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Looking under the hood: Quantitative vs. qualitative inputs to analyst forecasts of fundamental risk

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Motivation, research questions

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- Literature on the role of quantitative and qualitative information in capital markets
  - Tetlock et al. (2008, opening paragraph):

    'A voluminous literature examines the extent to which stock market prices incorporate quantitative information. Although few researchers study the impact of qualitative verbal information, there are compelling theoretical and empirical reasons to do so'.

  - An increasing number of papers has focused on how information arriving in **qualitative** form affects capital market decision making, e.g., textual analysis, analysis of 'affect' (vocal cues), …

  - Broadly speaking, research finds an ***incremental role*** for qualitative information as inputs to financial decisions:
    - Investors respond to qualitative information via stock returns
    - Analysts react via earnings forecast revisions and/or changes in recommendations.

Motivation, research questions

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- Literature on the 'black box' of sell-side financial analysts
  - Call for focus on 'black box' despite a vast literature on analysts, their incentives, inputs, outputs, insights
  - Conclusion in survey paper by Kothari et al. 2016:

    '….understanding how analysts form and revise their true expectations is crucial '
  - Ramnath et al. (2008), Bradshaw (2011), Brown et al. (2015) emphasize the importance of opening the 'black box' of analyst advice –research needs to focus on ***what*** information analysts use and ***how*** they use it is

Motivation, research questions

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- **Question 1:** Is there a joint (complementary) role for quantitative and qualitative information in the context of analyst forecasts of fundamental risk?
  - Why risk forecasts?
    - Despite the importance of risk assessment in investment decisions, the literature on fundamental risk *forecasting* is relatively scarce…
    - …to our knowledge no study has documented the role of qualitative information in this context.
    - Evidence in JPS (2016) that forecasts of firm risk (state-contingent valuation risk) do *not* exhibit bias similar to first moment forecasts.

Motivation, research questions

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- **Question 2:** Do conditions of macro-uncertainty influence the relative roles of quantitative vs qualitative information for risk forecasting?
  - Why focus on conditions of macro-uncertainty?
    - Evidence that forecast setting parameters change under conditions of higher macro-uncertainty
      - Higher macro-uncertainty leads to a heightened investor *demand* for information and *reliance* on analyst advice (Amiram et al. 2014; Loh and Stulz 2016).
      - Loh and Stulz (2016): 'changed' analyst behavior during 'bad times': harder work, better (appropriately-scaled) forecasts. "*Analysts change what they do.*"
      - JPS (2016): forecasts of firm risk (state-contingent valuation risk) '*changed*' during and after the financial crisis with the forecasts becoming better *calibrated*.
      - Garcia (2013): increased role for 'sentiment' as a predictor of stock returns during recessions
      - (Kacperczyk et al. 2014, 2014: changing 'attention allocation' of mutual fund managers as a function of the business cycle)

Data setting

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- We merge two datasets to construct a unique research setting
  - **DATA SET 1:** Morgan Stanley investment reports containing scenario-based valuation estimates
    - Sample period: 2007-2012
    - Universe: North America coverage
  - **DATA SET 2:** Transcripts of Earnings Conference Calls [ECC]
    - Source: www.seekingalpha.com
    - Investor-oriented website in the US, broad coverage of publicly-traded companies, free access to ECC transcripts
    - Time period: 2006 – 2013
  - **Matching criteria**: Report within 30 days post-ECC
    - 74% of sample is within 2 days post-ECC
    - Resulting sample: 4,366 observations (624 firms, 125 analysts)

Data setting: Scenario-based investment reports

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- Key features:
  - *Mandatory* inclusion of scenario-estimates in reports starting in 2007
  - Output in each report: 3 scenario estimates, dubbed Bull, Bear, Base case (along with Price target, EPS forecasts and rating)
  - Allows computing proxy for fundamental risk forecast
  - Scenario-based investment reports more prominent in recent years:
    - UBS, Barclays, RBC Capital Markets, Credit Suisse
  - Use in other studies:
    - JPS (2016), Joos and Piotroski (2017), Hope et al. (2016)

Amazon.com (AMZN, $120, OW, DCF $160)

Risk-Reward View: Customer Focus Drives Sustainable Growth

Source: FactSet, Morgan Stanley Research

Bull Case $190	22x Bull Case 11E EV / EBITDA	Assumes Amazon.com actively participates in digital distribution of video, music, and books. Amazon.com continues to add products / selection and gain share as traditional retailers suffers. Assumes 5-yr. revenue CAGR (C09-C14E) of 25% and cash operating margin expands to 9.3% in C2019E.
Base Case $160	20x Base Case 11E EV / EBITDA	Assumes Amazon.com's invests in infrastructure in C2010, but margins rebound in C2011E + C2012E. Momentum continues as customers value broad selection of attractively priced items, which allows Amazon.com revenue to significantly outperform overall eCommerce. Digital distribution impacts business and Kindle continues to face challengers, but Amazon.com is able to participate in the digital transition. Assumes 5-yr. revenue CAGR (C09-C14E) of 22% and cash operating margin expands to 9% in C2019E.
Bear Case $95	16x Bear Case 11E EV / EBITDA	Business slows as digital distribution negatively impacts sales of media and intense competition hurts Amazon.com's competitive position in the digital media transition (Music, Video, Books). Assumes 5-yr. revenue CAGR (C09-C14E) of 18% and cash operating margin remains around 7% in C2019E.

SWOT Analysis – Amazon.com

Strengths 1. Market / brand leadership in growing eCommerce 2. Best-in-class user experience defined by selection / convenience / reliability / low prices / free shipping / powerful recommendation engine 3. Leader in Internet innovation + logistics	**Weaknesses** 1. Low prices / free shipping / product mix pressure near-term margins 2. High exposure to foreign exchange fluctuations 3. Seasonality + inventory risk
Opportunities 1. Continued share gains in overall retail market, in which eCommerce penetration is still low. 2. Continued expansion into international markets (both mature + emerging) 3. Monetization of nascent-stage initiatives gaining traction, such as Kindle, Amazon.com Web Services + digital downloads (VoD + Amazon.comMP3)	**Threats** 1. Apple and others present threat as media products transition to digital distribution 2. Execution risk in new markets / categories / products 3. Intense competition in both core (retail) + new markets (digital downloads, eCommerce solutions, web services, etc.) 4. Legal (e.g., state sales tax issues, international sales tax possibility)

Source: Morgan Stanley Research, Format based on Michael Porter's *Competitive Strategy*

Why Overweight?

