Thomas Laubach Research Conference

May 16, 2025

Thomas Laubach
RESEARCH CONFERENCE

Session 5: Financial Market Expectations: Implications for Policy and Communications

Moderator: Roberto Perli, Federal Reserve Bank of New York
Presenter: Ricardo Caballero, Massachusetts Institute of Technology
Discussant: Markus Brunnermeier, Princeton University

Thomas Laubach
RESEARCH CONFERENCE

FCI-plot:

Central Bank Communication Through Financial Conditions

Ricardo J. Caballero (MIT) Alp Simsek (Yale SOM)

2nd Thomas Laubach Research Conference
Federal Reserve Board

Washington, D.C., May 2025

The questions

Chair Powell, Jackson Hole Symposium, August 24, 2018

"Our communications with financial markets are a critical component of monetary policy transmission—markets take our words as signals for future moves, so ambiguity is the enemy of stability."

Communication with markets is a key pillar of monetary policy

Key Research Questions

1. *What specific advantages does enhanced communication with markets provide for monetary-policy effectiveness?*
2. *Which communication strategies best deliver these benefits?*
3. *How should central banks manage the frequent disagreements with market participants?*

Our model's answers

Q1: Advantages of enhanced communication?

- Reduces markets misunderstanding of policy ("tantrums")
- *Recruits* sophisticated market participants to insulate financial conditions from "noise"

Q2: Best communication strategies?

- **FCI-plot:** Communicate the central bank expected desired path for financial conditions—rather than the expected policy rate path
- **Scenario-based FCI-plot:** Communicate how the central bank would adjust financial conditions across different economic states

Q3: Managing disagreements?

The goal is not persuasion, but to achieve an "**agree-to-disagree**" equilibrium where markets understand policymakers' views and help to implement them despite differing views

Roadmap

1. Motivating Facts
2. A Model of Disagreements and FCI Communication
3. Proof-of-concept and Final Remarks

Eight facts on monetary policy & financial conditions

1. *Monetary policy transmits through financial conditions (FCs)*
2. *FCs are primarily driven by risky asset prices*
3. *FCs are "noisy" and cause macroeconomic fluctuations*
4. *Monetary policy affects FCs beyond interest rates*
5. Lags and unobservables make monetary policy belief dependent
6. Central banks already have views about desirable FCs
7. *Markets disagree with central banks and perceive policy "errors"*
8. *Markets are uncertain about FCs, conditional on economic outlook*

Monetary policy transmits through financial conditions

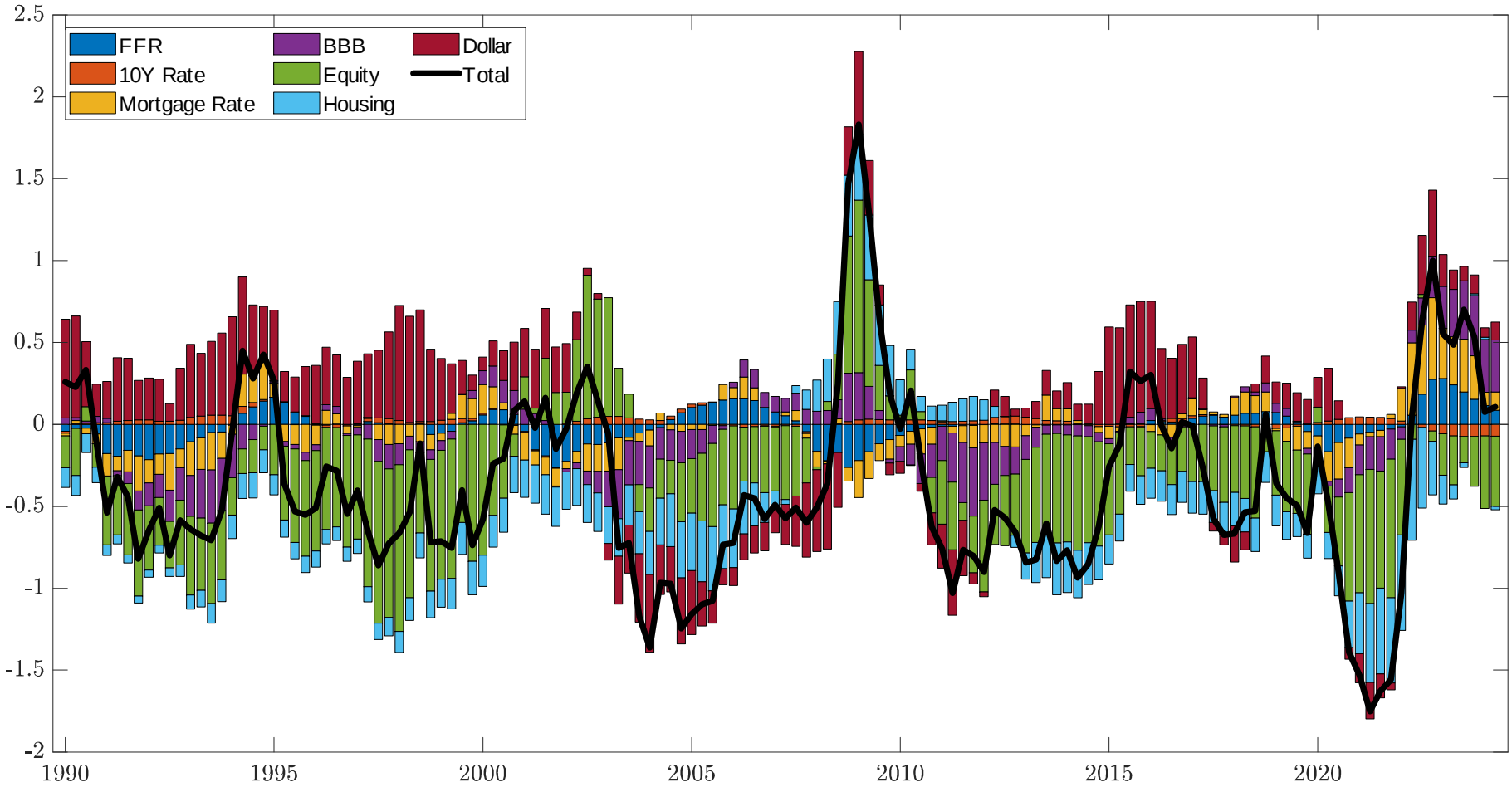
Chair Powell on Policy Transmission (2022)

"Our policy decisions affect financial conditions immediately... Then, changes in financial conditions begin to affect economic activity within a few months."

