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Not All Inflation Is the Same: State-Dependent Transmission of Monetary Policy*

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Abstract

We show that the underlying source of inflation impacts financial market perceptions of the persistence of monetary policy tightening. Investors expect policy tightening to be more persistent when inflation is driven by demand factors. During supply-driven episodes, however, investors perceive tightening as less persistent and less effective at producing a disinflation. These results point to a state-dependent financial market response to monetary policy: credibility, and therefore financial-market transmission, depends on what kind of inflation the central bank is perceived to be fighting.

JEL classification codes: E43, E52, E58

Keywords: monetary transmission, inflation expectations, high frequency, taylor rule

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1 Introduction

Financial markets play a vital role in the transmission of monetary policy, mediating how central bank policy actions filter into the entire credit market. Macroeconomic theory has long emphasized that monetary policy operates primarily through an expectations channel, highlighting the importance of financial markets' perceptions of future monetary policy actions.[1] Indeed, financial markets closely track central banks' forward guidance, which impacts longer-duration securities and market-based inflation expectations.[2] The efficacy of monetary policy hinges on the degree to which its actions are reflected in credit market prices across the yield curve.

We examine whether the transmission of policy tightening into credit markets depends on the underlying source of inflationary pressure—namely, whether inflation is supply- or demand-driven. Recent evidence indicates that both the Federal Reserve and financial markets distinguish between these sources of inflation. Using the decomposition of Shapiro (2024), Hofmann et al. (2024) show that the Federal Reserve responds roughly four times more aggressively to demand-driven than supply-driven inflation. This is an intuitive result: a policy tradeoff emerges when high inflation is driven by supply factors, and the Federal Reserve therefore tends to implement a more balanced approach to achieving its objectives of stable inflation and output. Boissay et al. (2025) further find that financial market stress is exacerbated when the Federal Reserve reacts to supply-driven inflation, but is reduced when it reacts to demand-driven inflation. This implies that markets welcome a policy tightening only when it is in response to demand factors, since strong demand gives firms a buffer against tighter credit conditions.

If markets internalize the Federal Reserve's state-dependent reaction function, asset prices will adjust accordingly, reinforcing policy credibility and effectiveness in that particular state. We quantify how various credit market yields, as well as measures of inflation expectations, respond to high-frequency identified monetary policy shocks, constructed by Jarociński and Karadi (2020).[3] Similar to the analysis of Boissay et al. (2025), we allow the impact of monetary policy tightening to differ depending on the source of inflation pressure, using the decomposition of Shapiro (2024).[4]

Our main finding is that the response of Treasury yields to monetary policy tightening is state-dependent, particularly in the case of real yields. We find that a tightening is more likely to raise expected future real rates when inflation is mainly demand driven. Specifically, a 25 basis point (bp) monetary policy tightening causes the 2-year-ahead real yield (measured by TIPS) to rise by 40 bps, on average. This effect rises to 130 bp if the tightening occurred when the demand-driven contribution to inflation was 0.5 percentage points (pp) above average, but *declines* to zero if the supply-driven contribution is 0.5 pp above average. This finding holds for contracts at later

[1] See Woodford (2003).

[2] See, Gürkaynak et al. (2005), Jarociński and Karadi (2020), Campbell et al. (2012)

[3] We provide similar findings using the shock series of Bauer and Swanson (2023).

[4] Our results are robust to alternative supply-and demand-driven decompositions including Eickmeier and Hofmann (2022) and Leiva-León et al. (2025).

horizons, although the effect diminishes as one goes further down the yield curve.

We find smaller state-contingent effects on nominal rates than real rates, implying differential effects of tightening on inflation expectations. Indeed, we find that tightening reduces market-based inflation expectations to a larger extent when inflation is mainly demand driven. In fact, tightening only has an impact on inflation expectations when the demand-driven contributions to inflation are elevated. Markets either recognize that tightening may not assuage the underlying inflation source, or they perceive that tightening will not persist enough going forward to achieve a disinflation. The fact that future nominal rates do not react to tightenings during supply-driven episodes supports the latter interpretation.

An important implication of our analysis is that fighting supply-driven inflationary pressures can be a challenge for central banks. Specifically, our estimates imply that markets perceive monetary tightening to be less persistent and less effective at lowering inflation during supply-driven episodes. By contrast, during demand-driven episodes, tightening is aided by the endogenous response of financial markets, which perceive the tightening to be more persistent and the central bank as more effective at lowering inflation. That is, financial markets transmit monetary policy to the broader credit market in a stronger fashion during demand-driven episodes.

As a final exercise, we use our point estimates to construct a time-varying estimate of the perceived persistence of monetary policy tightening. We find that perceptions were highest around the same time that the economy experienced painless disinflations—notably the 1980s, 1990s, and 2020s. Monetary policy was perceived as particularly credible throughout much of the post-COVID era, rationalizing how the Federal Reserve was able to achieve a soft landing. By contrast, perceptions were low during the 1970s, consistent with the difficulties the Federal Reserve had in bring inflation down. More broadly, we find that higher perceived persistence is associated with periods of lower future inflation volatility. Our results thus suggest that differences across disinflation attempts are at least partly explained by the markets view of the Federal Reserve's commitment to disinflation.

Our study is related to the literature on the financial channels of monetary policy transmission. Gertler and Karadi (2011) document that much of the movement in credit markets following monetary policy surprises is induced by movements in one- to five-year-ahead Treasury yields, which reflect the expected persistence of monetary policy. We find that this perceived persistence is amplified when inflation is primarily demand-driven, and conversely is dampened when inflation is supply-driven. The results of Gertler and Karadi (2011) thus imply that the underlying causes of inflation mediate the credit market response to monetary tightening shocks. Our analysis is also related to the recent paper by Bauer et al. (2024), who estimate professional forecasters' perceptions of the Federal Reserve's reaction function. The study focuses on the perceived reaction to the output gap, and find that forecasters learn from observed policy actions. Our study is related in that we are interested in market perceptions of monetary policy actions. However, we focus on perceptions of monetary policy via the underlying inflationary pressure, revealing that transmission of policy into credit prices depends critically on the inflation source. Our results are also related to a recent paper by Kroner (2025), who finds that investor attention to Consumer Price Index (CPI) releases rose with the level of inflation during the post-pandemic period. We show that responses to monetary policy also rise with inflation, consistent with higher attention allocation to macroeconomic developments during times of greater inflationary pressure.

This paper builds on the recent literature discussing how the source of inflationary pressures influences monetary policy. Hofmann et al. (2024) show that the Taylor rule can be decomposed into weights on supply- and demand-driven inflation, and that the Federal Reserve has historically responded much more strongly to demand-driven inflation than to supply-driven inflation. We present evidence that markets are aware of this fact, leading to differences in the perceived persistence of monetary policy. Nakamura et al. (2025) argue that the Federal Reserve's credibility has enabled it to look through supply shocks in recent years, as the belief that the Federal Reserve will intervene strongly in response to spiraling inflation has ensured that inflation expectations remain anchored. Our evidence complements this narrative, as markets appear to be are aware of the Federal Reserve's credible commitment to address demand-driven inflation, even though they perceive tightening shocks to be less persistent in the face of supply-driven inflation.

Finally, this paper builds on recent work documenting state-contingent impacts of monetary policy. Boissay et al. (2025) find that monetary policy tightening leads to more financial stress when the supply-contributions to inflation are higher. Our findings complement this result, showing that monetary tightening in the face of supply shocks also limits the perceived persistence of monetary policy tightening. Najjar and Shapiro (2025) and Leiva-León et al. (2025) further show that monetary tightening primarily lowers inflation through its demand-driven contributions. Our evidence indicates that markets are perhaps aware of this, coloring their perceptions of how effective monetary policy may be in different states of the economy.

The the paper is organized as follows. Section 2 motivates our analysis by showing that the underlying source of inflation has important implications for monetary policy perceptions. Section 3 discusses the daily financial data we use for our empirical analysis and specifies our empirical strategy. Section 4 presents our main empirical results on state contingencies in the perceived persistence of monetary policy. Section 5 concludes.

