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FCI-PLOT: CENTRAL BANK COMMUNICATION THROUGH FINANCIAL CONDITIONS

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ABSTRACT

We develop a model of central bank communication where market participants' uncertainty about desired financial conditions creates misunderstandings ("tantrums") and amplifies the impact of financial noise on asset prices and economic activity. We show that directly communicating the expected financial conditions path (FCI-plot) eliminates tantrums and recruits arbitrageurs to insulate conditions from noise, while communicating expected interest rates alone fails to achieve these benefits. We demonstrate that scenario-based FCI-plot communication enhances recruitment when participants disagree with the central bank regarding scenario probabilities. This enables an "agree-to-disagree" equilibrium where markets help implement central bank objectives despite differing views.

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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 FCI-plot communication further strengthens these benefits, particularly when market participants disagree with the central bank about the likelihood of different near-term scenarios and seek to understand the central bank’s “reaction function” to these alternative scenarios.

We motivate our model and 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, creates ripple effects through financial conditions to macroeconomic outcomes, ultimately hampering monetary policy implementation. 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 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 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

¹Throughout 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.

implement in the future reduces the Arbs’ uncertainty about future 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 —specifying how the Fed expects financial conditions to adjust under alternative near-term economic scenarios— significantly enhances the framework. This is because disagreeing arbitrageurs primarily require insight into the Fed’s reaction function across different conditions rather than the Fed’s evaluation of particular 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 providing a proof-of-concept visualization of our FCI-plot framework. 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. 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.

Related Literature. This paper relates to the vast literature on central bank communication and transparency (see Geraats (2002, 2014); Blinder et al. (2008); Blinder (2009); Van der Cruijsen and Eijffinger (2010) for reviews). Many 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, 2025)). 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.³

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

²See 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)).

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

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 the 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. Section 4 presents a prototype FCI-plot. Section 5 concludes. Appendix A contains the proofs of all the propositions and Appendix B the 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 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.

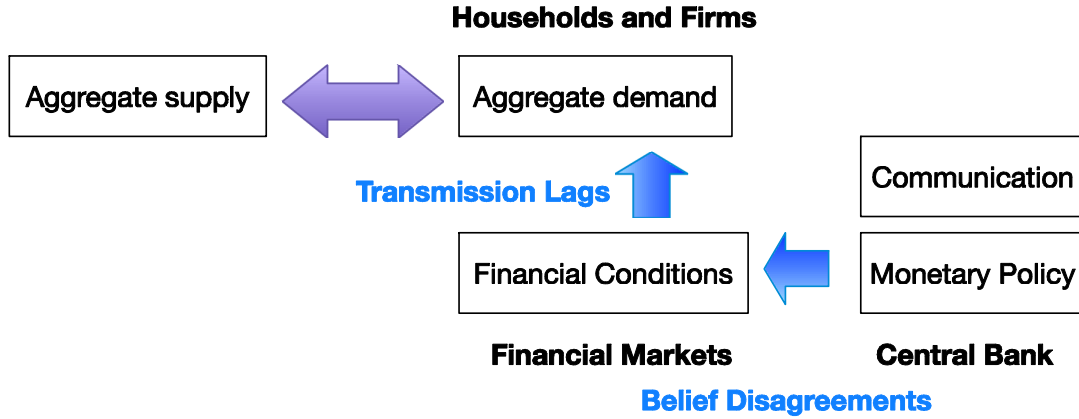


Figure 1: Monetary policy transmission through financial conditions.

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.

