB)/AT] + 3.139193×[(DLTT+DLC)/(DLTT+DLC+SEQ)] – 39.3678×[(DVC+DVP)/ PPENTT – 1] – 1.314759×[CHE/ATT – 1], where the terms in parantheses refer to variables names in Compustat.

2.2 *Measuring Uptalk*

We estimate uptalk for each earnings call as follows. First, we use the Python package *aeneas* to synchronise the speech fragments spoken by each participant in the call with the audio recording of that fragment. This process generates a *synchronization map* that identifies the time interval corresponding to each speech fragment.[4] Second, we use the Python package *pydub* to break the recording of each speech fragment into 15 second chunks. The Python package *parselmouth* is then used to extract the *sound intensity* for each of those chunks.[5] Sound intensity is measured in decibels (dB) relative to the auditory threshold pressure.[6] Finally, we compute uptalk for a given speech fragment as follows:

$$Uptalk = \begin{cases} \dfrac{Intensity_K}{\frac{1}{K-1}\sum_{k=1}^{K-1} Intensity_k} - 1, & \text{if } Intensity_K > \frac{1}{K-1}\sum_{k=1}^{K-1} Intensity_k \\ 0, & \text{otherwise} \end{cases}$$

where K denotes the total number of 15 second audio chunks in the speech fragment. The resultant uptalk measure is continuous and has a lower bound of 0.

2.3 *Descriptive Statistics*

Detailed descriptive statistics for he 1,607,428 questions and answers in our earnings call sample appear in the Appendix (tables A1a and A1a).

3. Uptalk

This section presents statistics on the incidence of uptalk in earnings calls and, in particular, about the relationship between speaker gender, role, and uptalk. In line with the linguistics literature, we find that speeches by women contain higher levels of uptalk than those by men. Moreover, uptalk is role-dependent. For example, the gap between the level of female and male uptalk is significantly bigger for CFOs than it is for other executive roles.

Table 1 reports regressions of uptalk at the call-speech level on gender, portion of call (presentation or Q&A), participant type, and call progress. In line with the linguistics literature, Table 1 shows that female participants exhibit significantly higher levels of uptalk than their male counterparts. There is almost no uptalk during presentations (see Figure A1b in the Appendix). Models (2)–(3) in Table 1 show a significantly higher level of uptalk in the Q&A part of the call; note from Figure A1b and models (2) and (3) of Table 1 that, while

[4]The Appendix Table A2 presents a synchronization map for the General Motors Q1'2018 earnings call.

[5]*parselmouth* is a software wrapper for the Praat program.

[6]Praat measures the intensity of sound in air as $10\log_{10}\left(\frac{1}{TP_0^2}\int x^2(t)dt\right)$, where $x(t)$ is the estimated sound pressure in Pascal (Pa), T is sound duration, and $P_0 = 2\times 10^{-5}Pa$ is auditory threshold pressure.

Table 1. Uptalk by participant type and call features

This table presents OLS estimates of the relationship between uptalk levels and speech fragment characteristics in quarterly earnings calls based on the following specification:

$$Uptalk_{cpi} = \beta_0 + \beta_1 Female_{cp} + \beta_2 Executive_{cp} + \beta_3 Q\&A_{ci} + \beta_4 Y_{ci} + \lambda_c + \varepsilon_{cpi}.$$

Here, c and p are indices for the call and for each individual in the call, and i is a count of speech fragments starting from the beginning of the call. $Female$ is a dummy that is equal to 1 if the call participant is female. $Executive$ is a dummy that is equal to 1 if the call participant is the firm's executive, and to 0 if the participant is an analyst. $Q\&A$ is a dummy that is equal to 1 if the speech fragment is part of a question or answer, and to 0 if the speech fragment occurs during the presentation part of the call. The Y_{ci} are call-specific controls, and λ_c denotes call fixed effects. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Model:	(1)	(2)	(3)	(4)
Female	0.056***	0.064***	0.064***	0.060***
	(0.015)	(0.015)	(0.015)	(0.014)
Q&A		0.084***	0.083***	0.054***
		(0.005)	(0.006)	(0.009)
Executive			-0.003	-0.005
			(0.009)	(0.009)
Call progress (%)				0.065***
				(0.013)
Call FE	✓	✓	✓	✓
Observations	2,071,052	2,071,052	2,071,052	2,039,125
Adjusted R^2	0.255	0.256	0.256	0.255

uptalk incidence varies by gender, it does not vary more according to whether a participant is an analyst or executive.

Table 2 shows how average levels of uptalk during the Q&A part of earnings calls vary among executives by role and gender. Female CEOs and CFOs use significantly more uptalk than their male counterparts. There is no significant gender-based difference in uptalk levels for chairpersons and board members. Note that board members in general use more uptalk in their speech than non-board members. These findings are illustrated in Figure A2 in the Appendix.

In our analysis below, we will be concerned with the information that market participants derive from executive speeches and, in order to establish the expected properties of those speeches, we regress the mean level of uptalk among participants across an entire call on the characteristics of participants and the firm conducting the call. Table 3 reports our results. Model (1) examines the effect of these characteristics upon the mean level of uptalk by all executives in the call. With the exception of the firm's stock price volatility in the 90 days preceding the call, none of the variables shows a significant association with mean uptalk among executives. Models (2) and (3) examine the effect of call and firm characteristics on mean uptalk levels among female executives participating in the call, and Models (4) and (5) perform the same exercise for male executives.

The table shows that the mean level of uptalk that female executives exhibit during a call is increasing in the proportion of executives participating in the call that are female, and is decreasing in the proportion of analysts that are female. Uptalk patterns for male

Table 2. Uptalk by gender and role.
This table presents OLS estimates of the relationship between uptalk levels in quarterly earnings calls by executives and executive role and gender based on the following specification:

$$Uptalk_{cpi} = \beta_0 + \beta_1 Female_{cp} + \beta_2 Executive_{cp} + \beta_3 Q\&A_{ci} + \beta_4 X_{cp} + \beta_5 Female_{cp} \times X_{cp} + \beta_6 Y_{ci} + \lambda_c + \varepsilon_{cpi}.$$

Here, c and p are indices for the call and for each individual in the call, and i is a count of speech fragments starting from the beginning of the call. $Female$ is a dummy that is equal to 1 if the call participant is female. $Executive$ is a dummy that is equal to 1 if the call participant is the firm's executive, and to 0 if the participant is an analyst. $Q\&A$ is a dummy that is equal to 1 if the speech fragment is part of a question or answer, and to 0 if the speech fragment occurs during the presentation part of the call. The X_{cp} and Y_{ci} are participant and call-specific controls, respectively, and λ_c denotes call fixed effects. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Model:	(1)	(2)	(3)	(4)
Female	0.066***	0.067***	0.031*	0.033*
	(0.018)	(0.017)	(0.018)	(0.017)
Q&A	0.048***	0.048***	0.048***	0.048***
	(0.008)	(0.008)	(0.008)	(0.008)
Executive	0.337***	0.340***	0.340***	0.342***
	(0.037)	(0.038)	(0.031)	(0.032)
Call progress (%)	0.065***	0.064***	0.063***	0.063***
	(0.014)	(0.014)	(0.014)	(0.014)
CEO	0.014	0.006	0.011	0.003
	(0.012)	(0.016)	(0.013)	(0.017)
CFO	0.049***	0.051***	0.038**	0.040***
	(0.015)	(0.014)	(0.016)	(0.015)
Chairperson		0.016		0.015
		(0.018)		(0.018)
Board member		0.173		0.171
		(0.153)		(0.157)
Female × CEO			0.003	0.001
			(0.044)	(0.050)
Female × CFO			0.095**	0.092**
			(0.043)	(0.042)
Female × Chairperson				0.013
				(0.087)
Female × Board member				0.005
				(0.204)
Call FE	✓	✓	✓	✓
Observations	1,607,428	1,607,428	1,607,428	1,607,428
Adjusted R^2	0.288	0.288	0.288	0.288

executives is similarly increasing in the proportion of executives participating in the call that are male, and is decreasing in the proportion of analysts that are male. If uptalk is evidence of discomfort or anxiety, then this means that executives are less comfortable when their peer group has the same gender as they do. As far as we are aware, this effect has not been documented in the existing literature on uptalk; the effect is very pronounced for female executives, and is weaker for male executives.

Our interpretation of several results in Table 3 relies upon the generally accepted result that uptalk is a signal of a lack of confidence and is exhibited particularly by women rather than men. We combine this fact with the observation that poor corporate performance is likely a driver of lack of confidence amongst executives. That means that recent analyst recommendations should be positively associated with levels of executive confidence;

Table 3. Factors that influence uptalk among executives in a call

This table presents OLS estimates of the relationship between the average incidence of uptalk among executives participating in quarterly earnings calls and call- and firm-level features based on the following specification:

$$Mean\ Uptalk_{cftg} = \beta_0 + \beta_1 FemaleExecs_{cft} + \beta_2 FemaleAnalysts_{cft} + \beta_3 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and g is a participant grouping (e.g., all executives, female executives only, male executives only). $FemaleExecs_{cft}$ and $FemaleAnalysts_{cft}$ are the respective percentages of female executives and analysts participating in the call. X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variables:	Mean Uptalk (Executives)	Mean Uptalk (Female Executives)		Mean Uptalk (Male Executives)	
Model:	(1)	(2)	(3)	(4)	(5)
Female Executives(%)	0.0205	0.6712***	0.6626***	-0.1533***	-0.1511***
	(0.0421)	(0.0674)	(0.0667)	(0.0230)	(0.0228)
Female Analysts(%)	0.0026	-0.2058***	-0.1996***	0.0955***	0.0941***
	(0.0263)	(0.0459)	(0.0449)	(0.0177)	(0.0175)
Log(Assets)	0.0143	-0.0095	-0.0099	-0.0095**	-0.0112**
	(0.0113)	(0.0094)	(0.0092)	(0.0045)	(0.0046)
Book/Equity	0.0054	0.0080	0.0069	-0.0016	-0.0021
	(0.0134)	(0.0086)	(0.0081)	(0.0072)	(0.0070)
Profitability	0.1988	-0.0319	-0.0133	-0.1377	-0.1696
	(0.2148)	(0.1125)	(0.1091)	(0.1490)	(0.1588)
ROA	-0.1081	-0.0357	-0.0595	0.1487	0.1264
	(0.1489)	(0.0658)	(0.0575)	(0.1024)	(0.1031)
FinConstraints	0.0001	0.0004**	0.0004**	0.0000	0.0000
	(0.0005)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Momentum(-90,-2)	0.0056	0.0009	0.0003	0.0032	0.0024
	(0.0139)	(0.0066)	(0.0066)	(0.0083)	(0.0080)
Volatility(-90,-2)	1.206**	0.0904	0.0504	0.0894	-0.0339
	(0.4959)	(0.2115)	(0.2113)	(0.3129)	(0.3206)
EPS	-0.0017	0.0001	0.0000	-0.0019	-0.0015
	(0.0029)	(0.0023)	(0.0022)	(0.0019)	(0.0018)
ΔEPS_{t-4}^{t}	0.0033	0.0017	0.0014	0.0022	0.0015
	(0.0023)	(0.0011)	(0.0011)	(0.0020)	(0.0018)
SUE		-0.0015		-0.0025	
		(0.0019)		(0.0018)	
Recent Rec (mean)		-0.0193***		0.0067	
		(0.0061)		(0.0057)	
SUE_{t+1}			-0.0021		0.0004
			(0.0014)		(0.0018)
Next Rec (mean)			-0.0144***		0.0036
			(0.0050)		(0.0048)
Firm FE	✓	✓	✓	✓	✓
Year-Q FE	✓	✓	✓	✓	✓
Observations	52,168	45,938	46,366	45,938	46,366
Adjusted R^2	0.0472	0.0807	0.0829	0.1059	0.1095

it follows that they should also be negatively correlated with uptalk levels among female executives, but not male executives. In line with this reasoning, Model (2) demonstrates that female executive responses have less uptalk in the wake of a positive recent recommendation, and Model (4) identifies no relationship between male executive uptalk and recent analyst recommendations.

We use the same line of reasoning to explain the relationship identified in Table 3 between

executive uptalk levels and the next analyst recommendation in Models (3) and (5). If executives know that the company's prospects are poor, then this is likely a source of a lack of confidence for them. The poor prospects will reduce the quality of the next analyst recommendation, and the lack of confidence will manifest in uptalk by female executives, but not male executives. In line with this argument, Model (3) reports a significant negative association between the level of the next analyst recommendation and female executive uptalk, while Model (5) identifies no such relationship for male executives.

We have also examined the relationship between call and firm characteristics and mean uptalk among male and female analysts. We find no significant relationship between mean uptalk levels by male or female analysts and either call composition or the quality of analyst recommendations. These findings are consistent with the hypothesis that female analysts do not experience the same lack of confidence as female executives in the firm that is conducting the earnings call. These results are reported in Table A3 of the online appendix.

4. Market Reactions

This section examines the way that markets respond to the gender of executive speakers in the Q&A part of earnings calls, and to the presence of uptalk in their speech. In line with our discussion in the previous section of Table 3, we are concerned in this section with the information inadvertently revealed by executive speech patterns during earnings calls. If speech patterns are gendered, then information revelation must also be gendered. In order to investigate these possibilities, we first study the relationship between executive speech during an earnings call and the analyst recommendations that emerge after the call; we then investigate the way bid-ask spreads vary in real time as executive speech patterns change during an earnings call.

4.1 *Analyst Recommendations*

We start by examining the possibility that the incidence of uptalk among executives affect analyst recommendations. As reported in Table 3, an executive's level of uptalk depends in a predictable way upon their gender, the gender composition of participants in the earnings call, and characteristics of the executive's firm. In order to isolate the effect of uptalk for a given group g (e.g., all executives, female executives only, male executives only) from these factors, we proceed in two stages. In the first stage, we use Models (2) and (4) of Table 3 to compute $\textit{Predicted(Mean Uptalk)}_{cftg}$, the predicted average level of uptalk amongst participant group g in a given earnings call c for firm f in year-quarter t. We then define $\Delta(\textit{Mean Uptalk})_{cftg}$ to be the difference between the realized average level of uptalk

$Mean\ Uptalk_{cftg}$ and the predicted level $Predicted(Mean\ Uptalk)_{cftg}$:

$$\Delta(Mean\ Uptalk)_{cftg} = Mean\ Uptalk_{cftg} - Predicted(Mean\ Uptalk)_{cftg}. \quad (1)$$

In the second stage of our analysis, we regress consensus analyst recommendations as reported by I/B/E/S on $\Delta(Mean\ Uptalk)$ and a variety of control variables. The results of the second stage of our analysis are presented in Table 4.

The main result in Table 4 is that unexpected female executive uptalk gives rise to weaker analyst recommendations. Models (1) and (2) show that unexpected uptalk by female executives results in fewer buy recommendations (I/B/E/S code 4 or 5), and Models (3) and (4) show that it results in more sell recommendations (IB/E/S code 1 or 2).

There are two possible explanations for the effects identified in Table 4. First, it is possible that unexpected female executive uptalk results in weaker analyst recommendations because analysts are biased against women executives, and that, as a result of their bias, analysts respond to unexpectedly high levels of female executive uptalk with negative recommendations. Second, it is also possible that analysts have no gender bias, and that unexpected female executive uptalk occurs when the firm's earnings are likely to be lower. In the latter case, analysts might update their recommendations in response to unexpected uptalk by female executives, or later on, when the bad news presaged by this uptalk emerges.

We address the question of bias in two stages. First, we examine the relationship between unexpected uptalk and *Standardized Unexpected Earnings* (SUE) in the two quarters following the earnings call. SUE is a normalised measurement of the surprise in the change in quarterly earnings per share (EPS) from the previous year. More precisely, to compute SUE we first compute the year-on-year change in quarterly EPS each quarter. We then work out the difference between the EPS change for the current quarter and the average EPS change over the previous eight quarters. Finally, we normalise this difference by the standard deviation of EPS change over the previous eight quarters.