Keynes (1936)

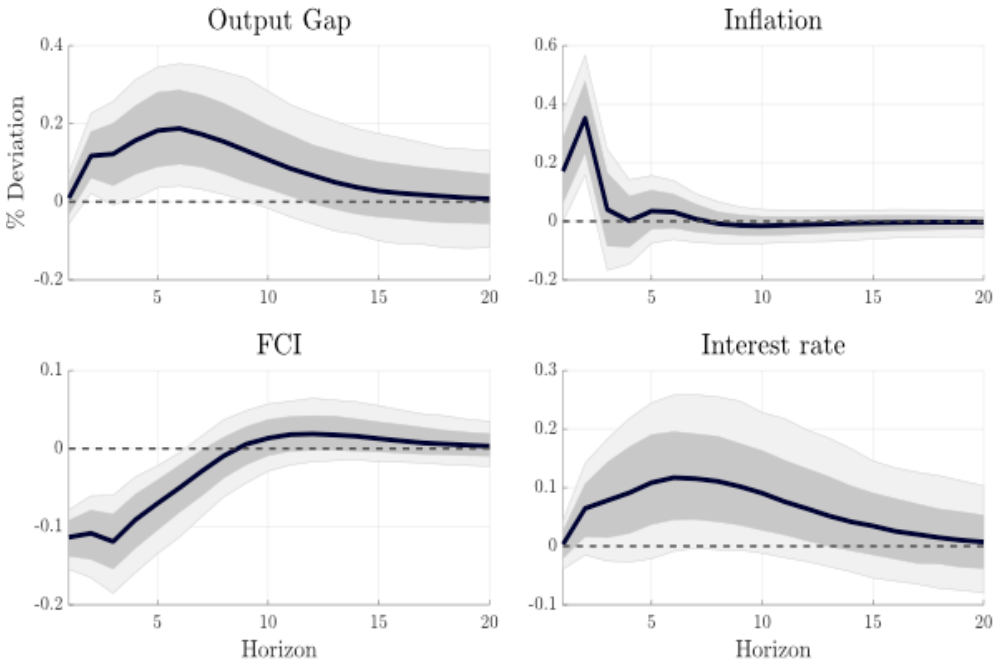
"...there are not many people who will alter their way of living because the rate of interest has fallen from 5% to 4% (...) Perhaps the most important influence (...) depends on the effect of these changes on the appreciation or depreciation in the prices of securities"

FCs are primarily driven by risky asset prices

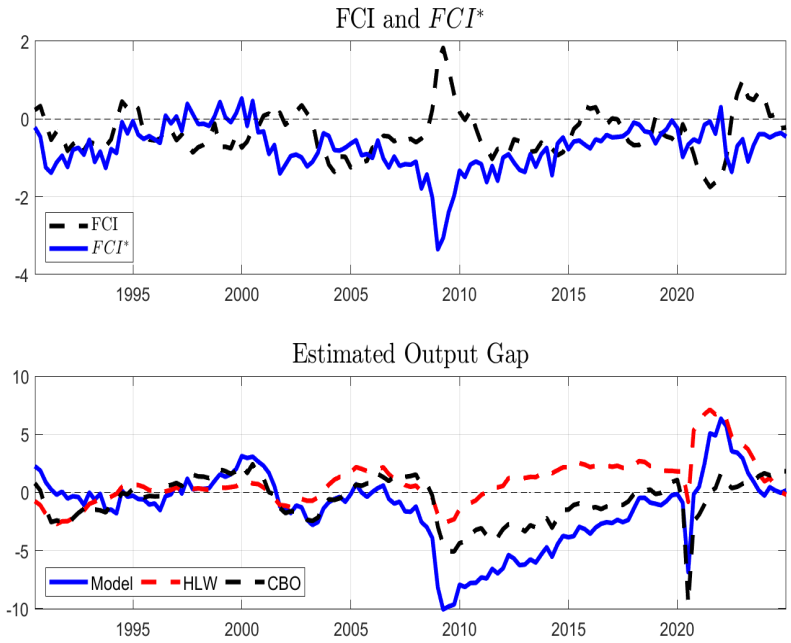


FCI-G index and its drivers. Source: Ajello et al. (2024)

FCs are "noisy" and cause macroeconomic fluctuations



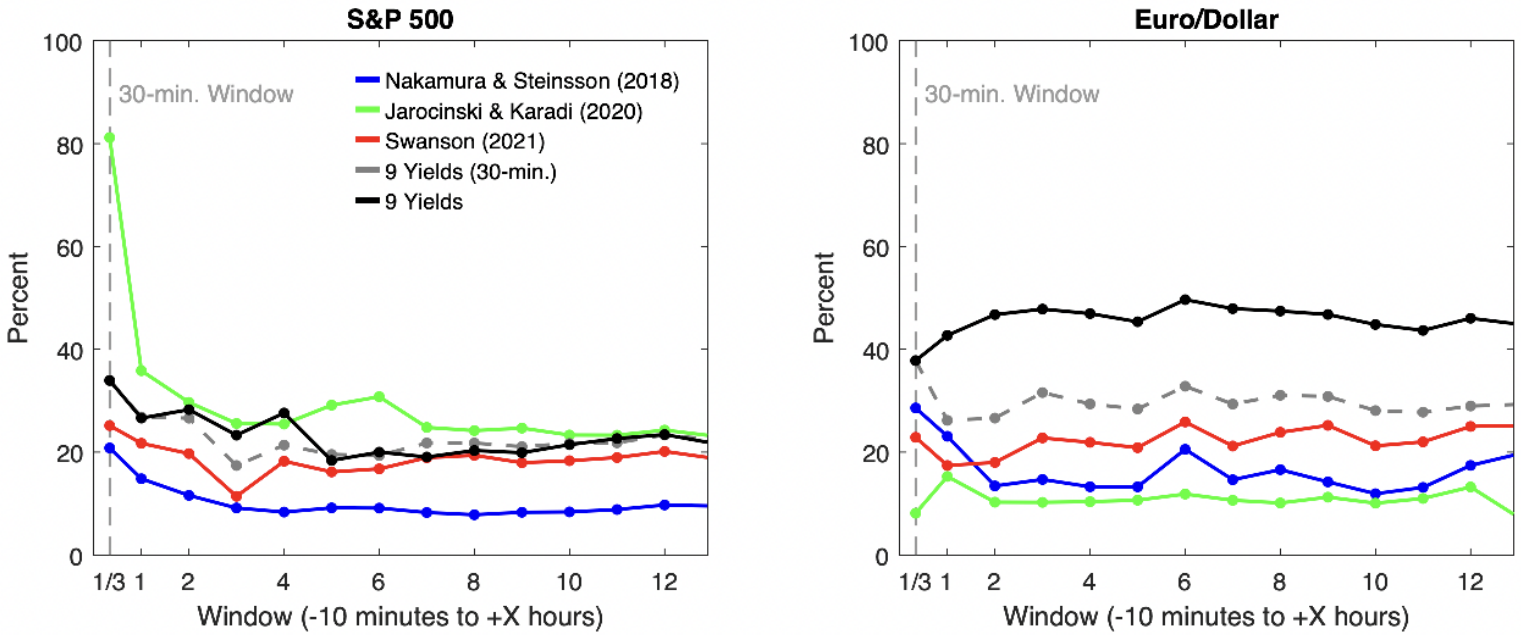
Impulse response to a financial noise shock. Source: Caballero et al. (2024)



FCI* and output gap estimates. Source: Caballero et al. (2025)

