FCI-plot: Central Bank Communication Through Financial Conditions

Ricardo J. Caballero and Alp Simsek*

May 14, 2025

Abstract

This paper examines how central banks can improve monetary policy effectiveness through enhanced communication with financial markets. We motivate our analysis with eight empirical facts that highlight the key role of volatile financial conditions in policy transmission, the pervasiveness of disagreements between the markets and the central bank, and the limitations of traditional interest rate projections for conveying policy intentions. We develop a theoretical framework consistent with these facts and investigate its implications for policy communication. Our model reveals that market participants' uncertainty about the central bank's desired financial conditions creates the possibility of misunderstandings ("tantrums") and amplifies the effects of noise trading on financial conditions. We show that directly communicating the central bank's expected financial conditions path (**FCI-plot**), eliminates tantrums and recruits arbitrageurs to insulate financial conditions from noise. In contrast, communicating expected interest rates alone fails to achieve these benefits. We also demonstrate that a *scenario*-based FCI-plot communication enhances the recruitment effect. This occurs when market participants disagree with the central bank regarding near-term scenario probabilities and seek to understand the central bank's "reaction function." Overall, FCI-plot communication enables an "agree-to-disagree" equilibrium where markets help implement the central bank's objectives despite differing views.

Link to Latest Version

*Contact information: Caballero (MIT and NBER; `caball@mit.edu`) and Simsek (Yale SOM, NBER and CEPR; `alp.simsek@yale.edu`). This article was prepared for the 2nd Thomas Laubach Research Conference at the Board of Governors of the Federal Reserve System, Washington D.C., May 15–16, 2025. We thank Julia Coronado, Laura Rosner-Warburton, and Kaushik Vasudevan for sharing data. We also thank Tomas Caravello, Paul Fontanier, Valeria Morales, and Vicente Jimenez for their comments. Kentaro Sakato and Yingxuan Yang provided excellent research assistance. First draft: April 13, 2025.

1. Introduction

Unlike fiscal policy, which directly affects households and firms, monetary policy transmits to the real economy indirectly through financial markets. Households and firms respond to *financial conditions*—primarily, long-term interest rates, stock prices, house prices, and exchange rates—rather than to the policy rate itself. While monetary policy influences these financial conditions, they are ultimately determined in financial markets. This critical intermediary role makes effective central bank communication with markets essential for the successful implementation of monetary policy. Yet important questions remain: What specific advantages does enhanced communication with markets provide for monetary policy effectiveness, and which communication strategies best deliver these benefits? How should central banks manage frequent disagreements with market participants?

In this paper, we argue that better communication with financial markets improves monetary policy outcomes through two main channels: by eliminating market misunderstandings of policy (what we refer to as "tantrums") and by recruiting sophisticated market participants to insulate financial conditions from financial noise (non-fundamental trading flows). We develop a framework in which the central bank communicates its expected path for financial conditions (FCI-plot) and demonstrate that this approach reduces tantrums, recruits market forces to support policy objectives, and enables an "agree-to-disagree" equilibrium where markets help implement the central bank's objectives despite differing views. We show that scenario-based communication further strengthens these benefits, particularly when market participants disagree with the central bank about the likelihood of different near-term scenarios and would like to know the central bank's "reaction function."

We motivate our arguments by presenting eight empirical facts about the interactions between monetary policy and financial markets. First, monetary policy transmits to the real economy primarily through financial conditions—a broad set of asset prices and interest rates that shape aggregate demand. Second, financial conditions indices (FCIs) that quantify the importance of different assets for policy transmission are driven predominantly by riskier asset prices, such as equities and exchange rates, rather than by interest rates. Third, the excess volatility of risky asset prices—driven by time-varying sentiment, risk premia, and financial noise—affects financial conditions and, consequently, macroeconomic outcomes, thereby interfering with monetary policy objectives. Fourth, monetary policy affects financial conditions through channels beyond interest rates, including shifts in risk premia. Fifth, transmission lags and reliance on unobservable variables—such as potential output and the natural rate of unemployment—make policy formulation heavily belief dependent. Sixth, central banks have beliefs about appropriate financial conditions that influence their policy decisions. Seventh, sophisticated financial market participants frequently hold beliefs that diverge from the central bank's beliefs. And eighth, these participants have diverse views on future financial conditions even after conditioning on their economic outlook, suggesting that they are uncertain about whether or how the central bank will steer financial conditions in different scenarios. Together, these facts highlight the potential benefits from communicating with sophisticated financial market participants and the limits of conventional interest rate–based communication.

We theoretically investigate policy communication by developing a stylized model in which financial conditions—represented by an aggregate asset price—are the central channel through which monetary policy affects aggregate demand. The model features four types of agents: households, noise traders, arbitrageurs (the Arbs), and the central bank (the Fed).[1] Households' spending depends on financial conditions; noise traders introduce non-fundamental flows that generate excess volatility in financial conditions; and the Arbs attempt to stabilize financial conditions by trading against noise. The Fed sets the policy interest rate to close output gaps, but does so gradually, reflecting a preference for smooth and predictable paths. Crucially, the Fed and the Arbs may disagree about key macroeconomic variables, such as potential output. These disagreements make the Arbs uncertain about the Fed's policy stance—particularly about the financial conditions it aims to achieve—creating the possibility of misunderstandings and a need for communication.

The model shows that when the Arbs are uncertain about the Fed's intended financial conditions, two concerns arise: "tantrum shocks," where the Arbs misinterpret the Fed's intended financial conditions; and "excess volatility in financial conditions," as the Arbs trade cautiously against noise due to this uncertainty. Given the Fed's gradualism, without communication both tantrum shocks and excess volatility result in excessive output gap fluctuations.

We demonstrate that the Fed's communication of its expected financial conditions path (FCI-plot) mitigates both problems. By announcing the financial conditions it aims to achieve in the present, the Fed eliminates tantrum shocks in which the Arbs misinterpret the Fed's intended conditions. Furthermore, announcing the financial conditions the Fed expects to implement in the future reduces the Arbs' uncertainty about future

[1] Throughout this paper, we often use "the Fed" as a shorthand for a generic central bank. Unless explicitly stated or quoting directly, our arguments and recommendations are not intended as specific advice for the Federal Reserve. The underlying insights are general and apply broadly across monetary policy institutions.

financial conditions. Greater clarity in turn encourages the Arbs to trade against noise more aggressively, thereby recruiting them to insulate financial conditions from noise. We further show that scenario-based FCI-plot communication—which specifies how the Fed's expected financial conditions would adjust under alternative near-term economic scenarios—provides superior results. This occurs because the Arbs who disagree with the Fed primarily need to understand the Fed's "reaction function"—how the Fed's views will change in different scenarios—rather than the Fed's assessment of different scenarios. Overall, FCI-plot communication enables an "agree-to-disagree" equilibrium where markets help implement the central bank's objectives despite differing views.

In contrast, we show that the Fed's communication of expected interest rates (forward guidance) fails to mitigate tantrums or excess volatility. This limitation stems from the inherently incomplete mapping between interest rates and financial conditions, both in our model and in practice. While interest rates influence financial conditions, they represent just one factor among many that determine overall financial conditions. Consequently, when the Fed announces only its intended interest rate path, market participants still face substantial uncertainty about expected financial conditions—the variable that ultimately matters for macroeconomic outcomes. This uncertainty persists because participants must make their own assumptions about how various financial factors beyond interest rates will evolve, leading to potential misinterpretations of policy intentions.

We conclude by drawing out the practical implications of our framework. First, we identify the primary audience for FCI-based communication: sophisticated financial market participants who determine the financial conditions that ultimately influence households and firms. Second, we explain how this communication serves two key purposes: eliminating tantrums and recruiting arbitrageurs to insulate financial conditions from noise. Third, we propose that central banks should communicate an FCI-plot—a projection of financial conditions they expect to see—while framing it as a range rather than a precise point. In view of the disagreements between the Fed and the markets, we recommend supplementing these announcements with scenario-based guidance showing how financial conditions would adjust under different macroeconomic outcomes.

To demonstrate the practicality of our approach, we provide a proof-of-concept visualization of our proposed FCI-plot framework in Section 4.3.1. This prototype, constructed using historical data, shows how this communication tool would have signaled the central bank's intended financial conditions during both normal periods and times of financial stress. While preliminary, this visualization demonstrates the practical potential of our theoretical framework and illustrates how the FCI-plot approach could bridge the gap between central bank intentions and market outcomes—even when beliefs diverge. We also discuss various challenges presented by this framework, including the risk of misinterpretation, the need to balance commitment with flexibility, and the difficulty of appropriately weighting different components of financial conditions.

Related Literature. This paper relates to the vast literature on central bank communication (see Blinder et al. (2008); Blinder (2009) for reviews). Studies show that central bank transparency has grown in recent years, and that standard communication methods have made monetary policy more predictable. Our model is consistent with these findings and provides theoretical foundations for central bank communication. As anticipated by Blinder (1998), the central bank in our framework engages in communication to convey its *beliefs* to the market. We further argue that communicating in terms of financial conditions is more effective than communicating in terms of interest rates, and we show that this communication improves policy in two ways, by mitigating tantrums in which the markets misunderstand policy objectives, and by recruiting the arbitrageurs to trade against noisy flows that contaminate financial conditions.[2]

In terms of the underlying theory, our paper builds upon our earlier work that investigates the connections between financial markets and monetary policy (see Caballero and Farhi (2018); Caballero and Simsek (2020, 2021, 2023, 2024b,a); Caballero et al. (2024)). The most closely related paper is Caballero et al. (2024), where we develop a New-Keynesian model with noise and limits to arbitrage and show that it creates a rationale for Financial Conditions Targeting—a framework in which the central bank *commits* to stabilize future financial conditions around a target level to encourage arbitrageurs to trade against noisy flows. This policy improves monetary policy by "recruiting" the arbitrageurs to insulate the real economy from financial noise.

In contrast, the present paper demonstrates that even without such commitment mechanisms, when arbitrageurs are uncertain about the central bank's beliefs, simply *communicating* the central bank's expected FCI level (FCI-plot) can activate the recruitment effect. While commitment strategies remain powerful tools, our analysis here highlights how communication alone can deliver significant benefits. This communication approach relies on the FCI* concept that we empirically estimate and analyze in Caballero et al. (2025) (see Section 2.3).[3]

[2]See Woodford (2005) for additional rationales supporting central bank communication and Amato et al. (2002) for a model in which central bank communication might be excessive. A related discussion addresses optimal central bank communication strategies; for example, whether central banks should present a unified message or express diverse perspectives—mirroring the varying viewpoints among policymakers (see, e.g., Ehrmann and Fratzscher (2007); Vissing-Jorgensen (2019)).

[3]Beyond our own work, this paper is part of a large literature on New Keynesian models with risk and

The theory is also related to our earlier work on the policy implications of disagreements between markets and the central bank (Caballero and Simsek (2022)). The main difference is that in our current model policy transmits through financial conditions (as we see in the data), whereas in Caballero and Simsek (2022) policy transmits through interest rates as in the textbook New-Keynesian model. We confirm the finding in Caballero and Simsek (2022) that greater policy transparency mitigates tantrums, but we further argue that communicating in terms of financial conditions rather than policy interest rates is more effective in achieving this benefit.

The empirical facts we present mostly summarize the insights from various strands of the literature that we discuss in Section 2. In Section 2.8, we present new evidence (to our knowledge) that shows financial market participants' forecasts of *future financial conditions* are highly heterogeneous and uncorrelated with their forecasts of macroeconomic conditions. This complements Bauer et al. (2024b,a), who show that professional forecasts of future policy interest rates *are* correlated with forecasts of macroeconomic conditions—a fact that we verify with a different survey.

We organize the rest of the paper as follows. Section 2 presents empirical facts about monetary policy and financial markets that motivate our analysis. Section 3 develops a theoretical model that clarifies how communication about financial conditions can reduce market overreactions ("tantrums") and mobilize arbitrageurs to offset noise. A central result of this section is that communicating the expected level of financial conditions is more effective than conventional interest rate guidance. Section 4 translates the model's insights into practical recommendations and broader implications for central bank communication. This section also presents a prototype FCI-plot. Section 5 concludes. Appendix A contains technical derivations and proofs and Appendix B contains details of the empirical analysis.

2. Motivating facts about monetary policy and financial market interactions

"So, of course, monetary policy does, famously, work with long and variable lags. The way I think of it is, our policy decisions affect financial conditions immediately. In fact, financial conditions have usually been affected well before we actually announce our decisions. Then, changes in financial conditions begin to affect economic activity... within a

asset prices (Kashyap and Stein, 2023; Pflueger et al., 2020; Kekre and Lenel, 2022; Kekre et al., 2023; Beaudry et al., 2024; Adrian and Duarte, 2018; Adrian et al., 2020).

few months." (Chair Jerome Powell's Press Conference, September 21, 2022)

In this section, we describe eight key facts about monetary policy and financial market interactions that motivate our analysis of central bank communication: (i) Monetary policy transmits through financial conditions; (ii) Financial conditions are primarily driven by risky asset prices, over which central banks have imprecise control; (iii) Financial conditions are inherently noisy and routinely deviate from levels compatible with macroeconomic stabilization, thereby creating or amplifying macroeconomic fluctuations; (iv) Monetary policy affects financial conditions through channels beyond interest rates; (v) Transmission lags as well as unobservable variables make monetary policy highly dependent on the central bank's views about the economy and financial conditions; (vi) Central banks have views about appropriate financial conditions; (vii) Sophisticated financial market participants are opinionated and routinely disagree with the central banks' views; (viii) These market participants have diverse views about future financial conditions, even conditional on their economic outlook, suggesting that they are uncertain about how financial conditions will unfold in different macroeconomic scenarios.

2.1. Monetary policy transmits through financial conditions

Chair Powell's quote illustrates that monetary policy influences aggregate demand indirectly—through financial markets—rather than operating directly in goods and services markets as fiscal policy does. When a central bank adjusts its policy rate or generates policy news, the immediate impact is on asset prices, which then shape broader financial conditions and ultimately real economic activity. In fact, Keynes (1936) noted:

"...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" (as quoted by Beaudry et al. (2024)).

As shown in Figure 1, this transmission mechanism creates a policy framework in which the central bank employs its tools to influence financial conditions, which in turn shape the behavior of households and firms. Conceptually, the term "financial conditions" in this figure represents a weighted average of aggregate asset prices—such as stock prices, borrowing rates, and exchange rates—that drive economic activity. This raises a natural question: how do we measure financial conditions and which assets are their primary drivers in practice? Recently developed financial conditions indices (FCIs) provide an answer to these questions.

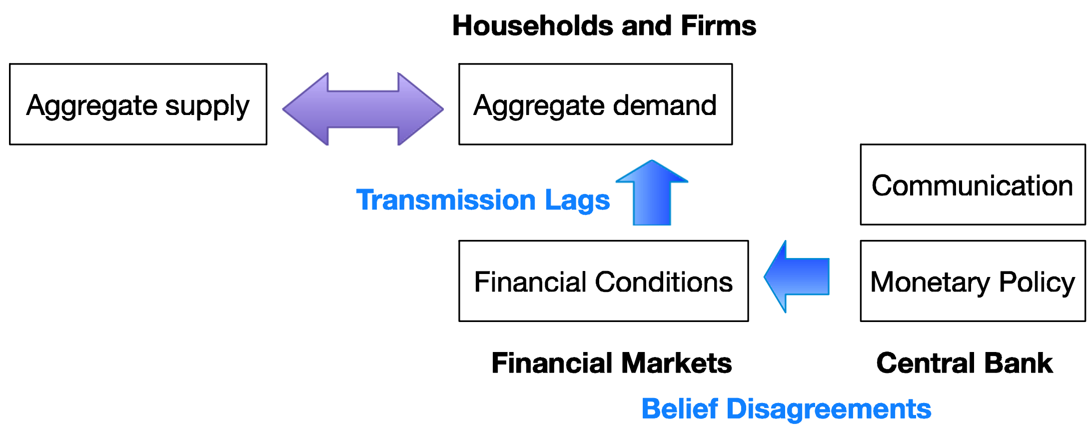

Figure 1: Monetary policy transmission through financial conditions.

2.2. Financial conditions are primarily driven by risky asset prices

An FCI attempts to measure the impact of recent development in financial markets on future GDP growth, quantifying the *market-based* policy transmission plotted in Figure 1. There are several well-known financial conditions indexes, such as the Goldman Sachs FCI (see Hatzius and Stehn (2018)), the National FCI by the Chicago Fed, and the FCI-Growth index (FCI-G) by Ajello et al. (2023). The FCI-G is notable for its reliance on the FRB/US model and other large-scale DSGE models developed by the Federal Reserve. These models are disciplined by empirical evidence and incorporate the various channels by which financial markets affect economic activity, including the borrowing and investment effects of various interest rates, the wealth effects of stock and house prices, and the expenditure switching effects of exchange rates. Hence, the FCI-G provides a summary statistic of how recent asset price and interest rate changes are expected to influence output growth over the next year according to the Federal Reserve's structural models.

Figure 2 plots the FCI-G index along with its drivers in recent years. As the figure shows, fluctuations in the index are driven primarily by risky asset prices—specifically, stock prices and exchange rates, and occasionally house prices—rather than by various yields. While these assets may not individually influence economic activity more strongly than interest rates, their heightened volatility generates larger swings in overall financial conditions, making them disproportionately important for monetary policy transmission.

While the risky asset prices that drive financial conditions are influenced by monetary policy, they are also subject to financial forces that extend well beyond the central bank's

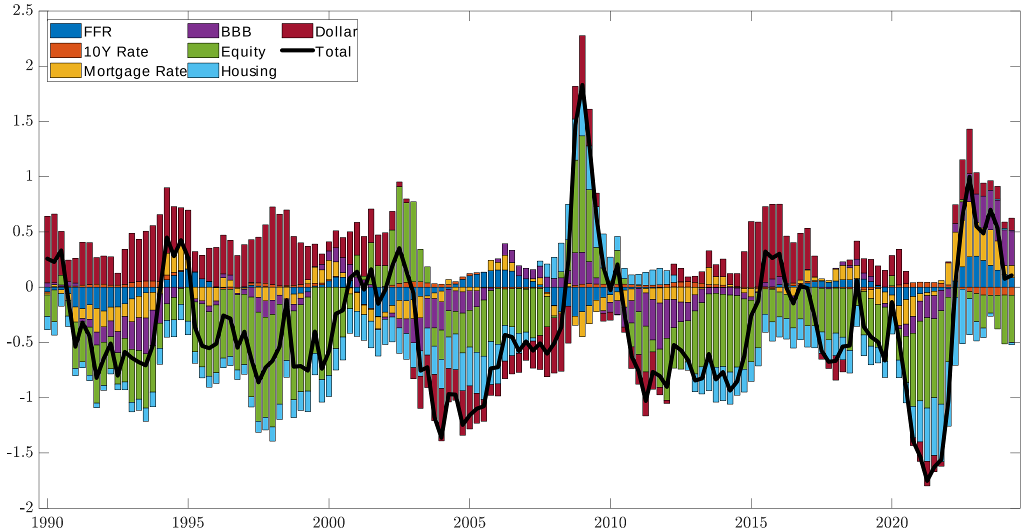

Figure 2: FCI-G index (with a three-year lookback) and its drivers over 1990Q1-2024Q2. Positive values imply recent financial conditions will reduce the GDP growth in the next year. Data is from Ajello et al. (2024).

control. Thus, the central bank faces the challenging task of steering volatile financial conditions in order to close the gaps between aggregate demand and aggregate supply. As we will see, the central bank's imprecise control over financial conditions is a key reason why proper communication with market participants can improve monetary policy.