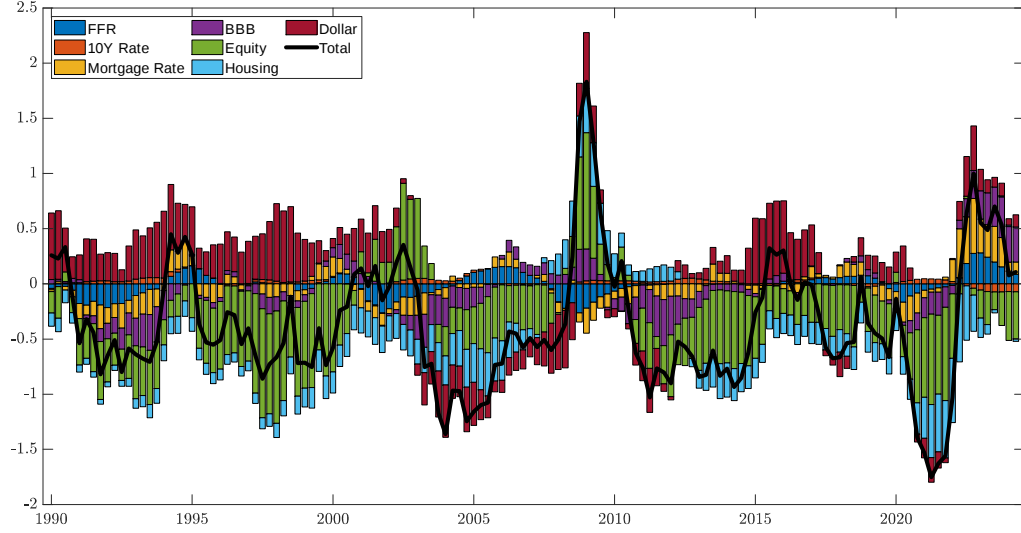


Figure 2: FCI-G index (with a three-year lookback) and its drivers over 1990Q1-2024Q2. Positive values imply recent financial conditions will reduce the GDP growth in the next year. Data is from Ajello et al. (2024).

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 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 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

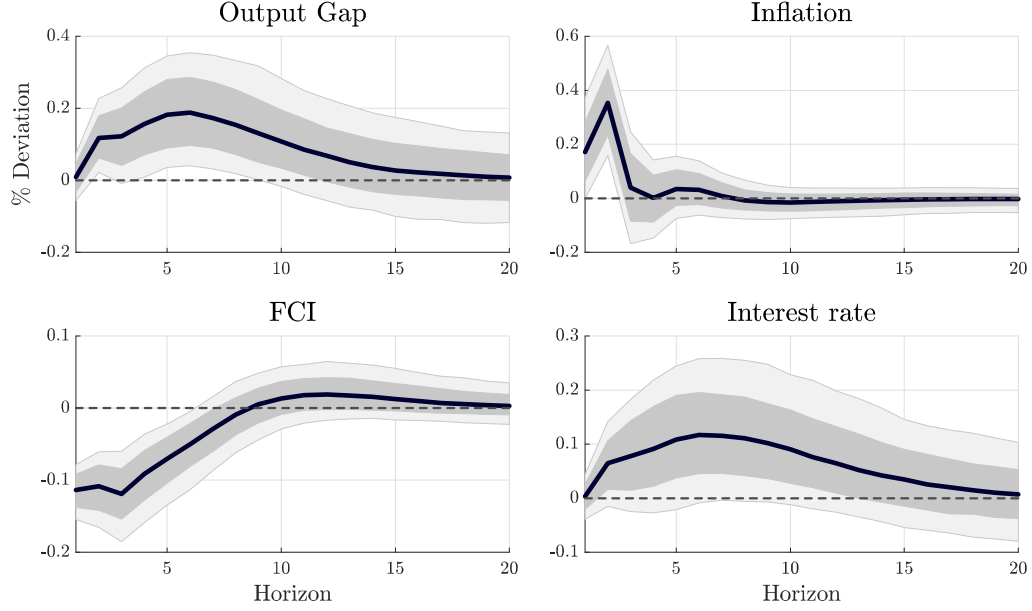


Figure 3: Impulse response to a financial noise shock. Shaded and light shaded grey bands indicate 68 and 90 confidence sets respectively. Reprinted from Caballero et al. (2024).

the latent FCI* from the observed FCI and the estimated output gaps. We operationalize this idea by developing and estimating a two equation macroeconomic 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 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, 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

