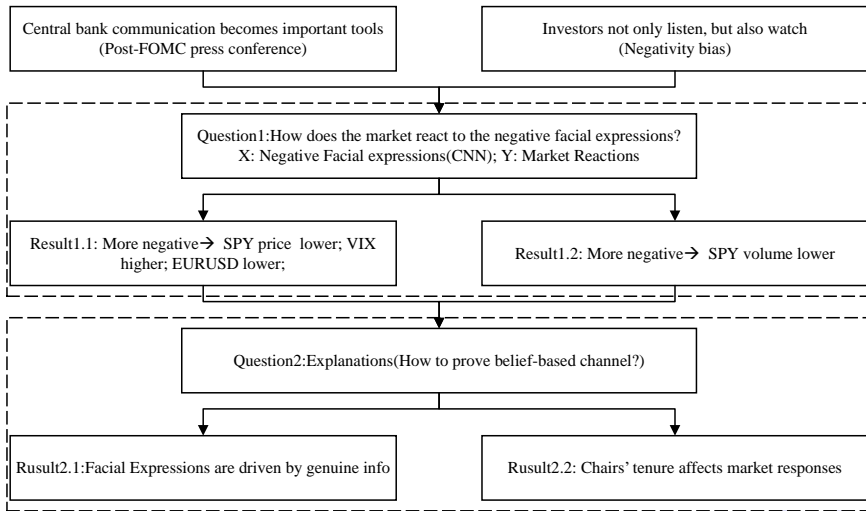# Let's face it: Quantifying the impact of nonverbal communication in FOMC press conferences

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解读：王梦涵

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Framework

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│ Central bank communication becomes   │    │ Investors not only listen, but also  │
│ important tools                      │    │ watch                                │
│ (Post-FOMC press conference)         │    │ (Negativity bias)                    │
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Question1:How does the market react to the negative facial expressions?
X: Negative Facial expressions(CNN); Y: Market Reactions

Result1.1: More negative→ SPY price lower; VIX higher; EURUSD lower;

Result1.2: More negative→ SPY volume lower

Question2:Explanations(How to prove belief-based channel?)

Rusult2.1:Facial Expressions are driven by genuine info

Rusult2.2: Chairs' tenure affects market responses

Motivation

- Communication becomes one of the most important tools for policymakers

- The key component of Fed communication is FOMC meeting deliberations

  - Post-FOMC press conferences from 2011

    Lucca and Moench (2015);Boguth et al. (2019); Gomez Cram and Grotteria (2022);

- Investors not only listen, but also watch

  - Facial expressions are a key part in communication(7-55-38 rule)

  - Negativity bias:Adults tend to take disproportionate note of negative information

 **X: Negative Facial expressions; Y: Market Reactions**

Question

- How does the market react to the negative facial expressions?

    - More negative $\rightarrow$ SPY price/volume lower; VIX higher; EURUSD lower;

    - Such impact is heightened

        - when there is increased media attention prior to the FOMC meeting

        - when forward guidance is discussed

        - when the text tone of the discussion is more negative

- Possible explanations?(How to prove belief-based channel?)

    - Facial Expressions during press conferences are driven by genuine information

    - Chairs' tenure significantly affects market responses to facial expressions

Contribution

- Literature on nonverbal communication in finance

  - Prior:Akansu et al. (2017);Hu and Ma (2021);

  - Ext: **First** to study the impact of facial expressions in central bank
    communication

- Literature on the signaling channel of monetary policy

  - Prior:Boguth et al. (2019);Gomez Cram and Grotteria (2022);Gorodnichenko et
    al. (2023)

  - Ext: Explore how market react to **nonverbal** communication signals in **real time**

