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Abstract

This paper provides evidence that inflation targeting delivered anchored inflation expectations during the post-2020 inflation surge. Using a macroeconomic model, we illustrate how long-term nominal interest rates respond to an unexpected burst of inflation under both anchored and unanchored inflation expectations. We then evaluate these predictions using high-frequency financial market data from nine advanced economies and illustrate three main findings. First, inflation expectations embedded in asset prices were just as well, or in some countries better anchored, after the pandemic. Second, this favorable outcome was broadly accompanied by perceptions of an aggressive monetary policy response to above-target inflation. And, third, the stability of longer-term inflation expectations greatly improved labor market outcomes during disinflation, contributing to much smaller sacrifice ratios relative to the 1970's and 80's.

JEL Classification: E32, E52

Keywords: Monetary Policy, Inflation Expectations, COVID

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1 Introduction

The aftermath of the COVID-19 pandemic brought about the highest rates of inflation in advanced economies since the 1980's. However, unlike the high inflation of the 1980's, advanced economy central banks have since adopted inflation targeting frameworks, complemented by numerical inflation targets. When facing significant inflationary pressures, economic theory suggests that an inflation targeting framework delivers better macroeconomic outcomes by keeping inflation expectations well anchored. This paper studies whether inflation targeting worked as intended to keep inflation expectations from drifting amid the large inflation surge brought on by the COVID-19 pandemic and its aftermath.

Our paper begins with a simple macroeconomic model which informs and disciplines our empirical approach. The model features an inflation-targeting central bank in an environment where the inflation expectations of price-setting firms can be either anchored or unanchored. If anchored, long-term inflation expectations are determined solely by the central bank's target. If unanchored, long-term inflation expectations can drift with realized inflation. In the model, we generate longer-term nominal bonds and show how they react to a burst of inflation in both the anchored and unanchored inflation expectations regimes. The key prediction from the model is that returns on far-forward nominal assets become much more sensitive to inflation news when expectations are unanchored. Importantly, we show that unanchoring could be detected in longer-term nominal bonds even if there are simultaneous changes to the composition of shocks or the central bank's reaction function.

With this model prediction in hand, we empirically evaluate the degree of anchoring in nine advanced economies during the post-pandemic surge in inflation. For each country, we study the high-frequency response of far-forward nominal compensation to inflation data releases. Based on this test of anchoring, we find that longer-term inflation expectations were just as well, or in some countries better anchored, after the pandemic. The robustness of this finding across countries is somewhat remarkable given the differing initial conditions prior to the pandemic. For example, regardless of whether an economy experienced above- or below-target inflation before the onset of the pandemic, empirical evidence suggests that all countries in our study emerged from this inflationary episode with well anchored expectations. This evidence also suggests that cross-country differences in the implementation of inflation targeting, such as the use of point targets versus a range for inflation or the presence of other mandates, did not affect the performance of inflation targeting in delivering anchored inflation expectations.

We complement these empirical results with analysis as to how perceptions of central bank reaction functions shifted following the pandemic. This analysis connects our paper with other recent research documenting shifts in the Federal Reserve's perceived reaction function after 2020. As in Bocola et al. (2024), we find that the Fed was initially perceived as less reactive to inflation following the adoption of the Flexible Average Inflation Targeting (FAIT) framework in August 2020. We also find that as inflation climbed above target, the Federal Reserve was perceived as becoming more aggressive in combating inflation, consistent with work from Bauer, Pflueger and Sunderam (2024).

However, our analysis shows that the same pattern holds for other advanced economy central banks which did *not* change their inflation-targeting frameworks. In particular, financial market participants perceived most central banks in our sample as becoming less responsive to inflation after August 2020. Then, as inflation increased, these perceptions changed and expectations for short-term policy rates became more responsive to inflation. This cross-country evidence suggests that the Federal Reserve's adoption of FAIT and new strategy did not result in the Fed falling behind the curve, at least not more so than other central banks. Instead, our empirical evidence suggests that the Fed was like many other central banks in initially interpreting inflationary pressures early in the pandemic recovery as transitory but then responding more aggressively as inflation moved further from target.

Finally, we return to our theoretical model to quantify the labor market benefits of maintaining well anchored inflation expectations. Unlike prior disinflations, in virtually all countries, inflation fell following the post-pandemic inflation surge with very little increase in the unemployment rate. Put differently, the so-called sacrifice ratio, which we define as the average quarterly increase in the unemployment rate needed to reduce inflation by one percentage point, was much lower than prior estimates based on historical disinflations predicted. Using our theoretical model, we show that well-anchored inflation expectations were an important factor in bringing about the low sacrifice ratios observed during the post-pandemic disinflation. In particular, using counterfactual experiments, we show that without well anchored inflation expectations, central banks would have faced much worse tradeoffs with either higher inflation or higher unemployment.

2 Related Research

A substantial body of research studies the potential benefits that can accrue to society from having well-anchored inflation expectations (Bernanke et al., 1999). Textbook macroeconomic models suggest that firmly anchored inflation expectations can reduce the extent of above-target inflation in response to inflationary shocks and minimize the cost of disinflation. Orphanides and Williams (2004) shows that macroeconomic performance improves considerably when private-sector inflation expectations are anchored at the central bank's inflation target. Empirical work generally finds that, in practice, central banks can reap these gains by communicating a numerical inflation target. Most directly related to our work, Gürkaynak et al. (2007), Gürkaynak, Levin and Swanson (2010), Beechey, Johannsen and Levin (2011), and Bundick and Smith (2025) use cross-country evidence to show that, with few exceptions, communicating a numerical inflation target indeed made financial market measures of inflation expectations more stable in response to inflation surprises. These conceptual benefits, as well as the apparent success of inflation-targeting frameworks in practice, provide some rationale why inflation targeting became the predominant framework for central banks to achieve their price-stability mandates in the decades before the pandemic.

However, the surge in inflation following the COVID-19 pandemic was a stark break from the decades of inflation stability that preceded the pandemic. Our paper therefore builds directly on this prior work using similar methodologies to examine how inflation targeting performed under these more extreme inflationary conditions. Our results indicate that inflation targeting appears to have performed well in terms of preventing inflation expectations from drifting amid the large COVID-19 inflation surge.

Our paper is also related to another line of research examining the factors behind the post-2020 surge in inflation. Bernanke and Blanchard (2024) provide a particularly thorough analysis of the forces that drove up inflation across advanced economies, concluding that it was initially driven by relative price shocks but inflation persisted as labor markets tightened. Bernanke and Blanchard therefore suggest that an unanchoring of inflation expectations was not behind the rise in inflation, contrasting this episode from the 1970's.

Other research more directly attributes the COVID-19 surge in inflation to the conduct of monetary policy, particularly in the United States. Cieslak, McMahon and Pang (2024) argue that the Fed's August 2020 revamp of its monetary policy strategy and subsequent communications increased uncertainty about the Fed's reaction to inflation in the minds of

the public. Orphanides (2024) documents deviations of interest rates in 2021 from historical policy rules may have contributed to the subsequent rise in inflation. Similarly, Romer and Romer (2024) argue that the Fed was slow to respond to rising inflation following the adoption of its new framework. Bocola et al. (2024) provide high-frequency financial market evidence to that effect, by showing that long-term nominal interest rates became less responsive to long-term inflation compensation after 2020, which they link to a reduction in the Federal Reserve's response to inflation following the adoption of FAIT. In contrast, Bauer, Pflueger and Sunderam (2024) show that in 2022, as inflation climbed further from target and the FOMC started to increase interest rates, the Federal Reserve was perceived as becoming much more responsive to inflation.

Among these works, our paper is most closely related in terms of methodology to Bocola et al. (2024) and Bauer, Pflueger and Sunderam (2024). However, our paper differs in the use of cross-country data from eight other inflation-targeting central banks as well as our focus on the degree to which financial markets perceived inflation expectations to be well anchored. As discussed in the Introduction, our findings echo the results of this prior research in terms of finding multiple shifts in the Fed's perceived reaction to inflation after 2020. However, we document similar shifts across many other central banks, suggesting that global and pandemic-related factors may explain the perceived shifts in reaction functions rather than the Fed's adoption of a new monetary policy strategy. Our analysis on the anchoring of inflation expectations further underscores that although financial markets perceived central banks to be less responsive to inflation early in the pandemic-inflation surge, a subsequent increase in responsiveness was largely sufficient to keep inflation expectations from unanchoring as inflation climbed further from target.

3 Testable Predictions in a Theoretical Model

Our goal is to empirically test whether long-term inflation expectations were well anchored following the COVID-induced inflation surge. In this section, we use a theoretical model to illustrate some testable predictions that an econometrician could implement to uncover if longer-term inflation expectations become unanchored. The framework below draws heavily from prior work in Ireland (2007), Bundick and Smith (2025), and Bundick and Petrosky-Nadeau (2026) but also includes some additional shocks to help capture inflation and unemployment dynamics during the COVID-induced inflation surge. For expositional purposes, the main text of the paper presents a condensed summary of the model. We provide additional details of our theoretical model and its calibration in the Appendix.

3.1 Longer-Term Inflation Expectations

In the model, longer-term inflation expectations can either be anchored at the central bank's target or they can be unanchored and drift with realized inflation outcomes. The following equation captures this idea:

$$\pi_t^{LT} = \rho^{\pi}\pi_{t-1}^{LT} + \Big(1-\rho^{\pi}\Big)\pi^{*} + \delta^{\pi}\Big(\pi_t - \mathbb{E}_t\pi_{t-1}\Big), \tag{1}$$

where π_t^{LT} is the long-term inflation expectation in period t, π_t is the inflation rate, and π^* represents the central bank's inflation objective. The coefficient δ^{π} determines the degree to which long-term inflation expectations are anchored. If $\delta^{\pi} = 0$, then long-term inflation expectations are fully anchored meaning they are invariant to realized inflation and longer-term expectations coincide with the central bank's target. If instead $\delta^{\pi} > 0$, then inflation expectations are unanchored and drift with realized inflation. If $\delta^{\pi} > 0$, the parameter $0 \leq \rho^{\pi} \leq 1$ determines the persistence of the fluctuations in longer-term expectations in response to unexpected changes in current inflation.[1]

3.2 Households

Our model features a representative household in which a fraction N_t of its members work H_t hours on the job at an hourly wage W_t. A fraction U_t of the household are unemployed and search for work. The representative household chooses consumption C_t and holdings of the one-period nominal bond B_{t+1} to maximize its lifetime utility:

$$\max \mathbb{E}_t \sum_{i=0}^{\infty} a_{t+i}\,\beta^i \left\{ \frac{C_{t+i}^{1-\sigma}}{1-\sigma} + \nu_0 \frac{(1-H_{t+i})^{1-\nu_1}}{1-\nu_1} N_{t+i} + \nu_u\, U_{t+i} \right\}$$

subject to its budget constraint each period:

$$C_t + T_t + \frac{B_t}{P_t R_t} = \frac{B_{t-1}}{P_t} + W_t\, H_t\, N_t + b\, U_t + D_t,$$

where β represents the household discount factor. The parameters $\sigma > 0$, $\nu_0 > 0$ and $\nu_1 > 0$ affect the intertemporal elasticity of substitution and the disutility of hours worked relative to the total amount of time available each period (which we normalize to 1). ν_u affects the utility of non-employment and b denotes unemployment benefits. a_t is an exogenous preference shock which causes unexpected fluctuations in household demand. Finally, R_t denotes the gross nominal interest rate, T_t denotes lump-sum taxes which fund unemployment benefits, and D_t denotes dividends from owning shares in the wholesale and retail firms.

[1] In this paper, we remain agnostic about the microfoundations of Equation (1) and instead focus on the testable implications if inflation expectations become unanchored. Previous work by Ireland (2007), Gürkaynak, Sack and Swanson (2005), Rudebusch and Wu (2008), and Rudebusch and Swanson (2012) also use similar specifications in modeling longer-term inflation expectations.

