FCI-plot:
Central Bank Communication Through Financial Conditions

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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

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

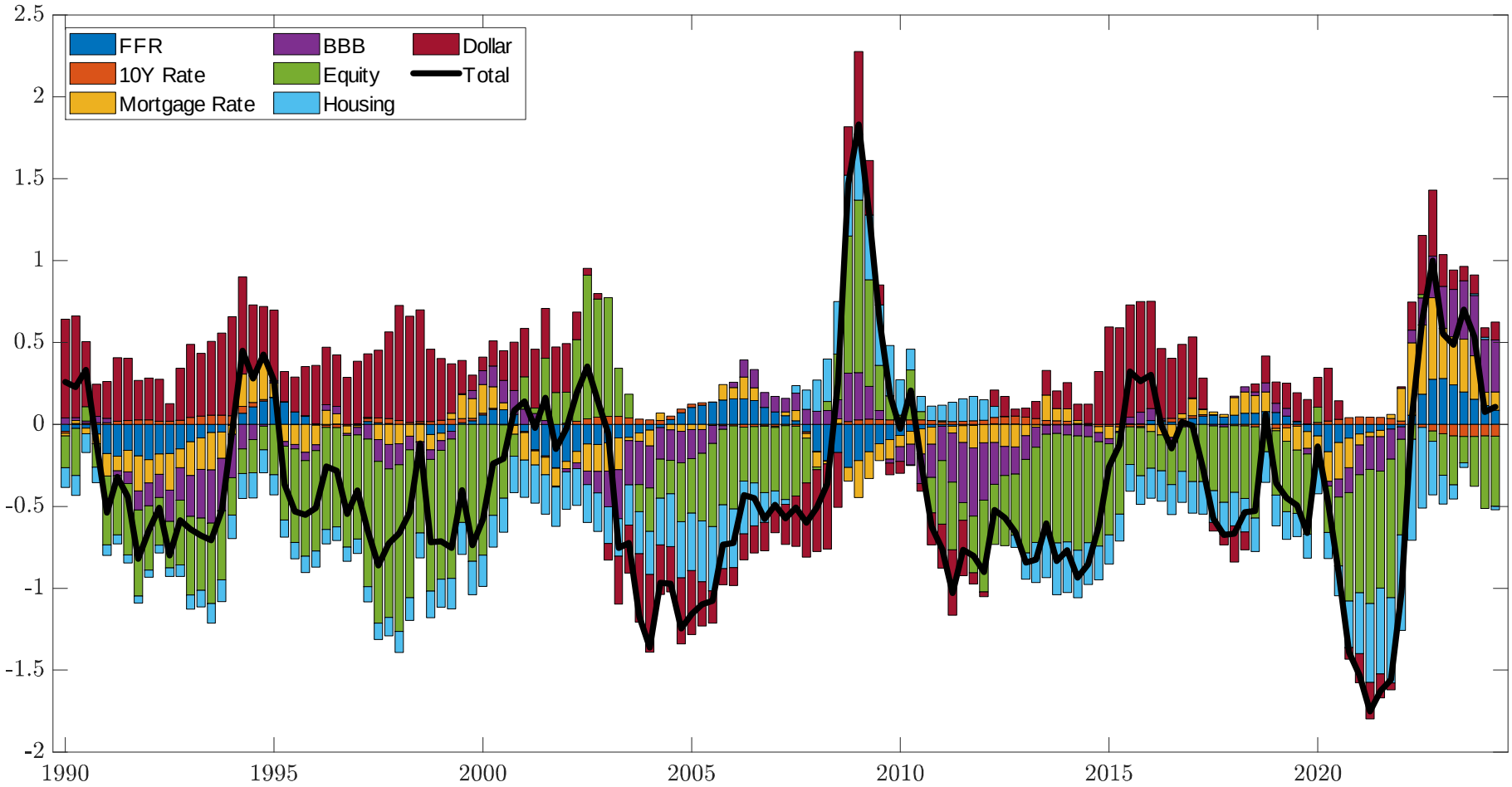
Chair Powell on Policy Transmission (2022)

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

Keynes (1936)

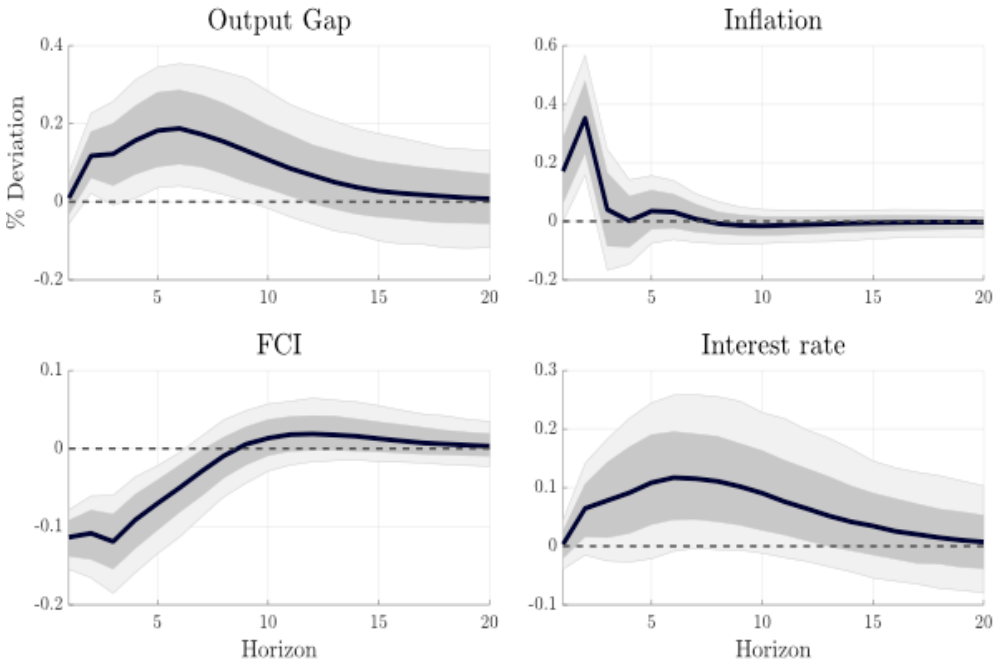
"...there are not many people who will alter their way of living because the rate of interest has fallen from 5% to 4% (...) Perhaps the most important influence (...) depends on the effect of these changes on the appreciation or depreciation in the prices of securities"