2.3. Financial conditions are "noisy" and induce large macroeconomic fluctuations

A robust body of finance literature emphasizes that risky asset prices feature "excess" volatility that is unrelated to expected cash flows. This phenomenon is driven in part by time-varying sentiment (e.g., Shiller (2014)), time-varying risk premiums (e.g., Cochrane (2011)), or time-varying noise in inelastic markets (e.g., De Long et al. (1990); Gabaix and Koijen (2021)). Given that financial conditions—as captured by the FCI-G index—greatly impact macroeconomic activity according to the Fed's structural models, a natural question arises: Does the "excess volatility" in asset prices also induce "excessive" macroeconomic fluctuations?

We have recently addressed this question in two different studies. Our first study (Caballero et al. (2024)) builds upon Gabaix and Koijen (2021), who provide a measure of noisy flows into the aggregate stock market and show that this type of noise can induce substantial swings in stock prices. We show that these noisy flows also influence financial conditions and macroeconomic activity. Figure 3 shows our estimated impulse responses

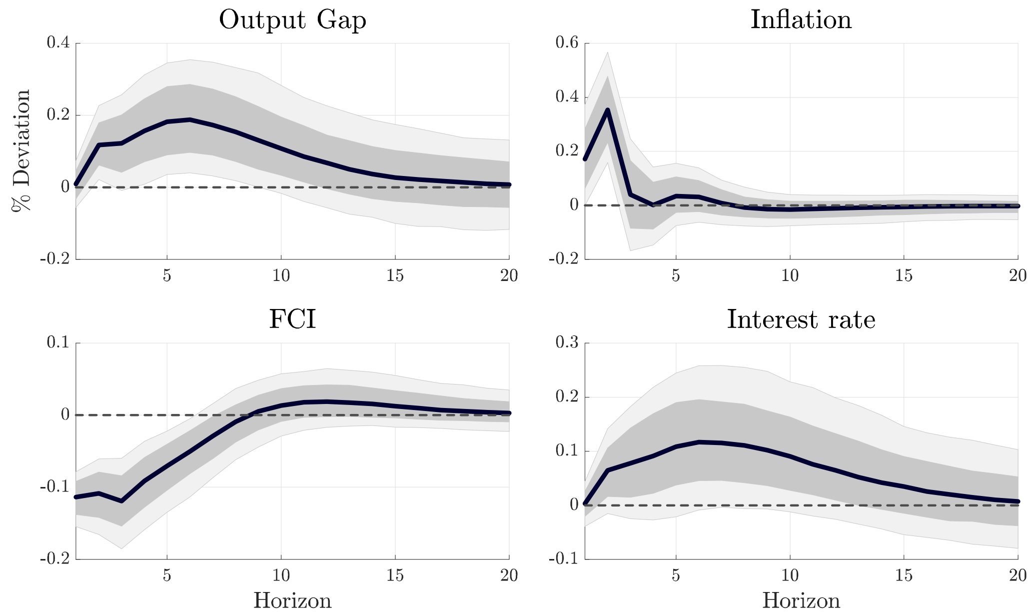

Figure 3: Impulse response to a financial noise shock. Shaded and light shaded grey bands indicate 68 and 90 confidence sets respectively. Reprinted from Caballero et al. (2024).

to a noisy flow shock into the stock market; i.e., when one large sector (e.g., households) decides to increase its stock holdings for reasons unrelated to fundamentals. We find that this shock increases stock prices and loosens financial conditions (captured by the decline in the FCI-G index), which in turn increases output gaps and inflationary pressures. The Fed eventually increases the policy interest rate and stabilizes the output gap, but the Fed's response comes with a substantial delay, likely reflecting the Fed's preference for gradual interest rate adjustments.

Our second study (Caballero et al. (2025)) introduces and empirically estimates FCI*, the analogue of r*, within a framework in which financial conditions along with demand shocks drive economic activity as in Figure 1. Conceptually, FCI* is the level of FCI that closes the expected output gap. Therefore, FCI gaps—the differences between the observed FCI and the FCI*—are related to output gaps. This feature enables us to infer the latent FCI* from the observed FCI and the estimated output gaps. We operationalize this idea by developing and estimating a two equation macroeconometric model along the lines of Laubach and Williams (2003); Holston et al. (2023), and using the FCI-G measure by Ajello et al. (2023).

Figure 4 illustrates our estimated FCI* in the top panel along with the estimated output gaps in the bottom panel. Our estimates show that the latent FCI* series primarily reflects *macroeconomic* forces rather than financial market developments, loosening in demand recessions and tightening in inflationary booms. In contrast, the observed FCI

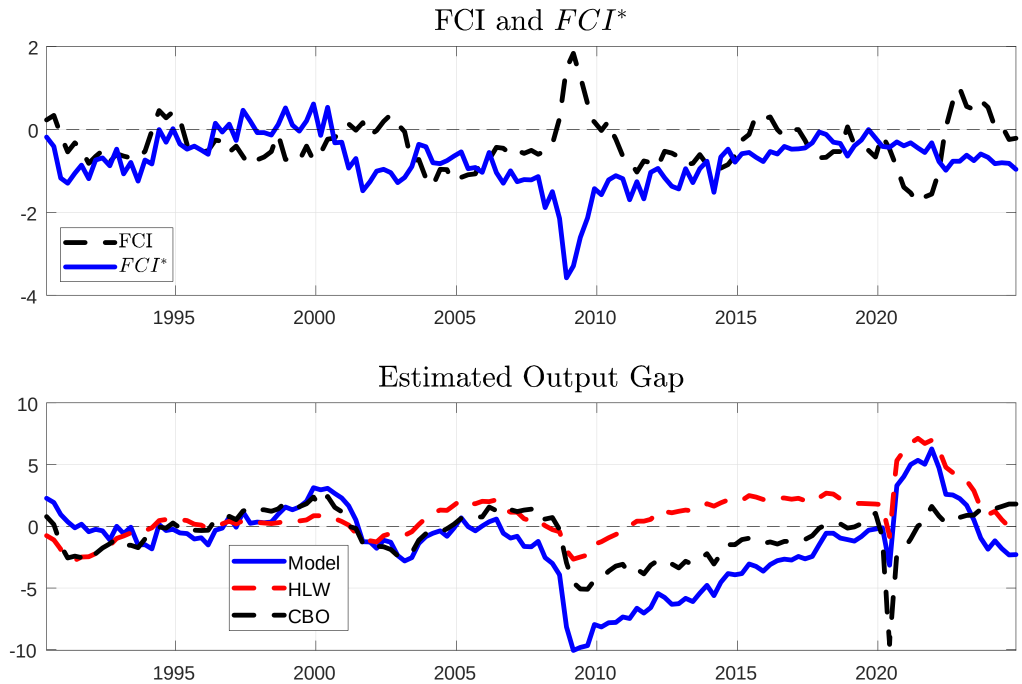

Figure 4: Top: FCI (black) and FCI* (blue). Bottom: output gap estimates from our two equation macroeconometric model (blue), Holston et al. (2023) (red) and CBO (black). All estimates are one-sided. Reprinted from Caballero et al. (2025).

partly reflects financial market shocks, which induces FCI gaps. These gaps are especially large during the onset of large recessions, such as the Global Financial Crisis (GFC), where the observed FCI tightens, reflecting the distress in financial markets, whereas the FCI* loosens, reflecting the greater stimulus needed by the macroeconomy.

These gaps reflect well-known real-time constraints on policy—most notably central banks' preference for rate-smoothing and the presence of transitory cost-push pressures. In (Caballero et al. (2024)) we use a semi-structural VAR approach that incorporates these types of frictions to estimate financial conditions targets that the Fed could in principle implement without violating standard constraints. In Section 4.3.1, we use this analysis to construct a prototype FCI-plot: the financial conditions the Fed expects to see in the near future under optimal policy. As we will see, the FCI-plot often deviates from the observed FCI as well, but less so than the FCI*. The pattern parallels conventional interest-rate policy: the optimal path does not leap immediately to r*, but converges toward it gradually.

Overall, while our two studies use very different methodologies, they reach a similar conclusion: "excess volatility" in financial markets induces "excessive" macroeconomic fluctuations that are only partially stabilized by the Fed. As we will argue later in the paper, appropriate communication with sophisticated market participants can enable the Fed to better smooth financial-noise driven macroeconomic fluctuations.

2.4. Monetary policy affects financial conditions through channels beyond expected rates

A growing body of evidence suggests that monetary policy affects financial conditions through channels beyond expected interest rates. One of the early papers documenting this channel is Bernanke and Kuttner (2005), who find that the bulk of the effect of conventional monetary policy surprises on the stock market comes from changes in the equity premium (as opposed to changes in expected real risk-free rates or expected cash flows). Subsequent research further demonstrated that monetary policy shocks significantly impact risk premia across various asset classes (see, e.g., Bekaert et al. (2013); Hanson and Stein (2015); Gertler and Karadi (2015)). Bauer et al. (2023) synthesize the insights from this literature and show that monetary policy shocks have strong and persistent effects on a risk appetite index, which in turn drives a substantial part of the transmission of monetary policy to financial markets.[4]

Recent work by Boehm and Kroner (2024) provides further evidence that Federal Reserve actions affect financial conditions through dimensions other than interest rate changes. As Figure 5 from their paper illustrates, conventional yield curve changes explain surprisingly little variation in stock prices and exchange rates around FOMC announcements. They identify what they call a "Fed non-yield shock" that explains substantial variation in equity prices and exchange rates around FOMC announcements, despite having no impact on the yield curve.

This evidence underscores the importance of developing a communication strategy that addresses the broader financial conditions channel of monetary policy, rather than focusing narrowly on the expected path of interest rates.

2.5. Policy is belief dependent due to transmission lags and unobservable variables

As Chair Powell's quote suggests, a further challenge for monetary policy is that financial conditions transmit to the economy with significant lags. For instance, Chodorow-Reich

[4] Nagel and Xu (2024) provide a dissenting view to this literature by arguing that conventional interest-rate based monetary policy shocks affect stock prices mostly due to the yield curve changes. However, they note that the yield curve moves partly due to changes in the term premium, which is consistent with our point that monetary policy does not transmit only through the expected short-term interest rates.

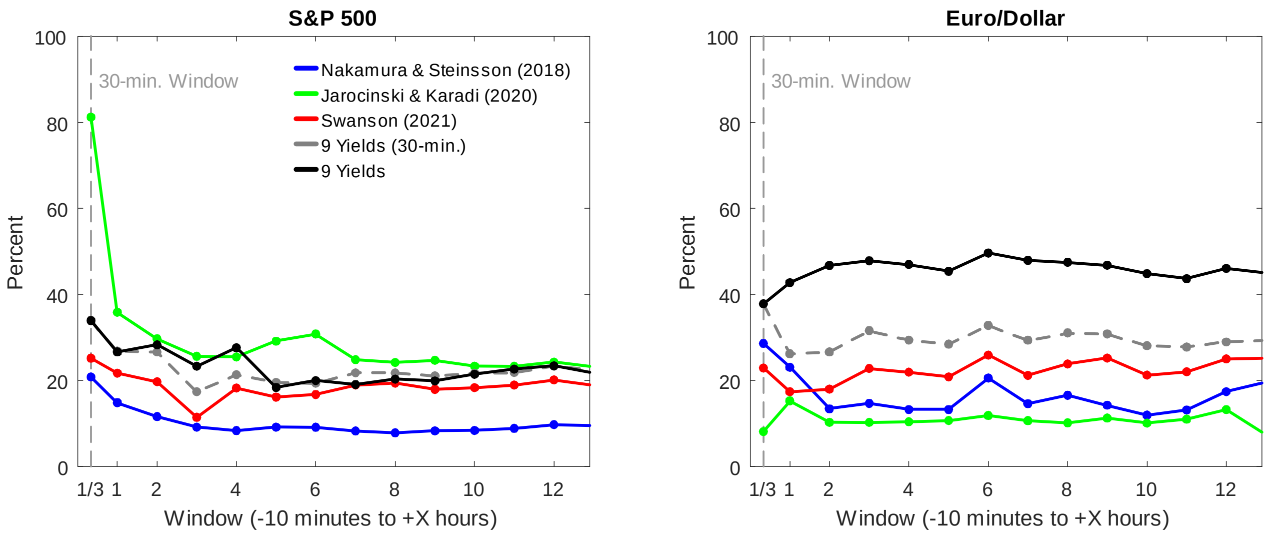

Figure 5: This figure is from Boehm and Kroner (2024), reprinted with permission. It shows the R2 values of regressing the log-return around FOMC announcements of the front-month S&P E-mini futures contracts (left panel) and the Euro-Dollar exchange rate (right panel) on various high frequency monetary policy shocks. The window over which returns are constructed is expanding along the horizontal axis. The full sample ranges from January 1996 to April 2023. See Boehm and Kroner (2024) for details.

et al. (2021) find that the impact of a stock price shock on labor market outcomes peaks 4 to 8 quarters after the initial shock. Romer and Romer (2004) find similar lags for the effect of monetary policy shocks on output. These lags are captured by the Federal Reserve's structural models: the baseline version of the FCI-G index plotted in Figure 2 considers asset price or interest rate changes up to three years old to accommodate the lagged effect of financial conditions on economic activity.

Transmission lags make monetary policy belief dependent. Since today's policy actions will primarily affect future economic conditions, central banks must base their decisions not only on current economic data but also on forecasts of where the economy is headed and how their decisions will impact the economy. This forward-looking aspect makes the central bank's beliefs about current and future conditions a key driver of policy and creates an important role for central bank communication.

Compounding this challenge is the central bank's need to estimate unobservable yet critical variables like potential output and the natural rate of unemployment. As Powell (2018) notes, these estimations create fundamental uncertainties for policymakers, with misestimations potentially causing policy errors similar to those during the 1970s Great Inflation. The importance of these unobservable variables further reinforces the belief-dependent nature of monetary policy.

2.6. Central banks already have views about appropriate financial conditions

Since central banks recognize the key role of financial conditions in the transmission of monetary policy—as Chair Powell's remarks suggest—they naturally form views about what constitutes appropriate financial conditions and incorporate these views into their deliberations. FOMC members, in particular, frequently discuss financial conditions in their meetings. Cieslak and Vissing-Jorgensen (2020) conduct a textual analysis of FOMC minutes and transcripts and find that members pay close attention to the stock market, viewing it as a causal driver of economic activity through wealth effects. They also show that discussions of stock market declines are correlated with subsequent policy easing, suggesting that equity market conditions may influence policy decisions.

More recently, Laarits et al. (2025) document that FOMC members hold well-defined views about desirable financial conditions and that these views systematically affect their policy preferences. Using large language models to analyze FOMC transcripts, the authors extract individual committee members' statements during both the economic and policy discussion segments of each meeting. They then quantify how much attention members give to dimensions such as stock and credit markets by assigning scores from –3 to +3. The negative values reflect a dovish bias (e.g., preference for lower rates) and positive values a hawkish one, while the magnitude captures the importance of the variable on shaping the member's stance.

Figure 6 illustrates these FOMC preferences over time by plotting the importance assigned to stock market conditions (solid blue line) and credit conditions (dashed red line) in shaping committee members' policy stances, alongside our measure of the FCI gap (dotted green line, shown on the right axis). The FCI gap is defined as the difference between FCI* and observed FCI, with negative values indicating that desirable financial conditions are looser than prevailing market conditions.

The figure reveals a striking alignment between FOMC members' stated preferences and the direction implied by our FCI gap measure. During periods when FCI* falls below FCI—typically associated with recessions—committee members tend to place increased emphasis on stocks and credit markets in support of more accommodative policy (reflected in negative scores). Conversely, when FCI* rises above FCI—as is often the case during inflationary episodes—members more frequently cite these financial variables in support of tighter policy (positive scores).

This pattern suggests that the FOMC is already, perhaps implicitly, responding to FCI gaps in ways that are consistent with macroeconomic stabilization. Our framework

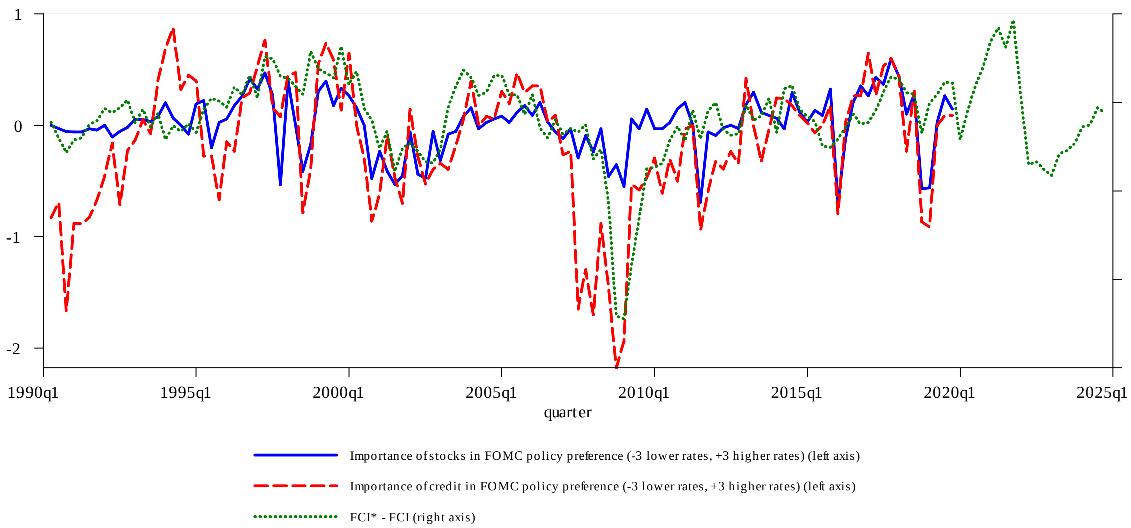

Figure 6: **Alignment between FOMC policy preferences and FCI gaps.** The blue solid line (resp. red dashed line) shows the importance of the stock market (resp. credit conditions) in FOMC policy preferences. The sign of the measure reflects the direction of the preferred policy action (- indicates preference for lower rates, + indicates preference for higher rates), while the magnitude (0,3) captures the importance for decisions. Data from Laarits et al. (2025). The green dotted line shows the FCI gap (FCI* - FCI) from Figure 4.

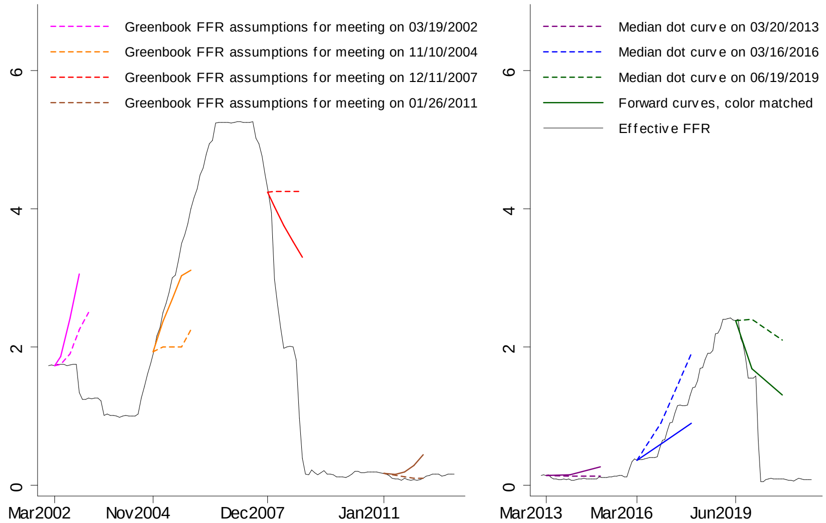

Figure 7: Dotted lines: the Fed prediction for Fed funds rates for select FOMC meetings—from either the Greenbook assumptions (left panel) or the FOMC dots (right panel). Solid lines: the forward Fed funds rates for the same meetings. Thin black line: the Fed funds rate. Reprinted from Caballero and Simsek (2022).

implies that making these views explicit—by directly communicating the perceived FCI gap and its implications for policy—could enhance market understanding and improve the effectiveness of monetary transmission.