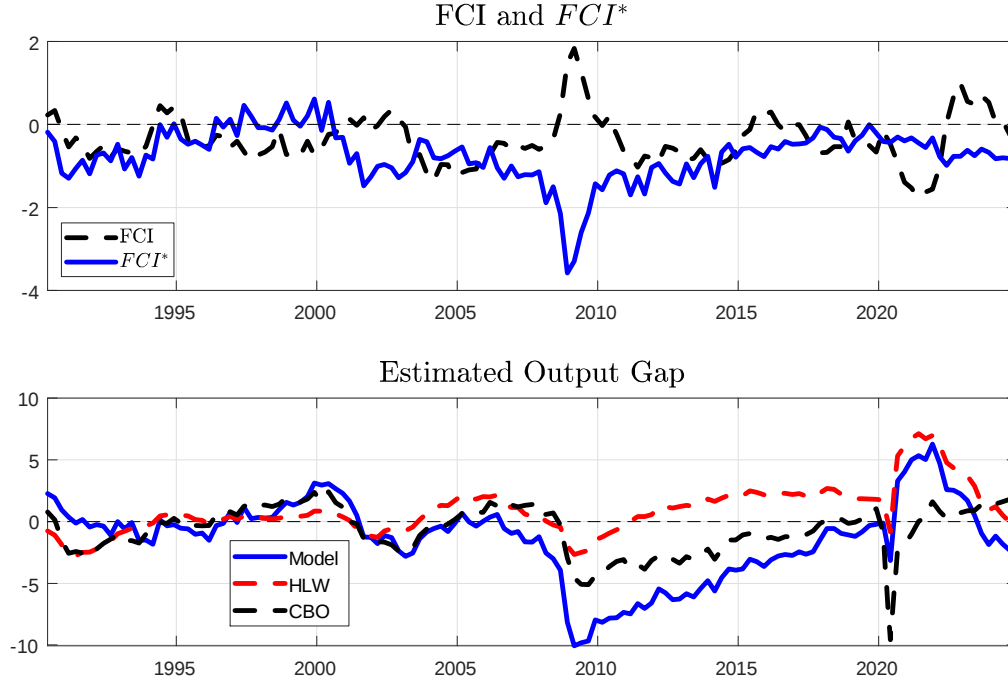


Figure 4: Top: FCI (black) and FCI^* (blue). Bottom: output gap estimates from our two equation macroeconomic model (blue), Holston et al. (2023) (red) and CBO (black). All estimates are one-sided. Reprinted from Caballero et al. (2025).

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 im-

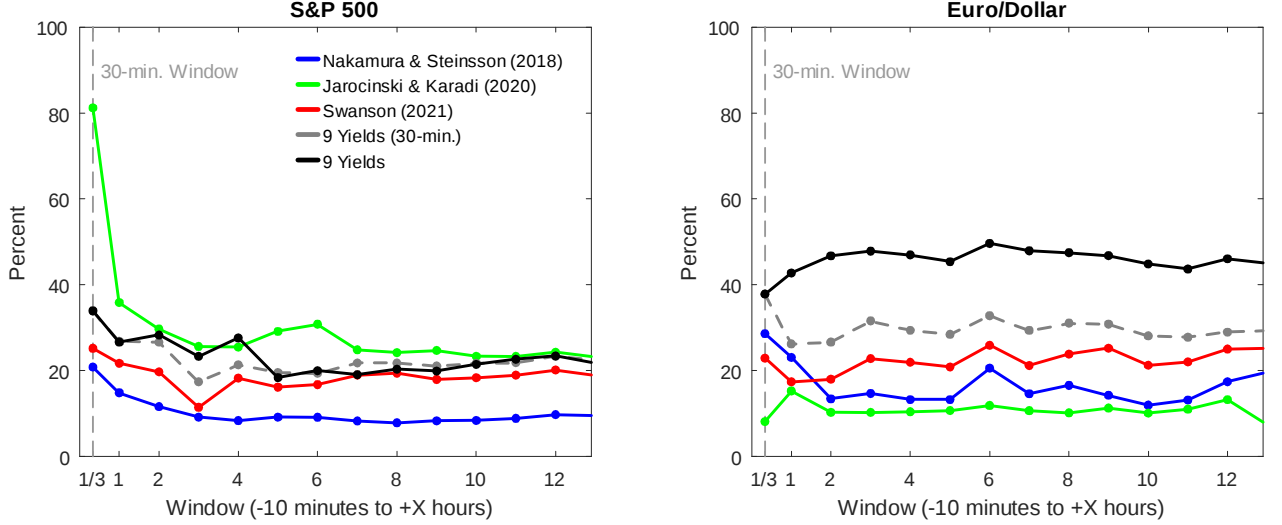


Figure 5: This figure is from Boehm and Kroner (2024), reprinted with permission. It shows the R^2 values of regressing the log-return around FOMC announcements of the front-month S&P E-mini futures contracts (left panel) and the Euro-Dollar exchange rate (right panel) on various high frequency monetary 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.

pact 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.

⁴Nagel 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.

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 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.

