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Tempting FAIT: Flexible Average Inflation Targeting and the Post-COVID U.S. Inflation Surge^{*}

Roberto Duncan[†], Enrique Martínez García[‡] and Luke Miller[§]

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Abstract

In August 2020, the Federal Reserve adopted Flexible Average Inflation Targeting (FAIT), permitting inflation to temporarily exceed the 2% target. Using synthetic control methods, we estimate that FAIT raised headline CPI inflation by 1 percentage point and core CPI by 0.5 percentage points, relative to a no-FAIT-adoption counterfactual, with short-lived effects concentrated during the 2021 inflation surge. Short-term inflation expectations increased by 0.8 percentage points, while long-term expectations remained well anchored. Real economic effects were statistically insignificant. The combination of a moderate and transitory inflationary impact, well-anchored long-term expectations, and muted real effects is suggestive of monetary policy operating in a steeper post-pandemic Phillips-curve environment in the New Keynesian model. These findings are robust to alternative specifications, including controls for global and fiscal conditions.

JEL Classification: E52, E58, E61, E65, C32, C54.

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1 Introduction

In August 2020, at the Jackson Hole Economic Symposium, Federal Reserve Chairman Jerome Powell announced a pivotal shift in monetary policy: the adoption of Flexible Average Inflation Targeting (FAIT). Designed to address persistently below-target inflation and the risk of expectations becoming anchored below 2%, FAIT allowed inflation to temporarily exceed target to offset past undershooting, operationalizing make-up strategies through inflation averaging (Board of Governors (2020)). In this sense, make-up strategies are defined by the outcomes the framework is willing to tolerate—most notably a temporary and moderate inflation overshoot after past undershooting—not by a particular instrument used to implement policy. The 2020 framework change was broader than the averaging clause alone: it also recast maximum employment in terms of “shortfalls” rather than “deviations,” weakening the presumption of preemptive tightening before inflation pressures had materialized.¹ Because inflation had been below 2% for much of the prior decade, average inflation would need to run above target for some time before tightening was warranted—a departure from the “let-by-gones-be-by-gones” approach of conventional inflation targeting.

At FAIT’s adoption, with the federal funds rate at the effective lower bound (ELB), the current policy rate itself had limited room to provide additional accommodation. The relevant policy margin was therefore the expected effective policy path: under FAIT, that path was framed in outcome-based terms through make-up strategies and shaped through rate guidance, balance sheet guidance, and the sequencing of tapering, liftoff, and runoff. In September and December 2020, FOMC guidance tied the beginning of policy normalization to progress after policy-rate liftoff, delayed asset runoff, and reaffirmed the post-2015 sequencing used after the previous ELB episode (Waller (2022)). These communications helped reinforce a “low-for-longer” effective policy path in support of the make-up strategies introduced under FAIT. The post-pandemic inflation surge was broad among major advanced economies with explicit inflation objectives or target ranges—countries comparable by level of development and, broadly, operating under a Flexible Inflation Targeting (FIT) regime, many of which had also experienced below-target inflation before the surge. Yet the U.S. inflation departure from target appears larger than in many comparable cases when evaluated at common normalization benchmarks.² This cross-country contrast is descriptive rather than causal: it does not identify the effect of FAIT, but it motivates the central counterfactual question of whether the U.S. would have experienced similar outcomes had the Federal Reserve retained a conventional FIT framework. The synthetic-control analysis proposed in this paper provides an empirical approach to that question, constructing a FIT counterfactual and allowing causal empirical inferences about the outcome effects of the FAIT policy environment under the maintained identifying assumptions.

In the U.S., this framework shift to FAIT came shortly before the most significant inflation surge since the Great Inflation (1965–1982). The causes of the post-pandemic surge remain contested. Much of the literature attributes it to a combination of supply chain and trade disruptions, spending shifts from services to goods, commodity price shocks, and fiscal stimulus—all factors that together drove demand to outpace pandemic-constrained supply.³ Others emphasize deeper structural forces—such as persistent labor and

¹In the empirical analysis, we use FAIT to refer to the policy environment created by this package of changes rather than to a single clause in the Statement. The shortfalls language is part of that environment because it changed the guardrails around preventive policy action when inflation was still below target but inflationary pressures were building up.

²Supplementary Appendix A provides institutional background, and Table A1 reports the descriptive cross-country comparison of inflation-target breaches, policy-rate liftoff reference dates, and inflation gaps at liftoff.

³See, e.g., Ball et al. (2022), Alp et al. (2023), Baumeister (2023), Bianchi et al. (2023), Borio et al. (2023), Gagliardone and Gertler (2023), Blanchard and Bernanke (2024), Bernanke and Blanchard (2025), and Lipińska et al. (2025). Shapiro

supply constraints with heterogeneous sectoral effects and potential nonlinearities, including a steepening Phillips curve—as central to explaining inflation dynamics.⁴ Meanwhile, as Waller (2022) notes, questions persist about whether FAIT itself contributed to the surge. The Federal Reserve’s subsequent 2025 framework review, which removed the averaging language and the “shortfalls” formulation while reaffirming the 2% objective, does not by itself establish that FAIT altered outcomes. It does suggest, however, that the FOMC did not view those features as worth retaining, making the FAIT episode especially informative for assessing how framework guardrails shape macroeconomic performance when inflation pressures are already building (Board of Governors (2025); Powell (2025); Leduc et al. (2025)).

Among influential earlier works, Nessen and Vestin (2005) was pivotal in making the case for FAIT. Post-FAIT-adoption studies include Duncan et al. (2022), Eggertsson and Kohn (2023), Honkapohja and McClung (2023), and Jia and Wu (2023), with Duncan et al. (2022) providing the most closely related empirical analysis, though focused mainly on the theoretical transmission of monetary policy under FAIT. The remaining empirical question is therefore not whether the inflation surge had multiple causes—it clearly did—but whether the FAIT policy environment produced distinct outcomes relative to a plausible FIT counterfactual after accounting for those confounding forces.

We examine whether FAIT produced distinct outcomes—relative to those that would have occurred under FIT—for realized inflation, inflation expectations, and economic activity, and, if so, what these differences reveal about potential concurrent structural shifts in monetary policy trade-offs. We remain agnostic as to whether such differences reflected FAIT constraining policy choices, permitting a more accommodative expected policy path through explicit tolerance for overshooting, or both. Accordingly, our estimand is the macro effect of the FAIT policy environment relative to a FIT counterfactual, not the separately identified structural contribution of each communication or implementation tool. The empirical question is therefore an outcome question: conditional on a comparable set of inflation-targeting economies that did not adopt average-inflation targeting, did the U.S. display inflation, expectations, and real-activity outcomes that are meaningfully different from those implied by a FIT counterfactual? The theory below provides the null: if FAIT did not change the outcome path policymakers were willing to pursue relative to conventional FIT’s let-by-gones-be-by-gones logic, inflation, expectations, and real activity should have evolved similarly.

To evaluate this policy environment, we compare U.S. outcomes under FAIT to a counterfactual scenario under FIT using synthetic control methods (SCMs). SCM is useful in this setting because, when the donor pool reproduces the treated unit’s pre-intervention outcomes and is not itself affected by the intervention, the synthetic control provides a data-driven estimate of the missing FIT counterfactual needed for causal inference. Our baseline donor pool starts from advanced-economy OECD central banks classified as inflation targeters in Duncan et al. (2026), beginning with the Federal Reserve’s explicit transition to FIT in January 2012. For greater comparability in the objective of policy, we then restrict the pool to countries that consistently maintained a 2% inflation target or midpoint throughout 2012–2022, matching the Federal Reserve’s objective.⁵

(2024) attributes roughly half of U.S. headline PCE inflation (August 2020–February 2022) to supply-side factors, one-quarter to demand, and the remainder to ambiguous influences.

⁴See, e.g., Guerrieri et al. (2021) and Guerrieri et al. (2022), and related evidence in Forbes et al. (2022), Ari et al. (2023), Benigno and Eggertsson (2023), Benigno and Eggertsson (2024a), Benigno and Eggertsson (2024b), Florio et al. (2025), and Montag and Villar (2025).

⁵The countries in our donor pool also experienced similar pandemic-related shocks and structural changes—such as a steeper Phillips curve—as discussed, among others, in Ari et al. (2023), Florio et al. (2025) (Appendix A), Hobijn et al. (2023), Lipińska et al. (2025), and Neri et al. (2026). For discussion and evidence of a steepening Phillips curve in the U.S., see Benigno and

We focus on the period from FAIT’s adoption to the onset of Russia’s invasion of Ukraine to avoid war-related commodity price shocks—particularly in oil, gas, and food—that disproportionately affected inflation in several European donor-pool economies. This window also captures the U.S. and global pre-tightening phase, before policy decidedly pivoted to liftoff and a forward-guidance “high-for-longer” stance. Alongside the canonical SCM (Abadie (2021)), we use the Augmented SCM (Ben-Michael et al. (2021)) to correct for potential bias from imperfect pre-intervention fit. Following Doudchenko and Imbens (2016), we residualize outcomes with covariates capturing global and domestic inflation drivers, including supply chain disruptions, global activity, commodity prices, fiscal balances, and monetary aggregates. These design choices are central because the empirical exercise must separate the FAIT policy environment from the many non-monetary-policy forces that also shaped the post-pandemic inflation surge.

We find CPI inflation increased by about 1 percentage point on average under the FAIT policy environment relative to our estimated FIT counterfactual—substantial given a 2% target. Core CPI—a common proxy for underlying inflation trends—rose by roughly 0.5 percentage points, suggesting moderate, mostly transitory effects after excluding food and energy. Short-term professional forecasters’ expectations increased by about 0.8 percentage points, while long-term expectations remained well anchored. In turn, we find little evidence of an impact on unemployment or industrial production, consistent with a relatively steep Phillips curve in which accommodation transmitted more strongly to prices and short-term expectations than to output or employment.

The credibility of this FIT counterfactual is central to the causal interpretation of our estimates, so we subject it to diagnostics and robustness checks aimed at the main threats to identification. Anticipation and in-time placebo tests ask whether the estimated gaps predate FAIT or depend mechanically on the chosen intervention date. Donor-pool composition checks, leave-one-out exercises, and spillover-adjusted estimates assess whether the results are driven by a particular control economy or contaminated by U.S. spillovers. Extended post-intervention windows examine whether the findings survive the subsequent tightening phase. Residualization and additional controls for fiscal responses, commodity prices, supply-chain disruptions, global activity, monetary aggregates, and other inflation drivers address alternative explanations for the post-pandemic surge. Finally, Causal ARIMA (C-ARIMA; Menchetti et al. (2023)) constructs a treated-unit counterfactual without relying on a donor pool. Across these exercises, the main inflation and short-term expectations results remain materially unchanged and statistically significant.

Our study contributes to several strands of the literature. First, it adds to a large body of research evaluating the effectiveness of inflation-targeting regimes (see, e.g., Balima et al. (2020), Duncan et al. (2026)). Because the Federal Reserve is the only central bank to have implemented a flexible average version of canonical inflation targeting, our analysis represents a unique case. We evaluate this monetary policy framework using causal inference techniques, thus providing novel evidence on its macroeconomic effects.

Second, while most analyses of the post-pandemic surge focus on the nature of the shocks—whether supply- or demand-driven—or on how structural changes, such as a steeper Phillips curve, may have altered transmission, less attention has been paid to how monetary policy performance itself may have shifted under FAIT.⁶ We address this by empirically assessing how FAIT shaped inflation and real dynamics in the presence of such structural shifts.

Third, while some studies find little effect of FAIT’s announcement on household inflation expectations

Eggertsson (2023), Benigno and Eggertsson (2024a), Cerrato and Gitti (2022), Gitti (2024), and Smith et al. (2025).

⁶See, e.g., Duncan et al. (2022), Borio et al. (2023), and Gagliardone and Gertler (2023).