2 Perceptions of Inflation Pressure

Our empirical analysis aims to quantify how financial markets absorb monetary policy tightening into asset prices, and how this absorption depends on the perceived reason for the tightening. It is typically assumed that markets believe the Federal Reserve sets the federal funds rate, i_t, according to a Taylor-type rule, the simplest form being:

$$i_t = r^* + \phi^\pi \tilde{\pi}_t + \phi^y \tilde{y}_t \tag{1}$$

where $\tilde{\pi}_t = \pi_t - \pi^*$ is the inflation gap, $\tilde{y}_t = y_t - y^*$ is the output gap, and r^* is the long-run real interest rate. Markets observe the Federal Reserve's actions, infer the reasons *why* the Federal Reserve acted, and then adjust asset prices accordingly. For example, if markets observe a tightening when inflation is high but output is subdued, they would conclude from (1) that the Federal Reserve reacted to high inflation. Markets may perceive a reaction to high inflation as having different implications for future policy, and the evolution of the economy, than a reaction to high output.

In practice, market participants likely believe the Federal Reserve's reaction function is richer than (1), incorporating factors such as financial stability, interest rate smoothing, and even stock market performance (see Shapiro and Wilson (2022)). Motivated by Hofmann et al. (2024), we focus on a more nuanced formulation of (1) in which the Federal Reserve's policy response distinguishes between supply- and demand-driven inflation pressures:

$$i_t = r^* + \phi^d \pi_t^d + \phi^s \pi_t^s + \phi^y \tilde{y}_t \tag{2}$$

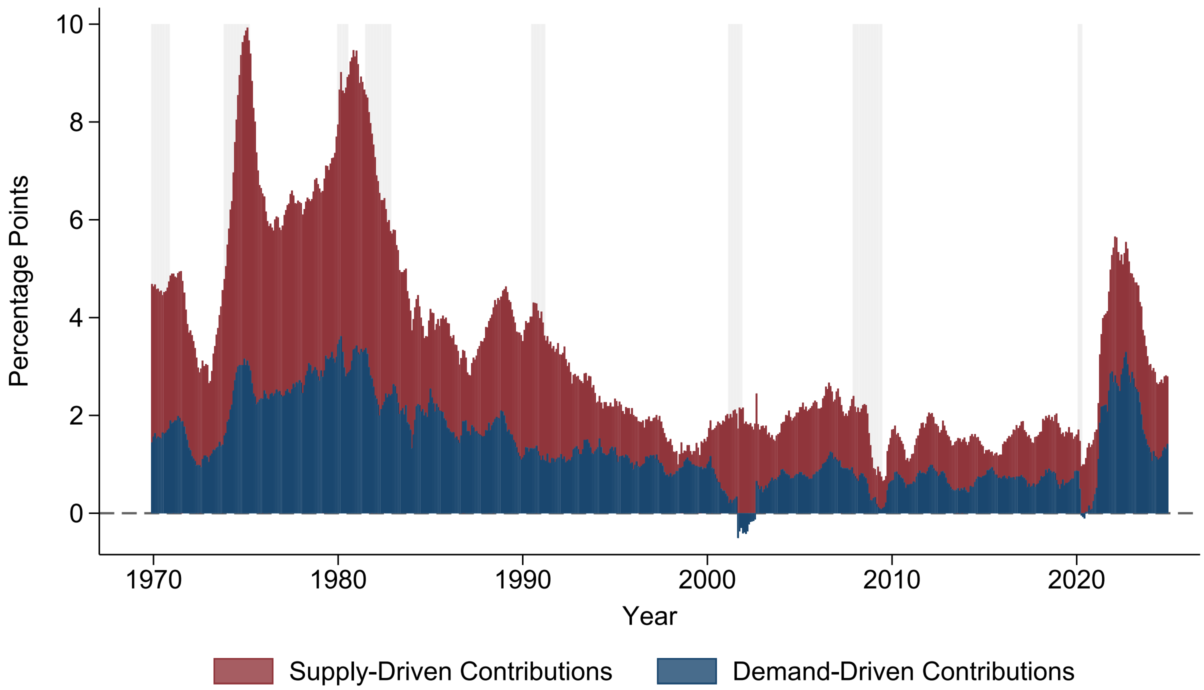
where inflation is separated into its supply- and demand-driven components, as constructed in Shapiro (2024) (see Figure 1). In Hofmann et al. (2024), the authors' estimates of ϕ^d is approximately four times larger than ϕ^s, implying that the Federal Reserve reacts far more strongly to demand-driven inflation. This pattern is consistent with the view that demand-driven inflation reflects pressures that monetary policy can effectively counteract, whereas supply-driven inflation often stems from temporary or cost-push shocks that interest rate hikes cannot easily mitigate—and may even exacerbate by further slowing output.

There is substantial evidence to support this view. Figure 2 updates our analysis in Najjar and Shapiro (2025), assessing the impact of monetary policy tightening on the supply- and demand-driven contributions to core PCE inflation.[5] A monetary policy tightening substantially reduces the demand-contributions to inflation, but has a statistically insignificant impact on the supply-driven contributions. That is, monetary policy interventions are primarily transmitted through demand channels. Similar results are also found in Leiva-León et al. (2025).

This all suggests that the Federal Reserve's credibility with markets is tied to its perceived focus and success in reducing demand-driven inflationary pressures. Consistent with this view, Nakamura

[5] Specifically, we run the following local projection specification: $\pi^j_{t+h} - \pi^j_t = \alpha + \beta MPS_t + \gamma \mathbf{X_t} + \varepsilon_t$, where $j \in sup, dem$ and MPS_t is the treatment variable—defined as a dummy variable equal to one if the Jarociński and Karadi (2020) monetary policy shock is in the upper 75th percentile, normalized to 25 basis points. $\mathbf{X_t}$ are of vector of monthly controls, including the vacancy-to-unemployment ratio, the industrial production index, oil and food inflation, and lags of our dependent and independent variables.

Figure 1: Shapiro (2024) Core PCE Decomposition

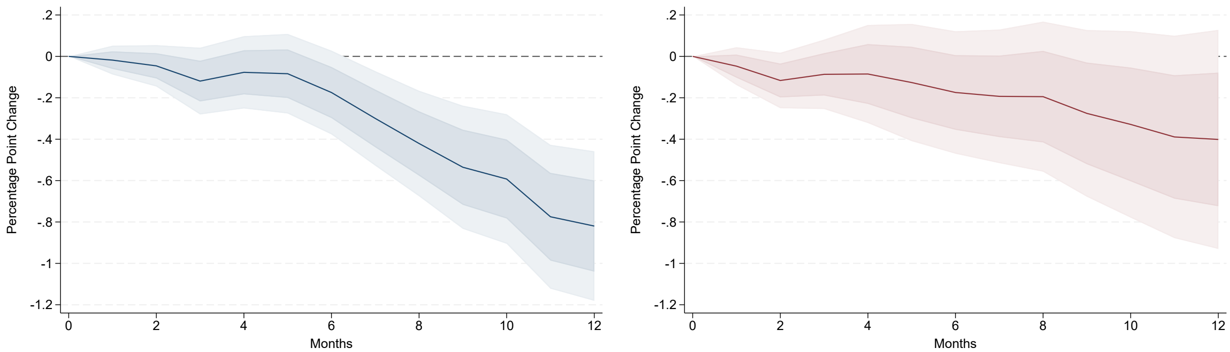


Note: Year-over-year percent change in Core PCE Inflation, broken down into demand-driven contributions (blue bars) and supply-driven contributions (red bars).

et al. (2025) argue that when a central bank has a credible commitment to combat demand-driven inflation, it has more leeway to "see through" supply shocks without risking a de-anchoring of inflation expectations. Specifically, markets know that the Federal Reserve faces little to no tradeoff when inflation is mainly demand-driven, and therefore believe that the Federal Reserve will act forcefully in response to demand-driven inflationary pressures. In contrast, markets may anticipate less persistence in the policy stance when inflation is mainly supply driven, since tightening entails further reducing economic activity. The Federal Reserve's credibility in addressing demand-driven inflationary pressures thus buys the Federal Reserve the ability to see through supply shocks.