2.7. Markets are opinionated and routinely disagree with central banks

We will argue that central bank communication should be directed primarily toward sophisticated financial market participants. A defining feature of this audience is that they are both *informed* and *opinionated* (see Caballero and Simsek (2022)). Market participants often hold strong, independent beliefs about the state of the economy and the appropriate monetary policy response—views that frequently diverge from those of the central bank. Figure 7 illustrates this point by showing that forward interest rates, which largely reflect market expectations for the federal funds rate (FFR), often deviate from the Fed's own median projections. Such divergences are not rare exceptions but a persistent feature of the policy landscape. Figure 8 further reveals that forecast differences for the FFR are correlated with differences in inflation expectations, suggesting that these disagreements stem in part from differing macroeconomic outlooks.

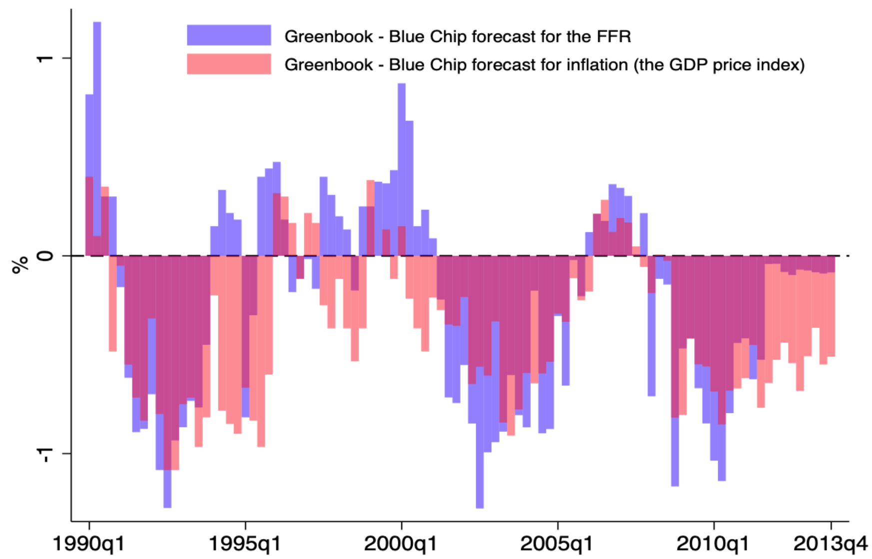

Figure 8: The bars denote the difference between the Fed's Greenbook/Tealbook forecast and the consensus Blue Chip forecast for four quarters ahead. The blue (resp. red) bars correspond to forecasts for the FFR (resp. the GDP price index growth). Reprinted from Caballero and Simsek (2022).

One view is that these forecasts in economic outlook reflect "different information" available to markets and the central bank. This view is a priori implausible since both market participants and policymakers are sophisticated with access to similar data. As Blinder (2007) put it, *"... in the case of monetary policy virtually all the data that matter are common knowledge, making differential information a weak foundation on which to build a theory."* Recent research by Bauer and Swanson (2023) confirms that market participants do not consider the Fed to have superior information about the state of the economy. Our view is that forecast differences between sophisticated market participants and the central bank mostly reflect different interpretations of the same data; e.g., because agents disagree about the informativeness of different signals, or they use different models. We refer to these types of opinionated interpretation differences as belief disagreements.

This belief disagreements perspective helps us understand another key feature of forecast differences: When markets disagree with the central bank, they also perceive its actions as policy "mistakes." For example, in December 2007, when the Fed cut rates by only 25 basis points instead of the larger reduction expected by the market, one Morgan Stanley economist observed: *"From talking to clients and traders, there is in their view no question the Fed has fallen way behind the curve... There's a growing sense the Fed doesn't get it."* For another example, a May 2021 Deutsche Bank survey conducted amid

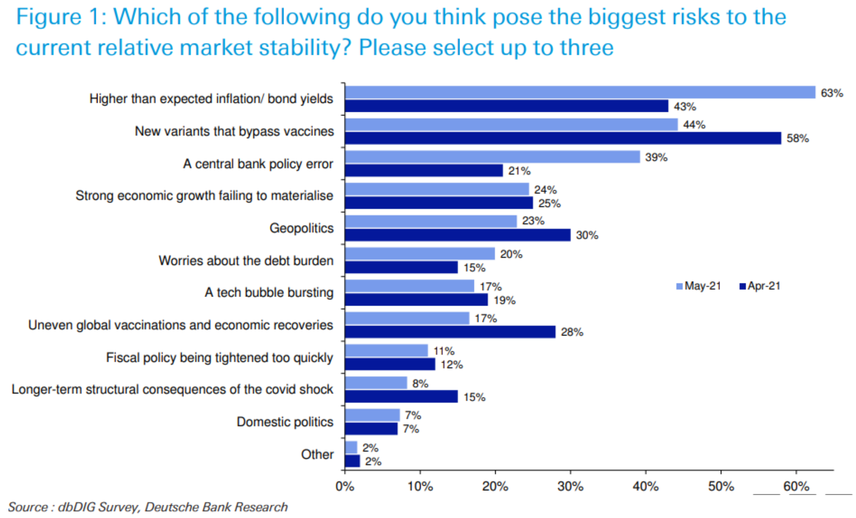

Figure 9: Source: Deutsche Bank monthly survey of clients in May 2021 (based on 620 responses). Reproduced with permission.

the Covid pandemic, ranked a “central bank policy error” among the three greatest risks to market stability. In fact, respondents view such a “mistake” as nearly as concerning as a new Covid variant capable of circumventing vaccines (see Figure 9).

These disagreements and perceived “mistakes” do not mean that the market ignores the central bank communications; on the contrary, in practice markets follow central bank communications very closely. This is because market participants do not set monetary policy—the central bank does. Market participants pay attention to central bank communications to infer the direction of policy. These policy decisions are influenced by the central bank’s beliefs (such as whether they expect future economic activity to be strong or weak) as well as their preferences (such as whether they prioritize stabilizing inflation over the output gap). Hence, the central bank communication does *not* persuade the markets of the Fed’s views, but lets them know about the Fed’s views and policy preferences so they can infer the likely direction of policy.

In fact, belief disagreements between the market and the central bank substantially increase the need for communication. In a world where everyone broadly agrees, policy uncertainty would be minimal because the central bank’s views would closely mirror market views—already familiar to participants. However, in an environment of evolving disagreements, policy uncertainty abounds. Market participants want to know whether the central bank’s views align with their own, the extent of any divergence, and how such differences might influence future policy decisions.

2.8. Conditional on economic outlook, markets are uncertain about future financial conditions

Our final empirical point is that market participants exhibit substantial uncertainty about the future trajectory of financial conditions even after accounting for their economic outlook. This observation follows naturally from the central role that volatile and noisy asset prices play in driving financial conditions indices (see Figures 2 and 3). We document this uncertainty and examine its potential sources, as one of the key objectives of our proposed communication framework is precisely to reduce this kind of uncertainty.

Figure 10 illustrates the cross-sectional variation in financial conditions forecasts from the MacroPolicy Perspectives Shadow Survey (Coronado and Rosner-Warburton (2025)), which asks market participants: "What is your expectation for broader U.S. financial conditions over the next year? (scale of 1-4, where 1=Ease, 4=Tighten a lot)." Several important patterns emerge from the data. First, shifts in the consensus forecast (blue line) tend to precede actual changes in financial conditions (red line), indicating that market participants have some ability to anticipate directional movements. Second, and more importantly, the wide cross-sectional dispersion in individual responses—captured by the dotted lines—points to significant disagreement and uncertainty within the market. While we do not directly observe risk assessments at the individual level, this heterogeneity strongly suggests that uncertainty about the path of financial conditions is both prevalent and persistent.

Are participants' financial conditions forecasts mainly driven by their different economic outlooks? If this were the case, the Fed might be unable to reduce uncertainty about financial conditions, since participants tend to be opinionated about their economic outlook (see Section 2.7). However, Table 1 presents evidence against this conjecture. The first column shows that financial conditions forecasts are not strongly correlated with economic outlook forecasts. In contrast, the second column shows that policy interest rate forecasts *are* correlated with economic outlook forecasts—forecasters expecting higher unemployment predict lower rates, while those expecting higher inflation predict higher rates (see also Figure 8 and Bauer et al. (2024b)). This suggests financial market participants understand the Fed's reaction function in terms of its interest rate response, but they do not fully understand whether or how the Fed will steer financial conditions in response to new developments. Reducing this type of uncertainty is the cornerstone of our proposed communication policy, which we turn to next.

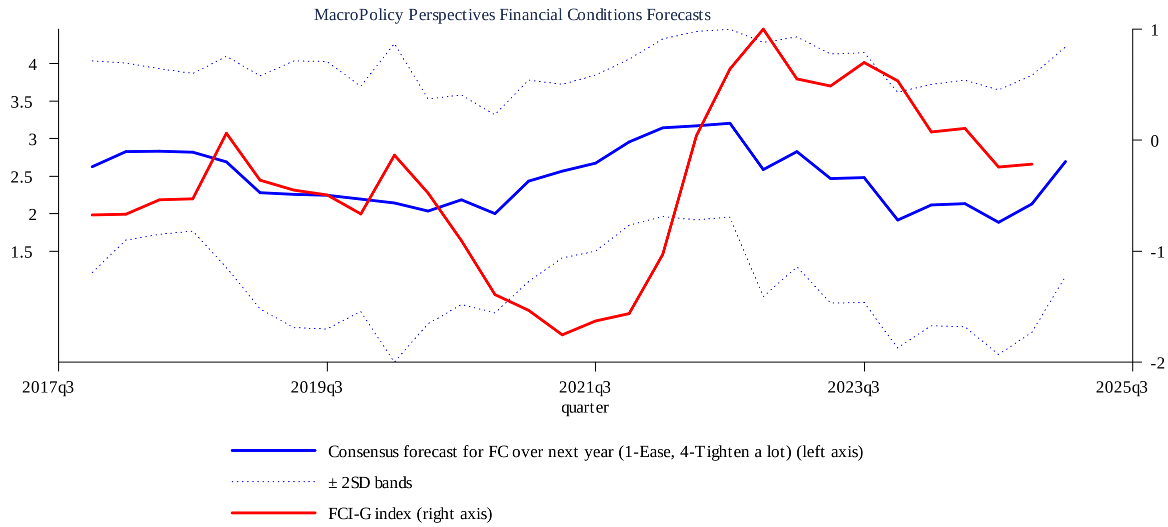

Figure 10: Consensus forecast for the changes in the U.S. financial conditions over the next year (blue solid line) with cross-sectional dispersion across forecasters (2 standard deviations, blue dotted lines). Data from the MacroPolicy Perspectives Shadow Survey (Coronado and Rosner-Warburton (2025)). Red line shows the FCI-G from Figure 2.

Table 1: Relationships Between Monetary Policy Forecasts and Economic Outlook

	(1) FC change (until Q4)	(2) FFR change (until Q4)
Unemployment 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

Note: Data come from the quarterly Shadow Survey of Market Participants conducted by MacroPolicy Perspectives from 2017-2024. The dependent variables are forecaster-level predictions of financial conditions changes (column 1) and FFR changes (column 2) over a four-quarter horizon. Independent variables are forecaster-level predictions of unemployment four quarters ahead (quarterly average) and core PCE inflation four quarters ahead (measured as year-over-year change). FFR, unemployment, and core PCE forecasts are interpolated from the end-of-year forecasts provided in the survey. All regressions include forecaster and quarter fixed effects, with standard errors (in parentheses) clustered by forecaster and quarter. * and ** denote statistical significance at the 5% and 1% levels, respectively.

3. A Stylized Model of FCI-plot Communication

In this section, we develop a stylized model broadly consistent with the empirical facts discussed in Section 2 and investigate its implications for central bank communication. We briefly describe the model's setup and summarize the key results; additional details are provided in Appendix A.

The model has four agents: households, noise traders, arbitrageurs (the Arbs, denoted by subscript A) and the central bank (the Fed, denoted by subscript F). Households transmit financial conditions to aggregate spending decisions, noise traders submit noisy financial flows that affect financial conditions, the Arbs absorb these flows and partly stabilize financial conditions, the Fed sets the interest rate to steer financial conditions and close the output gap (see Figure 1). Importantly, the Arbs and the Fed may have different beliefs about potential output, which creates a need for communication. These belief disagreements reflect different interpretations of the data rather than different information (see Section 2.7).

The structural equations are given by (all variables in logs)

$$y_t = m + p_t, \tag{1}$$

$$p_t = \rho + E_{t,A}[p_{t+1}] - (i_t + rp_t) + var_{t,A}(p_{t+1})\mu_t, \tag{2}$$

$$i_t = E_{t-1,A}[i_t] + \theta\left(y_t - y^*_{t,F}\right) + v_t. \tag{3}$$

Here, y_t denotes output, $y^*_{t,F}$ denotes *the Fed's* belief about potential output, p_t denotes the price of the market portfolio—a financial claim on a fraction of future output, i_t denotes the policy interest rate, $rp_t \equiv \frac{var_{t,A}(p_{t+1})}{2}$ denotes the deterministic component of the risk premium, μ_t denotes a financial noise shock (demand from noise traders), and v_t denotes a monetary policy shock. We assume μ_t and v_t follow independent i.i.d. processes $N\left(0, \sigma^2_\mu\right)$ and $N\left(0, \sigma^2_v\right)$ (the analysis extends to more general cases). For simplicity, all nominal prices are fixed so there is no inflation and i_t is a real rate—the model can be extended to introduce inflation via a standard Phillips curve.

Eq. (1) states that the price of the market portfolio affects output through a consumption wealth effect amplified with a standard Keynesian multiplier. The asset price p_t is the model counterpart of the FCI, with an asset price rather than yield convention, and in levels rather than in first differences. While this equation is microfounded in the appendix, it can also be interpreted more broadly as a reduced form for the many channels through which asset prices affect output (see Section 2.2). The intercept m captures a variety of other aggregate demand factors (see Caballero and Simsek (2023)).[5]

Eq. (2) says that the equilibrium asset price depends on three forces: the future asset price, the discount rate (the sum of the risk-free rate and the risk premium), and the financial noise shock. Importantly, the effect of financial noise on asset prices is *endogenous* and determined by the asset price variance perceived by the arbitrageurs, $var_{t,A}(p_{t+1})$. This effect emerges because noise traders submit buy or sell orders that are in equilibrium absorbed by the Arbs who solve a mean-variance portfolio optimization problem. Taking the other side of noise traders is risky, especially since p_t is an aggregate asset that cannot be hedged. The Arbs require compensation to absorb noisy flows, and this required compensation increases with variance. Therefore, when the Arbs perceive greater price volatility, noisy flows have a greater impact on financial conditions.

Eq. (3) describes the policy rule. The Fed's main goal is to close the output gaps *according to its belief about potential output.* However, the Fed also likes to be predictable and penalizes deviations from the interest rate path that was previously expected by the Arbs. This modeling device is introduced to capture the empirically observed tendency of central banks to adjust interest rates gradually. The parameter θ captures the speed at which the central bank is willing to change the policy rate in response to new developments. We also add a monetary policy shock v_t to capture various unmodeled forces that might drive policy in practice and that introduce some uncertainty into the policy process.

We next characterize the equilibrium starting with a benchmark case with common beliefs across the Arbs and the Fed. We then show how belief disagreements and the Arbs' uncertainty about the Fed's beliefs changes the equilibrium. We conclude by deriving the implications for central bank communication.

Benchmark with common beliefs: Financial noise affects macroeconomic outcomes. First, suppose the Arbs and the Fed have the same beliefs. In particular, they observe and agree on the path of potential output $\{y_t^*\}$ (and agree on the remaining shock distributions). Proposition 1 in the appendix shows that in this case the equilibrium is

[5] Since the FCI-G we have introduced in Section 2.2 estimates the impact on output *changes* rather than on output levels, its more precise counterpart in this model would be $\Delta p_t = p_t - p_{t-1}$ rather than p_t (see Caballero et al. (2025) for the mapping between FCI-G and asset price changes in a richer model). In the theory part, we focus on p_t since this changes vs levels distinction does not matter for our qualitative results.

given by

$$\begin{aligned} p_t &= p_t^* + \frac{1}{1+\theta}\left(\sigma^2\mu_t - v_t\right), \quad \text{where } p_t^* \equiv y_t^* - m, \\ y_t &= y_t^* + \frac{1}{1+\theta}\left(\sigma^2\mu_t - v_t\right), \\ i_t &= \rho + \left(y_{t+1}^* - y_t^*\right) - rp_t + \frac{\theta}{1+\theta}\sigma^2\mu_t + \frac{1}{1+\theta}v_t. \end{aligned} \tag{4}$$

The variance $\sigma^2 = var_t\left(p_{t+1}\right)$ is the solution to a fixed point problem:

$$\sigma^2 = \left(\frac{1}{1+\theta}\right)^2 \left(\left(\sigma^2\right)^2 \sigma_\mu^2 + \sigma_v^2\right). \tag{5}$$

Here, "p-star" denotes the aggregate asset price compatible with zero output gaps—it is the model analogue of the "FCI-star" from Figure 4. Eq. (4) shows that "p-star" is determined purely by macroeconomic factors, i.e., the aggregate supply y_t^* and the aggregate demand pressures captured by the intercept m. Importantly, it does *not* depend on financial factors such as expected cash-flows, risk premium, or noisy flows. Those financial factors are absorbed into "rstar," which in this model is given by

$$i_t^* = \rho + \left(y_{t+1}^* - y_t^*\right) - rp_t + \sigma^2\mu_t.$$

To eliminate output gaps, the Fed needs to adjust the interest rate to insulate the FCI and the real economy from purely financial factors. In this model, this adjustment is incomplete due to the Fed's preference to set predictable interest rates. This allows financial shocks and monetary policy shocks to partially affect macroeconomic outcomes.

Consider the response to the financial noise shock μ_t. The central bank's gradualist approach means it only partially counteracts these shocks. This incomplete response lets financial noise influence both asset prices and, consequently, macroeconomic outcomes. This implies that asset price volatility stems from both monetary policy *and* financial noise shocks. Crucially, a feedback mechanism emerges: greater price variance amplifies the noise shock's impact on the aggregate asset price. Therefore, the variance solves a fixed point problem that captures a vicious cycle: increased variance enables noise to more significantly affect the aggregate asset price, which further increases the variance and magnifies noise impact in a self-reinforcing cycle.

This result is broadly consistent with the evidence we present in Section 2.3 that noisy financial flows affect the FCI, the output gap, and the policy interest rate. The policy eventually responds to the shock, but this response is delayed, so the shock slips into the aggregate asset price and the output gap.

Eq. (5) highlights that the macroeconomic impact of these shocks is endogenous to the volatility faced by sophisticated market players. In Caballero et al. (2024), we argue that this creates a rationale for Financial Conditions Targeting—a framework in which the central bank commits to stabilize future financial conditions to encourage arbitrageurs to trade against noisy flows, thereby "recruiting" them to insulate the real economy from financial noise. We next introduce disagreements and show that the central bank communication of its beliefs can also activate this recruitment mechanism.

Belief disagreements: Arbs' uncertainty about the Fed's belief induces tantrums and volatility. Suppose potential output is not directly observed and agents have different beliefs about the path it follows. For the baseline disagreements model, we focus on the special case in which both agents think potential output is constant over time $y_t \equiv y^*$. However, the Fed thinks it is y_F^* and the Arbs think it is y_A^*. For now, the agents never receive a signal about potential output so their beliefs remain fixed over time. These assumptions naturally imply disagreements about "pstar": the Fed thinks it is $p_F^* = y_F^* - m$, the Arbs think it is $p_A^* = y_A^* - m$ (see (4)). In fact, the key feature for our results is that the Fed and the Arbs might disagree about "pstar": whether this comes through disagreements about supply (y^*) or demand (m) is immaterial.