(Coibion et al. (2023), Binder et al. (2024)), our analysis of professional forecasters—whose forecasts more directly guide price- and wage-setting—identifies statistically significant dynamic causal effects, broadly consistent with experimental evidence in Hoffmann et al. (2022).⁷

Finally, we add to the literature on expectation anchoring. Poorly anchored long-term expectations can make temporary shocks have lasting inflationary effects (Bems et al. (2021)) and sharpen central bank trade-offs in stabilizing inflation, output, and employment (Beaudry et al. (2023), Bonomo et al. (2024)). Unlike prior regression-based tests focusing on correlations between short- and long-term expectations (Kumar et al. (2015)), we apply a novel SCM-based approach to estimate FAIT’s causal effects separately, finding that short-term expectations shifted while long-term expectations remained firmly anchored.

The remainder of the paper is organized as follows: Section 2 introduces the null hypothesis, data, and SCM methodology; Section 3 presents the main findings and robustness checks; and Section 4 concludes. The Appendix details data sources, while the Supplemental Appendix provides background on the FAIT framework, theoretical insights and derivations of the canonical New Keynesian model, and supplementary tables and figures.

2 Theory, Data, and Methods

The Null Hypothesis. The Federal Reserve adopted FAIT in August 2020 to reinforce the anchoring of long-term inflation expectations, marking a departure from the traditional let-by-gones-be-by-gones approach under FIT. By introducing outcome-based make-up strategies—conditioning current and future policy on past inflation misses—the framework signaled a willingness to tolerate moderate overshooting after a prolonged period of below-target inflation (see, e.g., Board of Governors (2020); Coulter et al. (2021)). These make-up strategies are not separate instruments in the policy toolkit; they describe outcomes that the framework makes admissible, with implementation left to policy-rate guidance, balance sheet guidance, asset purchases, or other tools. This commitment was soon tested during the post-pandemic recovery.

We assess whether this regime altered monetary policy’s conduct or effectiveness by formulating the null hypothesis: FAIT preserved the stability of long-term inflation expectations during the post-pandemic surge—just as FIT would have—and neither constrained policy responses to inflation nor changed the policy trajectory. If so, the shift should have left macroeconomic outcomes unaffected: inflation, output, employment, and expectations would be indistinguishable from those under FIT.

Theoretical framework. To frame the null hypothesis and guide the empirical analysis, we use a generalized workhorse New Keynesian model with demand shocks in the IS curve and cost-push shocks in the Phillips curve. The framework is useful because it: (i) isolates the transmission from the policy stance to inflation and real activity; (ii) separates non-policy shocks from policy-induced changes in the stance; and (iii) is consistent with the empirical evidence that long-run inflation expectations remained anchored after FAIT’s adoption. The model is deliberately stylized: its role is to clarify the sufficient statistic for monetary policy transmission, not to impose a structural reaction function for either FAIT or FIT.

Following Woodford (2008), equilibrium inflation converges to the stochastic (Beveridge–Nelson) trend $\pi_t^T \equiv \lim_{j \rightarrow +\infty} \mathbb{E}_t(\pi_{t+j})$, equal to the central bank’s target. Following Galí (2015), we set the target to

⁷Hoffmann et al. (2022) show that surveyed individuals significantly revise their inflation expectations upward when presented with a hypothetical ECB adoption of FAIT.

zero for tractability and log-linearize around the zero-inflation steady state. In the frictionless flexible-price allocation, there is no exploitable trade-off between nominal and real variables: the central bank can implement zero inflation, and the neutral nominal rate i_t^n coincides with the natural real rate r_t^n because expected inflation is normalized to zero. The relevant short-run object in the sticky-price economy is therefore the ex ante real policy gap, measured relative to this neutral benchmark.

The only extension relative to the purely conventional model concerns the policy stance entering aggregate demand. Following the shadow-rate New Keynesian framework of [Wu and Zhang \(2019\)](#), and consistent with the substitutability between QE and conventional monetary policy analyzed by [Sims and Wu \(2020\)](#), let i_t denote the observed administered short rate, s_t the shadow or unconstrained nominal policy stance, and \underline{i} the ELB, so that $i_t = \max\{\underline{i}, s_t\}$. We denote by \mathcal{I}_t^ν the effective nominal policy stance entering the IS curve:

$$\mathcal{I}_t^\nu \equiv \nu i_t + (1 - \nu) s_t, \quad 0 \leq \nu \leq 1. \quad (1)$$

The case $\nu = 1$ is the conventional specification in which only the observed short rate matters for aggregate demand; $\nu = 0$ is the shadow-rate specification in which unconventional policies are summarized by the shadow stance; and $0 < \nu < 1$ allows imperfect substitutability across tools. Away from the ELB, $i_t = s_t$ and $\mathcal{I}_t^\nu = i_t = s_t$ regardless of ν . At the ELB, however, forward guidance, balance sheet policy, and balance sheet guidance can shift s_t and hence the expected effective policy path even when i_t itself is constrained. The generalized IS equation and the standard Phillips curve, augmented with exogenous demand and cost-push shocks, are:

$$\text{Generalized IS curve: } x_t = \mathbb{E}_t(x_{t+1}) - \sigma^{-1}(\mathcal{I}_t^\nu - \mathbb{E}_t(\pi_{t+1}) - i_t^n) + \varepsilon_t, \quad (2)$$

$$\text{Phillips curve: } \pi_t = \beta \mathbb{E}_t(\pi_{t+1}) + \kappa x_t + u_t. \quad (3)$$

Key parameters include the discount factor $0 < \beta < 1$, the intertemporal elasticity of substitution $\sigma^{-1} > 0$ which pins down the slope of the IS curve, the Frisch elasticity of labor supply $\varphi^{-1} > 0$, the intratemporal elasticity of substitution between differentiated goods $\epsilon > 0$, the returns to scale parameter $0 \leq \alpha < 1$, and the [Calvo \(1983\)](#) price stickiness parameter $0 < \theta < 1$. Together, these determine the Phillips curve slope: $\kappa \equiv \left(\frac{(1-\theta)(1-\beta\theta)}{\theta}\right) \left(\frac{1-\alpha}{1-\alpha+\alpha\epsilon}\right) \left(\sigma + \frac{\varphi+\alpha}{1+\alpha}\right)$. The output gap is $x_t \equiv y_t - y_t^n$, where y_t is actual output and y_t^n is its flexible-price counterpart. The model links the output gap to the employment gap as $x_t = (1 - \alpha)(n_t - n_t^n)$.

Proposition 1 (Effective stance and policy-tool mapping) In equations (2)–(3), the policy toolkit affects aggregate demand through the current and expected future path of the effective real policy gap, $\mathcal{I}_t^\nu - \mathbb{E}_t \pi_{t+1} - i_t^n$. Rate guidance shifts expected administered rates. Balance sheet actions and balance sheet guidance can shift the shadow stance by compressing risk premia, term premia, or private borrowing spreads. In the simple QE mapping of [Wu and Zhang \(2019\)](#), let r_t^B denote the private return relevant for household and firm decisions and let b_t^G denote central bank bond holdings. If

$$r_t^B = i_t + rp_t, \quad rp_t = rp - \varsigma(b_t^G - \bar{b}^G), \quad \varsigma > 0, \quad (4)$$

then asset purchases reduce the private return by lowering the risk premium. Equivalently, the same private

return can be represented by a lower shadow stance,

$$s_t = i_t - \varsigma(b_t^G - \bar{b}^G), \quad \mathcal{I}_t^\nu = i_t - (1 - \nu)\varsigma(b_t^G - \bar{b}^G). \quad (5)$$

Thus, even if the administered short rate is unchanged at the ELB, changes in the current or expected balance sheet can shift s_t , \mathcal{I}_t^ν , and the expected effective policy-gap path. Current rates, rate guidance, balance sheet actions, and balance sheet guidance are therefore implementation tools; for the model's purposes, they matter insofar as they shift the path of \mathcal{I}_t^ν .

Supplementary Appendix B develops this mapping and the forward solution in more detail. The notation uses ν rather than the v in [Wu and Zhang \(2019\)](#) to avoid confusion with the non-policy shock term v_t below. The key implication is policy-path equivalence: conditional on the same non-policy shocks and transmission parameters, different implementation packages that generate the same expected path for $\mathcal{I}_{t+j}^\nu - i_{t+j}^n$ generate the same inflation, output, employment, and expectations paths.

We do not impose a specific reaction function to characterize FAIT or to distinguish it from FIT. Unlike approaches based on [Taylor \(1993\)](#) rule variants that use inflation averaging as the guidepost for make-up strategies (e.g., [Duncan et al. \(2022\)](#)), we refrain from formalizing a particular implementation. Instead, we solve equations (2)–(3) forward, conditional on a given expected effective policy path, to decompose outcomes into: (a) the transmission of current and expected future non-policy shocks and (b) the transmission of current and expected future deviations of \mathcal{I}_t^ν from the neutral rate i_t^n .

Proposition 2 (Forward-looking solution and counterfactual policy paths) Suppose long-run expectations remain anchored and the terminal condition in equation (11) below holds. Then the generalized New Keynesian system admits the forward-looking solution

$$\pi_t = -\kappa\sigma^{-1} \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t (\mathcal{I}_{t+j}^\nu - i_{t+j}^n) + v_t, \quad (6)$$

$$x_t = -\sigma^{-1} \sum_{j=0}^{+\infty} \gamma_j \mathbb{E}_t (\mathcal{I}_{t+j}^\nu - i_{t+j}^n) + w_t, \quad (7)$$

and

$$n_t - n_t^n = \frac{x_t}{(1 - \alpha)}. \quad (8)$$

The weights ψ_j and γ_j satisfy

$$\psi_j = ((1 + \beta) + \kappa\sigma^{-1}) \psi_{j-1} - \beta\psi_{j-2}, \quad \forall j \geq 1, \quad (9)$$

$$\psi_0 = 1, \quad \psi_{-1} = 0,$$

$$\gamma_j = \psi_j - \beta\psi_{j-1}, \quad \forall j \geq 0. \quad (10)$$

The non-policy terms are $v_t \equiv \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t(e_{t+j})$, where $e_t \equiv \kappa\varepsilon_t - \mathbb{E}_t(u_{t+1} - u_t)$, and $w_t \equiv [v_t - \beta\mathbb{E}_t(v_{t+1}) - u_t]/\kappa$. The terminal condition is

$$\lim_{j \rightarrow \infty} (\psi_j \mathbb{E}_t(\pi_{t+j}) - \beta\psi_{j-1} \mathbb{E}_t(\pi_{t+j+1})) = 0. \quad (11)$$

For regimes $m \in \{FAIT, FIT\}$, holding shocks and transmission parameters fixed, the implied outcome gaps are

$$\pi_t^{FAIT} - \pi_t^{FIT} = -\kappa\sigma^{-1} \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t \left(\mathcal{I}_{t+j}^{\nu, FAIT} - \mathcal{I}_{t+j}^{\nu, FIT} \right), \quad (12)$$

$$y_t^{FAIT} - y_t^{FIT} = -\sigma^{-1} \sum_{j=0}^{+\infty} \gamma_j \mathbb{E}_t \left(\mathcal{I}_{t+j}^{\nu, FAIT} - \mathcal{I}_{t+j}^{\nu, FIT} \right), \quad (13)$$

$$n_t^{FAIT} - n_t^{FIT} = \frac{1}{1-\alpha} (y_t^{FAIT} - y_t^{FIT}), \quad (14)$$

and, for inflation expectations τ periods ahead,

$$\mathbb{E}_t(\pi_{t+\tau}^{FAIT}) - \mathbb{E}_t(\pi_{t+\tau}^{FIT}) = -\kappa\sigma^{-1} \sum_{j=0}^{+\infty} \left(\frac{\psi_j}{\psi_{j+\tau}} \right) \psi_{j+\tau} \mathbb{E}_t(\mathcal{I}_{t+j+\tau}^{\nu, FAIT} - \mathcal{I}_{t+j+\tau}^{\nu, FIT}), \quad \forall \tau \geq 1. \quad (15)$$

Proposition 2 is the theoretical basis for the null hypothesis. If $\mathcal{I}_{t+j}^{\nu, FAIT} = \mathcal{I}_{t+j}^{\nu, FIT}$ for all $j \geq 0$, then inflation, output, employment, and expectations coincide under FAIT and FIT. If the effective paths diverge for some horizon, the outcome gaps in equations (12)–(15) summarize the macroeconomic implications of the change in policy stance. This is why our empirical estimand is the effect of the FAIT policy environment relative to a FIT counterfactual, not the separately identified structural contribution of rate guidance, LSAP sequencing, balance sheet guidance, the shortfalls language, or the averaging clause.