FCs are primarily driven by risky asset prices

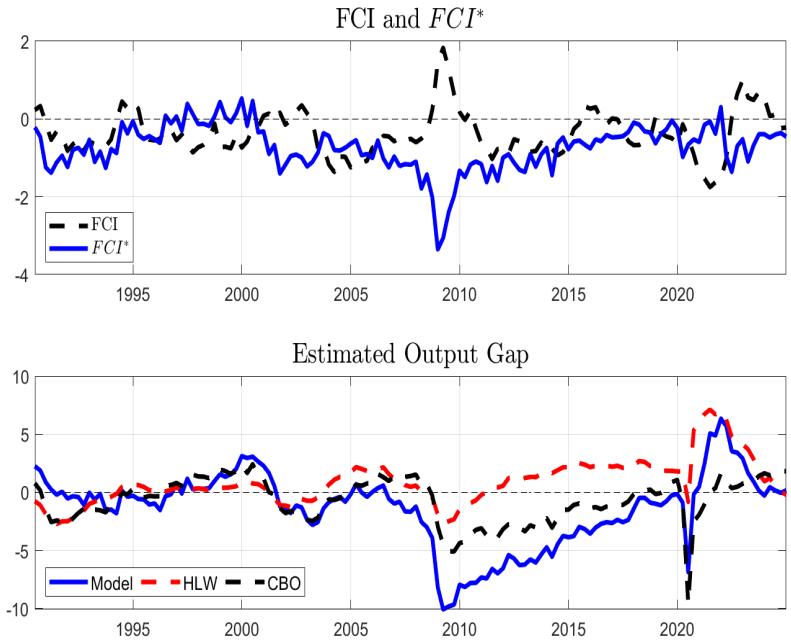


FCI-G index and its drivers. Source: Ajello et al. (2024)

FCs are "noisy" and cause macroeconomic fluctuations



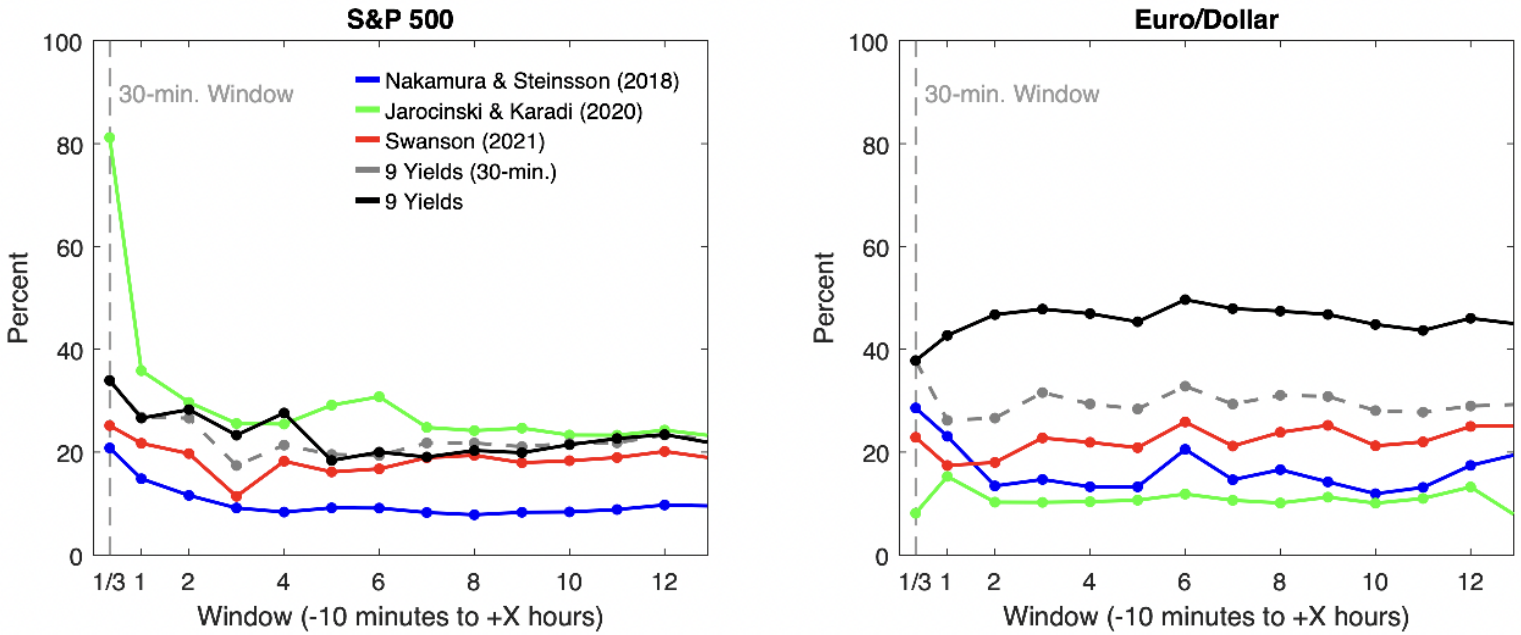
Impulse response to a financial noise shock. Source: Caballero et al. (2024)



