The Messenger Matters

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Alena Wabitsch
University of Oxford

Motivation

- Central banks use communication to influence financial volatility, institutional trust and inflation expectations (e.g., Blinder et al. (2008), Schnabel (2020), Ehrmann et al. (2013), Christelis et al. (2020), Coibion et al. (2020)) → **Monetary policy tool**

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- Does the messenger matter for reaching EA citizens?

- Gender and ethnicity seem to play a role (D'Acunto et al. (2021), Bodea et al. (2021), Bodea and Kerner (2022))

This Paper

This Paper: How is central bank communication affected by multinational messengers (policymakers) and receivers (citizens)? Do ingroup effects exist?

Ingroup: Messenger and receiver match nationalities

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1. Information supply through media (signal availability)
2. Information Processing (signal uptake)

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2 Dimensions impacting effectiveness of communication (=the signal):

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Main Findings:

- Information availability increases for the ingroup (supply- not demand-driven)
- Ingroup updates beliefs more strongly
  → Causal positive nationality-based ingroup effects exist

This Paper

Motivational Evidence: 3 Stylised Facts

- Focus on policymakers, information supply and belief updating varies across nationalities (Twitter)
- Real-world evidence, high-frequency, information supply

Experimental Evidence:

- Inflation Forecasting Experiment[1]
- Causal effect, inflation expectations, mechanism, information demand
- Treatment: Messengers
- Participant nationality (+ residence): DE, ES, FR, IT
- 400 participants via Prolific, collected in fall of 2023

[1] Ethics approval reference: ECONCIA21-22-24. AEA RCT Registry ID: AEARCTR-0010727. Funded by: The Austrian Economic Association (NOeG) 2022 Dissertation Fellowship, St Catherine's College (Oxford), the Department of Economics (Oxford).

Motivation: 3 Stylised Facts

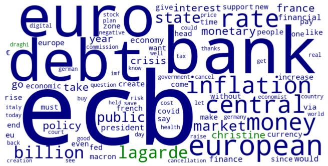
Motivation

1. Focus on policymaker varies across nationalities:

English

Italian

French

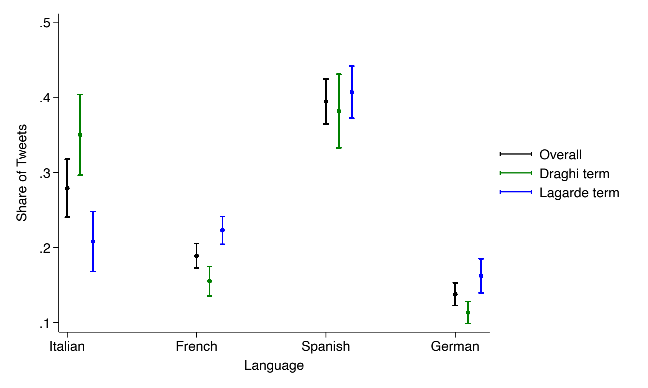


Data:

- >4M tweets in 4 languages (DE, ES, FR, IT) & $\sim$ 4M in EN
- Contain "ECB", "European Central Bank" or translated equivalents
- 2016-2022: 3Y per president (Draghi and Lagarde)

Motivation

2. Information supply increases for the ingroup

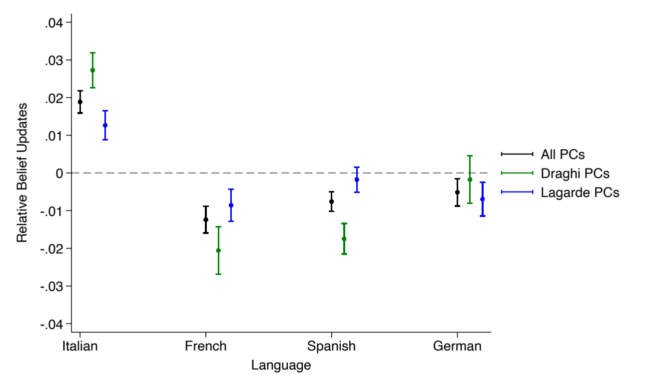


Information supply: Share of tweets by language per 6-week PC cycle (with 95%-CI)

▸ Print media ▸ Survey

Motivation

3. Belief updates increase in size for the ingroup



- **Beliefs:** Measured as tweet sentiment $\in (-1, 1)$
- **Prior:** last tweet of quiet period before a press conference
- **Posterior:** first tweet after press conference (within 24 hours)