If the analyst response to unexpected female executive uptalk was due to gender bias, then that uptalk would have no information content and so would be unrelated to SUE. Conversely, a significant negative association between SUE and unexpected uptalk by female executives would suggest that the analyst reactions reported in Table 4 were likely rational. In order to conduct our first test of gender bias in analyst recommendations, we therefore regress next-period SUE on unexpected uptalk. Our results are reported in Models (1), (2), and (3) of Table 5. The table reports a significant negative relationship between unexpected uptalk by female executives and SUE for the quarter immediately after the earnings call, and no such relationship for male analysts. We conclude that the analyst recommendations made in the wake of unexpected uptalk by female executives are likely rational; the absence of any analyst response to unexpected uptalk by male executives is likewise rational.

Table 4. Uptalk and analyst recommendations

This table reports logit estimates of the relationship between unexpected uptalk among earnings call participants and subsequent consensus analyst recommendations based on the following specification:

$$Outcome_{cft} = \beta_0 + \beta_1 \Delta(Mean\ Uptalk)_{cftg} + \beta_2 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and g is a participant grouping (e.g., all executives, female executives only, male executives only). $Outcome_{cft}$ is a dummy variable that captures the consensus analyst recommendation as reported by I/B/E/S. In Models (1) and (2), *Outcome* is 1 in case the consensus estimate is 4 or 5 and, hence, is classified as a buy, and is otherwise 0; in Models (3) and (4), *Outcome* is 1 in case the consensus estimate is 1 or 2 and, hence is classified as a sell, and is otherwise 0. $\Delta(Mean\ Uptalk)_{cftg}$ is the unexpected level of uptalk, as defined in Equation (1). X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variables:	Buy recommendation		Sell recommendation	
Model:	(1)	(2)	(3)	(4)
Δ(*Mean Uptalk*) (Female Executives)	-0.4724***	-0.4771***	0.2772*	0.3025**
	(0.1591)	(0.1741)	(0.1434)	(0.1379)
Δ(*Mean Uptalk*) (Male Executives)	-0.2238	-0.2185	0.0622	0.0629
	(0.1561)	(0.1563)	(0.0900)	(0.0885)
Δ(*Mean Uptalk*) (Female Analysts)	0.1002	0.0768	0.1009	0.1016
	(0.1961)	(0.1948)	(0.1675)	(0.1719)
Δ(*Mean Uptalk*) (Male Analysts)	-0.2142	-0.2008	-0.0573	-0.0708
	(0.2657)	(0.2706)	(0.2086)	(0.2082)
Log(Assets)	-0.2098	-0.7808***	0.3212**	0.8640***
	(0.2252)	(0.2781)	(0.1551)	(0.1987)
Book/Equity	0.6714***	0.8923***	-0.9012***	-1.195***
	(0.2022)	(0.2208)	(0.1463)	(0.1641)
Profitability	-2.956	-2.595	1.178	0.7834
	(3.719)	(3.779)	(2.701)	(2.862)
ROA	-3.305	-2.994	9.235***	8.513***
	(3.643)	(3.56)	(2.485)	(2.599)
FinConstraints	-0.0110	-0.0145*	0.0213***	0.0216***
	(0.0073)	(0.0077)	(0.0060)	(0.0062)
SUE	-0.0734	-0.0920	0.0556	0.0917**
	(0.0571)	(0.0582)	(0.0446)	(0.0452)
Momentum(-90,-2)	0.3819	0.4044	-0.2809	-0.2768
	(0.2725)	(0.2661)	(0.1802)	(0.1752)
Volatility(-90,-2)	13.68	15.5	-14.62**	-20.28**
	(11.6)	(13.27)	(6.879)	(8.494)
EPS	-0.0338	-0.0291	-0.0726	-0.0736
	(0.0807)	(0.0810)	(0.0450)	(0.0477)
ΔEPS_{t-4}^{t}	-0.0310	-0.0316	0.0081	0.0048
	(0.0707)	(0.0732)	(0.0196)	(0.0200)
Last Recommendation (buy)	5.518***	5.565***		
	(0.1496)	(0.1566)		
Last Recommendation (sell)			5.472***	5.484***
			(0.1111)	(0.1145)
Firm FE	✓	✓	✓	✓
Year-Q FE		✓		✓
Observations	9,969	9,968	17,013	17,009
Pseudo R^2	0.6699	0.6783	0.6713	0.6779

While the regressions of Models (1), (2), and (3) in Table 5 suggest that analyst recommendations move in the right *direction* after unexpected female executive uptalk, those regressions cannot establish that the *scale* of the reaction is accurate. We investigate whether the difference between realised earnings and consensus analyst earnings estimates changes

Table 5. Uptalk and future unexpected earnings

This table reports OLS estimates of the relationship between unexpected uptalk among earnings call participants and future unexpected earnings based on the following specification:

$$Outcome_{ft} = \beta_0 + \beta_1 \Delta(Mean\ Uptalk)_{cftg} + \beta_2 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and g is a participant grouping (e.g., all executives, female executives only, male executives only). $Outcome_{ft}$ is a measure of unexpected earnings in the year-quarter after t: in Models (1)–(3), *Outcome* is equal to Standardized Unexpected Earnings (*SUE*) and in Models (4)–(6), *Outcome* is equal to Standardized Unexpected Earnings relative to Consensus analyst estimates (*SUEC*). For firm f in year-quarter t, $SUE_{ft} = (EPS_{f,t} - EPS_{f,t-4} - \mu_{ft}^{SUE})/\sigma_{ft}^{SUE}$, where μ_{ft}^{SUE} and σ_{ft}^{SUE} are the respective mean and standard deviation of $(EPS_{f,\tau} - EPS_{f,\tau-4})$ for $\tau = t-8, t-7, \ldots, t-1$ (Bernard and Thomas, 1990); and $SUEC_{ft} = (EPS_{f,t} - (Consensus\ EPS\ estimate)_{f,t} - \mu_{ft}^{SUEC})/\sigma_{ft}^{SUEC}$, where μ_{ft}^{SUEC}, and σ_{ft}^{SUEC} are the respective mean and standard deviation of $(EPS_{f,\tau} - (Consensus\ EPS\ estimate)_{f,\tau})$ for $\tau = t-8, t-7, \ldots, t-1$. X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variables:	SUE_{t+1}			$SUEC_{t+1}$		
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Δ(*Mean Uptalk*) (Female Executives)	-0.0319**	-0.0319**	-0.0329**	-0.0063**	-0.0064**	-0.0064**
	(0.0154)	(0.0155)	(0.0147)	(0.0030)	(0.0030)	(0.0030)
Δ(*Mean Uptalk*) (Male Executives)	0.0095	0.0139	0.0089	0.0013	0.0007	0.0001
	(0.0196)	(0.0202)	(0.0188)	(0.0042)	(0.0043)	(0.0043)
Δ(*Mean Uptalk*) (Female Analysts)		0.0307	0.0111		-0.0005	-0.0005
		(0.0358)	(0.0340)		(0.0069)	(0.0070)
Δ(*Mean Uptalk*) (Male Analysts)		-0.0486	-0.0462		0.0066	0.0064
		(0.0351)	(0.0314)		(0.0072)	(0.0073)
Last Recommendation	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Year-Q FE	✓	✓	✓	✓	✓	✓
Firm/Stock controls			✓			✓
Observations	37,944	37,944	37,944	37,970	37,970	37,970
Adjusted R^2	0.045	0.045	0.122	0.026	0.026	0.028
Mean (SD) of Dependent Variable		-0.08 (1.03)			-0.02 (0.34)	

in the wake of unexpected female executive uptalk. Our measure of this difference is *Standardized Unexpected Earnings Relative to Consensus Analyst Estimates* (SUEC). In order to compute SUEC, we measure the difference between the realised and consensus EPS estimate for the firm every quarter; for clarity, call this *diff*. We then subtract the average difference between realised and consensus EPS estimates for the firm over the preceding eight quarters from *diff* to obtain *net diff*. Lastly, we normalize *net diff* by the standard deviation of *diff* over the past eight quarters.

If the accuracy of consensus analyst earnings was unaffected by unexpected female executive uptalk, then there should be no relationship between SUEC and unexpected female executive uptalk. Models (4), (5), and (6) of Table 5 indicate that this is not the case: there is a negative and significant relationship between SUEC and Δ(*Mean Uptalk*)(Female Executives). This means that, on average, analyst earnings estimates fail to move far enough in response to unexpected female executive uptalk. While this result suggests that the market does not respond completely rationally to the information in female executive speech patterns, the negative coefficient on Δ(*Mean Uptalk*)(Female Executives) in Models (4), (5), and (6) is

strong *prima facie* evidence against gender bias, because it suggests that earnings estimates should be revised down further than they currently are.

The results in Table 5 suggest a rational relationship between unexpected female executive uptalk and analyst recommendations, but they leave unanswered the question of whether analysts understand this relationship. It is possible that unexpected female executive uptalk occurs because the speaker anticipates bad news about her firm, and that analyst recommendations change only when that news is revealed. It is also possible that analysts respond directly to unexpected uptalk, and that the associated news arrives after their recommendations change. We distinguish between these possibilities in two ways.

First, we regress the average analyst recommendation as reported by I/B/E/S in each of three periods after the earnings call on unexpected uptalk by male and female executives. Our regression results are reported in the Appendix Table A4. The negative response of analyst recommendations to unexpected female executive uptalk occurs only in the first three weeks after the call. This evidence is consistent with the hypothesis that analysts understand that this type of uptalk is an advance indicator of corporate problems, and that they update their forecasts ahead of the arrival of precise information.

Second, we perform a more granular investigation of the speed with which buy and sell recommendations emerge after unexpected uptalk. In order to do so, we regress a dummy variable that indicates whether the average I/B/E/S recommendation in week $w = 1, 2, \ldots, 6$ after an earnings call is a buy or a sell recommendation against unexpected uptalk ($\Delta(\textit{Mean Uptalk})$) by female and male executives and analysts, as well as a variety of control variables. The $\Delta(\textit{Mean Uptalk})$ coefficient results for male and female executives are illustrated in Figure A4, which appears in the Appendix.

Panels (a) and (b) of Figure A4 show coefficients for sell recommendation dummies in the weeks after the earnings calls for $\Delta(\textit{Mean Uptalk})$ by female and male executives, respectively. In line with the results of Table 4, only $\Delta(\textit{Mean Uptalk})$ (Female Executives) has a significant impact upon analyst recommendations; that effect is negative and occurs immediately after the earnings call. Completely analogous results are reported in Panels (c) and (d) for buy recommendations. Taken together, Panels (a) and (c) suggest that analysts respond to unexpected female executive uptalk and not to the news that it anticipates. Panels (e) and (f) present week-by-week coefficients for the difference between the median analyst recommendation per week and the consensus recommendation over the 90-day period after the call. While there is no significant difference for $\Delta(\textit{Mean Uptalk})$ (Male Executives) in any week after the earnings call in which it occurs, $\Delta(\textit{Mean Uptalk})$ (Female Executives) is associated with very negative recommendations immediately after the call. Once again, these data are consistent with the hypothesis that at least some analysts understand, and respond to, the information content of $\Delta(\textit{Mean Uptalk})$ (Female Executives).

We have now investigated the relationship between uptalk during an earnings call and the analyst recommendations and realised earnings that emerge after the call. We find no significant relationship between either of these post-call data and unexpected male executive uptalk. In contrast, unexpected uptalk by female executives is significantly associated with lower analyst recommendations. Moreover, it appears that those recommendations are rational: realised earnings after unexpected female executive uptalk are lower than usual. We have also presented evidence that suggests that analysts understand this relationship: the significant effects that we identify emerge soon after earnings calls and so likely pre-date the release of the information that is anticipated in female executive uptalk.

One way to gain additional insight into the question of whether or not market participants understand the information content of female executive uptalk is to investigate the real-time effect of that uptalk upon market prices. The following section undertakes that investigation.

4.2 *Risk Perceptions*

This section examines the real-time effect that unexpected executive uptalk during an earnings call has upon bid-ask spreads. We know from Section 4.1 that unexpected uptalk by female executives is associated with lower analyst recommendations and with weaker realised earnings and, hence, that this type of uptalk is a signal of potential bad news. Market awareness of this fact could manifest in two ways. First, if a female executive starts to use uptalk, then she indicates that there is downside risk in the stock and so generates a heightened perception of risk that results in wider bid-ask spreads. Second, when a female executive starts to speak for the first time, market participants face the higher-order risk that she might start to use uptalk. If that risk is significant, then it should cause bid-ask spreads to widen as soon as a female executive starts to speak.

We use NBBO quotes from Polygon to investigate these two potential sources of risk. At every microsecond t during an earnings call, we define $\textit{Percentage Spread}_t = (\textit{Ask} - \textit{Bid})/((\textit{Ask} + \textit{Bid})/2)$ to be the bid-ask spread of the stock price quote expressed as a percentage of its midpoint; *Percentage Spread* therefore ranges between 0 and 1. We then define *Quoted Spread* for each executive response in the call to be the arithmetic average of every *Percentage Spread* calculated during the response:

$$\textit{Quoted Spread}(\textit{Response}) = \frac{\sum_{\textit{Every microsecond } t \textit{ in Response}} \textit{Percentage Spread}_t}{\textit{Number of microseconds in Response}}. \tag{2}$$

4.2.1 Bid-Ask Spreads and Female Executive Uptalk

We now investigate the contemporaneous effect of female executive uptalk on market risk perceptions. In order to do so, we examine the real-time changes in *Quoted Spread* that occur

when female executives use uptalk. Our measure of unexpected uptalk, $\Delta(\textit{Mean Uptalk})$, is computed over the length of an entire call and, hence, cannot yield tick-by-tick data. We therefore use the raw measure of uptalk in our regressions.

Table 6 reports regressions of the *Quoted Spread* for executive responses on executive uptalk interacted with the gender of the executive speaking and other variables. In line with our hypothesis that female executive uptalk generates heightened risk perception, we find that a unit increase in female executive uptalk is associated with a three percentage point increase in *Quoted Spread*. In contrast, uptalk in male executive responses serves marginally to reduce the mean bid-ask spread. The average value of *Quoted Spread* is nine percentage points wider when female executives respond to female analysts, and is unrelated to uptalk.

On average, bid-ask spreads narrow by 69% over the course of the earnings call. We hypothesise that this effect obtains because, as information is revealed over the course of an earnings call, market perceptions of risk reduce. Moreover, longer responses by executives correspond to higher bid-ask spreads: every doubling of the response length (in minutes) corresponds to a seven percentage point increase in *Quoted Spread* from the sample average.

Our evidence that unfavourable market reactions to female executive uptalk is rational does not rule out the possibility of bias in financial markets. We have argued that the market reactions are rational, because it seems likely that female executives reveal bad news about their firms when they use uptalk. But it is possible that the assignment of executives to questions is not random: if female executives are consistently forced to talk in situations where there is non-public bad news about their firms, then, in responding to their uptalk, market participants could simply be capturing a form of within-firm bias.

In order to investigate the possibility that female executives are forced to talk in situations where bad news might be revealed, we categorize executive speech fragments according to the executive's role, and we run the regressions of Table 6 separately for CEOs, CFOs, Chairpersons, and Board Members. Our results are reported in the Appendix in Table A11. Female executive uptalk has a significant effect upon *Quoted Spread* only when the executive is a CEO. Moreover, uptalk by male CEOs narrows the bid-ask spreads, although the economic magnitude of this effect is much lower.