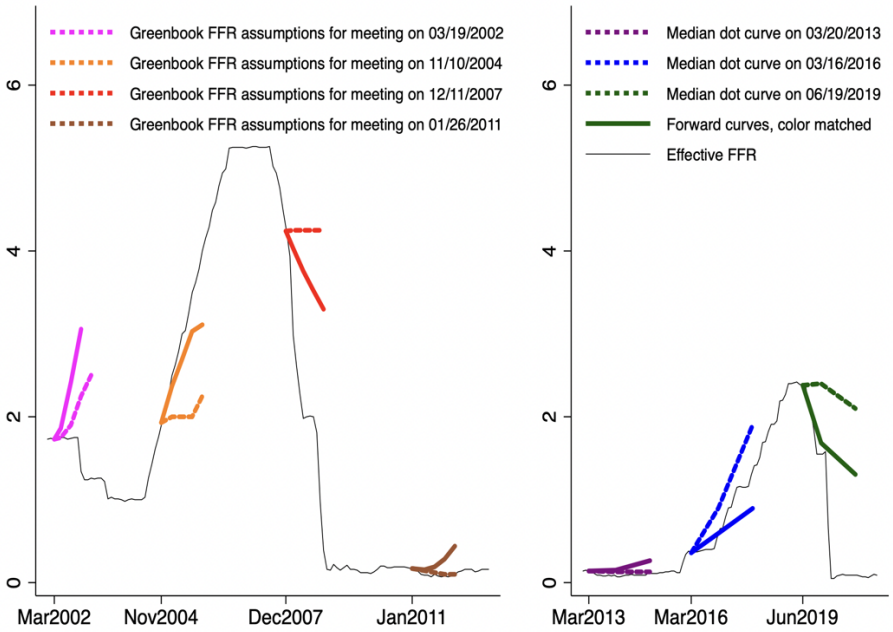
Monetary policy affects FCs via channels beyond rates

- Bauer et al. (2023) synthesis: monetary policy shocks have strong effects on risk appetite
- Boehm & Kroner (2024) "Fed non-yield shock": Yield curve changes explain surprisingly little variation in equity prices and exchange rates around FOMC announcements

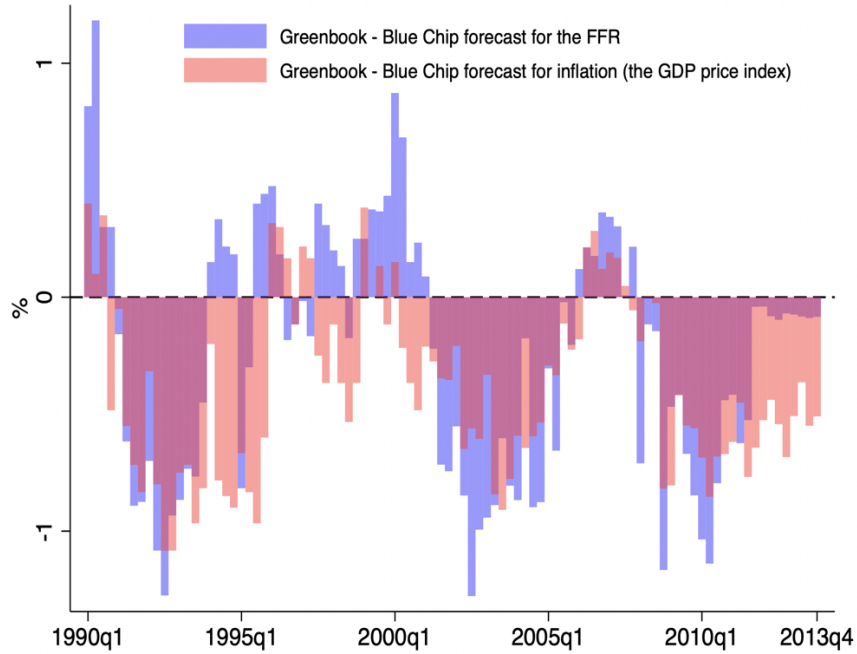


R2 of regressing log returns on high frequency FOMC shocks. Source: Boehm and Kroner (2024)

Markets routinely disagree with central banks



Disagreements between the Fed's and the market's interest rate forecasts.

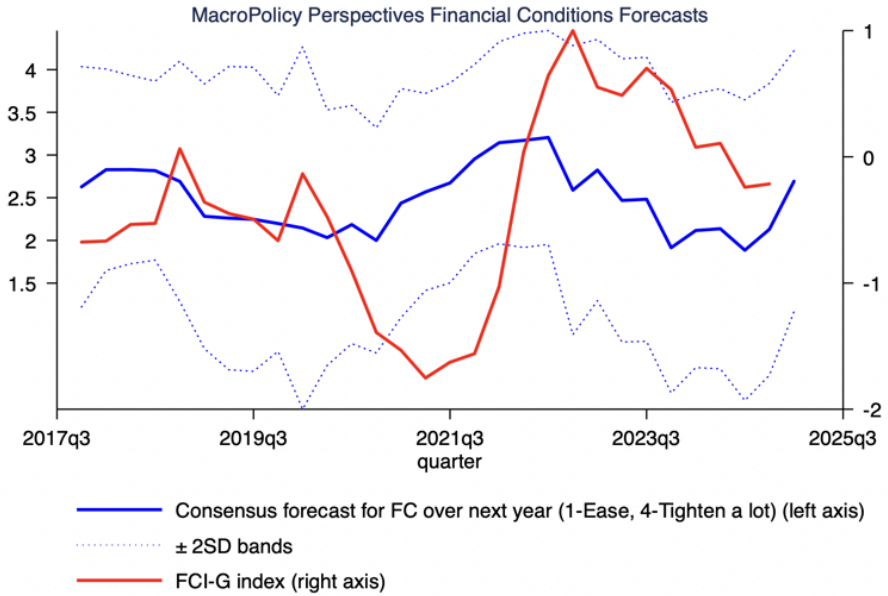


Alignment of interest rate and inflation disagreements.

Source: Caballero and Simsek (2022)

Disagreements also imply that markets often perceive policy "errors"

Markets are uncertain about FCs conditional on outlook



	(1) FC change (until Q4)	(2) FFR change (until Q4)
Unemp. forecast (Q4)	0.040	-0.110**
	(0.023)	(0.031)
Core PCE forecast (Q4)	-0.018	0.204**
	(0.036)	(0.046)
Forecaster and Quarter FE	Yes	Yes
Observations	1,752	1,730
Adjusted R-squared	0.378	0.878

Source: MacroPolicy Perspectives Shadow Survey (Coronado and Rosner-Warburton, 2025)