3.3 The Labor Market and Wholesale Sector

Firms in the wholesale sector hire workers in a labor market subject to search frictions. They post job vacancies V_t to attract job seekers. Employed workers experience exogenous separation shocks which occur at a time-varying rate s_t each period. These exogenous separation shocks help the model capture the sudden increase in unemployment during the COVID pandemic. Each vacant position costs κ_t units of final output per unit of time. The firm fills vacancies with a constant returns to scale matching function. We define labor market tightness as $\theta_t \equiv V_t/U_t$ and the probability of filling a vacancy per unit of time as $q(\theta_t)$. Thus, $q(\theta_t)V_t$ denotes the number of new hires and overall employment N_t evolves as follows:

$$N_{t+1} = (1 - s_t)N_t + q(\theta_t)V_t. \tag{2}$$

The wholesale goods-producing firms produce with a production technology $X_t N_t H_t^{\alpha}$ where H_t denotes hours worked per worker, $\alpha \in (0, 1)$ is a parameter capturing diminishing returns to additional hours, and X_t is aggregate productivity subject to exogenous fluctuations. Firms sells their output at unit price ψ_t.

Keeping with much of the literature, we assume workers and firms engage in bilateral Nash bargaining over hours and wages. The Appendix of Bundick and Petrosky-Nadeau (2026) shows that the Nash bargained wage can be expressed as compensation per worker $W_t H_t$:

$$W_t H_t = \eta \left[\psi_t X_t H_t^{\alpha} + \kappa_t \theta_t\right] + (1 - \eta) Z_t, \tag{3}$$

where $\eta \in (0, 1)$ is the worker's relative bargaining weight. Z_t captures the worker's reservation wage as a function of unemployment compensation b and the change in flow utility from employment compared to remaining unemployed.[2]

3.4 Retail Goods Producers

A continuum of firms in the monopolistically-competitive retail goods sector each produce a differentiated product $Y_t(j)$ using the homogeneous wholesale good as input. ω_t denotes the elasticity of substitution among the differentiated retail goods, which is subject to exogenous fluctuations. Increases in ω_t act as inefficient markup shocks which help the model capture the increase in inflation caused by the pandemic-induced disruptions in supply chains. Firm

[2]See the Appendix for the full description of Z_t.

j faces a quadratic cost to adjusting its nominal price $P_t(j)$:

$$\frac{\Omega}{2}\left[\frac{P_t(j)}{\Pi_t^{LT} P_{t-1}(j)} - 1\right]^2 Y_t,$$

where $\Pi_t = P_t/P_{t-1}$, $\Pi_t^{LT} = \exp(\pi_t^{LT})$ is the gross rate of long-term inflation expectations, Ω governs the magnitude of the adjustment costs, and Y_t is the final output good. An aggregation sector purchases each intermediate good $Y_t(j)$ with price $P_t(j)$ and aggregates the differentiated retail goods into output of the final consumption good Y_t.

3.5 Monetary Policy

The central bank in the model sets its short-term nominal policy rate R_t to minimize deviations of inflation relative to long-term expectations and fluctuations in unemployment:

$$\log\Big(R_t\Big) = \phi_\pi \log\Big(\Pi_t/\Pi_t^{LT}\Big) + \phi_u\Big(U_t - U\Big) + \sigma^r \varepsilon_t^r, \tag{4}$$

where $\phi_\pi > 1$ and $\phi_u \leq 0$ capture the central bank's responses to inflation and unemployment deviations while U denotes the steady-state unemployment rate. Similar to Gürkaynak, Sack and Swanson (2005), we assume the central bank responds to deviations from long-term expectations rather than its target Π^*, even if a target has been announced.[3] While we remain agnostic as to why the central bank would allow expectations to drift, policymakers could perceive the costs of driving inflation back to target as larger than the benefits or lack commitment (Afrouzi et al., 2026). The policy rule also includes an exogenous monetary policy shock ε_t^r with volatility σ^r, which we use later in the paper to conduct counterfactual experiments.

3.6 Equilibrium and Aggregation

In a symmetric equilibrium, all retail-goods producing firms make identical decisions ($Y_t(j) = Y_t$ and $P_t(j) = P_t$). Households hold all the shares in the retail and wholesale firms and the nominal bond is in zero net supply. After aggregation, we can write the aggregate production function and national income identify as follows:

$$Y_t = X_t N_t H_t^\alpha, \tag{5}$$

$$Y_t = C_t + \kappa_t V_t + \frac{\Omega}{2}\left(\frac{\Pi_t}{\Pi^{LT}} - 1\right)^2 Y_t. \tag{6}$$

[3] If instead the central bank responds to deviations from its target, Equation (1) plays no meaningful role in shaping inflation dynamics.

Thus, search frictions in the labor market through vacancy postings and nominal rigidities cost real economic resources. Under the assumption of full participation in the labor market, we can write the unemployment rate as:

$$U_t = 1 - N_t. \tag{7}$$

3.7 Shocks, Solution, and Estimation

To capture the full range of economic dynamics during and after the pandemic, the model features five exogenous shocks (demand, productivity, monetary policy, employment separations, and markup) which all follow standard, first-order autoregressive processes. We calibrate the model to monthly frequency and solve the model with a first-order approximation around the deterministic steady state. In the Appendix, we provide additional details on the calibrated and estimated parameters of the model and illustrate the model impulse responses to each shock. For the rest of this section, we simply use the estimated model to illustrate some testable predictions that an econometrician could implement to uncover if longer-term inflation expectations become unanchored.

3.8 Testable Predictions of Unanchoring Expectations

Figure 1 shows the effects of an unexpected increase in household demand under both anchored and unanchored inflation expectations. For the case of unanchored inflation expectations, we set $\delta^{\pi} = 0.05$ while $\delta^{\pi} = 0$ under the assumption of anchored expectations.[4] For illustration purposes, we pick the size of the demand shock such that it generates a 50 basis-point surprise in annualized inflation under anchored inflation expectations.

Under anchored expectations, the increase in demand results in a short-lived increase in inflation. However, if longer-term expectations drift, the unexpected inflation today causes expectations about future inflation to move higher resulting in a highly persistent inflationary episode. As implied by Equation (1), these responses highlight that the correlation between longer-term inflation expectations and unexpected inflation can be informative about the degree of anchoring. An arithmetic manipulation of Equation (1) provides intuition on how

[4]This value of $\delta^{\pi} = 0.05$ under unanchored inflation expectations is consistent with the pre-COVID empirical evidence for Norway and Japan, which we present later in the paper. In both countries we find evidence that longer-term inflation expectations drifted with news about inflation prior to the onset of the COVID pandemic. We set $\rho^{\pi} = 0.995$ which generates persistent but ultimately temporary movements in longer-term inflation expectations following a shock. This calibration of ρ^{π} is very close to the drifting inflation target specifications of Rudebusch and Swanson (2012) or Gürkaynak, Sack and Swanson (2005).

an econometrician could estimate δ^{π} using a high-frequency event-study approach. Taking expectations of Equation (1) at time $t-1$ and subtracting it from Equation (1) delivers the expression:

$$\pi_t^{LT} - \mathbb{E}_{t-1}\pi_t^{LT} = \delta^{\pi}(\pi_t - \mathbb{E}_{t-1}\pi_t), \tag{8}$$

where the left-hand side measures revisions to long-term inflation expectations, the right-hand side captures the news about current inflation revealed between time $t-1$ and t, and the coefficient δ^{π} governs how that inflation news affects long-term inflation expectations. Equation (8) suggests that we can estimate δ^{π} by regressing the change in long-term inflation expectations on the surprise or unexpected component of domestic inflation data releases. A positive and statistically significant δ^{π} suggests that inflation expectations are unanchored and drift with realized inflation outcomes.

In practice, directly estimating Equation (8) is not feasible since longer-term inflation expectations are unobserved, at least at a high frequency. Therefore, following the approach of prior research, we proxy the revisions to long-term inflation expectations using the one-period change in far-forward nominal compensation in financial markets. Ideally, we prefer to use far-forward inflation breakevens —measured as the difference between nominal and inflation-indexed government bonds (such as the TIPS market in the US) — to infer changes in longer-term inflation expectations.

However, most countries in our study do not have an active inflation-linked debt market, therefore, we often rely on far-forward nominal interest rates. While these yields have both a nominal and real component, we can assume that the primary information revealed around an inflation release would inform inflation expectations rather than far-forward real yields. Following Gürkaynak, Sack and Swanson (2005), we demonstrate this idea in our macroeconomic model by showing that we can infer changes in δ^{π} by estimating a version of Equation (8) using high-frequency changes in either model-generated 10-year (120-month) forward inflation breakevens (π_t^{120}) or 10-year nominal forward rates (r_t^{120}),

$$\pi_t^{120} - \pi_{t-1}^{120} = d^{\pi}(\pi_t - \mathbb{E}_{t-1}\pi_t), \tag{9}$$

$$r_t^{120} - r_{t-1}^{120} = d^{r}(\pi_t - \mathbb{E}_{t-1}\pi_t), \tag{10}$$

where d^{π} and d^{r} reflect the empirical proxies for the true underlying δ^{π} that we can estimate in the actual economy. The middle row of Figure 1 highlights the responses of these forward rates to the unexpected increase in demand. The results suggest that, even without ideal measures of inflation expectations, breakeven inflation rates or nominal forward rates can be

informative about the underlying parameter δ^{π}.

We now show that, even in a small sample of the size we will encounter in our empirical COVID samples, high-frequency regressions of the form in Equations (9) and (10) could recover changes in δ^{π} *if they occurred*. For this experiment, we first assume that, with the adoption of an inflation targeting framework, the central bank was able to anchor expectations. Thus, we set $\delta^{\pi} = 0$ and simulate the resulting economic outcomes using all five exogenous shocks for 111 monthly periods (the length of our pre-COVID empirical sample for the US). Then, we assume that the COVID-induced burst of inflation causes inflation expectations to become unanchored ($\delta^{\pi} = 0.05$) for the next 45 periods. Table 1 shows the estimates of a high-frequency regressions using Equations (8), (9), and (10) across these two sample periods as well as a formal break test in the δ^{π}, d^{π}, or d^{r} coefficient.

Even without perfectly observing longer-term inflation expectations, Table 1 shows that an econometrician could detect a change in the degree to which inflation expectations are well anchored if such a change occurred. The first set of columns shows that, if we could perfectly observe longer-term inflation expectations, then we could exactly recover the true value δ^{π} and detect a break in the coefficient even in a short sample period of only 45 observations. More importantly, the second and third sets of columns show that formal break tests also detect the unanchoring even using an imperfect measure of longer-term inflation expectations. These results shows that these high-frequency regressions can be useful to assess changes in the degree of anchoring over time even in small samples.

In the Appendix, we additionally show that an econometrician would still correctly identify a break in the degree of anchoring even if the economy experienced other structural changes at the same time. For these exercises, we continue to assume that inflation expectations become unanchored after 111 periods but we also simultaneously either increase or decrease the central bank's reaction coefficient to inflation in its policy rule or change the composition of shocks hitting the economy. Under either scenario, an econometrician still correctly finds evidence of a break in Equations (8), (9), and (10). These results suggest that the relationship between inflation surprises and far forward breakevens or nominal rates remains informative about the degree of anchoring even if other policy parameters change at the same time.

4 Empirical Analysis of Inflation Targeting During the COVID-19 Inflation Surge

Building on the predictions of our model, we now turn to financial market data to measure the degree of anchoring across advanced economies pre- and post-pandemic. Despite numerous differences across the economies we study, a common finding emerges from our analysis of inflation-targeting central banks: Inflation expectations appear to be just as well or, in some cases, better anchored following the COVID-19 inflation surge. We first review the panel of countries we study and briefly summarize some of the differences across each central bank's approach to inflation targeting before presenting our estimates of the degree of anchoring before and after the COVID-19 inflation surge.