- eCommerce leader that continues to take market share from offline and online channels
- Broad selection / best-in-class customer experience / ease of use creates superior user experience and drives loyalty
- Focus on customer has led to double-digit Y/Y active customer / seller growth

Key Value Drivers

- Active customers eclipsed 118MM (+26% Y/Y) in CQ2 and further customer growth should drive future revenue growth
- Amazon.com / Kindle app downloads
- Increased revenue per customer and higher ASPs drive increased value

Potential Catalysts

- Accelerating mobile commerce business (3.5% of TTM revenue / currently 5%+ per our estimate) and mobile commerce share could be higher than its eCommerce share
- Faster-than-expected shift from offline to online commerce
- Retail bankruptcies could continue to shift sales online

Potential Risks

- Amazon.com faces competitive threat from Apple / others as Media sales (44% of total revenue in CQ2) transition to digital distribution
- Investors capitalize working capital free cash at the same rate as operating free cash; if growth slows, this could have a meaningful impact on the stock
- Sales tax collection laws could be challenged as eCommerce grows

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Spread= (190-95)/[(190+95)/2]= 0.667

Data setting: ECCs

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- Key features:
  - One of the major forms of communication firms use to supplement the information contained in their financial statements and other regulatory filings.
  - Source of both quantitative and qualitative information as ECCs feature spoken language that goes beyond (boilerplate) statements in filings.
  - Format: typically two parts:
    - **Introduction:** Brief introduction of the management team present on the call and a legal disclaimer about forward-looking statements. Then company executives (CEO, CFO, etc.) give an overview of the operating performance for the quarter just ended and provide information on future plans and operations.
    - **Q&A:** After the introductory statements by managers, the call is opened to questions from analysts and investors.
  - Vast literature on information role of ECCs with focus on different types of information
    - Some recent examples: Matsumoto et al. (2011), Mayew and Venkatachalam (2012), Bochkay et al. (2017), …

Data setting: ECCs

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- Brown et al. (2015, Table 1):

TABLE 1

Survey Responses to the Question: How Useful Are the Following for Determining Your Earnings Forecasts (Stock Recommendations)?

Panel A: Summary statistics for the EF version

			% of Respondents Who Answered	
Responses	Average Rating	Significantly Greater Than	Very Useful (5 or 6)	Not Useful (0 or 1)
(1) Your industry knowledge	5.15	2–11	79.35	0.54
(2) Private communication with management	4.70	5–11	65.76	3.26
(3) Earnings conference calls	4.67	5–11	61.96	1.63
(4) Management's earnings guidance	4.65	5–11	61.41	1.63
(5) Quality or reputation of management	4.22	9–11	46.45	2.73
(6) Recent earnings performance	4.18	9–11	41.30	3.26
(7) Recent 10-K or 10-Q	4.16	9–11	42.39	4.89
(8) Primary research (e.g., channel checks, surveys, etc.)	3.96	9–11	46.20	14.13
(9) Other analysts' earnings forecasts[a]	2.16	11	7.07	36.41
(10) Your stock recommendation[a]	2.06	11	7.07	42.39
(11) Recent stock price performance	1.72	–	3.80	46.74
Total possible $N = 184$				

(Continued)

Column 1 reports the average rating, where higher values correspond to greater usefulness. Column 2 reports the results of t-tests of the null hypothesis that the average rating for a given item is not different from the average rating of the other items. We report the rows for which the average rating significantly exceeds the average rating of the corresponding items at the 5% level, and use Bonferroni-Holm–adjusted p-values to correct for multiple comparisons. Column 3 (4) presents the percentage of respondents indicating usefulness of 5 or 6 (0 or 1).

Main variables of interest

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- **Risk forecast**: *SPREAD = (Bull-Bear)/[(Bull+Bear)/2]*

- **Quantitative information**:
  - Actual earnings per share (EPS) minus analyst consensus forecast of one- or two-quarters ahead earnings, issued or reviewed in the last 60 days before earnings announcement, divided by stock price at the end of the quarter
  - Absolute value

- **Qualitative information**:

$$Tone = 100 \times \frac{Positive\ Words - Negative\ Words}{Total\ Words}.$$

A bit more on *Tone*

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- *Tone* measured using Loughran and McDonald (2011) financial sentiment dictionary (http://www3.nd.edu/~mcdonald/World_lists.html)
  - 'Bag-of-words' method
  - L&M (2011) is 1) comprehensive, and 2) financial communication-based (10-Ks)
  - We count 'positive' and 'negative' words and use these counts to define our main variable

$$Tone = 100 \times \frac{Positive\ Words\ -\ Negative\ Words}{Total\ Words}.$$

- In further analysis, we refine this *Tone* variable along four dimensions:
  1. We separately measure *PosTone* and *NegTone.*
  2. We measure the *intensity* of *Tone* and define *ExtremeTone* vs. *ModerateTone.* We rely on the methodology of Bochkay et al. (2016) who define and validate these two variables
  3. We use XML tags in the transcript of the ECCs to separately calculate the *Tone* of the *introductory* part and the *Q&A* part of the ECC
  4. We use XML tags in the transcript of the ECCs to separately calculate the *Tone* of *management* and the *analysts* during the interactive Q&A part of the ECC

Examples of Tone-relevant words

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- When we look at our **terrific** fourth-quarter and full-year 2006 results, one thing is very clear: **what a success**[…] We have done a **phenomenal job** operating our core business […] Our **vibrant business** continues to **throw off huge amounts of cash** […] I am **really enthusiastic** about the future… I have **unequivocal full confidence** that our team will continue to lead this company **with success** and indeed, **with distinction.**

(Q4 2006 Conference call, CBS Corporation)

- Our results in the fourth quarter were **very disappointing**. Our operating results were **negatively impacted** from the Southern California wildfires, **increasing severity of** auto **losses**, **adverse development** of prior period reserves […]. Mercury's investment portfolio has **suffered through** another **difficult period** […]"

(Q4 2008, Mercury General Corporation)

Connecting the ECC with the analyst notes

July 23, 2010

Stock Rating
Overweight

Industry View
Attractive

Amazon.com

CQ2: Strong Revenue, Increased Investment

Exhibit 1

AMZN — CQ2:10E vs. CQ2:10A Snapshot

(US$ in Thousands, Except per Share Data)