Because CEOs are the most important executives who participate in earnings calls, we view it as implausible that women executives are deliberately being assigned the job of revealing bad news to the market. Because CEO uptalk is the only phenomenon that appears to affect market risk perceptions, we conclude that CEOs are more likely to be called upon to speak about matters that render bad news salient. That is, the results in Table A11 are consistent with the hypothesis that the responsibility for talking about potentially damaging stories is assigned by role, and not by gender.

Table 6. Uptalk and bid-ask spreads

This table presents GLM logit estimates of the relationship between uptalk incidence during executive responses to analyst questions and the mean bid-ask spread of the firm's stock during a given response, based on the following regression:

$$\begin{aligned} \textit{Quoted Spread}_{cftpi} = \beta_0 &+ \beta_1 \textit{Uptalk}_{cftpi} + \beta_2 \textit{Female Executive}_{cftpi} + \beta_3 \textit{Female Analyst}_{cfti} \\ &+ \beta_4 \textit{Uptalk}_{cftpi} \times \textit{Female Executive}_{cftpi} + \beta_5 \textit{Uptalk}_{cftpi} \times \textit{Female Analyst}_{cfti} \\ &+ \beta_6 \textit{Female Executive}_{cftpi} \times \textit{Female Analyst}_{cfti} \\ &+ \beta_7 \textit{Uptalk}_{cftpi} \times \textit{Female Executive}_{cftpi} \times \textit{Female Analyst}_{cfti} + \beta_8 X_{cfti} + \lambda_c + \theta_p + \varepsilon_{cftpi}. \end{aligned}$$

Here, c, f, and p are indices for the call, the firm, and the responding executive, respectively, and i counts question-response pairs from the start of the call. *Quoted Spread*$_{cftpi}$ is the average percentage bid-ask spread for response i by executive p in call c for firm f in year-quarter t; it is calculated using the formula in Equation (2). *Uptalk*$_{cftpi}$ is the average level of uptalk during the same response. *Female Analyst* and *Female Executive* are dummies that are equal to 1 in the respective cases where a question is posed by a female analyst and answered by a female executive, and that are otherwise equal to 0. X_{cfti} is a vector, which includes *Call Progress* and *Answer Duration*: *Call Progress*$_{cfti}$ is the percentage of the earnings call that elapsed before response i in call c, expressed as a number between 0 and 100; *Answer Duration*$_{cfti}$ is the duration in minutes of response i in call c. Standard errors are double-clustered by firm and date of the call, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	*Quoted Spread*		
Model:	(1)	(2)	(3)
Uptalk	-0.0056*	-0.0057*	-0.0068**
	(0.0028)	(0.0028)	(0.0030)
Uptalk × *Female Executive*	0.0299**	0.0300**	0.0311**
	(0.0129)	(0.0130)	(0.0153)
Female Analyst		0.0023	0.0001
		(0.0125)	(0.0136)
Uptalk × *Female Analyst*			0.0134
			(0.0109)
Female Executive × *Female Analyst*			0.0935**
			(0.0456)
Uptalk × *Female Executive* × *Female Analyst*			-0.0169
			(0.0542)
Call Progress (%)	-0.0069***	-0.0069***	-0.0069***
	(0.0009)	(0.0009)	(0.0009)
Log (*Answer Duration*)	0.0669***	0.0667***	0.0667***
	(0.0049)	(0.0049)	(0.0049)
Call FE	✓	✓	✓
Executive FE	✓	✓	✓
Observations	387,930	387,772	387,772
Pseudo R^2	0.775	0.775	0.776

4.2.2 Bid-Ask Spreads and Female Executive Participation

We now investigate the possibility that market participants have an increased perception of risk when a female executive starts to speak for the first time during the call. That this is a possibility because a female executive may use uptalk and, as noted above, female executive uptalk is viewed as a risky signal.

In order to study whether introducing a female speaker increases market risk perceptions, we measure the within-earnings-call dynamics of bid-ask spreads in the following way. First, we list the question/answer combinations in the Q&A section of the call in the order in which they occur. Second, we compute the average bid-ask spread for each executive response to a question. Third, for every consecutive pair of responses, we record the percentage change Δ(*Quoted Spread)* in the average spread, the change in uptalk Δ*Uptalk*, and the change

Table 7. The effect of executive gender dynamics and uptalk on bid-ask spreads

This table reports OLS estimates of the within-earnings-call dynamics of bid-ask spreads on genders of the responding executives, occurrence of uptalk in their responses, and call progress, based on the following regression:

$$\Delta(\textit{Quoted Spread})_{cft,n} = \beta_0 + \beta_1 \Delta(\textit{Exec Gender})_{cft,n} + \beta_2 \Delta \textit{Uptalk}_{cft,n} + \beta_3 \Delta(\textit{Exec Gender})_{cft,n} \times \Delta \textit{Uptalk}_{cft,n} + \beta_4 \textit{CallProgress}_{cft,n} + \beta_5 \Delta(\textit{Exec Gender})_{cft,n} \times \textit{Call Progress}_{cft,n} + \beta_6 X_{cft,n} + \lambda_c + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and n counts the transitions between executive speakers in call c for firm f in year-quarter t. As described in the text, $\Delta(\textit{Quoted Spread})_n$ is the percentage change in the average bid-ask spread for speaker change n in an earnings call, $\Delta(\textit{Exec Gender})_n$ is the corresponding change in speaker gender, $\Delta \textit{Uptalk}_n$ is the change in uptalk, and $\textit{Call Progress}_n$ is the percentage of the earnings call that has elapsed when speaker change n occurs. $X_{cft,n}$ is a vector of controls that includes $\textit{Answer Duration}_n$ measured in minutes and a $\textit{Female Analyst}_n$ dummy that is equal to 1 if the question in between the speeches at index n is posed by a female analyst and is otherwise 0. Standard errors are double-clustered by firm and date of the call, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	Δ(*Quoted Spread)*		
Model:	(1)	(2)	(3)
$I(\Delta(\textit{Exec Gender}) = \text{M to F})$	0.3702***	0.3683***	1.553***
	(0.0757)	(0.0741)	(0.3535)
$I(\Delta(\textit{Exec Gender}) = \text{F to M})$	0.0707	0.0761	0.4257*
	(0.0520)	(0.0546)	(0.2196)
$I(\Delta(\textit{Exec Gender}) = \text{F to F})$	-0.0291	-0.0311	-0.3800**
	(0.0457)	(0.0470)	(0.1538)
$\Delta \textit{Uptalk}$		0.0294***	0.0294***
		(0.0106)	(0.0106)
$I(\Delta(\textit{Exec Gender}) = \text{M to F}) \times \Delta \textit{Uptalk}$		-0.0001	-0.0097
		(0.0861)	(0.0858)
$I(\Delta(\textit{Exec Gender}) = \text{F to M}) \times \Delta \textit{Uptalk}$		-0.0267	-0.0249
		(0.0433)	(0.0429)
$I(\Delta(\textit{Exec Gender}) = \text{F to F}) \times \Delta \textit{Uptalk}$		0.0156	0.0149
		(0.0515)	(0.0515)
Call Progress (%)	-0.0038***	-0.0038***	-0.0034***
	(0.0006)	(0.0006)	(0.0006)
$I(\Delta(\textit{Exec Gender}) = \text{M to F}) \times$ *Call Progress (%)*			-0.0165***
			(0.0042)
$I(\Delta(\textit{Exec Gender}) = \text{F to M}) \times$ *Call Progress (%)*			-0.0050*
			(0.0026)
$I(\Delta(\textit{Exec Gender}) = \text{F to F}) \times$ *Call Progress (%)*			0.0047**
			(0.0020)
Log (*Answer Duration*)	0.0098	0.0091	0.0089
	(0.0157)	(0.0157)	(0.0157)
Female Analyst	-0.0472	-0.0472	-0.0477
	(0.0290)	(0.0290)	(0.0290)
Call FE	✓	✓	✓
Observations	332,835	332,835	332,835
Adjusted R^2	0.114	0.114	0.114
Mean (SD) of Δ(*Quoted Spread)* when $\Delta(\textit{Exec Gender}) = \text{M to M}$		0.38 (4.49)	

in the executive speaker's gender $\Delta(\textit{Exec Gender})$. We then regress $\Delta(\textit{Quoted Spread})$ on dummies for the values of $\Delta(\textit{Exec Gender})$, on $\Delta \textit{Uptalk}$, and on other variables. Table 7 reports our results.

When a female executive succeeds a male executive during the Q&A part of the earnings call, there is a corresponding 37% increase in *Quoted Spread*. Other changes in executive gender do not have a significant effect on the bid-ask spread. These results are consistent with the hypothesis that market perceptions of risk increase when a female executive starts

Table 8. The effect of first-time executive gender switches and uptalk on bid-ask spreads

This table reports OLS estimates of the within-earnings-call dynamics of bid-ask spreads on genders of the responding executives, occurrence of uptalk in their responses, and call progress, based on the following regression:

$$\Delta \textit{Quoted Spread}_{cft,n} = \beta_0 + \beta_1 \Delta(\textit{Exec Gender})_{cft,ns} + \beta_2 \Delta \textit{Uptalk}_{cft,n} + \beta_3 \Delta(\textit{Exec Gender})_{cft,ns} \times \Delta \textit{Uptalk}_{cft,n} + \beta_4 \textit{Call Progress}_{cft,n} + \beta_5 \Delta(\textit{Exec Gender})_{cft,ns} \times \textit{Call Progress}_{cft,n} + \beta_6 X_{cft} + \lambda_c + \varepsilon_{cft,n}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and n counts the transitions between executive speakers in call c for firm f in year-quarter t. As described in the text, $\Delta(\textit{Quoted Spread})_n$ is the percentage change in the average bid-ask spread for speaker change n in an earnings call. For $s \in \{M \textit{ to } F, F \textit{ to } M\}$, $\Delta(\textit{Exec Gender})_{sn}$ is a dummy that is equal to 1 if gender change s occurs for the first time during the call at speaker change n, and is otherwise equal to 0. $\Delta \textit{Uptalk}_n$ is the change in uptalk at speaker change n, and $\textit{Call Progress}_n$ is the percentage of the earnings call that has elapsed when change n occurs. $X_{cft,n}$ is a vector of controls that includes $\textit{Answer Duration}_n$ measured in minutes and a $\textit{Female Analyst}_n$ dummy that is equal to 1 if the question in between the speeches at index n is posed by a female analyst and is otherwise 0. Standard errors are double-clustered by firm and date of the call, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	Δ(*Quoted Spread)*			
Model:	(1)	(2)	(3)	(4)
$I(\Delta(\textit{Exec Gender}) = \text{M to F})_{\text{first}}$	0.7403***	1.693***		
	(0.1430)	(0.4892)		
$I(\Delta(\textit{Exec Gender}) = \text{F to M})_{\text{first}}$			0.1937	0.8650**
			(0.1183)	(0.3587)
$\Delta \textit{Uptalk}$		0.0259***		0.0306***
		(0.0099)		(0.0103)
Call Progress (%)	-0.0035***	-0.0033***	-0.0037***	-0.0036***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)
$I(\Delta(\textit{Exec Gender}) = \text{M to F})_{\text{first}} \times \Delta \textit{Uptalk}$		0.2524		
		(0.2224)		
$I(\Delta(\textit{Exec Gender}) = \text{M to F})_{\text{first}} \times \textit{Call Progress (\%)}$		-0.0168**		
		(0.0069)		
$I(\Delta(\textit{Exec Gender}) = \text{F to M})_{\text{first}} \times \Delta \textit{Uptalk}$				-0.0865
				(0.1108)
$I(\Delta(\textit{Exec Gender}) = \text{F to M})_{\text{first}} \times \textit{Call Progress (\%)}$				-0.0108**
				(0.0049)
Log (*Answer Duration*)	0.0109	0.0101	0.0125	0.0117
	(0.0156)	(0.0156)	(0.0156)	(0.0156)
Female Analyst	-0.0460	-0.0466	-0.0466	-0.0466
	(0.0289)	(0.0290)	(0.0289)	(0.0289)
Call FE	✓	✓	✓	✓
Observations	333,990	333,990	333,990	333,990
Adjusted R^2	0.114	0.115	0.114	0.114

to speak.

If the reason that female executive speakers increase risk perceptions is that uptalk by those executives may reveal bad news, then female executive participation later in the call is likely to have a smaller effect on risk perceptions. The reason is that bad news is more likely already to have been revealed later earlier in the call, by which time several speeches by female executives might have already occurred. We present three pieces of evidence that are consistent with this claim.

First, Model (3) in Table 7 shows a very significant and negative interaction between $I(\Delta(\textit{Exec Gender}) = \text{M to F})$ and $\Delta \textit{Uptalk}$. That is, in line with our reasoning above, the later a change from male to female executive speaker occurs in a call, the lower is its

impact upon bid-ask spreads. Moreover, risk perceptions decrease throughout an earnings call: Table 7 shows that, over the course of an average earnings call, *Quoted Spread* narrows by 38%.

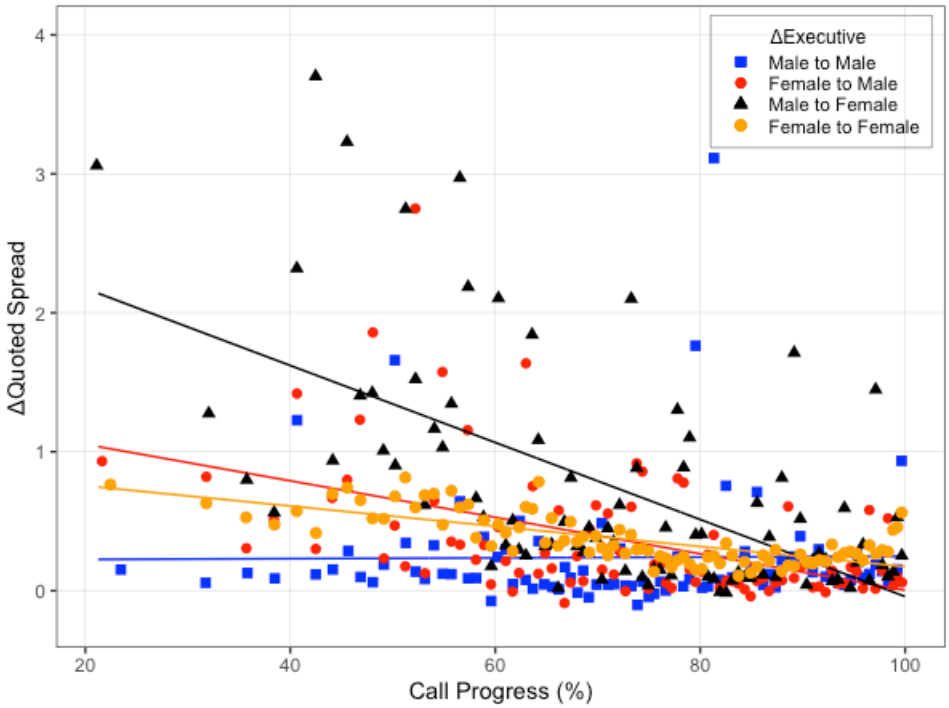
We have checked whether the results in Table 7 could be explained by changes in the textual content of responses when the identity of a responding executive changes. Our results appear in Table A6 in the Appendix. When we include changes in levels of positive, negative, uncertain, and financial tone in our regression specifications, the effect of gender changes reported in Table 7 is unchanged.

Second, we investigate the relative impact of the first and subsequent switches from male to female speakers by regressing Δ(*Quoted Spread)* on dummies for the first times gender switches between consecutive executive speakers occur as well as Δ*Uptalk* and call progress. Table 8 reports the results of this regression. Model (1) in the table shows that the average relative change in *Quoted Spread* when the recorded gender of consecutive executive speakers changes from male to female for the first time is 74 percentage points. That compares to the average effect of 37% reported in Table 7 for all recorded changes in consecutive executive speakers from male to female. In line with our hypothesis, it follows that after the female executive has spoken for the first time during a call, successive female executive participation has a smaller effect on market risk perceptions. Note that, when we include an interaction term between the effect of the first female speech and the call progress in Model (2), the coefficient on the first female speech term more than doubles. To understand this, note that, with the interaction term, the Model (1) average coefficient on the first female speech is obtained by taking the Model (2) coefficient and adding the interaction term multiplied by the average elapsed call percentage when a female speech first occurred. That calculation implies that the first female speech occurs 56.7% of the way through the call: $0.7403 = 1.693 - 56.7 \times 0.0168$.