Roadmap

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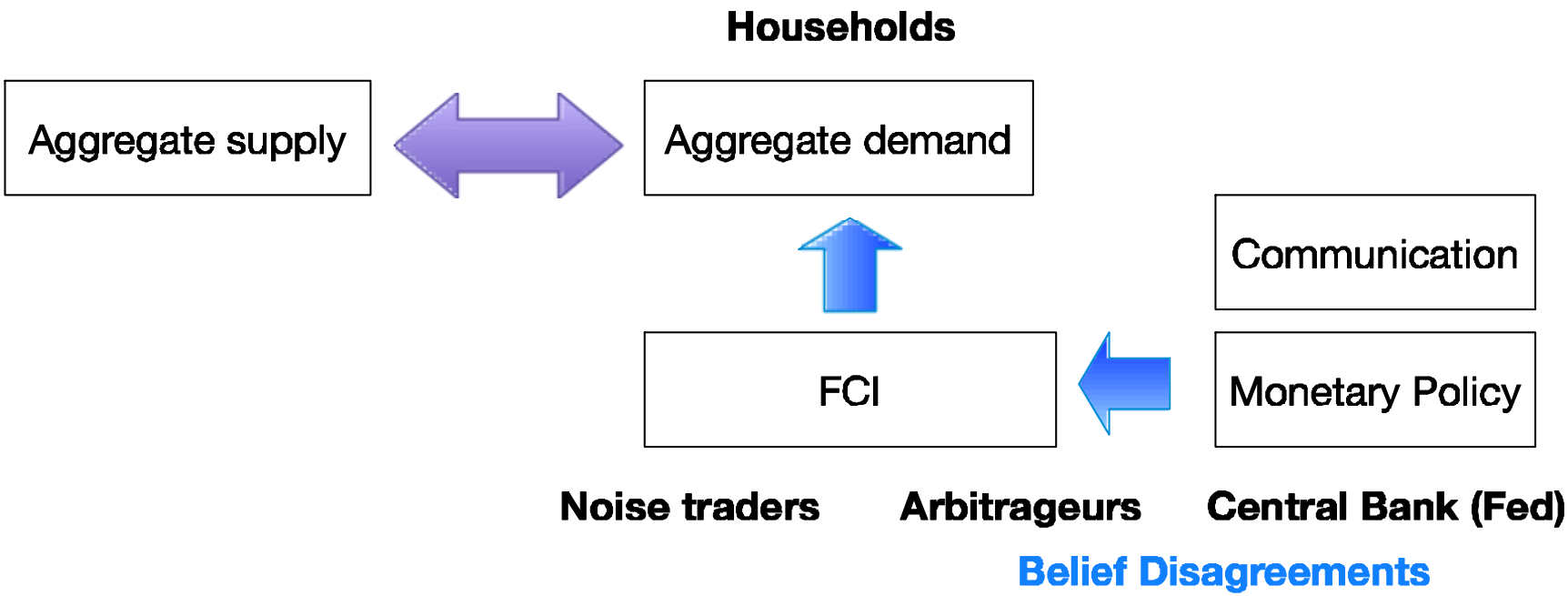
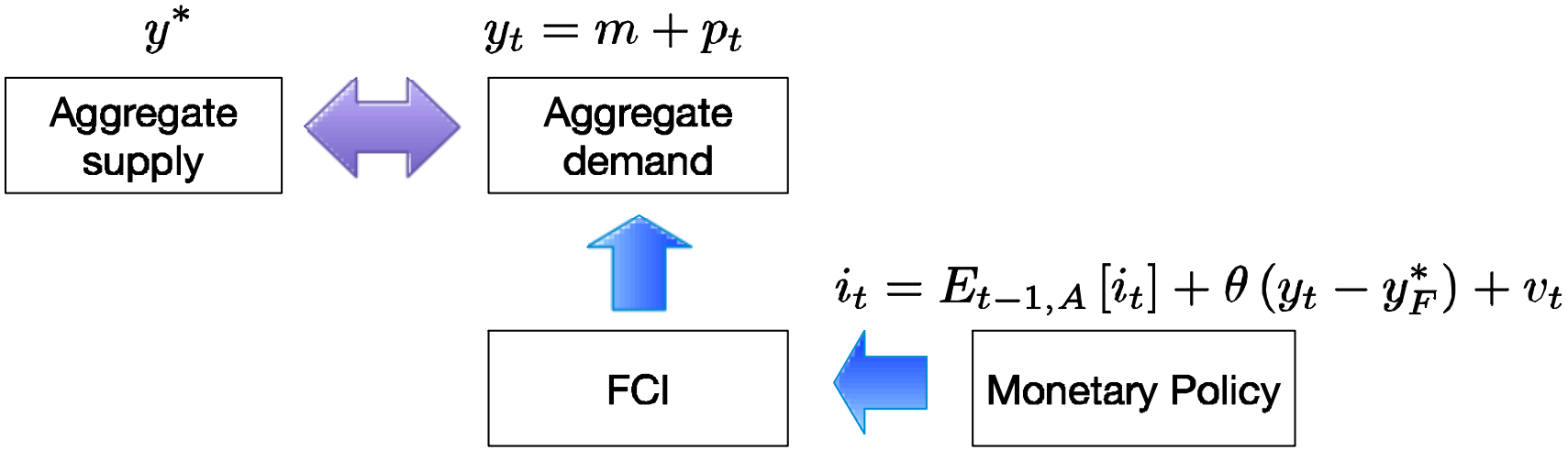
Sketch of the model