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

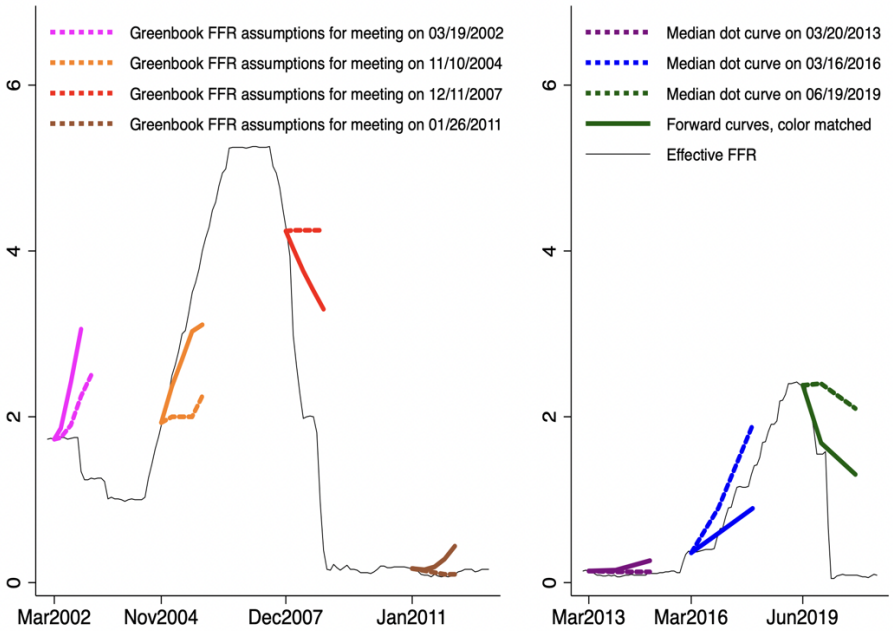
Monetary policy affects FCs via channels beyond rates

- 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

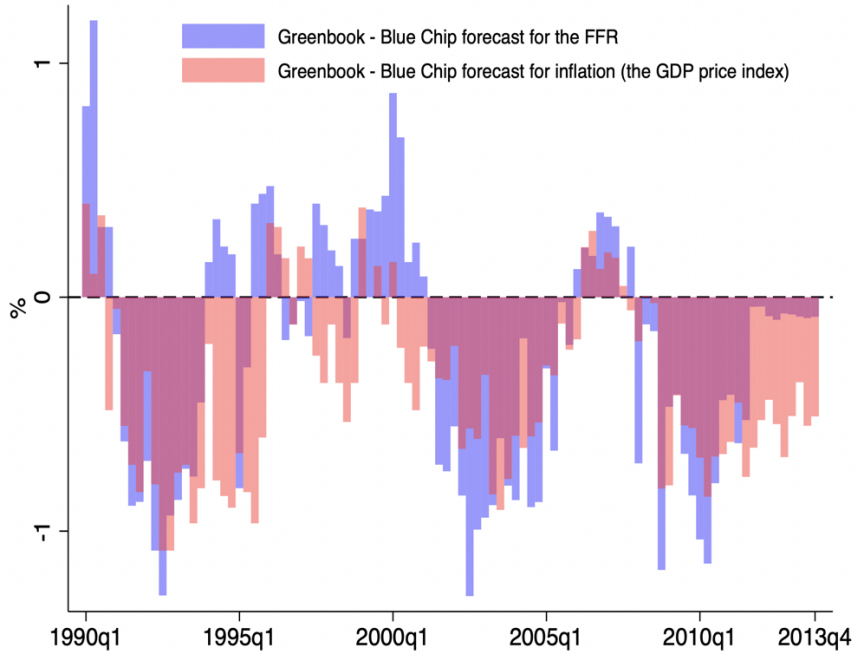


R2 of regressing log returns on high frequency FOMC shocks. Source: Boehm and Kroner (2024)