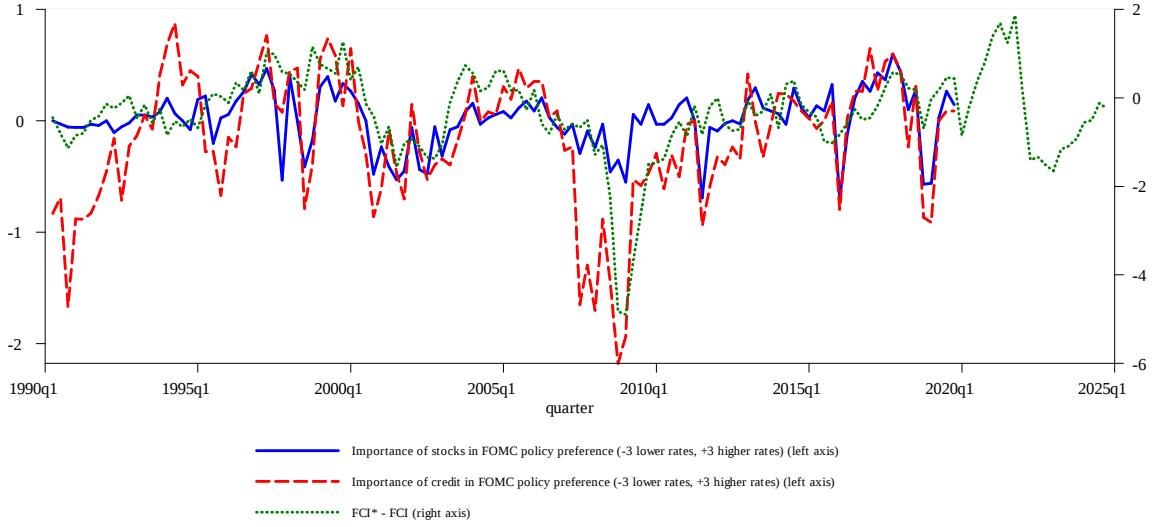


Figure 6: **Alignment between FOMC policy preferences and FCI gaps.** The blue solid line (resp. red dashed line) shows the importance of the stock market (resp. credit conditions) in FOMC policy preferences. The sign of the measure reflects the direction of the preferred policy action (- indicates preference 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.

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 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.

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

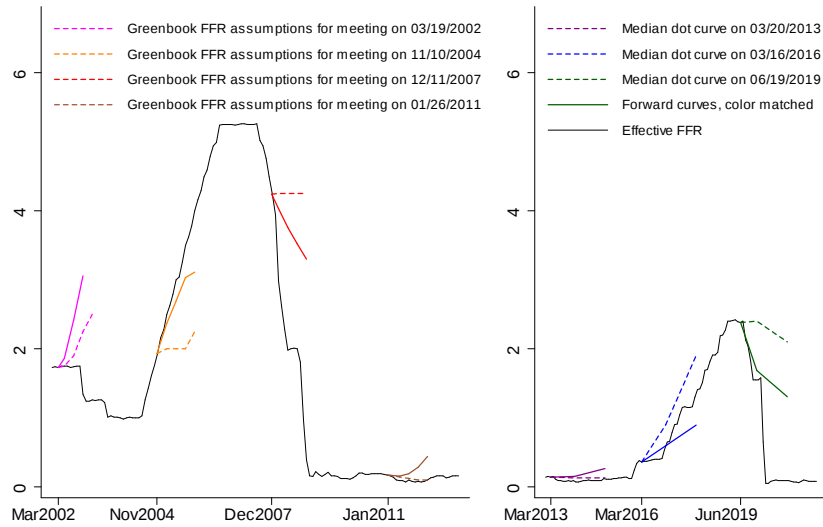


Figure 7: Dotted lines: the Fed prediction for Fed funds rates for select FOMC meetings—from either the Greenbook assumptions (left panel) or the FOMC dots (right panel). Solid lines: the forward Fed funds rates for the same meetings. Thin black line: the Fed funds rate. Reprinted from Caballero and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

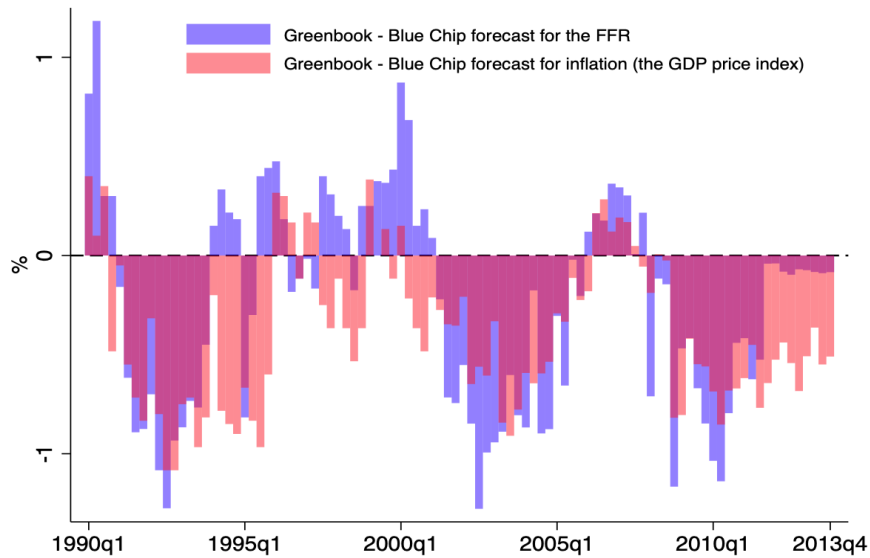


Figure 8: The bars denote the difference between the Fed's Greenbook/Tealbook forecast and the consensus Blue Chip forecast for four quarters ahead. The blue (resp. red) bars correspond to forecasts for the FFR (resp. the GDP price index growth). Reprinted from Caballero and Simsek (2022).

