



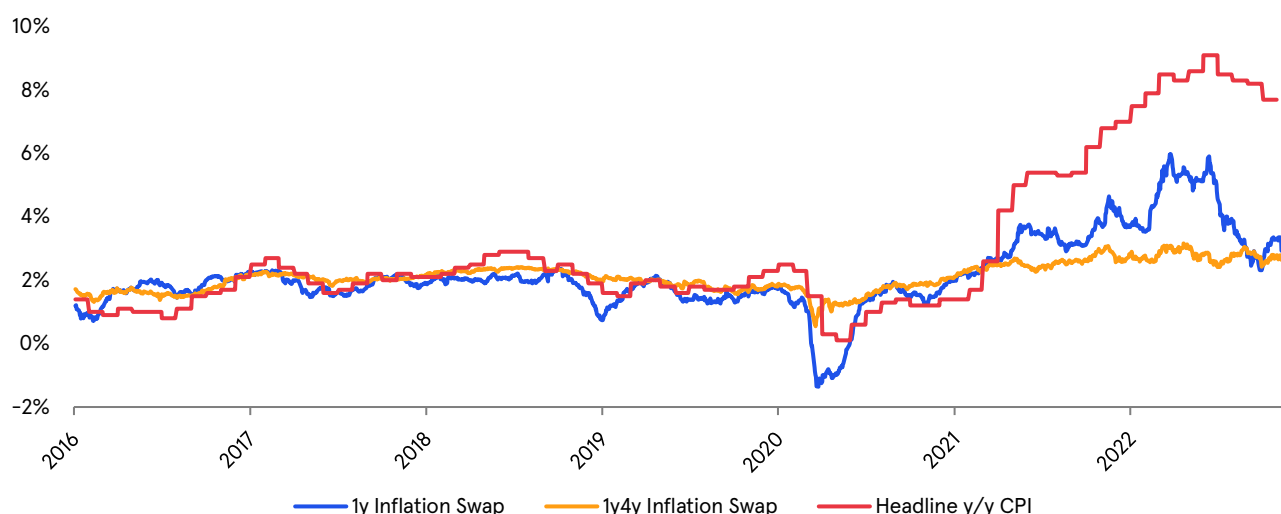
Anchors that Stay: The Impact of U.S. Federal Reserve Policy on Inflation Expectations During the 2022 Inflation Surge

The U.S. Federal Reserve entered 2022 with an accommodative policy stance that, in the words of one senior Fed official, left the bank “wrong footed”¹ as headline inflation surged to a 40-year high. Nevertheless, medium-term inflation expectations, as proxied by 1y4y inflation swap rates (*i.e.*, market-implied inflation expectations for a four-year period beginning in one year), remained well anchored throughout 2022, as shown by the orange line in *Figure 1*.

What role did the Fed play in driving that outcome? In this piece, we illustrate a methodology that shows the Fed's shift to an aggressive tightening path was meaningful in keeping inflation expectations anchored, reducing the cumulative increase in expected inflation since the start of 2021 to less than half of what it might have been under a more typical approach to interest rate policy. (We discuss that typical approach in the “Gauging the Impact of Fed Policy on Inflation Expectations” section below.)

Figure 1: Realized Inflation vs. Market-Implied Inflation Expectations

(Jan 2016–Nov 2022)



Note: Figure 1 depicts time series of the year-over-year headline Consumer Price Index (“CPI”), 1-year inflation swap rate, and 1y4y inflation swap rate.

Sources: Bloomberg; the Bureau of Labor Statistics; the D. E. Shaw group. Applicable data are used with permission of Bloomberg.

The Empirical Challenge of Bidirectional Causality

We aim to measure the interactions between near-term monetary policy expectations (proxied by the 1y1y overnight index swap (“OIS”) rate) and the outlook for inflation. We use 1y4y inflation swap rates as a measure of the market’s expectations for medium-term inflation, as the five-year horizon reflects the cyclical pressures to which the Fed typically responds. (We use the 1-year-ahead forward rate to limit distortion from a range of idiosyncratic factors that affect very near-term inflation.) Market-based measures are only one of several ways of quantifying inflation expectations, but from an analytical perspective, they have the advantage of providing daily data while directionally aligning with other common measures of household and forecaster inflation expectations.²