4.1 Sample Selection and Data

Our sample of economies consists of nine advanced-economy inflation targeting central banks.[5] The economies we study were selected based on three criteria: (1) Their central banks follow some form of an inflation targeting framework with a numerical inflation target, (2) There is a sufficiently liquid financial market instrument to measure forward nominal interest rates or inflation compensation in the domestic economy at a daily frequency, and (3) There is a sufficiently large Bloomberg panel of forecasters which submit forecasts for domestic inflation releases. The following countries meet our criteria:[6]

1. US: United States
2. UK: United Kingdom
3. JP: Japan
4. CA: Canada
5. SE: Sweden

[5]Many emerging market economies also follow inflation-targeting frameworks. However, exchange rate considerations and capitals flows are more prominent for many emerging market economies, and the degree of central bank credibility and independence varies considerably across emerging market central banks. Recent work by Bocola et al. (2025) addresses some of these issues.

[6]One notable exception not included in our analysis is the Euro Area. The ECB has an explicit inflation targeting framework and there is a large panel of Bloomberg forecasters which submit forecasts for Euro Area inflation; however, there is no financial market instrument over a sufficiently long sample to measure forward nominal interest rates or forward inflation compensation across the Euro Area.

6. CH: Switzerland

7. NO: Norway

8. AU: Australia

9. NZ: New Zealand

All the central banks in our sample follow an inflation-targeting framework with a numerical target in the vicinity of 2 percent. However, the details of their frameworks differ considerably from one another. Table 2 provides a high-level summary of the differences that underlie each central bank's inflation targeting framework. For example, the 2 percent targets differ in terms of whether 2 percent represents a point target, the center of a range, or if 2 percent is a ceiling or floor on desired inflation outcomes. Moreover, these central banks often have other objectives in addition to inflation. Of the nine central banks we study, only the Bank of Japan is a single-mandate central bank with the sole remit being price stability. Instead, the majority of countries in our sample take a "flexible" approach to inflation targeting to allow for temporary and modest deviations of inflation from target in order to accommodate other considerations, such as employment or economic growth. The importance of these other mandates varies across countries. For some central banks, price stability is elevated among other considerations whereas, for other central banks, price stability is given equal importance to other mandates.

Despite these differences in inflation targeting frameworks, the commonality of the inflation surge after 2020 led to a shared focus on restoring price stability across all of these inflation-targeting central banks. Figure 2 documents the often-cited fact that the post-2020 inflation surge marked the highest inflation rates in decades. Table 3 further quantifies the extent to which inflation exceeded each central bank's respective inflation target. Prior to 2020, central banks were generally effective at delivering inflation near their targeted level. This apparent success was challenged in the aftermath of the pandemic. Inflation around the world peaked somewhere between 3.4 percent (Switzerland) to as high as 10.2 percent (Sweden).[7]

[7]Japan is a bit of an outlier in that inflation was running persistently below target before 2020 despite considerable efforts from the Bank of Japan to raise inflation to 2 percent. As we will see in our empirical analysis, unlike all the other central banks we study, the increase in inflation in Japan following the pandemic was largely accommodated by the Bank of Japan after years of below-target inflation.

In the following section, we empirically test how well inflation targeting performed in anchoring inflation expectations in the face of persistently high inflation. As in our model in Section 3, our empirical measure of anchoring is the estimated sensitivity of long-term nominal forward compensation to inflation news. Before presenting our findings, we briefly discuss the construction of the data used to test the degree of anchoring. More complete details of the data for each country are listed in Table 4.

For most countries, the nominal forward rate measure is based on implied forward rates across sovereign (zero-coupon) yield curves. Only the United States and the United Kingdom have actively traded inflation-protected securities, which is our preferred and more direct measure of inflation expectations priced into financial markets.[8] However, our model predictions in Section 3 underscore that nominal forward interest rates, as well as forward inflation compensation, will become more responsive to inflation news when inflation expectations are not well anchored.[9] We most often work with the 1-year, 9-year forward horizon which is sufficiently long to ensure that persistent inflation shocks fade. Though, in some cases, data limitations led us to work with 3-year, 7-year forward rates or 5-year, 5-year forward rates.

We interpret the model analogue of inflation news, defined in our model as "unforecasted" inflation, as the surprise component of domestic inflation releases. The inflation surprises are constructed as the difference between the as-reported inflation number and the median forecast across the panel of Bloomberg forecasters.

We select the inflation release to study based on the number of forecasts submitted to ensure sufficient survey coverage and to maximize the amount of inflation news. For most countries, this implies that year/year inflation is used to measure the inflation surprise based on survey coverage, even though month/month inflation would provide greater (marginal) news content. Similarly, core measures of inflation that exclude volatile energy and food prices would be preferred to maximize the signal of the surprise for underlying inflation dynamics. However, in several instances, headline inflation measures have broader survey coverage and allow for an earlier start to the estimation sample. We also note that the

[8]For the UK, these gilts are linked to the retail prices index (RPI), which is not the measure we study for the inflation surprise due to the lack of survey coverage. Since the RPI and CPI data are released on the same day in the UK, we chose to work with nominal forward gilt yields for that country.

[9]This result builds on work by Gürkaynak, Sack and Swanson (2005) who also study the response of longer-term interest rates to economic news and demonstrate that, in standard models, less than perfectly anchored inflation expectations can drive movements in far-forward interest rates.

inflation surprise measure may not necessarily align with the inflation rate targeted by the central bank. For example, in the US, the Federal Reserve has specified its target for inflation in terms of inflation measured by the personal consumption expenditures (PCE) price index. However, data on the consumer price index (CPI) is released well-ahead of the PCE data and contains much of the same price information. Therefore, the majority of "inflation news" in the United States is concentrated in the CPI release.[10]

By construction, these inflation surprises are (ex-ante) unforecastable, and therefore are orthogonal to far forward nominal interest rates and inflation compensation prior to the inflation release. Therefore, in the regression analysis that follows, we study the one-day change in long-term nominal forward compensation on the day of these domestic inflation releases to measure the effect of inflation news on longer-term inflation expectations.[11]

4.2 Estimates of Anchoring Across Advanced Economies

We empirically measure the degree to which inflation expectations remained anchored by estimating the sensitivity of longer-term nominal compensation to inflation news. We measure this sensitivity empirically by regressing the one-day change in nominal forward compensation on the surprise component of domestic inflation releases:

$$\Delta y_t^{10yr,forward} = \delta^0 + \delta^\pi \, \pi_t^{surprise} + \varepsilon_t, \tag{11}$$

where $y_t^{10yr,forward}$ is a measure of long-term nominal forward compensation always based on a 10-yr tenor, $\pi_t^{surprise}$ is the surprise component of the economy's inflation release based on Bloomberg forecasts, and ε_t is a regression residual. We estimate Equation (11) on the days that the domestic price data is released, country by country, using OLS. Inference is based on heteroskedasticity-robust standard errors. The estimated coefficient, denoted by $\widehat{\delta^\pi}$, is our measure of the the sensitivity of nominal forward compensation to inflation news and, hence, is our empirical measure of anchoring. We estimate the degree of anchoring in split samples, pre-COVID and during the COVID period inflation surge.

[10] Moreover, the Treasury Inflation Protected Securities we use to measure forward inflation compensation in the United States are indexed to CPI rather than PCE.

[11] This also requires that the inflation surprise does not reveal information on long-term real fundamentals. This is one reason we prefer to focus on inflation releases as opposed to other popular data releases, such as employment or GDP releases which are more likely to contain information about trends in real variables and future productivity.

Figure 3 shows our first empirical result, that across economies longer-term inflation expectations remained just as well, or even better anchored during the COVID-19 inflation surge. The chart shows estimates of δ^{π} from Equation (11) over the pre-COVID sample in blue circles and the COVID period in red squares.[12] The vertical whiskers denote 90 percent confidence intervals. For each country, the COVID sample confidence intervals include zero, indicating no statistically significant evidence of pass through from inflation surprises to longer-term nominal forward compensation. By this measure, the COVID sample estimates indicate that inflation expectations were well anchored during the COVID inflation surge.

Our COVID samples are small which could lead to wide confidence bands and low power to reject the hypothesis that $\delta^{\pi} = 0$. While our model simulations in Section 3 suggest that we should be able to detect an increase in δ^{π} if one occurred, even in a small sample, there could be factors outside of our theoretical model that make the actual data noisy and the estimates less precise. Nevertheless, we should still observe an increase in the point estimates of δ^{π} if expectations became unanchored. However, Figure 3 shows there is little evidence of a uniform increase in the point estimates of δ^{π} during the COVID period. Only in four of the nine countries is the COVID estimate of δ^{π} larger than the pre-COVID estimate, and only meaningfully higher in Switzerland (CH). Perhaps most striking is the indication that in some countries inflation expectations became better anchored. For example, the point estimate of δ^{π} declined from pre-COVID to the COVID sample in five of the nine countries we study.

We use structural break tests to more formally measure how the sensitivity of long-term nominal compensation changed during the COVID inflation surge. Table 5 shows results of a Chow (1960) test for a change in the coefficient δ^{π} with the candidate break date specified for most countries when inflation breached the central bank's target.[13] We implement the break test with a COVID period inflation dummy that is interacted with the inflation surprises. The results in Table 5 show the estimated coefficient δ^{π}_{COVID} from the following regression model, estimated over the full sample for each country:

$$\Delta y_t^{10yr,forward} = \delta^0 + \delta^0_{COVID} + \delta^{\pi}\, \pi_t^{surprise} + \delta^{\pi}_{COVID}\, \pi_t^{surprise} \times \mathcal{I}_{COVID} + \varepsilon_t. \tag{12}$$

The results of these break tests suggest that in no economy did inflation expectations become unanchored during the COVID inflation surge. In fact, in some economies, we

[12] The start of the pre-COVID period is determined by country-specific details of their inflation targeting regime and the availability of data. The pre-COVID period ends for all countries except Japan when inflation climbed above the central bank's target. See Table 4 for details on the sample dates.

[13] The breakdate for Japan is set to when inflation moved into positive territory.

find evidence that inflation expectations became *better* anchored during the COVID period. In the United Kingdom, Japan, and Norway, there is evidence that inflation expectations were not especially well anchored before the pandemic; the estimate of δ^{π} is positive and statistically significant in the pre-COVID period. However, we estimate a decline in δ^{π} in all three countries after mid-2021. While the evidence of a decline in the δ^{π} coefficient is not statistically significant, the decline in the point estimates nevertheless points to better — rather than worse — anchored inflation expectations by the end of 2024.

4.3 Sensitivity Analysis of Anchoring Results

Before turning to our interpretation of this finding, we show that the empirical results are largely insensitive to a number of reasonable changes in the regression specification. First, we examine an alternative breakdate, set universally across countries to March 2020 which more closely marks the global start of the pandemic. Second, we control for energy price changes to account for the fact that energy prices have been linked to market-based measures of inflation compensation by prior research (Hammoudeh and Reboredo, 2018; Perez-Segura and Vigfusson, 2016; Elliot et al., 2015). Moreover, some of the countries we study are significantly exposed to energy prices, either because energy is a large share of national economic activity (e.g. Norway) or through a large foreign energy dependence. And third, we examine the sensitivity of our estimate of δ^{π} to outliers by estimating the regression model using LAD rather than OLS. Table 6 presents the results of these sensitivity analysis for each country.

The durability of the inflation anchor amid the COVID-19 inflation surge is a fairly robust empirical finding across 8 of the 9 economies we study. Switzerland is the only country whose anchoring results are somewhat sensitive to these perturbations. Focusing on Switzerland, the estimate of δ^{π} is not statistically significant in the COVID sample in the baseline regression model, nor is it significant in any of the three alternative regression specifications. However, the estimates and statistical significance of the break in δ^{π} post-pandemic depend somewhat on the specification. Specifically, the increase in the estimate of δ^{π} is not statistically significant in the baseline specification, the universal breakdate specification, nor in the LAD regression specification that is less sensitive to outliers. However, the increase in the estimate of δ^{π} during the COVID sample is larger and statistically significant in the regression specification that controls for energy price changes on the day of the release. An important caveat is that Switzerland has the shortest COVID sample (relative to the pre-COVID sample) due to the timing of when inflation breached the Swiss National Bank's 0-2

percent inflation band.[14] Therefore, it remains to be seen if these mixed signs of unanchoring in Switzerland survive over a slightly longer sample.