Markets routinely disagree with central banks



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

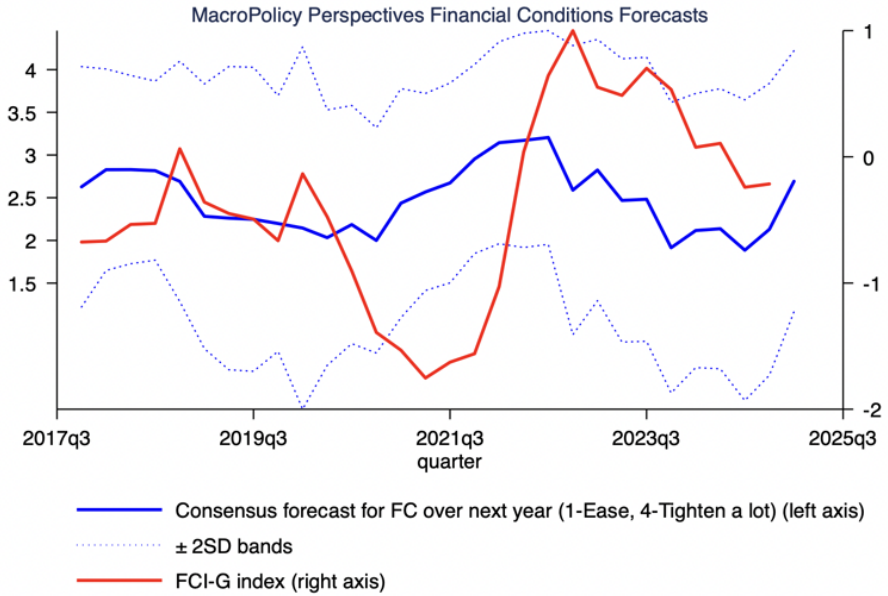


Alignment of interest rate and inflation disagreements.

Source: Caballero and Simsek (2022)

Disagreements also imply that markets often perceive policy "errors"

Markets are uncertain about FCs conditional on outlook

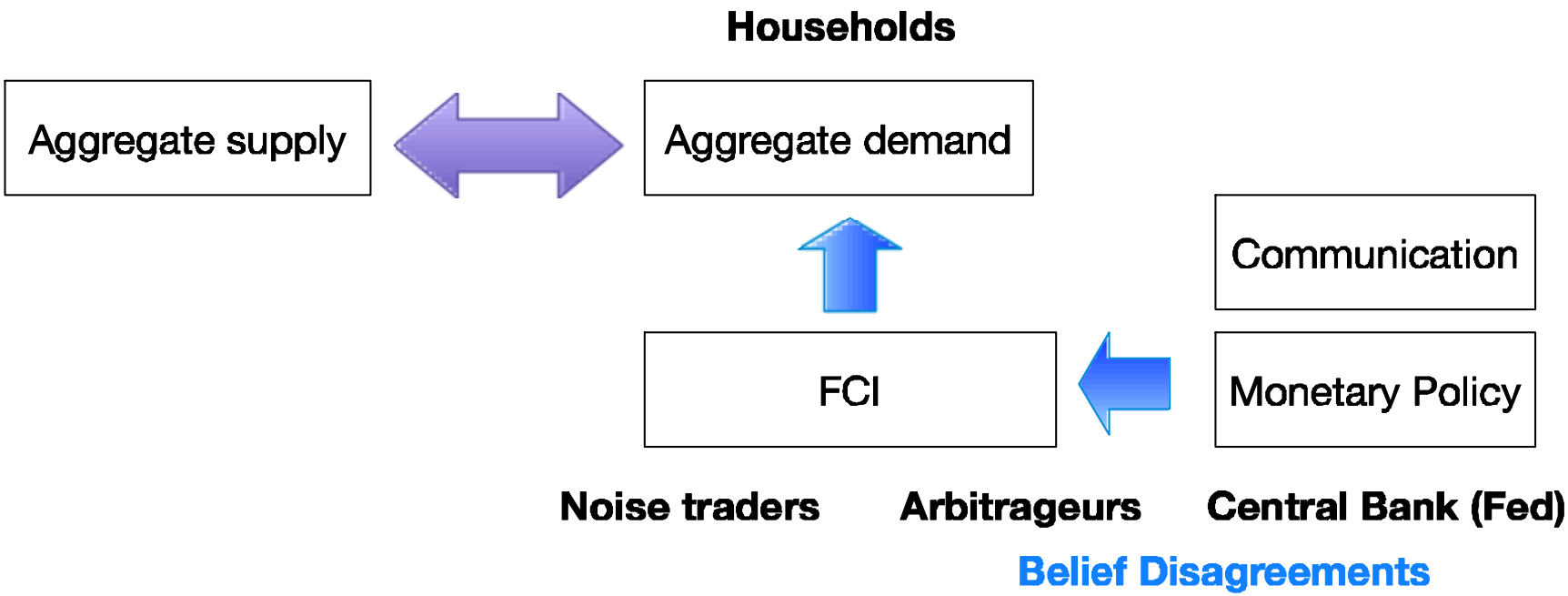


	(1) FC change (until Q4)	(2) FFR change (until Q4)
Unemp. forecast (Q4)	0.040	-0.110**
	(0.023)	(0.031)
Core PCE forecast (Q4)	-0.018	0.204**
	(0.036)	(0.046)
Forecaster and Quarter FE	Yes	Yes
Observations	1,752	1,730
Adjusted R-squared	0.378	0.878