At FAIT’s adoption, the federal funds rate was already at the ELB, making guidance about the future policy stance central. The “low-for-longer” approach—reinforced by balance sheet guidance in September and December 2020 (see Waller (2022))—became a primary means of delivering accommodation and implementing the make-up strategies in FAIT through inflation averaging. Following a period of below-target inflation, inflation averaging would naturally further delay the policy-rate liftoff horizon, as shown in Duncan et al. (2022).

The model also clarifies the transmission margin. The policy mix matters through the expected effective policy-gap path: forward guidance shifts expected administered rates, while balance sheet actions and guidance shift the shadow component of the stance. The inflation-output trade-off induced by any such path depends on the transmission parameters, especially the Phillips-curve slope κ . Using standard pre-pandemic New Keynesian calibrations ($\sigma = 1$, $\beta = 0.99$, and $\kappa \in [0.0264, 0.204]$), the weights $-\kappa\sigma^{-1}\psi_j$ and $-\sigma^{-1}\gamma_j$ vary sharply with κ . A steeper Phillips curve amplifies the inflation response while dampening the output response relative to inflation: for an expected effective-policy differential four quarters ahead ($j = 4$), the sacrifice ratio $\frac{y_t^{FAIT} - y_t^{FIT}}{\pi_t^{FAIT} - \pi_t^{FIT}} = \frac{\gamma_j}{\kappa\psi_j}$ falls from 8.86 to 1.84 as κ rises from 0.0264 to 0.204.⁸

Although we do not formally test for a change in the Phillips-curve slope, elevated inflation and short-run inflation expectations under FAIT relative to FIT, paired with modest real effects on output and employment, would be consistent with monetary policy operating in a steeper post-pandemic Phillips-curve environment than implied by pre-pandemic flat-slope estimates. Several mechanisms unrelated to FAIT may help explain such a shift: changes in consumption patterns from sticky-priced services to more flexible-priced goods (Aoki (2001), Rubbo (2023)); pass-through of higher import inflation (Martínez-García and Wynne (2010)); more

⁸See Supplementary Appendix B for details.

frequent price adjustment during high-inflation periods (Forbes et al. (2022), Montag and Villar (2025)); pandemic-induced supply and trade disruptions (Guerrieri et al. (2021), Guerrieri et al. (2022), Ari et al. (2023), Benigno and Eggertsson (2023), Benigno and Eggertsson (2024a), Benigno and Eggertsson (2024b)); high commodity price pass-through and tight labor markets (Baumeister (2023), Alp et al. (2023)); and robust fiscal support (Bianchi et al. (2023)) driving demand beyond pandemic-constrained supply.

While existing evidence does not suggest that FAIT directly altered transmission, this possibility complicates attribution. Any outcome differences are therefore best viewed as upper bounds on the macroeconomic impact of FAIT-induced policy changes, since they may capture both policy-driven effects and any transmission changes that FAIT itself induced or permitted. In either case, outcomes would have differed under FAIT relative to FIT, which defines our alternative hypothesis and motivates the focus on realized outcome gaps.

Donor Pool and Outcome Variable. To estimate the counterfactual under FIT, we apply the SCM using a carefully selected donor pool. We start from the 38 OECD economies, retaining those classified as advanced economies and identified as inflation targeters in Duncan et al. (2026) with an explicit target of 2%, ensuring comparability with the Federal Reserve’s explicit shift to FIT in January 2012.⁹ We prioritize economies that underwent similar pandemic-related shocks, as highlighted in Blanchard and Bernanke (2024), and potential structural shifts—such as a steepening of the Phillips curve—outlined in Ari et al. (2023). We then further limit the pool to countries that consistently maintained a 2% inflation objective or 2% midpoint throughout 2012–2022, in line with the Federal Reserve’s stated objective.¹⁰ These conditions are verified using central bank documentation and Duncan et al. (2026). Our final donor pool consists of six economies: Canada, the Czech Republic, Israel, New Zealand, Sweden, and the U.K.

Our analysis covers the post-intervention period from the introduction of FAIT in August 2020 (2020:M8) to February 2022 (2022:M2), ending before monetary policy shifted toward tightening and forward guidance pivoted to a “higher-for-longer” strategy. This restriction also helps mitigate the confounding effects of Russia’s invasion of Ukraine on February 24, 2022, which triggered sharp commodity price shocks with disproportionately larger impacts on some European economies in our donor pool.¹¹ The pre-intervention period spans from the adoption of FIT in January 2012 (2012:M1) to July 2020 (2020:M7).

The primary outcome variable (OV) is the year-over-year log change in seasonally adjusted headline CPI inflation: $\pi_t^{CPI} \equiv 100 \cdot (\ln(CPI_t) - \ln(CPI_{t-12}))$. We use headline CPI inflation to ensure consistency between the treated unit and the donor pool. Furthermore, we consider core CPI inflation (excluding food and energy), which, despite some critiques, is often used as a proxy for underlying inflation trends by removing highly volatile components.

Unlike donor pool countries, where central banks define their inflation targets in terms of CPI, the Federal Reserve shifted its target from CPI to PCE inflation in 2000.¹² However, CPI-PCE inflation differences have

⁹The inflation-targeting classification follows Duncan et al. (2026), who document adoption dates and institutional requirements for inflation-targeting central banks. Applying the OECD, advanced-economy restriction leaves a natural starting set that includes Australia, Canada, the Czech Republic, Iceland, Israel, Japan, South Korea, New Zealand, Norway, Sweden, and the U.K., while treating the U.S. as the treated unit.

¹⁰This final restriction excludes otherwise relevant advanced-economy inflation-targeting cases whose objective was not a constant 2% target or midpoint over the full sample—Australia’s 2–3% range, Iceland’s 2.5% target, Japan’s change from 1% to 2% in 2013, South Korea’s target shift from a range of 2.5–3.5 to 2% in 2016, and Norway’s move from 2.5% to 2% in 2018. These exclusions sharpen comparability in the objective of policy rather than in every institutional detail.

¹¹We relax this timing restriction in our robustness checks and obtain qualitatively similar results.

¹²As noted in Board of Governors (2000), the shift was motivated by the PCE deflator’s superior ability to reflect changes

remained modest on average: headline CPI inflation exceeded headline PCE inflation by only 0.3 percentage points from January 2000 to February 2022 (Janson et al. (2020)). During the pre-intervention period, average inflation rates were 1.58% for CPI and 1.40% for PCE, with an estimated difference of approximately 0.18 percentage points and a correlation of 0.993 (p-value = 0.00). To ensure robustness, we also estimate the model using PCE inflation as an alternative OV.¹³

Estimation Strategy. We employ SCM to construct a synthetic counterfactual for the U.S. inflation in the absence of FAIT, following Abadie, Diamond, et al. (2010) and Abadie, Diamond, et al. (2015).¹⁴ SCM assigns weights to donor units to best replicate trends of the U.S. inflation rate—the OV—before FAIT’s adoption. These weights are estimated by minimizing the quadratic differences between the treated unit (the OV) and the synthetic control (the counterfactual OV, constructed as a weighted average of control units) using pre-intervention data. The dynamic treatment effect (DTE) is computed as the difference between actual inflation (π_t) and the synthetic control (π_t^S): $DTE_t \equiv \pi_t - \pi_t^S$, for each post-intervention period ($T_0 \leq t \leq T$). This is the empirical counterpart of the left-hand side of equation (12). The average treatment on the treated (ATT) is then calculated as the mean of the DTEs over the post-intervention period:

$$ATT \equiv \frac{1}{T - T_0 + 1} \sum_{t=T_0}^T DTE_t, \quad (16)$$

where T_0 and T denote the first and last post-intervention periods, respectively.

Our design incorporates several key features that enhance the reliability of the SCM: (A) a relatively long pre-intervention period (103 months), (B) a carefully selected donor pool of 6 control units with OVs closely matching the treated unit, and (C) a pre-intervention period characterized by relatively low variability in inflation shocks.¹⁵ These conditions are favorable for SCM, as noted by Abadie (2021). Under assumptions closely aligned with (A)–(C), the synthetic control estimator is unbiased when the data-generating process (DGP) follows a vector autoregressive model. If the DGP follows a linear factor model, the estimator’s bias is also bounded and converges to zero—provided the pre-intervention fit is sufficiently good (Abadie (2021)).

That said, we also employ the Augmented SCM (ASCM) introduced by Ben-Michael et al. (2021), which improves the pre-intervention fit and corrects for (potential) bias using ridge regression and auxiliary predictors such as the government surplus as a share of GDP and percent changes in M3. Unlike the standard SCM, the ASCM permits negative weights, providing greater flexibility in capturing complex economic relationships between the treated unit and control units.¹⁶

Additionally, following Doudchenko and Imbens (2016), we residualize both pre- and post-intervention OVs against country effects and key global and domestic inflation drivers (e.g., Ball et al. (2022), Borio et al. (2023), Gagliardone and Gertler (2023), and Bernanke and Blanchard (2025)). These include the Global Supply Chain Pressures Index, the Kilian Index (global economic activity), international energy in consumption patterns, its broader coverage, and its incorporation of more comprehensive data revisions beyond seasonal adjustments.

¹³In the Supplementary Appendix E, Table S1 presents summary statistics for headline CPI, core CPI (excluding food and energy), PCE inflation rates, and other indicators in the U.S. and the donor pool, while Figure S1 visualizes headline CPI inflation trends across these economies, and Figure S2 depicts the CPI-PCE inflation differential over time.

¹⁴For a comprehensive exposition, see Abadie (2021).

¹⁵See descriptive statistics in Table S1 and Figure S1 in the Supplementary Appendix E.

¹⁶Following Bove et al. (2014), negative weights can be interpreted as isolating underlying global factors. For instance, if the treated unit is primarily influenced by factor A , while control units 1 and 2 are affected by both A and B and only B , respectively, the difference between control units 1 and 2 helps estimate the impact of factor A on the treated unit so a linear combination with a negative weight arises naturally in this context.

price inflation, international food price inflation, government surplus as a share of GDP, changes in M3 money supply, industrial production growth, and the overnight interest rate. We then apply ASCM to the residualized OVs, following [Ben-Michael et al. \(2021\)](#), to control for external factors beyond FAIT that may have influenced inflation.¹⁷

Finally, we assess statistical significance using p-values and confidence intervals, following [Chernozhukov et al. \(2021\)](#).

3 Empirical Results

3.1 Main Findings

[Table 1](#) and [Figure 1](#) present our main results using headline CPI inflation and Core CPI inflation as the OVs. The first two rows in [Table 1](#) report ATT estimates and corresponding p-values for various specifications and estimators included for sensitivity analysis. Bias-corrected estimates from ASCM appear in columns [2]-[4] and [6]-[8], while residualized inflation rates are analyzed over the full period using the covariates listed above (columns [3]-[4] and [7]-[8]).¹⁸ To further evaluate robustness, we assess the impact of excluding Canada from the donor pool, given its high economic integration with the U.S. (columns [4] and [8]).