This line of reasoning assumes that, similar to the FOMC, *market participants* can distinguish between supply- and demand-driven inflation pressures. To examine the extent to which this is true, we look at the correlations of professional forecasters perceptions of current economic conditions with the supply- and demand-driven contributions to core PCE inflation. If market participants can differentiate between the sources of inflation, then perceptions of overall inflation should rise with *either* supply- or demand-driven inflation, whereas perceptions of economic activity should vary depending on the source. This is precisely what we find, as shown in the left panel of Figure 3. Supply- and demand-driven inflation are *similarly* correlated with perceptions of current overall inflation, but they differ markedly in their correlations with real activity. Perceptions

Figure 2: Inflation Contribution Response to Monetary Policy Tightening



(a) (b)

Note: Local projection of Jarociński and Karadi (2020) monetary policy shock on inflation contributions with controls for macro variables and lags. Panel (a) plots demand-contribution response, panel (b) plots supply-contribution response. 1 standard deviation and 90% confidence bands shown.

of real activity are more positively correlated with demand-driven inflation than supply-driven inflation. In particular, perceptions of GDP growth, consumer spending, investment spending, and industrial production are *negatively* correlated with supply-driven inflation. Panel B shows that these patterns persist even after conditioning on a wide set of macroeconomic observables, including the output gap.[6] This suggests that the supply- and demand-driven inflation series capture variation in market participants' perceptions of underlying inflation pressures even beyond what is contained in publicly observed macroeconomic data. Overall, these results indicate that the supply- and demand-contributions series capture salient information to market participants regarding the source of underlying inflationary pressures that may have implications for their perceptions of future monetary policy.

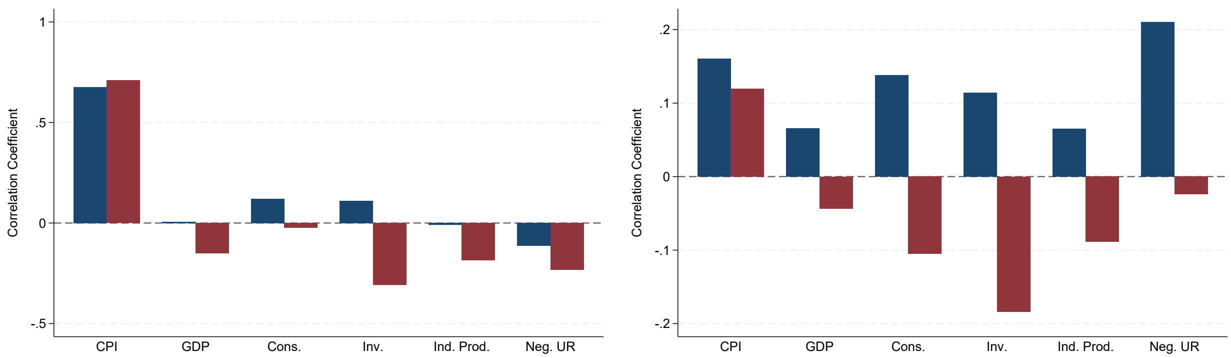
3 Data and Empirical Methodology

The findings above motivate the idea that market perceptions of policy actions depend on a broader set of state variables than just aggregate inflation and output. If markets recognize that the Federal Reserve reacts differently depending on the source of inflation, then the source itself could affect how tightening transmits to asset prices. This insight motivates our empirical design, which tests whether the market's response to a monetary tightening depends on the state of inflation, output, and ultimately the composition of inflationary pressures.

We test this hypothesis using a high-frequency event-study approach, estimating how expecta-

[6]Specifically, we collect the residuals from a regression of each of the current quarter SPF nowcasts on several macroeconomic data series (and their lags), time fixed effects, and lags of the dependent variable. We then collect the residuals for the analogous regressions of supply- and demand-driven inflation on the same covariates.

Figure 3: Correlation of SPF Nowcasts with Supply- and Demand-Driven Contributions



(a) Raw Correlations

(b) Residualized Correlations

Note: Plot of the correlation between Shapiro (2024) the supply- (red bars) and demand-driven (blue bars) contributions to core PCE inflation and current quarter SPF forecasts of headline CPI inflation, real GDP growth, real consumption expenditure growth, real nonresidential investment growth, industrial production growth, and the unemployment rate. Panel (a) plots raw correlations. Panel (b) plots correlations after controlling for lags of the supply- and demand-contributions to inflation, current and lagged values of the effective federal funds rate, the output gap, industrial production, the Gilchrist and Zakrajšek (2012) excess bond premium, credit spread, and year fixed effects.

tions about future interest rates and inflation adjust around monetary policy surprises. We use daily financial market data to measure interest rates and inflation expectations. Nominal zero-coupon Treasury yields and instantaneous forward rates are taken from the estimates of Gürkaynak et al. (2007). Real yields and breakeven inflation rates are obtained from the Treasury Inflation Protected Securities (TIPS) based estimates of Gürkaynak et al. (2010)[7]. Throughout our analysis, we use instantaneous forward rates to isolate the expected effects of monetary policy at different horizons. We supplement this series with daily data on federal funds futures and inflation swaps to capture market expectations of short-term policy rates and inflation more directly.

Our primary measure of monetary policy shocks is that developed by Jarociński and Karadi (2020), who construct high-frequency policy shocks from changes in 3-month federal funds futures around FOMC announcements. We additionally replicate our main results using the shock measure of Bauer and Swanson (2023) to ensure the robustness of our results to the selected monetary policy shock measure.[8]

Our baseline specification is:

$$E_{t+1}(i_{t+h}) - E_{t-1}(i_{t+h}) = \alpha + \beta MPT_t + \gamma \mathbf{X_t} + \varepsilon_t \tag{3}$$

[7]Both series were retrieved from https://www.federalreserve.gov/data/yield-curve-models.htm.

[8]Bauer and Swanson (2023) construct shocks by extracting the first principal component of the change in the first four quarterly Eurodollar futures in short windows around monetary policy announcements and then orthogonalizing these series to macroeconomic fundamentals.

where MPT_t is a monetary policy tightening event, defined as a dummy variable equal to one if the monetary policy shock defined by Jarociński and Karadi (2020) lies in the upper 75th percentile, normalized to 25 bps surprise[9]. We assess the impact of tightening on asset prices one day after the shock relative to one day before the shock. Specifically, $E_{t+1}(i_{t+h})$ is the market-based expectation on day $t+1$ of asset i at horizon h, while $E_{t-1}(i_{t+h})$ is the market-based expectation on day $t-1$ of asset i at horizon h. For example, for the June 18th FOMC meeting, it would be the market interest rate of the 2-year ahead (h) federal funds futures contract on June 19, 2025 (t) minus the market interest rate of the 2-year ahead (h) federal funds futures contract on June 17th, 2025. That is, β measures the impact of a surprise 25 bp tightening occurring on day t on the change in the price of futures contract i_{t+h} between one day after the shock and one day before the shock.[10] The vector $\mathbf{X_t}$ is a set of macroeconomic controls, including the supply- and demand-contributions to core PCE inflation, the unemployment gap, the vacancy-to-unemployment ratio, industrial production, oil inflation, and food inflation, all at time t.

To introduce state dependence into the empirical model, we include interactions between the monetary tightening dummy and macroeconomic state variables. We specifically choose inflation and the output gap as the relevant state variables because they are the key arguments of the simple Taylor rule (1). This allows us to directly test whether the market's response to policy tightening depends on the same macroeconomic conditions that guide the Federal Reserve's own policy decisions:

$$E_{t+1}(i_{t+h}) - E_{t-1}(i_{t+h}) = \alpha + \beta^0 MPT_t + \beta^\pi \pi_t \cdot MPT_t + \beta^y \tilde{y}_t \cdot MPT_t + \gamma \mathbf{X_t} + \varepsilon_t \tag{4}$$

where π_t is the 12-month change in core PCE inflation and $\tilde{y}$ is the output gap, as estimated by the Federal Reserve's nowcast in the Greenbook and Tealbook[11]. The coefficient β^π measures the additional impact of a monetary policy shock if it occurred when inflation is 1 pp above average while β^y measures the additional impact when the output gap is 1 pp is above average. If β (from equation (2)) does not depend on the level of inflation, then the estimate of $\hat{\beta^\pi}$ will be zero, and $\hat{\beta} = \hat{\beta^0}$.

Finally, we extend this framework to separate the state dependence by the source of inflationary pressure:

$$E_{t+1}(i_{t+h}) - E_{t-1}(i_{t+h}) = \alpha + \beta^0 MPT_t + \beta^d \pi_t^d \cdot MPT_t + \beta^s \pi_t^s \cdot MPT_t + \beta^y \tilde{y}_t \cdot MPT_t + \gamma \mathbf{X_t} + \varepsilon_t \tag{5}$$

[9] To ensure our results are robust to the monetary policy shock series and definition, we additionally report our main results using the Bauer and Swanson (2023) shocks and several different shock definitions in the appendix.

[10] Our results are robust to looking at larger windows after the monetary policy shock. We plot the responses for $h = 0$ to $h = 30$ for our main specifications in the appendix.