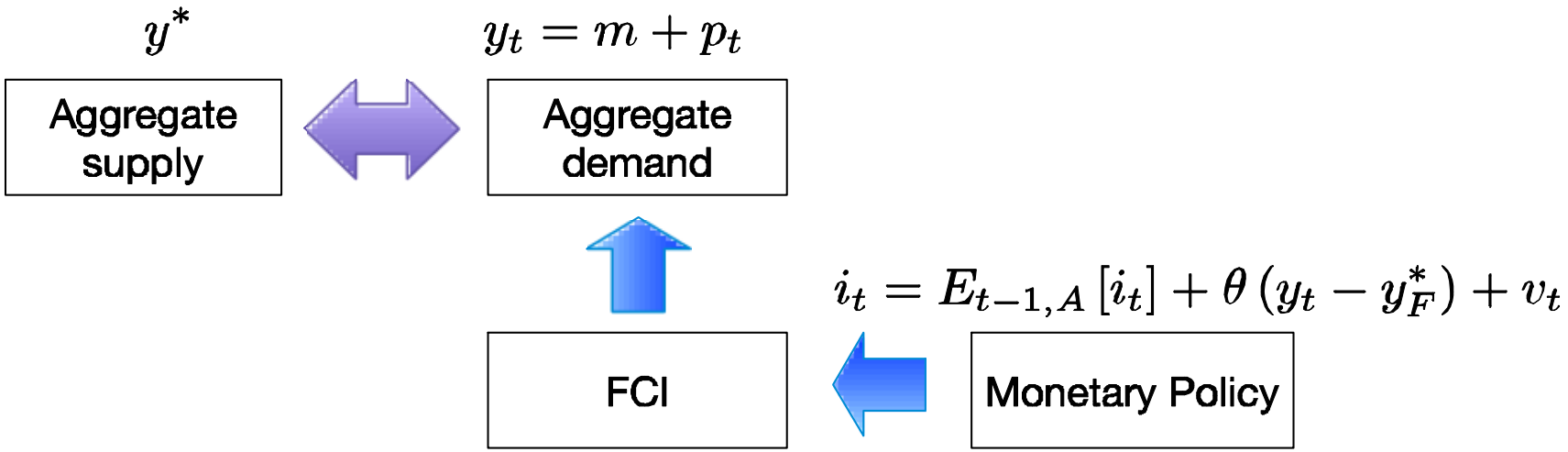
Source: MacroPolicy Perspectives Shadow Survey (Coronado and Rosner-Warburton, 2025)

Roadmap

Sketch of the model



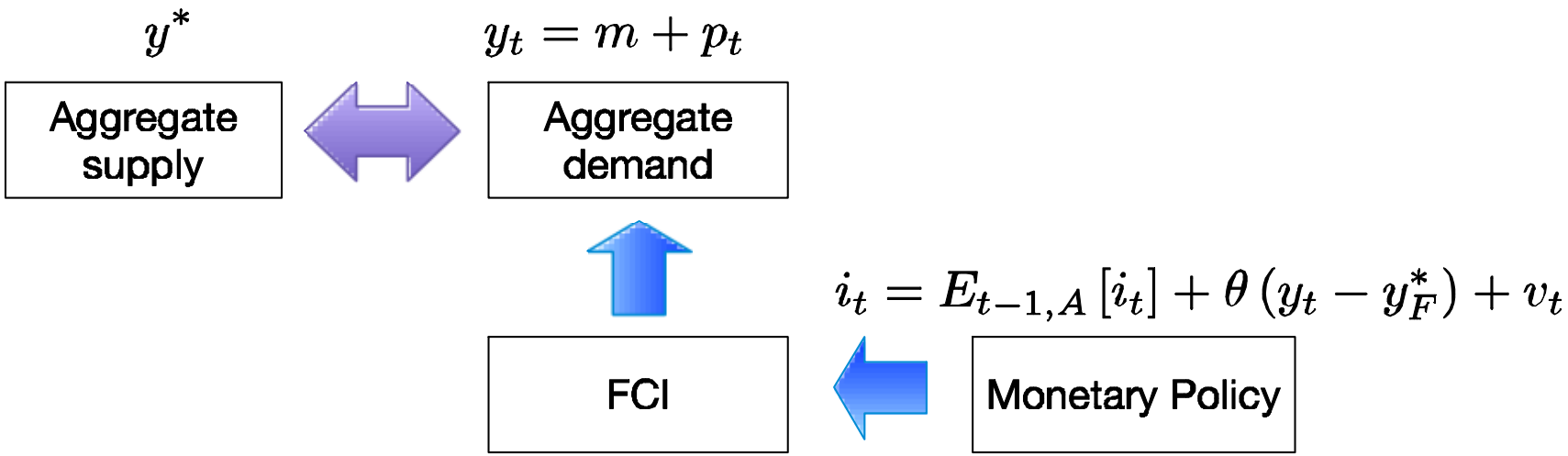
Sketch of the model, with equations



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

The model has three key features consistent with the motivating evidence

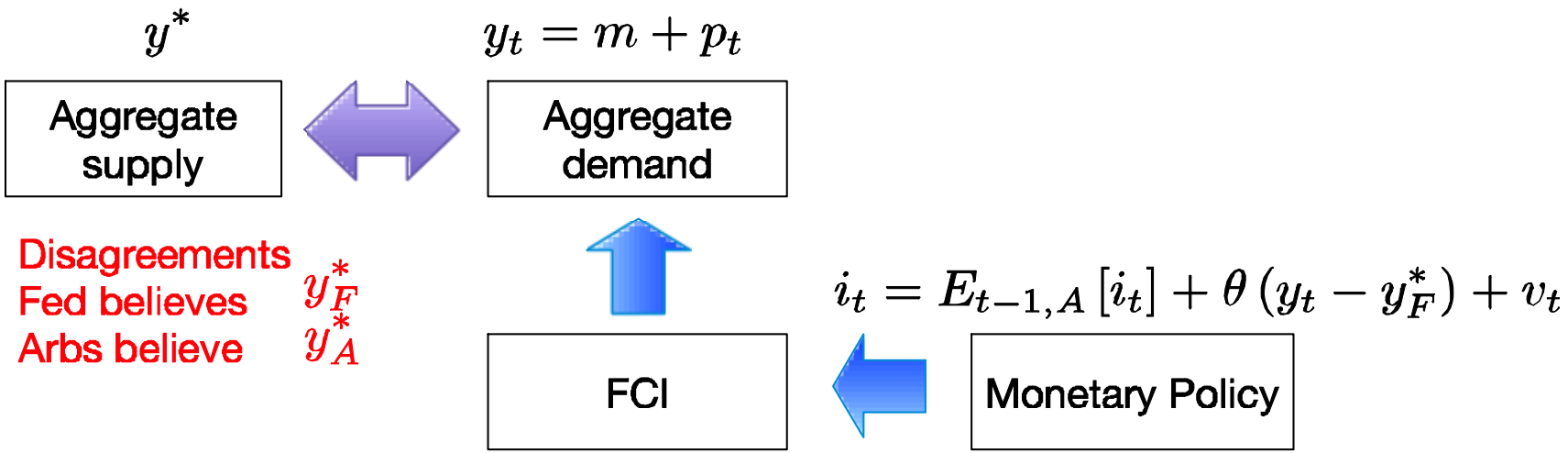
Feature 1: Noise affects FCI due to limits to arbitrage