Third, we use the Python *binsreg* package to create binned scatterplots of Δ(*Quoted Spread)* against call progress for every change in recorded executive speaker during an earnings call (Cattaneo, Crump, Farrell, and Feng, 2022). That is, for a given change in recorded gender, we take every (Δ(*Quoted Spread)*, call progress (%)) pair in our dataset, divide them into 90 equal-sized bins by call progress, and compute the average Δ(*Quoted Spread)* in each bin. Finally, we regress average Δ(*Quoted Spread)* against Call Progress. Our results are plotted in Figure 1.

The plots in Figure 1 are consistent with our hypothesis. The black line in Figure 1 indicates the relationship between Δ(*Quoted Spread)* and Call Progress when the recorded gender of consecutive executive speakers switches from male to female. The line has a negative slope so that, across our dataset, the later in the call a change from male to female executive speaker occurs, the lower is its impact upon risk perceptions.

Figure 1. Changes in bid-ask spreads as speaker gender changes through earnings calls
This figure presents binned scatterplots of Δ(*Quoted Spread)* against call progress for every change in recorded executive speaker during an earnings call. The *binsreg* plots include the control variables and fixed effects shown in Table 7.



5. The #MeToo Movement

This section examines the effect of the #MeToo movement upon market reactions to uptalk in male and female speech during earnings calls. The phrase "Me Too" was first used by the activist Tarana Burke to express her empathy for women of colour who had experienced sexual abuse, and the #MeToo movement achieved global in the wake of a 15 October 2017 social media post by the actress Alyssa Milano in response to a Pulitzer-prize winning New York Times article about the Hollywood producer Harvey Weinstein.[7] The movement highlighted the systemic nature of workplace sexual harassment and of gender discrimination more generally, and it resulted in the resignation of several high-profile male executives who were alleged to have a long history of inappropriate sexual behaviour.

If the #MeToo movement altered gender relationships in the workplace, then it may also have had an effect upon gendered speech patterns. We present summary statistics for pre- and post-#MeToo uptalk levels in Table A7 in the Appendix. There was a significant decline in uptalk after the start of the #MeToo movement; there was also a substantial drop in the standard deviation of uptalk, and a small decline in median levels of uptalk.

If the #MeToo movement altered attitudes towards gender, then one would expect it to change the way that the gender composition of a call affects gendered speech patterns. We

[7]The speed with which the #MeToo movement emerged is demonstrated by Figure A3 in the Appendix, which reports an explosion in Google searches for #MeToo in the wake of Ms Milano's post.

Table 9. The effect of call composition and #MeToo on uptalk levels

This table reports GLM logit estimates of the association between call participant composition and the mean incidence of uptalk among male and female executives and analysts participating in quarterly earnings calls around the #MeToo period, based on the following specification:

$$Mean\ Uptalk_{cftg} = \beta_0 + \beta_1 Call\ Characteristics_{cft} + \beta_2 Call\ Characteristics_{cft} \times MeToo_c + \beta_3 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and g is a participant grouping (e.g., all executives, female executives only, male executives only). Standard errors are clustered by year-quarter, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variables:	Mean Uptalk (Female Execs)	Mean Uptalk (Male Execs)	Mean Uptalk (Female Analysts)	Mean Uptalk (Male Analysts)
Model:	(1)	(2)	(3)	(4)
Female Executives (%)	0.6956***	-0.0919***	0.0056	-0.0079
	(0.0843)	(0.0263)	(0.0183)	(0.0177)
Female Analysts (%)	-0.2570***	0.0248	0.0021	-0.0065
	(0.0459)	(0.0151)	(0.0111)	(0.0076)
Female Executives (%) × MeToo	-0.1813**	-0.0544	0.0221	-0.0112
	(0.0855)	(0.0323)	(0.0361)	(0.0379)
Female Analysts (%) × MeToo	0.1854***	0.0943***	-0.0023	0.0251
	(0.0475)	(0.0240)	(0.0261)	(0.0238)
Firm/Stock Controls	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Year-Q FE	✓	✓	✓	✓
Observations	45,974	45,974	45,974	45,974
Adjusted R^2	0.0843	0.1070	0.0975	0.1081

investigate this possibility in Table 9, which reports regressions of uptalk amongst female and male executives and analysts on the gender of earnings call participants pre- and post-#MeToo. Neither call composition nor #MeToo has a significant effect upon uptalk levels by analysts (Models (3) and (4)). The first row of Models (1) and (2) shows that an executive's level of uptalk in a earnings call is increasing in the fraction of executives in the call who share his or her gender. This is the effect that we documented in Table : executives appear to be less comfortable when they have the same gender as their peer group. Row three of the table shows that this effect is partly reversed by #MeToo for women, and that it is unaffected for men.

Table 9 also reports the effect of female analysts upon uptalk levels. Pre-#MeToo, the proportion of female analysts participating in an earnings call had no effect upon male executive uptalk levels. In contrast, a higher proportion of female analysts participating in the call is associated with a lower level of uptalk by female executives. One possible interpretation of this fact is that, pre-#MeToo, female analysts were viewed by female executives as less threatening than male analysts. Row four of the Table shows that the #MeToo movement had an effect on executives of both genders: post-#MeToo, analyst gender had a smaller impact on female executive uptalk levels, and male executives actually exhibited higher levels of uptalk when there was a higher proportion of female analysts in the earnings call. We interpret this pair of results as being consistent with a higher level of self confidence amongst female analysts after #MeToo. That self confidence led the analysts to ask tougher questions

Table 10. #MeToo Movement, uptalk, and analyst recommendations

This table reports logit estimates of the relationship between uptalk among earnings call participants and subsequent consensus analyst recommendations based on the following specification:

$$Outcome_{cft} = \beta_0 + \beta_1 Mean\ Uptalk_{cftg} + \beta_2 MeToo\ GST_{cft} + \beta_3 Mean\ Uptalk_{cftg} \times MeToo\ GST_{cft} + \beta_4 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and g is a participant grouping (e.g., all executives, female executives only, male executives only). *Outcome* is a dummy variable that captures the consensus analyst recommendation as reported by I/B/E/S. In Models (1) and (2), *Outcome* is 1 in case the consensus estimate is 4 or 5 and, hence, is classified as a buy, and is otherwise 0; in Models (3) and (4), *Outcome* is 1 in case the consensus estimate is 1 or 2 and, hence is classified as a sell, and is otherwise 0. *Mean Uptalk*$_{cftg}$ is the measured level of uptalk for participant group g in the call c. *MeToo GST*$_{cft}$ measures the volume of Google search queries for the term "MeToo" made at the time of the earnings call. X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variables:	Buy recommendation		Sell recommendation	
	(1)	(2)	(3)	(4)
Mean Uptalk (Female Executives)	-0.3890**	-0.3704**	0.1307**	0.1187**
	(0.1899)	(0.1858)	(0.0586)	(0.0570)
Mean Uptalk (Male Executives)	-0.2042	-0.1710	0.0048	-0.0049
	(0.1561)	(0.1649)	(0.0489)	(0.0482)
MeToo GST	-0.1761	-0.1787	0.1362	0.1362
	(0.4374)	(0.4324)	(0.3193)	(0.3280)
Mean Uptalk (Female Executives) × *MeToo GST*	0.3439	0.3116	0.3894	0.4600
	(0.5953)	(0.5930)	(0.3339)	(0.3443)
Mean Uptalk (Male Executives) × *MeToo GST*	1.273**	1.219**	-0.4323***	-0.4025***
	(0.4987)	(0.5462)	(0.1596)	(0.1553)
Analyst Controls		✓		✓
Firm FE	✓	✓	✓	✓
Year-Q FE	✓	✓	✓	✓
Observations	9,994	9,994	17,088	17,088
Pseudo R^2	0.2603	0.2606	0.2697	0.2702

and so to induce discomfort that raised uptalk levels relative to the pre-#MeToo baseline.

We have also examined the effect of #MeToo upon the relationship between executive uptalk levels and role; our results appear in Table A8 in the Appendix. The table demonstrates, in line with Table 2, that only the CFO role has a consistently positive level of uptalk. We also find that CEOs and board members engage in significantly less uptalk post-#MeToo.

We now examine whether or not the #MeToo movement altered the relationship between executive uptalk and consensus analyst recommendations and earnings forecasts. We do this by regressing consensus average analyst recommendations on average uptalk levels of male and female executives and a Google Search Trends (GST) variable that measures the volume of Google search queries for the term "#MeToo" made around the time of the earnings call.[8] Our results are reported in Table 10; they are qualitatively unchanged when we replace the GST variable with a #MeToo dummy that is equal to 1 after October 17 2017 (see Table

[8]Google search trends is a service provided by Google that gives insights into internet search behavior by measuring the volume of internet queries of specific search terms over time and in specific geographic areas. Google aggregates this information for each search term and scales it between 0 to 100, with 0 (100) suggesting lowest (highest) search volume for that search term at a given date and location.

A9).

The first row of Table 10 reports the effect of pre-#MeToo female executive uptalk upon consensus analyst recommendations. Consistent with Table 4, female executive uptalk served significantly to reduce the likelihood of analyst buy recommendations, and to increase the likelihood of sell recommendations. Once again, in line with Table 4, male executive uptalk had no significant association with recommendations before the #MeToo movement. Row four of the table indicates that the effect of female uptalk upon analyst recommendations was not changed by the #MeToo movement. Of course, as per Table A7, the level of female executive uptalk was significantly lower after #MeToo; but, when that uptalk occurred, it continued to reveal the same concern about earnings as it did before #MeToo, and it was interpreted in the same way.

The fifth row of Table 10 reports that, after #MeToo, analysts responded positively to male executive uptalk. That is, while the informational content of female executive uptalk was unchanged by #MeToo, male executive uptalk was received more positively by the market after #MeToo. Our interpretation of this fact relies upon analysis reported by Lins, Roth, Servaes, and Tamayo (2020), who find that firms whose culture does not discriminate on the basis of gender experienced positive excess returns after the #MeToo movement. We conjecture that male executive uptalk is more likely to occur in an organization whose culture discourages sexual discrimination and sexual harassment. If this is the case, then, to the extent that by a firm's officers harms the firm's revenues when it is revealed, male uptalk reveals useful information about future revenue streams. That information has the effect upon analyst recommendations that we report in row five of Table 10.[9]

We have demonstrated that analyst recommendations respond positively to male executive uptalk in the post-#MeToo era. Following Section 4.1, the results of Table 10 could occur for two reasons: they could reflect analysts' gender biases; or they could reflect a rational judgment about future firm earnings. In order to investigate these possibilities, we now investigate the relationship between uptalk and realised earnings. In line with Section 4.1, we do so by we regressing SUE and SUEC on executive uptalk; our analysis in this section is supplemented by the inclusion of a #MeToo dummy. Table 11 reports our results.

The signs of the coefficients reported in Table 11 are the same as those of Table 5 but, in contrast to Table 5, the SUE coefficients in Table 11 are not significant. We contend that this happens because SUE measures unexpected earnings relative to a two-year trend and that the trend experienced a structural break when the #MeToo movement occurred. To the extent that analysts understood that a structural break had occurred, they factored it into their earnings forecasts. Hence, it seems likely that, by using consensus earnings to

[9]We have also investigated the effect of #MeToo on the relationship between financial constraints, uptalk, and analyst recommendations. Our results appear in Table A10 in the Appendix; we find that #MeToo has no significant effect in this case.

Table 11. #MeToo movement, Uptalk and future unexpected earnings

This table reports OLS estimates of the relationship between unexpected uptalk among earnings call participants and future unexpected earnings before and after the #MeToo movement, based on the following specification:

$$Outcome_{cft} = \beta_0 + \beta_1 \Delta(Mean\ Uptalk)_{cftg} + \beta_2 \Delta(Mean\ Uptalk)_{cftg} \times MeToo_{cft} + \beta_3 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and g is a participant grouping (e.g., all executives, female executives only, male executives only). $Outcome_{ft}$ is a measure of unexpected earnings in the year-quarter after t: in Models (1)–(3), *Outcome* is equal to Standardized Unexpected Earnings (*SUE*) and in Models (4)–(6), *Outcome* is equal to Standardized Unexpected Earnings relative to Consensus analyst estimates (*SUEC*). For firm f in year-quarter t, $SUE_{ft} = (EPS_{f,t} - EPS_{f,t-4} - \mu_{ft}^{SUE})/\sigma_{ft}^{SUE}$, where μ_{ft}^{SUE} and σ_{ft}^{SUE} are the respective mean and standard deviation of $(EPS_{f,\tau} - EPS_{f,\tau-4})$ for $\tau = t-8, t-7, \ldots, t-1$ (Bernard and Thomas, 1990); and $SUEC_{ft} = (EPS_{f,t} - (Consensus\ EPS\ estimate)_{f,t} - \mu_{ft}^{SUEC})/\sigma_{ft}^{SUEC}$, where μ_{ft}^{SUEC}, and σ_{ft}^{SUEC} are the respective mean and standard deviation of $(EPS_{f,\tau} - (Consensus\ EPS\ estimate)_{f,\tau})$ for $\tau = t-8, t-7, \ldots, t-1$. *MeToo* is a dummy variable that is equal to 0 before the #MeToo movement and 1 after the movement starts. X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variables:	SUE_{t+1}			$SUEC_{t+1}$		
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Δ(*Mean Uptalk*) (Female Executives)	-0.0260	-0.0260	-0.0293*	-0.0075**	-0.0076**	-0.0078**
	(0.0175)	(0.0177)	(0.0166)	(0.0034)	(0.0034)	(0.0034)
Δ(*Mean Uptalk*) (Male Executives)	0.0270	0.0322	0.0186	-0.0054	-0.0061	-0.0069
	(0.0266)	(0.0271)	(0.0253)	(0.0049)	(0.0050)	(0.0051)
Δ(*Mean Uptalk*) (Female Executives) × MeToo	-0.0402	-0.0396	-0.0245	0.0078	0.0077	0.0089
	(0.0398)	(0.0398)	(0.0396)	(0.0076)	(0.0076)	(0.0077)
Δ(*Mean Uptalk*) (Male Executives) × MeToo	-0.0347	-0.0362	-0.0190	0.0136*	0.0138*	0.0143*
	(0.0376)	(0.0375)	(0.0354)	(0.0080)	(0.0080)	(0.0081)
Δ(*Mean Uptalk*) (Female Analysts)		0.0305	0.0110		-0.0004	-0.0004
		(0.0358)	(0.0340)		(0.0069)	(0.0070)
Δ(*Mean Uptalk*) (Male Analysts)		-0.0492	-0.0465		0.0069	0.0066
		(0.0350)	(0.0313)		(0.0072)	(0.0073)
Last Recommendation	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Year-Q FE	✓	✓	✓	✓	✓	✓
Firm/Stock controls			✓			✓
Observations	37,944	37,944	37,944	37,970	37,970	37,970
Adjusted R^2	0.045	0.045	0.122	0.026	0.026	0.028
Mean (SD) of Dependent Variable	-0.08 (1.03)			-0.02 (0.34)		

normalise unexpected earnings, the SUEC measure corrects to some extent for the structural break and that this is the reason that the SUEC coefficients remain significant in Table 11.