	6/10E	6/10A	Comments
Revenue	**$6,497,610**	**$6,566,000**	**1% above our estimate; +41% Y/Y (+42% ex. FX), vs. +14% in CQ2:09**
Media	2,923,100	2,874,000	
Electronics & Other General Merchandise	3,379,230	3,489,000	First time EGM revenue 50%+ of total revenue; +69% Y/Y
Other	195,280	203,000	
North America	$3,627,170	$3,590,000	1% below our estimate; +46% Y/Y vs. +13% Y/Y in CQ2:09
Media	1,435,000	1,324,000	
Electronics & Other General Merchandise	2,029,770	2,090,000	
Other	162,400	176,000	
International	$2,870,440	$2,976,000	4% above our estimate; +35% Y/Y vs. +16% Y/Y in CQ2:09; +38% ex. FX
Media	1,488,100	1,550,000	
Electronics & Other General Merchandise	1,349,460	1,399,000	
Other	32,880	27,000	
Company Revenue Guidance	*$6.10-6.70B*	$6.10-6.70B	
Cost of Revenue	4,921,362	4,957,000	COGS growth in line with revenue growth at +41% Y/Y
North America	2,630,881	2,570,000	
International	2,290,481	2,387,000	
Gross Profit (incl. Depreciation)	**$1,576,248**	**$1,609,000**	**Gross margin of 24.5%; in-line with our 24.3% estimate; vs. 24.4% in CQ2:09**
North America	996,289	1,020,000	
International	579,959	589,000	
Marketing	519,809	558,000	
Fulfillment	185,182	204,000	
Technology & Content	344,373	350,000	
General & Administrative	81,220	91,000	
Other Operating Expense	25,000	25,000	
Total Stock Compensation Expense	106,250	111,000	
Total Operating Expenses (incl. Amort. Stock Comp.)	**$1,261,834**	**$1,339,000**	
Total Operating Expenses (excl. Amort. Stock Comp.)	**$1,130,584**	**$1,203,000**	
Operating Income (incl. Stock Comp. & Other)	**$314,414**	**$270,000**	
Operating Income (excl. Stock Comp. & Other)	**$445,664**	**$406,000**	**Operating margin of 6.2%, below our 6.9% estimate on higher marketing and fulfillment expenses**

Quantitative Connection

Connecting the ECC with the analyst notes

July 23, 2010

Stock Rating
Overweight

Industry View
Attractive

Amazon.com

CQ2: Strong Revenue, Increased Investment

EBITDA (excl. Stock Comp. & Other)	**577,008**	**535,000**	
Net Interest (Income) and Other (Income)	(2,199)	(27,000)	
Pre-Tax Profit (excl. Stock Comp. & Other)	**$422,862**	**$408,000**	
Provision / (Benefit) for Income Taxes	79,153	88,000	
Adjustment for Extraordinary Items- Reported	0	0	
Tax benefit from Stock Compensation	37,188	38,850	
(Benefit) for NOL Carryforwards	0	0	
Operating Net Income (excl. Stock Comp. & Other)	**$306,522**	**$281,150**	
Company Operating Net Income Guidance			
Reported Net Income	**$237,459**	**$207,000**	
Wtd. Avg. Shares Out (Diluted)	451,013	455,000	
Operating EPS (excl. Stock Comp. & Other)	**$0.68**	**$0.62**	
Reported EPS	**0.53**	**0.45**	**Below our estimate due to revenue higher-than-expencted opexl; taxes $0.04 negative impact to EPS.**

For this ECC:

UE = -0.00092

AbsUE = 0.00092

Quantitative Connection

Connecting the ECC with the analyst notes

July 23, 2010

Stock Rating
Overweight

Industry View
Attractive

Amazon.com

CQ2: Strong Revenue, Increased Investment

Qualititative Connection

For this ECC:

Tone = 0.24

PosTone=1.08

NegTone=0.84

CQ2:10 Highlights

What We Liked:

1. Strong Revenue Growth Continued, Driven by EGM
2. Mobile eCommerce Ramping Faster Than We Thought
3. North America Gross Margin Stronger Than Expected
4. Despite iPad Launch, Kindle Device + Content Growth Remained Stellar

What We Didn't Like:

1. Lower-Than-Expected Operating Margin Owing to Incremental Fulfillment & Marketing / G&A Expenses
3. Capital Expenditures Potentially Reset at Higher Level in the Near Future
4. Decelerating North America Media Growth Owing to Weak Video Game Sales

What the Model Says:

1. Reducing CH2:10E Operating Income Owing to Higher-Than-Expected Fulfillment + Marketing Spend
2. C2011E / C2012E Operating Margin to Expand Owing to Leverage from Investments
3. EGM to Continue Grow at Impressive Rates

Question 1: Prediction

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- ***If*** *AbsUE* and *Tone* capture complimentary aspects of future fundamental risk, we expect both to map into estimates of *Spread*

  - ***UE***:
    - *U-shaped* relation with Spread: big 'shocks' map into bigger forecasts of risk → linear relation for ***AbsUE***

  - ***Tone***:
    - Kothari et al. 2009, Campbell et al. 2014, 2017
    - *Linear* negative relation of *Tone* and firm risk measures
      - *Intuition:* Ng et al. 2009

Question 1: Findings

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- Descriptives
- Determinants model of *Spread* as per JPS (2016) and Lui et al. (2007)

$$\begin{aligned} Spread = {} & \alpha_0 + \alpha_1 AbsUE + \alpha_2 Tone + \alpha_3 GoodNews + \alpha_4 BaseReturn + \alpha_5 Tilt + \alpha_6 Beta + \\ & \alpha_7 IdioRisk + \alpha_8 Loss + \alpha_9 EarnVol + \alpha_{10} FirmSize + \alpha_{11} BTM + \alpha_{12} Leverage + \\ & \alpha_{13} NegBV + \alpha_{14} BTM \times NegBV + \alpha_{15} Leverage \times NegBV + \\ & \beta_1 AnalystFE + \beta_2 IndustryFE + \beta_3 YearQuarterFE + \varepsilon. \end{aligned} \quad (1)$$

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Table 1: Descriptive Statistics

	Mean	Median	STD	Q1	Q3
Panel A: Main Variables					
Spread	0.6914	0.6207	0.3076	0.4762	0.8333
BaseReturn	0.1546	0.1213	0.2807	0.0210	0.2394
Tilt	0.5476	0.5556	0.1304	0.4706	0.6364
AbsVolErr	0.3511	0.2609	0.3083	0.1182	0.4855
UE	0.0002	0.0006	0.0096	−0.0001	0.0022
AbsUE	0.0040	0.0013	0.0087	0.0005	0.0035
GoodNews	0.6667	1.0000	0.4714	0.0000	1.0000
Tone	0.5061	0.5339	0.6147	0.1431	0.9062
ToneIntro	0.8855	0.9282	0.8969	0.3290	1.5053
ToneQA	0.2330	0.2533	0.5583	−0.1012	0.5906
Panel B: Control Variables					
Beta	1.2247	1.1670	0.5473	0.8516	1.5217
IdioRisk	0.5095	0.3914	1.0062	−0.1667	1.0355
Loss	0.1483	0.0000	0.3554	0.0000	0.0000
EarnVol	0.0191	0.0093	0.0283	0.0046	0.0204
FirmSize	9.0228	9.0235	1.4702	8.0399	9.9816
BTM	0.5223	0.3968	0.4673	0.2416	0.6726
Leverage	3.0974	1.4466	4.8147	0.6754	3.5126
NegBV	0.0235	0.0000	0.1516	0.0000	0.0000
VIX	25.6942	22.0780	11.7678	18.1660	27.5940
Observations	4,336				

Table 3: Analysts' Assessment of Future Risk and Valuation Uncertainty for High and Low Earnings Surprise
Terciles by High and Low Tone Terciles.