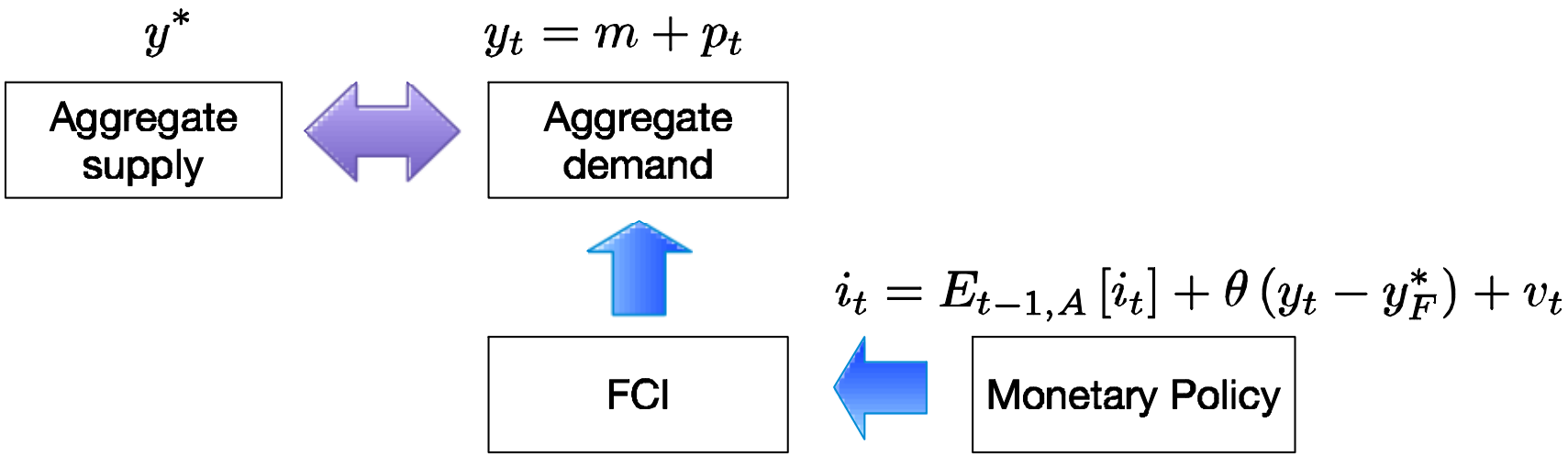
Sketch of the model, with equations



$$p_t = \rho + E_{t,A}[p_{t+1}] - (i_t + rp_t) + var_{t,A}(p_{t+1})\mu_t$$

The model has three key features consistent with the motivating evidence

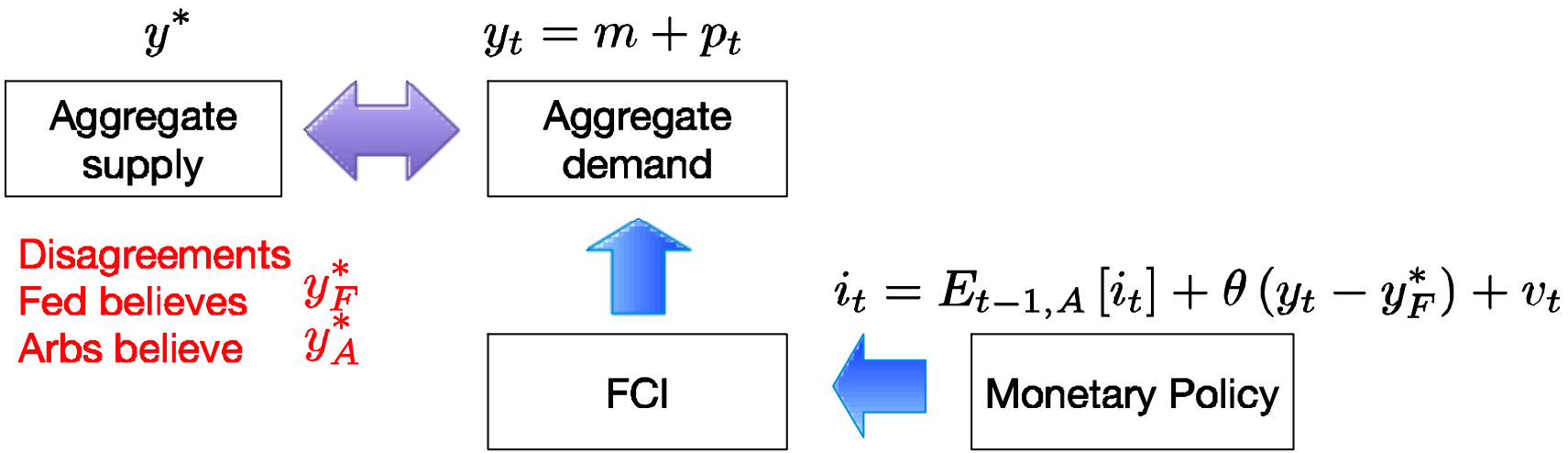
Feature 1: Noise affects FCI due to limits to arbitrage



$$p_t = \rho + E_{t,A}[p_{t+1}] - (i_t + rp_t) + var_{t,A}(p_{t+1})\mu_t$$

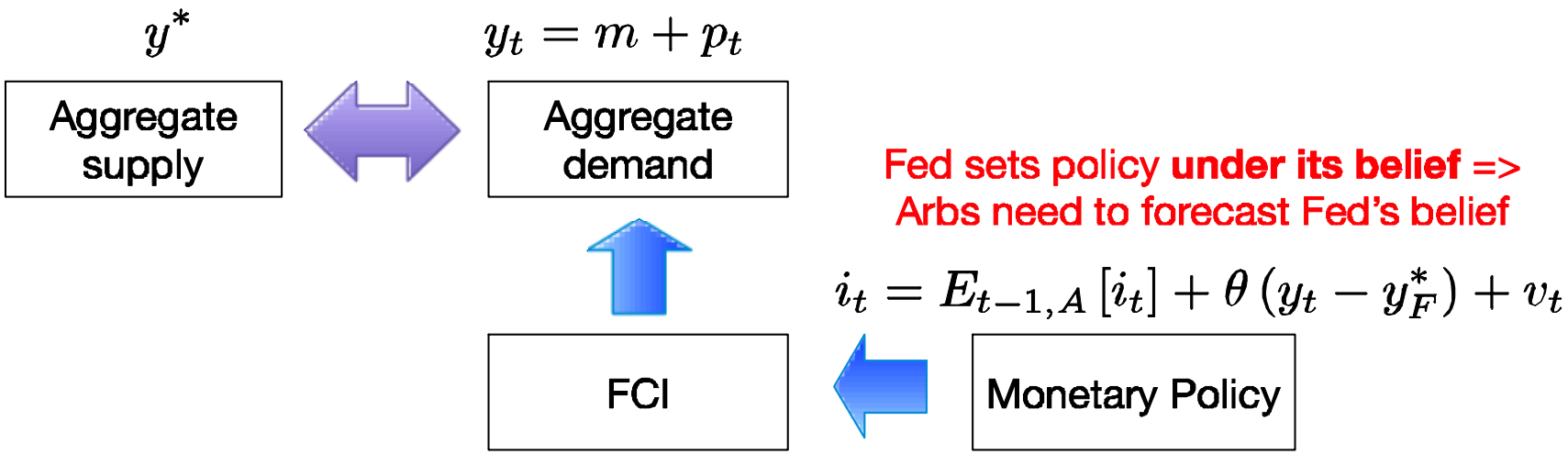
Noise affects the FCI, with higher impact when Arbs perceive greater variance

Feature 2: Fed and Arbs have different beliefs



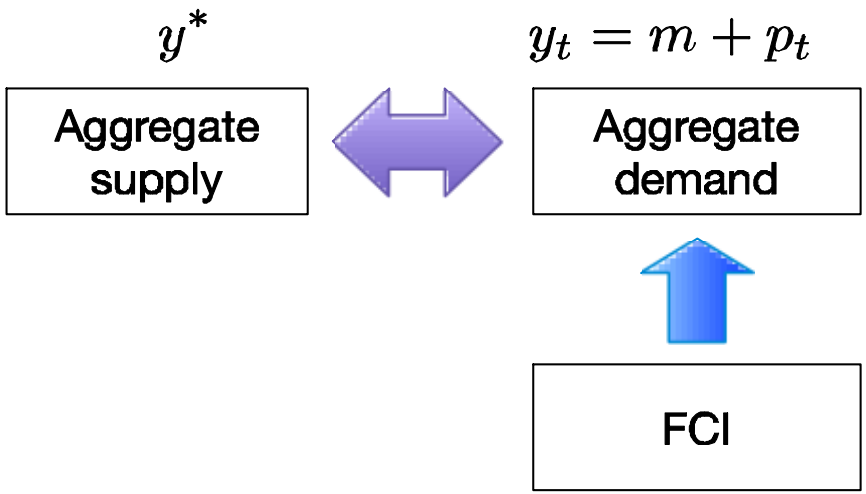
$$p_t = \rho + E_{t,A}[p_{t+1}] - (i_t + rp_t) + var_{t,A}(p_{t+1})\,\mu_t$$

Feature 2 (cont.): Fed's belief creates policy uncertainty for Arbs



$$p_t = \rho + E_{t,A}[p_{t+1}] - (i_t + rp_t) + var_{t,A}(p_{t+1})\,\mu_t$$

Feature 3: Fed is gradual so communication can be useful



Fed sets policy **gradually** =>
It has limited **direct** control over FCI =>
Communication with Arbs can be useful

$$i_t = E_{t-1,A}\left[i_t\right] + \theta\left(y_t - y_F^*\right) + v_t$$

$$p_t = \rho + E_{t,A}\left[p_{t+1}\right] - \left(i_t + rp_t\right) + var_{t,A}\left(p_{t+1}\right)\mu_t$$

Benchmark with common beliefs: Noise slips into FCs

Benchmark with $y^* = y_F^* = y_A^*$. Arbs already know Fed's beliefs $\Longrightarrow$

$$p_t = p^* + \frac{1}{1+\theta}\left(\sigma^2 \mu_t - v_t\right), \quad \text{where } p^* \equiv y^* - m.$$

$$\sigma^2 = \left(\frac{1}{1+\theta}\right)^2 \left(\left(\sigma^2\right)^2 \sigma_\mu^2 + \sigma_v^2\right). \quad \text{(Fixed Point)}$$

Key Insights

- *"p-star" depends* **only** *on macroeconomic factors (supply & demand)*
- *p is influenced by financial factors* **including noise** *(gradualism)*
- **Destabilizing feedback** *between volatility and impact of noise on FCI*

