Emotion in Euro Area Monetary Policy Communication and Bond Yields: The Draghi Era

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Communication via Press Conferences

"[The Press Conference] was originally an obligation, then it became a welcome obligation, and then even a pleasure. [...] Communication has become a tool of monetary policy, so your interaction has been essential in our monetary policy decisions all throughout these eight years."
Mario Draghi to Journalists, 24 October 2019

Emotions and Asset Prices

- *"Go back and ask yourself, where were you two years ago?' Mr. Draghi said, with a hint of annoyance in his voice."*
  - *Source: NYT https://www.nytimes.com/2014/10/03/business/international/ecb-leaves-key-interest-rate-unchanged.html*
- Even in economics (finance), there exists a well-known link between emotions (i.e., non-verbal communication) and investor and manager behaviour (Mayew & Venkatachalam '12 JF; Hu & Ma '20 NBER wp 29048)

What We Do?

- Use most up to date methodology (see below) to capture vocal emotions and its interaction with the language of CB communication
- Create a novel data arising stemming from challenges of decoding voice from press conferences
  - Answering several questions at once;
  - Matching audio with written transcripts;
  - Dealing with audio of unequal length;
- We employ an event study to estimate the (joint) impact of emotions transmitted via audio and language on GERMAN YIELDS and YIELD SPREADS for selected euro area countries
  - FRANCE, GERMANY, ITALY & SPAIN

Contributions and Motivations

What's New?

- Data set is novel: <u>synchronize</u> voice & language data

- A technique not yet applied to this kind of data set: *Fully Convolutional Neural Networks* (FCN) – García-Ordás (2021)

- 1st to evaluate how an ECB President (Draghi's) emotions impact a segment of the financial market

- We don't ignore text. Actually, turns out to be very important!

Why Draghi?

- The challenges of communicating consensus of the GC (and divisions inside ECB more generally)
  - Lack of transparency/information about dissent (Tillmann, 2021)

- His presidency was very eventful (GFC, ESDC, introduction of audio, **FG**)

- His presidency saw wide variations in inflation, including deflation

Methodology: I
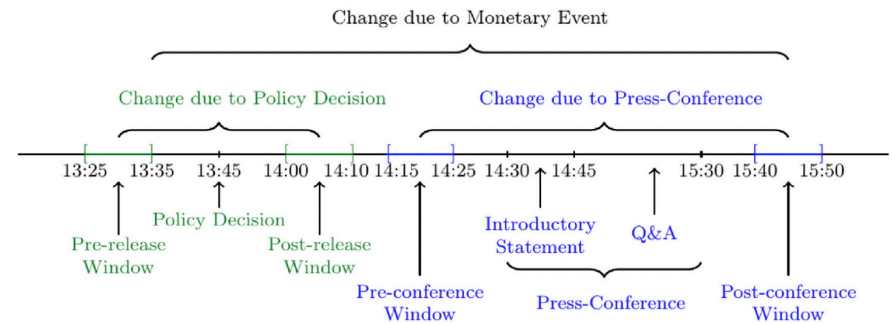
- Raw material is ECB Press Conferences (PCs; start time 14:30 CET) following ECB Press Releases (13:45 CET)
  - Written version of Introductory Statement (IS) also plays a role BUT this is <u>SCRIPTED</u> material while PCs are <u>UNSCRIPTED</u>
- An EVENT study approach is used – @ minute frequency
- Sample is July 2013 – OCTOBER 2019, that is, <u>a portion of DRAGHI</u>'s Presidency (more precisely his Presidency is 1 Nov. '11 – 31 Oct. '19)
  - Data set consists of 2336 answers and 71 PCs (10 removed due to bad audio quality)

Methodology: II

- "Emotions" are, broadly speaking, evaluated in 2 parts
  - Assessment of VOCAL emotions
  - Assessment of tone/<u>sentiment</u> of content of PCs
- VOCAL element: **S**peech **E**motion **R**ecognition (SER)
  - A ML technique due to Perez-Espinoza et. al. (2022)
  - BUT, unlike Gorodnichenko et. al. (2023) or Alexopoulos et. al. (2022), we use FCN which has not only better OOS properties but is also suitable **for non-fixed length audio** (Garcia-Ordas, et. al., 2021)
    - Audio files are not cut & a package (Librosa) translates emotions
    - Training (contains 80% of emotions) and validation (20% of emotions) are also required ("neutral North American English")
    - Multiple sets are examined to ensure robustness
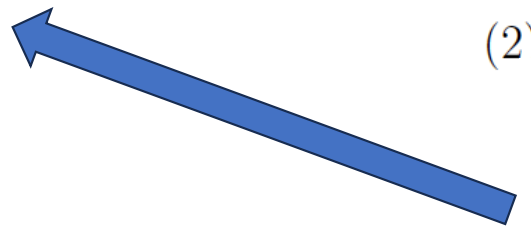
This is important!
>90%

