Fifty Shades of Green: Central Bank Communication about Climate Change and Inflation Expectations

Conference of Macroeconomists from Liberal Arts Colleges

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The Push for Green Central Banking

- **Mark Carney (2015):** "Breaking the tragedy of the horizon - climate change and financial stability"
- **Global Coordination:** Network for Greening the Financial System (NGFS, 2017) created to align the financial system with Paris Agreement (2015) goals and mobilize green capital.
- **Banque de France (2020):** Pioneered comprehensive climate stress testing for financial institutions.
- **ECB Strategy Review (2021):** Formally adopted a concrete climate action plan.
- **Pres. Lagarde (2021):** *"...climate change has consequences for us as a central bank pursuing our primary mandate of price stability..."*
- **Green QE (2022):** ECB started implementing its climate-aligned "tilting" policy for corporate bond purchases.

Climate Communication Trends

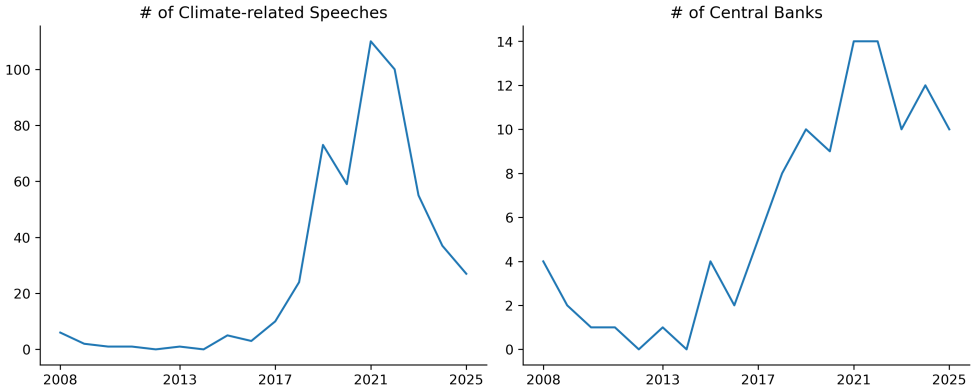

Figure 1: Climate-related speeches over time and number of central banks in the Euro area communicating about climate change (2008–2025).

Mandate vs. Climate Integration

- The ECB has a primary mandate to maintain price stability, aiming for an inflation rate of 2% over the medium term.
- Climate change considerations should be integrated into monetary policy frameworks (McKibbin et al., 2021).
- Tasking central banks with climate goals rather than strict price stability risks losing anti-inflation credibility (Bolton et al., 2020; Hansen, 2022).
- How to support green goals **without compromising price stability**? (Benoît Cœuré, "Monetary policy and climate change", 2018).

Communication as a Key Instrument

- Public speeches shape market expectations, credibility, and pricing long before structural interventions take effect (Blinder et al., 2008, 2024).
- Not always clear: “Fedspeak"
- Climate Communication: Arseneau et al., 2022; Campiglio et al., 2025.
- **Risk of Mandate Drift:** Markets may misinterpret climate rhetoric as a distraction or "mission creep," driving up inflation expectations.
- Financial markets may grow uncertain about how the ECB will prioritize between their core objective of maintaining price stability and supporting the green transition.

Core Research Question: Does central bank communication on climate change systematically move market-based inflation expectations?

Theoretical Hypotheses

H1: Mandate Drift Channel

Climate-related central bank communication containing greater mandate-drift content is likely to be associated with higher market-based inflation expectations.

H2: Climate Inflation Information Channel

Speeches that draw attention to inflationary pressures (“climateflation") linked to climate-related events are likely to be associated with higher inflation expectations.

H3: Mandate-Affirming Channel

Price stability reaffirming climate communication should be associated with lower (or stable) inflation expectations.