Disagreements induce tantrums and policy uncertainty

- Fed believes potential output is y_F^*. Arbs believe it is y_A^*
- Creates disagreement about "p-star": $p_F^* = y_F^* - m$ vs $p_A^* = y_A^* - m$
- Arbs are uncertain about Fed's belief, with prior $p_F^* \sim_A N\left(\tilde{p}_{FA}^*, \tilde{\sigma}_{FA}^2\right)$
- Policy i_0 partially reveals Fed's belief, with posterior $p_F^* \sim_A N\left(p_{FA}^*, \sigma_{FA}^2\right)$

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Two main problems:

1. Arbs may misundertand current policy intentions: **Tantrum shocks**

$$\tau_0 = p_F^* - p_{FA}^*$$

2. Arbs perceive greater future volatility due to **policy uncertainty**

$$var_{0,A}\left(p_1\right) = \sigma_{FA}^2 + \sigma^2$$

Tantrums and policy uncertainty induce excessive gaps

Equilibrium when Arbs are uncertain about the Fed's belief for "p-star":

$$p_0 = p_F^* + \frac{1}{1+\theta}\left(\sigma_1^2\mu_0 - v_0 - \tau_0\right) \quad \text{with } \tau_0 = p_F^* - p_{FA}^*.$$

$$y_0 = y_F^* + \frac{1}{1+\theta}\left(\sigma_1^2\mu_0 - v_0 - \tau_0\right) \quad \text{with } \sigma_1^2 = \sigma_{FA}^2 + \sigma^2.$$

Key Insight

Unnecessary output gaps due to tantrums and amplified noise impact

1. **Tantrum shocks:** *Arbs' misunderstanding affects financial conditions*
2. **Policy uncertainty** *discourages Arbs from countering market noise*

FCI-plot communication addresses both problems

FCI-plot communication: Suppose the Fed truthfully announces

$$\begin{aligned} E_{0,F}[p_0] &= p_F^* + \frac{1}{1+\theta}\left(\sigma^2\mu_0 - v_0\right). \\ E_{0,F}[p_1] &= p_F^*. \end{aligned}$$

This reveals Fed's "pstar" and reduces Arbs' uncertainty about future p

Main Result

Announcing the FCI-plot is highly effective to reduce output gaps:

- *Eliminates tantrum shocks* $\tau_0 = 0$
- *Reduces Arbs' perceived variance* $\sigma^2 < \sigma_{FA}^2 + \sigma^2$ *and impact of noise*

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FCI-plot communication: Suppose the Fed truthfully announces

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Main Result

Announcing the FCI-plot is highly effective to reduce output gaps:

- *Eliminates tantrum shocks* $\tau_0 = 0$
- *Reduces Arbs' perceived variance* $\sigma^2 < \sigma_{FA}^2 + \sigma^2$ *and impact of noise*

In contrast, rate-plot communication that announces $E_{0,F}\left[i_1\right] = \rho - \frac{1}{2}\sigma^2$ *is uninformative (extreme, but principle is more general)*

Scenario-based FCI-plot communication

Date 0:
Announcement

Date 1:
Fed and Arbs disagree about states

State F

Fed's view remains at p_F^*

State A

Fed's view shifts to $p_F^*(A) \in (p_F^*, p_A^*)$

Arbs don't know $p_F^*(A)$

Simple FCI-plot is insufficient with data dependency

Date 0:
Announcement

Date 1:
Fed and Arbs disagree about states

Standard FCI-plot:

Fed announces $E_{0,F}[p_1] = p_F^*$

State F

Fed's view remains at p_F^*

No information about $p_F^*(A)$

which is what Arbs want to know

State A

Fed's view shifts to $p_F^*(A)$

Scenario-based FCI-plot communicates "reaction function"

Date 0:
Announcement

Date 1:
Fed and Arbs disagree about states

Scenario-based FCI-plot:

Fed announces $E_{0,F}[p_1|F] = p_F^*$

State F

Fed's view remains at p_F^*

Fed also announces $E_{0,F}[p_1|A] = p_F^*(A)$

State A

Fed's view shifts to $p_F^*(A)$

Key Insight

Scenario-based FCI-plot generates stronger recruitment effect, even when beliefs about scenario likelihood differ

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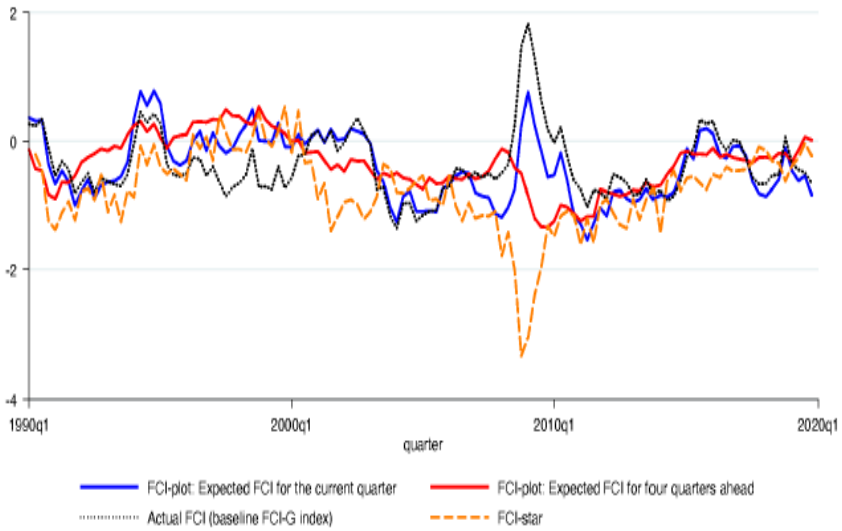
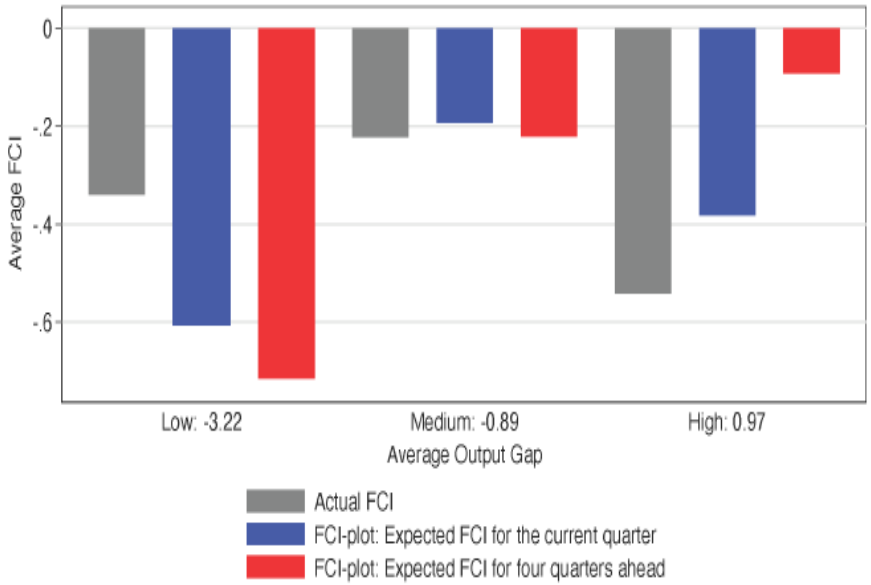
A proof-of-concept FCI-plot with historical data