Experiment

Experimental Design

- **Inflation forecasting experiment**

Experimental Design

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- Standard Bayesian belief updating:
  - Posterior: $E_i[x|B] = \frac{\alpha_i A_i + \beta B}{\alpha_i + \beta}$
  - where Prior about $x \sim \mathcal{N}(A_i, \alpha_i^{-1})$
  - and Signal $B = x + e$, where $e \sim \mathcal{N}(0, \beta^{-1}) \to B \mid x \sim \mathcal{N}(x, \beta^{-1})$

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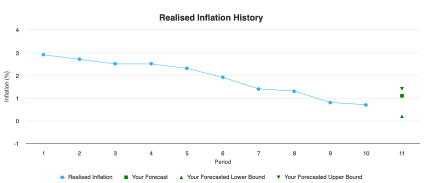
- Key decisions:
  1. Prior and Posterior (with precision)



Incentivised to minimise forecast error ▸ More

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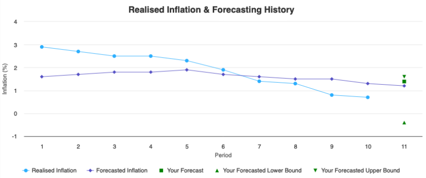

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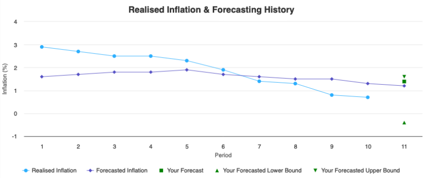

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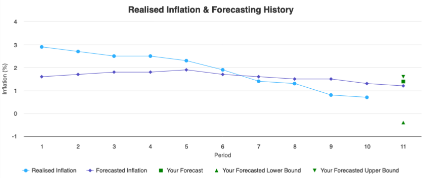

Incentivised to minimise forecast error ▸ More

2. Information demand

- **6** inflation forecasting tasks ▸ Data
- Treatments: **messenger** of signal (*within-subject* randomisation)

1. **Experts of in- and outgroup nationality**
2. ECB Experts of in- and outgroup nationality
3. ECB and NCB experts

> *'Now imagine* **an expert from France who represents the European Central Bank (ECB)** *provides a forecast of* **1.2%** *for inflation in period 11.*
> *You find this forecast, as well as the expert's corresponding forecast history, displayed in the graph.'*

Information Demand

Experimental Evidence: Information Demand

Information demand: Average number of additional information pieces requested (with 95%-CI)

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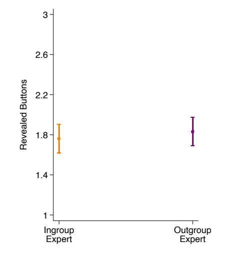

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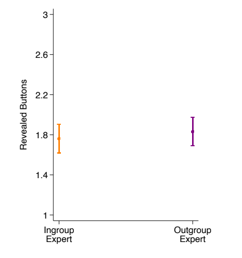

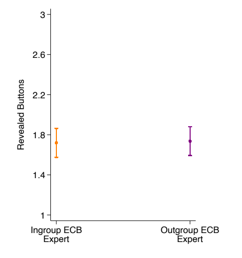

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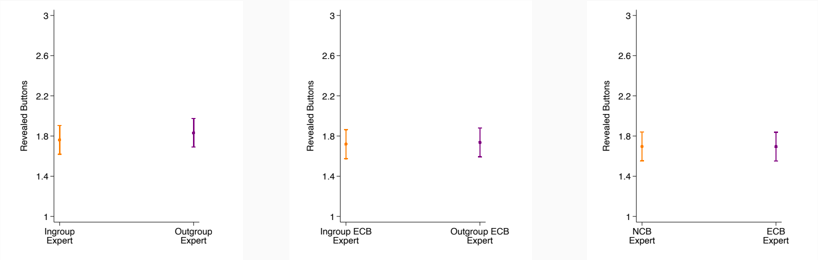

→ Information demand unaffected by the messenger

Information Processing

Experimental Evidence: Information Processing

Is there a causal effect of being in the ingroup on updating inflation expectations?