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

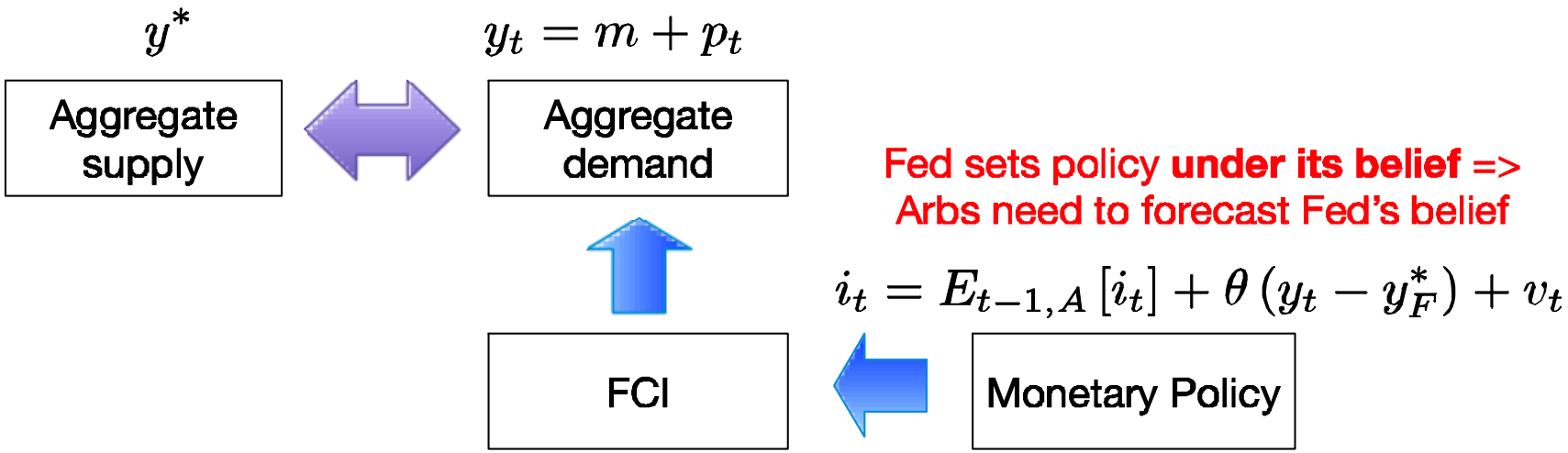
Noise affects the FCI, with higher impact when Arbs perceive greater variance

Feature 2: Fed and Arbs have different beliefs



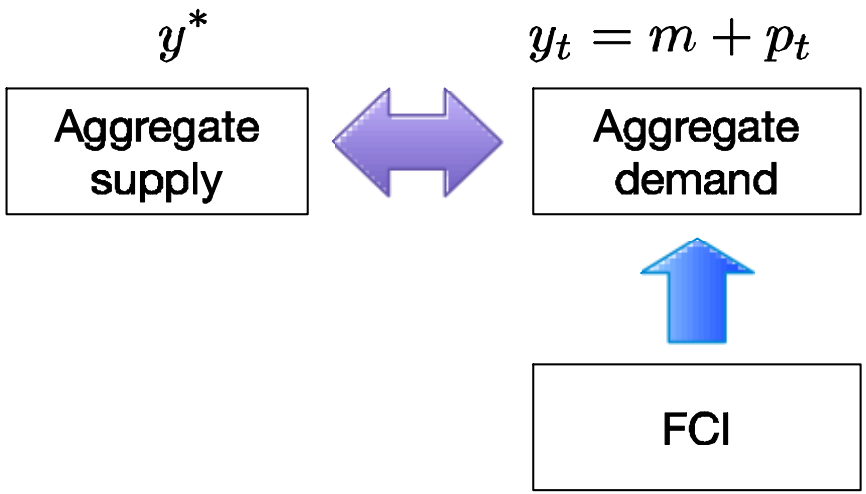
$$p_t = \rho + E_{t,A}[p_{t+1}] - (i_t + rp_t) + var_{t,A}(p_{t+1})\,\mu_t$$

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":

$$\begin{aligned} p_0 &= p_F^* + \frac{1}{1+\theta}\left(\sigma_1^2\mu_0 - v_0 - \tau_0\right) \quad \text{with } \tau_0 = p_F^* - p_{FA}^*. \\ y_0 &= y_F^* + \frac{1}{1+\theta}\left(\sigma_1^2\mu_0 - v_0 - \tau_0\right) \quad \text{with } \sigma_1^2 = \sigma_{FA}^2 + \sigma^2. \end{aligned}$$