Optimization Problem

$$\mathcal{L} = \sum_{t=0}^{\infty} \beta^t \left[\pi_t^2 + \tilde{y}_t^2 + \lambda_{\Delta i} (i_t - i_{t-1})^2 \right].$$





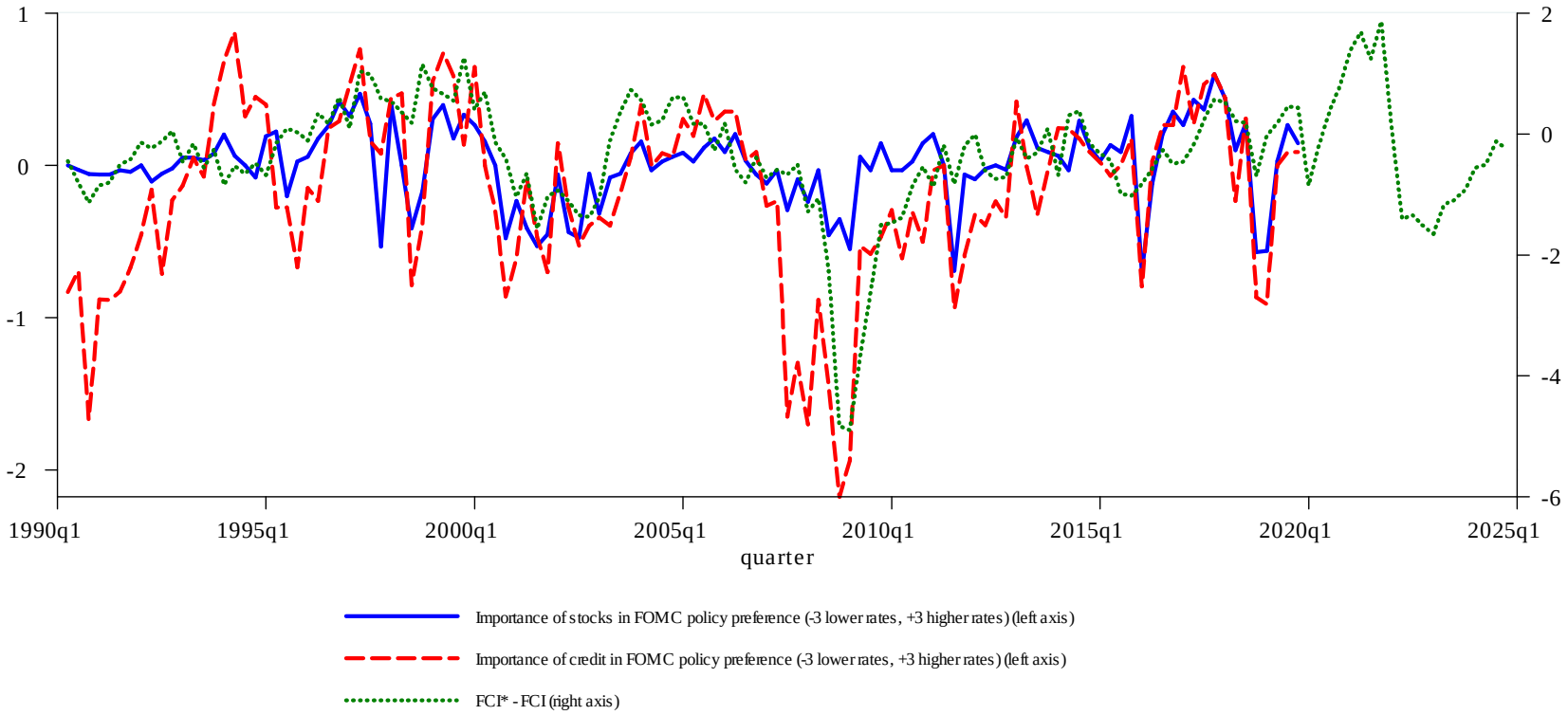
Source: See Caballero et al. (2024) for details on the procedure.

Final remarks

Key Findings

- Markets' uncertainty about central bank's desired financial conditions creates misunderstandings ("tantrums")
- Higher uncertainty raises the impact of noise on financial conditions
- FCI-plot communication eliminates tantrums and recruits arbitrageurs to insulate financial conditions from noise, enabling an "agree-to-disagree" equilibrium despite differing views
- FCI-plot scenario-based guidance is particularly useful when there are severe disagreements about the likelihood of near-future states of the economy

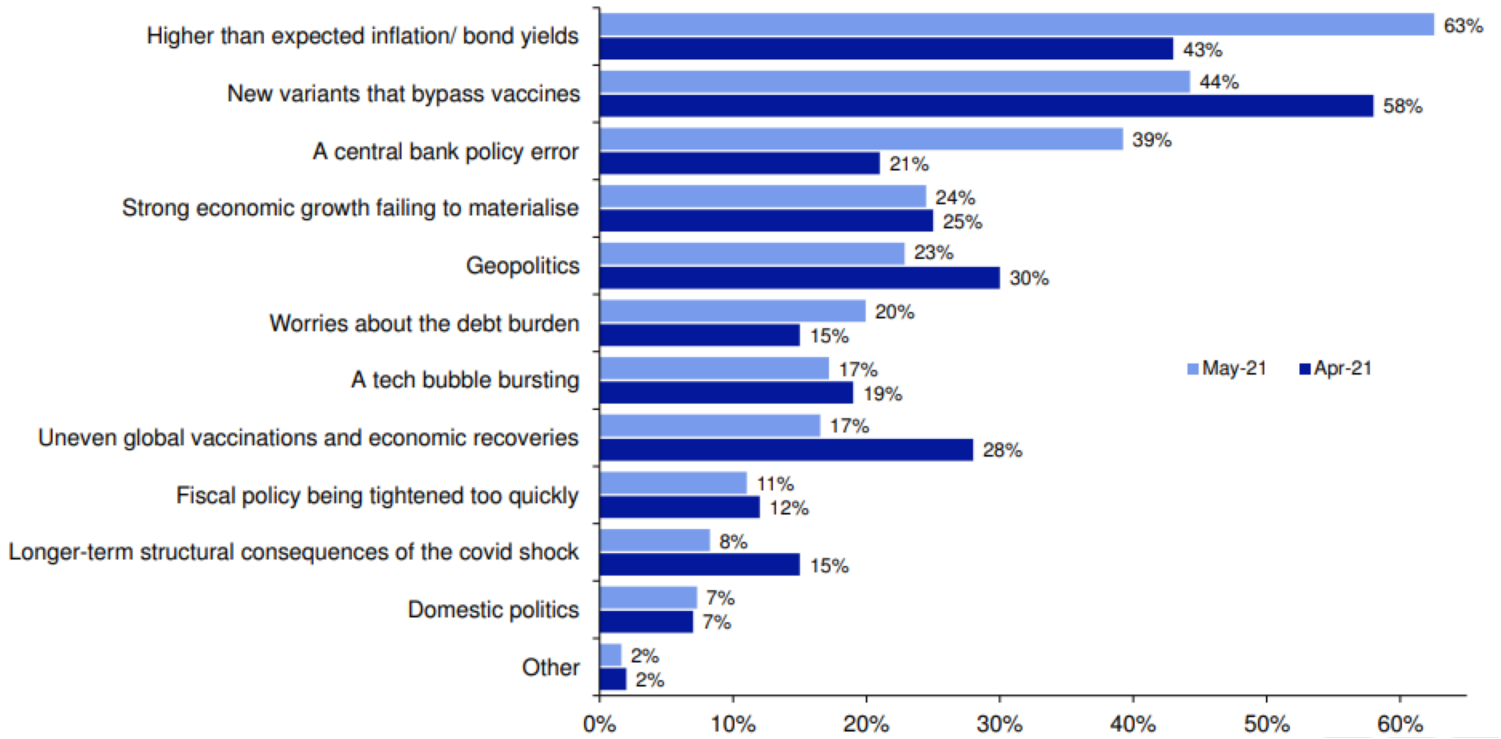
Central banks have views about desirable FCs