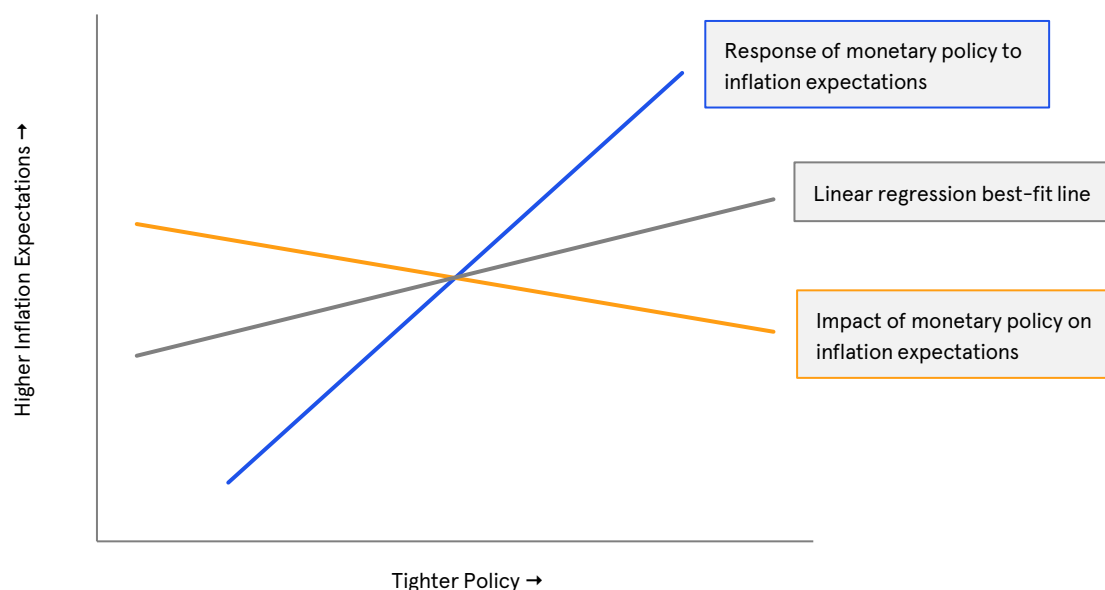
¹ See Charles L. Evans, “On the Benefits of Running the Economy Hot,” 2022 U.S. Monetary Policy Forum (February 18, 2022), Initiative on Global Markets at the University of Chicago Booth School of Business; available [here](#).

² Inflation swap rates incorporate an inflation risk premium in addition to inflation expectations; similarly, OIS rates incorporate a risk premium in addition to monetary policy expectations. In each case, isolating the risk premium component is empirically challenging. As a result, we don’t attempt to adjust for these risk premia and instead express pairwise relationships as a function of both components of each rate.

Figure 2 illustrates the core problem of bidirectional causality: the Fed’s actions can both influence and be influenced by inflation expectations. In this hypothetical illustration, the upward-sloping blue line represents the impact of inflation expectations on monetary policy—an increase in inflation expectations should lead to increased policy tightening.

Conversely, the downward-sloping orange line represents the impact of Fed policy on inflation expectations: tighter-than-expected policy should lower inflation expectations. At any point in time, both effects are at play, making it difficult to isolate the impact of just one. Indeed, a simple regression of daily changes in one variable on the other would result in a best-fit line (grey line in Figure 2) with a slope between the blue and orange lines, as it would mix the two causal effects into a single parameter that obfuscates both.

Figure 2: Theoretical Relationship between Fed Policy and Inflation Expectations



Source: the D. E. Shaw group.

Isolating the Responses of Monetary Policy and Inflation Expectations

This presents an econometric challenge: How can we identify the causal relationship between the variables? That is, how can we measure the respective responses of monetary policy and of inflation expectations to changes in the other? To do so, we employ the heteroskedasticity identification approach pioneered in a paper by Rigobon and used in a similar context in a study by Rigobon and Sack.³

The latter study’s key insight is that surprises in monetary policy and inflation have different importance on different days. In particular, when the Federal Open Market Committee (“FOMC”) meets, more information enters the market regarding Fed policy than on other days. As a result, we can isolate each variable’s impact on the other by observing the shift in their variances and correlation on FOMC days relative to non-FOMC days.