[Table 1](#) also provides synthetic weights, pre-intervention root mean squared prediction error (RMSPE) and mean absolute prediction error (MAPE), and details on diagnostic and robustness tests (elaborated below). The low RMSPE values indicate an excellent pre-intervention fit, aligning with the observed U.S. inflation trajectory and similar inflation dynamics among control units from 2012:M1 to 2020:M7.¹⁹ The estimated weights show notable sparsity, with some control units contributing minimally to the synthetic control. No single unit dominates, but the largest contributors are core Anglosphere economies, primarily Canada and the U.K., and occasionally New Zealand. Some negative weights appear, but they remain relatively small.

Our results largely exhibit the expected sign and statistically significant effects. Under our preferred specification, the ATT estimate for headline CPI inflation is 1.153 percentage points (column [3]). Given the pre-FAIT average inflation rate of 1.58%, this represents a relatively large intervention effect. The estimate also survives residualization on global supply-chain pressures, commodity prices, fiscal conditions, broad money growth, industrial production, and the overnight rate, which means the post-FAIT U.S. gap is not mechanically driven by the most direct observable confounders in the specification. The dynamic gaps in [Figure 1](#) reinforce this interpretation: the estimated post-FAIT effect is concentrated in the 2021 inflation surge rather than in a visible pre-existing divergence between the U.S. and its synthetic counterpart. This timing is important for interpretation. The result is not that FAIT explains the entire post-pandemic inflation surge; it is that, relative to a counterfactual built from comparable inflation-targeting economies, the U.S. experienced an additional and statistically detectable inflation gap during precisely the window in which the framework made above-target outcomes more tolerable and liftoff guidance remained lower-for-longer.

¹⁷We distinguish between SCM predictors, used in the matching process for SCM estimation, and covariates for residualization, which help remove their potential effects from the outcome, though some overlap exists.

¹⁸The findings remain consistent, even when restricting to the main set of covariates or residualizing only over the pre-pandemic period (available upon request).

¹⁹See details in [Table S1](#) and [Figure S1](#) in the [Supplementary Appendix E](#).

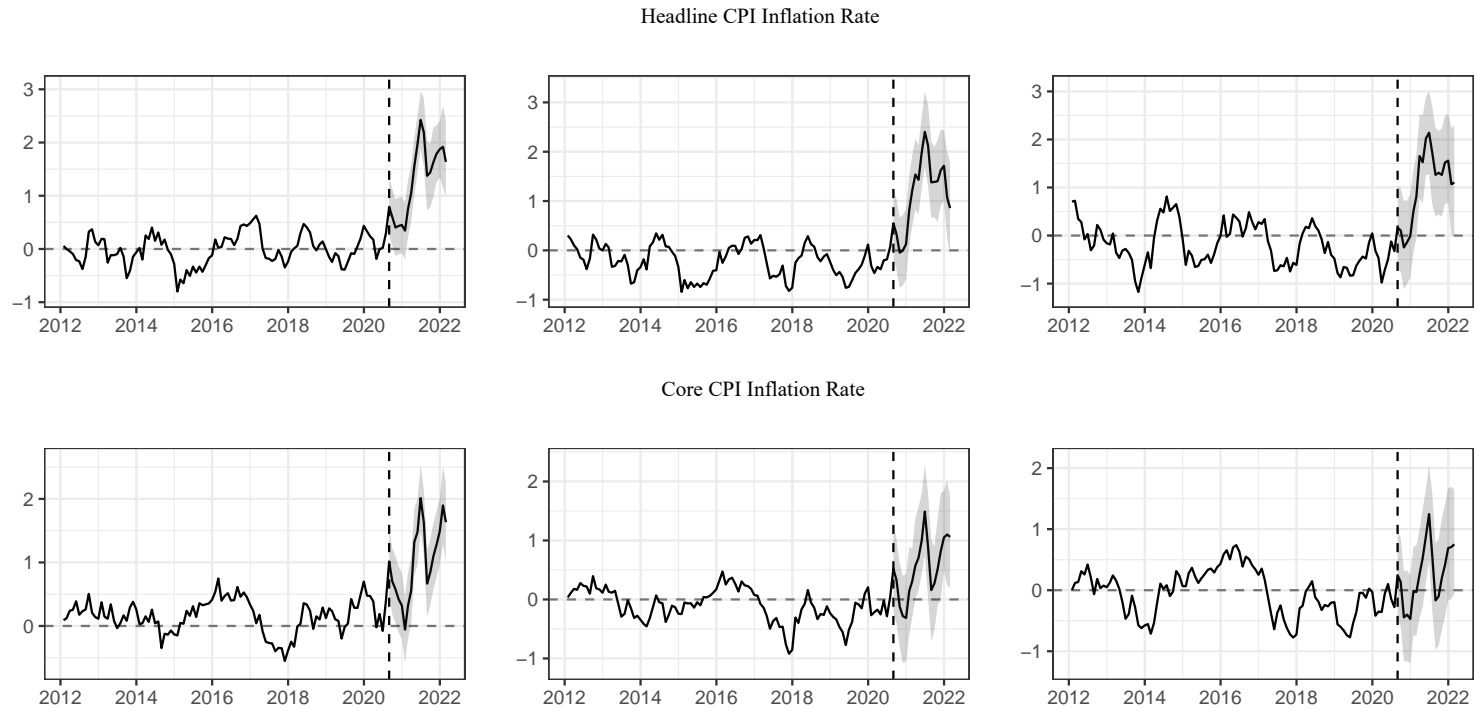
Table 1. The Effect of Adopting FAIT on the CPI Inflation Rate

	Headline CPI Inflation				Core CPI Inflation			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ATT	1.257	1.296	1.153	1.018	1.094	1.010	0.537	0.263
p-value	0.000	0.000	0.000	0.000	0.010	0.052	0.000	0.197
Bias correction	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Residualization	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>
Dropping Canada	<i>No</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>Yes</i>
Weights								
Canada	0.438	0.438	0.414	...	0.541	0.575	0.404	...
Czech Republic	0.061	0.047	0.168	0.078	0.000	-0.016	-0.038	-0.010
Israel	0.000	-0.006	0.002	0.167	0.000	-0.040	0.141	0.295
New Zealand	0.080	0.065	0.117	0.416	0.000	0.026	0.211	0.379
Sweden	0.039	0.041	-0.055	0.017	0.000	-0.056	-0.022	0.018
United Kingdom	0.381	0.414	0.354	0.321	0.459	0.511	0.304	0.317
Diagnostics & Robustness								
RMSPE	0.282	0.283	0.386	0.482	0.360	0.302	0.295	0.381
MAPE	0.226	0.226	0.314	0.408	0.313	0.253	0.236	0.313
Estimated bias	...	-0.009	0.018	-0.022	...	0.069	-0.069	-0.035
Improv. vs. unif. weights	40.89	40.78	18.71	7.95	55.44	62.62	36.91	26.54
No anticipation (p-val)	0.320	0.302	0.912	0.609	0.287	0.181	0.971	0.520
In-time placebo (p-val)	0.982	0.979	0.290	0.034	0.824	0.571	0.198	0.534

Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.

Note: The p-value for the average treatment on the treated (ATT) corresponds to the joint null hypothesis that all post-intervention effects are zero. RMSPE and MAPE denote the pre-intervention root mean squared prediction error and mean absolute prediction error, respectively. When the Augmented SCM is used, the estimated bias from a potentially weak pre-intervention fit is reported. The auxiliary predictors used are the government surplus as a share of GDP and percent changes in M3. The row labeled 'Improv. vs. unif. weights' shows the percentage improvement relative to using uniform weights instead of synthetic control weights. The no-anticipation test (p-val) provides the p-value for the null hypothesis that the outcome gap was zero one month before FAIT adoption, while the in-time placebo test (p-val) tests whether the ATT was zero during the 24-month period between the placebo treatment date (2018:M8) and the actual treatment date (2020:M8). Residualization of outcome variables is conducted using country effects and key inflation drivers, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR). Specifications [4] and [8] exclude Canada from the donor pool as part of a sensitivity analysis.

Figure 1. Outcome Gap: Headline and Core CPI Inflation Rates



Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.

Note: The figures display the gap between actual values and synthetic estimates of the outcome variable, with 95% confidence intervals. The intervention date (August 2020) is marked by a dashed vertical line in each plot. The left panels show augmented synthetic control estimates (columns [2] and [6] in [Table 1](#)), while the center panels present augmented synthetic control with residualization (columns [3] and [7] in [Table 1](#)). The right panels illustrate augmented synthetic control with residualization, excluding Canada from the donor pool (columns [4] and [8] in [Table 1](#)). Residualization of inflation rates is conducted using country effects and key inflation drivers, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR).

We also assess FAIT’s impact on Core CPI inflation, often considered a proxy for underlying inflation trends. As shown in [Table 1](#), residualized specifications yield ATT estimates of 0.537 percentage points with the full donor pool (column [7]) and 0.263 percentage points when Canada is excluded (column [8]), notably lower than those for headline CPI inflation. The smaller core effect is consistent with the importance of food, energy, and relative-price shocks during the episode, but the positive and statistically significant preferred core estimate indicates that the result is not confined to volatile headline components. This suggests that FAIT’s impact on inflation, net of food and energy, was moderate and largely perceived as transitory. The contrast between headline and core inflation also helps discipline the interpretation: the estimates are consistent with a policy environment that amplified or accommodated inflationary pressures at the margin, not with a framework effect large enough to dominate the supply, energy, and sectoral shocks emphasized elsewhere in the literature.

Excluding Canada from the donor pool—typically the largest weight in the synthetic control estimator—does not significantly affect the results for headline CPI inflation ([Table 1](#), column [4]). However, for core CPI inflation, removing Canada slightly lowers the ATT estimate to 0.3 percentage points (column [8]) and leads to reduced precision and a weaker pre-intervention fit.

Since the Federal Reserve targets PCE inflation rather than CPI inflation, we test robustness by replacing U.S. CPI inflation with PCE inflation as the OV while retaining CPI inflation for donor pool countries (as no equivalent PCE inflation target exists for them). ATT estimates comparable to columns [2] and [3] in [Table 1](#) remain close to 1 percentage point, suggesting that our findings are unlikely driven by differences in target inflation measures between the U.S. and donor pool countries.²⁰ Taken together, the headline, core, and PCE exercises point to the same qualitative conclusion: the estimated effect is economically meaningful, but it is a moderate margin of the inflation surge rather than an accounting explanation for the entire post-pandemic episode.

3.2 Exploring the Transmission Mechanism

To examine potential transmission mechanisms, we conduct parallel estimations using expected inflation measures from professional forecasters, including sophisticated forecasters in business and financial markets (polled by Consensus ForecastTM), from short-term (one-quarter ahead) to long-term (6–10-years ahead) horizons. [Table 2](#) and [Figure 2](#) present the results. Our estimated ATTs range from 0.834 to 1.031 percentage points for short-term expectations (columns [1]–[4]), while for long-term expectations the effects are much smaller, between 0.013 and 0.103 percentage points, and generally statistically insignificant (columns [5]–[8]).²¹

This exercise is similar to a shock-anchoring test, which assesses whether short-term expectations adjust to an aggregate shock while long-term expectations remain stable around the target (see, e.g., [Apokoritis et al. \(2025\)](#)). Rather than relying on regression-based tests that examine the predictive relationship between short- and long-term expectations ([Kumar et al. \(2015\)](#)), we estimate causal effects separately at short and long horizons using expectations indicators and synthetic control estimators. The contrast is informative: FAIT appears to have shifted near-term beliefs about the inflation path without producing a corresponding

²⁰See details in columns [1]–[2] of [Table S2](#) in the [Supplementary Appendix E](#).