[11] Since Tealbook estimates are published with a 5-year lag, we use the Congressional Budget Office (CBO) output gap measure for recent years.

where π_t^d and π_t^s represent the demand- and supply-driven contributions to 12-month core PCE inflation. This decomposition allows us to isolate whether markets respond differently to monetary tightening depending on the type of inflation motivating it. Specifically, β^d measures the additional effect of a tightening when demand-driven inflation is 1 pp above average, and β^s does the same for supply-driven inflation. If markets' response is agnostic to the source of inflation, then $\beta^s = \beta^d = \beta^\pi$ should hold.

4 Empirical Results

4.1 Main Results

We report our main results for our three main assets of interest—nominal 2-year ahead forward Treasury yields (columns (1)-(3)), 2-year ahead forward TIPS yields (columns (4)-(6)), and 2-year ahead Federal Funds futures (columns (7)-(9))—in Table 1.[12] For each asset, we report the results from estimating equation (2)—the baseline response to a monetary policy tightening with no state conditionality—as well as the specifications that include state-contingent effects, namely equations (4) and (5). The baseline estimates show that expectations of 2-year ahead interest rates (for all three types of securities) rise in response to a monetary policy tightening.

Estimates of equation (4) show a positive, but somewhat noisy, influence of inflation, and no meaningful influence of the output gap on the impact of the tightening shock. These results suggest that the higher the level of inflation, the greater the effect of the monetary policy shock on interest rates futures[13]. Finally, the third column for each asset displays the estimates from equation (5), where we decompose changes in β^π into β^d and β^s. The results show that all of the additional impact of the monetary tightening when inflation is higher loads on the demand-contribution to inflation. The negative coefficient on the supply-driven contribution indicates that higher supply-driven pressures *reduces* the impact of the monetary tightening, rationalizing the noisy coefficient from estimating equation (4). These results indicate that the degree to which monetary tightening is absorbed into asset prices depends on the underlying source of inflationary pressure.

The effect is strongest for real yields, indicating a potential response of inflation expectations. Specifically, since real yields are roughly equivalent to nominal yields minus the market's expected inflation path, a larger increase in real yields than nominal yields implies a concurrent fall in inflation expectations. Thus, we run the same regressions as was plotted in Table 1 but with two market inflation expectations measures, breakeven inflation expectations and inflation swaps,

[12] These results plot the response to the 75th percentile Jarociński and Karadi (2020) monetary policy shock. To ensure our results are robust to the shock series and shock definition, Table A1 in the appendix reports the response of real yields to the Bauer and Swanson (2023) shock series and alternative shock definitions. To ensure our results are robust to the event window, we plot the dynamic response up to 30-days out for real yields in appendix Figure A1.

[13] These results mimic those of Kroner (2025), but in the context of interest rates as opposed to inflation expectations. When inflation is higher, markets are more attentive to monetary policy movements, and expect changes in the short rate to be more persistent.

instead of interest rate expectations. The results are reported in Table 2. Consistent with the difference between the real and nominal yield response, higher demand-driven contributions are associated with a larger fall in inflation expectations, whereas higher supply-contributions push up the inflation expectation response. Although these results are weaker than the response of interest rates on impact, the difference grows quickly in the trading days following the announcement, as can be seen in Figure A2. This implies that investors adjust inflation expectations after observing the response of market interest rates. These results imply a potential dynamic feedback loop between the interest rate response and the inflation expectations response: higher expected nominal interest rates when demand-contributions are elevated leads to a fall in inflation expectations, which in turn amplify the response of real yields. This virtuous cycle aids the Federal Reserve in transmitting monetary policy to the macroeconomy, but as our results stress, this feedback is only pronounced when the demand-contributions to inflation are elevated.

4.2 Robustness

To test the robustness of our findings we go through a series of alternative estimation specifications. One potential identification concern is the presence of risk premiums, which correlate with both monetary policy tightening and asset price dynamics. To address this concern, we rerun our main specification while including controls for the contemporaneous change in VIX, the term premium, and the inflation risk premium[14]. The results, reported in appendix Table A4, show that contemporaneous movements in daily financial risk indicators do not impact our main results. Additionally, we follow the literature on high frequency identification of monetary policy shocks and exclude 2008 and 2020, years of high liquidity stress, from our sample to address concerns that liquidity premia may confound our results[15].

Another potential identification concern is measurement error. We report results using two alternative supply- and demand-driven decompositions, Eickmeier and Hofmann (2022) and Leiva-León et al. (2025), in Appendix figures A3 and A2. Results are similar using these two alternative supply- and demand-driven series series, although R^2 are lower, and the standard errors are relatively larger on the interaction with the supply-driven term. We also address potential measurement error of our treatment variable, MPT_t, by running specifications with different shock definitions. Appendix Table A1 shows results on real yields using three alternative measures of monetary policy shocks: the 75th percentile dummy of the Bauer and Swanson (2023) monetary policy shock, the 90th percentile dummy of the Jarociński and Karadi (2020) shock, and the raw value of the Jarociński and Karadi (2020) shock, conditional on it being in the upper 75th percentile. Results are all qualitatively similar.

[14] As measured in D'Amico et al. (2018)

[15] See Nakamura and Steinsson (2018).

Table 1: **Response of Policy Tightening on 2-year-ahead Interest Rate Expectations**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Nominal Yields			Real Yields			Fed Funds Futures		
Tightening Shock	0.286**	-0.158	0.425	0.413***	-0.250	0.655	0.135	-0.301	0.385
	(0.129)	(0.346)	(0.425)	(0.149)	(0.404)	(0.421)	(0.136)	(0.331)	(0.459)
Tightening x Core PCE		0.179			0.279*			0.168	
		(0.139)			(0.165)			(0.133)	
Tightening x Ygap		-0.0102	-0.00718		-0.0244	-0.0183		-0.0223	-0.0155
		(0.0360)	(0.0362)		(0.0553)	(0.0477)		(0.0347)	(0.0338)
Tightening x Supply			-0.906*			-1.448***			-1.134*
			(0.538)			(0.504)			(0.616)
Tightening x Demand			0.960***			1.522***			1.096***
			(0.363)			(0.367)			(0.367)
Observations	150	150	150	150	150	150	143	143	143
R^2	0.139	0.163	0.204	0.138	0.169	0.230	0.107	0.131	0.182

Response to 75th percentile Jarociński and Karadi (2020) monetary policy shock. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2: **Response of Policy Tightening on 2-year-ahead Inflation Expectations**

	(1)	(2)	(3)	(4)	(5)	(6)
	Breakeven Expectations			Inflation Swaps		
Tightening Shock	-0.126	0.0920	-0.230	-0.142	-0.0748	-0.306
	(0.0895)	(0.298)	(0.342)	(0.0923)	(0.306)	(0.368)
Tightening x Core PCE		-0.1000			-0.0407	
		(0.134)			(0.138)	
Tightening x Ygap		0.0142	0.0111		0.0228	0.0196
		(0.0393)	(0.0366)		(0.0349)	(0.0332)
Tightening x Supply			0.541			0.491
			(0.367)			(0.389)
Tightening x Demand			-0.563*			-0.431
			(0.308)			(0.291)
Observations	150	150	150	145	145	145
R^2	0.090	0.120	0.143	0.062	0.099	0.127

Response to 75th percentile Jarociński and Karadi (2020) monetary policy shock. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.3 Interpreting the Estimates

The estimates of β^s and β^d in Table 1 quantify how the response to tightening changes depending on the underlying contributions of supply- and demand-factors to inflation. That is, these coefficients describe the *marginal* effects of the state on β. They do not reveal the implied *level* of β at different levels of supply- and demand-driven inflation. For example, while $\beta^s < 0$ indicates that a larger supply-driven contribution is associated with a smaller response of interest rate forwards to a tightening, this does not by itself imply that β will necessarily be negative when supply-driven inflation is high. To understand the policy response in levels, we need to recover the *total* implied β at a given state of the economy.