Kanelis, D. and Siklos, P., 2024: *The ECB Press Conference Statement: Deriving a New Sentiment Indicator for the Euro Area*, International Journal of Finance and Economics

Methodology: III

- "Emotions" are classified into several dimensions
  - Neutral, Calm, Happy, Sad, Angry, Surprised (fearful, disgust, crying removed)
- The range of emotions are then aggregated in 2 steps as follows:
  - 1. Happy, (pleasantly surprised) become POSITIVE emotions
  - 2. Angry, Sad become NEGATIVE emotions
  - 3. Neutral, Calm become NEUTRAL

May be Limiting: We also tried

$$Voice_t = \frac{Positive_t - Negative_t}{Positive_t + Negative_t} \qquad (2)$$

$$Voice_t^{Likert} = \begin{cases} -2 \ if -1 \leq Voice_t < -0.6 \\ -1 \ if -0.6 \leq Voice_t < -0.2 \\ 0 \ if -0.2 \leq Voice_t \leq 0.2 \\ 1 \ if \ 0.2 < Voice_t \leq 0.6 \\ 2 \ if \ 0.6 < Voice_t \leq 1 \end{cases}$$

Interesting examples from Press Conference on 27th April 2017 (No Specific reason; good vocal emotional variation)

"Negative" Vocal Emotion:

"Neutral" Vocal Emotion:

"Positive" Vocal Emotion:

Methodology IV

- Thanks to the ECB Staff individual answers and focal points are identified
- Combined with **Fin**-**B**idirectional **E**ncoder **R**epresentation for **T**ransformers or **Fin-BERT** (large neural network model)
  - Goes beyond word-count & classifies sentiment of economics & financial texts in context

$$PositivityAN_t = \frac{Positive_t - Negative_t}{Positive_t + Negative_t} \qquad (3)$$

MONETARY POLICY STATEMENT
PRESS CONFERENCE

Christine Lagarde, President of the ECB,
Luis de Guindos, Vice-President of the ECB

Frankfurt am Main, 2 February 2023

☑ Jump to the transcript of the questions and answers

Good afternoon, the Vice-President and I welcome you to our press conference.

We would like to begin by congratulating Croatia on joining the euro area on 1 January 2023. We also warmly welcome Boris Vujčić, the Governor of Hrvatska narodna banka, to the Governing Council. We will now report on the outcome of today's meeting.

You may also be interested in:

Combined monetary policy decisions and statement
> Download PDF

Christine Lagarde
The President of the European Central Bank

Luis de Guindos
Vice-President of the European Central Bank

Methodology V

- Basic Regression Specification

$$\Delta p_t = \beta_0 + \beta_1 * Voice_t \times Positivity_t^{AN} + \beta_2 * Voice_t +$$

$$\beta_3 * Positivity_t^{AN} + \beta_4 * Positivity_t^{IS} + \sum_{i, 5} \beta_i X_{ti} + \epsilon_t \qquad (1)$$

- Δp_t: Change in yield for German public bonds with 1Y, 2Y, 5Y, and 10Y durations and change in yields for French, Italian, and Spanish public bonds with 2Y, 5Y, and 10Y durations.

- $Voice_t$: Sentiment of the vocal cues during Q&A.

- $Positivity_t^{AN}$: Sentiment of the verbal cues during Q&A.

- $Positivity_t^{IS}$: Sentiment indicator of the monetary policy statement.
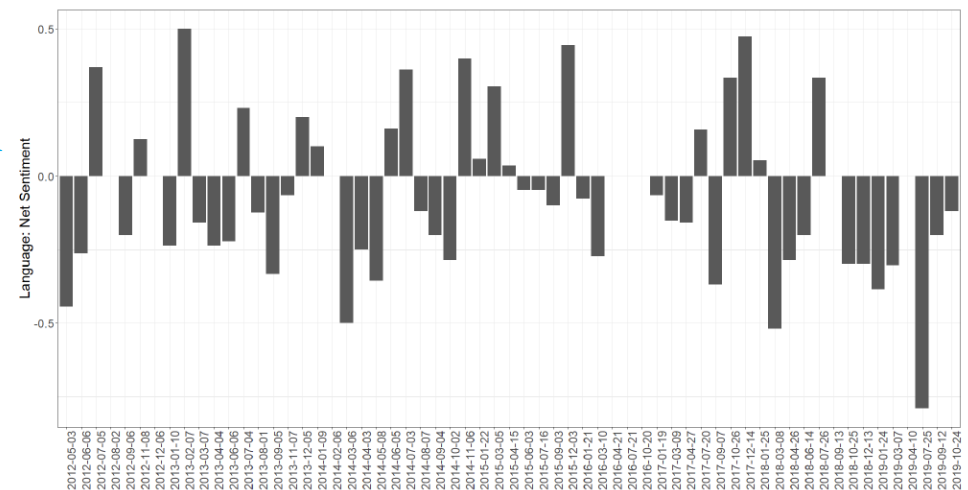
Methodologies VI