²¹Additional results at medium-term horizons, which further complement this evidence, can be found in columns [3]–[6] of [Table S2](#) in the [Supplementary Appendix E](#). These findings indicate that much of the impact on inflation under FAIT was perceived as short-lived, largely dissipating within a year.

drift in the long-run nominal anchor. This pattern is precisely the one implied by a credible make-up strategy in the model: the expected near-term effective policy path can move short-run inflation expectations, while the terminal condition remains anchored by the unchanged long-run target. Had FAIT generated de-anchoring, one would expect larger and more persistent effects at long horizons. Instead, [Table 2](#) shows that the long-horizon point estimates are close to zero and statistically weak, while the short-horizon estimates are large and precisely estimated. Consistent with this, our results suggest that long-run expectations remained well-anchored following FAIT’s adoption.

Compared to recent studies based on daily household surveys—such as [Coibion et al. \(2023\)](#) and [Binder et al. \(2024\)](#)—which find no effect of FAIT’s announcement on household inflation expectations, our analysis using professional forecasters’ surveys reveals statistically significant effects, though limited to short-term horizons. This finding aligns with experimental results from [Hoffmann et al. \(2022\)](#), where individuals revised their expectations upward when presented with a hypothetical ECB adoption of FAIT. The divergence is unsurprising, as professional forecasters and financial market participants tend to have more anchored expectations, greater attentiveness to inflation trends, and lower forecast errors ([D’Acunto et al. \(2024\)](#)). Central banks also prioritize these expectations, as they influence business decisions and, by extension, play a central role in shaping pricing behavior—the Phillips curve—and the broader transmission and trade-offs of monetary policy ([Apokoritis et al. \(2025\)](#)).

While short-term expectations appear highly sensitive, our findings for long-term expectations align with the baseline assumptions of the New Keynesian model underlying our null and alternative hypotheses. Building on this, we examine FAIT’s impact on economic activity, a crucial factor in assessing the Phillips curve’s slope and broader monetary policy trade-offs. Using the unemployment rate and industrial production as outcome variables, we find little statistically significant and robust evidence of a compelling causal link, even when considering alternative specifications. This asymmetry—visible inflation and short-run-expectations effects but muted real effects—is the empirical pattern motivating our cautious Phillips-curve interpretation. The results are presented in [Table 3](#).

To assess the inflation–unemployment trade-off, we examine unemployment through the New Keynesian model. We control for energy prices and focus on the pre-Ukraine-war inflationary period, ending before Russia’s invasion on February 24, 2022, to limit the influence of the subsequent energy shock and related wage–price dynamics. Because the model summarizes monetary policy through the current and expected future effective policy-gap path, and late-2020 rate and balance-sheet guidance helped shape that path [Waller \(2022\)](#), we also include the overnight rate and M3 growth as covariates. These controls do not separately identify each instrument; rather, they reduce the risk that contemporaneous rate movements or balance-sheet-related money growth mechanically account for the estimated gaps. In the preferred residualized specification using the full donor pool, the unemployment effect is negative, as accommodation would imply, but statistically insignificant, at about -0.46 percentage points ([Table 3](#), column [3]).

FAIT’s effects, concentrated primarily on inflation and short-term inflation expectations, while showing muted and largely insignificant effects on unemployment, are consistent with the hypothesis that the Phillips curve may have steepened post-pandemic. However, this does not constitute direct evidence of a structural shift, nor does it imply that FAIT caused any steepening. The more cautious interpretation is that monetary policy likely operated in a steeper-than-anticipated environment.

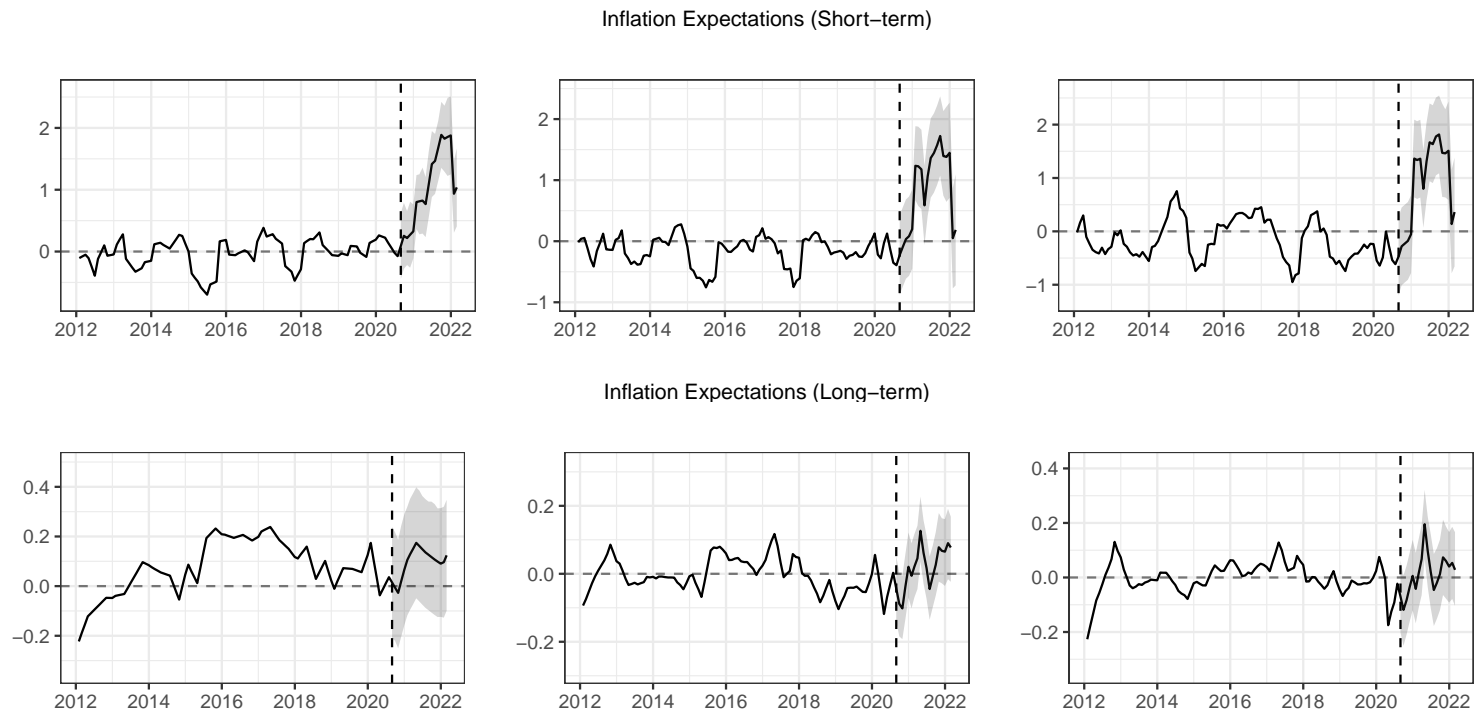
Table 2. The Effect of Adopting FAIT on Inflation Expectations

	Short-term Expected Inflation				Long-term Expected Inflation			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ATT	1.031	1.023	0.834	0.884	0.103	0.096	0.019	0.013
p-value	0.000	0.000	0.000	0.000	0.606	0.727	0.056	0.161
Bias correction	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Residualization	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>
Dropping Canada	<i>No</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>Yes</i>
Weights								
Canada	0.585	0.586	0.575	...	0.000	-0.034	0.743	...
Czech Republic	0.000	-0.004	0.146	0.174	0.042	0.070	0.090	0.632
Israel	0.000	-0.017	-0.008	0.151	...	...	...	...
New Zealand	0.073	0.050	0.134	0.411	0.000	-0.031	0.080	0.273
Sweden	0.061	0.070	-0.126	-0.016	0.311	0.330	-0.005	0.096
United Kingdom	0.282	0.315	0.278	0.280	0.647	0.665	0.092	-0.001
Diagnostics & Robustness								
RMSPE	0.237	0.235	0.281	0.408	0.129	0.128	0.048	0.058
MAPE	0.184	0.184	0.208	0.350	0.107	0.106	0.039	0.042
Estimated bias	...	-0.005	0.074	-0.010	...	0.008	0.000	0.001
Improv. vs. unif. weights	36.98	37.34	31.38	9.716	26.24	27.01	22.10	20.29
No anticipation (p-val)	0.726	0.744	0.164	0.139	0.770	0.901	0.970	0.679
In-time placebo (p-val)	1.000	1.000	0.771	0.046	1.000	1.000	0.016	0.561

Source: Dallas Fed's Database of Global Economic Indicators (Grossman et al. (2014)); authors' calculations.

Note: Short-term expected inflation refers to the projected four-quarter change, one quarter ahead, while long-term expected inflation corresponds to the expected rate 6-10 years into the future. The p-value for the average treatment on the treated (ATT) tests the joint null hypothesis that all post-intervention effects are zero. RMSPE and MAPE denote the pre-intervention root mean squared prediction error and mean absolute prediction error, respectively. When the Augmented SCM is used, the estimated bias from a potentially weak pre-intervention fit is reported. The auxiliary predictors used are the government surplus as a share of GDP and percent changes in M3. The row labeled 'Improv. vs. unif. weights' shows the percentage improvement relative to using uniform weights instead of synthetic control weights. The no-anticipation test (p-val) assesses the null hypothesis that the outcome gap was zero one month before FAIT adoption, while the in-time placebo test (p-val) tests whether the ATT was zero during the 24-month period between the placebo treatment date (2018:M8) and the actual treatment date (2020:M8). Residualization of outcome variables is conducted using country effects and key inflation drivers, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR). Specifications [4] and [8] exclude Canada from the donor pool as part of a sensitivity analysis. Israel is excluded from specifications [5]-[8] due to the unavailability of long-term expected inflation data.

Figure 2. Outcome Gap: Expected Inflation Rates



Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.

Note: The figures illustrate the gap between actual values and synthetic estimates of the outcome variable, along with the 95% confidence intervals. The intervention date (August 2020) is marked by a dashed vertical line in each plot. The left panels display augmented synthetic control estimates (columns [2] and [6] in [Table 2](#)), the center panels show augmented synthetic control with residualization (columns [3] and [7] in [Table 2](#)), and the right panels present augmented synthetic control with residualization, excluding Canada from the donor pool (columns [4] and [8] in [Table 2](#)). Residualization of inflation rates is conducted using country effects and key inflation drivers, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR).

Table 3. The Effect of Adopting FAIT on Economic Activity

	Unemployment Rate				Industrial Production			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ATT	-0.114	0.237	-0.463	-1.024	-0.052	0.327	-0.348	-1.426
p-value	1.000	0.766	0.160	0.151	0.483	0.417	0.418	0.000
Bias correction	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Residualization	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>
Dropping Canada	<i>No</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>Yes</i>
Weights								
Canada	0.604	1.176	0.665	...	0.668	0.698	0.734	...
Czech Republic	0.396	0.306	0.425	0.455	0.000	-0.041	-0.028	0.245
Israel	0.000	0.131	-0.010	0.002	0.032	0.039	0.122	0.226
New Zealand	0.000	-0.512	-0.060	0.004	0.191	0.163	0.093	0.441
Sweden	0.000	-0.630	0.013	0.665	0.000	-0.031	-0.010	-0.012
United Kingdom	0.000	0.529	-0.034	-0.126	0.109	0.173	0.088	0.100
Diagnostics & Robustness								
RMSPE	1.038	0.622	0.767	0.958	2.049	1.987	1.930	2.835
MAPE	0.797	0.447	0.545	0.525	1.647	1.607	1.642	2.329
Estimated bias	...	-0.316	0.089	0.070	...	-0.166	-0.098	0.001
Improv. vs. unif. weights	25.62	55.43	27.33	19.54	30.38	32.46	28.61	5.99
No anticipation (p-val)	0.032	0.029	0.052	0.032	0.328	0.192	0.421	0.032
In-time placebo (p-val)	0.007	0.045	0.116	0.000	0.991	0.787	0.084	0.177

Source: Dallas Fed's Database of Global Economic Indicators (Grossman et al. (2014)); authors' calculations.