Equations (4) and (5) imply that β can be written as the sum of its components evaluated at the sample means of inflation and the output gap:

$$\beta = \beta^0 + \beta^\pi \cdot \overline{\pi} + \beta^y \cdot \overline{\tilde{y}_t} \tag{6}$$

$$= \beta^0 + \beta^d \cdot \overline{\pi^d} + \beta^s \cdot \overline{\pi^s} + \beta^y \cdot \overline{\tilde{y}} \tag{7}$$

where $\overline{\pi^s}$ and $\overline{\pi^d}$ are the sample means of the supply- and demand-contributions to inflation, $\overline{\pi}$ is the sample mean of overall inflation, and $\overline{\tilde{y}}$ is the sample mean of the output gap. It follows that the total impact of a monetary policy shock at any given level of supply- and demand driven inflation can be expressed as:

$$\beta(\pi_t, \tilde{y}_t) = \beta^0 + \beta^\pi \cdot \pi_t^d + \beta^y \cdot \tilde{y}_t \tag{8}$$

if using estimates from equation (4), or

$$\beta(\pi_t^d, \pi_t^s, \tilde{y}_t) = \beta^0 + \beta^d \cdot \pi_t^d + \beta^s \cdot \pi_t^s + \beta^y \cdot \tilde{y}_t \tag{9}$$

if using estimates from equation (5). The standard error of $\beta(\pi_t, \tilde{y}_t)$ or $\beta(\pi_t^d, \pi_t^s, \tilde{y})$ can be obtained using the delta method.

To demonstrate how the estimates reported in Table 1 translate into the total effect of tightening, we report the implied values of $\beta(\pi_t, \tilde{y}_t)$ and $\beta(\pi_t^d, \pi_t^s, \tilde{y}_t)$ under three different counterfactuals:

$$\begin{aligned}
&(i) &&\beta(\pi_t, \tilde{y}_t) &&= \beta(\overline{\pi} + 0.5, \overline{\tilde{y}}) \\
&(ii) &&\beta(\pi_t^d, \pi_t^s, \tilde{y}_t) &&= \beta(\overline{\pi^d} + 0.5, \overline{\pi^s}, \overline{\tilde{y}}) \\
&(iii) &&\beta(\pi_t^d, \pi_t^s, \tilde{y}_t) &&= \beta(\overline{\pi^d}, \overline{\pi^s} + 0.5, \overline{\tilde{y}})
\end{aligned}$$

where (i) is the level of β when total inflation is 0.5 pp above its sample mean, (ii) is the level of β when total inflation is 0.5 pp its mean due solely to demand pressures, and (iii) is the level of β when total inflation is 0.5 pp above its mean due solely to supply pressures. We do not leverage variation in the output gap because it does not meaningfully explain differences in the overall response, as can be seen in Table 1.

We focus on the forward TIPS yield (i.e., the real yield) and display results on the 2-year ahead contract, as well as the 3-year ahead, 4-year ahead, 5-year ahead, and 5-year/5-year forward contracts in Figure 4[16]. Panel (a) is the unconditional response to the monetary policy shock (i.e., estimates of β from equation (2)). The 2-year ahead estimate is thus taken straight from column (4) of Table 1, where $\beta = 0.4$. The estimates of β declines as the contract horizon is increased, reaching zero at the 5-year/5-year horizon. This finding suggests that tightening has little to no effect on longer-term yields, suggesting markets perceive money as neutral over the long run (see King and Watson (1997)).

Panel (b) shows how these estimates of β change when inflation is 0.5 pp above average—that

[16]We show the same figure using the estimated responses of nominal yields and Fed Funds futures in appendix Figures A3 and A4. The results are qualitatively the same, but we focus on real yields for brevity and because they are arguably the most important rates for understanding monetary transmission.

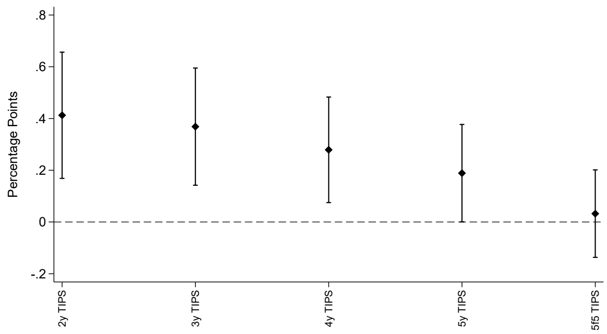
is, scenario (i). The results show β rises at all contract horizons under this scenario, but not by much more than in the unconditional scenario. The estimate on the 2-year ahead contract rises to about 0.6 (from 0.4) while the estimate on the 5-year ahead contract rises to about 0.3 (from 0.2). The estimate on the 5 year/5-year forward is still effectively zero.

Finally panel (c) shows the implied β under scenario (ii) in blue dots and scenario (iii) in red dots. That is, the blue dots are implied estimates of β when a 0.5 pp increase in inflation is entirely driven by demand, and the red dots are implied estimates of β when a 0.5 pp increase is entirely driven by supply. As can be seen, the positive effect of inflation on the response of real yields to monetary policy tightening is entirely driven by periods when the demand-contributions to inflation are elevated. In fact, the transmission of tightening to real yields is effectively zero when inflation is elevated solely due to supply factors. Interestingly, there is a positive effect on the 5-year/5-year forward rate when inflation is elevated due to demand-driven factors. We do not know the exact mechanism driving this result, but a recent study by Jordà et al. (2024) find that monetary policy shocks can have impacts on the real economy at horizons of over 10 years. It is plausible that these longer term effects are more salient when the central bank is fighting an exceedingly strong economy.

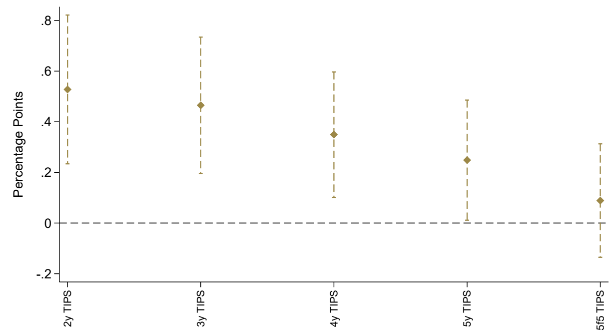
Of course, these are the implied estimates of β for specific values of inflation. To paint a fuller picture, we plot the implied β across different levels of the supply- and demand-contributions to inflation in Figure 5. Here, we vary either π^d or π^s over their historical ranges, while holding the other state variables at their historical means. For example, panel (a) shows the implied values of $\beta(\pi_t^d, \pi_t^s, \tilde{y})$ varying π_t^d between 0 and 3.5 while keeping π_t^s and $\tilde{y}$ at their historical averages. The vertical dashed line indicates the value of β when all states are at their mean level, which recovers β from equation (2). Panel (a) shows that β is generally not statistically different from zero when demand-driven inflation is below average, but rises steeply as demand-driven inflation exceeds average levels. Panel (b) shows the opposite pattern for supply-driven inflation. That is, β is generally not statistically significant at high levels of supply-driven inflation, but rises significantly when the supply-contribution declines to low levels. The slopes of these lines also highlights the asymmetry in how supply and demand factors differentially shapes the price response—while higher supply-contributions lower the real yield sensitivity moderately, higher demand-contributions raise the sensitivity of real yields significantly.

The supply- and demand-contributions to inflation are strongly correlated, and thus the extreme scenarios highlighted on either end of these panels are not frequently realized. However, it illustrates the point that the levels of these contributions as estimated in equation (3) have quantitatively meaningful implications for the perceived persistence of monetary policy tightening. To illustrate the implications of these estimates in observed macroeconomic contexts, we plug in the observed historical values of π_t^d, π_t^s, and $\tilde{y}_t$ into equation (5) and plot the results as a time-varying estimate of $\beta_t = \beta(\pi_t^d, \pi_t^s, \tilde{y}_t)$ in Figure 6. Since this exercise entails plugging in any values of π_t^d and π_t^s, we include out-of-sample estimates of β_t back to 1969—the year the series begin.