4.4 Comparing Our Estimates of Anchoring With Prior Research

Our empirical methodology is designed to study whether inflation expectations were anchored during the COVID-19 inflation surge. However, our regression specification builds directly on prior work that also sought to measure the degree to which longer-run inflation expectations were anchored by measuring the high-frequency responses of nominal forward compensation to data surprises. Moreover, several of the countries we examine in this paper were also studied in the previous literature, which provides an opportunity to compare our high-frequency regression results over the pre-pandemic period to prior estimates of anchoring.

For the United States, Gürkaynak, Levin and Swanson (2010) found that 1-year, 9-year forward inflation compensation responded to high frequency data releases prior to 2005, suggesting that longer-term inflation expectations were not especially well anchored. Beechey, Johannsen and Levin (2011) use inflation swaps data to similarly show that from 2003 to 2007 far forward inflation compensation responded to high-frequency data surprises. Bundick and Smith (2025) further show that 1-year, 9-year forward inflation compensation responded to CPI inflation surprises before 2012, but ceased to respond after 2012 which is when the Federal Reserve adopted its 2 percent numerical inflation target.[15] The results in this paper build on this prior work by providing evidence that inflation targeting has maintained its anchoring effect on longer-run inflation expectations in the United States.

Results for the U.K. were provided previously in Gürkaynak, Levin and Swanson (2010), which argues that long-term inflation expectations were well anchored after May 1997 when the Bank of England was granted operation independence from the Chancellor of the Exchequer. In particular, these authors find that from May 1997 through December 2005, far-forward inflation compensation (1-year, 9-year forwards) in the U.K. ceased to respond to RPIX (retail price inflation less mortgage interest payments) surprises. Our baseline results in Figure 3 and Table 5 however suggest that far forward nominal rates responded to

[14] Switzerland's COVID sample amounts to just 10% of the full sample, the smallest percentage for any country we study.

[15] Bundick and Smith (2025) also show that, by this measure, U.S. inflation expectations appeared to remain well anchored in the early years of the pandemic but their sample ended well before the totality of the inflation surge had been realized.

CPI surprises in the UK from January 2004 to May 2021. We attribute our contrasting results to the sample periods rather than the different measures of inflation surprises or far forward nominal compensation. In December 2003, the Chancellor of the Exchequer announced that the inflation target would subsequently be set in terms of CPI inflation and changed from 2.5 percent to 2 percent. However, as King (2004) noted, this effectively raised the inflation target by 25 basis points since RPIX had been running about 75 basis points above CPI, which may have called into question the stability of the central bank's inflation target. Our sample also includes the Global Financial Crisis as well as Brexit, the 2016 departure of the UK from the European Union, which resulted in a depreciation of the British pound and subsequent inflationary pressures that pushed inflation above target.

We perform additional analysis to verify our conjecture that inflation expectations became less well anchored in the U.K. between 2004 and 2021 and then more strongly anchored during the pandemic inflation surge. In particular, we estimate our regression model in Equation (11) using RPIX surprises instead of CPI surprises, which allows us to estimate the degree of anchoring back to September 1998. Table 7 shows resulting estimates of δ_π from September 1998 to December 2003, January 2004 to May 2021, and from June 2021 to December 2024. The results in Table 7 show that we can essentially match the findings from Gürkaynak, Levin and Swanson (2010) in so far as inflation expectations looked to be well anchored in the U.K. from 1998 through 2003. However, from 2004 through May 2021, the RPIX surprises confirm what we found with the CPI surprises in the baseline regressions, that inflation expectations were not as well anchored over the Pre-COVID sample. Finally, for completeness, the last column of Table 7 shows that the RPIX surprise specification also confirms the improved anchoring of U.K. inflation expectations in the COVID sample. Therefore, over similar samples, our results are broadly consistent with those reported in Gürkaynak, Levin and Swanson (2010) for the UK.

Gürkaynak, Levin and Swanson (2010) also provide evidence that inflation expectation in Sweden were well anchored before 2006. Coverage of our sample for Sweden begins in 2009, but we find evidence of continued anchoring in that country through the pre-pandemic period, and maintenance of that anchoring through the pandemic. Similarly, Gürkaynak et al. (2007) provides evidence that inflation expectations in Canada were fairly well anchored from 1998 to 2005. These authors show that domestic CPI data releases did not systematically influence far forward nominal interest rates or inflation compensation in Canada. Our pre-pandemic sample for Canada also begins in 1998, and our estimates for Canada in Figure 3 and Table 5 confirm that over a longer sample extending through early 2021,

longer-term inflation expectations in Canada were well anchored, extending the results previously reported in Gürkaynak et al. (2007).

Finally, for Japan, Bundick and Smith (2025) provide evidence that the Bank of Japan's (BOJ) announcement of a numerical 2 percent inflation target in 2013 did not anchor inflation expectations as of 2019. Our results here extend the sample period studied in this prior work and find evidence that expectations remained unanchored through early 2021 in Japan. However, the point estimates from Bundick and Smith (2025) suggest improved anchoring in Japan through 2019, albeit not statistically significant. Similarly, De Michelis and Iacoviello (2016) provided early evidence that the BOJ's efforts from 2013 were showing early signs of progress in stabilizing inflation expectations nearer to the Bank's target. The results in Figure 3 and Table 5 for the post May 2021 sample provide evidence that the BOJ's efforts have gained further traction in better anchoring inflation expectations in Japan. Though the break is not statistically significant, the point estimate for δ^{π} declines and is statistically insignificant in the COVID sample.

4.5 How Perceived Policy Reaction Functions Shifted

Our analysis of anchoring suggests that inflation targeting central banks were generally successful in preventing inflation expectations from unanchoring amid the COVID inflation surge. We now show that this favorable outcome was accompanied by perceptions of a more aggressive response of policy rates to inflation. In our model in Section 3, the responsiveness of the central bank to inflation deviations is determined by the parameter ϕ_{π} in the monetary policy rule in Equation (4).

While anchoring in our simple model is not explicitly tied to the responsiveness of monetary policy to inflation, other models with information rigidities have linked the degree of anchoring to the responsiveness of the central bank to deviations of inflation from target (Erceg and Levin, 2003; Orphanides and Williams, 2004; Jorgensen and Lansing, 2019; Beaudry, Carter and Lahiri, 2023). In other words, δ_{π} may depend on perceptions of ϕ_{π}. The analysis in this section therefore provides an interpretation for the perhaps surprising result that even central banks with less than perfectly anchored expectations before the pandemic emerged with well anchored expectations following the pandemic inflation surge. The analysis in this section also connects our research to other work that has documented shifts in the Federal Reserve's perceived responsiveness to inflation following the August 2020 framework change and subsequent inflation surge.

Our regression analysis builds on the anchoring specification in Equation (11) by replacing far-forward nominal rates with a measure of market-based expected short-term interest rates over the next 1-2 years. Specifically, we regress the one-day change in Overnight Interest Swap (OIS) rates on the surprise component of domestic inflation releases:

$$\Delta y_t^{n-yr,OIS} = \phi_0 + \phi_\pi \pi_t^{surprise} + \varepsilon_t, \tag{13}$$

where $y_t^{n-yr,OIS}$ is a 1- or 2-year OIS rate, depending on data availability. As in Equation (11), $\pi_t^{surprise}$ is the surprise component of the economy's inflation release based on Bloomberg forecasts, and ε_t is a regression residual. We estimate Equation (13) on the days that the domestic price data is released, country by country, using OLS. The estimated coefficient $\widehat{\phi_\pi}$ is our measure of the perceived reaction of the central bank to inflation. As with the anchoring equation, we estimate the central bank's perceived reaction to inflation in split samples, pre-COVID and during the COVID period inflation surge. Table 8 provides full details of the data and samples we use for each country.

Figure 4 shows that perceptions of the central bank's response to inflation generally shifted higher during the COVID inflation surge. The chart shows estimates of ϕ_π from Equation (13) over the pre-COVID period in blue circles and the COVID period in red squares.[16] The vertical whiskers denote 90 percent confidence intervals. Unlike every other country in our sample, the high inflation in Japan was accommodated with essentially no tightening in policy given that inflation had been stubbornly below target in that country prior to the pandemic. For all central banks except Japan, the perceived policy response increased after inflation climbed above target. Table 9 shows that the increase in the response of interest rate futures to inflation surprises is statistically significant in four of the nine countries we study, including the U.K., Switzerland, Australia, and New Zealand.

These policy responses provide one way to rationalize the evidence that inflation expectations remained just as well, if not better anchored following the COVID-19 inflation surge. In particular, after years of relatively stable inflation before the pandemic, the surge in inflation after 2020 allowed central banks to demonstrate their commitment to their inflation targets. In many countries, central bank officials signaled that aggressive interest rate increases during the COVID-19 inflation surge were carried out to keep inflation expectations

[16]The start of the pre-COVID period is determined by country-specific details of their inflation targeting regime and the availability of data. The pre-COVID period ends for all countries except Japan when inflation climbed above the central bank's target. See Table 8 for details.

well anchored.[17] The combination of our anchoring and policy response estimates supports this reasoning and suggests that the decisive actions of central banks around the globe were broadly sufficient to keep inflation expectations from drifting despite persistently high inflation.

Our estimates of a more aggressive central bank stance towards inflation after 2020 may appear to be at odds with other research suggesting that the Federal Reserve's response to inflation declined after the adoption of Flexible Average Inflation Targeting (FAIT). In particular, Bocola et al. (2024) use high-frequency data on nominal Treasury securities and inflation breakevens to show that the Fed was initially perceived as less reactive to inflation following the adoption of the FAIT framework in August 2020. And, other researchers reached similar conclusions using different methods (Orphanides, 2024; Romer and Romer, 2024). To reconcile our findings with this prior research, we estimate the following regression model for each country:

$$\Delta y_t^{n-yr,OIS} = \phi_\pi \pi_t^{surprise} + \phi_{\pi,FAIT}\, \pi_t^{surprise} \times \mathcal{I}_{FAIT} + \phi_{\pi,COVID}\, \pi_t^{surprise} \times \mathcal{I}_{COVID} + \varepsilon_t, \quad (14)$$

where $\mathcal{I}_{FAIT}$ takes a value of one after August 2020 and, as above, $\mathcal{I}_{COVID}$ takes a value of one for most countries when inflation exceeds their target (constants are included, but suppressed from the notation). Recall that FAIT was only adopted in the United States in August of 2020. Therefore, testing for a structural break in August of 2020 in countries that did *not* change their inflation-targeting frameworks serves as a placebo test for the hypothesis that the Federal Reserve's new framework for monetary policy resulted in a more passive response of the Fed to inflation.

Before showing the formal break tests from Equation (14), Figure 5 plots the estimate of ϕ_π from Equation (13) across three subsamples: Pre-COVID, Post-FAIT (Aug. 2020), and the COVID period (as previously defined for each country). The coefficient estimates of ϕ_π show a strikingly similar pattern across countries: the response of interest rate futures to inflation surprises was positive pre-COVID, declined towards zero Post-FAIT for all countries, and then increased in the COVID-period. The commonality in these shifts across central

[17] See, for example, Federal Reserve Chairman Jerome Powell's June 2022 Press Conference Remarks, "Since then, inflation has again surprised to the upside, some indicators of inflation expectations have risen, and projections for inflation this year have been revised up notably. In response to these developments, the Committee decided that a larger increase in the target range was warranted at today's meeting. This continues our approach of expeditiously moving our policy rate up to more normal levels. And it will help ensure that longer-term inflation expectations remain well anchored at 2 percent."
Available at: https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20220615.pdf

banks suggests that pandemic-related factors may explain the perceived shifts in reaction functions rather than the Fed's adoption of the FAIT framework.