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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- *Eliminates tantrum shocks* $\tau_0 = 0$
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In contrast, rate-plot communication that announces $E_{0,F}[i_1] = \rho - \frac{1}{2}\sigma^2$ *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

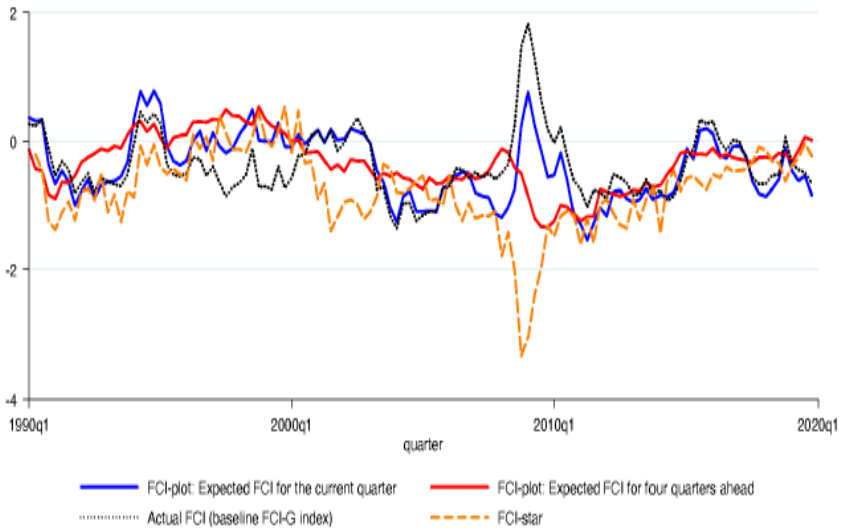
Scenario-based FCI-plot generates stronger recruitment effect, even when beliefs about scenario likelihood differ

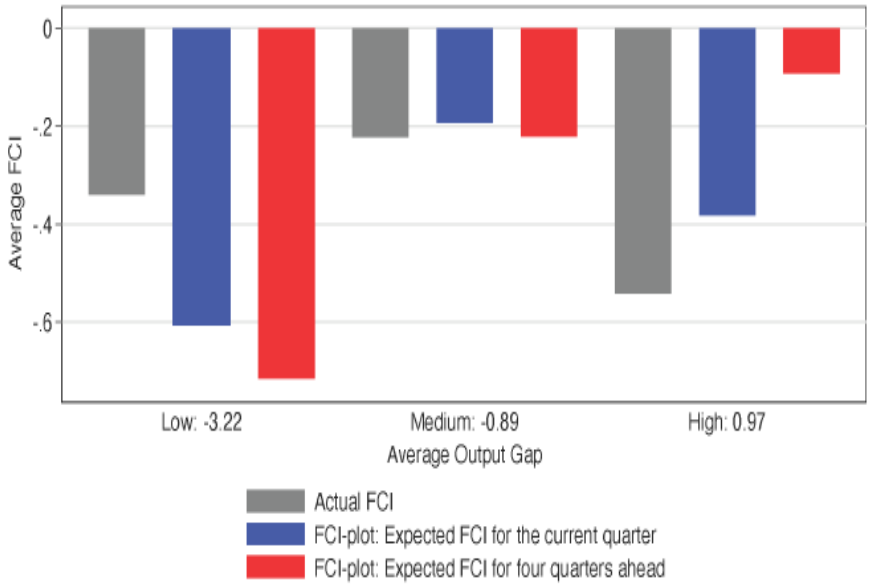
Roadmap

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

Optimization Problem

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





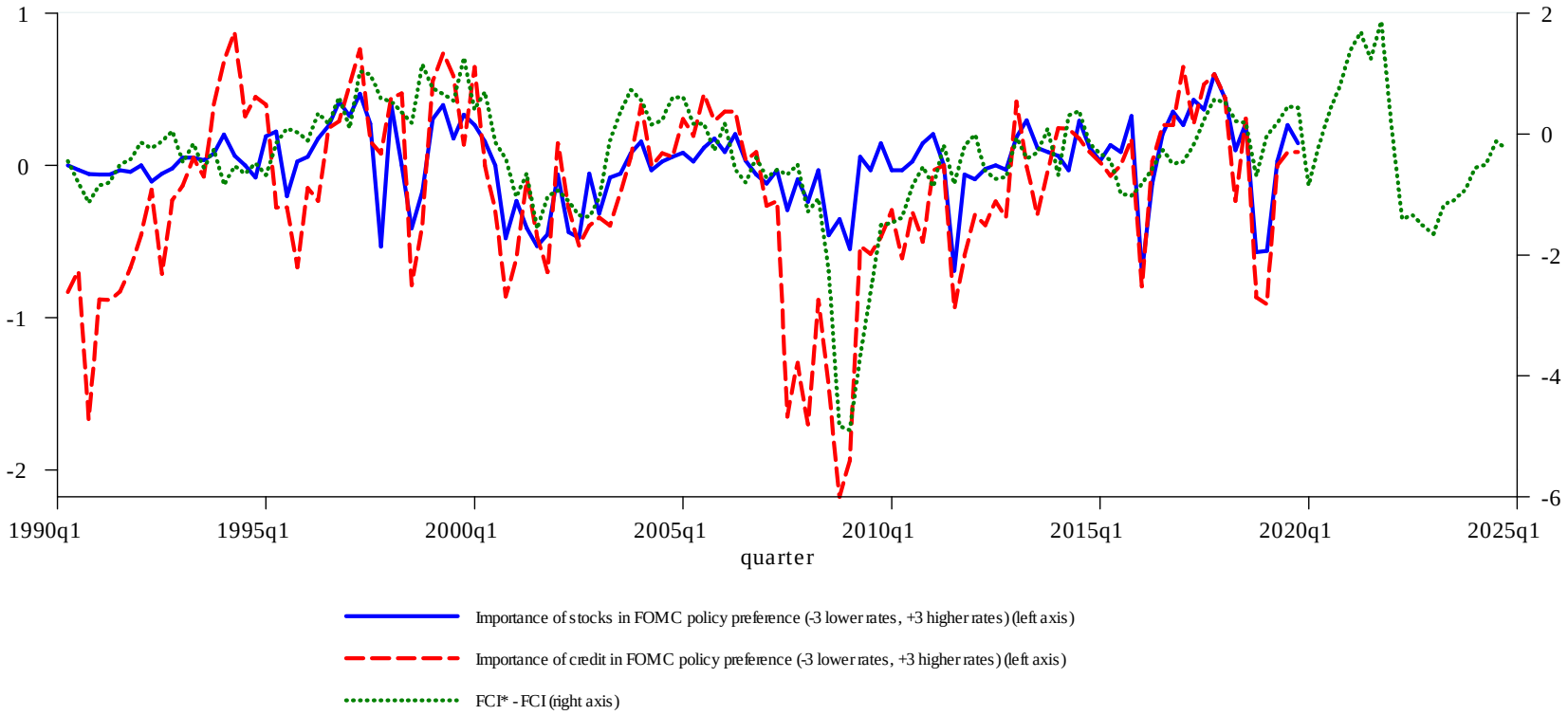
Source: See Caballero et al. (2024) for details on the procedure.