Table 11 presents new results on the accuracy of analyst responses to male executive uptalk. Recall that, in a regression of SUEC on unexpected executive uptalk across our entire sample, the coefficients for unexpected female executive uptalk are negative and significant. We interpreted that result as indicating that analysts consistently fail to change their recommendations as far as they should do in the wake of unexpected female executive uptalk. In line with that result, row one of Models (4)–(5) in Table 11 reports a negative pre-#MeToo coefficient for unexpected female executive uptalk, and row three of the table indicates that this effect does not change significantly after #MeToo. What is new in Table 11 are the positive coefficients reported in row four of Models (4)–(5) for post-#MeToo unexpected male executive uptalk. These coefficients, which are significant at the

Table 12. Uptalk and bid-ask spreads either side of the #MeToo movement

This table presents GLM logit estimates of the relationship between uptalk incidence during executive responses to analyst questions and the mean bid-ask spread of the firm's stock during a given response before and after the start of the #MeToo movement, based on the following regression:

$$\begin{aligned} \textit{Quoted Spread}_{cftpi} = \beta_0 &+ \beta_1 \textit{Uptalk}_{cftpi} + \beta_2 \textit{Female Executive}_{cftpi} + \beta_3 \textit{Female Analyst}_{cfti} \\ &+ \beta_4 \textit{Uptalk}_{cftpi} \times \textit{Female Executive}_{cftpi} + \beta_5 \textit{Uptalk}_{cftpi} \times \textit{Female Analyst}_{cfti} \\ &+ \beta_6 \textit{Female Executive}_{cftpi} \times \textit{Female Analyst}_{cfti} \\ &+ \beta_7 \textit{Uptalk}_{cftpi} \times \textit{Female Executive}_{cftpi} \times \textit{Female Analyst}_{cfti} + \beta_8 X_{cfti} + \lambda_c + \theta_p + \varepsilon_{cftpi}. \end{aligned}$$

Here, c, f, and p are indices for the call, the firm, and the responding executive, respectively, and i counts question-response pairs from the start of the call. $\textit{Quoted Spread}_{cftpi}$ is the average percentage bid-ask spread for response i by executive p in call c for firm f in year-quarter t; it is calculated using the formula in Equation (2). $\textit{Uptalk}_{cftpi}$ is the average level of uptalk during the same response. *Female Analyst* and *Female Executive* are dummies that are equal to 1 in the respective cases where a question is posed by a female analyst and answered by a female executive, and that are otherwise equal to 0. X_{cfti} is a vector, which includes *Call Progress* and *Answer Duration*: $\textit{Call Progress}_{cfti}$ is the percentage of the earnings call that elapsed before response i in call c, expressed as a number between 0 and 100; $\textit{Answer Duration}_{cfti}$ is the duration in minutes of response i in call c. Standard errors are double-clustered by firm and date of the call, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	*Quoted Spread*			
	Pre-#MeToo		Post-#MeToo	
Model:	(1)	(2)	(3)	(4)
Uptalk	-0.0069*	-0.0090**	-0.0037	-0.0030
	(0.0040)	(0.0041)	(0.0025)	(0.0020)
Uptalk × *Female Executive*	0.0293*	0.0307*	0.0313	0.0309
	(0.0159)	(0.0179)	(0.0217)	(0.0260)
Female Analyst	-0.0070	-0.0041	0.0140	0.0043
	(0.0174)	(0.0174)	(0.0174)	(0.0214)
Uptalk × *Female Analyst*		0.0284*		-0.0072
		(0.0140)		(0.0145)
Female Executive × *Female Analyst*		0.0713		0.1197
		(0.0599)		(0.0687)
Uptalk × *Female Executive* × *Female Analyst*		-0.0247		0.0044
		(0.0825)		(0.0665)
Call Progress (%)	-0.0083***	-0.0083***	-0.0052***	-0.0052***
	(0.0011)	(0.0011)	(0.0010)	(0.0010)
Log (*Answer Duration*)	0.0654***	0.0654***	0.0705***	0.0705***
	(0.0056)	(0.0056)	(0.0063)	(0.0063)
Call FE	✓	✓	✓	✓
Executive FE	✓	✓	✓	✓
Observations	249,357	249,357	138,415	138,415
Pseudo R^2	0.762	0.762	0.789	0.789

10% level, indicate that, while analyst recommendations respond positively to unexpected male executive uptalk, analysts fail to update their earnings estimates as far upwards as is warranted. That lack of responsiveness is completely in line with the relationship between female executive uptalk and SUEC.

We now examine the effect of the #MeToo movement on the relationship between executive uptalk and market risk perceptions. Recall from Table 6 that, across our entire sample, bid-ask spreads narrow slightly in response to male executive uptalk and widen in response to female executive uptalk. In order to investigate the effects of #MeToo upon these relationships, we split our sample into pre- and post-#MeToo sub-samples, and we run the regression of Table 6 on each of those sub-samples. Our results are reported in Table 12. The

Table 13. The effect of first-time executive gender switches and uptalk on bid-ask spreads around the #MeToo movement

This table reports OLS estimates of the within-earnings-call dynamics of bid-ask spreads on genders of the responding executives, occurrence of uptalk in their responses, and call progress, before and after the start of the #MeToo movement, based on the following regression:

$$\Delta \textit{Quoted Spread}_{cft,n} = \beta_0 + \beta_1 \Delta(\textit{Exec Gender})_{cft,ns} + \beta_2 \Delta \textit{Uptalk}_{cft,n} + \beta_3 \Delta(\textit{Exec Gender})_{cft,ns} \times \Delta \textit{Uptalk}_{cft,n} + \beta_4 \textit{Call Progress}_{cft,n} + \beta_5 \Delta(\textit{Exec Gender})_{cft,ns} \times \textit{Call Progress}_{cft,n} + \beta_6 X_{cft} + \lambda_c + \varepsilon_{cft,n}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and n counts the transitions between executive speakers in call c for firm f in year-quarter t. As described in the text, $\Delta(\textit{Quoted Spread})_n$ is the percentage change in the average bid-ask spread for speaker change n in an earnings call. For $s \in \{M \textit{ to } F, F \textit{ to } M\}$, $\Delta(\textit{Exec Gender})_{sn}$ is a dummy that is equal to 1 if gender change s occurs for the first time during the call at speaker change n, and is otherwise equal to 0. $\Delta \textit{Uptalk}_n$ is the change in uptalk at speaker change n, and $\textit{Call Progress}_n$ is the percentage of the earnings call that has elapsed when change n occurs. $X_{cft,n}$ is a vector of controls that includes $\textit{Answer Duration}_n$ measured in minutes and a $\textit{Female Analyst}_n$ dummy that is equal to 1 if the question in between the speeches at index n is posed by a female analyst and is otherwise 0. Standard errors are double-clustered by firm and date of the call, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	$\Delta(\textit{Quoted Spread})$	
	Pre #MeToo	Post #MeToo
Model:	(1)	(2)
$I(\Delta(\textit{Exec Gender}) = \text{M to F})$	0.3276***	0.4265***
	(0.0990)	(0.1117)
$I(\Delta(\textit{Exec Gender}) = \text{F to M})$	0.1217	0.0365
	(0.0765)	(0.0767)
$I(\Delta(\textit{Exec Gender}) = \text{F to F})$	-0.0266	-0.0327
	(0.0595)	(0.0759)
$\Delta \textit{Uptalk}$	0.0162	0.0510***
	(0.0138)	(0.0166)
$I(\Delta(\textit{Exec Gender}) = \text{M to F}) \times \Delta \textit{Uptalk}$	-0.0462	0.0482
	(0.0882)	(0.1581)
$I(\Delta(\textit{Exec Gender}) = \text{F to M}) \times \Delta \textit{Uptalk}$	-0.0707	0.0194
	(0.0665)	(0.0527)
$I(\Delta(\textit{Exec Gender}) = \text{F to F}) \times \Delta \textit{Uptalk}$	-0.0760	0.1458
	(0.0498)	(0.1026)
Call Progress (%)	-0.0034***	-0.0045***
	(0.0008)	(0.0008)
Log (Answer Duration)	-0.0123	0.1354***
	(0.0180)	(0.0208)
Female Analyst	-0.0418	-0.0570
	(0.0382)	(0.0433)
Call FE	✓	✓
Observations	215,526	117,309
Adjusted R^2	0.103	0.145

effects reported in Table 6 obtain in the pre-#MeToo sample, but they are absent in the post-#MeToo data, where we find no significant relationship between bid-ask spreads and uptalk by executives of either gender. Our explanations for these effects is as follows. First, we have already argued that, because uptalk is a female-typed speech characteristic, post-#MeToo male executive uptalk could arise in organizations in which accusations of sexual harassment are less likely to occur. If that type of organization has a more volatile stock price, then uptalk by men is associated with wider bid-ask spreads after #MeToo. That widening serves to reverse the narrowing identified in the pre-#MeToo data and, hence, could reverse the effect reported in row one of Models (1) and (2) of Table 12. Second, in order to explain the

absence of a significant effect of female executive uptalk on post-#MeToo bid-ask spreads, recall our argument that the heightened risk perception in Models (1) and (2) was caused by information revelation induced by a lack of confidence. It follows that, if female executive uptalk was less associated with a lack of confidence after #MeToo, then such uptalk ceased to reveal the sort of information that reasonably causes wider bid-ask spreads.

We conclude this section by examining the way that the #MeToo movement affected the within-call dynamics of bid-ask spreads. Following Section 4.2.2, we split our dataset into pre- and post-#MeToo samples, and for each sub-sample we regress Δ(*Quoted Spread)* on dummies for Δ(*Mean Uptalk*), on Δ*Uptalk*, and other variables. Table 13 reports our results. In line with Table 7, Table 13 reports a large and very significant widening in the bid-ask spreads when the gender of the responding executive switches from male to female between responses. The change is 10 percentage points higher after #MeToo than before it. While Δ*Uptalk* has no effect on Δ(*Quoted Spread)* pre-#MeToo, it has a post-#MeToo effect that is positive and significant at the 1% level. This result is in contrast to the insignificant post-#MeToo effect of *Uptalk* on *Quoted Spread* that is reported in Table 12. This contrast arises because the *Uptalk* coefficient in Table 12 concerns variation in uptalk during a given executive's response, whereas the Δ*Uptalk* coefficient in Table 13 applies only to variation in uptalk that occurs between successive speakers.

We have also used pre- and post-#MeToo sub-samples to perform the regressions in table 8 of Δ(*Quoted Spread)* on the first switch in gender between consecutive executive speakers. The results are reported in Table A12 in the Appendix, and are broadly in line with the findings of Table 8.

6. Conclusion

This paper breaks new ground in three ways. First, it examines the price efficiency of market responses to gendered behaviour. Second, it is the first study in which the main explanatory variable is constructed using the tonal variation in audio recordings of speeches. Third, it identifies a new real economic effect of the #MeToo social movement.

We show that the female-typed uptalk speech pattern affects the perception of analysts who observe it in earnings calls and, hence, is reflected in analyst buy and sell recommendations. As far as we are aware, ours is the first paper to relate real-world market reactions to gendered behaviour in this way. Other contributions to the literature on gender examine the historic roots of modern gender stereotypes (Boserup, 1967; Alesina, Giuliano, and Nunn, 2013; Giuliano, 2015; Galor, Özak, and Sarid, 2020; Santacreu-Vasut, Shoham, and Gay, 2013; Tur-Prats, 2019; Alesina, Brioschi, and La Ferrara, 2016), the impact of those stereotypes on hiring choices and other judgment-based allocation choices (Reuben, Sapienza, and Zingales, 2014; Coffman, Exley, and Niederle, 2018; Coffman, Exley,

and Niederle, 2021), and the real effects of female leadership, on the board and elsewhere (Tate and Yang, 2015; Kunze and Miller, 2017; Huang and Kisgen, 2013; Adams and Ferreira, 2009; Kim and Starks, 2016). None of these papers is concerned with market price effects, and, to the extent that they perform causal inference, most use laboratory experiments.

We find that analysts respond negatively when female executives use unexpectedly high levels of uptalk in earnings calls. This response appears to be warranted: realised earnings are lower when women use more uptalk than usual. Our data suggest that, if anything, analyst expectations regarding change less than they should in response to female executive uptalk. We also find that market perceptions of risk increase when female executives speak in earnings calls.

Our results draw on a novel dataset. We perform a tonal analysis of speech during earnings calls, and we record a measure of uptalk along with transcripts of earnings call text and real-time price information. We believe that ours is the first paper to use real-world audio data to study the price impact of gendered behavior.

Our analysis yields a surprising result about the #MeToo social movement. Analyst responses to uptalk by female executives do not change in the wake of #MeToo (although the volume of such uptalk diminishes), but, after #MeToo, analysts respond positively to uptalk by male executives. That is, one of the consequences of a movement that was intended to achieve greater social justice for women was to reward men who exhibited female-typed speech patterns.

We believe that our methods could be used to investigate the real economic effects of cultured mores in other settings. A population can be divided culturally in many ways. When a particular cultural grouping is associated with a way of speaking, a database of potentially market-sensitive speech can be with data about cultural markers and prices to study the real effects of that pattern. This type of analysis has the potential to shed new light on the real economic effects of perceptions not only of gender, but also of race, class, and educational achievements.

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A. For Online Publication

Descriptive Statistics

Table A1a presents dialogue-level descriptive statistics for the 1,607,428 questions and answers in our earnings calls sample. Uptalk occurs more intensely, and varies more, among executives than analysts. The average incidence of uptalk among executives (analysts) is 1.13 (1.02). Moreover, uptalk is more intense, and varies more, among female executives and analysts than among their male counterparts. It is clear from a comparison of the 5th and 95th percentiles of uptalk levels for female executives and analysts that uptalk varies much more among female executives. The distribution of uptalk is more similar for male executives and analysts. The average (median) quoted spread during call Q&As is 0.52% (0.15%). We also report percentage changes in quoted spreads for every consecutive pair of executive responses in a call, grouped by genders of the executive pairs. The highest average spread is 0.28% and occurs when consecutive speakers have different genders.

Table A1b reports call-level summary statistics. We group call participants by role (executive or analyst) and by gender, and report average uptalk for each grouping. Mean uptalk is marginally higher among executives than among analysts. Mean uptalk is higher by 0.12 units for female than for male executives; there is little difference in uptalk levels for female and male analysts. Female participation in earnings calls as a percentage of all participating executives (analysts) is rather low at just 10% (14%) on average. The average firm in the sample is moderately sized with assets of $12.82 billion, and receives an average consensus recommendation of 2.26 tilting it towards the sell side as confirmed by the large (small) mean value of the $Sell$ (Buy) recommendation dummy.

Table A1. Descriptive statistics

This table presents summary statistics for variables listed in the first column. Panel (a) reports statistics of uptalk by participant type and gender and quoted spreads at the dialogue-level for each question and answer in our earnings calls sample. Panel (b) reports call-level statistics of mean uptalk by participant type and gender, financial and stock performance charactersitics of firms, and analyst recommendations.