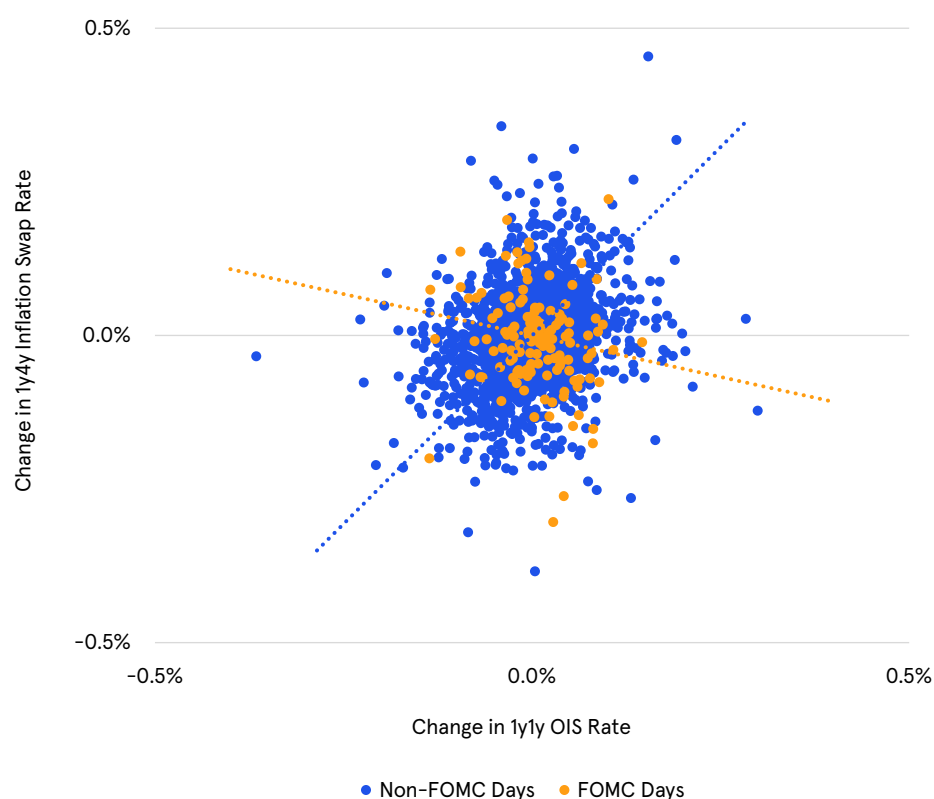
³ See Roberto Rigobon, “Identification Through Heteroskedasticity,” *The Review of Economics and Statistics*, Vol. 85, No. 4 (November 2003): 777–792; and Roberto Rigobon and Brian Sack, “The Impact of Monetary Policy on Asset Prices,” *Journal of Monetary Economics*, Vol. 51, No. 8 (November 2004): 1553–1575. Dr. Sack serves as Director of Global Economics for the D. E. Shaw group.

Figure 3 illustrates the intuition underlying this approach by showing the actual daily changes in 1y1y OIS rates (our proxy for market expectations of near-term monetary policy) and 1y4y inflation swap rates (our proxy for medium-term inflation expectations) over the period since 2005, layered on top of the Figure 2 hypothetical relationships.

On non-FOMC days (blue dots in Figure 3), the majority of new information being incorporated into market prices involves changes to the inflation outlook and the anticipated policy response to those changes. As a result, the slope of the empirical relationship ends up closer to the policy response line (blue).

The relative importance of the two effects changes, however, on days when the FOMC convenes to discuss monetary policy (orange dots in Figure 3). Fed policy plays an increased role on these days, rotating the relationship away from the policy response line (blue) and towards the policy impact line (orange). However, because inflation news continues to arrive on those days, the dots don't converge on the orange line, and a simple regression on those observations still would not uncover the underlying relationship.

Figure 3: Relationship Between 1y1y OIS Rates and 1y4y Inflation Swap Rates: Daily Changes on Non-FOMC Days and FOMC Days
(Jan 2005–Nov 2022; excludes periods of market stress)



Sources: Bloomberg; the D. E. Shaw group. Applicable data are used with permission of Bloomberg.

The identification method we use addresses this empirical challenge. Under certain simplifying assumptions, the shift in behavior across the two subsamples can be used to estimate the actual slopes of the individual relationships illustrated by the hypothetical orange and blue lines. Importantly, the technique used does not rely on any macroeconomic model but instead extracts its estimate directly from market indicators.

Gauging the Impact of Fed Policy on Inflation Expectations

Using this technique over the sample period since 2005, we estimate that a 1.00 percentage point (“pp”) increase in the 1y1y OIS rate leads to a 0.27 pp change in inflation expectations. Conversely, we find that a 1.00 pp increase in the 1y4y inflation rate is estimated to increase the 1y1y OIS rate by 0.82 pp. For purposes of this piece, we characterize the latter relationship as a “typical” policy approach because it describes the empirically observed response of monetary policy to inflation expectations.

With these estimated causal parameters, we can further decompose changes in the 1y4y inflation swap rate into the underlying inflation shock (i.e., how much inflation expectations would have risen if the Fed had followed a typical approach to policy) and the effects of policy changes that diverged from a typical policy response.

