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How central bank independence shapes monetary policy communication: A Large Language Model application
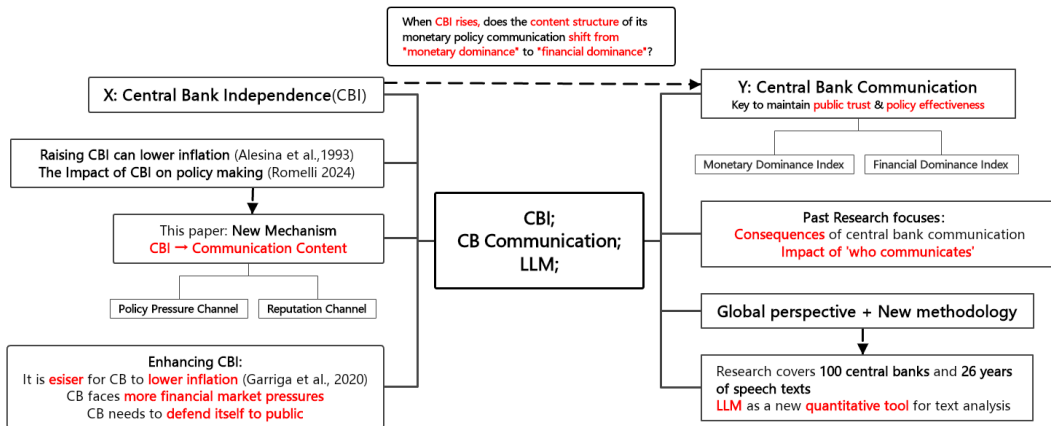
Lauren Leek, Simeon Bischl

European Journal of Political Economy, 2024

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2025.11.23

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Framework

When CBI rises, does the content structure of its monetary policy communication shift from "monetary dominance" to "financial dominance"?

X: Central Bank Independence(CBI)

Raising CBI can lower inflation (Alesina et al.,1993)
The Impact of CBI on policy making (Romelli 2024)

This paper: New Mechanism
CBI → Communication Content

Policy Pressure Channel | Reputation Channel

Enhancing CBI:
It is esiser for CB to lower inflation (Garriga et al., 2020)
CB faces more financial market pressures
CB needs to defend itself to public

CBI;
CB Communication;
LLM;

Y: Central Bank Communication
Key to maintain public trust & policy effectiveness

Monetary Dominance Index | Financial Dominance Index

Past Research focuses:
Consequences of central bank communication
Impact of 'who communicates'

Global perspective + New methodology

Research covers 100 central banks and 26 years of speech texts
LLM as a new quantitative tool for text analysis

Research Question

How will Central Bank Independence (CBI) affect the content and focus of central bank communication?

- Will CBI change central bank's attention to different pressures (inflation pressure; financial stability pressure) in communication?

Motivation

Central bank communication has become a core tool of monetary policy

- Communication is both about info disclosure and the policy transmission.

The reform of CBI is extensive and ongoing

- Numerous of CBs have modified their legal status in pursuit of greater independence.

Limitations of existing literature

- Studied the consequences of communication, but **lack of the causes** of it;

- The **mechanism** by which CBI changes communication has not been fully explored.

- Mainly focuses on **individual developed economies** (Fed, ECB etc.).

- Lack of new **methods(LLM) for quantifying** communication content.

Contribution I

1. Literature on Central Bank Communication

Prior: Central bank communication has two main functions.

- **Policy tool**: Communication directly affects financial markets (Anderes et al., 2021).

- **Reputation**: Enhancing public trust through communication (Blinder et al., 2024)

Extend: Exploring the causes of changes in communication contents - CBI.

2. Literature on the Development and Impact of CBI

Prior: Lack of analysis on mechanism between CBI and communication.

- Analyzed the impact of CBI on inflation performance and policy-making.

- Focused on correlation between transparency and CBI(no mechanism nor content).