Data: Eurozone Speech Corpus

- **Source:** Bank for International Settlements (BIS) corpus ($> 18,000$ speeches since 1973).
- **Sample Scope:** ECB & Eurozone NCB officials (Jan 1, 2008 – Dec 31, 2025).
- **Dictionary (Arseneau et al., 2022):** *Climate Change, Green Finance, Climate-related Risk, Paris Agreement, Climate Policy, Low-carbon Economy, Carbon Emission, Green Bond.*
- **Inclusion Rule:** Keyword must appear in at least **two separate sentences**.
- **Final Dataset: 514 climate speeches** across **402 unique trading days**.

Climate Communication

Figure 2: Total number of climate-related speeches by the ECB and national central banks, 2008–2025. Source: BIS.

Climate Communication

Figure 3: Climate-related speeches as a percentage of total speeches by the ECB and national central banks, 2008–2025. Source: BIS.

Financial Market Data

Market-Based Inflation Expectations:

- Daily inflation-linked swaps (ILS) for Euro area from Bloomberg.
- **Maturities:** 1Y, 2Y, 5Y, and 10Y horizons (Gürkaynak et al., 2005; Beechey et al., 2011).
- **Metric:** Primary market for hedging Euro area inflation risk; driven by pension funds, dealer banks, and hedge funds (Bahaj et al., 2023).
- **Mechanics:** The buyer pays a fixed rate (ILS) and receives the floating rate linked to actual realized inflation (HICP).
- **Intuition:** Directly reveals market breakeven inflation expectations.

▸ Net Cash Flow ▸ Liquidity

Empirical Methodology

We estimate impulse response functions (IRFs) using local projections on daily high-frequency financial data:

$$\sum_{j=0}^{h} y_{t+j} = \alpha_h + \sum_{m=1}^{2} \lambda_{m,h} y_{t-m} + \sum_{n=0}^{4} \beta_{n,h} s_{t-n} + \gamma_h x_t + \varepsilon_{t+h}$$

where

- y_t is ILS swap rates (in differences) across maturities (1Y, 2Y, 5Y, 10Y).
- s_t includes daily count indicator of climate speeches (**Frequency**), share of climate-related words relative to total word count (**Intensity**), sentiment indexes, and speaker identity dummies:
  - ECB President
  - ECB Executive Board Members
  - Governors from Founding Eurozone Member Countries
- x_t includes macro surprises, ECB Governing Council meetings, non-climate speech count.

Results

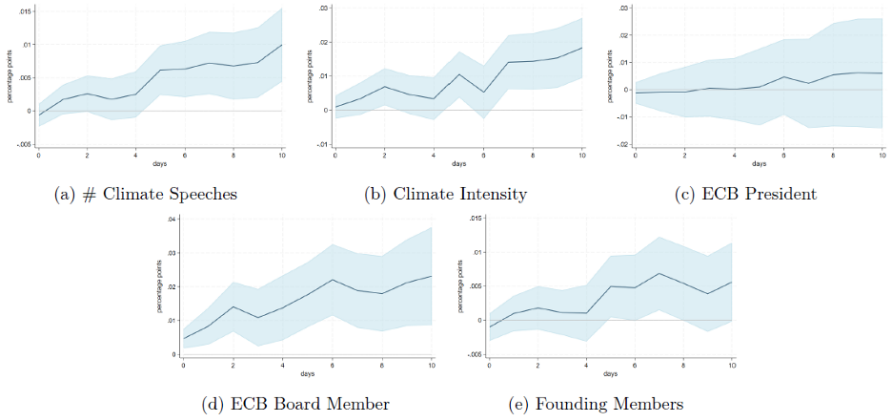

Figure 4: Impulse Responses of 10-year ILS to Climate Communication Shocks

Hypothesis 1: Mandate-Drift Channel

1. Identify mandate-related sentences.
2. Apply the specialized Loughran & McDonald financial dictionary to count negative words (e.g., conflict, compromise, challenge, threat).
3. Calculate the index:

$$\text{MandateTone}_t = \frac{\text{Count of Negative Words in Mandate Sentences}_t}{\text{Total Words in Mandate Sentences}_t}$$

Hypothesis 1: Mandate-Drift Channel

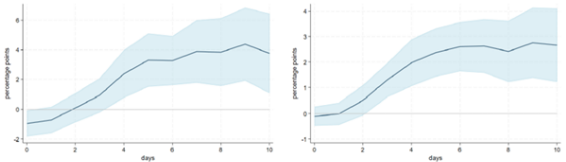

Figure 5: Impulse Responses of ILS to the negative tone index related to mandate.