With belief disagreements, agents face a new source of uncertainty: what does the other agent think? For simplicity, we assume the Fed knows the Arbs' beliefs p_A^* throughout. We further assume that the Arbs learn the Fed's beliefs from date 1 onward, so they face uncertainty only at date 0 (similar results hold in a dynamic learning setting). At the beginning of date 0, the Arbs think the Fed's belief about "pstar" is given by $p_F^* \sim_A N\left(\tilde{p}_{FA}^*, \tilde{\sigma}_{FA}^2\right)$. The expected belief $\tilde{p}_{FA}^*$ is typically somewhere between the Arbs' own belief and the Fed's true belief, though we allow for more general cases.

In the appendix, we characterize the resulting equilibrium, starting with dates $t \geq 1$, where there is disagreement but no belief uncertainty, and work our way back to date 0, where there is both disagreement and belief uncertainty.

Proposition 2 (in the appendix) shows that the equilibrium at dates $t \geq 1$ is given by (4), with y_t^* and p_t^* replaced by the Fed's belief. Specifically, the equilibrium variables at date 1 are given by

$$\begin{aligned} p_1 &= p_F^* + \frac{1}{1+\theta}\left(\sigma^2\mu_1 - v_1\right), \\ y_1 &= y_F^* + \frac{1}{1+\theta}\left(\sigma^2\mu_1 - v_1\right), \\ i_1 &= \rho - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\sigma^2\mu_1 + \frac{1}{1+\theta}v_1. \end{aligned} \tag{6}$$

The asset price depends on *the Fed's* beliefs about "pstar," as well as on noise and monetary policy shocks. Intuitively, the Fed can adjust the interest rate to steer the financial conditions to the level it deems appropriate—subject to interest rate gradualism constraints. In this particular model, the asset price reflects primarily the Fed's view for "pstar"—the Arbs' view has no impact. While this feature is extreme, the more general point is that, since the Fed sets policy, the Fed's belief will always have some impact on the aggregate asset price and financial conditions. Therefore, to trade against noise shocks at the ex-ante date 0, *the Arbs need to forecast the Fed's "pstar."*

At date 0, the Arbs are uncertain about the Fed's "pstar." The Fed's rate decision i_0 provides them with some information about the Fed's "pstar" but it does not fully reveal it because the decision is also influenced by the monetary policy shock v_0. Proposition 3 (in the appendix) solves this inference problem and characterizes the resulting equilibrium. The Arbs' posterior belief about the Fed's "pstar" (after observing i_0) is distributed $N\left(p_{FA}^*, \sigma_{FA}^2\right)$ where the mean belief is a weighted average of their prior belief and a noisy signal of the Fed's actual belief

$$p_{FA}^* = (1-\kappa)\,\tilde{p}_{FA}^* + \kappa\left(p_F^* - \frac{1}{\theta}v_0\right).$$

Importantly, the market's perception of the Fed's "pstar" is not necessarily equal to the Fed's "pstar." We define this gap as

$$\tau_0 \equiv p_F^* - p_{FA}^* = (1-\kappa)\left(p_F^* - \tilde{p}_{FA}^*\right) + \frac{\kappa}{\theta}v_0.$$

In this model, $\tau_0 > 0$ corresponds to a situation in which the Fed's actual "pstar" is higher (i.e., its desired financial conditions are looser) than what the market thinks it is. We refer to τ_0 as a "tantrum shock," evoking the 2013 taper tantrum episode in which financial conditions overreacted to the Fed's tapering announcement relative to its actual intentions.

The rest of the equilibrium variables are given by

$$\begin{aligned} p_0 &= p_F^* + \frac{1}{1+\theta}\left(\sigma_1^2\mu_0 - v_0 - \tau_0\right), \\ y_0 &= y_F^* + \frac{1}{1+\theta}\left(\sigma_1^2\mu_0 - v_0 - \tau_0\right), \\ i_0 &= \rho - \frac{1}{2}\sigma_1^2 + \frac{\theta}{1+\theta}\left(\sigma_1^2\mu_0 - \tau_0\right) + \frac{1}{1+\theta}v_0. \end{aligned} \tag{7}$$

Note that the perceived variance is higher than without disagreements and given by (cf. (4))

$$\sigma_1^2 = var_{0,A}\left(p_1\right) = \sigma_{FA}^2 + \sigma^2. \tag{8}$$

This equilibrium has two key differences with the previous case. First, the aggregate asset price and output are still centered around the Fed's "pstar" and "ystar" *but they are also influenced by tantrum shocks.* Intuitively, when the Arbs perceive the Fed's ideal financial conditions as tighter than they actually are, $p_F^* > p_{FA}^*$ and $\tau_0 > 0$, this creates an immediate tightening of financial conditions. This tightening is reflected in a lower p_0, which consequently reduces output y_0 below its potential level. The Fed responds by lowering the interest rate, but due to its gradualist approach, this adjustment only partially offsets the impact of these tantrums.

Second, the aggregate asset price variance is higher, which implies the impact of financial noise shocks on financial conditions and output. Intuitively, the Arbs face additional uncertainty about the Fed's desired financial conditions and this uncertainty discourages them from trading against noisy flows. Consequently, these flows exert a more substantial influence on both financial conditions and output.

In summary, the Arbs' uncertainty about the Fed's belief creates inefficient macroeconomic fluctuations through two channels: *by creating tantrum shocks that induce output gaps,* and *by enabling financial noise shocks to have a greater impact on output gaps.* This naturally motivates communication policies designed to reduce the Arbs' uncertainty.

FCI-plot communication. Suppose the Fed can engage in two types of communication (after it observes current shocks μ_0, v_0). One option is to announce its expected aggregate asset price path for the current and the next period, $(E_{0,F}[p_0], E_{0,F}[p_1])$. We refer to this option as the *FCI-plot* communication, since its practical counterpart would be to announce the Fed's expected FCI for the near future. The alternative option is to announce the interest rate the Fed expects to set, $E_{0,F}[i_1]$, which we refer to as *the rate-plot* communication. In both cases, the Fed also sets, and therefore announces, the current interest rate i_0. We compare these two policy options because they represent alternative methods to steer current financial conditions in the direction the Fed deems appropriate. We analyze which announcement is more effective for mitigating tantrums and for recruiting the Arbs to absorb noisy flows.

In our model, announcing the FCI-plot is extremely effective: it fully eliminates tantrum shocks and mitigates the impact of financial noise shocks. To see this, with the FCI-plot policy the Fed announces

$$\begin{aligned} E_{0,F}[p_0] &= p_F^* + \frac{1}{1+\theta}\left(\sigma^2\mu_0 - v_0\right). \\ E_{0,F}[p_1] &= p_F^* \\ i_0 &= \rho - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\sigma^2\mu_0 + \frac{1}{1+\theta}v_0. \end{aligned}$$

These announcements fully reveal the Fed's "pstar" p_F^* as well as the monetary policy shock v_0—the variables the Arbs are uncertain about.[6] In particular, the Arbs fully learn the asset price the Fed would like to implement in the current period; this ensures that no tantrums occur. The Arbs also learn the asset price the Fed expects to implement in the next period; this ensures that the Arbs perceive lower variance about asset prices and reduces the impact of financial noise shocks on the aggregate asset price. Since both tantrum and financial noise shocks induce output gaps, communicating the FCI-plot improves the Fed's standard gap minimization objectives (see Proposition 4 in the appendix).

In contrast, and perhaps surprisingly, announcing the rate-plot has *no* informational value. To understand why, note that Eq. (6) implies $E_{0,F}[i_1] = \rho - \frac{1}{2}\sigma^2$. This announcement conveys no information about p_F^*. As a result, the equilibrium remains unchanged; tantrum shocks persist and financial noise shocks continue to exert substantial influence. Intuitively, the future asset price p_1 depends not only on the future interest rate i_1 but also on the Arbs' expectations for the subsequent asset price p_2. Once the economy reaches date 1, the Arbs learn the Fed's desired price p_F^*, and they adjust their expectations for future periods accordingly: $E_{1,A}[p_2] = p_F^*$. This expectation anchors the current price p_1 centered around p_F^* without necessitating changes to the interest rate i_1. Thus, announcing the future interest rate the Fed expects to set reveals nothing about the future financial conditions the Fed expects to implement.

[6] In this particular example, the two variables $(E_{0,F}[p_0], i_0)$ are sufficient to reveal the two unknowns (p_F^*, v_0). Hence, the announcement of expected financial conditions in the future $E_{0,F}[p_1]$ is redundant. However, this announcement is not redundant in variants of this example in which $p_{0,F}^*$ and $p_{1,F}^*$ are different (see Appendix A.4).

While the stark contrast in our model—that announcing $E_{0,F}[i_1]$ provides no useful information—is extreme, it illustrates that announcing the FCI-plot—the financial conditions the Fed expects to implement—will generally be a more effective communication tool to mitigate tantrums and to strengthen the recruitment effect.

Tantrums fundamentally arise when the market misunderstands the Fed's desired current financial conditions. Thus, directly announcing the financial conditions the Fed expects to see now, $E_{0,F}[p_0]$, effectively eliminates tantrums. In contrast, as previously demonstrated, announcing the policy rate i_0 does not resolve the market's uncertainty about the Fed's desired financial conditions. Announcing the Fed's expected rates $E_{0,F}[i_1]$ may provide incremental information (in contexts beyond our model), but represents an incomplete solution at best. This announcement generally fails to fully resolve the market's uncertainty regarding the Fed's desired financial conditions, as interest rates exert relatively weak influence on financial conditions compared to the numerous other driving forces. In our model, the Fed influences financial conditions primarily by shaping the Arbs' expectations for future asset prices rather than through interest rate adjustments. This aligns with the evidence presented in Section 2.4 that monetary policy affects financial conditions through channels beyond interest rates.

The recruitment effect weakens when the Arbs face more uncertainty about future financial conditions. Therefore, explicitly announcing the financial conditions the Fed expects to materialize in the future period, $E_{0,F}[p_1]$, will typically provide some information about future financial conditions and strengthen the recruitment effect. In contrast, announcing the interest rate the Fed expects to set $E_{0,F}[i_1]$ is unlikely the provide much information about $E_{0,F}[p_1]$.

Scenario-based FCI-plot communication. So far, we have assumed that agents never learn about "pstar" so they never update their beliefs. The possibility of learning creates additional effects because agents expect the other agent to partially move toward their view (Caballero and Simsek (2022)). In this type of environment, communicating a *scenario-based FCI-plot* might be even more effective than a simple FCI-plot.

To illustrate the benefits of scenario-based FCI-plot, consider the same model but with the difference that at date 1, one of two states will be realized $s_1 \in \{F, A\}$. State $s_1 = F$ reveals data that are more aligned with the Fed's initial belief, whereas state $s_1 = A$ reveals data more aligned with the Arbs' initial belief. Consequently, when either state is realized, the agent whose belief is less aligned with the data updates its belief and moves closer to the belief of the other agent. We focus on the Fed's belief, which drives the equilibrium, and assume it is given by $p_F^*(F) = p_F^*$ and $p_F^*(A) \in (p_F^*, p_A^*)$. If the realized state is aligned with its view, the Fed retains its original view. In contrast, if the realized state is aligned with the market's beliefs, the Fed updates its view to move closer to the market's view. Importantly, the extent to which the Fed will move toward the market's view in this case is also uncertain. At date 0, the market is uncertain about both p_F^* and $p_F^*(A)$ and believes they are drawn from a joint distribution.

To describe the FCI-plot at date 0, we also need to specify the agents' probability of each state $s_1 \in \{F, A\}$. Each agent would naturally assign a higher probability to the state that is more aligned with its initial belief. To make the analysis stark, suppose the Fed assigns probability one to state $s_1 = F$ (and zero to $s_1 = A$), whereas the market assigns probability one to state $s_1 = A$.

How would FCI-plot work in this example? Conditional on the realization of s_1, belief uncertainty is resolved and the equilibrium at date 1 is given by Eq. (6) but with p_F^* replaced by $p_F^*(s_1)$. Since the Fed thinks $s_1 = F$ will be realized, it would truthfully announce its expected asset price for the next period as $E_{0,F}[p_1] = p_F^*$. However, this announcement would *not* reveal any information about $p_F^*(A)$. Note also that the Arbs think state $s_1 = A$ will be realized with certainty, so *they expect the future asset price to be* $p_F^*(A)$ rather than p_F^*. Therefore, the FCI-plot leaves considerable residual uncertainty about the asset price the Arbs expect to see, resulting in a weak recruitment effect.

Consider instead a *scenario-based* FCI plot: suppose the Fed announces $\left(E_{0,F}[p_0], \{E_{0,F}[p_1|s_1]\}_{s_1 \in \{F,A\}}\right)$. Specifically, for the future period, the Fed announces its expected asset price under different scenarios: the baseline scenario $s_1 = F$ that it anticipates to see and the alternative scenario $s_1 = A$. This announcement fully resolves the market's uncertainty and generates an equilibrium with a stronger recruitment effect (see Proposition 5 in the appendix).

The broader point is that, when the Arbs disagree with the Fed as we see in practice, announcing the financial conditions the Fed would like to implement in different near-term scenarios is likely to be more effective in recruiting the Arbs compared to announcing the financial conditions the Fed expects to implement. Scenario-based FCI communication reduces the Arbs' uncertainty about future financial conditions even if they disagree with the Fed about the likelihood of different scenarios. This approach achieves this by mapping out the Fed's financial conditions intentions across various states of the world, rather than conditional on just the Fed's expected state. In contrast, announcing the Fed's expected financial conditions leaves residual uncertainty about how conditions will evolve if the Arbs hold different views about which economic scenario will materialize. We next turn to a practical implementation of the model's insights.

4. Practical Lessons for Communication

The analysis so far makes a case for rethinking how central banks communicate their policy stance. If financial conditions are the primary transmission channel of monetary policy, then communication should focus directly on the level of financial conditions the central bank expects to achieve. In this section, we translate the implications of our model into concrete recommendations for how to design and implement an FCI-based communication strategy. We address four core questions: (i) Who should central banks communicate with? (ii) What is the purpose of this communication? (iii) What exactly should be communicated? and (iv) What challenges might arise, and how can they be addressed? Our answers draw on the logic of the model, but extend beyond it to offer guidance that is grounded in institutional realities and market behavior. We also offer a prototype-FCI plot constructed from historical data to illustrate how our framework might work in practice.

4.1. Who should central banks communicate with?

The primary audience for an FCI-based communication strategy is sophisticated financial market participants—investors, analysts, and arbitrageurs who set asset prices and, in doing so, determine the financial conditions that shape aggregate demand. This focus follows directly from the transmission structure outlined in Figure 1, where financial conditions serve as the main conduit through which monetary policy affects real activity. Because these conditions are determined largely by market expectations and asset pricing behavior, effective policy requires influencing the beliefs of the actors who move markets.

This is particularly true in a context where these participants are both informed and opinionated, and routinely disagree with the central bank's assessment of the economy and appropriate policy stance (see especially Facts 6–8). While communication with the general public remains important for anchoring long-term inflation expectations and influence price-setting behavior (see Blinder et al. (2024)), shaping financial conditions in the near term requires a communication strategy tailored to those who interpret and act on policy through a financial lens.

4.2. What is the purpose of central bank communication?

The primary goal of central bank communication is to reduce the policy uncertainty perceived by market participants. Our model in Section 3 provides a mechanism linking this goal to the central bank's core objectives of stabilizing output gaps and inflation, by showing how proper communication can markedly increase the central bank's control over financial conditions, thereby enhancing the overall effectiveness of monetary policy. Essentially, since financial market participants can adjust their positions much faster than the central bank, clear communication with them can improve its *indirect* control over financial conditions.

Our model highlights two distinct mechanisms through which proper communication helps the central bank regain control over financial conditions.

Eliminating tantrums. First, proper communication prevents *tantrums*—situations in which the market participants misinterpret the central bank's desired financial conditions. By clearly announcing its policy intentions, the central bank can eliminate these misunderstandings and better align financial markets with its objectives.

Disagreement need not imply dysfunction; on the contrary, as our model shows, transparent communication enables an equilibrium that aligns behavior even amid disparate views. We elaborate on this point in Caballero and Simsek (2022), where we develop a model in which the central bank's and the market's views evolve over time and these views influence the long-term rates as well as the shorter-term rates. In that model, the long-term forward rates primarily reflect *the market's* views for future interest rates whereas the shorter-term rates reflect a combination of *both the market's and the central bank's views.* As long as the market correctly understands the central bank's view, the central bank still maintains control over shorter-term rates and ultimately over financial conditions (see also our extended model in Appendix A.5). The key to effective policy is not full agreement but rather "agreeing-to-disagree"—a situation where markets understand the central bank's views and might disagree with them but still incorporate them into asset prices and financial conditions.

Recruiting the arbitrageurs to insulate financial conditions from noise. Second, proper communication *recruits* the sophisticated market participants to help insulate financial conditions from financial noise—that is, asset price fluctuations driven by flows unrelated to macroeconomic fundamentals. Financial noise is a significant driver of asset price volatility in practice, and our evidence suggests it also affects financial conditions and macroeconomic activity (see Figure 3). Arbitrageurs make their living by trading against mispricings in financial markets, including those triggered by noise. It is therefore natural to harness their expertise to reduce the *macroeconomic* "mispricings" that disrupt financial conditions and ultimately influence broader economic outcomes.

How would this type of *macro*-arbitrage work in practice? By construction, the FCI consists mostly of tradeable assets (see Section 2.2), so arbitrageurs can, in principle, trade the FCI—or a portfolio that closely mimics it. However, under the current system, trading the FCI is highly risky. As demonstrated in Figure 2, the FCI is volatile, reflecting *aggregate* risk that is difficult to hedge. Moreover, central banks are generally not forthcoming about the level of financial conditions they consider appropriate. This elevated risk may help explain why arbitrageurs perceive considerable uncertainty about financial conditions, as we document in Section 2.8, and why they do not consistently offset the impact of noisy flows, as shown in Section 2.3.

Our model suggests that a key impediment to macro-arbitrage is the arbitrageurs' uncertainty about the central bank's policy intentions. Proper communication reduces this uncertainty and encourages arbitrageurs to trade more aggressively against the noise that contaminates financial conditions.

4.3. What should be communicated?

We recommend that central banks consider explicitly communicating an expected range for financial conditions (FCI-plot) and providing scenario-based guidance that describes how they would adjust FCI-plot under alternative macroeconomic developments.

The FCI-plot can be integrated into policy statements, meeting minutes, speeches, or the SEP—alongside projections for inflation, unemployment, and the policy rate. Because financial conditions are not directly observable, the Fed would also need to clarify the index or measure it uses to assess them—for instance, the FCI-G or a similar aggregate measure (see Section 2.2). Specifying a range acknowledges both the inherent volatility in financial markets and the imprecise control central banks have over them. Similar to non-binding inflation forecasts, range-based FCI guidance signals policy intent without implying exact targets or rigid commitments. Market participants understand that financial conditions are influenced by numerous factors beyond direct central bank control, making it unlikely they would interpret a communicated FCI range as a binding commitment rather than as a flexible policy guide.

Announcing the Fed's FCI-plot to mitigate tantrums. Our model shows that announcing the Fed's FCI-plot would be a more effective strategy to mitigate tantrums than announcing the interest rates the Fed expects to set. Since financial conditions are influenced by a myriad of forces beyond interest rates, describing policy in terms of the interest rate leaves ample room for uncertainty about expected financial conditions. It is like speaking in code and expecting markets to perfectly decipher the meaning.

This translation problem is further complicated by the fact that, in practice, interest rates might not be the main channel through which policy affects financial conditions (see Section 2.4). By explicitly stating the financial conditions it expects to implement, the Fed can communicate directly in the language that matters for aggregate economic activity, eliminating this unnecessary translation layer and associated tantrums.

Instead of leaving the mapping from interest rates to financial conditions to market inference, we contend that the Fed should articulate *a range for its expected FCI*, while keeping its policy rate guidance deliberately ambiguous—specifying only the direction of rate adjustments in response to significant deviations from the target range. In other words, rather than fixating on an exact policy rate, the Fed should clearly communicate whether it intends to tighten or ease monetary policy if financial conditions deviate from the target range. This conditional approach allows the Fed to retain flexibility while anchoring expectations around the financial conditions it ultimately aims to achieve.