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Hypothesis 1: *The causal ingroup effect*

Treatment	Hypotheses	Messenger
1	H1	Expert from France
2	H1	Expert from Italy
3	H1	Expert from Germany
4	H1	Expert from Spain

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$$Posterior_{ij} = \gamma \underbrace{\left(\frac{\alpha_i}{\alpha_i + \beta_j} A_i\right)}_{\text{weighted Prior}} + \sum_{j=1}^{J} \delta_j T_j \underbrace{\left(\frac{\beta_j}{\alpha_i + \beta_j} B_j\right)}_{\text{weighted Signal}} + \epsilon_{ij}$$

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- Being in the **ingroup causes higher signal uptake** (0.052***)

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- Being in the **ingroup causes higher signal uptake** (0.052***)
- Additional controls:
  - Individual-FE
  - Inflation scenario
  - Treatment order

Regression Table

Taking Stock

There exist **positive ingroup effects** to matching nationality with the messenger.

1. Increased likelihood of receiving a signal
    - Raising information supply
    - Not causally raising demand
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What does this mean for policymaking?

Comments/Questions?

alena.wabitsch@economics.ox.ac.uk

Thank you!

Experimental Evidence: Information Processing

Are there benefits to communication through other ECB board members?

Hypothesis 2: *The ingroup effect in institutional context (ECB)*

Treatment	Hypotheses	Messenger
5	H2, H3	Expert from France representing **ECB**
6	H2, H3	Expert from Italy representing **ECB**
7	H2, H3	Expert from Germany representing **ECB**
8	H2, H3	Expert from Spain representing **ECB**

- Institutional context dampens the ingroup effect (0.028*)
- Effects are driven by homophily, not heterophobia

▸ Homophily
▸ Regression Table

Experimental Evidence: Findings

Hypothesis 3: Homophily vs. Heterophobia

Treatment	Hypotheses	Messenger
5	H2, H3	Expert from France representing **ECB**
6	H2, H3	Expert from Italy representing **ECB**
7	H2, H3	Expert from Germany representing **ECB**
8	H2, H3	Expert from Spain representing **ECB**
9	H3, H4	Expert representing **ECB**

Comparing signal use between:

- Ingroup and neutral ECB expert (0.035*) → Homophily
- Outgroup and neutral ECB expert (0.013) → Not Heterophobia

Back Regression Table

Experimental Evidence: Information Processing

Are there benefits to communication through Eurosystem's NCBs?

Hypothesis 4: *The ingroup effect of the Eurosystem's national central banks (NCBs) compared to the ECB*

Treatment	Hypotheses	Messenger
9	H3, H4	Expert representing **ECB**
10	H4	Expert representing **NCB**

- Slight preference for national institutions (0.034**)
- But: potential heterogeneity across all EA NCBs & risks (e.g., cacophony of voices)

▸ Regression Table

Model

Theoretical Framework with Strategic Complementarity

Stylised coordination game as in Morris and Shin (2002)

- **Information Structure:**
  - Nature draws exogenous fundamental $x \sim \mathcal{N}(\mu, \tau_x^{-1})$
  - Private signal: $y_i = x + \epsilon_{y,i}$, $\epsilon_{y,i} \sim \mathcal{N}(0, \tau_y^{-1})$
  - Public signal: $Y = x + \epsilon_Y$, $\epsilon_Y \sim \mathcal{N}(0, \tau_Y^{-1})$
- **Actions and Payoffs:**
  - Agents $i \in [0,1]$ choose action $a_i \in \mathbb{R}$ to maximise $u_i \in \mathbb{R}$
  - Payoff depends on own action, strategic complementarities, and $x \in \mathbb{R}$: $u_i = -(1-r)(a_i - x)^2 - r(L_i - \bar{L})$, where $L_i \equiv \int_0^1 (a_j - a_i)^2 \, dj, \quad \bar{L} \equiv \int_0^1 L_j \, dj$
  - Agent's action: $a_i = (1-r)\mathbb{E}[x|\Omega_i] + r\mathbb{E}[\bar{a}|\Omega_i]$, where $\bar{a} = \int_0^1 a_i \, di$ is the average action
- **2 Types of Agents:**
  - Ingroup agents: receive all signals, update like Bayesians
  - Outgroup agents: receive extreme signals (iff $|Y_j| \geq d$), update using $\rho_{ij}\tau_Y$ ($\rho_{ij} \in (0,1)$) instead of τ_Y, referred to as Resonance Weight $\rho_{ij} = (2 - 2\Phi(\chi \, || \, \theta_i, \theta_j \, ||))$ (Malmendier and Veldkamp 2022)