Note: The p-value for the average treatment on the treated (ATT) unit corresponds to the joint null hypothesis that all effects are zero over the post-intervention period. RMSPE and MAPE represent the pre-intervention root mean squared prediction error and pre-intervention mean absolute prediction error, respectively. When the Augmented SCM is used, the estimated bias from a potentially weak pre-intervention fit is reported. The auxiliary predictors used are the government surplus as a share of GDP and percent changes in M3. The row labeled 'Improv. vs. unif. weights' shows the percentage improvement relative to using uniform weights instead of synthetic control weights. The no anticipation test (p-val) provides the p-value for the null hypothesis that the outcome gap was zero one month before FAIT adoption. The in-time placebo test (p-val) tests the null hypothesis that the ATT was zero during the 24-month period between the placebo treatment date (2018:M8) and the actual treatment date (2020:M8). Residualization of outcome variables is conducted using country effects and key macroeconomic factors, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), and the overnight rate (ONR). Specifications [4] and [8] exclude Canada from the donor pool as part of a sensitivity analysis.

The industrial-production results point in the same direction under the preferred residualized full-donor specification: the estimate is negative but statistically insignificant at about -0.35 percentage points (Table 3, column [7]). The statistically significant industrial-production estimate appears only when Canada is excluded (column [8]), a specification with weaker pre-intervention fit. Thus, the real-side evidence is best read as an absence of robust expansionary effects rather than as evidence of contraction. This matters for the paper's interpretation: the empirically strongest signal is the price and short-run-expectations response, not a measured employment or output response. Given these fit metrics (RMSPE, MAPE) and other robustness checks, caution is warranted in interpreting the estimated effects on unemployment or industrial production as conclusive evidence of a causal real-activity effect from FAIT.

Several factors complicate inferences on FAIT's impact on economic activity. Differences in labor mar-

ket rigidity and policy responses across donor pool countries—particularly in Europe, where employment retention policies dominated, in contrast to the U.S.’s income support approach—likely influenced labor reallocation and adjustment dynamics (see, e.g., [García-Cabo et al. \(2023\)](#)). This divergence, coupled with variations in energy dependence and costs, may contribute to differences in counterfactual economic activity responses, despite our attempts to control for these factors through residualization using commodity prices and global supply chain disruption indicators, among others.

3.3 Additional Diagnostics and Robustness Checks

For a causal interpretation of these findings, it is essential to establish a credible synthetic control counterfactual. This requires conducting diagnostic checks and robustness exercises to evaluate the sensitivity of the results to alternative design choices. The lower panels of [Table 1](#) through [Table 3](#), together with [Supplementary Appendix E](#), present these diagnostics. Additional robustness analyses are detailed in [Supplementary Appendix C](#) and [Supplementary Appendix D](#).

The diagnostics are designed to address the main threats to interpretation. Anticipation and in-time placebo tests ask whether the estimated gaps were already present before FAIT. Donor-pool checks ask whether the results depend on Canada or any other single control economy and whether U.S. spillovers contaminate the counterfactual. The extended-window exercises ask whether the estimates survive once the early tightening phase is included. The fiscal-shock exercises ask whether the results vanish once pandemic-related fiscal measures are modeled more directly. Finally, C-ARIMA provides a complementary treated-unit time-series counterfactual that does not rely on a donor pool at all. The point of this battery is not that any single diagnostic is decisive, but that the main inflation and short-run-expectations results survive several distinct ways of stressing the empirical design. This is also why we interpret the estimates as evidence about the FAIT policy environment, rather than as a decomposition across individual tools: the robustness exercises test whether the observed U.S. outcome gap survives alternative counterfactual constructions and controls for the main confounding forces highlighted in the post-pandemic inflation literature.

3.3.1 Absence of Anticipation Effects and Time Placebos

We test for the absence of anticipation effects by estimating the synthetic control while backdating the intervention period to one month before FAIT’s adoption. We report the p-value for the null hypothesis that the treatment effect—the difference between the actual OV and its synthetic counterpart—is zero in 2020:M7. This diagnostic is especially relevant because the framework review was discussed before the August 2020 announcement. If the estimated effect merely reflected pre-existing U.S.-donor divergence, the outcome gap should already appear before the formal adoption date. Our results indicate no evidence of anticipation effects on actual or expected inflation rates (see, e.g., [Table 1–Table 2](#)).

Similarly, we conduct an in-time placebo test by backdating the intervention period 24 months before FAIT’s adoption. The row labeled “In-time placebo (p-val)” reports the p-value for the null hypothesis that the ATT is zero during this adjusted period. A high p-value, preferably above 0.1, indicates that the same empirical design does not generate a spurious treatment effect in the pre-FAIT window. Most specifications in [Table 1](#) through [Table 2](#) support the robustness of our design based on this backdating exercise. Where placebo p-values are lower in real-activity specifications, we interpret those outcomes more cautiously, consistent with the weaker unemployment and industrial-production results in [Table 3](#).

3.3.2 Potential Spillover Effects and Donor Pool Composition

Assessing the robustness of our main findings to variations in country weights and potential bias introduced by spillover effects is crucial. To address this issue, we examine the impact of omitting Canada—the control unit with the largest synthetic weight—in [Table 1–Table 3](#), columns [4] and [8]. This exercise is informative because Canada improves the pre-intervention match but is also the donor economy most plausibly exposed to U.S. spillovers. Excluding it therefore deliberately trades fit for a cleaner, but less precise, donor pool.

This finding warrants careful examination, particularly given insights from the SCM literature (e.g., [Abadie \(2021\)](#)), which acknowledges a trade-off between including a control unit potentially affected by the intervention and the potential bias resulting from spillover effects. [Abadie \(2021\)](#) suggests retaining affected control units when the direction of the bias can be anticipated. In our case, including Canada might introduce a negative bias (understated ATT), as FAIT may have slightly raised Canada’s CPI inflation due to its economic integration and geographic proximity to the U.S.

Comparing results with and without Canada in the donor pool ([Table 1–Table 2](#)), ATT discrepancies are generally small for headline inflation and short-term expectations, while precision weakens for core inflation and real activity. Excluding Canada also worsens the pre-intervention fit, increasing RMSPE by the first or second decimal place. This analysis highlights the benefits of retaining Canada in the donor pool to improve pre-intervention fit while recognizing the manageable trade-off posed by potential spillover effects.

To further validate our findings, we refine our approach using the spillover-adjusted SCM method proposed by [Cao and Dowd \(2019\)](#), which explicitly accounts for potential spillover effects. For brevity, we focus on headline CPI inflation, core CPI inflation, short-run inflation expectations, and long-run inflation expectations.²² The findings suggest that the canonical SCM may slightly underestimate the main effects, but most differences between the intervention effect with Canada and the spillover-adjusted effect remain statistically insignificant. Therefore, whether or not Canada is treated as an affected control unit, our conclusions remain qualitatively unchanged.

We also conduct a leave-one-out (LOO) test, a robustness check that evaluates how sensitive the dynamic treatment effects are to excluding individual control units from the donor pool. For visualization, [Figures S3–S4](#) in the [Supplementary Appendix E](#) display the outcome gaps from these LOO exercises for each control unit. Overall, no single control unit appears to disproportionately influence the construction of the synthetic control.

Finally, [Supplementary Appendix C](#) reports additional robustness analysis using an alternative method to estimate the dynamic treatment effect without relying on donor pool data. Causal-ARIMA (C-ARIMA), introduced by [Menchetti et al. \(2023\)](#), is a time series framework for estimating causal effects by embedding interventions within a standard Autoregressive Integrated Moving Average (ARIMA) structure. Based on the Rubin Causal Model, it extends traditional intervention analysis by modeling the counterfactual evolution of a treated time series based on its pre-intervention ARIMA dynamics. Unlike methods such as the SCM, which require a donor pool of untreated units, C-ARIMA identifies causal effects from a single treated unit, assuming key structural assumptions (e.g., exogenous intervention, no anticipatory effects) hold. This makes it particularly useful in settings where suitable control units are unavailable or not fully reliable for constructing a counterfactual. [Table S6](#) and [Figure S6](#) present the results for the four outcome variables using

²²The results, presented in [Figure S5](#) in the [Supplementary Appendix E](#), compare the DTEs of the canonical SCM and the spillover-adjusted SCM, along with their 95% confidence intervals.

C-ARIMA. The estimated effects on headline and core CPI inflation are positive and statistically significant, as is the effect on short-run inflation expectations. The estimated ATTs for these outcome variables range from 1.1 to 1.5 percentage points, all statistically significant.

Taken together, these considerations reinforce our confidence that the inflation and short-run-expectations conclusions are robust to the choice and composition of the donor pool. They also sharpen the interpretation of the estimates: because excluding Canada worsens pre-intervention fit and the spillover-adjusted estimator yields qualitatively similar effects, the main concern is not that a single contaminated donor mechanically drives the result. Instead, the evidence points to a stable post-FAIT U.S. gap relative to several feasible counterfactual constructions.

3.3.3 Extended Post-Intervention Period

Up to this point, our analysis has intentionally limited the post-intervention period to 2022:M2 to mitigate potential distortions in domestic inflation rates resulting from the Russian invasion of Ukraine and its subsequent effects, particularly on the control units. This event could lead to underestimated effects beyond that period, even after residualizing outcome gaps using energy prices, due to the diverse idiosyncratic characteristics of the economies under analysis.

To assess the robustness of our findings to this temporal restriction, we extend the post-intervention analysis to 2022:M12, adding ten additional months to cover the full year of 2022. This extension is intentionally demanding: it adds months in which the original “low-for-longer” stance had been replaced by policy-rate liftoff and a rapid shift toward “high-for-longer,” while the Ukraine shock was also affecting commodity prices and European inflation. The revised results continue to confirm the robustness of our initial findings, albeit with slightly lower ATTs. Overall, the ATTs remain positive and statistically significant, particularly for headline inflation and short-term expectations, reinforcing our principal conclusions even when considering a longer and less favorable post-intervention window.²³

3.3.4 Does the Effect of FAIT Vanish After Controlling for Pandemic-Related Fiscal Responses?

Some researchers contend that the fiscal response to the COVID-19 pandemic played a role in driving higher U.S. inflation during the timeframe we examine (see, e.g., [Bianchi et al. \(2023\)](#)). Our analysis addresses this concern using two complementary steps. First, we include government surplus as a share of GDP as a predictor when constructing the synthetic control weights, which aligns the treated and donor units on their pre-treatment fiscal stance. Second, and more critically, we residualize inflation on this fiscal indicator, a step which attenuates any linear relationship between the fiscal balance and inflation over our full sample. Acknowledging that these controls may not fully capture the unique nature of the pandemic response, we conduct a final robustness check using a more direct fiscal shock measure within an alternative framework, which corroborates our main findings.

Following [Bianchi et al. \(2023\)](#) we construct and use government transfer shocks. However, we face a data limitation: our SCM requires that the same indicator be available for all control units, but government transfer payments are reported only for the treated unit, the U.S. As in [Section 3.3.2](#), we therefore rely on C-ARIMA, which, as noted earlier, estimates a counterfactual using predictors without requiring a donor

²³See details in [Table S3–Table S4](#) of the [Supplementary Appendix E](#).

pool (see [Menchetti et al. \(2023\)](#)). [Supplementary Appendix D](#) provides further discussion and details. In particular, [Table S7](#) and [Figure S7](#) in [Supplementary Appendix E](#) present the results from this exercise. The estimated ATTs for headline CPI inflation, core CPI inflation, and short-run expected inflation range from 0.85 to 1.2 percentage points, all statistically significant. In contrast, long-run expected inflation remains unaffected. These additional results suggest that the estimated FAIT effect does not vanish when the unusually large U.S. fiscal response is modeled with a more direct transfer-shock measure.