- Controls
  - Text complexity: Flesch-Kincaid (# years education required to understand content; Gunning FOG index (complexity of words in content)
  - $PositivityIS$= tone of **I**ntroductory **S**tatement
  - **X**= vector that includes monetary policy shocks, and expectational variables
    - **MPS from Altavilla et. al. (2019): Timing, FG, QE**
    - **Change in ECB Staff forecasts of inflation and real GDP growth**

Empirical Results I

(b) Sentiment: Verbal Cues
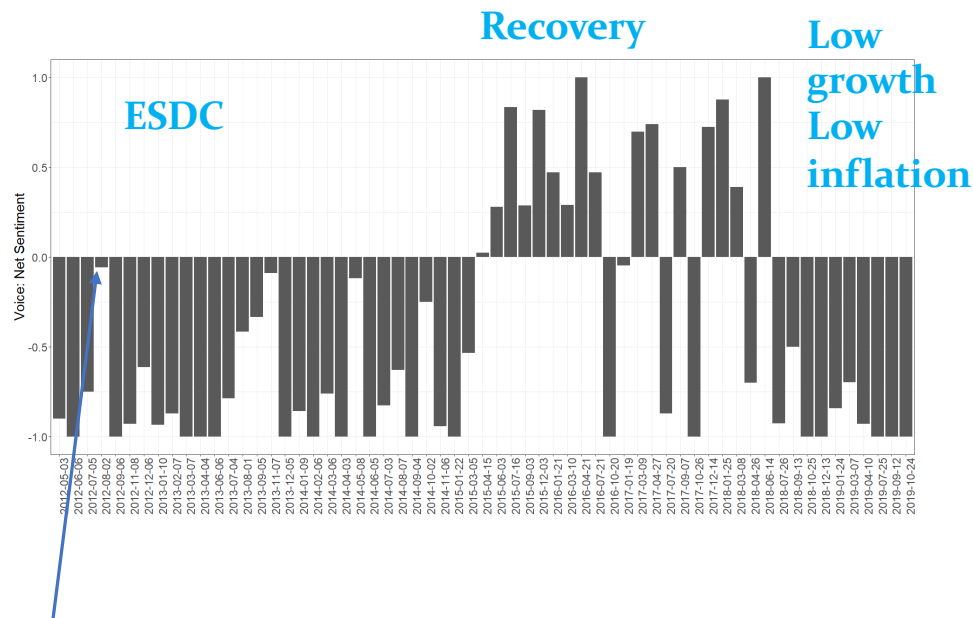
2ⁿᵈ August 2012:
First Press Conference after
"Whatever it takes" Speech.

1. Vocal and Verbal cues are NOT the same;
2. Vocal cues are more persistent than verbal cues;
3. BOTH are essential for explaining yield changes.

As Alexopoulos et. al., 2023 Also found, CORR between the two data sources is LOW.