Extend: Establish a theoretical mechanism from CBI to communication content.

Contribution II

3. Literature on Methods and Samples of CB Communication Research

Prior: Few studies using LLM and most of them focused on advanced economies.

- **Extend 1**: Improved classification accuracy through LLM fine-tuning and hyperparameter optimization. (**Extending** Leek et al.,2024)
- **Extend 2**: Diversified sample of CBs (advanced, developing, democratic countries)
  - Revealing the heterogeneous effects of how institutions shape communication strategies among different subgroups of CBs. (**Extending** Evdokimova et al., 2023)
- **Extend 3**: Long Sample period & a large number of independence events.
  - Financial dominated communication predates the global financial crisis (GFC).(**Against** Diessner et al., 2020)

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Hypothesis

"Monetary dominance" and **"Financial dominance"** for communication orientation:

- Fed emphasizes inflation and price stability: **Monetary dominated**;

- Fed emphasizes financial stability and market risks: **Financial dominated**.

H1: CBI rises → Monetary dominated communication decreases;

H2: CBI rises → Financial dominated communication increases;

H3: Both **Policy pressure** and **reputation mechanisms** contribute.

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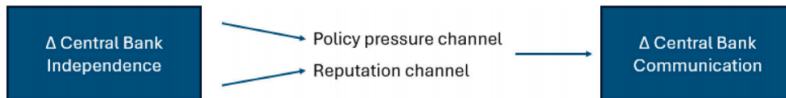
Mechanism

Fig. 1. Main relationship between independence and communication.
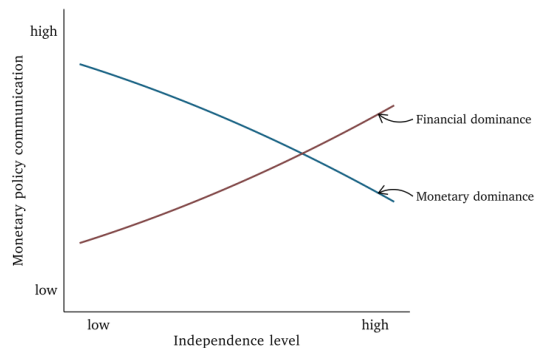
Inependent and Mechanism Variables

Independent Variable - CBI - Romelli (2024)

- Continous indicator ranging from 0 to 1;

- The **higher** the value, the **less** the CB is **influenced** by the government.

Romelli's extended CBI index is the average of the following six dimensions:

1. The governor and central bank board;

2. Monetary policy and conflict resolution;

3. Objectives;

4. Limitations on lending to the government;

5. Financial independence;

6. Reporting and disclosure.

Dependent Variables

- **Monetary Dominance Index, MD**
    - Proportion of content related to **price stability** and **inflation control**.
    - Use **LLM classification for sentences**.
    - Range: $[0, 1]$: the density of "currency dominant" in the speech.
- **Financial Dominance Index, FD**
    - Proportion of content related to **financial stability, liquidity risk**.
    - Range: $[0, 1]$: The density of 'financial dominance' in the speech.

$$\psi_i^m = \frac{\sum_{s \in S_i} 1(\text{Classification}_s = m)}{\sum_{s \in S_i} 1(\text{Classification}_s \in M)}$$

- ψ_i^m: Communication index of category m in $i-th$ speech。
- $m \in M$: Classification category (MD or FD);
- $M = \{$**Monetary dominance**, **Financial dominance** Fiscal dominance, etc$\}$.
- $s \ in S_i$: All sentences belonging to the ith speech.

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Sample and Data

- CB speech text: BIS database, **18,826** speeches.

- CBI: Romelli (2024): Range [0,1], calculated based on six dimensions.

- 100 central banks of **different countries**, from 1997 to 2023.

- Sentence level **semantic classification** based on **LLM (Monetary vs. Financial)**.