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

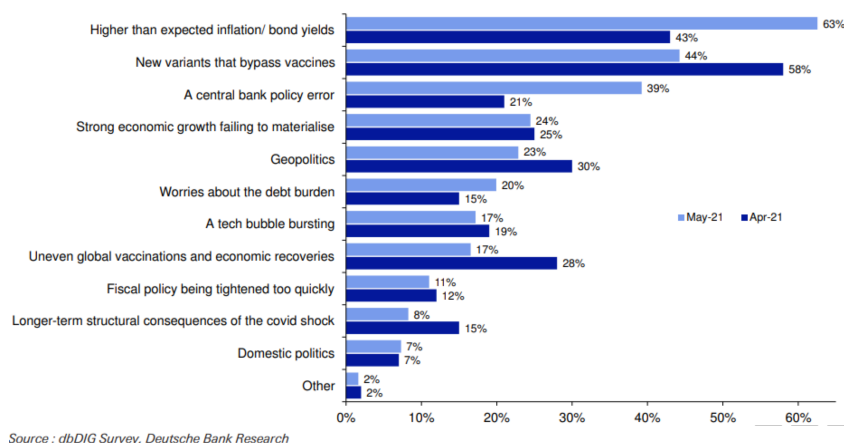


Figure 9: Source: Deutsche Bank monthly survey of clients in May 2021 (based on 620 responses). Reproduced with permission.

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 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

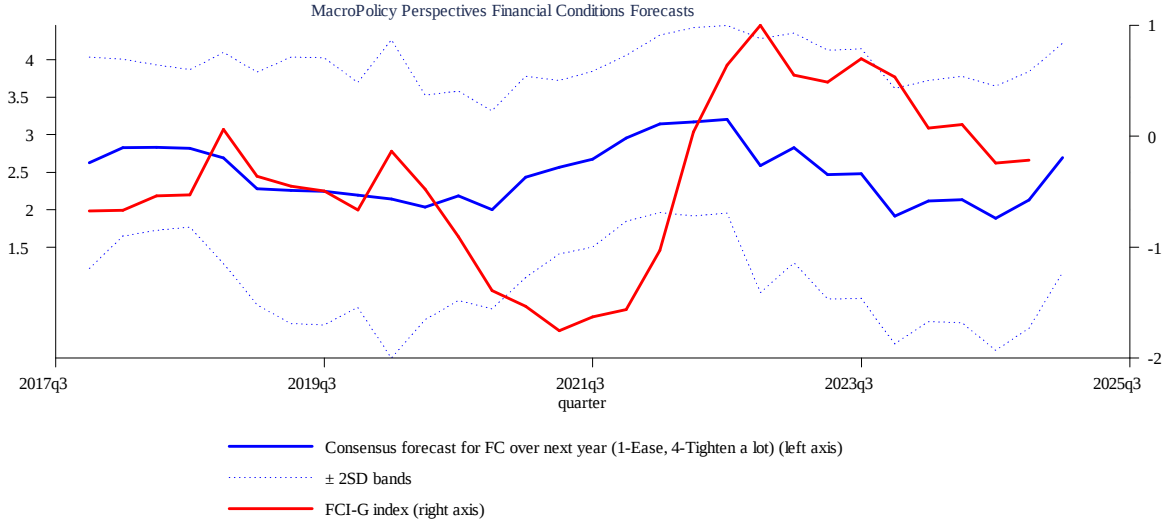


Figure 10: Consensus forecast for the changes in the U.S. financial conditions over the next year (blue solid line) with cross-sectional dispersion across forecasters (2 standard deviations, blue dotted lines). Data from the MacroPolicy Perspectives Shadow Survey (Coronado and Rosner-Warburton (2025)).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

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.

3. A Stylized Model of FCI-plot Communication

In this section, we develop a stylized model consistent with the empirical facts discussed in Section 2. We begin with a simplified version of the model from Caballero et al. (2024), which captures the mechanism by which noise shocks affect financial conditions, market volatility, and aggregate demand. Our main contribution extends this framework to analyze how central bank communication can mitigate the adverse effects of disagreement between markets and the Fed about economic conditions. Formal proofs are relegated to the appendix.

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 (0.023)	-0.110** (0.031)
Core PCE forecast (Q4)	-0.018 (0.036)	0.204** (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.

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).

3.1. 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

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

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

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

Here, $\rho \equiv -\log \beta$ is the (log of) households' discount rate. The return depends on future output (through cash flows) and asset price, and inversely on the current asset price. The second line uses (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 (who do not consume). 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 $N(0, \sigma_\mu^2)$ (the analysis extends to serially correlated 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

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

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 :

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

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:

$$\omega_{t,A}\sigma_{t,A}(r_{t+1}) = \frac{E_{t,A}[r_{t+1}] + \frac{\text{var}_{t,A}(r_{t+1})}{2} - i_t}{\sigma_{t,A}(r_{t+1})}. \quad (4)$$

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

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

$$E_{t,A}[r_{t+1}] = i_t + \frac{1}{2}\text{var}_{t,A}(r_{t+1}) - \text{var}_{t,A}(r_{t+1})\mu_t.$$

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

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

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

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

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

Without the monetary policy shock term, the rule in (6) emerges from minimizing the gap-objective function $G_t = \tilde{y}_t^2 + \frac{1}{\theta} (i_t - E_{t-1,A} [i_t])^2 + \beta E_t [G_{t+1}]$ (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 when we introduce belief disagreements.