[Supplementary Appendix D](#) presents an additional sensitivity check using the full-employment, or cyclically adjusted, fiscal surplus; a measure that accounts for the feedback from economic conditions to the fiscal balance. Constructed by the Congressional Budget Office, this series is defined as net federal government revenues and outlays, excluding automatic stabilizers, expressed as a percentage of potential GDP. The corresponding results are reported in [Table S8](#). The estimated ATTs for the first three outcomes range from 1.1 to 1.3 percentage points, all statistically significant (columns [1]–[3], [Table S8](#)); long-run expected inflation remains statistically insignificant (column [4]; see also [Figure S8](#)).

To summarize and compare the robustness results, we contrast the estimated effects obtained using SCM and C-ARIMA. For the baseline-window SCM and spillover-adjusted SCM estimates, the ranges are: headline CPI inflation 1.0–1.8, core CPI inflation 0.3–1.1, and short-run expected inflation 0.8–1.9 (see corresponding columns in [Tables 1–2](#) and [S5](#)). For C-ARIMA over the same sample, the ranges are: headline CPI inflation 0.8–1.4, core CPI inflation 1.2–1.5, and short-run expected inflation 0.9–1.1 ([Tables S6–S8](#)). The C-ARIMA ranges fall within those of SCM for short-run expected inflation, while for headline CPI inflation they only partially overlap. For core inflation, C-ARIMA estimates tend to be higher, making our SCM-based results comparatively more conservative. Overall, the C-ARIMA findings indicate that FAIT had a measurable impact consistent with the SCM results reported in the main analysis.

4 Concluding Remarks

This paper empirically evaluates the impact of FAIT on the U.S. economy. The central question is whether a framework that allowed moderate inflation overshooting after past undershooting produced measurable outcome differences relative to a counterfactual FIT regime that retained the conventional let-by-gones-by-gones logic. Using modern causal inference techniques to estimate its effects on headline and core CPI inflation, we find that inflation rose significantly relative to the counterfactual during the post-FAIT period. Unlike prior synthetic control applications, we apply the residualization approach of [Doudchenko and Imbens \(2016\)](#) to adjust inflation rates for shared covariates, including monetary and fiscal policy indicators, global supply chain disruptions, commodity prices, and other domestic and global factors.

Our findings support the view that the FAIT policy environment contributed to the conditions associated with the inflation surge—even after accounting for alternative drivers such as pandemic-induced global supply bottlenecks/disruptions and post-pandemic recovery commodity price increases. Consistent with the FAIT framework, forward guidance on make-up strategies—reinforced by the Fed’s September and December 2020 communications on balance sheet normalization and policy-rate liftoff—may have tilted expectations toward a prolonged period of low interest rates and a central bank less inclined to act preemptively, contributing to a delayed policy response as inflationary pressures mounted in late 2020 and into 2021.

While an earlier policy response under FIT may not have fully averted the inflationary surge, our results

suggest that a timelier intervention could have moderated its magnitude, enabling a somewhat more gradual tightening cycle and potentially requiring a lower terminal policy rate to restore price stability.

We find that FAIT’s effects were concentrated in inflation and short-term inflation expectations, with limited and statistically insignificant effects on unemployment or industrial production. These results are consistent with a steeper-than-expected Phillips curve in the post-pandemic period, as implied by the New Keynesian model, although this interpretation should be viewed as suggestive rather than definitive. Our findings do not imply that FAIT caused a permanent structural steepening of the Phillips curve; rather, monetary policy appears to have operated in an environment that temporarily behaved as if the curve were steeper.

Research suggests that the pre-pandemic flattening of the Phillips curve partly reflected credible inflation targeting and a preemptive policy stance (Boivin et al. (2010), and McLeay and Tenreyro (2020)). The shift away from preemptive action under FAIT may have contributed to steeper reduced-form estimates documented elsewhere, although the Fed’s swift 2022 tightening suggests these effects were likely short-lived (as noted in Kiley and Mishkin (2025))—consistent with our findings.

The empirical pattern is therefore most informative as a joint finding rather than as a single headline-inflation estimate. Headline and core inflation moved above their synthetic counterparts, short-term expectations shifted in the same direction, long-term expectations did not drift, and preferred real-activity estimates remained imprecise. That combination matches the model’s implication that a more accommodative expected effective policy path can raise inflation and near-term expectations without necessarily generating large measured real effects when transmission is steep.

Viewed through this lens, the paper’s contribution is narrower and more empirically grounded than a claim that FAIT, by itself, caused the entire post-pandemic inflation surge. The evidence instead points to a measurable difference in realized outcomes under a framework that permitted more accommodation and more explicit tolerance for overshooting, while long-run expectations remained anchored. The empirical exercise is therefore informative precisely because make-up strategies are outcome-defined: the framework did not mandate a particular mix of rates, forward guidance, or balance sheet policy, but it changed the range of inflation outcomes that could be viewed as consistent with the strategy. That interpretation is also consistent with the direction of the Federal Reserve’s 2025 framework revision, which retained the credibility benefits of a clear 2% PCE objective while removing the averaging language and clarifying the Committee’s balanced approach to conflicting mandate objectives (Board of Governors (2025); Powell (2025)).

Appendix

Data Sources

All data is sourced from national agencies used in the Federal Reserve Bank of Dallas' Database of Global Economic Indicators (Grossman et al. (2014)). The dataset is monthly, seasonally adjusted, covering January 2012–December 2022, with the U.S. as the treated country.

Donor pool: To construct a credible donor pool for the SCM, we begin with OECD economies classified as advanced economies that had adopted flexible inflation targeting (FIT) by the start of our analysis period, which begins with the Federal Reserve's transition to FIT in January 2012. To further enhance comparability and ensure consistency in monetary policy objectives, we restrict the pool to countries that maintained a 2% inflation target, or a 2% midpoint of the target range, throughout the 2012–2022 period—mirroring the Federal Reserve's stated objective. In other words, we include only countries that had adopted FIT before the sample starts and did not modify the relevant 2% objective during the study period. These conditions are verified using central bank documentation and Duncan et al. (2026). These restrictions help minimize cross-country heterogeneity in inflation objectives, macroeconomic conditions, and institutional settings, thus improving the credibility and validity of the synthetic control estimates. The final donor pool consists of six economies: Canada, Czechia, Israel, New Zealand, Sweden, and the United Kingdom.

CPI Inflation (INF): 12-month log change in Consumer Price Index (CPI). Sources: U.S. Bureau of Labor Statistics, Statistics Canada, Czech Statistical Office, Israel Central Bureau of Statistics, Statistics New Zealand, Sweden Statistiska Centralbyran, U.K. Office for National Statistics. *Note:* New Zealand CPI interpolated monthly.

Core CPI Inflation (INFC): 12-month log change in the core CPI (ex. food & energy). Sources as above. *Note:* Czechia and Sweden seasonally adjusted; New Zealand interpolated monthly.

U.S. PCE Inflation (INFPCE): 12-month log change in the PCE deflator. Source: U.S. Bureau of Economic Analysis.

Unemployment Rate (UR): Percentage of active population unemployed. Sources as for CPI. *Note:* New Zealand series interpolated monthly

Overnight Interest Rates (ONR): : End-of-period overnight nominal rates. Sources: U.S. Federal Reserve Board, Bank of Canada, Czech National Bank, Bank of Israel, Reserve Bank of New Zealand, Tullett Prebon Information, Bank of England.

Industrial Production Growth (IPP): 12-month log change in industrial production. Sources as for CPI. *Note:* New Zealand series interpolated monthly.

M3 Growth (M3P): 12-month log change in broad money (M3). Sources: OECD (U.S., Canada), Czech National Bank, Bank of Israel, Reserve Bank of New Zealand, Sveriges Riksbank, Bank of England. *Note:* U.S. data from OECD due to Fed discontinuation in 2006.

Government surplus as a share of GDP (GSGDP): Government net lending as a percent of GDP. Sources: OECD (U.S., Canada, U.K., New Zealand), Eurostat (Czechia, Sweden), Israel Ministry of Finance. *Note:* Data interpolated monthly; Czechia and Israel series seasonally adjusted.

ENERGY, FOOD: 12-month log change in the IMF's energy and food price indices.

Kilian Index (KILIAN): Measures global real economic activity via ocean bulk freight rates. Source: Federal Reserve Bank of Dallas at <https://www.dallasfed.org/research/igrea>. *Note:* Seasonally

adjusted.

Global Supply Chain Pressure Index (GSCPI): Measures supply chain conditions using transportation costs and manufacturing indicators. Source: Federal Reserve Bank of New York at <https://www.newyorkfed.org/research/policy/gscpi#/overview>.

Expected CPI Inflation Measures (INFEXP). Mean forecasts from professional forecasters via *Consensus Forecasts*TM. Details at <https://www.consensuseconomics.com>.

Real government transfer payments growth (RGTPP). 12-month percent change in real government transfer payments. This is calculated as government social benefits (B087RC1Q027SBEA) plus other current transfer payments, which include grants-in-aid to state and local governments (FGSL), divided by the GDP price deflator (GDPDEF). Data interpolated monthly; formula provided in [Bianchi et al. \(2023\)](#).

Cyclically-adjusted government surplus (CAGSGDP). This series measures the structural, or full-employment, fiscal surplus, defined as seasonally adjusted net federal government revenues and outlays excluding automatic stabilizers, expressed as a percentage of potential GDP. The data are based on the National Income and Product Accounts and are produced by the Congressional Budget Office (CBO). Potential GDP is CBO's estimate of the maximum sustainable output of the economy. Details at <https://www.cbo.gov/data/budget-economic-data>. *Note:* Values are linearly interpolated to monthly frequency.

Codes. All results are obtained with R 4.2.2. based on [Ben-Michael et al. \(2021\)](#)'s R code (07-14-2024 version) posted on <https://github.com/ebenmichael/augsynth>.

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Supplemental Appendix

A Background Details on the U.S. Monetary Policy Framework

At the 2020 Jackson Hole Economic Symposium on August 27, 2020, Federal Reserve Chairman Jerome Powell announced that the Federal Reserve was adopting a new monetary policy framework based on flexible average inflation targeting (FAIT). This framework was formalized in the amended Statement on Longer-Run Goals and Monetary Policy Strategy, outlining the Fed’s own interpretation of FAIT.

A key lesson from the Great Inflation of the 1970s and early 1980s was that strong commitment and decisive action were necessary to anchor inflation expectations and control inflation. Although inflation remained above 10% until 1981, Chairman Volcker successfully curbed inflation by maintaining a restrictive monetary stance despite a severe recession. The credibility the Fed earned in the 1980s allowed it greater flexibility in balancing its dual mandate of price stability and full employment in subsequent decades.

Since then, the Federal Reserve’s monetary policy framework has evolved with the goal of strengthening its inflation credibility, ensuring that long-term expectations remain anchored while preserving its ability to respond to short-term macroeconomic fluctuations. Long-term CPI inflation expectations progressively stabilized at levels close to, but moderately above, 2% in the 1980s and 1990s. This shift contributed to the Great Moderation, a period of greater macroeconomic stability during which observed inflation averaged around 3%.²⁴

Even after the federal funds rate hit the effective lower bound (ELB) during the 2007–09 Global Financial Crisis (GFC), long-term CPI inflation expectations remained anchored near 2%. However, despite numerous policy efforts, actual CPI inflation persistently undershot the target in the post-GFC period leading up to the COVID-19 pandemic (Caldara et al. (2021)).