Results for German Yields

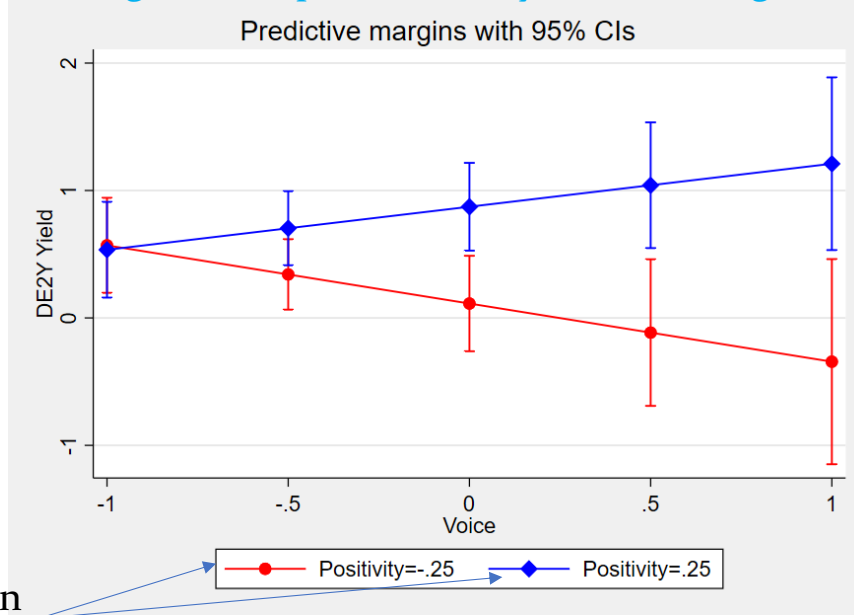|	(1) DE1Y	(2) DE2Y	(3) DE5Y	(4) DE10Y
$Voice_t \times Positivity_t^{AN}$	2.18***	1.59***	1.22	1.36
	(0.50)	(0.53)	(0.99)	(1.22)
$Voice_t$	-0.14	-0.06	0.20	0.21
	(0.20)	(0.19)	(0.24)	(0.21)
$Positivity_t^{AN}$	2.00***	1.52***	0.91	0.83
	(0.49)	(0.42)	(0.74)	(1.09)
$Positivity_t^{IS}$	0.15	0.02	-0.20	-1.04**
	(0.37)	(0.37)	(0.48)	(0.45)
$Constant$	-0.37	-0.17	0.29	0.43
	(0.24)	(0.22)	(0.30)	(0.30)
R^2	0.868	0.914	0.929	0.949
$Controls$	YES	YES	YES	YES
Obs	48	48	48	48

Verbal & Vocal cues COMBINE to influence ST yields

NOTE:
Similar impact on FRENCH BUT
No effect on Spanish yields
Negative impact on Italian yields where negative comm. Is found to matter.

Empirical Results II

Notice the ASYMMETRY: Positive vocal cues
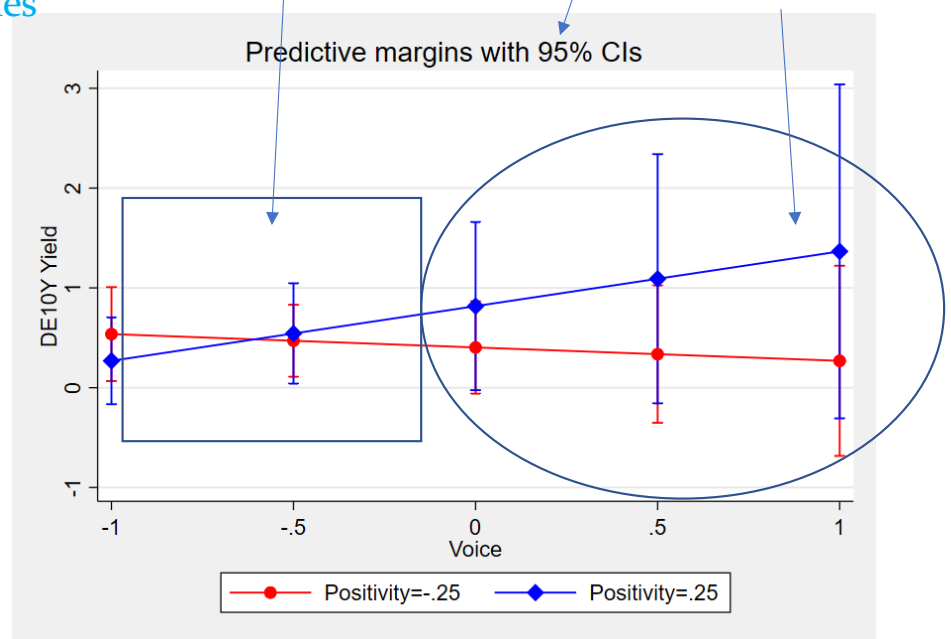Have a greater impact on DEU yields than negative ones