(a) Dialogue-level statistics

Variable	Mean	SD	Min	5p	25p	50p	75p	95p	Max	Obs
Uptalk (*Executive*)	1.13	1.69	0	0.14	0.54	0.83	1.09	2.74	15	1,607,428
Uptalk (*Female Executive*)	1.17	1.76	0	0.13	0.51	0.82	1.11	3.26	15	114,082
Uptalk (*Male Executive*)	1.13	1.69	0	0.14	0.54	0.83	1.09	2.72	15	1,493,346
Uptalk (*Analyst*)	1.02	1.21	0	0.21	0.61	0.86	1.08	1.98	15	1,607,428
Uptalk (*Female Analyst*)	1.04	1.32	0	0.21	0.62	0.86	1.08	2	15	147,582
Uptalk (*Male Analyst*)	1.02	1.20	0	0.21	0.61	0.86	1.08	1.97	15	1,459,846
Quoted Spread (%)	0.52	0.89	0.01	0.02	0.06	0.15	0.45	3.42	3.42	387,930
Δ(*Quoted Spread)* (%): Male to Male	0.21	0.83	-0.94	-0.76	-0.26	0	0.34	2.52	2.52	301,829
Δ(*Quoted Spread)* (%): Male to Female	0.28	0.94	-0.94	-0.80	-0.38	0.01	0.61	2.52	2.52	8,686
Δ(*Quoted Spread)* (%): Female to Male	0.28	0.95	-0.94	-0.80	-0.38	0	0.62	2.52	2.52	8,633
Δ(*Quoted Spread)* (%): Female to Female	0.17	0.74	-0.94	-0.70	-0.13	0	0.13	2.41	2.52	13,825

(b) Call-level statistics

Variable	Mean	SD	Min	5p	25p	50p	75p	95p	Max
Mean Uptalk (Executives)	1.03	0.75	0	0.53	0.73	0.87	1.06	2.01	15
Mean Uptalk (Female Executives)	1.10	1.56	0	0.14	0.57	0.81	1.05	2.68	15
Mean Uptalk (Male Executives)	0.98	0.76	0	0.42	0.65	0.82	1.03	2.03	15
Mean Uptalk (Analysts)	0.99	0.75	0	0.48	0.72	0.87	1.04	1.79	15
Mean Uptalk (Female Analysts)	0.98	0.73	0.02	0.35	0.68	0.88	1.05	1.71	15
Mean Uptalk (Male Analysts)	1.01	0.74	0.01	0.45	0.72	0.89	1.06	1.88	15
Female Executives (%)	0.10	0.19	0	0	0	0	0	0.50	1
Female Analysts (%)	0.14	0.29	0	0	0	0	0	1	1
Assets ($ bil.)	12.82	31.60	0.01	0.10	0.66	2.31	8.32	64.27	190.17
Book/Equity	0.55	0.50	-0.89	0.03	0.23	0.45	0.77	1.42	3.09
Profitability (%)	1.84	4.78	-30.30	-6.56	0.58	2.43	3.96	7.34	12.74
ROA (%)	0.04	5.05	-38.71	-9.11	-0.00	0.84	1.96	4.71	10.69
FinConstraints	2.81	8.17	-32.81	-1.69	0.58	1.79	3.71	12.67	50.58
Momentum(-90,-2)	-0	0.24	-3.54	-0.37	-0.11	-0	0.11	0.35	3.99
Volatility(-90,-2)	0.02	0.01	0	0.01	0.01	0.02	0.03	0.04	0.34
EPS ($)	0.45	1.52	-72.21	-0.67	-0	0.33	0.77	2	74.75
ΔEPS^{t}_{t-4} ($)	0.02	0.79	-3.70	-1.03	-0.13	0.03	0.19	1.03	3.31
SUE	-0.05	1.02	-2.47	-1.84	-0.68	-0.04	0.58	1.73	2.48
SUEC	-0.16	1.06	-2.48	-2.04	-0.85	-0.23	0.56	1.62	2.48
Recommendation (mean)	2.26	0.48	1	1.50	1.97	2.25	2.58	3	4.50
Buy Recommendation	0.04	0.21	0	0	0	0	0	0	1
Sell Recommendation	0.90	0.30	0	0	1	1	1	1	1
Observations				52,168					

Table A2. Example synchronization map for an earnings call

This table shows part of the sychronization map for the Q1 2018 General Motors (NYSE:GM) earnings earnings call; the first four questions by analysts and the corresponding responses by executives appear in the table. The "Speaker Text" column shows the speech fragments (comprising presentations, questions, or answers) spoken by a individual participant during the call. The "Audio Interval" column shows the start and end times of the audio file clip of the Speaker Text.

Question No	Participant Name	ParticipantRole	Speaker Text (truncated for brevity)		Audio Interval (s)
1	John Murphy	Analyst	Just a first question. Now that you're almost through the issues in Korea, just curious what is next on your list to address...	→	[933.60, 963.64]
1	Mary Barra	CEO	First, I would for say we think we have an exceptionally strong franchise in South America. When you look at the market share leadership position...	→	[963.64, 1123.96]
2	John Murphy	Analyst	Got you. That's helpful. And then just a second question around potential for changes in ownership structure, JV requirements in China. I mean, ...	→	[1123.96, 1152.88]
2	Mary Barra	CEO	We think we have an outstanding partner in SAIC. We've been working together for more than 20 years. So we think having a partner that ...	→	[1152.88, 1197.64]
3	John Murphy	Analyst	Okay. And then just lastly real quick on raws. You were sharing – or you were absorbing, I should say, a larger portion of the raw mat complex...	→	[1197.64, 1241.04]
3	Charles Stevens	CFO	Yes, I – John, let me answer that question in a couple of dimensions. First, we buy about $16 billion of raw material on an annual basis...	→	[1241.04, 1359.88]
4	Ryan Brinkman	Analyst	You guys have been very proactive in recent years about exiting under earning or loss-making geographies, ...	→	[1359.88, 1413.32]
4	Mary Barra	CEO	Well, I think already, when you look at – as I mentioned before, in '15 and '16, we launched new very efficient architectures in the mid-sized compact...	→	[1413.32, 1510.36]
4	Charles Stevens	CFO	And if I could just add to that, Ryan, and to Mary's comments. A lot of the questions seem to be focused on the U.S. market, rightfully so...	→	[1510.36, 1579.52]

Table A3. Factors that influence uptalk among analysts in a call

This table presents OLS estimates of the relationship between the average incidence of uptalk among analysts participating in quarterly earnings calls and call- and firm-level features based on the following specification:

$$Mean\ Uptalk_{cftg} = \beta_0 + \beta_1 FemaleExecs_{cft} + \beta_2 FemaleAnalysts_{cft} + \beta_3 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, and t is the year-quarter of the call. $Female\ Executive_{cft}$ and $FemAn_{cft}$ are the respective percentages of female executives and analysts participating in the call. X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variables:	Mean Uptalk (Analysts)	Mean Uptalk (Female Analysts)		Mean Uptalk (Male Analysts)	
Model:	(1)	(2)	(3)	(4)	(5)
Female Executives(%)	0.0774**	0.0177	0.0160	-0.0026	-0.0017
	(0.0347)	(0.0151)	(0.0152)	(0.0172)	(0.0172)
Female Analysts(%)	-0.0309	-0.0013	-0.0020	-0.0021	-0.0020
	(0.0256)	(0.0083)	(0.0084)	(0.0090)	(0.0095)
Log(Assets)	0.0266*	0.0166***	0.0153***	0.0022	0.0011
	(0.0157)	(0.0042)	(0.0047)	(0.0042)	(0.0042)
Book/Equity	-0.0115	-0.0010	-0.0013	-0.0038	-0.0034
	(0.0137)	(0.0066)	(0.0067)	(0.0032)	(0.0030)
Profitability	-0.1544	-0.0486	-0.1063	-0.0906	-0.0823
	(0.1625)	(0.0816)	(0.0937)	(0.0820)	(0.0839)
ROA	0.1505	-0.0055	0.0428	-0.0227	-0.0451
	(0.1775)	(0.0900)	(0.0784)	(0.0580)	(0.0565)
FinConstraints	-0.0001	-0.0000	-0.0000	-0.0003**	-0.0003**
	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Momentum(-90,-2)	-0.0043	-0.0113	-0.0096	0.0043	0.0040
	(0.0148)	(0.0069)	(0.0073)	(0.0039)	(0.0037)
Volatility(-90,-2)	0.2793	0.5326**	0.6116**	-0.0260	-0.0880
	(0.4054)	(0.2093)	(0.2310)	(0.1414)	(0.1419)
EPS	-0.0025	0.0003	0.0018	0.0005	0.0007
	(0.0024)	(0.0014)	(0.0021)	(0.0007)	(0.0008)
ΔEPS_{t-4}^{t}	0.0007	-0.0000	0.0004	0.0002	0.0001
	(0.0018)	(0.0008)	(0.0008)	(0.0006)	(0.0005)
SUE		0.0011		-0.0006	
		(0.0014)		(0.0010)	
Recent Rec (mean)		0.0005		0.0060	
		(0.0036)		(0.0043)	
SUE_{t+1}			0.0009		-0.0005
			(0.0015)		(0.0015)
Next Rec (mean)			0.0034		0.0025
			(0.0036)		(0.0043)
Firm FE	✓	✓	✓	✓	✓
Year-Q FE	✓	✓	✓	✓	✓
Observations	52,168	45,938	46,366	45,938	46,366
Adjusted R^2	0.0289	0.0976	0.0939	0.1074	0.1092

Table A4. Speed with which analysts respond to executive uptalk.

This table OLS estimates based on the following specification to investigate the speed with which analyst recommendations respond to unexpected uptalk among earnings call participants:

$$Outcome_{cft} = \beta_0 + \beta_1 \Delta(Mean\ Uptalk)_{cftg} + \beta_2 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and g is a participant grouping (e.g., all executives, female executives only, male executives only). $Outcome_{cft}$ captures the average of individual recommendations issued by analysts within 1–2, 3–4, or 5–6 weeks after the call. $\Delta(Mean\ Uptalk)_{cftg}$ is the unexpected level of uptalk, as defined in Equation (1). X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Post-call period of recommendations:	(Weeks 1–2)	(Weeks 3–4)	(Weeks 5–6)
Model:	(1)	(2)	(3)
Δ(*Mean Uptalk*) (Female Executives)	-0.0461***	-0.0420	-0.0164
	(0.0152)	(0.0423)	(0.0165)
Δ(*Mean Uptalk*) (Male Executives)	0.0827	0.0250	-0.0312
	(0.0493)	(0.0378)	(0.0283)
Call/Firm/Stock Controls	✓	✓	✓
Analyst Controls	✓	✓	✓
Recent Recommendation	✓	✓	✓
Firm FE	✓	✓	✓
Year-Q FE	✓	✓	✓
Observations	7,315	7,905	8,705
Adjusted R^2	0.096	0.099	0.077

Table A5. Uptalk and analyst recommendation revisions

This table reports logit estimates of the relationship between unexpected uptalk among earnings call participants and subsequent analyst recommendation changes based on the following specification:

$$Outcome_{cft} = \beta_0 + \beta_1 \Delta(Mean\ Uptalk)_{cftg} + \beta_2 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and g is a participant grouping (e.g., all executives, female executives only, male executives only). $Outcome_{cft}$ is a dummy variable that captures major changes in the consensus analyst recommendation as reported by I/B/E/S. In Models (1)-(3), *Outcome* is 1 in case the consensus estimate is revised from 1 or 2 before the call to 4 or 5 afterwards and, hence, is classified as an upgrade to buy, and is otherwise 0; in Models (4)-(6), *Outcome* is 1 in case the consensus estimate is revised from 4 or 5 before the call to 1 or 2 afterwards and, hence, is classified as a downgrade to sell, and is otherwise 0. $\Delta(Mean\ Uptalk)_{cftg}$ is the unexpected level of uptalk, as defined in Equation (1). X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variables:	Recommendation change (upgrade to buy)			Recommendation change (downgrade to sell)		
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Δ(*Mean Uptalk*) (Female Executives)	-0.2477	-0.2508	-0.3749	0.3823***	0.3851***	0.4160***
	(0.3453)	(0.3529)	(0.5177)	(0.1400)	(0.1396)	(0.1071)
Δ(*Mean Uptalk*) (Male Executives)	0.0414	0.0321	-0.3561	-0.6025	-0.4368	-0.8242
	(0.3683)	(0.4026)	(0.6172)	(0.6943)	(0.6826)	(0.9881)
Δ(*Mean Uptalk*) (Female Analysts)		-0.0683	0.0703		-0.6236	-0.3036
		(0.2887)	(0.2476)		(0.5992)	(0.5075)
Δ(*Mean Uptalk*) (Male Analysts)		0.0657	0.1540		-0.8443	-0.8831
		(0.5446)	(0.7077)		(0.8385)	(1.023)
Firm/Stock controls			✓			✓
Last Recommendation	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Year-Q FE	✓	✓	✓	✓	✓	✓
Observations	3,446	3,446	3,352	2,762	2,762	2,659
Pseudo R^2	0.0581	0.0582	0.0842	0.0695	0.0723	0.3919

Table A6. Effect of changes in speaker gender and textual tone on bid-ask spreads

This table reports OLS estimates of the within-earnings-call dynamics of bid-ask spreads on genders of the responding executives, occurrence of uptalk in their responses, and call progress, based on the following regression:

$$\Delta(\textit{Quoted Spread})_{cft,n} = \beta_0 + \beta_1 \Delta(\textit{Exec Gender})_{cft,n} + \beta_2 \Delta(\textit{Tone})_{cft,n} + \beta_3 \Delta(\textit{Exec Gender})_{cft,n} \times \Delta(\textit{Tone})_{cft,n} + \beta_4 \textit{CallProgress}_{cft,n} + \beta_5 \Delta(\textit{Exec Gender})_{cft,n} \times \textit{Call Progress}_{cft,n} + \beta_6 X_{cft,n} + \lambda_c + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and n counts the transitions between executive speakers in call c for firm f in year-quarter t. As described in the text, $\Delta(\textit{Quoted Spread})_n$ is the percentage change in the average bid-ask spread for speaker change n in an earnings call, $\Delta \textit{Uptalk}_n$ is the change in uptalk, and $\textit{Call Progress}_n$ is the percentage of the earnings call that has elapsed when speaker change n occurs. $\Delta(\textit{Tone})_n \in \{\textit{Positive}, \textit{Negative}, \textit{Uncertain}, \textit{Financial}\}$ is the change in textual tone that occurs when speaker change n occurs. $X_{cft,n}$ is a vector of controls that includes $\textit{Answer Duration}_n$ measured in minutes and a $\textit{Female Analyst}_n$ dummy that is equal to 1 if the question in between the speeches at index n is posed by a female analyst and is otherwise 0. Standard errors are double-clustered by firm and date of the call, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	ΔQuoted Spread$_{n-1,n}$			
Model:	(1)	(2)	(3)	(4)
ΔExecutive(Male$_{n-1}$ to Female$_n$)	0.3517***	0.4177***	0.3319***	0.4023***
	(0.0857)	(0.0854)	(0.0927)	(0.0845)
ΔExecutive(Female$_{n-1}$ to Male$_n$)	0.0639	0.1349**	0.0827	0.0829
	(0.0585)	(0.0576)	(0.0660)	(0.0601)
ΔExecutive(Female$_{n-1}$ to Female$_n$)	-0.0241	0.0269	-0.0256	0.0210
	(0.0578)	(0.0520)	(0.0643)	(0.0530)
ΔPositive Tone	0.0018			
	(0.0049)			
ΔExecutive(Male$_{n-1}$ to Female$_n$) $\times$ ΔPos Tone	-0.0602			
	(0.0513)			
ΔExecutive(Female$_{n-1}$ to Male$_n$) $\times$ ΔPos Tone	-0.0151			
	(0.0151)			
ΔExecutive(Female$_{n-1}$ to Female$_n$) $\times$ ΔPos Tone	0.0040			
	(0.0145)			
ΔNegative Tone		0.0050		
		(0.0037)		
ΔExecutive(Male$_{n-1}$ to Female$_n$) $\times$ ΔNeg Tone		0.0021		
		(0.0159)		
ΔExecutive(Female$_{n-1}$ to Male$_n$) $\times$ ΔNeg Tone		-0.0015		
		(0.0093)		
ftof $\times$ ΔNeg Tone		0.0016		
		(0.0102)		
ΔUncertain Tone			-0.0046	
			(0.0072)	
ΔExecutive(Male$_{n-1}$ to Female$_n$) $\times$ ΔUnc Tone			-0.0045	
			(0.0687)	
ΔExecutive(Female$_{n-1}$ to Male$_n$) $\times$ ΔUnc Tone			0.0067	
			(0.0174)	
ΔExecutive(Female$_{n-1}$ to Female$_n$) $\times$ ΔUnc Tone			-0.0149	
			(0.0220)	
ΔFinancial Tone				-0.0051
				(0.0053)
ΔExecutive(Male$_{n-1}$ to Female$_n$) $\times$ ΔFin Tone				0.0354
				(0.0424)
ΔExecutive(Female$_{n-1}$ to Male$_n$) $\times$ ΔFin Tone				0.0029
				(0.0141)
ΔExecutive(Female$_{n-1}$ to Female$_n$) $\times$ ΔFin Tone				-0.0316*
				(0.0179)
Call Progress (%)	-0.0032***	-0.0030***	-0.0022***	-0.0030***
	(0.0006)	(0.0006)	(0.0007)	(0.0006)
Log (Answer Duration)	0.0753***	0.0797***	0.0742***	0.0791***
	(0.0129)	(0.0139)	(0.0154)	(0.0136)
Female Analyst	-0.0670**	-0.0658**	-0.0447	-0.0485
	(0.0318)	(0.0311)	(0.0372)	(0.0336)
Call FE	✓	✓	✓	✓
Observations	254,862	275,155	206,862	254,189
Adjusted R^2	0.124	0.120	0.125	0.130

Table A7. Effect of #MeToo on uptalk levels by role and gender

This table presents descriptive statistics of the incidence of uptalk in for speech fragments uttered by make and female executives and analysts in the pre- and post-#MeToo periods.