Panel A. Averages of Spread, UE, and Tone - Sort by Unexpected Earnings

	Low UE	**Med UE**	**High UE**	**Low-High UE**
Spread	0.726	0.602	0.743	-0.017 (-0.66)
Observations	[1,497]	[1,411]	[1,428]	

Panel B. Averages of Spread, UE, and Tone - Sort by Tone

	Low Tone	**Med Tone**	**High Tone**	**Low-High Tone**
Spread	0.760	0.678	0.623	0.137***
				(6.83)
Observations	[1,473]	[1,436]	[1,427]	

Panel C. Averages of Spread - Two-way Sort by Unexpected Earnings and Tone

	Low Tone	**Med Tone**	**High Tone**	**Low-High Tone**
Low UE	0.794	0.717	0.611	0.183***
	[651]	[498]	[348]	(6.56)
Med UE	0.639	0.612	0.572	0.067***
	[365]	[440]	[606]	(3.20)
High UE	0.808	0.727	0.696	0.112***
	[457]	[498]	[473]	(4.05)
Low-High UE	-0.014	-0.010	-0.085***	
	(-0.58)	(-0.47)	(-3.82)	

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Univariate relation between spread and UE and Tone

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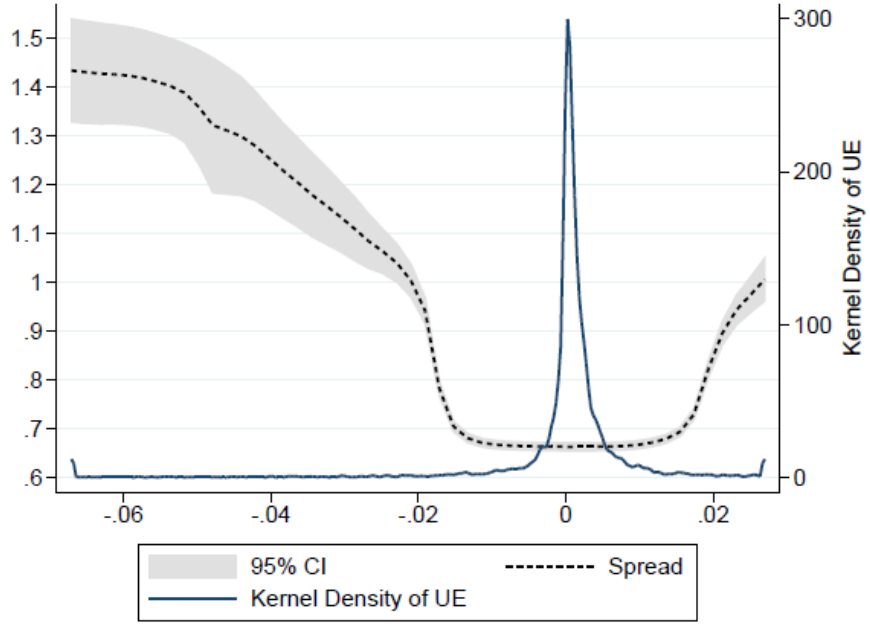

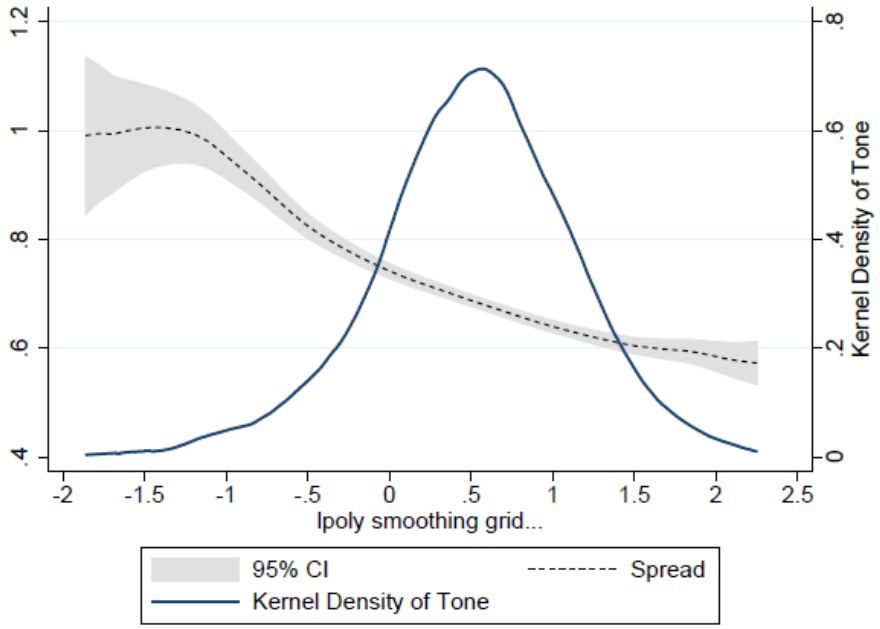

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Table 4: Analysts' Assessment of Future Risk and Valuation Uncertainty following Earnings Conference Calls.

	Spread		
AbsUE	4.172***		4.042***
	(6.30)		(6.05)
Tone		−0.034***	−0.030***
		(−4.28)	(−3.83)
GoodNews	−0.016**	−0.013*	−0.011
	(−2.29)	(−1.77)	(−1.55)
BaseReturn	0.187***	0.197***	0.184***
	(8.64)	(8.96)	(8.51)
Tilt	−0.245***	−0.260***	−0.232***
	(−5.36)	(−5.58)	(−5.11)
Beta	0.172***	0.180***	0.169***
	(11.58)	(12.05)	(11.37)
IdioRisk	0.049***	0.054***	0.048***
	(6.31)	(7.08)	(6.30)
Loss	0.077***	0.095***	0.079***
	(3.74)	(4.53)	(3.83)
EarnVol	0.328	0.334	0.312
	(1.37)	(1.40)	(1.29)
FirmSize	−0.018***	−0.018***	−0.018***
	(−4.21)	(−4.05)	(−4.23)
BTM	0.041***	0.060***	0.039***
	(2.83)	(3.91)	(2.71)
Leverage	0.005***	0.006***	0.005***
	(3.27)	(3.88)	(3.25)
NegBV	−0.027	−0.078	−0.042
	(−0.12)	(−0.38)	(−0.20)
BTM × *NegBV*	−0.938***	−1.073***	−0.946***
	(−3.27)	(−3.47)	(−3.28)
Leverage × *NegBV*	−0.013	−0.020	−0.014
	(−0.48)	(−0.79)	(−0.52)
Analyst FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes
Observations	4,336	4,336	4,336
Adj. R^2	0.649	0.643	0.651