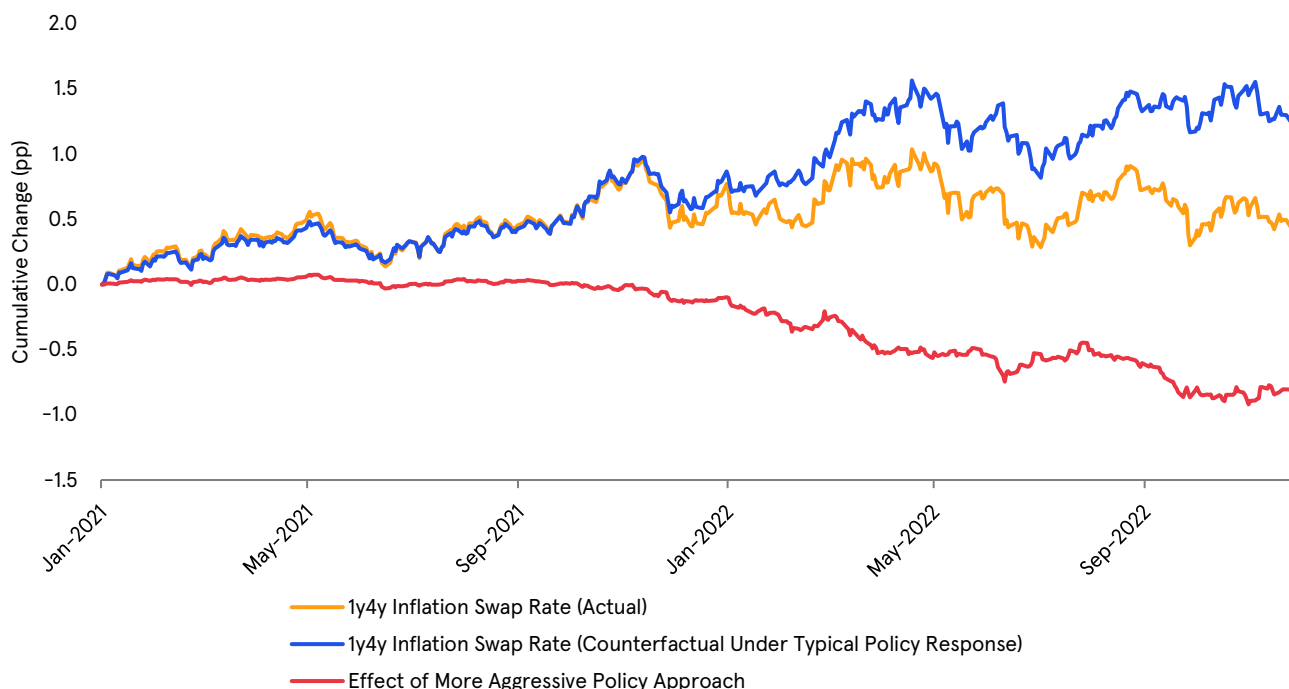
This decomposition facilitates a counterfactual analysis: What would inflation expectations have been if the Fed had pursued an approach to tightening more in line with recent cycles?

Figure 4 presents the results of the decomposition. The orange line represents the changes over time to actual inflation expectations, corresponding to the orange line in Figure 1 after rebasing it to 0.0% starting in January 2021. The blue line represents our estimate of the inflation expectations that would have transpired if the Fed had followed a more typical policy path, and the red line reflects the impact of the Fed’s policy innovations on those inflation expectations.

This chart suggests that the Fed’s shift to a more hawkish policy approach in early 2022 restrained inflation expectations substantially. In effect, after entering 2022 with an overly accommodative policy, the FOMC quickly made up ground by shifting to an aggressive tightening cycle. This shift kept inflation expectations approximately 75 bps lower than they would have been under the typical policy response.

Figure 4: Counterfactual Decomposition of Changes to Medium-Term Inflation Expectations

(Jan 2021–Nov 2022)



Sources: Bloomberg; the D. E. Shaw group. Applicable data are used with permission of Bloomberg.

Conclusion

Although the Fed initially appeared surprised by accelerating inflation, it soon embarked on a notable hawkish shift in the pace of monetary policy tightening. In this piece, we demonstrate that this shift was critical in keeping inflation expectations moored, and we attempt to quantify the effect of that shift. Absent this, inflation expectations may well have become unanchored, with potentially substantial effects on asset prices and correlations.⁴

Inflation expectations depend upon a number of volatile macroeconomic variables, and we expect the paths of both realized and anticipated inflation will fluctuate in the months to come, warranting ongoing assessment. To that end, we believe this approach could be helpful in monitoring the underlying inflation pressures to which the Fed is reacting and the effects of monetary policy innovations on inflation prospects.

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⁴ We've previously analyzed the effect of inflation on asset class correlations in "[Positively Negative: Stock-Bond Correlation and Its Implications for Investors](#)" and "[Revisiting Stock-Bond Correlation](#)."

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