Table 10 shows more formal evidence based on Equation (14) that the perceived response of the central bank to inflation declined in every country after August 2020. In fact, these formal break tests show that the decline in $\hat{\phi_\pi}$ after the adoption of FAIT by the Federal Reserve is statistically significant in six out of nine countries. Then, once inflation climbed above target, every central bank with the exception of Japan was perceived as becoming much more responsive to inflation. This cross country evidence suggests that the Fed was perceived as behaving like virtually all other central banks in initially looking through the post-pandemic increase in inflation before turning much more aggressive as inflation moved persistently above target. In this respect, we find little evidence that the adoption of FAIT led investors to perceive the Federal Reserve as behaving differently than other central banks.

5 The Labor Market Benefits of Anchored Inflation Expectations During the Post-COVID Disinflation

The stability of longer-term inflation expectations during the pandemic inflation surge was also accompanied by a relatively painless disinflation. Prior research argues that these two observations should be related: Well-anchored inflation expectations should improve the unemployment versus inflation tradeoff a central bank faces during a disinflation, leading to both a more rapid decline in inflation and much smaller increases in unemployment.

This literature often summarizes these tradeoffs through the sacrifice ratio, which measures the costs to the labor market or output of a disinflation. We define the sacrifice ratio as the quarterly unemployment rate deviations from full employment for each percentage point reduction in inflation:

$$\text{Sacrifice Ratio} = \frac{\frac{1}{3} \times \sum_{t=\tau}^{T} (u_t - u^*)}{\pi_\tau - \pi_T}, \tag{15}$$

where τ is the period disinflation begins, T is the end of disinflation (or, the end of our sample in our case, December 2024), u_t is the unemployment rate, u^* is the natural rate of unemployment, and π_t is the year-over-year inflation rate. The constant in the numerator scales the sum of unemployment rate to a quarterly average from the monthly data.[18]

[18]We will apply this scaling to both the data and the model so it has no influence on the relative cost of

Table 11 shows the implied sacrifice ratios during the COVID disinflation for each country in our sample. The median across countries was 0.7.[19] In U.S. data, the observed sacrifice ratio during the COVID disinflation was a mere 0.37, meaning that each percentage point decrease in inflation cost 0.37 percentage points higher quarterly unemployment.[20] For comparison, the sacrifice ratio under our same calculation was 2.9 during the Volcker disinflation, more than seven times larger for the United States than during the COVID disinflation. Given our evidence in Section 4 arguing that inflation expectations remained well anchored during this period, the small sacrifice ratio provides reduced-form evidence suggesting significant benefits to the labor market of maintaining well-anchored inflation expectations during the post-2020 experience.

However, we can directly measure the degree to which maintaining anchored inflation expectations contributed to this relatively low-cost disinflation using our theoretical model. Specifically, how costly would it have been to the labor market to disinflate from the pandemic *if* inflation expectations had instead become unanchored? To answer this question, we first use our model to estimate the structural slope of the Phillips curve and the exogenous forces driving inflation during the pandemic inflation surge in the United States. We estimate the volatility and persistence parameters for each of our five shocks: Aggregate demand, productivity, monetary policy, employment separations, and markup shocks. Consistent with our high-frequency evidence from Section 4, we first assume that inflation expectations remained anchored ($\delta^{\pi} = 0$).

We estimate the model over the October 2020 though December 2024 period using four macroeconomic observables: Monthly real GDP growth, unemployment, year-over-year PCE inflation, and the 2-year Treasury yield.[21] Estimating the exogenous shocks helps ensure that the forces behind the pandemic inflation surge in the model are broadly consistent with the data. Figure 6 shows that the estimated model can exactly replicate the outcomes we see in the data for the key model observables.[22]

disinflation under different scenarios. The sacrifice ratio is sometimes reported "point years" of unemployment, effectively the years of unemployment at the higher rate needed to reduce inflation by one percentage point. Ball (1994) provides a thorough review of different approaches.

[19] Forbes, Ha and Kose (2025) use a different methodology and also document significantly smaller sacrifice ratios during the post-COVID disinflation for advanced economies.

[20] For the U.S., we take u^* to be 3.6 percent, the unemployment rate in June 2022, which was also the unemployment rate in December 2019 before the pandemic.

[21] S&P Global, formerly Macroeconomic Advisers, produces monthly measures of nominal and real GDP.

[22] Details of the estimation and filtered shocks are provided in the Appendix.

Using this sequence of estimated shocks, we then conduct two counterfactual scenarios to illustrate how the tradeoffs faced by policymakers would have changed if inflation expectations instead became unanchored. First, we feed through the same set of shocks but assume that the burst of inflation during the pandemic caused inflation expectations to drift ($\delta^{\pi} > 0$).[23] The top left panel of Figure 6 shows that under drifting inflation expectations, U.S. inflation would have peaked at a higher level (roughly 2 percentage points higher than was observed) and persisted further above the Fed's 2 percent inflation target for much longer. Without any change in the policy rule, nominal interest rates would have also been much higher as shown in the bottom left panel. Therefore, real interest rates would have been roughly similar under this scenario, leading to similar unemployment outcomes, shown in the top right panel. Overall, the inflation outcome is more severe, without any benefit to the labor market.

In a second counterfactual experiment, we again assume that inflation expectations become unanchored, but we now assume that rather than tolerating persistently higher inflation, the central bank aggressively tightens monetary policy to achieve the same inflation outcomes as under anchored inflation expectations. Specifically, we feed in an additional sequence of contractionary monetary policy shocks to generate the identical path for realized inflation as in the data in the top left panel of Figure 6. The 2-year Treasury yield reaches 13 percent under this tighter monetary policy stance, not far below the 16 percent witnessed in the early 1980's. The top right panel underscores the labor market costs of fighting inflation under unanchored inflation expectations, as the unemployment rate rises towards 5 percent and remains elevated throughout the simulation.

If inflation expectations had indeed become unanchored, this second counterfactual highlights that worse labor market outcomes would be required to achieve the same inflation outcomes. To summarize this unfavorable shift in the tradeoff between unemployment and inflation, we can re-calculate the sacrifice ratio under this counterfactual. We find that the sacrifice ratio surges to 2, much closer to the value of 2.9 during the Voclker disinflation, implying much larger unemployment costs to achieve disinflation. This exercise suggests that the relative stability of longer-term inflation expectations played an important role in avoiding a repeat of the costly disinflation of the 1980's.

[23] We set $\delta^{\pi} = 0.01$ for our counterfactual exercises in this section, which is close to the lower bound of the 95% confidence interval for the empirical estimate for Norway during its pre-COVID period (see Table 5). We choose this lower value to be conservative in our estimates regarding the potential real costs of inflation expectations becoming unanchored.

6 Conclusions

The COVID-19 pandemic lifted inflation in many countries to levels last seen in the Great Inflation of the 1970's and 1980's. The key lesson from this Great Inflation episode was the importance of maintaining well-anchored inflation expectations in order to limit the economic cost of disinflation. The results in this paper suggest that advanced-economy, inflation-targeting central banks were generally able to prevent inflation expectations from drifting during the post-2020 surge in inflation, avoiding a repeat of the unanchoring of inflation expectations that occurred in the Great Inflation. We show that by keeping inflation expectations anchored, inflation declined without a significant increase in unemployment in advanced economies, resulting in much lower sacrifice ratios than past experience with disinflations might have predicted.

Looking ahead, our cross-country findings from this episode have important implications for the design of central bank frameworks. In particular, despite different initial conditions as well as differences in each country's approach to inflation targeting, we find that having a numerical inflation target and taking actions through current and expected policy rates as inflation moved away from the target appear to be common elements across countries that helped to prevent inflation expectations from drifting.

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Table 1: Testable Predictions of Unanchoring Inflation Expectations

Event-Study Regressions Using Simulated Data From Model

	Δ Long-Term Inflation Expectations		
	Pre-Pandemic	COVID	Full Sample
$\pi_t - \mathbb{E}_{t-1}\pi_t$	0.000	0.050***	0.000
	(0.000)	(0.000)	(0.000)
$\pi_t - \mathbb{E}_{t-1}\pi_t \times \mathcal{I}_{COVID}$			0.050***
			(0.000)
	Δ 10-Year Inflation Forward		
	Pre-Pandemic	COVID	Full Sample
$\pi_t - \mathbb{E}_{t-1}\pi_t$	0.001	0.082***	0.001
	(0.002)	(0.002)	(0.002)
$\pi_t - \mathbb{E}_{t-1}\pi_t \times \mathcal{I}_{COVID}$			0.080***
			(0.003)
	Δ 10-Year Nominal Forward		
	Pre-Pandemic	COVID	Full Sample
$\pi_t - \mathbb{E}_{t-1}\pi_t$	0.002	0.081***	0.002
	(0.002)	(0.003)	(0.002)
$\pi_t - \mathbb{E}_{t-1}\pi_t \times \mathcal{I}_{COVID}$			0.080***
			(0.004)
Observations	111	45	156

We show bootstrapped standard errors using model-simulated data. Each regression includes a constant but is always estimated to be numerically close to zero. See Section 3 for more details. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

Table 2: Differences in Inflation Targeting Frameworks Across Countries

Country	Inflation Target	Measure	Other Mandates
United States	2%[1]	PCE	Maximum employment
United Kingdom	2%	CPI	Strong, sustainable and balanced growth giving priority to price stability
Japan	2%	CPI	
Canada	2% (+/-1%)	CPI	Maximum sustainable employment
Sweden	2%	CPIF[2]	Balanced development of output and employment giving priority to price stability
Switzerland	0%-2%	CPI	Resolve conflicts between price stability and business cycle considerations giving priority to price stability
Norway	2%	CPI	High and stable employment giving priority to price stability
Australia	2%-3%	CPI	Maintenance of full employment, economic prosperity and welfare
New Zealand	2% (+/-1%)[3]	CPI	Maximum stable employment, targets inflation "over the medium term"

[1] In August of 2020, the Federal Reserve has adopted Flexible Average Inflation Targeting, which the FOMC described as the following: "In order to anchor longer-term inflation expectations at this level, the Committee seeks to achieve inflation that averages 2 percent over time, and therefore judges that, following periods when inflation has been running persistently below 2 percent, appropriate monetary policy will likely aim to achieve inflation moderately above 2 percent for some time."

[2] CPIF stands for consumer price index with a fixed interest rate which removes the effects of changes in mortgage rates on CPI inflation.

[3] In December 2023, the Minister of Finance changed the Remit of the RBNZ to remove maximum sustainable employment and focus on maintaining low and stable inflation.

Table 3: COVID-19 Inflation Experiences by Country

Country	Measure	Inflation Target	Pre-Covid Average[2]	Post-2020 Peak	December 2024
United States	PCE	2%	1.38%	7.25%	2.55%
United Kingdom	CPI	2%	2.12%	9.58%	3.47%
Japan	CPI	2%	0.16%	4.29%	3.66%
Canada	CPI	2% (+/-1%)	1.90%	8.10%	1.82%
Sweden	CPIF	2%	1.38%	10.16%	1.47%
Switzerland	CPI	0%-2%	0.43%	3.42%	0.64%
Norway	CPI	2%	2.02%	7.52%	2.27%
Australia	CPI	2%-3%	2.57%	7.83%	2.42%
New Zealand	CPI	2% (+/-1%)	2.53%	7.29%	2.22%

[1] All rates in the table are expressed as the year over year percent change in the central banks' preferred price index.

[2] The Precovid period spans from the beginning of the baseline sample, as described in table 4, through December 2019.

[3] Unlike observations in our empirical samples, this table refers to an inflation release by its reference month rather than its release month, therefore the December 2024 rates shown above are not included in our sample.

Table 4: Data Availability Across Countries for Anchoring Estimates

Country	Nominal Forward Rate	Inflation Surprise	Sample Dates	Covid Break Date[4]
United States	1y9yf Infl Comp[1]	Core CPI MoM	Jan 2012 - Dec 2024	Apr 2021
United Kingdom	1y9yf Govt Yield	CPI YoY	Jun 2003 - Dec 2024	Jun 2021
Japan	1y9yf Govt Yield	CPI ex Fresh Food YoY	Sep 2001 - Dec 2024	May 2021
Canada	1y9yf Govt Yield	CPI YoY	Aug 1998 - Dec 2024	May 2021
Sweden	3y7yf Govt Yield	CPIF YoY[2]	Sep 2009 - Dec 2024	May 2021
Switzerland	1y9yf Govt Yield	CPI YoY	Feb 2001 - Dec 2024	Mar 2022
Norway	5y5yf Govt Yield	Underlying CPI YoY[3]	Feb 2003 - Dec 2024	Feb 2021
Australia	1y9yf Govt Yield	CPI QoQ	Q4 1998 - Q4 2024	Q3 2021
New Zealand	3y7yf OIS Rate	CPI QoQ	Q3 2001 - Q4 2024	Q3 2021

Note: Inflation surprises are defined as the difference between the median forecast in the Bloomberg survey and the rate of inflation as-released that day (unrevised).