On balance negative and
positive 'emotions' offset
each other

ASYMMETRY STRONGER
WHEN 90% CI USED

Insignificant
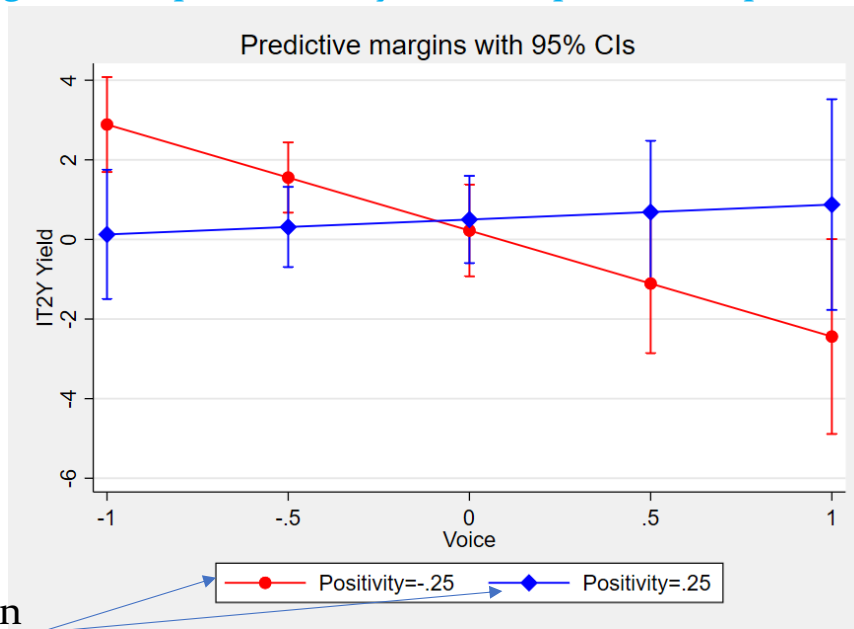

Chosen
levels

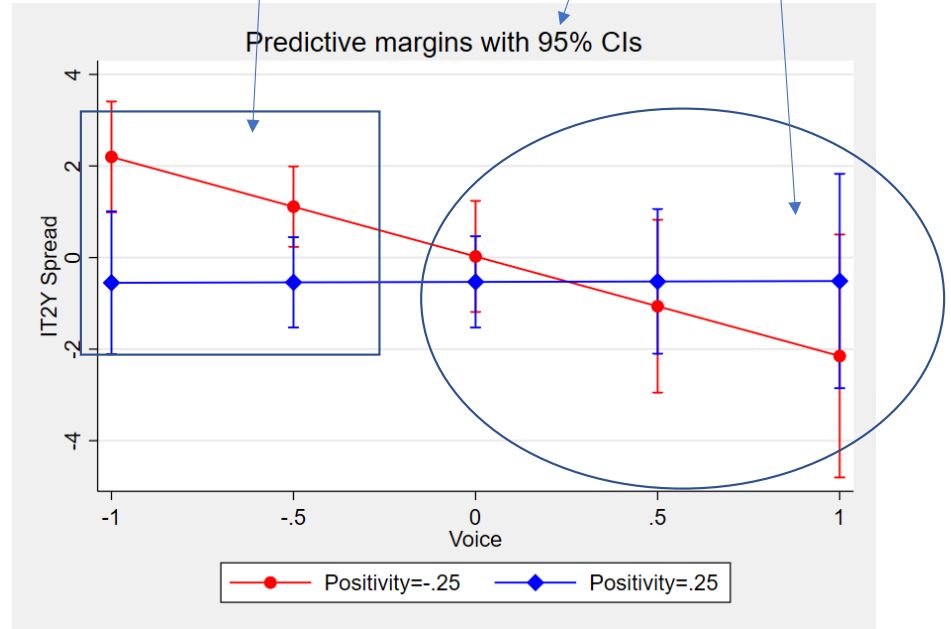Marginal Plots: SHOWS THE IMPACT ON VERTICAL AXIS FOR A GIVEN LEVEL OF **POSITIVITY (Verbal Cues)**

Empirical Results III

Notice the ASYMMETRY: Negative vocal cues have a greater impact on ITA yield and spread than positive ones

Only negative cues matter, similar to stocks (Mayew & Vekatachalam, 2012 JF)

ASYMMETRY STRONGER WHEN 90% CI USED

Insignificant

Chosen levels

Marginal Plots: SHOWS THE IMPACT ON VERTICAL AXIS FOR A GIVEN LEVEL OF **POSITIVITY (Verbal Cues)**

Is There More to do?

- Are there alternatives to FinBERT? Yes, e.g., RoBERTa
- Is the event study the only way? No, but a TS approach greatly complicates controls needed to identify vocal effects
- Are there news effects ignored? Yes, could add ECONDAY controls
- Why not vocal emotions during IS? Reporter's vocal cues? Good ideas
- Why not other variables? Exchange rates (only 1); Stock prices (not all equally deep or traded)
- Could Altavilla et. al. controls be 'contaminated' by vocal cues? Yes, BUT this would imply another interaction between TOPICS & verbal cues