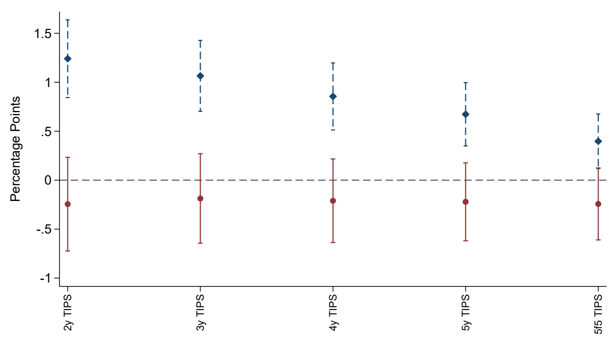
Figure 4: Real Yield Response to Monetary Policy Tightening, Scenario Analysis



(a)



(b)

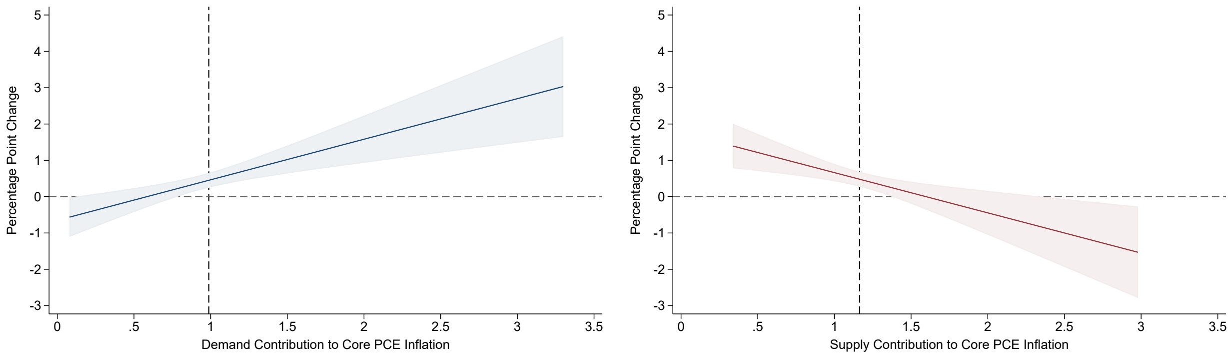


(c)

Note: Panel (a) reports β estimated from eq. (3). Panel (b) reports $\beta^0 + \beta^\pi \cdot (\overline{\pi} + 0.5)$ estimated from eq. (4). Panel (c) reports $\beta^0 + \beta^d \cdot (\overline{\pi^d} + 0.5) + \beta^s \cdot \overline{\pi^s}$ (blue dots), and $\beta^0 + \beta^d \cdot \overline{\pi^d} + \beta^s \cdot (\overline{\pi^s} + 0.5)$ (red dots) estimated from eq. (5). All panels plot responses to 75th percentile Jarociński and Karadi (2020) policy shock. 90 percent confidence interval.

The plot shows substantial variation in the perceived persistence of monetary policy tightening. A couple things are worth noting about this figure. First, there is strong business cycle variation in the perceived persistence of monetary policy tightening. During some recessions β_t even becomes negative, implying any tightening would be perceived to be reversed within the next two years. Second, there is a discrepancy in the level of β_t between the pre- and post-Volcker era (i.e., before and after the mid-1980s). The implied estimate of β_t is not statistically different than zero (albeit negative) throughout the 1970s and early 1980s, but then resides above zero for a large portion of the post-1990s period. This pattern is consistent with the difficulty the Federal Reserve had in tackling inflation in the 1970s, when strong supply disruptions and stagflation complicated the Federal Reserve's ability to address both sides of its mandate (see, for example, Blinder (2013) and Känzig (2021)). Specifically, the estimates of β_t in the 1970s imply that markets would have perceived any tightening to *not* be credible. However, the rise of β_t in the mid 1980s suggests an increase in credibility. Indeed, this period coincides with the disinflation of the 80s, which led to

Figure 5: Distribution of Real Yield Response to Monetary Policy Tightening



(a)

(b)

Note: Panel (a) reports β estimated from eq. (5) when π^s and $\tilde{y}$ are at their historical averages and π^d is allowed to vary. Panel (b) reports β estimated from eq. (5) when π^d and $\tilde{y}$ are at their historical averages and π^s is allowed to vary. Dashed line shows $\overline{\pi^d}$ in panel (a) and $\overline{\pi^s}$ in panel (b). All panels plot responses to 75th percentile Jarociński and Karadi (2020) policy shock. 90 percent confidence interval.

a period of anchored inflation expectations in the 1990s (see Williams (2006)). Finally, monetary policy was perceived as particularly credible throughout much of the post-COVID era, rationalizing how the Federal Reserve was able to achieve a soft landing.

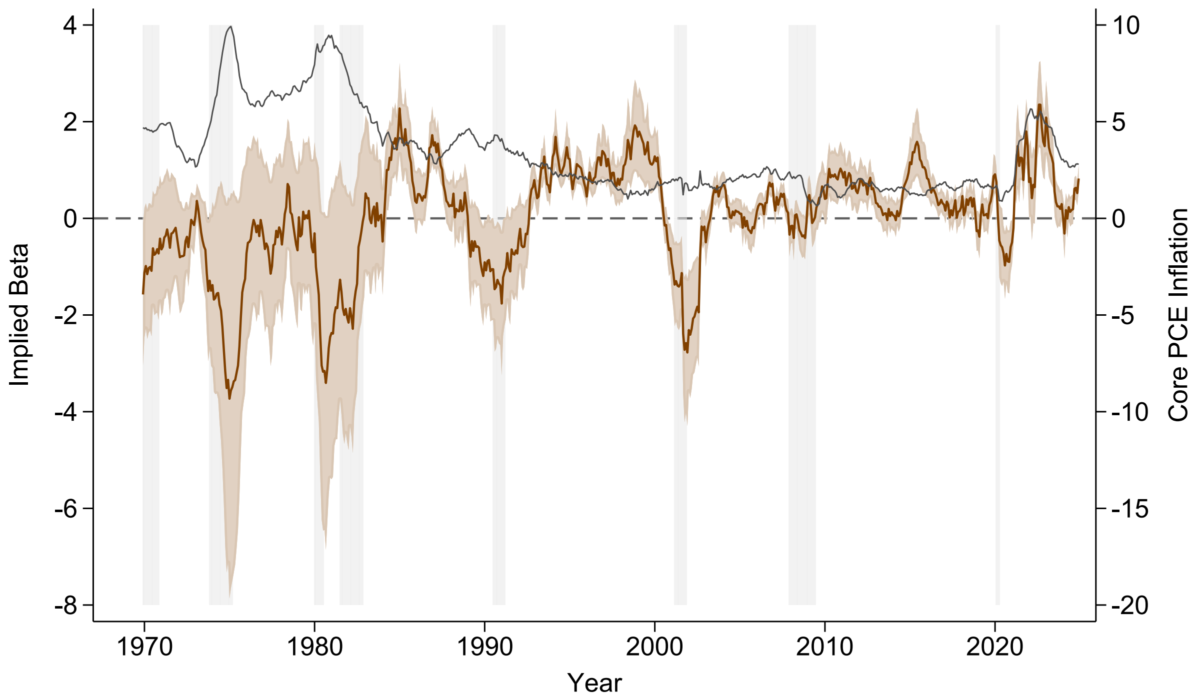
Overall, Figure 6 suggests that the Federal Reserve had an easier time keeping inflation stable when markets perceived tightening to be more persistent—that is, when β_t was higher. Indeed, β_t is strongly correlated with various measures of perceived inflation stability and actual future inflation stability, as shown in in A5[17]. Ultimately, these results highlight significant temporal variation in the perceived persistence of monetary policy depending on source of inflationary pressure.

5 Conclusion

We provide novel empirical evidence of state-dependency in the financial market response to monetary policy tightening shocks. In particular, when high inflation is mainly demand driven, monetary policy tightening has a sizable impact on both real and nominal yields, and inflation expectations fall. Conversely, when the Federal Reserve tightens during supply-driven episodes, there is little transmission into real yields, nominal yields, or inflation expectations. This implies that, under supply-driven inflations, markets believe that the Federal Reserve will have a more difficult time maintaining a persistently restrictive policy stance. Our results thus highlight another mechanism that complicates the ability of central banks to tackle supply-driven inflationary pressures.

[17]Figure A5 reports the correlation between the estimates of β_t the 2-year ahead TIPS yield when plugging in the historical values of π_t^d, π_t^s, and $\tilde{y}_t$ into eq. (9) and the variance of core PCE inflation, the variance of headline PCE inflation, the variance of breakeven inflation expectations, the average SPF headline CPI forecast dispersion, and the average inflation risk premium between time t and $t + 12$.

Figure 6: Implied $\beta(\pi_t^d, \pi_t^s, \tilde{y}_t)$ over time



Note: This figure reports $\beta(\pi_t^d, \pi_t^s, \tilde{y}_t)$ in brown—the estimates of β_t for the 2-year-ahead real rate when plugging in the historical values of π^s, $\tilde{y}$, and π^d into eq. (9). In light brown are the 90th percentile confidence bands, constructed using the delta method. Year-over-year change in total core PCE inflation is in black.