3.2. 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 $N(0, \sigma_\mu^2)$, and monetary policy shocks are *i.i.d.* with $N(0, \sigma_v^2)$. Suppose the parameters are such that the quadratic in (8) has two positive roots. Then, there is an equilibrium with

$$\begin{aligned} p_t &= p_t^* + \frac{1}{1+\theta} (\sigma^2 \mu_t - v_t), \quad \text{where } p_t^* \equiv y_t^* - m, \\ y_t &= y_t^* + \frac{1}{1+\theta} (\sigma^2 \mu_t - v_t) \\ i_t &= \rho + y_{t+1}^* - y_t^* - \frac{1}{2} \sigma^2 + \frac{\theta}{1+\theta} \sigma^2 \mu_t + \frac{1}{1+\theta} v_t \end{aligned} \quad (7)$$

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

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

Here, “p-star” denotes the aggregate asset price compatible with zero output gaps (the model analogue of the “FCI-star” from Figure 4, with opposite sign due to the price-versus-yield representation). Eq. (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.⁵

Consider first the response to the monetary policy shock v_t . As expected, a positive

⁵Observe 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.

monetary policy shock lowers the output gap. The impact is less than one-to-one since the endogenous 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.

3.3. 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* asset prices to deviate from the Fed’s desired level, resulting in excessive output gaps. 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 3.5).

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 (6) with the difference that it stabilizes output gaps *around its own belief about potential output*

$$i_t = E_{t-1,A} [i_t] + \theta (y_t - y_{t,F}^*) + v_t. \quad (9)$$

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 $p_F^* \sim_A N(\tilde{p}_{FA}^*, \tilde{\sigma}_{FA}^2)$. 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 (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*

$$\begin{aligned} p_t &= p_F^* + \frac{1}{1+\theta} (\sigma^2 \mu_t - v_t) \\ y_t &= y_F^* + \frac{1}{1+\theta} (\sigma^2 \mu_t - v_t) \\ i_t &= \rho - \frac{1}{2} \sigma^2 + \frac{\theta}{1+\theta} \sigma^2 \mu_t + \frac{1}{1+\theta} v_t \end{aligned} \quad (10)$$

The return is given by $r_{t+1} = \rho + p_{t+1} - p_t$. The perceived variance $\sigma^2 = \text{var}_{t,A}(p_{t+1})$ is the smallest positive solution to the same fixed point problem as before in (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 3.5, 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 $p_F^* \sim_A N(\tilde{p}_{FA}^*, \tilde{\sigma}_{FA}^2)$. Then, there is an equilibrium in which the Arbs’ posterior belief about the Fed’s “pstar” (after observing the interest rate) is given by $p_F^* \sim_A N(p_{FA}^*, \sigma_{FA}^2)$ where*

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

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

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

The rest of the equilibrium variables are

$$p_0 = p_F^* + \frac{1}{1+\theta} (\sigma_1^2 \mu_0 - v_0 - \tau_0) \quad (13)$$

$$y_0 = y_F^* + \frac{1}{1+\theta} (\sigma_1^2 \mu_0 - v_0 - \tau_0) \quad (14)$$

$$i_0 = \rho - \frac{1}{2} \sigma_1^2 + \frac{\theta}{1+\theta} (\sigma_1^2 \mu_0 - \tau_0) + \frac{1}{1+\theta} v_0 \quad (15)$$

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

$$\sigma_1^2 = \text{var}_{0,A}(p_1) = \sigma_{FA}^2 + \sigma^2 \quad (16)$$

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

3.4. 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

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

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” communication since return variance remains at the higher level σ_1^2 .*

As we mentioned, 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.