Identification strategy

1. **Staggered DiD**: CBI reform as an exogenous event to identify casual effects.

2. **IV** : Democratic index of neighboring countries as tools to alleviate endogeneity.

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Identification strategy

CBI Reform
$$
\begin{cases}
\textbf{DiD:} \psi_{ict}^m = \sum_{k=-5}^{-2} \beta_k D_{ci}^k + \sum_{k=0}^{12} \beta_k D_{ci}^k + \sum_{j=2}^{J} \sum_{k=0}^{12} \delta_{jk} D_{ci}^k S_{ct}^j + \mu_c + \theta_t + \epsilon_{ict} \\
\textbf{IV:} \quad \text{CBI}_{ct} = \alpha_1 Z_{ct}^1 + \alpha_2 Z_{ct}^2 + \alpha_3 Z_{ct}^3 + \gamma \, \text{Controls}_{ct} + \mu_c + \theta_t + u_{ct} \\
\textbf{IV Stage2:} \quad \psi_{ict}^m = \rho \, \widetilde{\psi}_{ict}^m + \beta_1 \widehat{\text{CBI}}_{ct} + \gamma \, \text{Controls}_{ct} + \mu_c + \theta_t + \epsilon_{ict}
\end{cases}
$$

- D_{ct}^k: $[0,1]$ Dummy: Whether there is a rise of CBI for speech i of contry c at time t.
  - $K = -1$: Base period. Standardized to 0. The effects of all other periods are measured relative to the year before the event occurred.

- S_{ct}^j: Subgroup dummy (democracy, advanced, etc.);

- $CBI_{i,t}$: Independence index at the national level;

- $Controls_{ct}$: Changes in inflation rate ($\Delta \pi_{ct}$) and unemployment rate (Δu_{ct});

- μ_i: country fixed effect; year fixed effect: θ_t.

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H1 & H2: Rise of CBI implies less MD and more FD

Effect heterogeneity by country characteristics.

	Monetary dominance	Financial dominance
Baseline		
Full sample	−0.1607***	0.0548***
	(0.0554)	(0.0200)
Supervision capabilities		
Low	−0.1532**	0.0642***
	(0.0623)	(0.0203)
Medium	−0.1373***	0.0446*
	(0.0457)	(0.0228)
High	−0.2504***	0.0279
	(0.0724)	(0.0189)
Political system		
Autocracy	−0.1161**	0.0495**
	(0.0459)	(0.0195)
Democracy	−0.1747***	0.0595***
	(0.0592)	(0.0187)
Monetary sovereignty		
Full monetary sovereignty	−0.1417***	0.0556***
	(0.0532)	(0.0206)
Monetary union or peg	−0.2268***	0.0244
	(0.0732)	(0.0229)
Economic development		
Emerging and Developing	−0.0644*	0.0021
	(0.0354)	(0.0289)
Advanced	−0.2229***	0.0774***
	(0.0735)	(0.0170)
Mandates		
Non-conflicting with price stability	−0.1479***	0.0542***
	(0.0506)	(0.0207)
Conflicting objectives	−0.2440***	0.0588***
	(0.0700)	(0.0183)

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H1 & H2: 2SLS(IV)

2SLS estimation of the impact of CBI on monetary and financial dominance.