Question 2: Prediction

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- Connecting macro-uncertainty and analyst activities, e.g.,
  - Amiram et al. 2014; Loh and Stulz 2016
    - More demand for analyst output; Changing properties of analyst output
    - Different effect of idiosyncratic firm uncertainty and macro-uncertainty
  - JPS (2016): changing properties of *Spread* during and after FC
    - Changing relation with *Beta* (stronger) and *Base-Return*(weaker)
    - Better calibration
- Will changing conditions of macro-uncertainty affect the relative roles of quantitative and qualitative information?
  - Garcia (2013)
    - Psych lit showing that 'mood states' affect information processing…
    - Behavioral economics lit showing that sentiment affects market variables…
    - Bottomline: 'recessions' correspond with heightened sensitivity to 'news' and stronger role for sentiment
    - His measurement of sentiment is similar to our measure of *Tone*
      - Source of info is financial columns in the *New York Times*

Question 2: Prediction

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- Our proxies for **Macro-uncertainty**:
  - ***HIGH VIX***: Indicator variable equal to 1 if VIX for the observation > *Median VIX* over the sample period, 0 otherwise
  - ***Crisis***: Indicator variable equal to 1 if the observation occurs during a crisis period as identified by NBER, 0 otherwise (12/2007-6/2009)
  - Related but distinct: high VIX can also occur when markets are *up*

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Table 5: Analysts' Assessment of Future Risk and Valuation Uncertainty for High and Low Macro-Uncertainty Periods.

Panel A. Averages of Spread, UE, Tone, VIX, and Crisis - Low and High VIX Periods

	Low VIX			High VIX			Difference
	Mean	Med	STD	Mean	Med	STD	High-Low
Spread	0.638	0.576	0.276	0.745	0.666	0.327	0.106***
UE	0.0008	0.0006	0.007	-0.0003	0.0006	0.011	-0.001***
AbsUE	0.003	0.001	0.007	0.005	0.002	0.010	0.002***
Tone	0.618	0.619	0.575	0.393	0.428	0.632	-0.225***
VIX	18.20	18.16	1.954	33.12	27.50	12.78	14.82***
Crisis	0.125	0	0.331	0.506	1	0.500	0.381***
Observations	2,172			2,164			

Panel B. Averages of Spread, UE, Tone, VIX, and Crisis - Crisis and No-Crisis Periods

	NoCrisis			Crisis			Difference
	Mean	Med	STD	Mean	Med	STD	Crisis-NoCrisis
Spread	0.655	0.590	0.282	0.768	0.607	0.343	0.113***
UE	0.001	0.0007	0.007	-0.002	0.0004	0.013	-0.003***
AbsUE	0.003	0.001	0.006	0.006	0.001	0.012	0.003***
Tone	0.619	0.617	0.562	0.260	0.309	0.649	-0.359***
VIX	21.01	19.51	4.832	35.83	29.13	15.41	14.82***
Observations	2,967			1,369			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Analysts' Assessment of Future Risk and Valuation Uncertainty following Earnings Conference Calls. Periods of High Macro-Uncertainty.

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Panel A: Period of High Market Volatility			
HighVIX	0.049***	0.078***	0.069***
	(6.36)	(7.68)	(5.88)
AbsUE	4.580***		4.688***
	(3.97)		(4.09)
AbsUE × *HighVIX*	1.121		0.172
	(0.96)		(0.14)
Tone		−0.027***	−0.027***
		(−2.95)	(−2.91)
Tone × *HighVIX*		−0.061***	−0.048***
		(−5.70)	(−3.96)
GoodNews	−0.019**	−0.013*	−0.010
	(−2.59)	(−1.69)	(−1.38)
BaseReturn	0.216***	0.225***	0.207***
	(9.79)	(10.15)	(9.48)
Tilt	−0.282***	−0.282***	−0.247***
	(−6.23)	(−6.02)	(−5.47)

Panel B: Period of Financial Crisis			
Crisis	0.061***	0.087***	0.070***
	(5.77)	(7.95)	(5.69)
AbsUE	3.936***		3.957***
	(3.51)		(3.54)
AbsUE × *Crisis*	1.871		0.932
	(1.44)		(0.68)
Tone		−0.028***	−0.030***
		(−3.20)	(−3.46)
Tone × *Crisis*		−0.074***	−0.052***
		(−6.26)	(−3.71)
GoodNews	−0.014*	−0.007	−0.005
	(−1.95)	(−0.96)	(−0.72)
BaseReturn	0.214***	0.225***	0.207***
	(9.95)	(10.37)	(9.66)
Tilt	−0.265***	−0.267***	−0.236***
	(−5.69)	(−5.59)	(−5.09)

- Analysts change what they do?
- Evidence consistent with Garcia (2013): during recessions augmented prediction role for 'sentiment' (~*Tone*)
- Robustness: firm-specific uncertainty? → effect on both *AbsUE* and *Tone*

Does incorporation of qualitative info affect *Spread*'s predictive ability?

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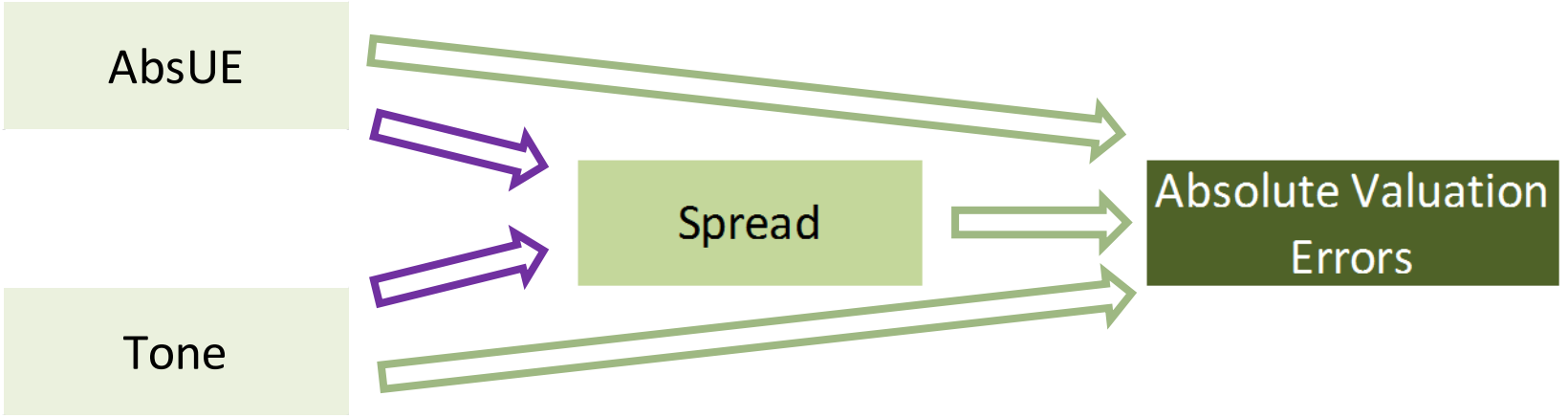
- **Intuitively**: *If* analysts correctly assess state-contingent risk in their forecasts of *Spread*, then *Spread* will be associated with the magnitude of ex post absolute forecast errors (i.e., a positive relation) JPS (2016)
- Dealing with the sequential nature of our variables of interest:

- We estimate a path analysis to examine the relation between *AbsUE* and *Tone* and absolute valuation errors, with a mediating role for *Spread*



Path analysis results

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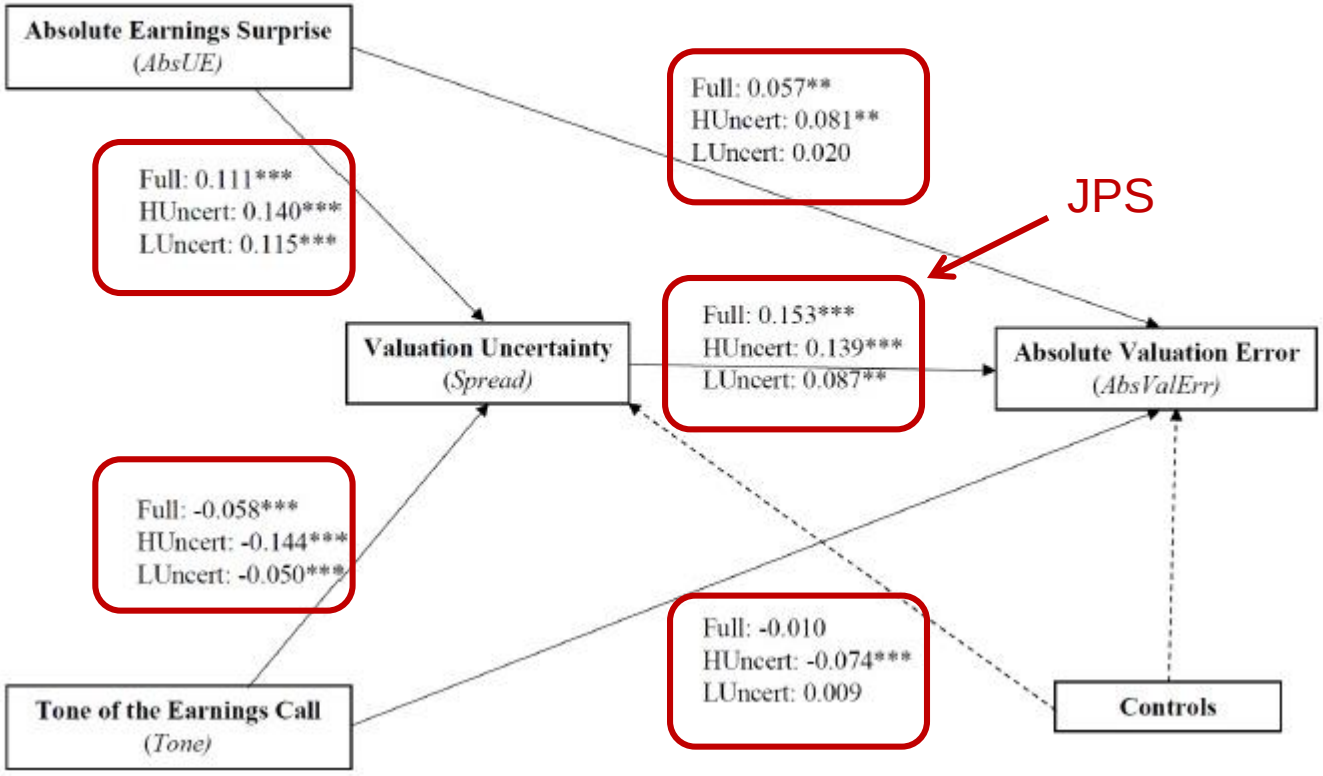
INDIRECT **DIRECT**

Figure 2: Quantitative and Qualitative Information in Earnings Conference Calls, Valuation Uncertainty, and Valuation Error. Path Analysis.



Total Effects (Direct + Indirect)	Full	HUncert	LUncert
AbsUE	0.074***	0.101***	0.030
Tone	−0.019	−0.094***	0.005
Spread	0.153***	0.139***	0.087**

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Table 7: Mapping of Qualitative and Quantitative Information into Spread and Absolute Valuation Errors.

Panel A: Full Sample		
Outcome Variable: *AbsValErr* **Mediating Variable:** *Spread*	Standardized Coefficient	*Z*-statistic
Direct Effects		
AbsUE	0.057**	2.10
Tone	−0.010	−0.53
Spread	0.153***	5.61
Mediating Path		
AbsUE, Spread	0.111***	5.94
Tone, Spread	−0.058***	−3.81
Indirect Effects		
AbsUE	0.017***	3.84
Tone	−0.009***	−3.17
Total Effects (Direct + Indirect)		
AbsUE	0.074***	2.67
Tone	−0.019	−0.98
Spread	0.153***	5.61
% Effect Mediated		
AbsUE, Spread	23.0%	
Tone, Spread	47.4%	
Controls	Yes	
Analyst, Industry, Year-Quarter FE	Yes	
Observations	4,286	
R^2	0.75	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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Table 7: Mapping of Qualitative and Quantitative Information into Spread and Absolute Valuation Errors.

Panel B: Periods of High and Low Macroeconomic Uncertainty.

	High Macro-Uncertainty		**Low Macro-Uncertainty**	
Outcome Variable: *AbsValErr*	Standardized		Standardized	
Mediating Variable: *Spread*	Coefficient	*Z*-statistic	Coefficient	*Z*-statistic
Direct Effects				
AbsUE	0.081**	2.50	0.020	0.51
Tone	−0.074***	−0.51	0.009	0.39
Spread	0.139***	3.79	0.087**	2.04
Mediating Path				
AbsUE, Spread	0.140***	6.30	0.115***	3.19
Tone, Spread	−0.144***	−6.84	−0.050***	−2.68
Indirect Effects				
AbsUE	0.020***	3.02	0.010*	1.67
Tone	−0.020***	−3.34	−0.004*	−1.66
Total Effects (Direct + Indirect)				
AbsUE	0.101***	2.95	0.030	0.79
Tone	−0.094***	−3.57	0.005	0.21
Spread	0.139***	3.79	0.087**	2.04
% Effect Mediated				
AbsUE, Spread	19.4%		33.3%	
Tone, Spread	21.2%		80.0%	
Controls	Yes		Yes	
Analyst, Industry FE	Yes		Yes	
Observations	2,411		1,875	
R^2	0.69		0.75	

Net Tone vs. Pos/Neg Tone

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- Our main variable *Tone* is a 'net' metric

- Survey paper by Loughran & McDonald (2016, section 6.3) highlights potential problems with *positive* tone or *net* tone (p. 1217):

  'positive words […] in addition to their positive usage are just as frequently used to frame a negative statement.'

- We split *Tone* into its positive and negative components ***PosTone*** and ***NegTone*** and re-estimate the main analyses

Net Tone vs. Pos/Neg Tone

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Table 8: Positive and Negative Tone in Earnings Conference Calls.