3.5. 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 $(E_{0,F}[p_0], \{E_{0,F}[p_1|s_1]\}_{s_1 \in \{F,A\}})$. 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 $p_F^* \sim_A N(\tilde{p}_{FA}^*, \tilde{\sigma}_{FA}^2)$ and $p_F^*(A) | p_F^* \sim_A N(\tilde{p}_{FA}^*(A), \tilde{\sigma}_{FA}^2(A))$ 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** $(E_{0,F}[p_0], \{E_{0,F}[p_1|s_1]\}_{s_1 \in \{F,A\}})$ (credibly, but not as a commitment). Then the Arbs learn the Fed’s belief fully and the equilibrium is given by*

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

The return is given by $r_1 = \rho + p_1 - p_0$ where $p_1 = p_F^(s_1) + \frac{1}{1+\theta} (\sigma^2 \mu_1 - v_1)$. The*

Arbs' perceived variance $\sigma^2 = \text{var}_{0,A}(p_1)$ is the smallest positive solution to the fixed point problem as before in (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

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

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

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

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.⁶

⁶The technical assumption $E_{-1,A}[p_F^*(A) - p_F^*] = 0$ 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 $E_{-1,A}[i_0] = \rho - \frac{1}{2}\sigma^2$). 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.

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 Arb correctly understand the Fed’s belief.

4. A Prototype FCI-plot

In order to illustrate how our proposed FCI-plot framework might look like 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

$$\mathcal{L} = \sum_{t=0}^{\infty} \beta^t [\pi_t^2 + \tilde{y}_t^2 + \lambda_{\Delta i}(i_t - i_{t-1})^2] . \quad (19)$$

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 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

⁷These 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.

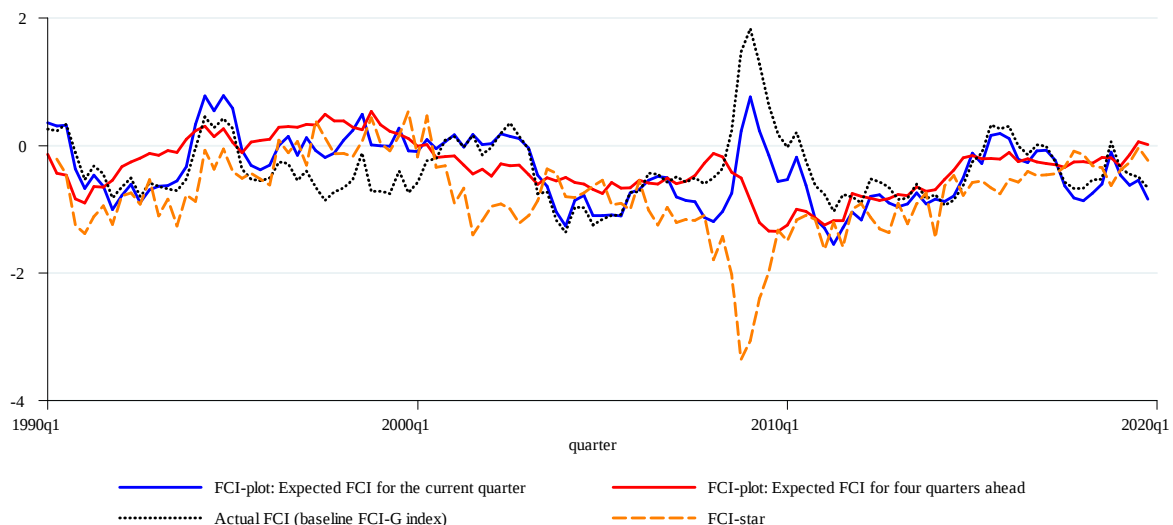


Figure 11: **A prototype FCI-plot.** The figure shows the expected FCI paths from a VAR-based counterfactual analysis in which monetary policy minimizes the loss function in (19) taking the history as given (see Caballero et al. (2024) for details). Solid blue (resp. red) line: expected FCI for the current quarter (resp. four quarters ahead). Dotted black line: baseline FCI-G index. Dashed orange line: FCI-star from Figure 4.

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 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 visu-