Announcing the Fed's scenario-based FCI-plot to recruit the arbitrageurs. Our model suggests that announcing the Fed's FCI-plot has the additional benefit of recruiting the arbitrageurs for macro arbitrage. By providing *forward guidance* about the FCI that the Fed expects to implement, the FCI-plot reduces the arbitrageurs' uncertainty about financial conditions. Our model shows that a *scenario-based FCI-plot* would strengthen this effect further. This is because macro arbitrageurs have strong opinions about the economic outlook that often differ from the Fed's opinions (see Section 2.7). They are particularly interested in the central bank's "reaction function"—that is, the framework through which policy decisions evolve across different economic scenarios—rather than the central bank's views of the likelihood of different scenarios. Describing the Fed's FCI-plot under various scenarios effectively communicates its reaction function and reduces uncertainty about future financial conditions. Once the arbitrageurs understand the Fed's reaction function in terms of financial conditions—through the scenario-based FCI-plot—they can form an informed view of future financial conditions even when they disagree with the Fed about the likelihood of particular scenarios.

Could the Fed equivalently describe its "reaction function" in terms of the policy interest rate rather than the FCI under different scenarios? We believe this alternative is less effective for two reasons. First, interest rate-based scenario analysis remains subject to the translation problem discussed earlier and does not provide sufficient information about the Fed's desired financial conditions. Second, FCI-based scenario analysis has the added advantage of embedding built-in responses to financial shocks and tantrum scenarios that commonly occur in practice. For example, suppose the Fed signals:

"If this scenario unfolds, we aim to keep the FCI in this range. We currently believe that our chosen policy rate will lead us there; however, if the market overreacts or if financial conditions change for reasons unrelated to the short-run outlook, we will adjust the policy rate accordingly."

When backed by credible policy actions, this approach builds in a response to purely financial shocks and helps avoid market tantrums. If a market tantrum tightens financial conditions beyond the intended range, participants would expect the Fed to lower rates to counteract the tightening. Conversely, if a decline in risk premiums loosens conditions without a change in fundamentals, they would anticipate a rate increases to bring conditions back in line. Achieving the same clarity with interest rate-based communication would be far more difficult because it would require the Fed to describe in detail the financial or tantrum scenarios and how the interest rate would adjust in each case—an impossible task in practice.

4.3.1. From theory to application: A prototype FCI-plot

To illustrate how our proposed FCI-plot framework might look in practice, we next present a proof-of-concept construction from our analysis in Caballero et al. (2024). In this paper, we build upon the methodology described in McKay and Wolf (2023) and Caravello et al. (2024) to construct counterfactual paths for monetary policy. The basic idea is to combine an estimated VAR with estimated impulse responses to *policy shocks* to approximate *policy rules.* We focus on rules that minimize a loss of the form

$$\mathcal{L} = \sum_{t=0}^{\infty} \beta^t \left[\pi_t^2 + \tilde{y}_t^2 + \lambda_{\Delta i}(i_t - i_{t-1})^2 \right]. \tag{9}$$

At any time t, the planner takes the history as given and chooses the policy that minimizes the inflation gaps, output gaps, and interest rate smoothing term. This kind of loss is used as a benchmark in the optimal control exercises reported by the Fed staff to the FOMC (Federal Reserve Tealbook, 2016). We choose the degree of smoothing $\lambda_{\Delta i}$ to match the interest rate variance observed in the data. Importantly, our VAR includes the FCI—in addition to the standard macroeconomic variables, which enables us to construct the forecasts of the FCI under the optimal policy—along with the forecasts of interest rates, inflation, and output gaps. Our main sample is 1990Q1:2019Q4. We start in 1990 since the FCI-G index starts in this year and we stop before the Covid period to avoid

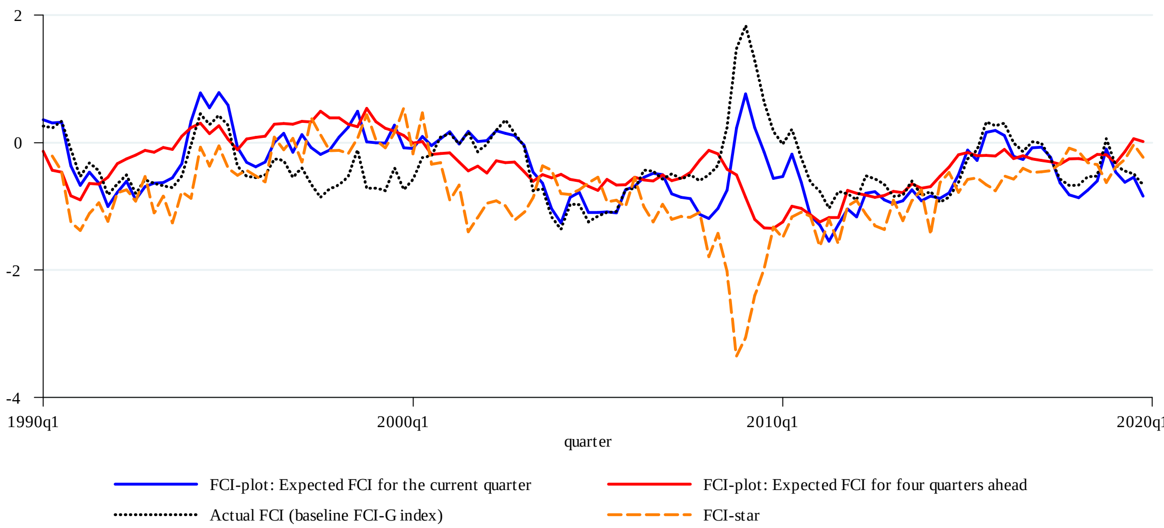

Figure 11: **A prototype FCI-plot**. The figure shows the expected FCI paths from a VAR-based counterfactual analysis in which monetary policy minimizes the loss function in (9) taking the history as given (see Caballero et al. (2024) for details). Solid blue (resp. red) line: expected FCI for the current quarter (resp. four quarters ahead). Dotted black line: baseline FCI-G index. Dashed orange line: FCI-star from Figure 4.

outliers (see Caballero et al. (2024) for details and robustness exercises).[7]

Figure 11 depicts *the FCI-plot*: current-quarter FCI expectations (solid blue line) and four-quarter-ahead FCI expectations (solid red line) under optimal policy. For comparison, we also plot the actual FCI (dotted black line) and the estimated FCI* (dashed orange line) from our analysis in Section 2.3. Several features are worth noting. First, the current-quarter FCI-plot (solid blue line) tracks the general trajectory of actual FCI (dotted black line) while exhibiting markedly less volatility, particularly during crisis periods. For instance, the FCI-plot remains closer to neutral both when the actual FCI loosened during the Internet boom of the late 1990s and when the actual FCI tightened during the Global Financial Crisis (GFC). The FCI-plot communicates that these large movements in actual FCI were excessive from the perspective of the Fed's gap minimization objectives. Second, the four-quarter-ahead FCI-plot deviates from the actual FCI by larger amounts and reveals the gradual convergence path toward FCI*. This is particularly visible in the

[7] These VAR outcomes do not account for the endogenous volatility reduction that our model suggests would arise from implementing an FCI-plot communication strategy. In practice, we would expect the realized FCI to become less volatile as market participants better understand the central bank's FCI views. See Caballero et al. (2024) for a method to construct policy counterfactual evaluations that incorporates endogenous volatility effects.

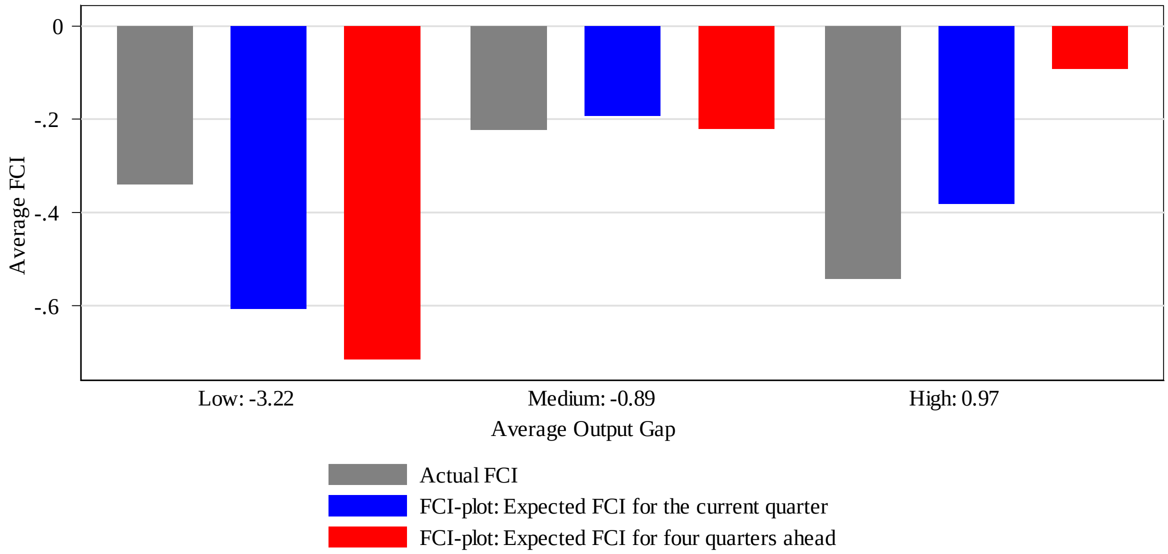

Figure 12: **FCI-plot by output gaps**. The figure shows the average values of the FCI-plot in Figure 11 by output gap bins. Blue bars (resp. red bars): expected FCI for the current quarter (resp. four quarters ahead). Grey bars: baseline FCI-G index.

GFC as well as the early 2000s recession, where the expected path showed a significant loosening ahead while actual conditions were tight. Overall, the FCI-plot provides meaningful information whenever there are large gaps between FCI and FCI*; with the current FCI-plot mostly describing *the direction* in which the Fed would like to move the FCI and the four-quarter-ahead FCI-plot describing *the speed* at which the Fed is likely to bring the FCI toward FCI*.

Figure 12 provides a complementary visualization of the same data to illustrate how the central bank's reaction function might appear in the FCI-plot framework. It displays the average FCI values grouped by output gap conditions (low, medium, and high). The visualization reveals a systematic pattern: during periods of negative output gaps (low), the actual FCI (gray) has typically been tighter than optimal, prompting the central bank to signal more accommodative financial conditions through both its current-quarter FCI-plot (blue) and an even more accommodative four-quarter-ahead FCI-plot (red). Conversely, during periods of positive output gaps (high), the actual FCI has been looser than ideal, with the central bank indicating progressive tightening through its FCI-plot projections. This representation effectively communicates the central bank's state-contingent reaction function in terms of financial conditions rather than interest rates. Such clarity would allow market participants who disagree with the central bank's output gap assessment to nevertheless make informed forecasts about future financial conditions based on their own economic outlook, thereby reducing uncertainty without requiring consensus.

While these visualizations provide useful illustrations of the FCI-plot concept, a full implementation would include additional features we propose, particularly confidence bands to acknowledge the imprecise control central banks have over financial conditions, and more detailed scenario-based projections beyond the simple output gap categories shown here. These enhancements would be especially valuable during periods of heightened uncertainty, such as the GFC period shown in the figure or the Covid-19 cycle.

This prototype demonstrates that constructing an FCI-plot is empirically feasible using existing techniques, data, and models already familiar to central banks. By showing not only the currently expected financial conditions but also the expected path over coming quarters, on average and in different scenarios, the central bank can better manage expectations and recruit arbitrageurs to help stabilize conditions around the desired path.

4.4. What are potential challenges?

While offering significant advantages, a financial conditions–centric communication framework also presents several challenges.

One key concern is the noisy pass-through from the policy interest rate to financial conditions, compounded by the Fed's lack of direct instruments to control asset prices. This situation raises the risk that markets might immediately test any announced expected target—a worry reminiscent of early skepticism about inflation targeting. However, just as the Fed does not "trade" inflation breakevens yet successfully anchors expectations with an explicit inflation target, it need not rigidly enforce an exact FCI target. Instead, the Fed should communicate the level of financial conditions consistent with its macroeconomic objectives and clearly describe how it will respond to deviations—thereby reducing uncertainty about its reaction function and providing a solid anchor for markets.

A second concern is that the Fed's communication might be misinterpreted as a *binding commitment* rather than a description of its expected behavior. Conditioning the communication on specific economic scenarios can help reduce this risk, but it does not eliminate it—since it is difficult to anticipate and articulate every relevant detail of a scenario. The Fed may wish to retain flexibility to adjust its actions in response to unanticipated events, yet prior communications may be interpreted as rigid commitments.

This issue is not unique to financial conditions; it also arises under the current interest rate–centric framework. In fact, it is arguably more acute in the current context because volatile financial conditions represent an important *omitted variable*. If financial conditions ease due to a decline in the risk premium and the Fed refrains from raising rates because it feels constrained by earlier guidance, inflationary pressures may build. Conversely, if financial conditions tighten due to a rise in risk premium or a market "tantrum," a commitment to the previous rate path could lead to an economic slowdown. While incorporating financial conditions into the communication framework does not fully resolve the commitment-versus-flexibility dilemma, it mitigates the problem by effectively conditioning policy on volatile financial market shocks in addition to anticipated economic states.

Furthermore, communicating the expected financial conditions is inherently less likely to be misinterpreted as a binding commitment than traditional interest rate guidance. Market participants understand that the central bank has only imprecise control over the FCI. As a result, they are unlikely to view FCI announcements as hard commitments—just as they do not interpret inflation forecasts as rigid promises. Deviations from inflation expectations prompt predictable policy responses, rather than suggesting that the central bank has missed a fixed target. Similarly, by articulating a soft target for FCI, the central bank can signal its intended policy stand without locking itself into an unchangeable course—thus preserving the flexibility needed to respond to evolving market conditions.

A third concern with FCI-based communication is the possibility of inadvertently stabilizing components of financial conditions that might not be the most relevant at specific times. For example, mortgage rates may dominate transmission during housing market downturns, whereas equity valuations might play a more significant role during periods of robust business investment. The FCI-G index we reference attempts to address these concerns by weighting components according to estimated macroeconomic impact derived from the Federal Reserve's structural models. However, these weights are inherently uncertain and may evolve over time. Rather than undermining the case for FCI communication, this uncertainty actually reinforces it. By transparently communicating how the central bank interprets financial conditions across various scenarios—highlighting which components it emphasizes under different economic contexts—policymakers help market participants better understand the central bank's evolving framework and priorities.

A fourth concern with FCI communication is that, like inflation targeting, it entails trade-offs. Adjusting interest rates to steer financial conditions may at times conflict with other policy objectives. For example, maintaining FCI within the expected range could require large movements in the policy rate, potentially raising concerns about financial stability. While this concern is valid, our previous work shows that FCI targeting *reduces* the need for large interest rate adjustments (Caballero et al. (2024)), and the same point applies to the FCI communication we propose in this paper. By recruiting arbitrageurs to help stabilize financial conditions through market-based mechanisms, the central bank alleviates some of the burden typically placed on the policy rate. To further address concerns about excessive adjustments, we propose that the central bank communicate a range for its expected FCI, rather than a precise point. This flexibility would allow for effective communication while avoiding unnecessary policy swings.

Finally, implementing an explicit FCI-based communication framework carries risks of initial confusion or credibility loss, especially if market participants interpret the shift as a fundamental departure from traditional interest rate guidance. However, transitioning need not involve a sudden overhaul of existing practices. A gradual introduction of financial conditions language alongside existing guidance on rates, inflation, and output gaps can mitigate this risk.

Policymakers could initially incorporate regular assessments of prevailing financial conditions into their communications, clarifying how these conditions align with broader macroeconomic objectives. Over time, this approach would establish familiarity and reduce potential misunderstandings. As markets adapt, central banks could then provide more explicit scenario-based guidance about expected financial conditions, enabling a smooth adjustment to the refined framework rather than an abrupt transition.

5. Conclusion

This paper examines how central banks can improve monetary policy effectiveness through enhanced communication with financial markets. We motivate our analysis with eight empirical facts that highlight the key role of volatile financial conditions in policy transmission, the pervasiveness of disagreements between the markets and the central bank, and the limitations of traditional interest rate projections for conveying policy intentions.

We then build a theoretical model consistent with these facts and investigate its implications for policy communication. Our model demonstrates that arbitrageurs' uncertainty about the central bank's desired financial conditions creates the possibility of misunderstandings ("tantrums") and amplifies the effects of noise trading on financial conditions. We show that directly communicating the central bank's expected financial conditions (FCI-plot) eliminates tantrums and recruits arbitrageurs to insulate financial conditions from noise. A scenario-based FCI communication further strengthens these benefits, particularly when the arbitrageurs disagree with the central bank about the likelihood of different near-term scenarios and would like to know the central bank's "reaction function." Overall, the FCI-plot communication enables an "agree-to-disagree" equilibrium where markets help implement the central bank's objectives despite differing views. In contrast, communicating expected interest rates alone fails to achieve these benefits.

We conclude by drawing the practical lessons from our analysis for policy communication. We recommend that central banks consider explicitly communicating the financial conditions they expect to see in the near future (FCI-plot) and providing scenario-based guidance that describes how they would adjust FCI-plot under alternative macroeconomic developments. We provide a prototype FCI-plot constructed from historical data to demonstrate how our proposed framework might work in practice. Our prototype reveals how current-quarter projections track actual financial conditions with reduced volatility, while longer-horizon projections demonstrate the gradual convergence path toward optimal financial conditions. This is particularly evident during demand recessions, where the FCI-plot would have signaled easing intentions despite tight actual conditions. Although preliminary, this prototype illustrates how an FCI-plot framework could enhance policy transmission by clarifying central bank intentions especially at times of macroeconomic uncertainty.

We argue that FCI communication should target sophisticated financial market participants who directly influence asset prices and financial conditions. These practitioners speak the language of markets fluently but often lack deep familiarity with macroeconomic concepts. By communicating policy intentions in terms of expected financial conditions rather than abstract concepts like output gaps, central banks can bridge this translation gap more effectively. The FCI-plot framework converts complex policy objectives into the metrics that matter most to market participants, eliminating the need for them to infer the central bank's intended financial outcomes. This clarity enables market participants to develop trading strategies that align with policy goals, creating a more efficient transmission mechanism even when fundamental disagreements about economic outlook persist between the central bank and markets.

Finally, a note of caution is warranted. While our analysis has focused on the technical benefits of FCI-based communication, practical implementation must consider broader political and public perception challenges. Critics might misinterpret a focus on financial conditions as prioritizing financial markets over broader economic concerns. Central banks should proactively address this potential misconception by clearly articulating that financial conditions communication serves as a means to achieve—not replace—their mandated objectives of maximum employment and price stability. By emphasizing that stable and appropriate financial conditions directly benefit households and businesses through more predictable economic outcomes, central banks can maintain public support while improving policy effectiveness. The ultimate goal remains the same: harnessing financial markets as allies in achieving macroeconomic stability, rather than treating them as ends in themselves.

References

Adrian, T., Duarte, F., 2018. Financial vulnerability and monetary policy.

Adrian, T., Duarte, F., Liang, N., Zabczyk, P., 2020. Nkv: A new keynesian model with vulnerability. In: AEA Papers and Proceedings. Vol. 110. American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203, pp. 470–476.

Ajello, A., Cavallo, M., Favara, G., Peterman, W. B., Schindler IV, J. W., Sinha, N. R., 2023. A new index to measure us financial conditions. FEDS Notes. Washington: Board of Governors of the Federal Reserve System, June 30, 2023, https://doi.org/10.17016/2380-7172.3281.

Ajello, A., Favara, G., Marchal, G., Szoke, B., 2024. Financial conditions and risks to the economic outlook. FEDS Notes 2024-09-20-1, Board of Governors of the Federal Reserve System.
URL `https://www.federalreserve.gov/econres/notes/feds-notes/financial-conditions-and-risks-to-the-economic-outlook-20240920.html`

Amato, J. D., Morris, S., Shin, H. S., 2002. Communication and monetary policy. Oxford Review of Economic Policy 18 (4), 495–503.