	Pre #MeToo				Post #MeToo				
Variable	Obs	Mean	SD	Median	Obs	Mean	SD	Median	t-test Diff in means
Male analyst	397894	1.186	1.786	0.865	190040	0.993	1.099	0.856	50.82^{***}
Female analyst	43641	1.283	2.035	0.876	18698	0.993	1.015	0.871	23.68^{***}
Male executive	958320	1.147	1.688	0.851	558199	1.003	1.193	0.817	60.99^{***}
Female executive	76712	1.188	1.683	0.872	50348	1.014	1.243	0.833	21.13^{***}

Table A8. Uptalk by participant type and role: the impact of the #MeToo movement

Table reports OLS estimates of call-level features and executive roles associated with the incidence of uptalk in each speech fragment (presentations, questions, and answers) of quarterly earnings calls based on the following specification:

$$\begin{aligned} Uptalk_{cpi} = \beta_0 &+ \beta_1 Female_{cp} + \beta_2 Executive_{cp} + \beta_3 Executive_{cp} \times Female_{cp} \beta_4 Female_{cp} \times MeToo_c \\ &+ \beta_5 Executive_{cp} \times MeToo_c + \beta_6 Executive_{cp} \times Female_{cp} \times MeToo_c + \beta_7 X_{ci} \\ &+ \beta_8 X_{ci} \times Female_{cp} + \beta_9 X_{ci} \times MeToo_c + \beta_{10} X_{ci} \times Female_{cp} \times MeToo_c + \lambda_c + \varepsilon_{cpi} \end{aligned}$$

Here, c and p are indices for the call and for each individual in the call, and i is a count of speech fragments starting from the beginning of the call. *Female* is a dummy equal to 1 if the call participant is female. *Executive* is a dummy equal to 1 if the call participant is the firm's executive, and 0 if the participant is an analyst. Q&A is a dummy equal to 1 if the speech fragment is a question or answer, and 0 if the speech fragment is a presentation made by the firm's executive. X_{ci} and λ_c denote call-specific controls and call fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	Uptalk			
	(1)	(2)	(3)	(4)
Female	0.011***	0.008***	0.009***	0.009***
	(0.002)	(0.003)	(0.001)	(0.001)
Executive	0.325***	0.315***	0.324***	0.324***
	(0.008)	(0.007)	(0.008)	(0.008)
Executive × Female	0.009	0.016	0.014	0.014
	(0.020)	(0.015)	(0.020)	(0.020)
Female × MeToo	-0.183***	-0.182***	-0.181***	-0.181***
	(0.007)	(0.009)	(0.007)	(0.007)
Executive × Female × MeToo	0.196***	0.199***	0.191***	0.191***
	(0.027)	(0.020)	(0.027)	(0.027)
CEO	0.021*	0.006	0.019	0.019
	(0.012)	(0.008)	(0.012)	(0.012)
CEO × Female	0.011		0.005	0.005
	(0.050)		(0.051)	(0.051)
CEO × MeToo	-0.040***		-0.035**	-0.035**
	(0.013)		(0.015)	(0.015)
CEO × Female × MeToo	-0.028		-0.031	-0.031
	(0.053)		(0.050)	(0.050)
CFO	0.029**	0.034***	0.030**	0.030**
	(0.013)	(0.008)	(0.013)	(0.013)
CFO × Female	0.013		0.012	0.012
	(0.036)		(0.037)	(0.037)
CFO × MeToo	0.008		0.006	0.006
	(0.015)		(0.015)	(0.015)
CFO × Female × MeToo	0.021		0.025	0.025
	(0.044)		(0.044)	(0.044)
Chair	0.004	0.020	0.006	0.006
	(0.012)	(0.016)	(0.017)	(0.017)
Chair × Female		0.024	0.021	0.021
		(0.097)	(0.105)	(0.105)
Chair × MeToo		-0.041**	-0.006	-0.006
		(0.017)	(0.020)	(0.020)
Chair × Female × MeToo		-0.048	-0.007	-0.007
		(0.107)	(0.112)	(0.112)
Board	0.022	0.127	0.128	0.128
	(0.038)	(0.081)	(0.081)	(0.081)
Board × Female		-0.071	-0.069	-0.069
		(0.349)	(0.348)	(0.348)
Board × MeToo		-0.172*	-0.175**	-0.175**
		(0.089)	(0.089)	(0.089)
Board × Female × MeToo		0.296	0.284	0.284
		(0.349)	(0.349)	(0.349)
Dialogue-level controls	✓	✓	✓	✓
Call FE	✓	✓	✓	✓
Observations	1,607,428	1,607,428	1,607,428	1,607,428
Adjusted R^2	0.267	0.267	0.267	0.267

Table A9. #MeToo Movement, uptalk, and analyst recommendations

This table reports logit estimates of the relationship between uptalk among earnings call participants and subsequent analyst recommendations based on the following specification:

$$Outcome_{cft} = \beta_0 + \beta_1 Mean\ Uptalk_{cftg} + \beta_2 MeToo_{cft} + \beta_3 Mean\ Uptalk_{cftg} \times MeToo_{cft} + \beta_4 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and g is a participant grouping (e.g., all executives, female executives only, male executives only). *Outcome* is a dummy variable that captures the consensus analyst recommendation as reported by I/B/E/S. In Models (1) and (2), *Outcome* is 1 in case the consensus estimate is 4 or 5 and, hence, is classified as a buy, and is otherwise 0; in Models (3) and (4), *Outcome* is 1 in case the consensus estimate is 1 or 2 and, hence is classified as a sell, and is otherwise 0. $Mean\ Uptalk_{cftg}$ is the measured level of uptalk for participant group g in the call c. $MeToo_{cft}$ is a dummy that is equal to 1 if call c for firm f in year-quarter t is on or after the October 15, 2017 start of the #MeToo movement. X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variables:	Buy recommendation		Sell recommendation	
	(1)	(2)	(3)	(4)
Mean Uptalk (Female Executives)	-0.3953*	-0.3763*	0.1418**	0.1268**
	(0.2248)	(0.2231)	(0.0651)	(0.0618)
Mean Uptalk (Male Executives)	-0.3587	-0.3601	0.0229	0.0071
	(0.2496)	(0.2512)	(0.0602)	(0.0601)
MeToo	0.4152*	0.4294*	0.3243**	0.3194**
	(0.2242)	(0.2366)	(0.1342)	(0.1357)
Mean Uptalk (Female Executives) × *MeToo*	0.1239	0.1195	0.0765	0.1008
	(0.2627)	(0.2674)	(0.0976)	(0.0984)
Mean Uptalk (Female Executives) × *MeToo*	0.5096*	0.5385**	-0.1414*	-0.1238*
	(0.2610)	(0.2663)	(0.0722)	(0.0702)
Analyst Controls		✓		✓
Firm FE	✓	✓	✓	✓
Year-Q FE	✓	✓	✓	✓
Observations	9,994	9,994	17,088	17,088
Pseudo R^2	0.2604	0.2608	0.2697	0.2701

Table A10. #MeToo Movement, Uptalk and analyst recommendations: the role of firm financial constraints

This table reports logit estimates of the relationship between uptalk among earnings call participants, firm financial constraints, and subsequent analyst recommendations based on the following specification:

$$Outcome_{cft} = \beta_0 + \beta_1 Mean\ Uptalk_{cftg} + \beta_2 MeToo + \beta_3 Financial\ Constraints_{ft} + \beta_4 Mean\ Uptalk_{cftg} \times Financial\ Constraints_{ft} \times MeToo + \beta_5 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and g is a participant grouping (e.g., all executives, female executives only, male executives only). $Outcome_{cft}$ is a dummy variable that captures the consensus analyst recommendation as reported by I/B/E/S. In Models (1) and (2), *Outcome* is 1 in case the consensus estimate is 4 or 5 and, hence, is classified as a buy, and is otherwise 0; in Models (3) and (4), *Outcome* is 1 in case the consensus estimate is 1 or 2 and, hence is classified as a sell, and is otherwise 0. $Mean\ Uptalk_{cftg}$ is the measured level of uptalk for participant group g in the call c. $Financial\ Constraints_{ft}$ denotes financial constraints facing the firm f at time t, which are measured using the method developed by Lamont, Polk, and Saaá-Requejo (2001) as described in Section 2.1. *MeToo* is a dummy equal to 1 if the call occurred on or after October 15, 2017 when the *MeToo* movement became a widespread social phenomenon. X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variables:	Buy recommendation		Sell recommendation	
Model:	(1)	(2)	(3)	(4)
Δ(*Mean Uptalk*) (Female Executives)	-0.1990	-0.2460	0.2536	0.3368
	(0.2508)	(0.3267)	(0.2346)	(0.2680)
Δ(*Mean Uptalk*) (Male Executives)	-0.1936	-0.2072	0.1520	0.1784
	(0.1816)	(0.1954)	(0.1091)	(0.1123)
MeToo	0.1854		-0.1583	
	(0.1429)		(0.1036)	
FinConstraints × MeToo	-0.0034	-0.0002	0.0153	0.0118
	(0.0142)	(0.0149)	(0.0103)	(0.0101)
Δ(*Mean Uptalk*) (Female Executives) × FinConstraints	-0.0554	-0.0527	0.0178	0.0115
	(0.0449)	(0.0592)	(0.0300)	(0.0318)
Δ(*Mean Uptalk*) (Female Executives) × MeToo	0.1481	0.2493	-0.4414	-0.5307
	(0.5309)	(0.5654)	(0.3950)	(0.4157)
Δ(*Mean Uptalk*) (Female Executives) × FinConstraints × MeToo	-0.1018	-0.1113	0.0505	0.0603
	(0.0707)	(0.0818)	(0.0657)	(0.0660)
Δ(*Mean Uptalk*) (Male Executives) × FinConstraints ×	-0.0251	-0.0295	-0.0116	-0.0015
	(0.0304)	(0.0295)	(0.0241)	(0.0237)
Δ(*Mean Uptalk*) (Male Executives) × MeToo	0.0785	0.0973	-0.4191**	-0.4289**
	(0.2249)	(0.2370)	(0.1972)	(0.1973)
Δ(*Mean Uptalk*) (Male Executives) × FinConstraints × MeToo	0.0565	0.0580*	0.0170	0.0085
	(0.0351)	(0.0349)	(0.0264)	(0.0261)
Firm/Stock Controls	✓	✓	✓	✓
Mean Uptalk (Analysts)	✓	✓	✓	✓
Recent Recommendation	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Year-Q FE		✓		✓
Observations	9,969	9,968	17,012	17,008
Pseudo R^2	0.671	0.679	0.672	0.678

Table A11. Uptalk and bid-ask spreads by executive role

This table presents GLM logit estimates of the relationship between uptalk incidence during executive responses by role to analyst questions and the mean bid-ask spread of the firm's stock during a given response, based on the following regression:

$$\begin{aligned} \textit{Quoted Spread}_{cftpi} = \beta_0 &+ \beta_1 \textit{Uptalk}_{cftpi} + \beta_2 \textit{Female Executive}_{cftpi} + \beta_3 \textit{Female Analyst}_{cfti} \\ &+ \beta_4 \textit{Uptalk}_{cftpi} \times \textit{Female Executive}_{cftpi} + \beta_5 \textit{Uptalk}_{cftpi} \times \textit{Female Analyst}_{cfti} \\ &+ \beta_6 \textit{Female Executive}_{cftpi} \times \textit{Female Analyst}_{cfti} \\ &+ \beta_7 \textit{Uptalk}_{cftpi} \times \textit{Female Executive}_{cftpi} \times \textit{Female Analyst}_{cfti} + \beta_8 X_{cfti} + \lambda_c + \theta_p + \varepsilon_{cftpi}. \end{aligned}$$

Here, c, f, and p are indices for the call, the firm, and the responding executive, respectively, and i counts question-response pairs from the start of the call. $\textit{Quoted Spread}_{cftpi}$ is the average percentage bid-ask spread for response i by executive p in call c for firm f in year-quarter t; it is calculated using the formula in Equation (2). $\textit{Uptalk}_{cftpi}$ is the average level of uptalk during the same response. *Female Analyst* and *Female Executive* are dummies that are equal to 1 in the respective cases where a question is posed by a female analyst and answered by a female executive, and that are otherwise equal to 0. X_{cfti} is a vector, which includes *Call Progress* and *Answer Duration*: $\textit{Call Progress}_{cfti}$ is the percentage of the earnings call that elapsed before response i in call c, expressed as a number between 0 and 100; $\textit{Answer Duration}_{cfti}$ is the duration in minutes of response i in call c. Standard errors are double-clustered by firm and date of the call, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	*Quoted Spread*			
Responding Executives	CEOs	CFOs	Chairpersons	Board Members
Model:	(1)	(2)	(3)	(4)
Uptalk (Executive)	-0.0072*	-0.0099	-0.0138*	0.0045
	(0.0043)	(0.0071)	(0.0073)	(0.0223)
Uptalk (Executive) × Female Executive	0.0491**	0.0104	0.0646	-0.0729
	(0.0238)	(0.0219)	(0.0478)	(0.2196)
Female Analyst	0.0020	-0.0055	-0.0214	0.0443
	(0.0140)	(0.0218)	(0.0242)	(0.0962)
Uptalk (Executive) × Female Analyst	0.0181	0.0069	0.0253	-0.0022
	(0.0114)	(0.0194)	(0.0183)	(0.0971)
Female Executive × Female Analyst	0.0462	0.0378	0.0306	-0.0462
	(0.0679)	(0.0712)	(0.1148)	(0.1020)
Uptalk (Executive) × Female Executive × Female Analyst	-0.0481	-0.0408	-0.0490	0.0196
	(0.0818)	(0.0892)	(0.1393)	(0.1467)
Call Progress (%)	-0.0062***	-0.0080***	-0.0085***	-0.0084***
	(0.0004)	(0.0005)	(0.0006)	(0.0019)
Log (Answer Duration)	0.0659***	0.0628***	0.0622***	0.0215
	(0.0050)	(0.0080)	(0.0072)	(0.0237)
Call FE	✓	✓	✓	✓
Executive FE	✓	✓	✓	✓
Observations	222,006	103,817	85,487	6,110
Pseudo R^2	0.759	0.802	0.770	0.783

Table A12. The effect of first-time executive gender switches and uptalk on bid-ask spreads around the #MeToo movement