Hypothesis 2: Climate Inflation Information Channel

1. Identify sentences that reference inflation-related terms.
2. Count additive modifiers (e.g., "rising," "upward") and subtractive modifiers (e.g., "easing," "subdued"), following Granziera et al. (2025).
3. Calculate the index:

$$\text{Inflation-Information}_t = \frac{(\text{add-sub})_t}{(\text{add+sub})_t}$$

Hypothesis 2: Climate Inflation Information Channel

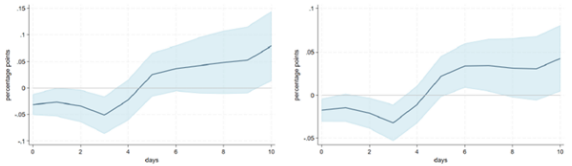

Figure 6: Impulse Responses of ILS to the inflation-information index.

Hypothesis 3: Mandate Affirming Channel

1. Identify sentences discussing interest rates.
2. Count hawkish terms (H) (e.g., "tighten," "raise") and dovish terms (D) (e.g., "ease," "accommodative") from Tobback et al. (2017), adjusting for local negations that reverse their meaning.
3. Calculate the index:

$$\text{NetStance}_t = \frac{H_t - D_t}{H_t + D_t}$$

Hypothesis 3: Mandate Affirming Channel

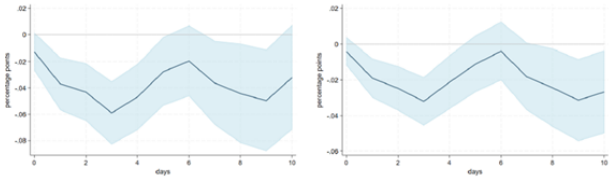

Figure 7: Impulse Responses of ILS to the net stance index.

Conclusions

- **Modest & Delayed Effect:** Frequency and intensity of climate speeches yield economically modest, delayed increases in ILS rates.
- **Mandate Drift (↑):** Negative tone on mandates increases inflation expectations (fear of priority conflicts).
- **Climate Inflation Info (↑):** Highlighting energy transition/cost shocks drives up expectations.
- **Mandate-Affirming (↓):** Reasserting price stability **neutralizes** upward inflation pressure.
- **No De-anchoring:** Climate rhetoric does **not** cause persistent or destabilizing unanchoring of inflation expectations.
- **Key takeaway:** European central banks can address climate risks without sacrificing price stability credibility.

▸ Financial Stability

Thank you!

Buyer's Net Cash Flow at Maturity

$$\text{Buyer's Net Cash Flow at Maturity} = \text{Notional} \times \left[\underbrace{\left(\frac{\text{HICP}_{\text{maturity}}}{\text{HICP}_{\text{start}}} - 1 \right)}_{\substack{\text{Floating Realized} \\ \text{Inflation Received}}} - \underbrace{\left((1 + r_{\text{fixed}})^{T} - 1 \right)}_{\substack{\text{Pre-Agreed Fixed} \\ \text{Rate Paid}}} \right]$$

- **Inflation Buyer:** Pays the fixed rate r_{fixed} locked at $t = 0$ and receives realized HICP index growth.
- **Net Settlement:** Single cash flow occurs at maturity T with no intermediate coupon payments.
  - If actual inflation exceeds the pre-agreed fixed rate: The buyer receives a net payout (the inflation hedge pays off).
  - If actual inflation falls below the fixed rate: The buyer makes a net payment to the counterparty.