Bauer, M. D., Bernanke, B. S., Milstein, E., February 2023. Risk appetite and the risk-taking channel of monetary policy. Journal of Economic Perspectives 37 (1), 77–100.

Bauer, M. D., Pflueger, C. E., Sunderam, A., 2024a. Changing perceptions and post-pandemic monetary policy. In: Jackson Hole Symposium, Federal Reserve Bank of Kansas City, available at https://www. kansascityfed. org/Jackson%20Hole/documents/10337/pflueger_jh. pdf.

Bauer, M. D., Pflueger, C. E., Sunderam, A., 2024b. Perceptions about monetary policy. The Quarterly Journal of Economics 139 (4), 2227–2278.

Bauer, M. D., Swanson, E. T., 2023. An alternative explanation for the âĂIJfed information effectâĂİ. American Economic Review 113 (3), 664–700.

Beaudry, P., Cavallino, P., Willems, T., 2024. Life-cycle forces make monetary policy transmission wealth-centric. Tech. rep., National Bureau of Economic Research.

Bekaert, G., Hoerova, M., Lo Duca, M., 2013. Risk, uncertainty and monetary policy. Journal of Monetary Economics 60 (7), 771–788.

Bernanke, B. S., Kuttner, K. N., 2005. What explains the stock market's reaction to federal reserve policy? The Journal of Finance 60 (3), 1221–1257.

Blinder, A. S., 1998. Central banking in theory and practice. Mit press.

Blinder, A. S., 2007. Monetary policy by committee: Why and how? European Journal of Political Economy 23 (1), 106–123.

Blinder, A. S., 2009. Talking about monetary policy: the virtues (and vice?) of central bank communication. BIS working paper No. 274.

Blinder, A. S., Ehrmann, M., De Haan, J., Jansen, D.-J., 2024. Central bank communication with the general public: Promise or false hope? Journal of Economic Literature 62 (2), 425–457.

Blinder, A. S., Ehrmann, M., Fratzscher, M., De Haan, J., Jansen, D.-J., 2008. Central bank communication and monetary policy: A survey of theory and evidence. Journal of economic literature 46 (4), 910–945.

Boehm, C., Kroner, T. N., 2024. Monetary policy without moving interest rates: The fed non-yield shock. NBER working paper No. 32636.

Caballero, R. J., Caravello, T. E., Simsek, A., 2024. Financial conditions targeting. NBER Working Paper 33206.

Caballero, R. J., Caravello, T. E., Simsek, A., 2025. Fci-star. working Paper.

Caballero, R. J., Farhi, E., 2018. The safety trap. The Review of Economic Studies 85 (1), 223–274.

Caballero, R. J., Simsek, A., 2020. A risk-centric model of demand recessions and speculation. The Quarterly Journal of Economics 135 (3), 1493–1566.

Caballero, R. J., Simsek, A., 2021. A model of endogenous risk intolerance and LSAPs: Asset prices and aggregate demand in a "COVID-19" shock. The Review of Financial Studies 34 (11), 5522–5580.

Caballero, R. J., Simsek, A., 2022. Monetary policy with opinionated markets. American Economic Review 112 (7), 2353–92.

Caballero, R. J., Simsek, A., 2023. A monetary policy asset pricing model. NBER working paper No. 30132.

Caballero, R. J., Simsek, A., 2024a. Central banks, stock markets, and the real economy. Annual Review of Financial Economics 16.

Caballero, R. J., Simsek, A., 2024b. Monetary policy and asset price overshooting: A rationale for the wall/main street disconnect. The Journal of Finance 79 (3), 1719–1753.
URL https://onlinelibrary.wiley.com/doi/abs/10.1111/jofi.13343

Caravello, T. E., McKay, A., Wolf, C. K., 2024. Evaluating policy counterfactuals: A âĂIJvar-plusâĂİ approach. MIT FRB Minneapolis MIT & NBER.
URL https://economics.mit.edu/sites/default/files/2024-02/mp_modelcnfctls_0.pdf

Chodorow-Reich, G., Nenov, P. T., Simsek, A., 2021. Stock market wealth and the real economy: A local labor market approach. American Economic Review 111 (5), 1613–57.

Cieslak, A., Vissing-Jorgensen, A., 10 2020. The economics of the fed put. The Review of Financial Studies 34 (9), 4045–4089.

Cochrane, J. H., 2011. Presidential address: Discount rates. The Journal of finance 66 (4), 1047–1108.

Coronado, J., Rosner-Warburton, L., 2025. Shadow survey of market participants.
URL https://www.macropolicyperspectives.com/

De Long, J. B., Shleifer, A., Summers, L. H., Waldmann, R. J., 1990. Noise trader risk in financial markets. Journal of political Economy 98 (4), 703–738.

Ehrmann, M., Fratzscher, M., 2007. Communication by central bank committee members: different strategies, same effectiveness? Journal of Money, Credit and Banking 39 (2-3), 509–541.

Federal Reserve Tealbook, June 2016. Report to the FOMC on Economic Conditions and Monetary Policy.

Gabaix, X., Koijen, R. S., 2021. In search of the origins of financial fluctuations: The inelastic markets hypothesis. NBER working paper No. 28967.

Gertler, M., Karadi, P., 2015. Monetary policy surprises, credit costs, and economic activity. American Economic Journal: Macroeconomics 7 (1), 44–76.

Hanson, S. G., Stein, J. C., 2015. Monetary policy and long-term real rates. Journal of Financial Economics 115 (3), 429–448.

Hatzius, J., Stehn, S. J., 2018. The case for a financial conditions index. Goldman Sachs Global Economics Papers.

Holston, K., Laubach, T., Williams, J. C., 2023. Measuring the natural rate of interest after covid-19. Federal Reserve Bank of New York Staff Reports (1063).

Kashyap, A. K., Stein, J. C., 2023. Monetary policy when the central bank shapes financial-market sentiment. Journal of Economic Perspectives 37 (1), 53–75.

Kekre, R., Lenel, M., 2022. Monetary policy, redistribution, and risk premia. Econometrica 90 (5), 2249–2282.

Kekre, R., Lenel, M., Mainardi, F., 2023. Monetary policy, segmentation, and the term structure.

Laarits, T., Matthies, B., Vasudevan, K., Yang, W., 2025. Monetary policy by committeeWorking paper.

Laubach, T., Williams, J. C., 2003. Measuring the natural rate of interest. The Review of Economics and Statistics 85 (4), 1063–1070.

McKay, A., Wolf, C. K., 2023. What can time-series regressions tell us about policy counterfactuals? Econometrica 91 (5), 1695–1725.
URL https://onlinelibrary.wiley.com/doi/abs/10.3982/ECTA21045

Nagel, S., Xu, Z., 2024. Movements in yields, not the equity premium: Bernanke-kuttner redux. NBER working paper No. 32884.

Pflueger, C., Siriwardane, E., Sunderam, A., 2020. Financial market risk perceptions and the macroeconomy. The Quarterly Journal of Economics 135 (3), 1443–1491.

Powell, J. H., 2018. Opening remarks: Monetary policy in a changing economy. In: a speech at Federal Reserve Bank Kansas City, Changing Market Structures and Implications for Monetary Policy: Economic Policy Symposium, Jackson Hole, Wyoming.

Romer, C. D., Romer, D. H., 2004. A new measure of monetary shocks: Derivation and implications. American Economic Review 94 (4), 1055–1084.
URL https://www.aeaweb.org/articles?id=10.1257/0002828042002651

Shiller, R. J., 2014. Speculative asset prices. American Economic Review 104 (6), 1486–1517.

Vissing-Jorgensen, A., 2019. Central banking with many voices: The communications arms race. In: Conference Proceedings, 23rd Annual Conference of the Central Bank of Chile. Central Bank of Chile, Santiago, Chile.

Woodford, M., 2005. Central bank communication and policy effectiveness. NBER working paper No. 11898.

A. A stylized model of central bank communication

We adapt the model from Caballero et al. (2024) to investigate the implications for central bank communication. We first describe a simplified version of the model from Caballero et al. (2024) along with the main result that shows the impact of noise shocks on financial conditions and market volatility. We then extend this model to illustrate the benefits of central bank communication. The proofs are at the end of the section.

A.1. A macroeconomic model with noise and limits to arbitrage

Real economy. On the supply side, (the log of) potential output follows a path $\{y_t^*\}$. For now, potential output follows a deterministic path that is known by all agents. Later, we introduce uncertainty and disagreements about $\{y_t^*\}$, which will motivate central bank communication.

Due to nominal price stickiness, (the log of) output, y_t, is determined by aggregate demand and can depart from potential output. For simplicity, prices are fully sticky. Our insights are robust to allowing for partially flexible prices via a standard Phillips curve (see Caballero et al. (2024)).

On the demand side, there are two types of households: hand-to-mouth agents and (asset holding) households. Hand-to-mouth agents do not play an important role beyond decoupling the labor supply decisions from household consumption behavior. They supply all of the labor and spend all of their income. Since their spending is driven by output, which is endogenous, they create a Keynesian multiplier effect but they do not drive aggregate demand.

Aggregate demand is driven by (asset holding) households. These households own the aggregate risky asset (the market portfolio): a claim on firms' share of output (νY_t). They have expected log utility and make portfolio allocation and consumption-savings decisions. They delegate the portfolio decision to the portfolio managers, which we describe later. The upshot of these assumptions is the *output-asset price* relation

$$y_t = m + p_t, \tag{A.1}$$

where p_t denotes (the log of) the price of the market portfolio and $m = \log\left(\frac{1-\beta}{\nu\beta}\right)$ is a constant derived parameter. The setup is easy to extend to incorporate non-financial demand shocks, but this specification will be sufficient for our purposes.

As we discuss in Section 2.5, in practice asset prices affect economic activity with substantial lags, and these lags are a key reason for why policy depends on the central bank's beliefs. For simplicity, we abstract away from transmission lags. However, we make the policy belief dependent by making potential output unobservable as we explain later in the section.

Financial markets. Households make a portfolio choice between two assets: the market portfolio and the risk-free asset (normalized to have zero net supply). The (log) return on the risk-free asset $i_t = \log R_t^f$ is set by the central bank as we describe later. The (log) return on the market portfolio, $r_{t+1} = \log R_{t+1}$, is approximately given by

$$\begin{aligned} r_{t+1} &= \rho - (1-\beta)\, m + (1-\beta)\, y_{t+1} + \beta p_{t+1} - p_t \\ &= \rho + p_{t+1} - p_t. \end{aligned} \tag{A.2}$$

Here, $\rho \equiv -\log \beta$ is the (log of) households' discount rate. The return depends on future output (through cash flows) and the future asset price and inversely on the current asset price. The second line uses $(A.1)$ to write future output in terms of the future asset price, which implies the return depends on the price changes.

Households delegate their portfolio choice to managers. In each period, a fraction η of these managers are "noise traders" and their portfolio weight is given by $\omega_{t,N} = 1 + \frac{1-\eta}{\eta}\mu_t$. That is, they deviate from the optimal portfolio benchmark by an amount $\frac{1-\eta}{\eta}\mu_t$,. where μ_t denotes aggregate noise and $\frac{1-\eta}{\eta}$ is a normalizing constant. For simplicity, we assume μ_t follows an i.i.d. process $N\left(0, \sigma_\mu^2\right)$ (the analysis extends to AR(1) noise shocks).

The remaining managers are "arbitrageurs" who choose their portfolio weights optimally as we describe below. Combining the managers' positions, we obtain the market clearing condition

$$(1-\eta)\, \omega_{t,A} + \eta \left(1 + \frac{1-\eta}{\eta}\mu_t\right) = 1 \Longrightarrow \omega_{t,A} = 1 - \mu_t. \tag{A.3}$$

In equilibrium, arbitrageurs must adjust their portfolio weight $\omega_{t,A}$ to absorb the aggregate noise.

The arbitrageurs choose their portfolio weight to maximize expected log assets-under-management, after observing the risk-free rate and the current noise μ_t:

$$\max_{\omega_{t,A}} E_{t,A}\left[\log\left(W_t\left(R_t^f + \omega_{t,A}\left(R_{t+1} - R_t^f\right)\right)\right)\right].$$

Observe that we allow arbitrageurs to have their own beliefs. This problem effectively results in a standard mean-variance portfolio optimization. Assuming the market and the portfolio returns are log-normally distributed, the approximate optimality condition is given by:

$$\omega_{t,A}\sigma_{t,A}\left(r_{t+1}\right) = \frac{E_{t,A}\left[r_{t+1}\right] + \frac{var_{t,A}(r_{t+1})}{2} - i_t}{\sigma_{t,A}\left(r_{t+1}\right)}. \tag{A.4}$$

The arbitrageurs' demand for risk is equal to their (perceived) equilibrium Sharpe ratio.

Combining this with $(A.3)$, we derive the *financial market equilibrium condition:*

$$E_{t,A}\left[r_{t+1}\right] = i_t + \frac{1}{2} var_{t,A}\left(r_{t+1}\right) - var_{t,A}\left(r_{t+1}\right)\mu_t.$$

Substituting $(A.2)$ into this condition, we obtain a present discounted value relation that describes the equilibrium aggregate asset price:

$$p_t = \rho + E_{t,A}\left[p_{t+1}\right] - \left(i_t + \frac{1}{2} var_{t,A}\left(p_{t+1}\right)\right) + var_{t,A}\left(p_{t+1}\right)\mu_t. \tag{A.5}$$

Note that we have substituted the conditional return variance in terms of the conditional price variance since $r_{t+1} = \rho + p_{t+1} - p_t$.

All else equal, the effect of noise on the aggregate asset price *increases with the return variance perceived by the arbitrageurs.* Intuitively, when the aggregate asset price is more volatile, arbitrageurs require a greater expected return to absorb noisy flows.

Monetary policy. The central bank (the Fed) sets i_t and determines output. As a benchmark, we assume the central bank follows the interest rate rule

$$i_t = E_{t-1,A}\left[i_t\right] + \theta\tilde{y}_t + v_t, \quad \text{where } \tilde{y}_t = y_t - y_t^*. \tag{A.6}$$

Here, $E_{t-1}^{A}\left[i_t\right]$ is the interest rate the Arbs expect the Fed to set and $v_t \sim N\left(0, \sigma_v^2\right)$ is an i.i.d. monetary policy shock.

Without the monetary policy shock term, the rule in $(A.6)$ emerges from minimizing the gap-objective function $G_t = \tilde{y}_t^2 + \frac{1}{\theta}\left(i_t - E_{t-1,A}\left[i_t\right]\right)^2 + \beta E_t\left[G_{t+1}\right]$ (taking future actions as given). Hence, it captures a central bank that aims to minimize the output gaps but also set predictable interest rates. This preference for predictability leads to a gradual adjustment of interest rates, which slows the central banks' response to shocks that create output gaps, such as the financial noise shock. The parameter θ captures the speed at which the central bank responds to shocks.

We append the rule with an additional monetary shock term v_t to introduce some irreducible noise into the central bank's interest rate policy. In practice, this type of policy noise can emerge from various unmodeled considerations, e.g., disagreements inside the central bank, a concern with near-term inflationary pressures, and so on. In the model, these monetary policy shocks play two purposes. First, they introduce a source of uncertainty to aggregate asset prices that is different from financial noise shocks. Second, and more importantly, they prevent a full revelation of the Fed's beliefs to the Arbs in the main setup where we introduce belief disagreements.

A.2. Benchmark equilibrium with common beliefs

We first consider a benchmark setup in which the Arbs and the Fed share identical beliefs. We use this setup to illustrate how financial noise affects the equilibrium asset price and output. The following result characterizes the equilibrium.

Proposition 1 (Equilibrium with Common Beliefs)**.** *Suppose the Arbs and the Fed agree: they both know that aggregate supply follows the deterministic path $\{y_t^*\}$, noise shocks are i.i.d. with $N\left(0,\sigma_\mu^2\right)$, and monetary policy shocks are i.i.d. with $N\left(0,\sigma_v^2\right)$. Suppose the parameters are such that the quadratic in $(A.8)$ has two positive roots. Then, there is an equilibrium with*

$$\begin{aligned} p_t &= p_t^* + \frac{1}{1+\theta}\left(\sigma^2\mu_t - v_t\right), \qquad \textit{where } p_t^* \equiv y_t^* - m, \\ y_t &= y_t^* + \frac{1}{1+\theta}\left(\sigma^2\mu_t - v_t\right) \\ i_t &= \rho + y_{t+1}^* - y_t^* - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\sigma^2\mu_t + \frac{1}{1+\theta}v_t \end{aligned} \tag{A.7}$$

The return is given by $r_{t+1} = \rho + p_{t+1} - p_t$. The perceived variance $\sigma^2 = var_t\left(p_{t+1}\right)$ is the smallest positive solution to the following fixed point problem:

$$\sigma^2 = \left(\frac{1}{1+\theta}\right)^2\left(\left(\sigma^2\right)^2\sigma_\mu^2 + \sigma_v^2\right). \tag{A.8}$$

Here, "p-star" denotes the aggregate asset price compatible with zero output gaps—it is the model analogue of the "FCI-star" from Figure 4. Eq. $(A.7)$ shows that "p-star" is determined purely by *macroeconomic* factors: specifically, the aggregate supply y_t^* and the aggregate demand pressures captured by the intercept m. It does not depend on financial factors such as expected cash-flows, risk premium, or noisy flows. Those financial factors are absorbed into "rstar," which in this model is given by $i_t^* = \rho + y_{t+1}^* - y_t^* - \frac{1}{2}\sigma^2 + \sigma^2\mu_t$. The actual interest rate i_t differs from i_t^* for two reasons: it features a smaller response to noise shocks ($\frac{\theta}{1+\theta}\sigma^2\mu_t$) and it responds to monetary policy shocks (v_t). Intuitively, to eliminate output gaps, the Fed needs to adjust the interest rate to insulate the FCI and the real economy from purely financial factors. In this model, this adjustment is incomplete due to the Fed's preference for setting predictable interest rates. This allows financial shocks as well as monetary policy shocks to partially affect macroeconomic outcomes.[8]

Consider first the response to the monetary policy shock v_t. As expected, a positive monetary policy shock lowers the output gap. The impact is less than one-to-one since the endogenous

[8]Observe that i_t *fully* responds to changes in the growth rate of potential output $y_{t+1}^* - y_t^*$. This is because we have assumed the path of potential output follows a deterministic path known by both the Fed and the Arbs. Therefore, in the baseline model the interest rate adjustments due to deterministic potential output growth do not violate the Fed's preference to set predictable interest rates. This will change when we introduce disagreements about potential output growth.

response of monetary policy to output gaps stabilizes some of the initial impact.

Next, consider the response to the financial noise shock μ_t. Since the central bank is gradualist, it reacts to the noise shock only partially, allowing this shock to affect the aggregate asset price. Consequently, aggregate return variance is driven not only by monetary policy shocks but also by financial noise shocks. Note also that greater return variance amplifies the noise shock's impact on the aggregate asset price. Therefore, the variance solves a fixed point problem that captures a vicious cycle: increased variance allows noise to have greater impact on aggregate asset price, which further increases variance and enables noise to have an even stronger effect, and so on.

In Caballero et al. (2024), we argue that this vicious cycle of volatility creates a rationale for Financial Conditions Targeting—a framework in which the central bank commits to stabilize future financial conditions to encourage arbitrageurs to trade against noisy flows, thereby "recruiting" them to insulate the real economy from financial noise. In the rest of this section, we show the right central bank communication strategy can also activate this recruitment mechanism.