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

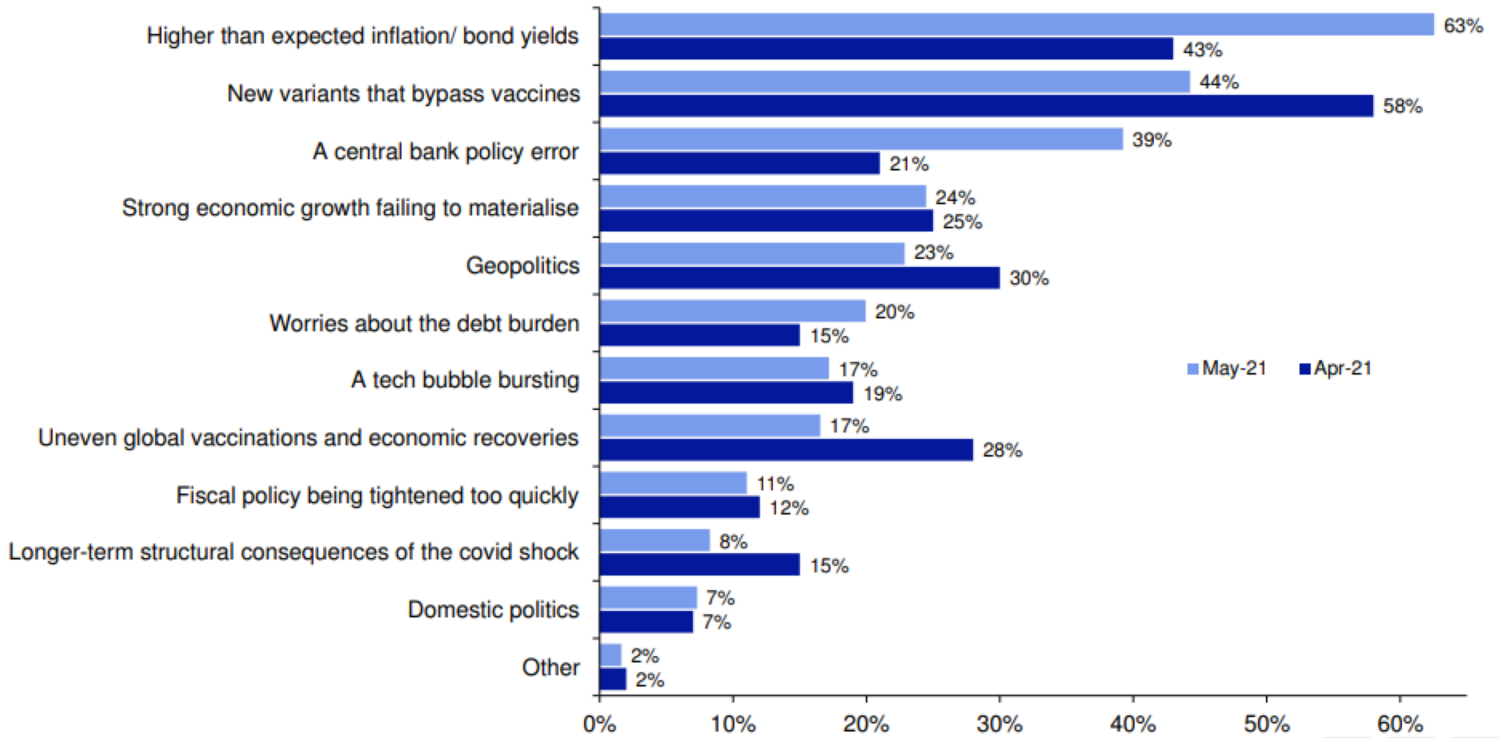
Central banks have views about desirable FCs



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)