This table reports OLS estimates of the within-earnings-call dynamics of bid-ask spreads on genders of the responding executives, occurrence of uptalk in their responses, and call progress, before and after the start of the #MeToo movement based on the following regression:

$$\Delta \textit{Quoted Spread}_{cft,n} = \beta_0 + \beta_1 \Delta(\textit{Exec Gender})_{cft,ns} + \beta_2 \Delta \textit{Uptalk}_{cft,n} + \beta_3 \Delta(\textit{Exec Gender})_{cft,ns} \times \Delta \textit{Uptalk}_{cft,n} + \beta_4 \textit{Call Progress}_{cft,n} + \beta_5 \Delta(\textit{Exec Gender})_{cft,ns} \times \textit{Call Progress}_{cft,n} + \beta_6 X_{cft} + \lambda_c + \varepsilon_{cft,n}.$$

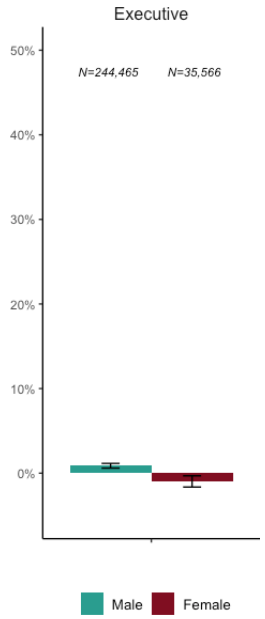
Here, c and f are indices for the call and the firm, t is the year-quarter of the call, and n counts the transitions between executive speakers in call c for firm f in year-quarter t. As described in the text, $\Delta(\textit{Quoted Spread})_n$ is the percentage change in the average bid-ask spread for speaker change n in an earnings call. For $s \in \{M \textit{ to } F, F \textit{ to } M\}$, $\Delta(\textit{Exec Gender})_{sn}$ is a dummy that is equal to 1 if gender change s occurs for the first time during the call at speaker change n, and is otherwise equal to 0. $\Delta \textit{Uptalk}_n$ is the change in uptalk at speaker change n, and $\textit{Call Progress}_n$ is the percentage of the earnings call that has elapsed when change n occurs. $X_{cft,n}$ is a vector of controls that includes $\textit{Answer Duration}_n$ measured in minutes and a $\textit{Female Analyst}_n$ dummy that is equal to 1 if the question in between the speeches at index n is posed by a female analyst and is otherwise 0. Standard errors are double-clustered by firm and date of the call, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable:	$\Delta(\textit{Quoted Spread})$			
	Pre-#MeToo	Post-#MeToo	Pre-#MeToo	Post-#MeToo
Model:	(1)	(2)	(3)	(4)
$I(\Delta(\textit{Exec Gender}) = \text{M to F})_{\text{first}}$	1.938***	1.323*		
	(0.6658)	(0.7039)		
$I(\Delta(\textit{Exec Gender}) = \text{F to M})_{\text{first}}$			1.567***	-0.1954
			(0.5305)	(0.4342)
Call Progress (%)	-0.0029***	-0.0039***	-0.0031***	-0.0045***
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
$\Delta \textit{Uptalk}$	0.0107	0.0499***	0.0132	0.0578***
	(0.0130)	(0.0155)	(0.0131)	(0.0165)
$I(\Delta(\textit{Exec Gender}) = \text{M to F})_{\text{first}} \times$ Call Progress (%)	-0.0212**	-0.0103		
	(0.0089)	(0.0107)		
$I(\Delta(\textit{Exec Gender}) = \text{M to F})_{\text{first}} \times \Delta \textit{Uptalk}$	-0.0344	0.6253		
	(0.2266)	(0.4175)		
$I(\Delta(\textit{Exec Gender}) = \text{F to M})_{\text{first}} \times$ Call Progress (%)			-0.0194***	0.0030
			(0.0063)	(0.0080)
$I(\Delta(\textit{Exec Gender}) = \text{F to M})_{\text{first}} \times \Delta \textit{Uptalk}$			-0.2469	0.1127
			(0.1581)	(0.1507)
Log (Answer Duration)	-0.0114	0.1364***	-0.0101	0.1389***
	(0.0179)	(0.0206)	(0.0179)	(0.0206)
Female Analyst	-0.0418	-0.0547	-0.0428	-0.0541
	(0.0381)	(0.0432)	(0.0381)	(0.0432)
Call FE	✓	✓	✓	✓
Observations	215,712	118,278	215,712	118,278
Adjusted R^2	0.103	0.145	0.103	0.144

Figure A1. Incidence of uptalk by gender and participant type

Average levels of uptalk are presented for executive and analyst speakers by gender; 95% confidence interval for standard errors are indicated by whiskers. Each call comprises a presentation, followed by a Q&A session; analysts do not speak during the presentation.

(a) Uptalk during presentations by gender



(b) Uptalk during Q&A by gender

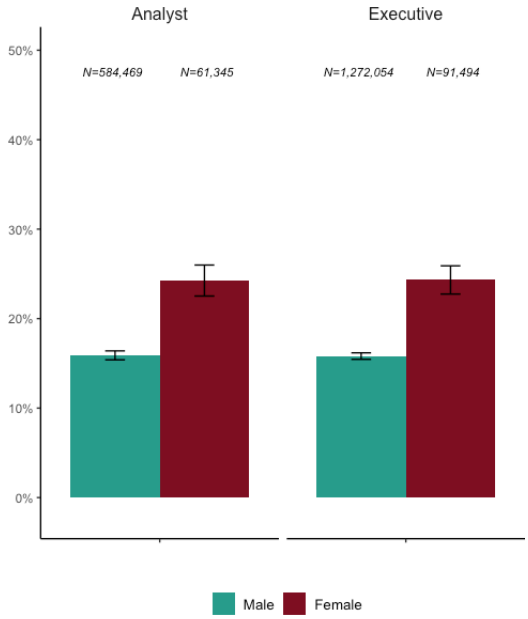
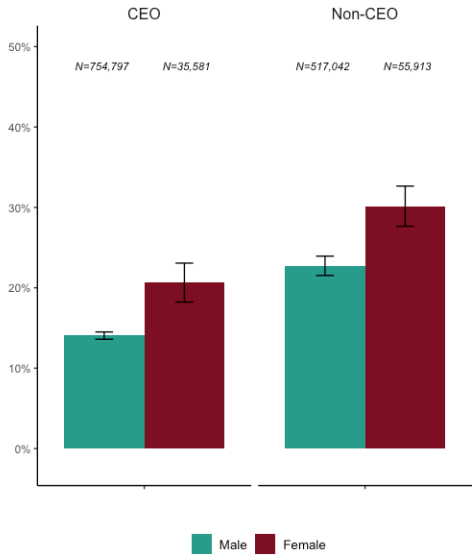


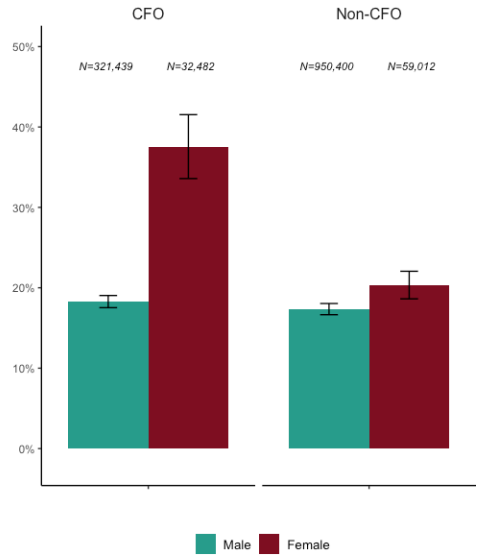
Figure A2. Incidence of uptalk among executives by gender and role

Average levels of uptalk are presented for executive and analyst speakers by gender; 95% confidence interval for standard errors are indicated by whiskers. Each call comprises a presentation, followed by a Q&A session; analysts do not speak during the presentation.

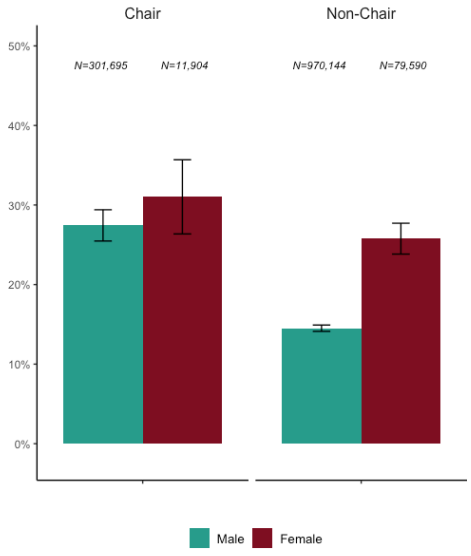
(a) Uptalk among CEOs and non-CEOs



(b) Uptalk among CFOs and non-CFOs



(c) Uptalk among Chair- and non-chairpersons



(d) Uptalk among Board- and non-board members

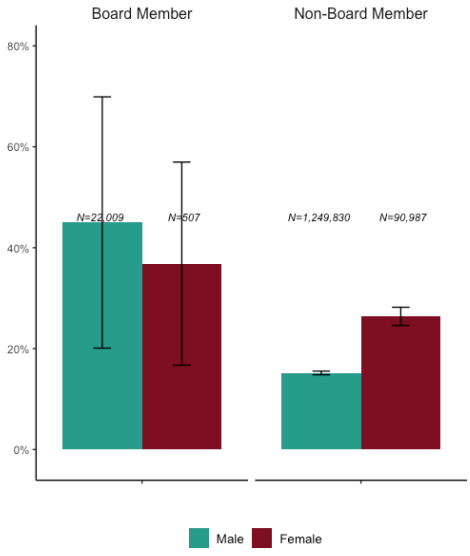


Figure A3. Google search trends for #MeToo

This Figure shows daily Google search trends in the USA for the search term "metoo" during the sample period. Google collects and aggregates this information based on search behaviour among internet users and scales it between 0 and 100. The lowest search volume for a search term at a given date and location is indicated by a search trend value of 0, and the highest volume by a value of 100.

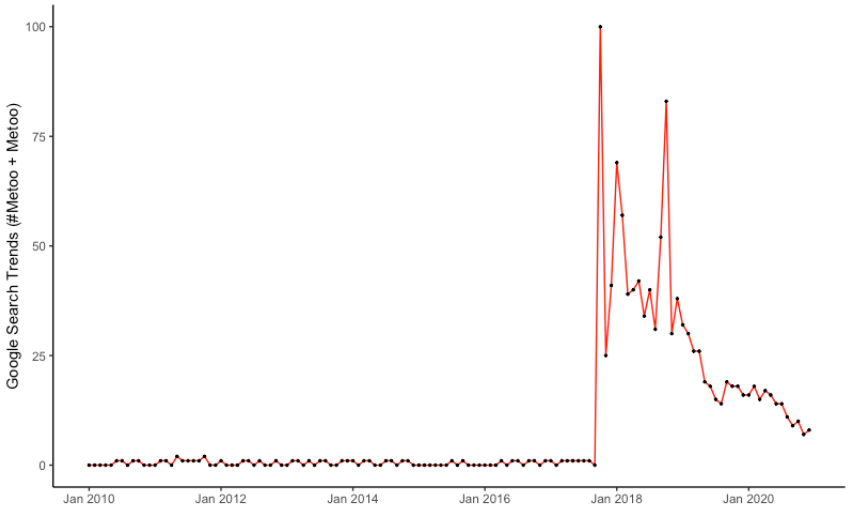


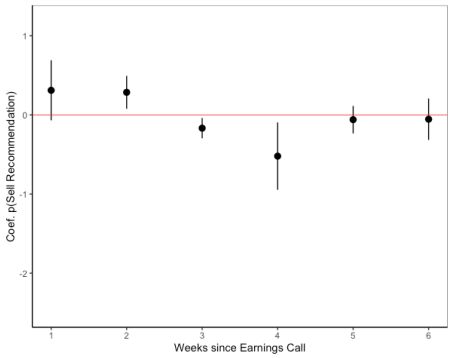
Figure A4. Uptalk and analyst recommendations by week

This table reports OLS estimates of the relationship between unexpected uptalk among earnings call participants and subsequent analyst recommendations based on the following specification:

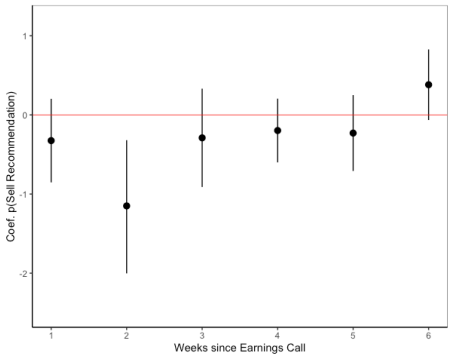
$$Outcome_{cftw} = \beta_0 + \beta_1 \Delta(Mean\ Uptalk)_{cftg} + \beta_2 X_{ft} + \lambda_f + \theta_t + \varepsilon_{cft}.$$

Here, c and f are indices for the call and the firm, t is the year-quarter of the call, g is a participant grouping (e.g., all executives, female executives only, male executives only), and w is a count of the number of weeks after call c. $Outcome_{cftw}$ is the average of individual analyst recommendations for firm f in week w: it is coded 1 for average buy recommendations (I/B/E/S score 4 or 5) in figures (a) and (b) and it is coded 1 for average sell recommendations (I/B/E/S score 1 or 2) in figures (c) and (d); it is otherwise coded 0. In figures (e) and (f), *Outcome* in week w is the difference between the median of individual recommendations for that week and the consensus forecast reported by I/B/E/S. $\Delta(Mean\ Uptalk)_{cftg}$ is the unexpected level of uptalk, as defined in Equation (1). X_{ft} is a vector of financial and stock characteristics and consensus analyst recommendations for firm f, and λ_f and θ_t are firm and time fixed effects, respectively. Standard errors are clustered by firm, and are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

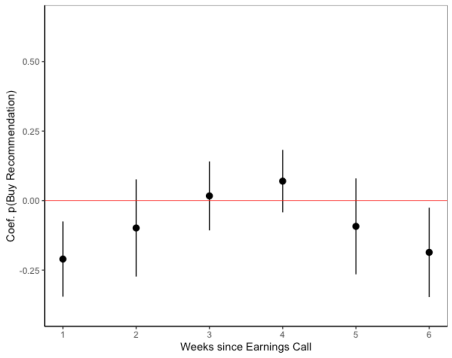
(a) Sell Recommendations: Female Executives



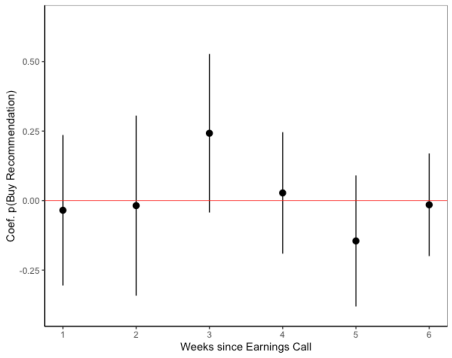
(b) Sell Recommendations: Male Executives



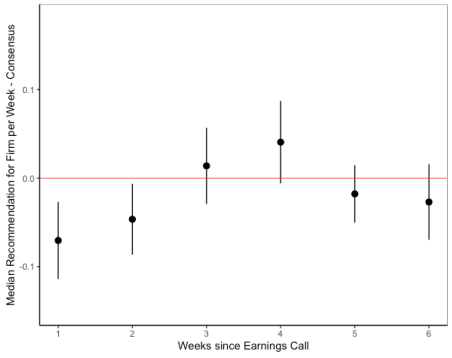
(c) Buy Recommendations: Female Executives



(d) Buy Recommendations: Male Executives



(e) Median - Consensus: Female Executives



(f) Median - Consensus: Male Executives