[1] Inflation Compensation is the difference between the Treasury Yield and the Treasury Inflation Protected Security (TIPS) yield.

[2] Swedish CPIF fixes interest rates on household mortgage payments at a constant rate.

[3] Norwegian Underlying CPI excludes energy and adjusts for price changes due to tax policy.

[4] The Covid break date for each country, with the exception of Japan, is based on when 12-month inflation first exceeds the central bank's target following the start of the Covid episode in 2020. For Japan, we set the breakdate to the first month that inflation moved into positive territory and deflation ended.

Table 5: Baseline Estimates of Anchoring
Response of Far-Forward Nominal Compensation to Inflation Surprises

	Pre-COVID			COVID Period			Chow Test	
	δ^{π}	SE	Obs	δ^{π}	SE	Obs	δ^{π}_{COVID}	SE
United States	−0.029	0.039	111	0.033	0.068	45	0.062	0.078
United Kingdom	0.061**	0.029	209	0.019	0.053	43	−0.041	0.060
Japan	0.098**	0.039	231	−0.008	0.050	39	−0.107	0.063
Canada	−0.015	0.015	261	−0.010	0.035	44	0.005	0.037
Sweden	0.017	0.028	140	−0.019	0.074	44	−0.036	0.078
Switzerland	−0.018	0.017	250	0.050	0.048	34	0.067	0.050
Norway	0.036**	0.015	216	0.001	0.040	47	−0.034	0.042
Australia	0.011	0.037	90	0.110	0.108	14	0.099	0.108
New Zealand	0.014	0.036	80	0.031	0.050	14	0.017	0.060

Note: Heteroskedasticity robust Eicker-White standard errors.

*, **, or *** implies that the p-value is below 0.1, 0.05, 0.01, respectively.

Table 6: Robustness of Anchoring Estimates
Response of Far-Forward Nominal Compensation to Inflation Surprises

		Pre-COVID			COVID Period			Chow Test	
		δ^{π}	se	Obs	δ^{π}	se	Obs	δ^{π}_{COVID}	se
United States									
	Universal Break Date	−0.047	0.045	98	0.035	0.050	58	0.082	0.067
	Energy Price Control	−0.033	0.037	111	0.036	0.071	45	0.069	0.079
	LAD Regression	0.017	0.033	111	0.005	0.050	45	−0.012	0.050
United Kingdom									
	Universal Break Date	0.066**	0.032	194	0.015	0.043	58	−0.052	0.053
	Energy Price Control	0.064**	0.029	209	0.011	0.058	43	−0.052	0.064
	LAD Regression	0.039*	0.023	209	0.070	0.072	43	0.031	0.052
Japan									
	Universal Break Date	0.110***	0.042	212	−0.017	0.038	58	−0.127**	0.056
	Energy Price Control	0.101**	0.040	231	0.005	0.050	39	−0.096	0.062
	LAD Regression	0.029	0.024	231	0.000	0.072	39	−0.029	0.059
Canada									
	Universal Break Date	−0.013	0.016	247	−0.022	0.026	58	−0.010	0.030
	Energy Price Control	−0.015	−0.015	261	−0.008	0.035	44	0.007	0.037
	LAD Regression	−0.007	0.014	261	−0.022	0.055	44	−0.015	0.040
Sweden									
	Universal Break Date	0.032	0.030	126	−0.025	0.062	58	−0.057	0.069
	Energy Price Control	0.020	0.026	140	−0.031	0.075	44	−0.051	0.079
	LAD Regression	0.031	0.027	140	0.054	0.068	44	0.023	0.049
Switzerland									
	Universal Break Date	−0.016	0.018	226	0.026	0.037	58	0.042	0.041
	Energy Price Control	−0.017	0.017	250	0.072	0.045	34	0.089*	0.048
	LAD Regression	−0.020	0.013	250	0.000	0.069	34	0.020	0.036
Norway									
	Universal Break Date	0.038**	0.016	205	0.002	0.032	58	−0.037	0.035
	Energy Price Control	0.034**	0.015	216	0.002	0.041	47	−0.032	0.043
	LAD Regression	0.025*	0.013	216	0.030	0.036	47	0.005	0.029
Australia									
	Universal Break Date	0.015	0.038	85	0.057	0.094	19	0.042	0.098
	Energy Price Control	0.017	0.036	90	0.106	0.105	14	0.089	0.103
	LAD Regression	0.050	0.052	90	0.100	0.278	14	0.050	0.184
New Zealand									
	Universal Break Date	0.024	0.038	75	0.028	0.045	19	0.005	0.058
	Energy Price Control	0.015	0.036	80	0.033	0.053	14	0.018	0.061
	LAD Regression	0.053	0.037	80	0.100	0.067	14	0.047	0.075

Note: Heteroskedasticity robust Eicker-White Standard Errors. *, **, or *** implies that the p-value is below 0.1, 0.05, 0.01, respectively.

Table 7: Additional Analysis for the United Kingdom
Response of Far Forward Nominal Compensation to Inflation Surprises

	1998-2003	Pre-COVID	COVID Period
Baseline CPI Surprises		0.061**	0.019
SE		(0.029)	(0.053)
Obs		209	43
Alternative RPIX Surprises	-0.018	0.053**	-0.036
SE	(0.019)	(0.023)	(0.063)
Obs	61	209	43

Note: Heteroskedasticity robust Eicker-White Standard Errors.
*, **, or *** implies that the p-value is below 0.1, 0.05, 0.01, respectively.

Table 8: Data Availability for Estimating the Perceived Policy Response to Inflation

Country	Interest Rate Future	Inflation Surprise	Sample Dates	Covid Break Date[3]
United States	1y OIS Swap Rate	Core CPI MoM	Oct 2003 - Dec 2024	Apr 2021
United Kingdom	1y OIS Swap Rate	CPI YoY	Jan 2009 - Dec 2004	Jun 2021
Japan	1y OIS Swap Rate	CPI ex Fresh Food YoY	Aug 2002 - Dec 2024	Oct 2021
Canada	1y OIS Swap Rate	CPI YoY	Sep 2008 - Dec 2024	May 2021
Sweden	1y OIS Swap Rate	CPIF YoY[1]	Sep 2009 - Dec 2024	May 2021
Switzerland	2y OIS Swap Rate	CPI YoY	Feb 2001 - Dec 2024	Mar 2022
Norway	1y OIS Swap Rate	Underlying CPI YoY[2]	Feb 2003 - Dec 2024	Feb 2021
Australia	1y OIS Swap Rate	CPI QoQ	Q1 2000 - Q4 2024	Q3 2021
New Zealand	1y OIS Swap Rate	CPI QoQ	Q3 2001 - Q4 2024	Q3 2021

Note: Inflation surprises are defined as the difference between the median forecast in the Bloomberg survey and the rate of inflation as-released that day (unrevised).
[1] Swedish CPIF fixes interest rates on household mortgage payments at a constant rate.
[2] Norwegian Underlying CPI excludes energy and adjusts for price changes due to tax policy.
[3] The Covid break date for each country, with the exception of Japan, is based on when 12-month inflation first exceeds the central bank's target following the start of the Covid episode in 2020. For Japan, we set the breakdate to the first month that inflation moved into positive territory and deflation ended.

Table 9: Baseline Perceived Policy Response Estimates
Response of Near-Term Interest Rate Futures to Inflation Surprises

	Pre-COVID			COVID Period			Chow Test	
	ϕ_π	SE	Obs	ϕ_π	SE	Obs	$\phi_{\pi,COVID}$	SE
United States	0.082***	0.030	210	0.303**	0.136	45	0.221	0.137
United Kingdom	0.039	0.025	164	0.324***	0.059	43	0.284***	0.064
Japan	0.028	0.019	201	0.028	0.059	39	0.000	0.061
Canada	0.039***	0.010	152	0.138***	0.039	44	0.100	0.040
Sweden	0.075***	0.013	140	0.103***	0.034	44	0.028	0.036
Switzerland	0.030***	0.009	250	0.203***	0.048	34	0.174***	0.009
Norway	0.090***	0.016	216	0.137***	0.029	47	0.047	0.033
Australia	0.185***	0.028	85	0.412***	0.098	14	0.223**	0.097
New Zealand	0.128***	0.030	80	0.226***	0.050	14	0.098*	0.056

Note: Heteroskedasticity robust Eicker-White standard errors. *, **, or *** implies that the p-value is below 0.1, 0.05, 0.01, respectively.

Table 10: Shifts in Perceived Policy Responses Pre-COVID, August 2020, & After COVID

	ϕ_π	$\phi_{\pi,FAIT}$	$\phi_{\pi,COVID}$	Obs
United States	0.101***	−0.108***	0.311**	255
	(0.033)	(0.034)	(0.134)	
United Kingdom	0.046	−0.010	0.324***	192
	(0.028)	(0.012)	(0.059)	
Japan	0.030	−0.033	0.032	240
	(0.020)	(0.023)	(0.059)	
Canada	0.042***	−0.049***	0.144***	196
	(0.011)	(0.014)	(0.040)	
Sweden	0.081***	−0.072**	0.094**	184
	(0.014)	(0.027)	(0.041)	
Switzerland	0.031***	−0.020	0.192***	284
	(0.010)	(0.020)	(0.051)	
Norway	0.094***	−0.097***	0.140***	263
	(0.017)	(0.019)	(0.029)	
Australia	0.189***	−0.110***	0.334***	99
	(0.029)	(0.039)	(0.097)	
New Zealand	0.130***	−0.051	0.147***	94
	(0.032)	(0.033)	(0.048)	

Note: Heteroskedasticity robust Eicker-White standard errors. *, **, or *** implies that the p-value is below 0.1, 0.05, 0.01, respectively.

Table 11: Sacrifice Ratios Across Countries During the COVID-19 Disinflation

Country	Cumulative Sum of Unemployment Change[1]	Decline in Inflation[2]	Sacrifice Ratio[3]
United States	5.3	4.5	0.4
United Kingdom	6.8	6.1	0.4
Japan	1.3	0.6	0.7
Canada	24.3	6.4	1.3
Sweden[4]	14.9	8.7	0.6
Switzerland	8.6	2.8	1.0
Norway	14.7	5.3	0.9
Australia	3.1	5.6	0.6
New Zealand	8.0	5.1	1.6

[1] The change in unemployment is measured relative to its value the period that inflation peaked through the end of 2024.

[2] The decline in inflation is measured from the its peak to the end of 2024.

[3] For all countries except Australia and New Zealand, the sacrifice ratio is measured as $\frac{1}{3}$ times the cumulative sum of unemployment changes divided by the decline in inflation. For Australia and New Zealand, the unemployment rates are measured quarterly, and therefore the sacrfice ratio is not scaled by $\frac{1}{3}$.

[4] Swedish CPIF is used to measure the change in inflation. The CPIF fixes interest rates on household mortgage payments at a constant rate.