A.3. Belief disagreements: Tantrums and volatility

To investigate the role of communication, we extend the model to introduce belief disagreements between the Fed and the Arbs. We show that, *on average*, the Fed implements the appropriate outcomes under its belief. However, the Arbs' uncertainty about the Fed's belief leads to additional asset price and output gaps for two different reasons. First, if the Arbs' belief about the Fed's belief is different than the Fed's actual belief, this discrepancy induces *current* additional asset price and output gaps that are only partially stabilized by the Fed in view of interest rate gradualism. We refer to these misunderstandings as *tantrums*. Second, the Arbs' uncertainty about the Fed's belief increases perceived *future* asset price variance, which amplifies the transmission of financial market noise to macroeconomic outcomes.

Beliefs about "ystar" and "pstar". We now assume potential output is uncertain and agents have different beliefs about the path it follows. For the baseline disagreements model, we focus on the special case in which both agents think potential output is constant over time $y_t \equiv y^*$. However, the Fed thinks it is y_F^* and the Arbs think it is y_A^*. For now, we assume that agents never receive a signal about potential output so their initial beliefs do not change (we relax this assumption in Section A.5).

These assumptions naturally imply disagreements about "pstar": the Fed thinks "pstar" is $p_F^* \equiv y_F^* - m$ and the Arbs think it is $p_A^* \equiv y_A^* - m$. We view the disagreements about potential output as a simple modeling device to introduce disagreements about "pstar". In Caballero and Simsek (2022) we obtain similar results when the Fed and the markets disagree about aggregate demand rather than potential output.

Monetary policy. We assume the Fed follows the rule in $(A.7)$ with the difference that it stabilizes output gaps *around its own belief about potential output*

$$i_t = E_{t-1,A}\left[i_t\right] + \theta\left(y_t - y^*_{t,F}\right) + v_t. \tag{A.9}$$

Beliefs about each other's beliefs. Since the Fed sets policy according to its own belief, the market wants to know the Fed's belief even though it does not agree with it. Therefore, we need to specify agents' beliefs for each other's beliefs. To illustrate our points transparently, we keep the model simple, focusing on belief uncertainty only at the single date 0. Similar results hold in richer dynamic environments.

Specifically, for the baseline model in which each agent thinks "pstar" is constant, we assume the Arbs initially (at date 0) do not know the Fed's belief. Their prior belief about the Fed's belief about "pstar" is given by $p^*_F \sim_A N\left(\tilde{p}^*_{FA}, \tilde{\sigma}^2_{FA}\right)$. We can expect $\tilde{p}^*_{FA}$ to be somewhere between the Arbs' own belief and the Fed's true belief, though we allow for more general cases. At date 1, the Arbs learn the Fed's belief p^*_A correctly so they no longer face uncertainty. For simplicity, we assume the Fed knows the Arbs' belief p^*_A throughout (it can learn this from asset prices). We next characterize the equilibrium.

Equilibrium with disagreement. First, consider the equilibrium from date $t = 1$ onward so there is disagreement but no uncertainty about beliefs. The equilibrium is given by $(A.7)$ but with the asset price replaced by *the Fed's belief about "pstar"*. We note this result with the following proposition.

Proposition 2 (Disagreement and Knowledge of Beliefs)**.** *Consider the baseline model in which the Fed and the Arbs disagree about "pstar", (p^*_F, p^*_A), and consider date $t \geq 1$ onward so they know each other's beliefs. Then, there is an equilibrium in which*

$$\begin{aligned} p_t &= p^*_F + \frac{1}{1+\theta}\left(\sigma^2\mu_t - v_t\right) \\ y_t &= y^*_F + \frac{1}{1+\theta}\left(\sigma^2\mu_t - v_t\right) \\ i_t &= \rho - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\sigma^2\mu_t + \frac{1}{1+\theta}v_t \end{aligned} \tag{A.10}$$

The return is given by $r_{t+1} = \rho + p_{t+1} - p_t$. The perceived variance $\sigma^2 = var_{t,A}\left(p_{t+1}\right)$ is the smallest positive solution to the same fixed point problem as before $(A.8)$.

Why does the Fed's belief about "pstar" determine the equilibrium? Intuitively, the Fed can always adjust the interest rate to steer the financial conditions to the level it deems appropriate—subject to interest rate gradualism constraints. In this model, given the full persistence of beliefs, asset prices adjust to the Fed's belief not only in the current period but also in future periods. Therefore, the Fed is able to implement its view without changing the equilibrium interest rate (its off-equilibrium adjustments ensure the asset price and output are aligned with its view). This in turn implies the gradualism constraints do not bind and the Fed can implement its view fully. While this result is rather extreme, our analysis only requires the Fed's belief to have some impact on the equilibrium asset price, which holds in many variants of this model. In Section A.5, we analyze an example in which the Arbs' belief affect the interest rate the Fed needs to set to achieve its "pstar", but the Fed's belief is still the primary driver of the equilibrium asset price.

Equilibrium with market's uncertainty about the Fed's belief. Now consider the equilibrium at date 0, so there is disagreement *and the Arbs are uncertain about the Fed's belief.* The following result characterizes the equilibrium in this case.

Proposition 3 (Disagreement and No Communication)**.** *Consider the baseline model in which the Fed and the Arbs disagree about "pstar", (p_F^*, p_A^*), and consider date $t = 0$ so that the Arbs are uncertain about the Fed's belief about "pstar" and have prior belief $p_F^* \sim_A N\left(\tilde{p}_{FA}^*, \tilde{\sigma}_{FA}^2\right)$. Then, there is an equilibrium in which the Arbs' posterior belief about the Fed's "pstar" (after observing the interest rate) is given by $p_F^* \sim_A N\left(p_{FA}^*, \sigma_{FA}^2\right)$ where*

$$p_{FA}^* = (1-\kappa)\,\tilde{p}_{FA}^* + \kappa\left(p_F^* - \frac{1}{\theta}v_0\right) \tag{A.11}$$

with $\kappa = \frac{\theta^2/\sigma_v^2}{1/\tilde{\sigma}_{FA}^2 + \theta^2/\sigma_v^2}$ and $\frac{1}{\sigma_{FA}^2} = \frac{1}{\tilde{\sigma}_{FA}^2} + \frac{\theta^2}{\sigma_v^2}$. The tantrum shock—the difference between the Fed's "pstar" and the market's perception of it—is given by

$$\tau_0 = p_F^* - p_{FA}^* = (1-\kappa)\left(p_F^* - \tilde{p}_{FA}^*\right) + \frac{\kappa}{\theta}v_0. \tag{A.12}$$

The rest of the equilibrium variables are

$$p_0 = p_F^* + \frac{1}{1+\theta}\left(\sigma_1^2\mu_0 - v_0 - \tau_0\right) \tag{A.13}$$

$$y_0 = y_F^* + \frac{1}{1+\theta}\left(\sigma_1^2\mu_0 - v_0 - \tau_0\right) \tag{A.14}$$

$$i_0 = \rho - \frac{1}{2}\sigma_1^2 + \frac{\theta}{1+\theta}\left(\sigma_1^2\mu_0 - \tau_0\right) + \frac{1}{1+\theta}v_0 \tag{A.15}$$

The return is given by $r_1 = \rho + p_1 - p_0$ where $p_1 = p_F^* + \frac{1}{1+\theta}\left(\sigma^2\mu_1 - v_1\right)$. The perceived variance is

$$\sigma_1^2 = var_{0,A}\left(p_1\right) = \sigma_{FA}^2 + \sigma^2 \tag{A.16}$$

where σ^2 is the solution to the same fixed point problem as before (A.8).

This equilibrium has two main differences from the earlier cases in which the Arbs know the Fed's belief. First, the Arbs' misunderstanding of the Fed's belief $\tau_0 = p_F^* - p_{FA}^*$—which we refer to as a "tantrum shock"—affects the aggregate asset price and output. Intuitively, when the Arbs think the Fed's "pstar" is lower than it actually is, they anticipate a lower aggregate asset price, and this anticipation reduces the aggregate asset price immediately. This tightening in financial conditions also reduces output below potential. The Fed offsets the tantrum shock by reducing the interest rate, but this offset is incomplete due to interest rate gradualism.

Second, return volatility is greater than before, $\sigma_1^2 = \sigma_{FA}^2 + \sigma^2 > \sigma^2$, which implies that financial noise has a greater effect on the aggregate asset price and output: The Arbs perceive greater uncertainty because they are unsure about the Fed's "pstar." This induces them to trade less aggressively against noisy flows and enables those flows to have a larger impact on the aggregate asset price and output.

In sum, the Arbs' uncertainty about the Fed's belief creates inefficient macroeconomic fluctuations through two channels: by creating tantrum shocks that induce output gaps, and by enabling financial noise shocks to have a greater impact on output gaps. This naturally motivates communication policies designed to reduce the Arbs' uncertainty.

A.4. FCI-plot communication

Suppose the Fed can, *after* it observes current shocks μ_0, v_0, send a truthful message to the Arbs to reduce their uncertainty about the Fed's belief. We focus on two types of messages: the Fed can announce either its expected aggregate asset price path for the current and the next period (FCI-plot) $(E_{0,F}[p_0], E_{0,F}[p_1])$, or it can announce its expected interest rate path for the next period (rate-plot), $E_{0,F}[i_1]$. In both cases, the Fed also sets (and therefore announces) the current interest rate i_0 as before. We compare these policies because they are in principle alternative methods to steer current financial conditions in the direction the Fed deems appropriate. We assume both announcements are truthful. Which one is more effective to mitigate tantrums and to recruit the Arbs to absorb noise shocks?

In this model, announcing FCI-plot is a very effective policy in the sense that it fully eliminates tantrum shocks and mitigates the impact of financial shocks. To see this, we conjecture an equilibrium in which after the announcement the market learns p_F^* and we are back to the case in which there is disagreement but knowledge of beliefs (see Proposition 2). Given this equilibrium, the Fed sets the interest rate

$$i_0 = \rho - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\sigma^2\mu_0 + \frac{1}{1+\theta}v_0$$

and it announces the FCI path it expects to see as follows

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

Observe that along this equilibrium path i_0 reveals v_0 (since the Arbs know μ_0). Given v_0, $E_{0,F}[p_0]$ reveals p_F^*. Thus, the announcement $(i_0, E_{0,F}[p_0])$ fully reveals both v_0 and p_F^*. In this example, announcing $E_{0,F}[p_1]$ is redundant but it provides further confirmation about p_F^* (see the discussion at the end of this section for an example in which this announcement is not redundant). Therefore, these announcements fully resolve the market's uncertainty about the Fed's "pstar", which verifies our conjecture that we are back to the case with disagreements but full knowledge of beliefs. Consequently, there are no tantrums and financial noise shocks have a smaller impact on the aggregate asset price since the Arbs perceive a smaller variance (see Proposition 2). Since tantrum shocks and financial noise both induce output gaps, this policy improves the Fed's usual gap minimization objectives.

In contrast, announcing $E_{0,F}[i_1]$ does not provide any additional information. To see this, note that Proposition 2 implies

$$E_{0,F}[i_1] = \rho - \frac{1}{2}\sigma^2.$$

This announcement contains no information about p_F^*; in fact, it provides the Arbs with no information at all. Thus, it leaves the equilibrium at date 0 unchanged. Intuitively, the future asset price p_1 depends not only on the future interest rate i_1 but also on the Arbs' expectation for the subsequent asset price p_2. At date 1, the Arbs will learn p_F^*, and this will change their expectation for the price in subsequent periods $E_{1,A}[p_2] = p_F^*$. This expectation will keep p_1 centered around p_F^* without need for an interest rate change. Thus, announcing the future rate the Fed expects to set is not informative about the financial conditions the Fed expects to implement. The following result summarizes this discussion.

Proposition 4 (Disagreement and FCI-plot Communication)**.** *Consider the baseline model in which the Fed and the Arbs disagree about "pstar", (p_F^*, p_A^*), and consider date $t = 0$.*

(i) Suppose the Fed announces the FCI-plot $(E_{0,F}[p_0], E_{0,F}[p_1])$ (credibly, but not as a commitment). Then, the equilibrium is the same as in Proposition 2 with t replaced by $t = 0$. In particular, the equilibrium does not feature tantrum shocks, $\tau_0 = p_F^* - p_{FA}^* = 0$, and financial noise shocks have a smaller impact on output gaps than in Proposition 3 since return variance declines to $\sigma^2 < \sigma_1^2$.

(ii) Suppose the Fed announces the rate-plot $(i_0, E_{0,F}[i_1])$ (credibly, but not as a commitment). Then, the equilibrium is the same as in Proposition 3. In particular, the equilibrium features tantrum shocks that induce output gaps, $\tau_0 = p_F^* - p_{FA}^*$ is generically non-zero, and financial noise shocks have a larger impact on output gaps than in the case with "pstar" com-

munication since return variance remains at the higher level σ_1^2.

In this baseline model, announcing $E_{0,F}[p_1]$ is redundant. This raises the question of whether announcing the current financial conditions $E_{0,F}[p_0]$ might be sufficient to achieve similar benefits. This policy is not as robust as announcing FCI-plot, as we can see from an extended model in which the market is uncertain about the Fed's views for both future and current financial conditions.

Specifically, suppose the Fed thinks potential output is temporarily different than its long run level (say, due to a short-run supply shock) so its belief about "pstar" is given by $p^*_{0,F} \neq p^*_F$ and $p^*_{t,F} \equiv p^*_{1,F}$ for each $t \geq 1$. The Arbs' belief about "pstar" is constant as before ($p^*_{t,M} \equiv p^*_M$). Suppose also that the Arbs know neither $p^*_{0,F}$ nor $p^*_{1,F}$ and believe they are drawn from a joint distribution. In this example, the Fed and the Arbs disagree not only about the current "pstar" but also about how it is likely to evolve in the near future. Therefore, announcing $E_{0,F}[p_1] = p^*_{1,F}$ is *not* redundant: it reveals the Fed's belief about $p^*_{1,F}$. As before, $E_{0,F}[p_0]$ reveals the Fed's belief about $p^*_{0,F}$. It is then easy to verify that the FCI-plot announcements $(E_{0,F}[p_0], E_{0,F}[p_1])$ fully resolves the Arbs' uncertainty about both current and near-term financial conditions, thus reducing tantrums and activating the recruitment effect. In contrast, announcing only $E_{0,F}[p_0]$ would leave residual uncertainty about p_1 and would generate a weaker recruitment effect.

This example also hints at benefits of providing FCI-plots under various scenarios, which we examine next.

A.5. Scenario-based FCI-plot communication

So far, we have assumed that agents never learn about "pstar" so they never update their beliefs. The possibility of learning creates additional effects because agents expect the other agent to partially move toward their view (Caballero and Simsek (2022)). In this type of environment, communicating a scenario-based FCI-plot might be more effective than a simple FCI-plot, which we illustrate next.

Consider the same model as before but with the difference that at date 1, one of two states will be realized $s_1 \in \{F, A\}$. State $s_1 = F$ reveals data that are more aligned with the Fed's initial belief, whereas state $s_1 = A$ reveals data more aligned with the Arbs' initial belief. Consequently, when either state is realized, the agent whose belief is less aligned with the data updates its belief and moves closer to the belief of the other agent. We focus on the Fed's belief, which drives the equilibrium, and assume it is given by $p^*_{t,F} = p^*_F(s_1)$ for $t \geq 1$ where

$$p^*_F(F) = p^*_F \quad \text{and} \quad p^*_F(A) \in (p^*_F, p^*_A).$$

If the realized state is aligned with its view, the Fed retains its original view. In contrast, if the realized state is aligned with the market's belief, the Fed updates its view to move closer to the market's view. Importantly, the extent to which the Fed will move toward the market's view is also uncertain. At date 0, the market is uncertain about both p_F^* and $p_F^*(A)$ and believes they are drawn from a joint distribution.

To describe the FCI-plot at date 0, we also need to specify the agents' probability for the likelihood of each state $s_1 \in \{F, A\}$. Each agent would naturally assign a higher probability to the state that is more aligned with its initial belief. To make the analysis stark, suppose the Fed assigns probability one to state $s_1 = F$ (and zero to $s_1 = A$), whereas the market assigns probability one to state $s_1 = A$.

How would FCI-plot work in this example? Conditional on the realization of s_1, belief uncertainty is resolved and the equilibrium at date 1 is still given by Proposition 2 but with p_F^* replaced by $p_F^*(s_1)$. Since the Fed thinks $s_1 = F$ will be realized, it would truthfully announce its expected asset price for the next period as

$$E_{0,F}[p_1] = 1 \times p_F^* + 0 \times p_F^*(A) = p_F^*.$$

This announcement would *not* reveal any information about $p_F^*(A)$. Note also that the Arbs think state $s_1 = A$ will be realized with certainty, so *they expect the future asset price to be* $p_F^*(A)$ rather than p_F^*. Therefore, the FCI-plot leaves considerable residual uncertainty about the asset price the Arbs expect to see, resulting in a weak recruitment effect.

Consider instead a *scenario-based* FCI plot: suppose the Fed announces $\left(E_{0,F}[p_0], \{E_{0,F}[p_1|s_1]\}_{s_1\in\{F,A\}}\right)$. Specifically, for the future period, the Fed announces its expected "pstar" under different scenarios: the baseline scenario $s_1 = F$ that it anticipates to see, and the alternative scenario $s_1 = A$. This announcement fully resolves the market's uncertainty and generates an equilibrium similar to that in Proposition 3, with a strong recruitment effect. The following result completes the characterization of this equilibrium.

Proposition 5 (Scenario-based FCI-plot Communication)**.** *Consider the extended model in which the Fed and the Arbs disagree about both "pstar" at date 0, (p_F^*, p_A^*), and "pstar" at different states of date 1, with the Fed's belief given by $(p_F^*(F) = p_F^*, p_F^*(A) \in (p_F^*, p_A^*))$. At date $t = 0$ the Arbs are uncertain about the Fed's belief about "pstar" and have a prior belief given by $p_F^* \sim_A N\left(\tilde{p}_{FA}^*, \tilde{\sigma}_{FA}^2\right)$ and $p_F^*(A)\,|p_F^* \sim_A N\left(\tilde{p}_{FA}^*(A), \tilde{\sigma}_{FA}^2(A)\right)$ that satisfy the assumption $E_{-1,A}[p_F^*(A) - p_F^*] = 0$. Suppose also that the Fed believes state $s_1 = F$ will be realized with certainty, while the Arbs believe state $s_1 = A$ will be realized with certainty.*

*(i) Suppose the Fed announces **the scenario-based FCI-plot** $\left(E_{0,F}[p_0], \{E_{0,F}[p_1|s_1]\}_{s_1\in\{F,A\}}\right)$ (credibly, but not as a commitment). Then the Arbs*

learn the Fed's belief fully and the equilibrium is given by

$$\begin{aligned} p_0 &= p_F^* + \frac{1}{1+\theta}\left(p_F^*(A) - p_F^* + \sigma^2\mu_0 - v_0\right) \\ y_0 &= y_F^* + \frac{1}{1+\theta}\left(p_F^*(A) - p_F^* + \sigma^2\mu_0 - v_0\right) \\ i_0 &= \rho - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\left(p_F^*(A) - p_F^* + \sigma^2\mu_0\right) + \frac{1}{1+\theta}v_0. \end{aligned} \tag{A.17}$$

The return is given by $r_1 = \rho + p_1 - p_0$ *where* $p_1 = p_F^*(s_1) + \frac{1}{1+\theta}\left(\sigma^2\mu_1 - v_1\right)$. *The Arbs' perceived variance* $\sigma^2 = var_{0,A}(p_1)$ *is the smallest positive solution to the fixed point problem as before* (A.8).