- Help policymakers improve the effectiveness of communication-based tools

Data:nonverbal communication

- Microsoft Azure Cognitive Services Emotion API
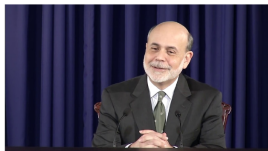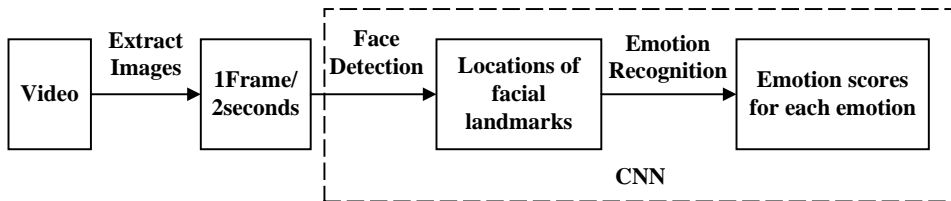
Panel A: Ben Bernanke, March 20th 2013	
Emotion	Intensity Score
Anger	0.00
Contempt	0.00
Disgust	0.00
Fear	0.00
Happiness	1.00
Neutral	0.00
Sadness	0.00
Surprise	0.00

Panel C: Jerome Powell, January 30th 2019	
Emotion	Intensity Score
Anger	0.00
Contempt	0.05
Disgust	0.00
Fear	0.00
Happiness	0.00
Neutral	0.04
Sadness	0.91
Surprise	0.00

Data:nonverbal communication

- 2518 observations at the minute level from 46 FOMC meetings
  - Ben Bernake (12), Janet Yellen (16), and Jerome Powell (18)

- Negative Emotions

$$NegativeEmotions_{i,k} = \frac{(Anger_{i,k} + Disgust_{i,k} + Fear_{i,k})}{(Anger_k + Disgust_k + Fear_k)}$$

  - $Anger/Digust/Fear_{i,k}$ represents the **average** intensity of anger/digust/fear expressed during a given 3 min interval i for Chair k

Data:Market responses & Controls

- Market responses(2011.1-2020.9):
    - Equity：SPY prices and trading volume at one-minute frequency
    - VIX: option-implied volatility of the S&P 500
    - EURUSD:Euro-to-USD exchange rates and trading volume at one-minute frequency
- Controls
    - Negative Tone;Hawkishnes;Status of Economy;Forward Guidance;Chair Tenure...

Q1:Market reactions to negative facial expressions

- How does the market react to the Fed chairman's negative facial expressions?

$$MarketReactions_{t,me} = \alpha_{fe} + \beta_1 NegativeEmotions_{t-1} + \beta_k Ctrls_{t-1} + \epsilon_{t,me,fe}$$

- *MarketReactions*
  - Price: the percent change in price for SPY/VIX/EURUSD in 3 minutes
  - Volume: average SPY/EURUSD trading volumes evaluated in 3 minutes
- α_{fe}: Chair or FOMC meeting fixed effects
- *NegativeEmotions*: Fed chairman's negative facial expressions in 3 minutes

Q1:Market reactions to negative facial expressions–Price

	(1) %Δ SPY	(2) %Δ SPY	(3) %Δ SPY	(4) %Δ VIX	(5) %Δ VIX	(6) %Δ VIX	(7) %Δ EURUSD	(8) %Δ EURUSD	(9) %Δ EURUSD
Negative Emotions	−0.463**	−0.497**	−0.500**	3.180	3.313	3.557	−0.255**	−0.247**	−0.174*
	(0.200)	(0.198)	(0.225)	(2.041)	(2.041)	(2.208)	(0.112)	(0.113)	(0.094)
Negative Tone	−0.391	−0.349	0.300	21.699	22.271	21.695	−2.796**	−2.784**	−3.125
	(1.845)	(1.855)	(1.851)	(19.059)	(19.066)	(19.419)	(1.311)	(1.313)	(2.009)
Hawkishness	−0.331	−0.296	0.095	12.600	12.650	11.762	−1.105**	−1.106**	−1.263
	(0.769)	(0.771)	(0.770)	(7.800)	(7.799)	(7.929)	(0.525)	(0.525)	(0.787)
Δ FFR	−0.033**	−0.039***		0.221*	0.269**		0.009	0.010*	
	(0.014)	(0.014)		(0.115)	(0.117)		(0.006)	(0.006)	
SPY Pre Drift	0.023***	0.022***							
	(0.007)	(0.007)							
VIX Pre Drift				0.006	0.005				
				(0.006)	(0.006)				
EURUSD Pre Drift							0.010**	0.010**	
							(0.004)	(0.004)	
MPU	−0.503	0.090		1.415	0.059		0.305*	0.215	
	(0.337)	(0.433)		(2.842)	(3.595)		(0.157)	(0.213)	
Market Conditions	−0.500	0.271		5.060	2.373		0.242	0.101	
	(0.846)	(0.916)		(5.950)	(6.320)		(0.399)	(0.406)	
Chair FE	No	Yes	No	No	Yes	No	No	Yes	No
Meeting FE	No	No	Yes	No	No	Yes	No	No	Yes
N	2518	2518	2518	2518	2518	2518	2518	2518	2518
Adj R²	0.012	0.017	0.051	0.001	0.002	0.022	0.007	0.007	0.040