Theoretical Framework with Strategic Complementarity

- **Central Bank's Disclosure Decision:**
  - Full disclosure: $\tau_Y \to \infty$
  - Complete opacity: $\tau_Y \to 0$
  - Partial disclosure: $\tau_Y \in \mathbb{R}^+$
- **Timeline**:
  - Game of 2 stages:
    1. The central bank chooses the level of public information disclosure
    2. Agents then choose their actions to maximise expected utility
  - In equilibrium, no player has an incentive to deviate (agents' expectations and actions align)
- **Social Welfare:**

$$W(a, x) \equiv \frac{1}{1-r} \int_0^1 u_i(a, x)\, di = -\int_0^1 (a_i - x)^2\, di$$

Peak Events By Language

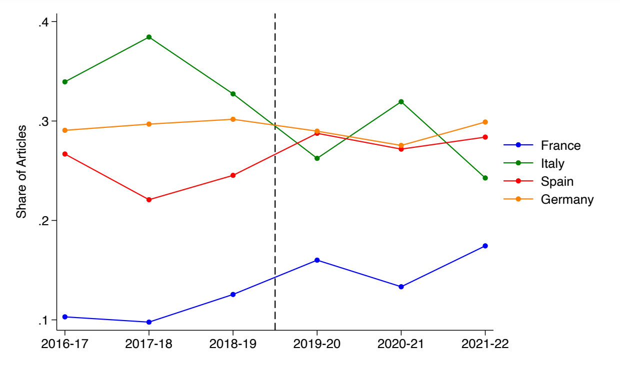
Tweets of different languages react to some events more than others:

Language	Peak Volume	Peak Date	Event
English	25,624	21 Jul 2022	ECB raising rates for first time in 11 years
German	7,098	05 May 2020	German constitutional court ruling
Spanish	26,599	19 Feb 2018	Eurogroup's support for Luis de Guindos
French	11,905	03 Jul 2019	Announcement of Lagarde as incoming ECB president
Italian	22,050	19 Mar 2020	Day after PEPP announcement

Back

Information Supply

Information supply: Similar trend for printed media (newspaper articles):



→ Information supply increases for the ingroup (by 6.1pp)

Back

Information Spread on Twitter (Regressions)

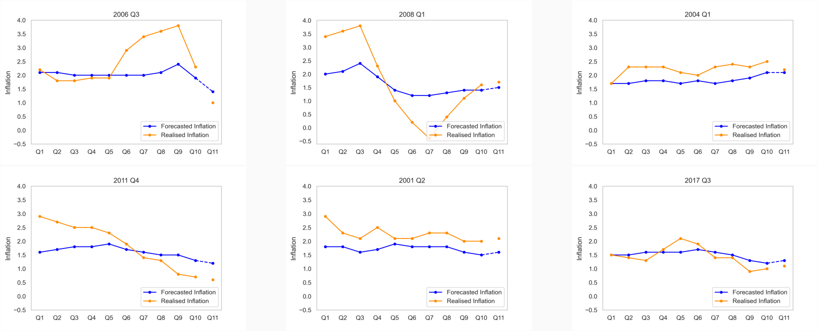
Ingroup Effect on Information Spread on Twitter

	(1) All	(2) Experts	(3) Non-Experts
Ingroup=1	0.105***	0.0244**	0.0778***
	(0.0179)	(0.0103)	(0.0190)
ES	0.256***	0.129***	0.243***
	(0.0179)	(0.0103)	(0.0190)
FR	-0.00138	-0.0944***	0.0195
	(0.0200)	(0.0115)	(0.0212)
IT	0.0887***	0.0923***	0.0903***
	(0.0200)	(0.0115)	(0.0212)
Constant	0.138***	0.212***	0.142***
	(0.0127)	(0.00725)	(0.0134)
N	200	200	200
R-squared	0.582	0.738	0.505