	Spread		
AbsUE	4.114***	4.070***	4.033***
	(6.18)	(6.10)	(6.02)
PosTone	−0.030***		−0.025**
	(−2.77)		(−2.25)
NegTone		0.043***	0.038***
		(3.02)	(2.62)
GoodNews	−0.013*	−0.012*	−0.011
	(−1.93)	(−1.74)	(−1.51)
BaseReturn	0.185***	0.185***	0.184***
	(8.58)	(8.54)	(8.51)
Tilt	−0.240***	−0.234***	−0.231***
	(−5.24)	(−5.22)	(−5.13)

Mitigates concern that our use of a net measure leads to ambiguous results since positive words can be used in negative statements

Untabulated results: effect of macro-uncertainty

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	High VIX		Crisis	
HighVIX	0.106***	−0.031		
	(4.04)	(−1.27)		
Crisis			0.107***	−0.044*
			(3.19)	(−1.73)
PosTone	−0.026**		−0.029**	
	(−2.23)		(−2.55)	
PosTone × *HighVIX*	−0.038**			
	(−2.44)			
PosTone × *Crisis*			−0.035*	
			(−1.69)	
NegTone		0.043**		0.045***
		(2.42)		(2.73)
NegTone × *HighVIX*		0.074***		
		(2.79)		
NegTone × *Crisis*				0.089***
				(3.94)
AbsUE	4.616***	4.670***	3.946***	3.954***
	(4.03)	(4.03)	(3.53)	(3.50)
AbsUE × *HighVIX*	0.797	0.242		
	(0.68)	(0.19)		
AbsUE × *Crisis*			1.622	0.837
			(1.24)	(0.60)

No Effect

Extreme/Moderate Tone

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- Our main variable *Tone* is a 'binary' metric

- Bochkay et al. (2017) [BCH] expand this definition and develop a dictionary of linguistic *extremity.* Using a similar sample of ECCs they find that market participants respond more strongly to extreme rather than moderate language.
- We use the BCH dictionary and measure the variables ***ExtremeTone*** and ***ModerateTone*** to replace the single *Tone* variable

ExtremeTone

ModerateTone

ExtremeTone

Rating	Words and Phrases	Extracts from Conference Calls
5	excellence, superior, terrific, wonderful, top quality, exceptional, best, incredible, extremely well, amazing	we continued to produce exceptional results; we are able to achieve superior outcomes because of our ability to share best practices; we experienced phenomenal growth rates; we do have some amazing, amazing innovation; this is terrific for us and our shareholders especially because the incremental value starts benefiting us this quarter.
4	strong, success, tremendous, really good, exceed expectations, powerful, leader, very good, great, prosper	our operating cash flow remains strong; we have experienced continuing success; we are both a powerful marketing vehicle as well as a commerce vehicle; we feel very good about the job we are doing; I remain confident in our company's ability to grow and prosper.
3	accomplishment, solid, improvement, work hard, effective, strengthen, optimistic, healthy, proud, high quality	we are proud of this accomplishment; we have had solid business across our businesses; we managed to strengthen our financial structure; we are optimistic about the future; we have a healthy balance sheet.
2	increase, growth, please, be able to, gain, expand, move forward, improve, continue to deliver, advantage	we are pleased with our operating and financial performance; this increase is due to revenue growth; we continue to improve the operating margins; we continue to expand our capacity; we do have an advantage over most other companies.
1	generate, competitive, in line, produce, lower cost, steady, encourage, transparency, sufficient, a bit better	our view would be to generate capital through sales; the performance is in line with our expectation; we have seen steady volume; we have a sufficient cash generation; we are going to be as competitive as we need to be.
-1	issue, force, limitation, expensive, complexity, heavy, step back, undue, unexpected, not on	the issue is the pricing of products; this effort will be expensive; revenues deferred due to project complexity; we experienced unexpected changes in revenues; it as a limitation on what we could do.
-2	weak, slow, slowdown, delay, concern, decrease, uncertain, adversely, work against, go down	we got off to a slow start; we expect a seasonal slowdown in volume; the tone of business has been a particular concern; we remain uncertain about the demand; our operating results were adversely affected by.
-3	loss, difficult, volatile, underperform, diminish, hard, fall short, unfavorable, decline, be behind	our consumer business has just completed a difficult season; the quarter was certainly more volatile than normal; we reported an operating loss of; we expect our volumes to underperform; we are having a hard time catching up.
-4	failing, weakness, negative, suffer, disappoint, deteriorate, disruptive, sharp decline, unsuccessful, get worse	we experienced continued weakness in our business; we still suffer declines in our international business; we have, to date, been unsuccessful; we are going to be disruptive in the market; the negative impact was more than anticipated.
-5	default, terrible, horrible, worst, devastate, bankrupt, very bad, very poor, in serious trouble, out of business	our results this year were the worst; we are close to being bankrupt; this quarter's performance has been horrible; we have had terrible spud to sales; it takes an awful long time to get projects underway.

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Table 9: Extreme Tone in Earnings Conference Calls and Analysts' Assessment of Future Risk and Valuation Uncertainty.

	Spread		
AbsUE	4.160***	4.175***	4.163***
	(6.29)	(6.29)	(6.28)
ExtremeTone	−3.982***		−3.690**
	(−3.49)		(−2.21)
ModerateTone		−0.451	−0.227
		(−1.48)	(−0.71)
GoodNews	−0.012*	−0.015**	−0.012*
	(−1.78)	(−2.18)	(−1.76)
BaseReturn	0.186***	0.186***	0.186***
	(8.61)	(8.61)	(8.59)
Tilt	−0.239***	−0.245***	−0.239***
	(−5.28)	(−5.36)	(−5.28)

Result is different from finding in BCH who show that **both** *ExtremeTone* and *ModerateTone* map into analyst forecast revisions of earnings

~ ***risk*** forecasting *differs* from modeling earnings revisions

~ Linguistic intensity captures ***conviction*** necessary to affect risk forecasts, moderate tone does not

Intro vs. Q&A Tone

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- Our main variable *Tone* measures the tone of the entire ECC
- Previous research draws a distinction between the informativeness of the introductory and *Q&A* part of the ECC. Recent examples:
  - Matsumoto et al. (2011), Lee (2015),…
- Survey evidence in Brown et al. (2015, Table 3) underlines the appreciation by analysts of the two parts:

TABLE 3

Survey Responses to the Question: How Useful Are the Following Types of Direct Contact with Management for the Purpose of Generating Your Earnings Forecasts (Stock Recommendations)?