Dependent Variables:	First Stage		2SLS Effect on Dominance	
	CBI		Monetary	Financial
Model:	(1)	(2)	(3)	(4)
Variables				
$\widehat{CBI}$			−0.7524*	0.6921**
			(0.4365)	(0.2969)
Monetary dominance 25 prior speeches	0.0078		0.4952***	
	(0.0129)		(0.0727)	
Financial dominance 25 prior speeches		−0.0009		0.3247***
		(0.0376)		(0.0567)
ΔInflation rate	0.0669	0.0671	0.4797***	−0.0932
	(0.0952)	(0.0955)	(0.1647)	(0.1080)
ΔUnemployment rate	0.0001	0.0001	−0.0016	0.0022
	(0.0006)	(0.0006)	(0.0039)	(0.0014)
Inverse distance weighted world CBI$_{-1}$	0.9288**	0.9182**		
	(0.3568)	(0.3653)		
Neighbour's electoral democracy index$_{-1}$	0.2376	0.2448		
	(0.2015)	(0.2077)		
Independence judiciary	0.0056**	0.0053*		
	(0.0027)	(0.0028)		
Fixed Effects				
Country	✓	✓	✓	✓
Year	✓	✓	✓	✓
Fit statistics				
R^2	0.97593	0.97591	0.21513	0.11198
Observations	12,205	12,205	12,205	12,205

H3: Mechanism(two channels)

A. HICP inflation
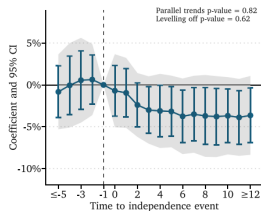
B. Financial stress

A. Monetary dominance

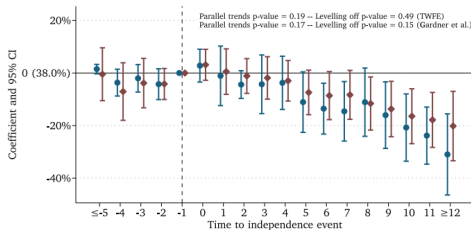B. Financial dominance

Extension

1. 多维沟通渠道研究

- 政策声明、会议纪要、议息会新闻发布会文字稿；
- 官员个人采访与社交媒体（如 Twitter、LinkedIn）；
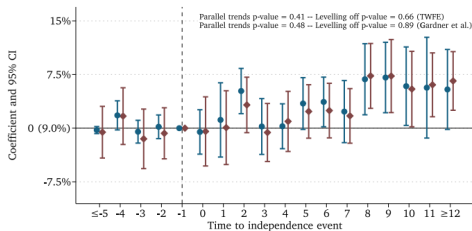- 甚至央行官网 FAQ、技术报告等非正式文本。

2. 从沟通"内容"到沟通"策略"的延伸（多模态）

- 本文聚焦"说什么"，未来可进一步研究"怎么说"；
- 电话会议、行长发言视频、结合本文的文本分析；
- 探讨央行是否在危机或政策转折时调整沟通语气、语调与透明度。

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Staggered DiD

A. Monetary dominance

B. Financial dominance

Gardner et al. (2024)   Two-way fixed effects

机制解释

1. 政策压力渠道（policy pressure channel）
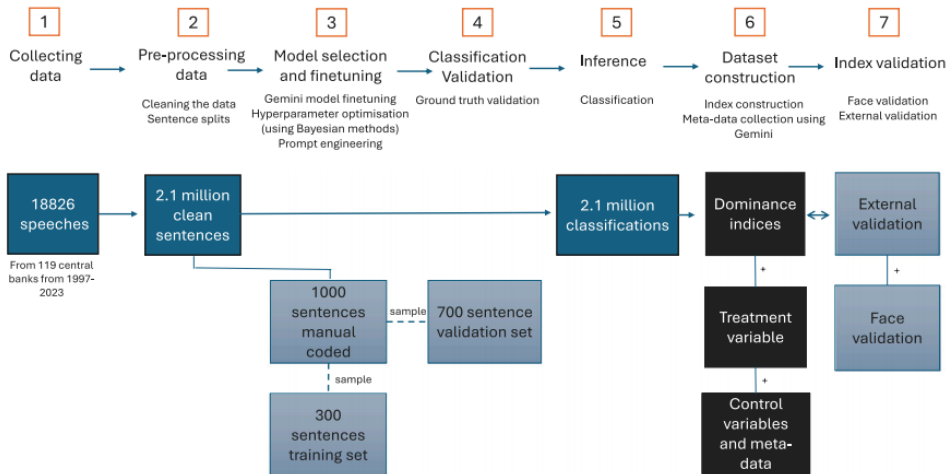
独立性提高后（Masciandaro et al., 2018; Aklin et al., 2021）：