Figure 1: Responses to Demand Shock Under Anchored & Drifting Inflation Expectations

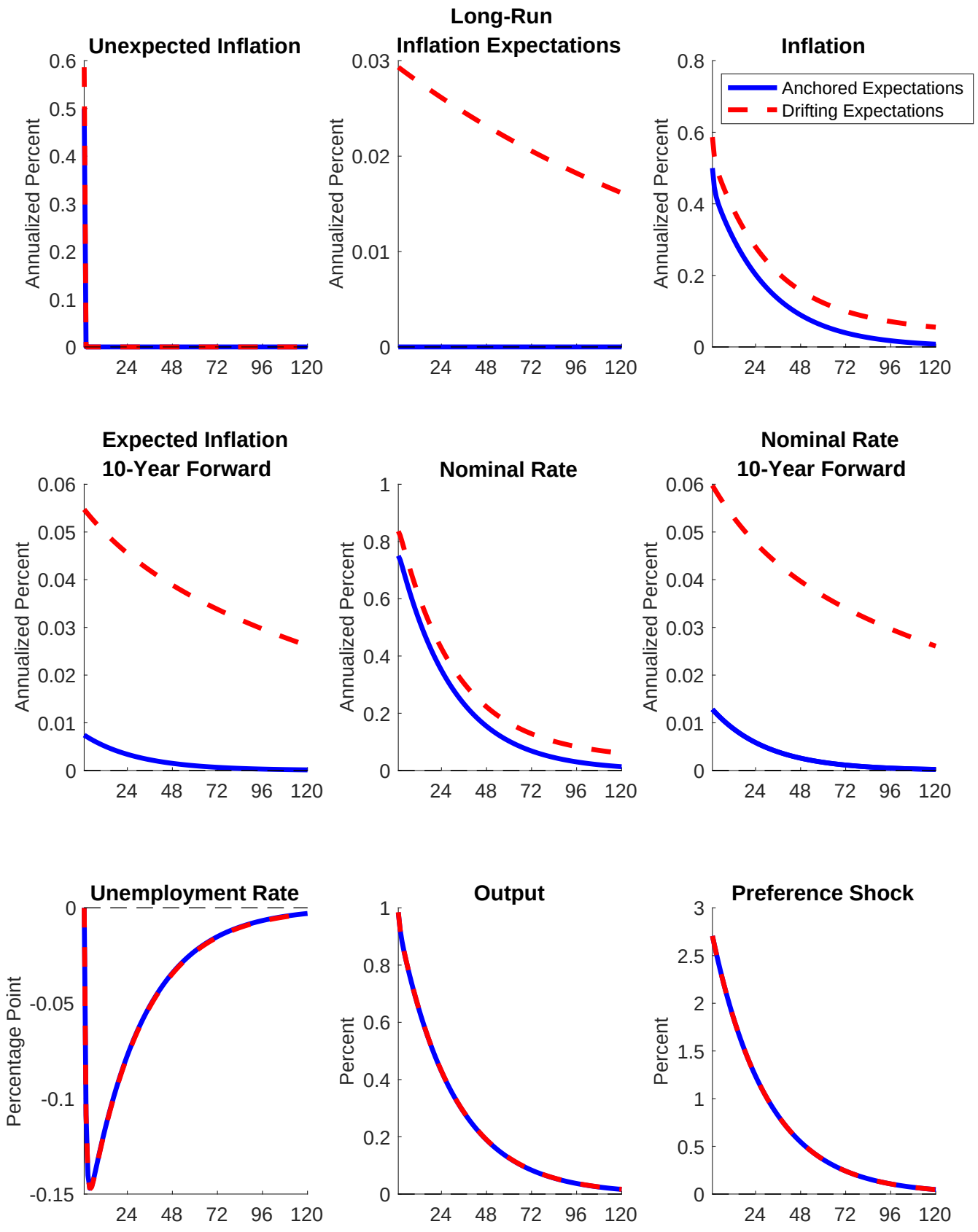
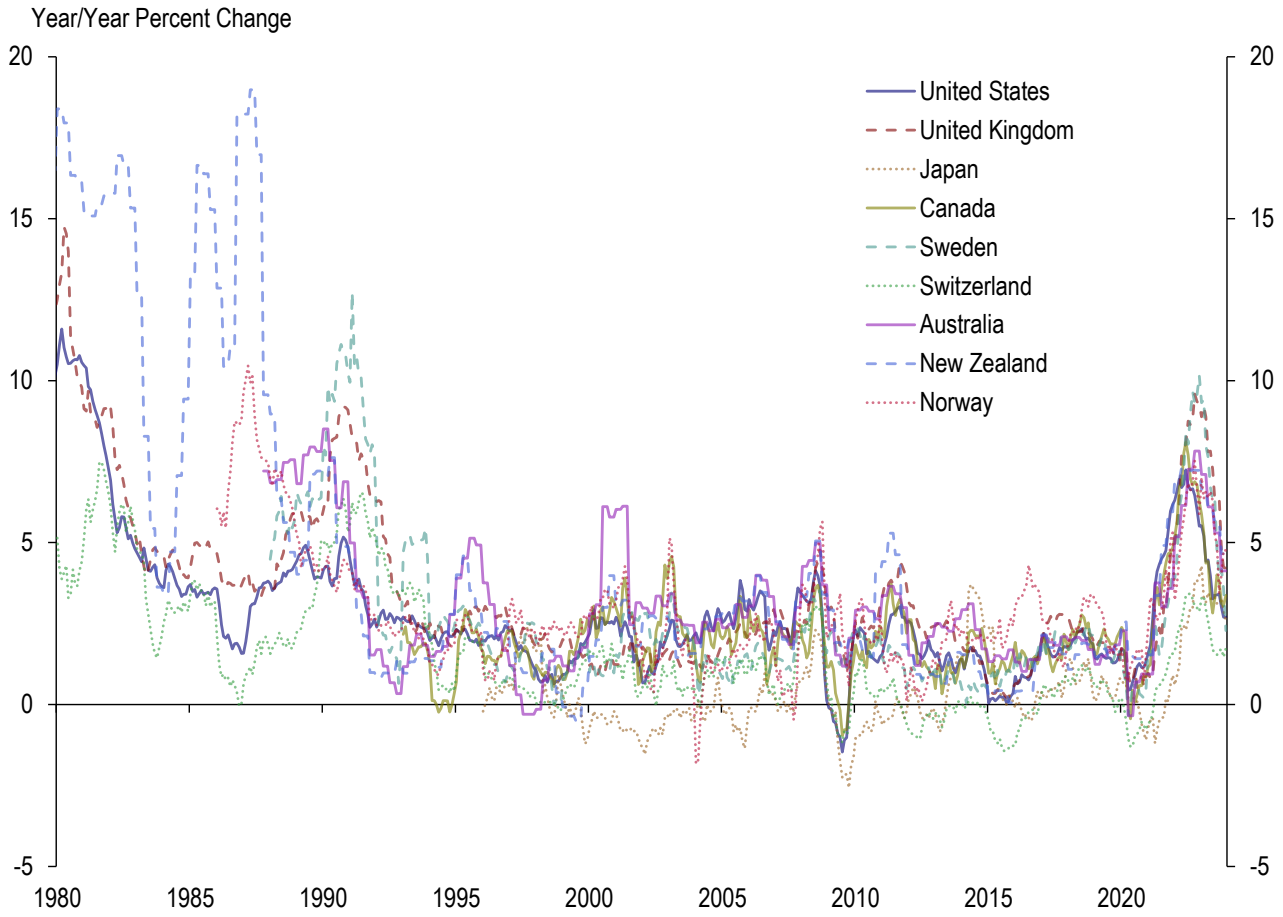
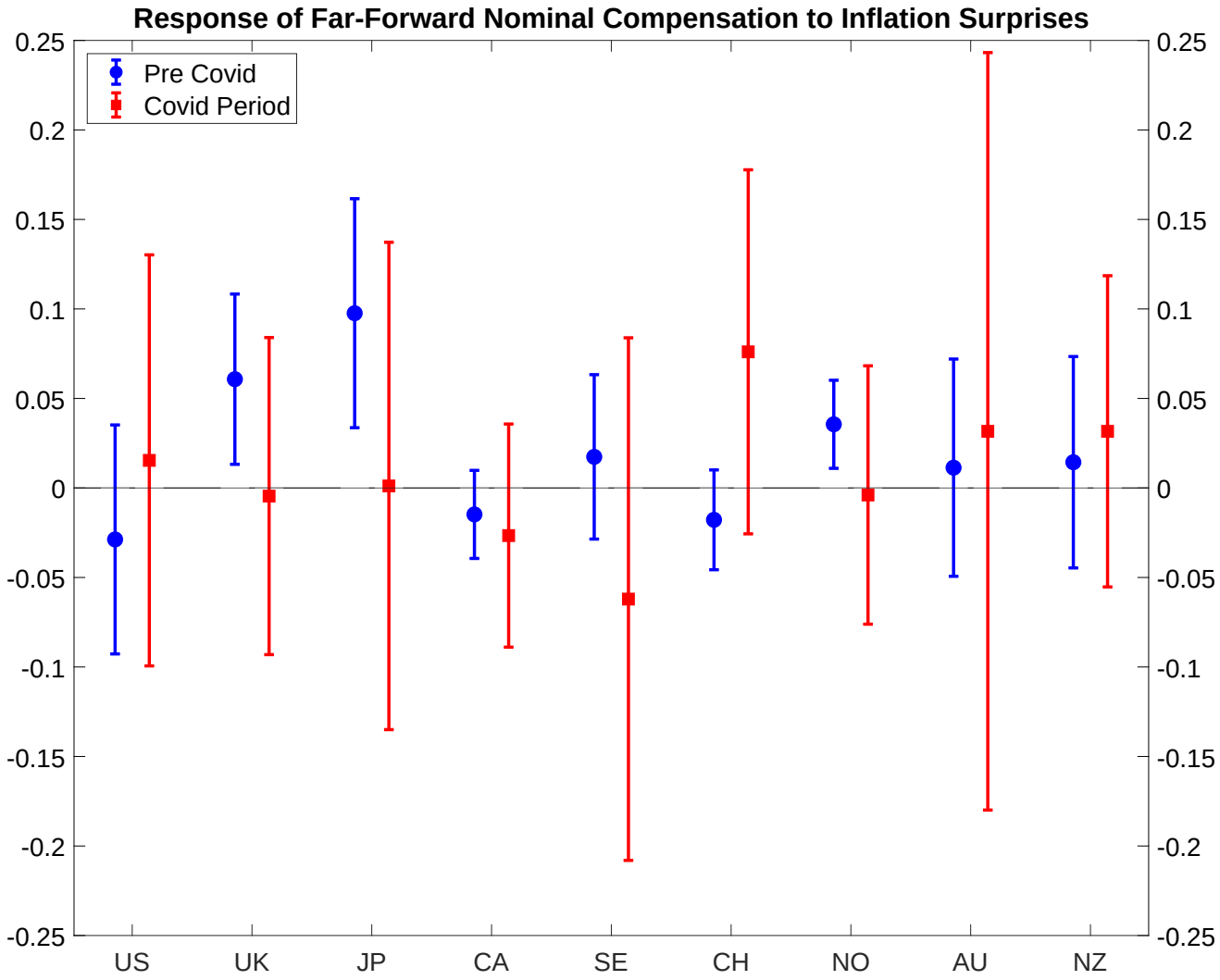