- Negative facial expressions **adversely** impact the financial markets.

Q1:Market reactions to negative facial expressions–Volume

	(1)SPY Volume	(2)EURUSD Volume
Negative Emotions	−0.012**	−0.006
	(0.005)	(0.007)
Negative Tone	−0.035	0.172***
	(0.044)	(0.058)
Hawkishness	−0.002	0.124***
	(0.018)	(0.024)
Meeting FE	Yes	Yes
N	2518	2518
Adj R^2	0.566	0.621

- Negative Emotions reduces trading volume for SPY $\rightarrow$ convergence in agents' belief

- Hawkishness and Negative Tone may introduce new info $\rightarrow$ disagreement

Q1:Market reactions to negative facial expressions–Heterogeneous

	(1) %Δ SPY	(2) %Δ VIX	(3) %Δ EURUSD
Negative Emotions	−0.080 (0.244)	0.703 (2.755)	−0.012 (0.127)
Negative Tone	0.183 (1.851)	21.551 (22.667)	−3.306** (1.308)
Hawkishness	0.130 (0.769)	10.826 (9.345)	−1.315** (0.525)
Status of Economy	1.396** (0.687)	−7.998 (6.814)	−0.267 (0.512)
Status of Economy * Negative Emotions	−0.525 (0.700)	2.771 (6.311)	−0.394 (0.452)
Forward Guidance	0.915 (0.781)	−2.539 (7.612)	0.509 (0.492)
Forward Guidance * Negative Emotions	−1.897*** (0.524)	13.633*** (4.597)	−0.756*** (0.282)
Meeting FE	Yes	Yes	Yes
N	2518	2518	2518
Adj R^2	0.056	0.025	0.042

- Adverse effect is amplified when forward guidance is discussed

- There is no amplification effect when status of the economy is discussed

Q2:Potential explanations–FOMC minutes

- Whether facial expressions reflect genuine info conveyed by the Fed?

	Negative Emotions*avg*	
	(1)	(2)
FOMC Minutes Negative Tone	91.895**	94.052**
	(37.158)	(42.816)
FOMC Minutes Hawkishness	2.451	2.237
	(1.834)	(1.755)
Negative Tone*avg*	6.551**	6.352*
	(3.312)	(3.258)
Hawkishness*avg*	2.299*	2.263*
	(1.276)	(1.283)
Chair FE	No	Yes
N	46	46
Adj R^2	0.145	0.108

- The FOMC minutes tone significantly affects the average level of negative emotions

Q2:Potential explanations–Chair tenure

- Whether market response to Chairs'facial expressions changes over time?

	(1)%Δ SPY	(2)%Δ VIX	(3)%Δ EURUSD
Negative Emotions	0.188	1.675	0.061
	(0.444)	(4.030)	(0.226)
Chair Tenure * Negative Emotions	−0.092*	0.251	−0.031
	(0.050)	(0.412)	(0.024)
Negative Tone	0.291	21.721	−3.128**
	(1.854)	(22.341)	(1.322)
Hawkishness	0.045	11.898	−1.280**
	(0.770)	(9.131)	(0.532)
Meeting FE	Yes	Yes	Yes
N	2518	2518	2518
Adj R^2	0.051	0.022	0.040

- Market participants learn to better decipher Chair's facial expressions with time

New ideas

- Controls: Voice Tone

- Explanations: Fed funds futures;Eurodollar futures

- Central bank communication & High-dimensional analysis

  - Text;Voice;Facial;**Gesture**

  - Interactions: voice tone & text tone;voice/text tone& facial...

  - Different setting: discussed themes...