- 独立的央行更能有效控制通胀。当 CBI 上升后，它抗通胀的承诺更可信，公众和市场的通胀预期被更好地锚定，通胀不再是那么迫在眉睫的压力；
- 但金融市场压力上升（因监管分离、金融自由化）。
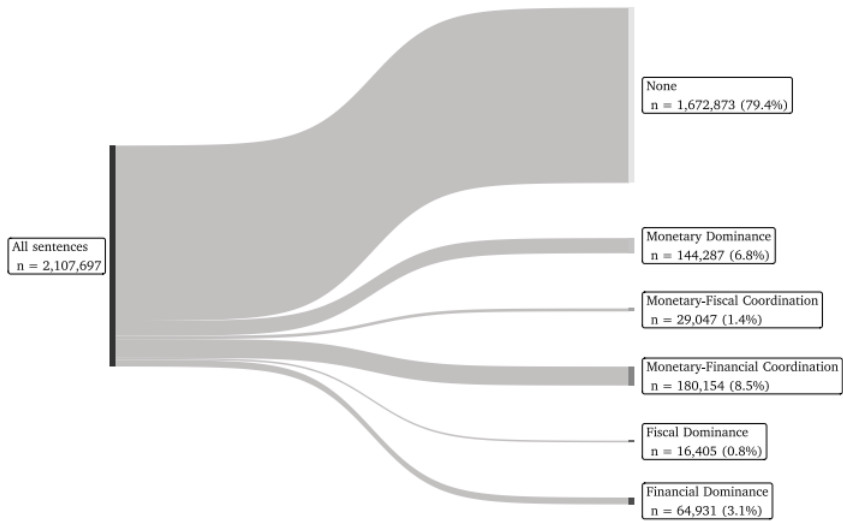- 因此，央行在沟通中需更频繁地回应金融市场议题，以展示能力与稳定性。

2. 声誉渠道（reputation channel）

- 独立的央行不再能借政府"背书"，必须通过沟通主动构建独立性声誉（Majone, 2001; Bernanke, 2010）。
- 研究表明独立性与透明度正相关（Dincer et al., 2018）；
- 中央银行通过沟通"表演性地维护独立形象"（Baker et al., 2024）。

这两条机制奠定了理论模型，解释了为何独立性会导致"从通胀到金融"的沟通转向。

LLM workflow

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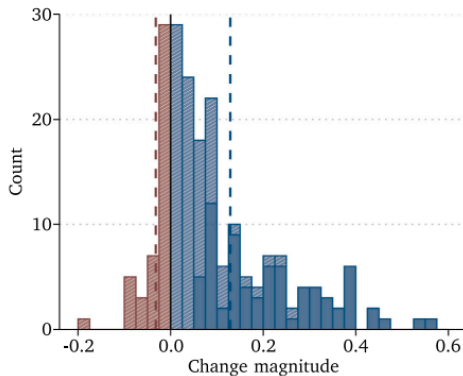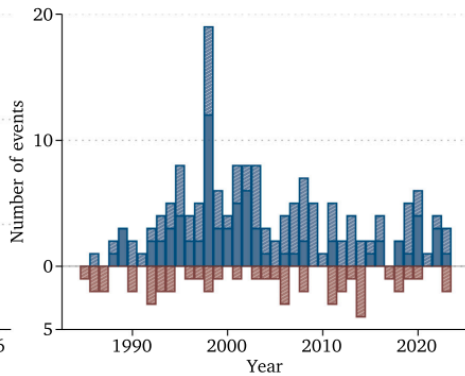○○○○

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CBI changes

A. Histogram of change magnitudes

B. CBI events over time

■ CBI increase   ■ CBI decrease