Figure 2: After the COVID-19 Pandemic, Inflation Rose to Multi-Decade Highs



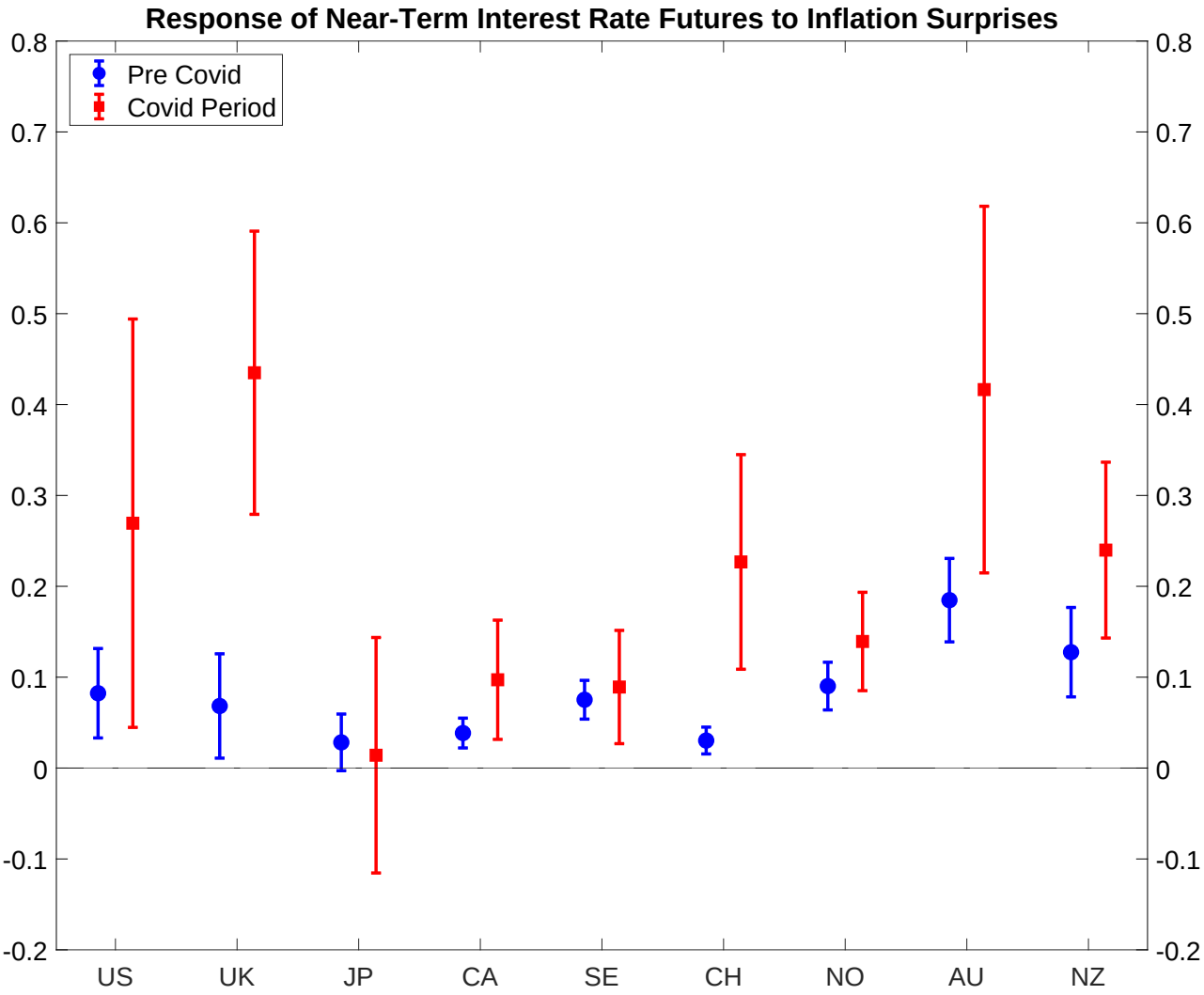
Note: This figure shows year/year inflation measures in each of the nine countries we study. The inflation measure for each country is based on the inflation measure each central bank currently targets. See Section 4 for details.

Figure 3: Baseline Estimates of Inflation Expectations Anchoring



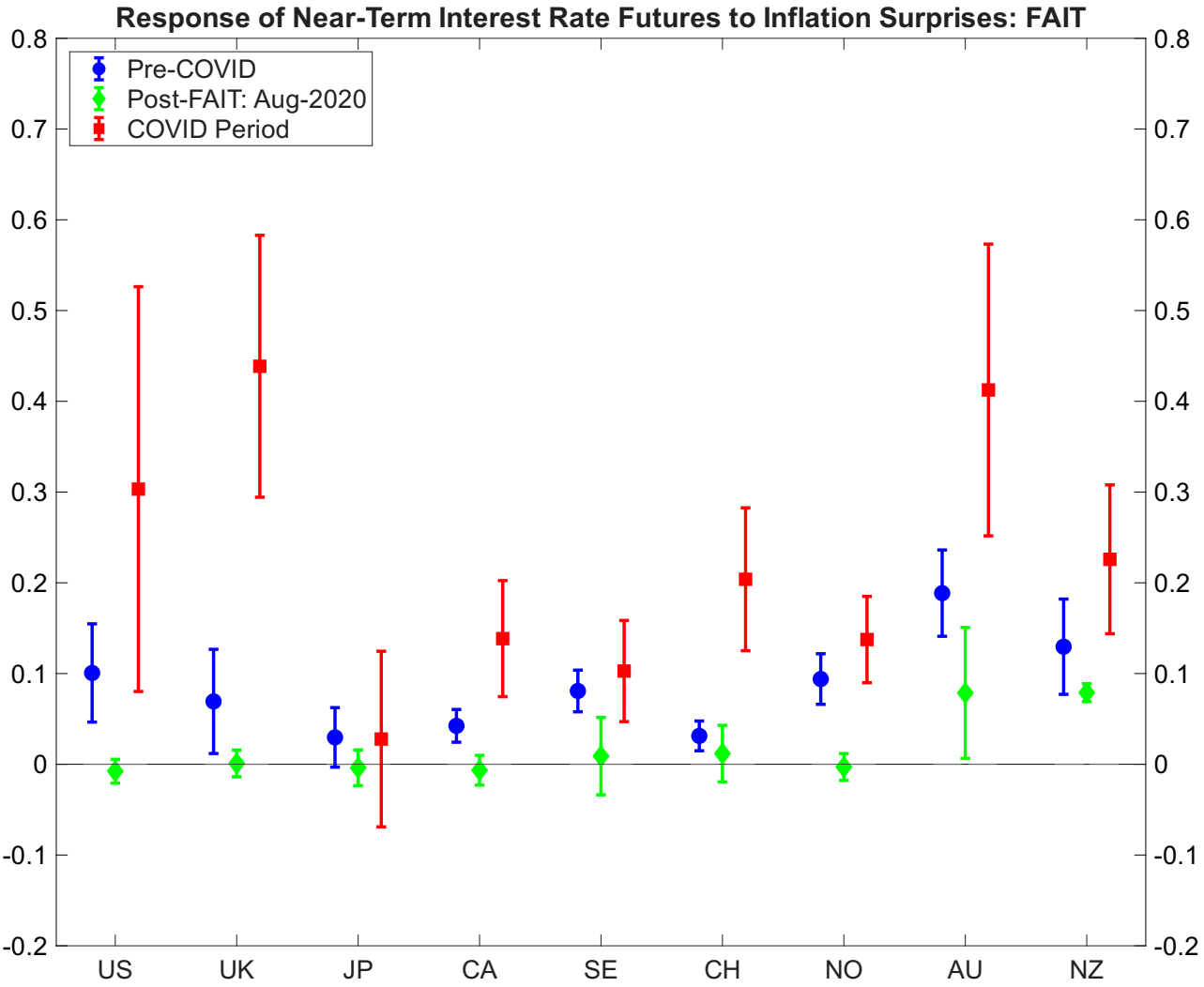
Note: The circle marker and blue lines show the point estimates of the degree of anchoring pre-COVID along with 90% confidence intervals. The square marker and red lines show the point estimates of the degree of anchoring during the COVID Period along with 90% confidence intervals. See Section 4 for details.

Figure 4: Baseline Estimates of Perceived Policy Response to Inflation



Note: The circle marker and blue lines show the point estimates of the perceived central bank response to inflation pre-COVID along with 90% confidence intervals. The square marker and red lines show the point estimates of the perceived central bank response to inflation during the COVID Period along with 90% confidence intervals. See Section 4 for details.

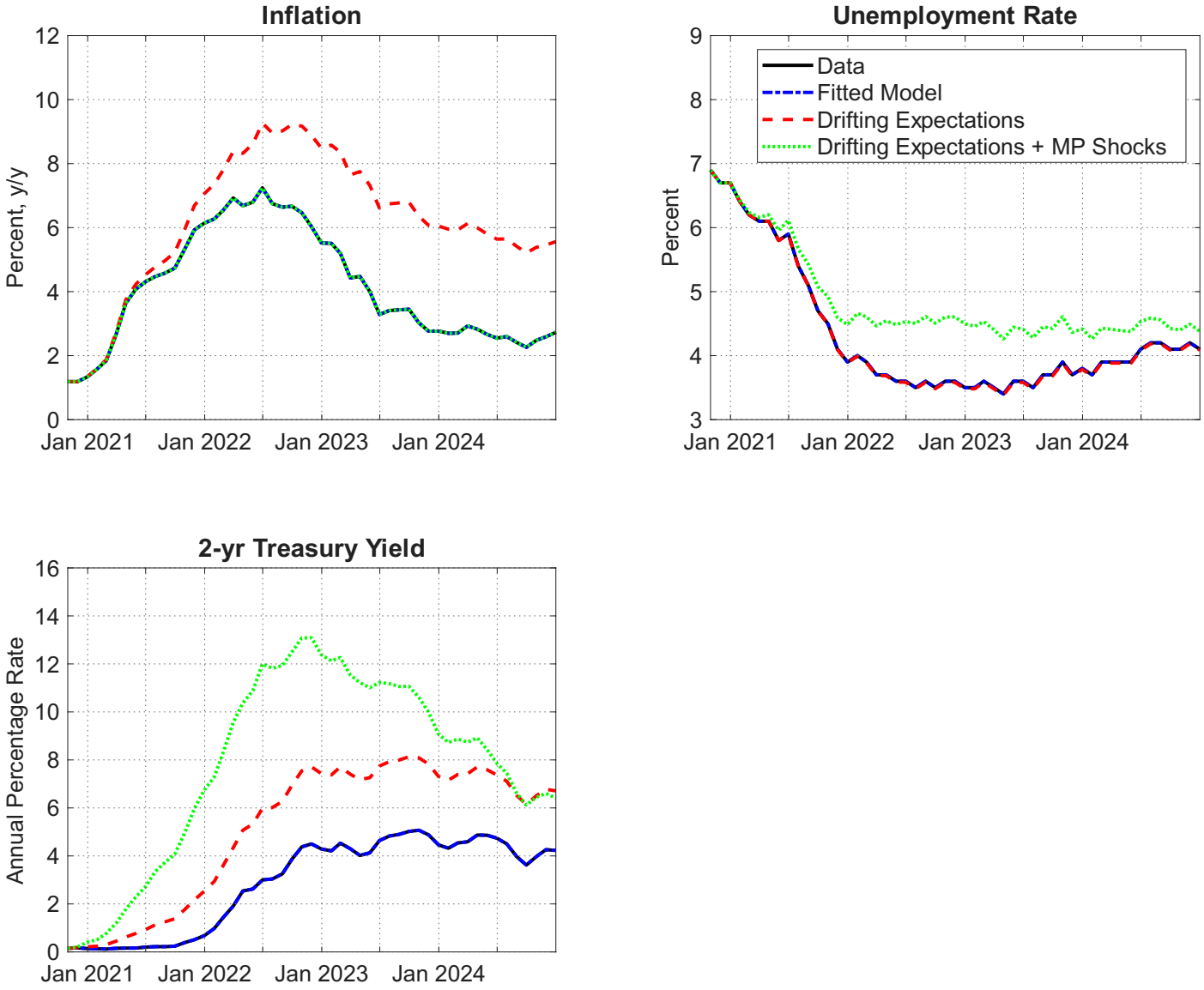
Figure 5: Estimates of Perceived Policy Response to Inflation
Pre-COVID, FAIT August-2020, and COVID Periods



Note: The circle marker and blue lines show the point estimates of the perceived central bank response to inflation pre-COVID along with 90% confidence intervals. The diamond marker and green lines show the point estimates of the perceived central bank response to inflation after the adoption of FAIT by the Federal Reserve in August-2020 along with 90% confidence intervals. The square marker and red lines show the point estimates of the perceived central bank response to inflation during the COVID Period along with 90% confidence intervals.

The square dot and red lines show the point estimates of anchoring during the COVID Period along with 90% confidence intervals. See Section 4 for details.

Figure 6: Counterfactuals: Policy Tradeoffs Under Drifting Inflation Expectations



Note: Inflation is measured by the year/year percent change in the PCE price index and the unemployment rate is measured by U3. All data are monthly. See Section 5 for details.