Alignment between FOMC policy preferences for FCIs and FCI gaps.
Source: Laarits et al. (2025) and Caballero et al. (2025)

Markets perceive policy "errors"

Figure 1: Which of the following do you think pose the biggest risks to the current relative market stability? Please select up to three



Source : dbDIG Survey, Deutsche Bank Research

Source: Deutsche Bank Markets Research, May 2021 (based on 620 responses)

Discussion of
"FCI-plot: Central Bank Communication through Financial Conditions" by Caballero-Simsek

Markus K. Brunnermeier

2nd Thomas Laubach Conference
Federal Reserve Review 2025

Washington, DC 2025-05-16

The FCI-Plot Proposal

- "Communicate" FCI_t (Financial Condition Index)
  to **enlist** financial arbitrageurs to lean more strongly against financial noise traders
  - future FCI_ts - a whole path (scenario-contingent) i.e. "**FCI-forward guidance**"
  - unlike interest rate rule (reaction function),
    FCI_t is **not** a policy **instrument** – pure communication

  - Expand the SEP projections

- Pure communication ("**Delphian**") CS25

- Communication and commitment ("**Odyssean**") CS24 (previous paper)
  (to overcome time-inconsistency problem)

Halls of Mirror Effect – A Warning Bernanke 2004

- A situation in which a CB's **reaction function** and **financial market prices interact** in economically suboptimal and potentially destabilizing ways
- Central bank policy choices and private sector beliefs about the economy are intertwined and lead to **unintended consequences**, like **self-reinforcing effects** that undermine the effectiveness of monetary policy.

- The central bank's expectations excessively reflect the private sector's expectations and vice-versa.
  - For example, the central bank cuts interest rates sharply in response to a recession.
  - Private agents mistakenly attribute it to Fed's views about the long-run real interest rate in the economy.
  - In response, the private sector lowers their own estimate of r-star, prompting output and inflation to fall.

“Whispering Effect” Jeremy Stein

- Central bank does not want to scare and erupt financial markets
- Speaks only “softly”
- Financial markets listen more carefully and interpret any micro-announcement
- Central bank speaks even more softly
- Financial markets interpret every nano-announcement
- ….

FCI – Which One? How to Design?

- One-dimensional or multi-dimensional index

- Big decision:
  - **Price of risk** / risk premium / spreads (portfolio choice/investment)
    - For which risk/market (if financial markets are segmented)
    - Tail risks (or normal risk)
  - Market **capitalization** to capture **wealth effects** (of consumption) CS24/25
    - In model p_t = market capitalization of all wealth (including government bonds)
    - Indirectly the price of risk through $Var(p_{t+1})$ to reduce arb's risk exposure

CS24/25: FCI vs. Output Gap Communication

- Consumption$_t$ = time preference rate $*$ $\mathbf{Net\ worth}_t$ (wealth) $= \rho * p_t$ (log-utility)
- Hence, FCI-communication of $\{\mathbb{E}_t p_s\}_{s \geq t}$ = communication of consumption
  = output-communication (since no investment)
- In CS25:
  Communication about output is as good as FCI-communication
  - Q: Why to add FCI-communication?
  - Q: What should one communicate if FCI and output are not 1:1-connected?

- In CS24: FCI and output are not 1:1-connected due to noise term δ_t
  - **actual** objective function has output gap (and inflation gap) as argument (not FCI gap)
  - **operational** objective function includes FCI gap (process) $\{p_s\}_{s \geq t}$ (with weight ψ)

  - **Odyssean Commitment (forward guidance)**…
    committing to "operational objective function" (with small ψ-weight) allows superior implementation than actual objective function (ψ=0) due to partial commitment.

Communication & Rule: Policy Instrument vs. Input

- **Single instrument: Only Interest rate**
  - **Taylor Rule** + Communication — Caballero-Simsek (2025)
  - $i_t = r_t^* + \pi_t + f(\pi_t - \pi^*, \underbrace{output_t - natural\ output_t^*}_{output\ gap\ (FCI_t - FCI_t^*)})$
    - FCI gap ⇔output gap (1:1-function)

- **Multiple Instruments + price of risk focus**
  - "Generalized/multi-dimensional Taylor Rule" — Alexandrov-Brunnermeier (2025)
  - Interest rates (excess, required reserves), price of risk, …
  - $\begin{pmatrix} i_t, \underline{i}_t \\ QE, QT, \text{price of risk} \end{pmatrix} = F(\pi_t - \pi^*, output\ gap, Financial\ Condition)$
    - FCI gap ⇏ output gap

Tantrums and FCI-Communication

- "Tantrum theory":
  - Abrupt believe changes about future monetary policy **PATH**
  - Tipping point – jump in equilibrium/incl. higher order beliefs
  - In CS25: financial market arbitrageurs' beliefs about Fed's "pstar" differs from Fed's suddenly released!
  - Q: Does discontinuous jump with FCI communication just occur earlier – when announcement occurs

- Gradual communication
  - Is FCI release sufficiently subtle?
  - Can FCI-communication be smoothed? What's the optimal frequency of revisions?

Financial Dominance

- Excessive volatility of price of risk
  due to imbalances in financial system

- **Financial Dominance**
  limits monetary policy space because it ruins financial stability
  (impairment monetary transmission mechanism)

- Q: Does FCI-communication limit or enhance financial dominance?

Political Economy: Fed is Seen as giving Investment Advice

- Predicting the value of all asset, market cap of S&P plus bond portfolio, p_t^* can be interpreted as **investment advice** from the FED
- SEP projections of GDP growth, unemployment, and inflation is not (despite hair diagram)
- Investors might make Fed responsible for losses from this "advice"
- E.g. Greenspan's "Irrational exuberance" statement is still controversial
- It might damage Fed's independence.

Wall Street vs. Main Street Communications

- Does FCI-communication simplify or complexify communication?
- Who will benefit primarily?
  - Wall Street or Main Street
  - Does it create asymmetric information between them?
- CS argue that Main street doesn’t need to know.

FCI communication, in sum

- Generally, I am sympathetic to more communication on Financial Conditions, but …
  - Halls of Mirror
  - Whispering Effect
- Communication (Delphian signaling only) vs. Commitment (Odyssean)
- What is a good FC Index?
  - Can it be reduced to a one-dimensional index?
  - What should it reflect? Market cap (incl. bonds) or price of risk/risk premia
  - SEP: Why not communicate in addition to GDP growth rate, if Market cap = consumption = output
- Multi-dimensional policy instruments: balance sheet measures (price of risk)
  - Communicating “Generalized Taylor Rule”
- Tamper Tantrum
- Investment advice problem: Threatens Fed Independence

Session 5: Financial Market Expectations: Implications for Policy and Communications

Q&A

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Discussant: Markus Brunnermeier, Princeton University

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Break

Coming Up Next:
Session 6: Enhancing Monetary Policy Communications

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