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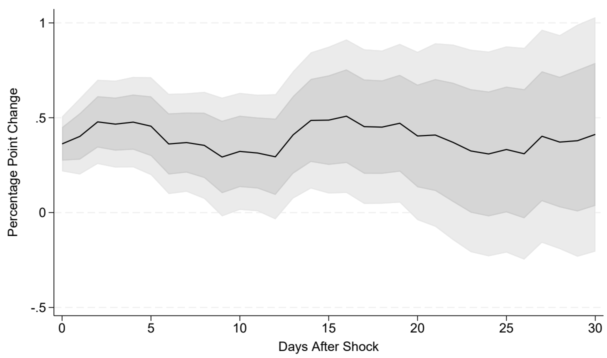
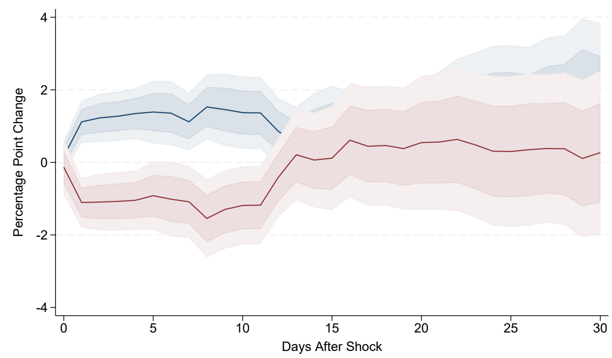
Appendix

Figure A1: State-Dependent Effects of Monetary Policy Shocks on Interest Rate Expectations: Local Projection



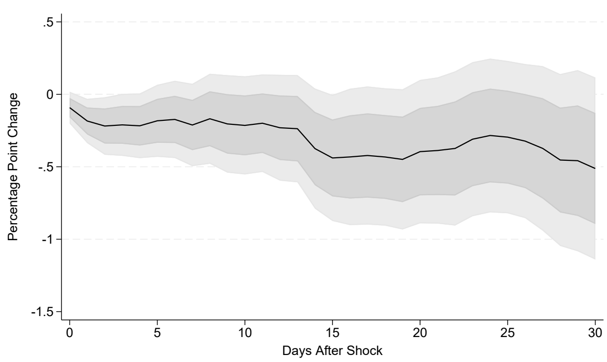
(a)



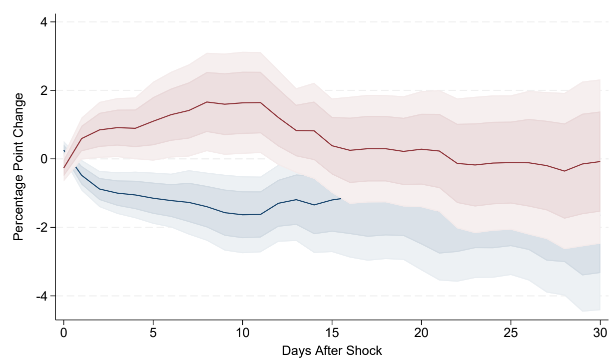
(b)

Note: Panel (a) reports β estimated from eq. (3). Panel (b) reports β^d (blue line) and β^s (red line) estimate from eq. (5). All panels plot responses to 75th percentile Jarociński and Karadi (2020) policy shock. 90 and 64 percent confidence intervals.

Figure A2: State-Dependent Effects of Monetary Policy Shocks on Inflation Expectations: Local Projection



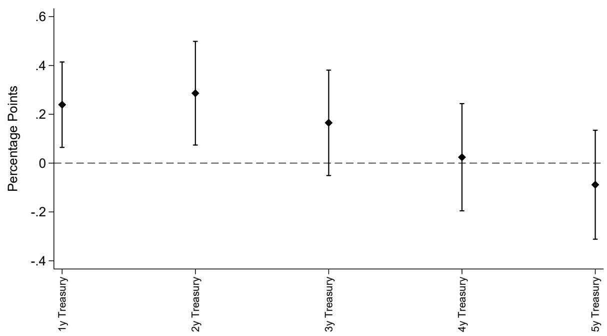
(a)



(b)

Note: Panel (a) reports β estimated from eq. (3). Panel (b) reports β^d (blue line) and β^s (red line) estimate from eq. (5). All panels plot responses to 75th percentile Jarociński and Karadi (2020) policy shock. 90 and 64 percent confidence intervals.

Figure A3: Nominal Treasury Yield Response to Monetary Policy Shock Scenario Analysis



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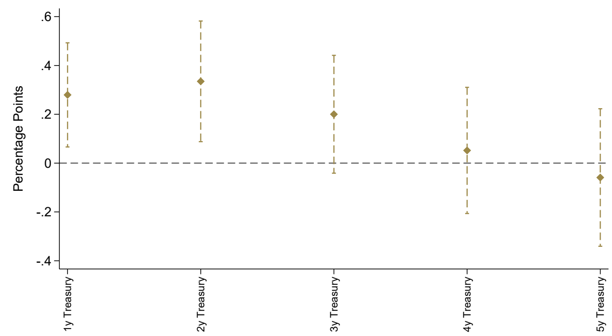

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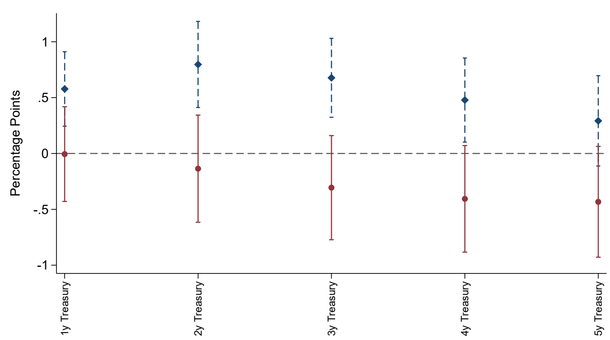
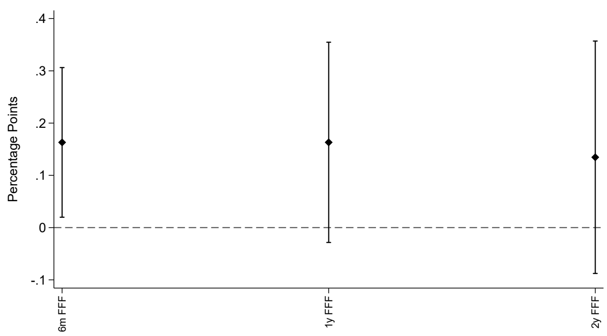


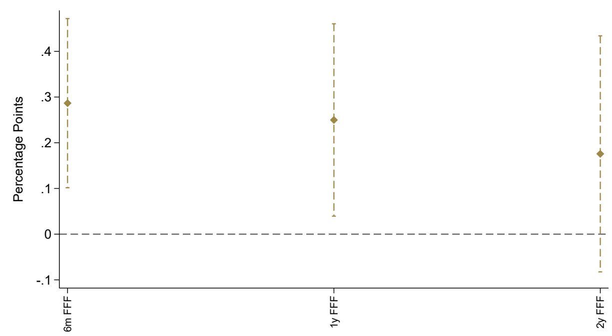
(c)

Note: Panel (a) reports β estimated from eq. (3). Panel (b) reports $\beta^0 + \beta^\pi \cdot (\overline{\pi} + 0.5)$ estimated from eq. (4). Panel (c) reports $\beta^0 + \beta^d \cdot (\overline{\pi^d} + 0.5) + \beta^s \cdot \overline{\pi^s}$ (blue dots), and $\beta^0 + \beta^d \cdot \overline{\pi^d} + \beta^s \cdot (\overline{\pi^s} + 0.5)$ (red dots) estimated from eq. (5). All panels plot responses to 75th percentile Jarociński and Karadi (2020) policy shock. 90 percent confidence interval.