Back to Data

Liquidity

- Recent empirical work by the European Central Bank (e.g., Grønlund et al., 2024) shows that "technical" or liquidity factors account for a negligible share of daily variation in Euro ILS rates. The price signal cleanly reflects pure inflation compensation (expected inflation + inflation risk premium).
- Bid-ask spreads on benchmark tenors (1Y, 2Y, 5Y, 10Y) are narrow, generally hovering between 0.5 and 2 basis points under normal market conditions.

◂ Back to Data

Appendix: Financial Stability

1. Extract sentences using the dictionary from Arseneau et al. (2022) to identify sentences referencing financial stability (e.g., “financial stability”, “systemic risk”, “macroprudential policy”, “resolution regime”, “macroprudential instrument”, “countercyclical capital buffer”, “macroprudential perspective”).
2. Apply the specialized Loughran & McDonald financial dictionary to count words related to uncertainty.
3. Calculate the index:

$$\text{Financial Stability Uncertainty}_t = \frac{\text{Count of Words related to Uncertainty}_t}{\text{Total Words in Speeches related to Financial Stability}_t}$$

Appendix: Financial Stability

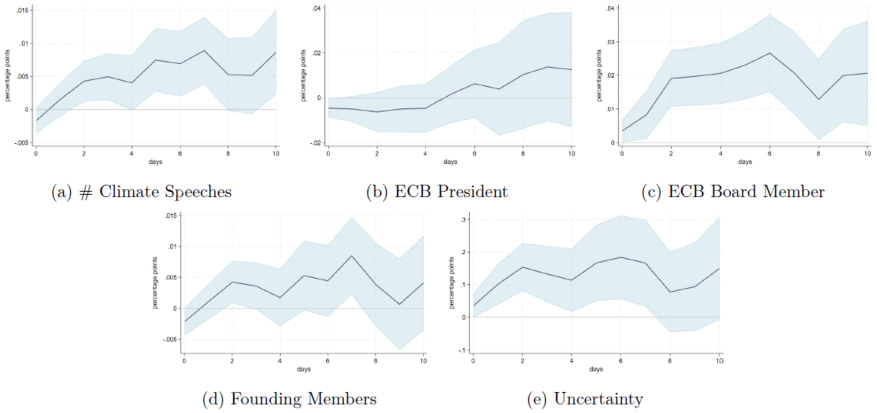

Figure 8: Impulse Responses of 10-year ILS to Financial Stability.

Back to Conclusions

Volatility

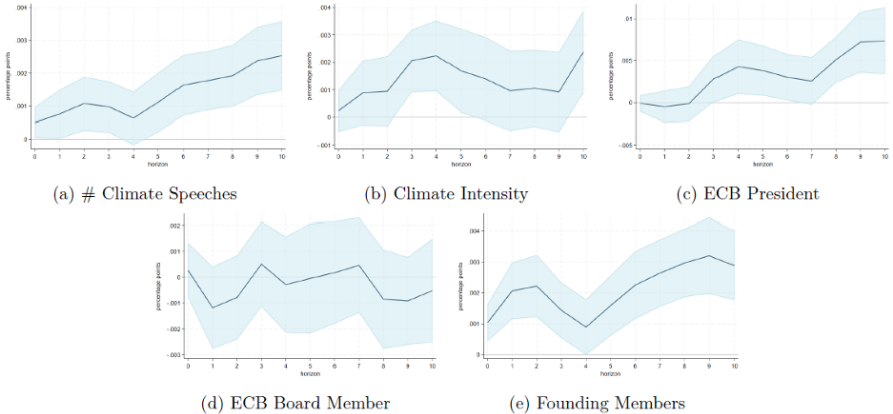

Figure 9: Impulse Responses of 10-year ILS (forward volatility) to Climate Communication Shocks