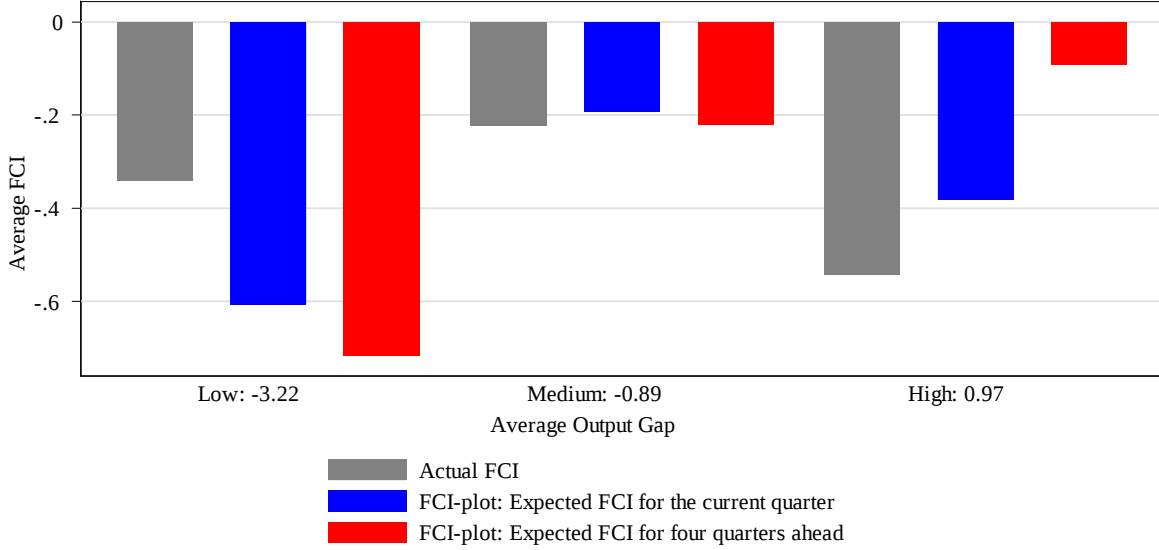


Figure 12: **FCI-plot by output gaps**. The figure shows the average values of the FCI-plot in Figure 11 by output gap bins. Blue bars (resp. red bars): expected FCI for the current quarter (resp. four quarters ahead). Grey bars: baseline FCI-G index.

alization 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.

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 providing 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 recognize that financial conditions communication faces implementation challenges, as illustrated by Canada's experience with its Monetary Conditions Index in the late 1990s. Canada ultimately abandoned the MCI because markets treated it as a pre-

cise target rather than a guide, shock identification proved difficult in real time, and the framework complicated communication during uncertain periods (see Freedman (2000)). However, these challenges—market misinterpretation, real-time analytical difficulties, and communication complexity—are not unique to financial conditions approaches but also characterize current interest rate communication systems. In fact, interest rate projections suffer from the additional fundamental limitation that interest rates are only a small part of the financial conditions that actually drive economic activity. Moreover, our FCI-plot framework differs from historical MCIs in several ways: it utilizes sophisticated modern financial conditions indices rather than simple weighted averages of interest rates and exchange rates, it emphasizes communication and guidance rather than precise targeting, and it aims to recruit the arbitrageurs rather than attempting direct control. While perfect communication frameworks may be unattainable, our analysis suggests the benefits of FCI-plot communication may outweigh these shared implementation challenges.

Beyond the theoretical benefits we have identified, FCI communication offers practical advantages for policy transmission. Sophisticated financial market participants who directly influence asset prices and financial conditions 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 exclusively through 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, especially when there are fundamental disagreements about economic outlook between the central bank and markets.

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A. Omitted proofs

Proof of Proposition 1. First, we conjecture that

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

Then, the monetary policy rule (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 (1). Substituting this to (5) yields

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

In what follows, we guess that $p_t = p_t^* + c_t$ where c_t is the term to be determined that satisfies $E_{t,A} [c_{t+1}] = 0$. 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 $E_{t,A} [c_{t+1}] = 0$ as μ_t, ν_t have zero mean. Therefore we have

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

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

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

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

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

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. $\square$

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^* . $\square$

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

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

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

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

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

Here, we have used the definition of σ^2 from (8). This proves (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 (9) as

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

We next substitute (A.2) into (A.1) to obtain

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

After rearranging terms, we obtain

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

The equilibrium output is given by a similar expression

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

Finally, substituting the asset price p_0 back into (A.2), the equilibrium interest rate satisfies

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

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 (13 – 15).

Finally, note that Eq. (11) implies

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

This proves (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 (11). To this end, we first substitute for τ_0 in (15) using (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

$$p_{FA}^* = \frac{\frac{1}{\tilde{\sigma}_{FA}^2}}{\frac{\theta^2}{\sigma_v^2} + \frac{1}{\tilde{\sigma}_{FA}^2}} \tilde{p}_{FA}^* + \frac{\frac{\theta^2}{\sigma_v^2}}{\frac{\theta^2}{\sigma_v^2} + \frac{1}{\tilde{\sigma}_{FA}^2}} \left(p_F^* - \frac{1}{\theta} v_0 \right)$$

$$\text{and } \frac{1}{\sigma_{FA}^2} = \frac{\theta^2}{\sigma_v^2} + \frac{1}{\tilde{\sigma}_{FA}^2}.$$

This proves (11) and completes the characterization of equilibrium. $\square$

Proof of Proposition 4. Presented in the main text. $\square$

Proof of Proposition 5.

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

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

along with the interest rate

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

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 3.4.

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

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

Then, the monetary policy rule (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 (1). Substituting this to (5) yields

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

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

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

Using $y_0 = m + p_0$, this implies

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

Finally, the equilibrium interest rate is given by

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

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

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

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

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

along with the interest rate

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

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 $p_F^*(A) | p_F^* \sim_A N(\tilde{p}_{FA}^*(A), \sigma_{FA}^2(A))$.

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

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

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

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

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

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.