(ii) Suppose the Fed instead announces the simple FCI-plot $(E_{0,F}[p_0], E_{0,F}[p_1])$ *(credibly, but not as a commitment). Then the Arbs fully learn* p_F^* *but remain uncertain about* $p_F^*(A)$ *and the equilibrium is given by*

$$\begin{aligned} p_0 &= p_F^* + \frac{1}{1+\theta}\left(\tilde{p}_{FA}^*(A) - p_F^* + \sigma_1^2\mu_0 - v_0\right) \\ y_0 &= y_F^* + \frac{1}{1+\theta}\left(\tilde{p}_{FA}^*(A) - p_F^* + \sigma_1^2\mu_0 - v_0\right) \\ i_0 &= \rho - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\left(\tilde{p}_{FA}^*(A) - p_F^* + \sigma_1^2\mu_0\right) + \frac{1}{1+\theta}v_0 \end{aligned} \tag{A.18}$$

The return is given by $r_1 = \rho + p_1 - p_0$ *where* $p_1 = p_F^*(s_1) + \frac{1}{1+\theta}\left(\sigma^2\mu_1 - v_1\right)$. *The Arbs' perceived variance is higher than in the previous case and given by*

$$\sigma_1^2 = var_{0,A}(p_1) = \tilde{\sigma}_{FA}^2(A) + \sigma^2.$$

The first part verifies that scenario-based FCI-plot communication fully reveals the Fed's belief. This eliminates tantrums and recruits the Arbs to absorb noise as in Propositions 2 and 4. The second part verifies that simple FCI-plot communication reveals the Fed's belief only partially: the Arbs learn p_F^* but they remain uncertain about $p_F^*(A)$, which is the price they expect to see in the next period. Therefore, there are no tantrums (or misunderstandings) regarding the Fed's current "pstar", but the recruitment effect is weaker. In particular, since the Arbs face greater uncertainty than before, $\sigma_1^2 > \sigma^2$, noise shocks have a greater impact on the aggregate asset price and the output gap.

Finally, for both parts there is a new effect that emerges from disagreements and learning: unlike before, the Arbs expect the Fed to converge (partially) toward their belief so their expected price change between periods 0 and 1 is no longer zero (it is $p_F^*(A) - p_F^* \neq 0$ for the first part and $\tilde{p}_{FA}^*(A) - p_F^* \neq 0$ for the second part). For instance, when the Arbs perceive a higher "pstar" than the Fed $p_A^* > p_F^*$, they will typically expect "pstar" to increase $p_F^*(A) - p_F^* > 0$ (since $p_F^*(A) \in (p_F^*, p_A^*)$). This exerts immediate upward pressure on the asset price p_0. The Fed responds to this pressure by raising the policy interest rate, but it does so partially due to interest rate gradualism.[9] Consequently, when agents expect each other to learn, *disagreements* between the Fed and the Arb inevitable create some output and asset price gaps. These disagreements-induced gaps reduce the Fed's objective function but they cannot be eliminated through (honest) communication since they do not stem from misunderstandings: they emerge even when the Arbs correctly understand the Fed's belief.

A.6. Omitted proofs

Proof of Proposition 1. First, we conjecture that

$$E_{t-1,A}\left[i_t\right] = \rho + y_{t+1}^* - y_t^* - \frac{1}{2}\sigma^2.$$

Then, the monetary policy rule $(A.6)$ implies

$$\begin{aligned} i_t &= \rho + y_{t+1}^* - y_t^* - \frac{1}{2}\sigma^2 + \theta(y_t - y_t^*) + v_t \\ &= \rho + y_{t+1}^* - y_t^* - \frac{1}{2}\sigma^2 + \theta(p_t - p_t^*) + v_t, \end{aligned}$$

where the second equality uses $(A.1)$. Substituting this to $(A.5)$ yields

$$p_t + y_{t+1}^* - y_t^* = E_{t,A}\left[p_{t+1}\right] - \theta(p_t - p_t^*) - \nu_t + \sigma^2\mu_t.$$

In what follows, we guess that $p_t = p_t^* + c_t$ where c_t is the term to be determined that satisfies $E_{t,A}\left[c_{t+1}\right] = 0$. With this guess, we obtain

$$p_t^* + y_{t+1}^* - y_t^* + c_t = p_{t+1}^* - \theta c_t - \nu_t + \sigma^2\mu_t$$

Observing that $p_{t+1}^* - p_t^* = y_{t+1}^* - y_t^*$ and comparing coefficients yields

$$c_t = \frac{1}{1+\theta}(\sigma^2\mu_t - \nu_t).$$

This satisfies the conjecture $E_{t,A}\left[c_{t+1}\right] = 0$ as μ_t, ν_t have zero mean. Therefore we have

$$p_t = p_t^* + \frac{1}{1+\theta}(\sigma^2\mu_t - \nu_t).$$

[9] The technical assumption $E_{-1,A}\left[p_F^*(A) - p_F^*\right] = 0$ ensures that from an ex-ante point of view this effect is equally likely to induce an interest rate hike or an interest rate cut (which ensures $E_{-1,A}\left[i_0\right] = \rho - \frac{1}{2}\sigma^2$). This assumption will be satisfied if the Arbs ex-ante believe that the Fed's belief is equally likely to be more or less optimistic than the Arbs belief.

This in turn implies

$$\begin{aligned} y_t &= m + p_t \\ &= y_t^* + \frac{1}{1+\theta}(\sigma^2 \mu_t - \nu_t). \end{aligned}$$

Finally, the equilibrium interest rate is given by

$$\begin{aligned} i_t &= \rho + y_{t+1}^* - y_t^* - \frac{1}{2}\sigma^2 + \theta(p_t - p^*) + v_t \\ &= \rho + y_{t+1}^* - y_t^* - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}(\sigma^2 \mu_t - \nu_t) + v_t \\ &= \rho + y_{t+1}^* - y_t^* - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\sigma^2 \mu_t + \frac{1}{1+\theta} v_t. \end{aligned}$$

This satisfies our initial conjecture $E_{t-1,A}[i_t] = \rho + y_{t+1}^* - y_t^* - \frac{1}{2}\sigma^2$.

The endogenous return volatility satisfies

$$\begin{aligned} \sigma^2 = var_t(p_{t+1}) &= var_t\left(p^* + \frac{1}{1+\theta}(\sigma^2 \mu_{t+1} - \nu_{t+1})\right) \\ &= \left(\frac{1}{1+\theta}\right)^2 \left(\left(\sigma^2\right)^2 \sigma_\mu^2 + \sigma_v^2\right). \end{aligned}$$

Under the assumed parametric conditions, this quadratic has two positive roots. The solution corresponds to the smallest root, which corresponds to a stable equilibrium (the largest root is an unstable equilibrium). This completes the proof. □

Proof of Proposition 2. All the properties of the equilibrium for dates $t \geq 1$ can be established using the same steps as in the proof of Proposition 1, after replacing y_t^* with y_F^* and p_t^* with p_F^*. □

Proof of Proposition 3. We first take the Arbs' beliefs in $(A.11)$ as given and prove Eqs. $(A.13 - A.8)$. We then show that in this equilibrium Arbs' posterior beliefs are given by $(A.11)$.

Given the Arbs' beliefs in $(A.11)$ and the date $t = 1$ equilibrium characterized by Proposition 2, Eq. $(A.5)$ implies

$$\begin{aligned} p_0 &= \rho + E_{0,A}[p_1] - \left(i_0 + \frac{1}{2}\sigma_1^2\right) + \sigma_1^2 \mu_0 \\ &= \rho + p_{FA}^* - \left(i_0 + \frac{1}{2}\sigma_1^2\right) + \sigma_1^2 \mu_0, \end{aligned} \tag{A.19}$$

where we have used that μ_1, v_1 have zero mean and $p_1 = p_F^*$. Likewise, Eq. $(A.2)$ implies that the endogenous return volatility is given by

$$\begin{aligned}\sigma_1^2 = var_{0,A}[r_1] &= \sigma_{FA}^2 + \left(\frac{1}{1+\theta}\right)^2 \left(\left(\sigma^2\right)^2 \sigma_\mu^2 + \sigma_v^2\right) \\ &= \sigma_{FA}^2 + \sigma^2.\end{aligned}$$

Here, we have used the definition of σ^2 from $(A.8)$. This proves $(A.16)$.

Next consider the interest rate the Fed sets i_0. We conjecture that $E_{-1,A}[i_0] = \rho - \frac{1}{2}\sigma_1^2$. Using this conjecture along with the output asset price relation, we write the Fed's policy rule $(A.9)$ as

$$i_0 = \rho - \frac{1}{2}\sigma_1^2 + \theta\left(p_0 - p_F^*\right) + v_0. \tag{A.20}$$

We next substitute $(A.20)$ into $(A.19)$ to obtain

$$p_0 = p_{FA}^* - \theta\left(p_0 - p_F^*\right) + \sigma_1^2\mu_0 - v_0.$$

After rearranging terms, we obtain

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

The equilibrium output is given by a similar expression

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

Finally, substituting the asset price p_0 back into $(A.20)$, the equilibrium interest rate satisfies

$$i_0 = \rho - \frac{1}{2}\sigma_1^2 + \frac{\theta}{1+\theta}\left(\sigma_1^2\mu_0 - \tau_0\right) + \frac{1}{1+\theta}v_0.$$

Taking the ex-ante expectation of this expression, we verify the conjecture $E_{-1,A}[i_0] = \rho - \frac{1}{2}\sigma_1^2$. This proves $(A.13 - A.15)$.

Finally, note that Eq. $(A.11)$ implies

$$\begin{aligned}\tau_0 &= p_F^* - (1-\kappa)\tilde{p}_{FA}^* - \kappa\left(p_F^* - \frac{1}{\theta}v_0\right) \\ &= (1-\kappa)\left(p_F^* - \tilde{p}_{FA}^*\right) + \frac{\kappa}{\theta}v_0.\end{aligned}$$

This proves $(A.12)$. This completes the characterization of the equilibrium given the Arbs' posterior belief.

It remains to check that the Arbs' posterior beliefs is given by $(A.11)$. To this end, we first substitute for τ_0 in $(A.15)$ using $(A.12)$ to write the interest rate as

$$\begin{aligned} i_0 &= E_{-1,A}[i_0] + \frac{\theta}{1+\theta}(1-\kappa)(\tilde{p}_{FA}^* - p_F^*) - \frac{\theta}{1+\theta}\kappa\frac{1}{\theta}v_0 + \frac{1}{1+\theta}v_0 \\ &= E_{-1,A}[i_0] + \frac{\theta(1-\kappa)}{1+\theta}(\tilde{p}_{FA}^* - p_F^*) + \frac{1-\kappa}{1+\theta}v_0. \end{aligned}$$

This in turn implies

$$\frac{(1+\theta)}{\theta(1-\kappa)}(i_0 - E_{-1,A}[i_0]) = \tilde{p}_{FA}^* + \frac{v_0}{\theta} - p_F^*.$$

Hence, arbitrageurs receive an endogenous signal for $p_F^* - \tilde{p}_{FA}^*$. Recall that they also have the prior beliefs $p_F^* - \tilde{p}_{FA}^* \sim N(0, \tilde{\sigma}_{FA}^2)$. Bayesian updating implies their posterior is given by $p_F^* \sim N(p_{FA}^*, \sigma_{FA}^2)$ where

$$\begin{aligned} p_{FA}^* &= \frac{\frac{1}{\tilde{\sigma}_{FA}^2}}{\frac{\theta^2}{\sigma_v^2} + \frac{1}{\tilde{\sigma}_{FA}^2}}\tilde{p}_{FA}^* + \frac{\frac{\theta^2}{\sigma_v^2}}{\frac{\theta^2}{\sigma_v^2} + \frac{1}{\tilde{\sigma}_{FA}^2}}\left(p_F^* - \frac{1}{\theta}v_0\right) \\ \text{and } \frac{1}{\sigma_{FA}^2} &= \frac{\theta^2}{\sigma_v^2} + \frac{1}{\tilde{\sigma}_{FA}^2}. \end{aligned}$$

This proves $(A.11)$ and completes the characterization of equilibrium. □

Proof of Proposition 4. Presented in the main text. □

Proof of Proposition 5.

Part (i). We conjecture and verify that the equilibrium is given by $(A.17)$. We first check that the equilibrium fully reveals the Fed's belief. In equilibrium, the Fed announces

$$\begin{aligned} E_{0,F}[p_0] &= p_F^* + \frac{1}{1+\theta}\left(p_{FA}^*(A) - p_F^* + \sigma_1^2\mu_0 - v_0\right) \\ E_{0,F}[p_1|F] &= p_F^* \\ E_{0,F}[p_1|A] &= p_F^*(A) \end{aligned}$$

along with the interest rate

$$i_0 = \rho - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\left(p_F^*(A) - p_F^* + \sigma^2\mu_0\right) + \frac{1}{1+\theta}v_0.$$

Observe that the announcement of $E_{0,F}[p_1|A]$ fully reveals $p_F^*(A)$. Given $p_F^*(A)$, the announcement of the pair $(i_0, E_{0,F}[p_0])$ fully reveals (v_0, p_F^*) as before as there are two equations in two unknowns. The announcement of $E_{0,F}[p_1|F] = p_F^*$ provides further confirmation of p_F^*; this confirmation is redundant in this example but would not be redundant in variants as we discuss in Section A.4.

We then solve for the equilibrium when the Arbs know both p_F^* and $p_F^*(A)$. First, we conjecture that

$$E_{-1,A}\left[i_0\right] = \rho - \frac{1}{2}\sigma^2.$$

Then, the monetary policy rule $(A.9)$ implies

$$\begin{aligned} i_0 &= \rho - \frac{1}{2}\sigma^2 + \theta(y_0 - y_F^*) + v_0 \\ &= \rho - \frac{1}{2}\sigma^2 + \theta(p_0 - p_F^*) + v_0, \end{aligned}$$

where the second equality uses $(A.1)$. Substituting this to $(A.5)$ yields

$$\begin{aligned} p_0 &= E_{0,A}\left[p_1\right] - \theta(p_0 - p_F^*) - \nu_0 + \sigma^2\mu_0 \\ &= p_F^*\left(A\right) - \theta(p_0 - p_F^*) - \nu_0 + \sigma^2\mu_0. \end{aligned}$$

Here, we have substituted $E_{0,A}\left[p_1\right] = p_F^*\left(A\right)$, which follows because the Arbs think state $s_1 = A$ will be realized for sure. After rearranging terms, we obtain

$$p_0 = p_F^* + \frac{1}{1+\theta}\left(p_F^*\left(A\right) - p_F^* + \sigma^2\mu_0 - \nu_0\right).$$

Using $y_0 = m + p_0$, this implies

$$y_0 = y_F^* + \frac{1}{1+\theta}\left(p_F^*\left(A\right) - p_F^* + \sigma^2\mu_0 - \nu_0\right).$$

Finally, the equilibrium interest rate is given by

$$\begin{aligned} i_0 &= \rho - \frac{1}{2}\sigma^2 + \theta(y_0 - y_F^*) + v_0 \\ &= \rho - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\left(p_F^*\left(A\right) - p_F^* + \sigma^2\mu_0\right) + \frac{1}{1+\theta}v_0. \end{aligned}$$

Note also that this satisfies our initial conjecture $E_{-1,A}\left[i_0\right] = \rho - \frac{1}{2}\sigma^2$ in view of the assumption $E_{-1,A}\left[p_F^*\left(A\right) - p_F^*\right] = 0$. Note also that σ^2 is the solution to the same fixed point problem as before $(A.8)$. This shows that the equilibrium is given by $(A.17)$, completing the proof.

Part (ii). We conjecture and verify that the equilibrium is given by $(A.18)$.

We first check that the equilibrium reveals the Fed's belief only partially. In equilibrium, the Fed announces

$$\begin{aligned} E_{0,F}\left[p_0\right] &= p_F^* + \frac{1}{1+\theta}\left(\tilde{p}_{FA}^*\left(A\right) - p_F^* + \sigma_1^2\mu_0 - v_0\right) \\ E_{0,F}\left[p_1\right] &= E_{0,F}\left[p_1|F\right] = p_F^* \end{aligned}$$

along with the interest rate

$$i_0 = \rho - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\left(p_F^*(A) - p_F^* + \sigma^2\mu_0\right) + \frac{1}{1+\theta}v_0.$$

Since the Arbs already know $\tilde{p}_{FA}^*(A)$, the announcement of the pair $(i_0, E_{0,F}[p_0])$ fully reveals (v_0, p_F^*) as before as there are two equations in two unknowns. The announcement of $E_{0,F}[p_1|F] = p_F^*$ provides further confirmation of p_F^*. However, unlike before, these announcements do not reveal $p_{FA}^*(A)$. Therefore, after seeing these announcements, the Arbs posterior beliefs for the Fed's "pstar" in the state that is aligned with their view is given by $p_F^*(A)|p_F^* \sim_A N\left(\tilde{p}_{FA}^*(A), \sigma_{FA}^2(A)\right)$.

We then solve for the equilibrium when the Arbs know p_F^* and have a posterior belief about $p_F^*(A)$. The proof follows similar steps as in the first part except the asset price is given by

$$\begin{aligned} p_0 &= E_{0,A}[p_1] - \theta(p_0 - p_F^*) - \nu_0 + \sigma_1^2\mu_0 \\ &= \tilde{p}_{FA}^*(A) - \theta(p_0 - p_F^*) - \nu_0 + \sigma_1^2\mu_0. \end{aligned}$$

In particular, since the Arbs think state $s_1 = A$ will be realized and they are uncertain about the Fed's "pstar" in this state, their expected price is determined by their posterior belief. This in turn implies

$$\begin{aligned} y_0 &= y_F^* + \frac{1}{1+\theta}\left(\tilde{p}_{FA}^*(A) - p_F^* + \sigma_1^2\mu_0 - \nu_0\right) \\ i_0 &= \rho - \frac{1}{2}\sigma^2 + \frac{\theta}{1+\theta}\left(\tilde{p}_{FA}^*(A) - p_F^* + \sigma_1^2\mu_0\right) + \frac{1}{1+\theta}v_0. \end{aligned}$$

Note also that this satisfies our initial conjecture $E_{-1,A}[i_0] = \rho - \frac{1}{2}\sigma^2$ because $E_{-1,A}[\tilde{p}_{FA}^*(A)] = E_{-1,A}[p_F^*(A)]$ (the expectation of the posterior mean is the prior mean) and we assume $E_{-1,A}[p_F^*(A) - p_F^*] = 0$. Note also that since the Arbs believe the future price will be $p_1 = p_F^*(A)$ and they are uncertain about $p_F^*(A)$, their perceived variance is larger than before and given by

$$\sigma_1^2 = var_{0,A}(p_1) = \tilde{\sigma}_{FA}^2(A) + \sigma^2.$$

This shows that the equilibrium is given by $(A.18)$, completing the proof. □

B. Data details

This appendix contains the details of our data sources and variable construction.

FCI-G Index. The FCI-G index is public and obtained from the Fed (available at `https://www.federalreserve.gov/econres/notes/feds-notes/a-new-index-to-measure-us-financial-conditions-20230630.html`). There are two versions of the index: a baseline and an alternative one-year lookback version. In our analysis, we employ the quarterly frequency version of the baseline FCI-G index. The baseline version computes the cumulative effect on one-year-ahead GDP growth of the three-month changes in financial conditions over the past three years. In contrast, the one-year lookback version focuses on the cumulative effect on one-year-ahead GDP growth of the three-month changes in financial conditions that occurred only up to one year earlier.

MacroPolicy Perspectives (MPP) Data. The data come from the Shadow Survey of Market Participants conducted by Coronado and Rosner-Warburton (2025) (see `https://www.macropolicyperspectives.com/shadow-survey`). The surveys are conducted quarterly ahead of the FOMC meetings that are accompanied by a Summary of Economic Projections.

The dataset contains quarterly survey responses from market participants between 2017 and 2024, including forecasts for unemployment, core PCE inflation, the federal funds rate (FFR), and financial conditions. These forecasts are originally provided at annual horizons. To obtain forecasts at quarterly horizons, we apply linear interpolation to the annual horizon forecasts.

Before the regression, we trim outliers from the forecast variables using an interquartile range (IQR) approach. Specifically, for each forecast quarter, we calculate the 25th and 75th percentiles of each variable and define the IQR as the difference between them. Observations are identified as outliers if they fall below the 25th percentile minus two times the IQR or above the 75th percentile plus two times the IQR. Outliers identified through this procedure are removed from the sample.