Figure A4: Fed Funds Futures Response to Monetary Policy Shock Scenario Analysis



(a)



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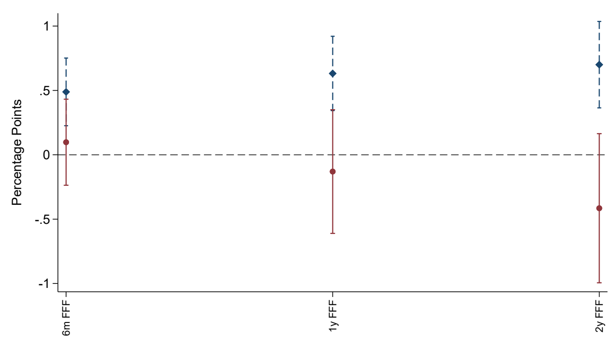
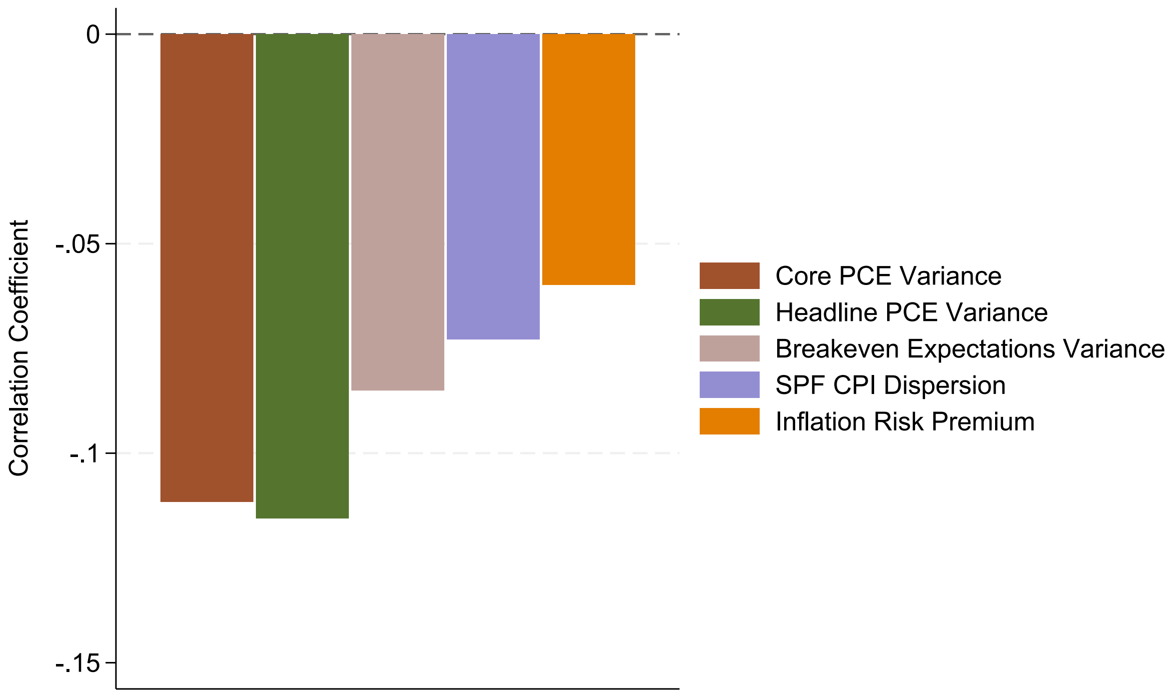


(c)

Note: Panel (a) reports β estimated from eq. (3). Panel (b) reports $\beta^0 + \beta^\pi \cdot (\overline{\pi} + 0.5)$ estimated from eq. (4). Panel (c) reports $\beta^0 + \beta^d \cdot (\overline{\pi^d} + 0.5) + \beta^s \cdot \overline{\pi^s}$ (blue dots), and $\beta^0 + \beta^d \cdot \overline{\pi^d} + \beta^s \cdot (\overline{\pi^s} + 0.5)$ (red dots) estimated from eq. (5). All panels plot responses to 75th percentile Jarociński and Karadi (2020) policy shock. 90 percent confidence interval.

Figure A5: Correlations Between Estimate-Implied Real Rate Response and Inflation Uncertainty



Note: This figure reports the correlation between the estimates of β_t for the 2-year ahead TIPS yield when plugging in the historical values of π_t^d, π_t^s, and $\tilde{y}_t$ into eq. (9) and the variance of core PCE inflation, the variance of headline PCE inflation, the variance of breakeven inflation expectations, the average SPF headline CPI forecast dispersion, and the average inflation risk premium between time t and $t + 12$.

Table A1: **Robustness to Shock Series**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Bauer and Swanson (2023) Shock			90th Percentile Shock			Raw 75th Percentile Shock		
Tightening Shock	0.430***	0.617*	1.209***	0.338**	-0.664**	-0.497	1.964***	0.561	2.332
	(0.119)	(0.325)	(0.346)	(0.133)	(0.257)	(0.301)	(0.376)	(1.131)	(1.500)
Tightening x Core PCE		-0.0817			0.335***			0.391	
		(0.141)			(0.0984)			(0.262)	
Tightening x Ygap		-0.00951	0.00943		-0.137***	-0.124***		-0.160	0.00196
		(0.0370)	(0.0374)		(0.0346)	(0.0321)		(0.283)	(0.301)
Tightening x Supply			-1.212***			0.114			-2.506*
			(0.452)			(0.285)			(1.426)
Tightening x Demand			0.712**			0.472**			2.263**
			(0.345)			(0.210)			(0.885)
Observations	144	144	144	150	150	150	150	150	150
R^2	0.170	0.221	0.266	0.111	0.210	0.225	0.175	0.219	0.243

Response to 75th percentile Bauer and Swanson (2023) monetary policy shock. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A2: **Robustness to Decomposition Series: Leiva-León et al. (2025)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Nominal Yields			Real Yields			Fed Funds Futures		
Tightening Shock	0.290**	0.157	-0.332	0.409***	0.196	-0.324	0.138	-0.0320	-0.344
	(0.131)	(0.182)	(0.269)	(0.149)	(0.214)	(0.299)	(0.138)	(0.191)	(0.266)
Tightening x Core PCE		0.139			0.265			0.166	
		(0.149)			(0.176)			(0.141)	
Tightening x Ygap		0.00434	-0.0896*		-0.00694	-0.105*		-0.0170	-0.0796
		(0.0323)	(0.0532)		(0.0507)	(0.0632)		(0.0304)	(0.0538)
Tightening x Supply			-0.444*			-0.334			-0.218
			(0.238)			(0.285)			(0.246)
Tightening x Demand			0.882***			1.031***			0.646**
			(0.309)			(0.345)			(0.303)
Observations	150	150	150	150	150	150	143	143	143
R^2	0.135	0.157	0.190	0.138	0.164	0.204	0.096	0.119	0.134

Response to 75th percentile Jarociński and Karadi (2020) monetary policy shock. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A3: **Robustness to Decomposition Series: Eickmeier and Hofmann (2022)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Nominal Yields			Real Yields			Fed Funds Futures		
Tightening Shock	0.314**	0.348***	0.318**	0.466***	0.550***	0.530***	0.198*	0.209*	0.200
	(0.124)	(0.124)	(0.129)	(0.148)	(0.145)	(0.148)	(0.118)	(0.120)	(0.124)
Tightening x Core PCE		0.0915			0.197**			0.0756	
		(0.0726)			(0.0908)			(0.0650)	
Tightening x Ygap		0.00824	-0.0349		0.00137	-0.0300		-0.0119	-0.0285
		(0.0300)	(0.0432)		(0.0414)	(0.0575)		(0.0276)	(0.0389)
Tightening x Supply			-0.120			0.0877			-0.0320
			(0.165)			(0.178)			(0.153)
Tightening x Demand			0.172*			0.243**			0.113
			(0.0927)			(0.0999)			(0.0857)
Observations	142	142	142	142	142	142	135	135	135
R^2	0.141	0.166	0.177	0.149	0.216	0.222	0.114	0.141	0.151

Response to 75th percentile Jarociński and Karadi (2020) monetary policy shock. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4: **Robustness to Daily Financial Controls**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Nominal Yields			Real Yields			Fed Funds Futures		
Tightening Shock	0.162***	0.0893	0.287**	0.252**	0.00402	0.518	0.0477	-0.0432	0.289
	(0.0556)	(0.151)	(0.143)	(0.0989)	(0.278)	(0.328)	(0.0678)	(0.165)	(0.187)
Tightening x Core PCE		0.0292			0.110			0.0278	
		(0.0680)			(0.115)			(0.0715)	
Tightening x Ygap		-0.00784	-0.00629		-0.0256	-0.0212		-0.0223	-0.0175
		(0.0270)	(0.0252)		(0.0508)	(0.0444)		(0.0219)	(0.0189)
Tightening x Supply			-0.348*			-0.892**			-0.638**
			(0.193)			(0.375)			(0.271)
Tightening x Demand			0.302*			0.839***			0.508**
			(0.177)			(0.286)			(0.196)
Observations	150	150	150	150	150	150	143	143	143
R^2	0.843	0.844	0.848	0.652	0.661	0.679	0.721	0.728	0.744

Response to 75th percentile Jarociński and Karadi (2020) monetary policy shock with controls while controlling for concurrent daily change in VIX, the term premium, and the inflation risk premium. Robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$