Panel A: Summary statistics for the EF version

Responses	Average Rating	Significantly Greater Than	% of Respondents Who Answered: Very Useful (5 or 6)	% of Respondents Who Answered: Not Useful (0 or 1)
(1) Private phone calls with management	4.71	3–8	66.48	7.69
(2) The Q&A portion of earnings conference calls	4.60	3–8	58.79	7.69
(3) Company investor day events	4.36	7–8	50.00	5.49
(4) Management's presentation on earnings conference calls	4.34	7–8	46.96	2.76
(5) Company or plant visits	4.19	7–8	46.15	7.14
(6) Road shows	4.13	7–8	48.90	10.44
(7) Industry conferences	3.55	8	26.92	9.34
(8) Conferences sponsored by your employer	3.14	–	21.43	20.33
Total possible $N = 182$				

Column 1 reports the average rating, where higher values correspond to greater likelihood. Column 2 reports the results of *t*-tests of the null hypothesis that the average rating for a given item is not different from the average rating of the other items. We report the rows for which the average rating significantly exceeds the average rating of the corresponding items at the 5% level, and use Bonferroni-Holm–adjusted *p*-values to correct for multiple comparisons. Column 3 (4) presents the percentage of respondents indicating usefulness of 5 or 6 (0 or 1).

Intro vs. Q&A; Mgt vs. Analysts

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- We define two variables ***ToneIntro*** and ***ToneQ&A*** to capture the *Tone* of the different parts of the ECCs
- Remember Table 1:

Table I: Descriptive Statistics

	Mean	Median	STD	Q1	Q3
Tone	0.5061	0.5339	0.6147	0.1431	0.9062
ToneIntro	0.8855	0.9282	0.8969	0.3290	1.5053
ToneQA	0.2330	0.2533	0.5583	−0.1012	0.5906

- Additionally, we can ***tag*** the tone of both management and the analysts during the *Q&A* part of the ECC, allowing us to define ***ExecToneQA*** and ***AnaToneQA***
  - *ExecToneQA*: Mean = 0.50; StDev= 0.63
  - *AnaToneQA*: Mean= -0.38; StDev= 0.63

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Table 10: Introduction and Questions and Answers Sections of Earnings Calls.

AbsUE	4.047***	4.122***	4.038***	3.935***
	(6.07)	(6.18)	(6.03)	(5.79)
ToneIntro	−0.020***		−0.022***	−0.022***
	(−3.63)		(−3.92)	(−3.93)
ToneQA		−0.025***		
		(−3.49)		
$ToneQA^{\perp}$			−0.016**	
			(−2.10)	
$ExecToneQA^{\perp}$				−0.015**
				(−2.10)
$AnaToneQA^{\perp}$				−0.013**
				(−2.15)
GoodNews	−0.011	−0.012*	−0.010	−0.012*
	(−1.64)	(−1.80)	(−1.46)	(−1.73)
BaseReturn	0.184***	0.185***	0.183***	0.184***
	(8.49)	(8.59)	(8.48)	(8.30)
Tilt	−0.234***	−0.237***	−0.231***	−0.235***
	(−5.12)	(−5.21)	(−5.07)	(−5.04)

Bottomline

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- Analysts incorporate both **quantitative and qualitative** information in their estimates of fundamental risk
  - First to show *directional impact* of *Tone* on risk **forecasts**
- The relative role of both types of information is affected by the degree of **macro-uncertainty** at the time of the forecasts
- Further analyses draw attention to the separate roles of positive and negative tone, extreme vs. moderate tone, the tone of the different parts of the ECC and the tone of the participants of the ECC.
- We believe that our findings help to understand (a bit) better what is inside the **black box** of analyst forecasting activities
- We highlight the relevance of the forecast context:
  - …what makes a forecast setting '**difficult**' and
  - …what actions do analysts take to deal with this difficulty.

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Extra

Table A1: Variable Definitions and Data Sources.

Variable	Definition	Source
Spread	Analyst's *Bull* forecast minus *Bear* forecast scaled by the average of *Bull* and *Bear*.	Analyst reports are from: Morgan Stanley
BaseReturn	The expected return (excluding dividends) to investing in the firm at the time of the analyst report, measured as *Base* minus *Price* scaled by *Price*, where *Price* is the closing stock price on the day before the release of the analyst report.	Morgan Stanley, FactSet
Tilt	Analyst's *Base* forecast minus *Bear* forecast, divided by *Bull* minus *Bear*.	Morgan Stanley
AbsValErr	Absolute value of the firm's realized raw return one year after the analyst report minus the predicted return under the analyst's base-case scenario (i.e., *BaseReturn*).	Morgan Stanley, FactSet
UE	Actual earnings per share (EPS) minus analyst consensus forecast of one- or two-quarters-ahead earnings issued or reviewed in the last 60 days before earnings announcement divided by stock price at the end of quarter, winsorized at 1% and 99%.	IBES
AbsUE	Absolute value of *UE*.	IBES
GoodNews	Indicator variable that equals to 1 if *UE* is greater than 0.	IBES
Tone	Difference between positive and negative word counts scaled by total words in the earnings conference call (×100).	Earnings calls are from: www.seekingalpha.com
ToneIntro	Difference between positive and negative word counts scaled by total words in the introductory section of the earnings conference call (×100).	Earnings calls are from: www.seekingalpha.com
ToneQA	Difference between positive and negative word counts scaled by total words in the Q&A section of the earnings conference call (×100).	Earnings calls are from: www.seekingalpha.com
PosTone	Number of positive words scaled by total words in the earnings conference call (×100).	Earnings calls are from: www.seekingalpha.com
NegTone	Number of negative words scaled by total words in the earnings conference call (×100).	Earnings calls are from: www.seekingalpha.com
ExtremeTone	Difference between extreme positive and extreme negative word counts scaled by total words in the conference call (×100).	Earnings calls are from: www.seekingalpha.com

Variable Definitions and Data Sources, continued

Variable	Definition	Source
ModerateTone	Difference between moderate positive and moderate negative word counts scaled by total words in the conference call (×100).	Earnings calls are from: www.seekingalpha.com
Beta	Beta of the firm relative to the S&P500 (measured as the slope in a weekly return regression over the 60 weeks before the release of the report).	FactSet
IdioRisk	Natural log of the ratio $(1 - R^2)/R^2$ where R^2 is the R^2 from a regression of weekly firm-returns on the weekly S&P500 returns, measured over the 52-week interval before release of the report.	FactSet
Loss	Indicator variable equal to one if the sum of the past four quarterly earnings is negative, and zero otherwise.	COMPUSTAT
EarnVol	Standard deviation of firm earnings, calculated using earnings scaled by total assets in the last twenty quarters, with a minimum of eight quarters required.	COMPUSTAT
FirmSize	Natural logarithm of the market value of equity at the end of the previous quarter.	COMPUSTAT
BTM	Ratio of common equity to market value of the firm.	COMPUSTAT
Leverage	Long-term debt to total assets ratio.	COMPUSTAT
NegBV	Indicator variable equal to one if common equity is negative, and zero otherwise.	COMPUSTAT
VIX	Market volatility index around the time of analyst report.	CBOE
Crisis	Indicator variable equal to one if earnings conference call and analyst report are at the time of 2007-2009 financial crisis.	NBER


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