Notes: Table shows OLS regression results of being in the ingroup with the ECB president on the share of tweets by language per 6-week PC cycles, controlling for language. German acts as the baseline language. The number of observations reflects the 4 languages and 49 press conferences in the cycle, where one PC cycle is split in partly being under Draghi's presidency and partly under Lagarde's, making it a total of 50 president-PC cycles combinations. The (non-)expert classification follows the benchmark in Ehrmann and Wabitsch (2022). Standard errors in parentheses. Significance level is indicated by stars: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Experimental Design: Inflation and Forecast Data

- Underlying EA inflation data (ECB forecasts and realisations)



Randomly Selected Inflation Sequences

- Randomised task order
- Randomised messenger-forecast match

▸ Back

Experimental Design

Incentivising decisions follows LtF literature[2]: Back

- **Point forecast bonus** (prior and posteriors) based on a participant's forecasting score $F_{i,t}$:

$$F_{i,t} = 3 * 3^{-|\mathbb{E}_{i,t-1}\{\pi_t\}-\pi_t|} \quad , \tag{1}$$

where π_t is inflation at t and $\mathbb{E}_{i,t-1}\{\pi_t\}$ is its forecast. $F_{i,t}$ is reduced by 2/3 for each p.p. increase in the forecast error.

- **Range forecast bonus** (precision of prior and posterior) based on participant's forecast uncertainty $r_{i,t} = ||\overline{u_{i,t}} - \underline{u_{i,t}}||$:

$$U_{i,t}\left(r_{i,t}\right) = \left\{ \begin{array}{ll} 0 & \pi_{i,t} \notin \left[\underline{u_{i,t}}, \overline{u_{i,t}}\right] \\ 3\left(\frac{1}{1+r_{i,t}}\right) & \pi_{i,t} \in \left[\underline{u_{i,t}}, \overline{u_{i,t}}\right] \end{array} \right\}, \tag{2}$$

where $\underline{u_{i,t}}$ ($\overline{u_{i,t}}$) is the lower (upper) bound of a participant's forecast uncertainty.

[2] Pfajfar and Zakelj (2013, 2014), Assenza et al. (2013), Kryvtsov and Petersen (2021), Rholes and Petersen (2021), etc.

Main Experimental Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Ingroup Effect (H1):											
	0.064**	0.048***	0.051***	0.051***	0.057***	0.053***	0.056***	0.040			
	(0.029)	(0.017)	(0.017)	(0.017)	(0.022)	(0.017)	(0.021)	(0.030)			
N (Treatments)	795	795	795	795	463	795	488	307			
Ingroup Effect for ECB Experts (H2):											
	-0.014	0.020	0.023	0.024	0.019	0.025			0.073**	0.065	0.091
	(0.029)	(0.017)	(0.017)	(0.017)	(0.023)	(0.017)			(0.032)	(0.042)	(0.064)
N (Treatments)	795	795	795	795	446	795			315	193	122
Homophily - Ingroup ECB Expert vs. Generic ECB Expert (H3):											
	0.005	0.035**	0.033*	0.032*	0.075***	0.032*			0.047**	0.090***	-0.034
	(0.029)	(0.017)	(0.017)	(0.017)	(0.023)	(0.017)			(0.021)	(0.028)	(0.038)
N (Treatments)	794	794	794	794	437	794			612	361	251
Heterophobia - Outgroup ECB Expert vs. Generic ECB Expert (H3):											
	0.020	0.015	0.010	0.008	0.056**	0.007			-0.026	0.026	-0.125*
	(0.029)	(0.017)	(0.017)	(0.017)	(0.023)	(0.017)			(0.031)	(0.039)	(0.064)
N (Treatments)	795	795	795	795	441	795			477	284	193
NCB vs ECB: Institutions Effect (H4):											
	0.026	0.031*	0.036**	0.035**	0.051**	0.032*			0.037**	0.048**	0.010
	(0.028)	(0.017)	(0.017)			(0.017)	(0.023)	(0.017)	(0.017)	(0.023)	(0.032)
N (Treatments)	795	795	795	795	433	795			779	455	324
Inflation Scenario		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Individual-FE			✓	✓	✓	✓	✓	✓	✓	✓	✓
Perceived Messenger Ability				✓	✓	✓					
Attention					Full	Controlled	Yes	No		Yes	No
Knowing PMs/Inst									Yes	Yes	Yes
N (Reg)	2,385	2,385	2,385	2,385	1,342	2,385	1,417	968	1,094	648	446

▸ Back (H1) ▸ Back (H2) ▸ Back (H4)