In response to concerns over a Japan-style liquidity trap and the potential de-anchoring of long-run inflation expectations, the post-GFC period also saw important changes in the Federal Reserve’s implementation and communication practices. The crisis-era expansion of reserves and the payment of interest on reserve balances moved policy implementation toward an ample-reserves environment, while the Summary of Economic Projections (SEP), introduced in 2007 and expanded in subsequent years, became a central communication tool. Still, the key framework change came in 2012, when the Fed formally adopted flexible inflation targeting (FIT) through its first-ever Statement on Longer-Run Goals and Monetary Policy Strategy. By explicitly setting a numerical 2% PCE inflation objective, the FOMC strengthened transparency and accountability while making explicit what had long been understood as the Fed’s effective nominal anchor.

FIT brought the Fed’s monetary policy framework in line with the prevailing consensus among many advanced and emerging economies (Bernanke and Mishkin (1997), Duncan et al. (2026)). However, persistent below-target inflation remained a concern, prompting the Fed to undertake its first-ever comprehensive review of its monetary policy framework (strategy, tools, and communication practices) in 2019–20.²⁵

The Fed’s framework review emphasized the risks posed by prolonged periods of below-target inflation at the ELB. A key concern was that persistent inflation misses might cause households and businesses to perceive the 2% target as a ceiling rather than a midpoint, eroding the Fed’s inflation anchor. To counteract

²⁴For more on the evolution of U.S. monetary policy during the Great Moderation, see Martínez-García (2018), Martínez-García (2019), and Duncan et al. (2022).

²⁵For details on the Federal Reserve’s 2019–20 framework review and the resulting changes to its Statement on Longer-Run Goals and Monetary Policy Strategy, see Board of Governors (2020).

this risk, FAIT was introduced on August 27, 2020.

The fundamental change under FAIT was the explicit acceptance of an asymmetric inflation bias: following prolonged periods of below-target inflation, the Fed would be willing to tolerate inflation moderately above 2% for some time. These make-up strategies are best understood as outcome-based commitments. They describe the inflation outcomes the central bank is willing to tolerate to offset prior misses, not the specific instruments used to achieve them.²⁶ The Fed’s stated goal was to preempt a downward shift in long-term inflation expectations, even at the cost of tolerating above-target inflation for some time. The FOMC’s revised Statement on Longer-Run Goals and Monetary Policy Strategy explicitly stated:

“The Committee judges that longer-term inflation expectations that are well anchored at 2 percent foster price stability and moderate long-term interest rates and enhance the Committee’s ability to promote maximum employment in the face of significant economic disturbances. 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.” Federal Reserve’s Statement on Longer-Run Goals and Monetary Policy Strategy amended effective August 27, 2020 ([Board of Governors \(2020\)](#)).

In addition to introducing inflation averaging and make-up strategies, FAIT elevated the importance of the Fed’s maximum employment objective. The Statement added language allowing for a more granular understanding of full employment, emphasizing that it ought to be broad-based and inclusive. By recasting policy decisions in terms of employment shortfalls rather than deviations, it also weakened the case for preemptive tightening against prospective inflation pressures when inflation itself remained consistent with the Committee’s objective, especially if doing so risked slowing labor-market gains ([Board of Governors \(2020\)](#)).

The shift from FIT to FAIT in August 2020 came shortly before the beginning of an inflation surge unseen since the Great Inflation of the 1970s and early 1980s. As highlighted by [Waller \(2022\)](#), [Eggertsson and Kohn \(2023\)](#), and [Bernanke and Blanchard \(2025\)](#), this raised concerns about whether FAIT itself played a role in fueling inflation. With the pandemic driving rates to zero, the Federal Reserve turned to forward guidance and large-scale asset purchases (LSAPs). Following FAIT’s adoption, rate guidance, LSAP guidance, and the sequencing of tapering, liftoff, and balance sheet runoff may have helped operationalize the outcome-based make-up logic in FAIT. As [Waller \(2022\)](#) notes:

“There are some other lessons (...) from the experience of tightening monetary policy, a process which was put in motion by the [forward] guidance that the FOMC issued in 2020 about how long it would keep the federal funds rate at the effective lower bound and continue asset purchases. In September and December of 2020, the FOMC provided criteria or conditions in the meeting statement that would need to be met before the FOMC would consider raising interest rates and begin to reduce asset purchases, respectively. These conditions were, in effect, the FOMC’s plan for starting the process of tightening policy.

(...) Based on our positive experience with unwinding after the Global Financial Crisis (GFC), we thought it would be appropriate to use the same sequence of steps: taper asset purchases until

²⁶As [Nessen and Vestin \(2005\)](#) argue, average inflation targeting can have different short-run effects by delaying the monetary policy response to inflation fluctuations, thereby preventing an overreaction to transitory inflation shocks. FAIT may have also limited policymakers’ scope for preemptive action against inflation (see, e.g., [Eggertsson and Kohn \(2023\)](#), [English and Sack \(2024\)](#)).

they ceased, then lift rates off the effective lower bound, then gradually and passively reduce our balance sheet by redeeming maturing securities.

(...) For asset purchases, the Committee declared that tapering would wait “until substantial further progress has been made toward the Committee’s maximum employment and price stability goals.” Meanwhile, the FOMC said that it would keep rates near zero until our employment goal had been reached and until inflation had reached 2 percent and was “on track to moderately exceed 2 percent for some time.”

(...) Unlike the normalization timeline after the financial crisis, we did not have flexibility to raise the target range sooner. However, if we had less restrictive tapering criteria and had started tapering sooner, the Committee could have had more flexibility on when to begin raising rates. So, by requiring substantial further progress toward maximum employment to even begin the process of tightening policy [liftoff], one might argue that it locked the Committee into holding the policy rate at the zero lower bound longer than was optimal.” Excerpts from Lessons Learned on Normalizing Monetary Policy, speech by Governor Christopher J. Waller, at the Dallas Fed’s sponsored policy panel on *Monetary Policy at a Crossroads*, June 18, 2022 (Waller (2022)).

The Waller remarks highlight how the 2020 guidance tied the removal of accommodation to outcome-based criteria and to a specific normalization sequence: tapering asset purchases, then policy-rate liftoff, and only later balance sheet runoff. This sequencing did not mechanically force a unique instrument path, but it made a lower-for-longer expected policy path easier to reconcile with the Fed’s stated strategy than would have been the case under conventional FIT. Relatedly, Clarida (2025) emphasizes the absence of a clear inflation escape clause in the September 2020 rate guidance as one way in which late-2020 communication could have reduced the FOMC’s flexibility as inflation pressures built.

This distinction matters for the empirical interpretation. FAIT is often used as shorthand for inflation averaging, but the 2020 framework change also altered the guardrails around policy: it introduced make-up strategies, but also recast maximum employment in terms of shortfalls rather than deviations and removed the earlier balanced-approach language for episodes in which employment and inflation objectives are not complementary. In the pandemic environment, these additional changes could reinforce a greater willingness to look through initial inflation pressures and delay tightening until those pressures had clearly materialized.

Other central banks also faced pandemic supply shocks, employment concerns, and incentives to look through transitory inflation. What was distinctive in the U.S. case was that the Federal Reserve had just loosened its framework guardrails in a way that explicitly made moderate overshooting after past undershooting part of the strategy. Implementation could occur through several tools, but the mechanism relevant for our model is the shift in outcome-based commitments associated with make-up strategies, not the separate contribution of each tool.

Table A1 provides a descriptive benchmark for the inflation environment surrounding post-pandemic policy normalization. It reports each central bank’s inflation objective; the first sustained post-pandemic breach of that objective using the preferred headline measure; the first post-breach policy-rate increase; and the inflation gap at that liftoff date. Similar cross-country liftoff comparisons have been used in policy discussions of the pandemic-era inflation surge, including by Clarida (2023) in his comments on the Bernanke and Blanchard (2025) analysis. Our use of the table is narrower. Liftoff is only a common observable reference point for measuring inflation gaps, not a sufficient statistic for the stance of policy and not evidence of FAIT’s causal effect. The table therefore motivates the counterfactual exercise; it does not substitute for it.

The country selection mirrors the empirical design. Starting from the OECD country frame, we focus on advanced-economy central banks classified as inflation targeters in Duncan et al. (2026). Panel A reports

the U.S. treated unit. Panel B reports the final donor pool, restricted to countries with a constant 2% target or midpoint over 2012–2022. Panel C reports other advanced-economy inflation targeters excluded because their target point or midpoint differs from 2% or changed during the sample period. Japan is also an advanced-economy inflation targeter with a target change during the sample, but it is not shown in Panel C because the Bank of Japan’s QQE and overshooting framework was designed to escape persistent below-target inflation by raising inflation expectations toward the 2% target. This makes Japan conceptually distinct from the other post-pandemic inflation-targeting cases considered here.

Three descriptive facts stand out. First, at U.S. policy-rate liftoff in March 2022, inflation was materially above the Federal Reserve’s 2% objective: headline PCE inflation was about 5.0 percentage points above target, headline CPI inflation about 6.5 percentage points above the same benchmark, and core CPI inflation about 4.5 percentage points above it. Second, the final donor-pool economies also experienced target breaches and policy-rate liftoff, but their inflation gaps at liftoff were generally smaller at the median: about 3.7 percentage points for headline CPI and 2.4 percentage points for core CPI. Canada is an important exception, as its normalization benchmark resembles the U.S. experience more closely, although with smaller inflation gaps. Czechia is also a special case: headline inflation was already above target before the pandemic, then eased during the pandemic before reaccelerating. Third, the other advanced-economy inflation targeters in Panel C display additional heterogeneity, with smaller median headline and core CPI gaps at liftoff, about 2.0 and 0.5 percentage points, respectively.

These comparisons should be read cautiously. They show that the U.S. inflation deviation was large relative to many comparable advanced-economy inflation-targeting cases by the time policy-rate normalization began. They do not establish that FAIT caused that gap, and they do not compare the full stance of policy across countries. Their role is to motivate a disciplined counterfactual exercise. The synthetic-control analysis is what moves the paper from this descriptive benchmark to causal empirical inference about the FAIT policy environment under the maintained identifying assumptions.

The Federal Reserve’s subsequent 2025 framework review provides useful institutional context. The revised consensus statement reaffirmed the 2% PCE inflation objective, emphasized robustness across a broad range of economic conditions, restored a balanced-approach formulation when employment and inflation objectives are not complementary, and continued to treat the ELB as a contingency rather than the organizing feature of the strategy. In Chair Powell’s description, the FOMC returned to flexible inflation targeting (FIT) as understood before August 2020, eliminated the make-up strategy embedded in FAIT, removed the “shortfalls” language that had complicated communication about preemptive action to tame inflation, and emphasized acting forcefully to keep longer-term inflation expectations anchored ([Board of Governors \(2025\)](#); [Powell \(2025\)](#); [Leduc et al. \(2025\)](#)). This subsequent revision should not be read as a retrospective judgment on policy decisions made under extraordinary uncertainty. It does indicate, however, that the FOMC ultimately moved away from those features, making the FAIT episode unique for assessing how framework guardrails shape macroeconomic performance when inflation pressures are already building.

The central empirical question is whether the FAIT policy environment had measurable effects on inflation, expectations, and real activity. The paper does not attempt to identify the separate contribution of each implementation tool. Instead, it asks whether the policy environment created by FAIT contributed to outcomes that differed from those implied by a conventional FIT counterfactual.

Table A1. Inflation-target breaches and inflation gaps at policy-rate liftoff

Country	Headline measure	Target/midpoint (%)	Relevant range/band (%)	Breach date	Rate-liftoff reference date	PCE gap	CPI gap	Core CPI gap
<i>Panel A: treated</i>								
United States	PCE	2.0	–	2021:M3	2022:M3	5.0	6.5	4.5
<i>Panel B: final donor pool</i>								
Canada	CPI	2.0	1–3	2021:M3	2022:M3	–	4.7	2.6
Czechia*	CPI	2.0	1–3	2021:M3	2021:M6	–	0.8	1.5
Israel	CPI	2.0	1–3	2021:M8	2022:M4	–	1.9	1.3
New Zealand	CPI	2.0	1–3	2021:M5	2021:M10	–	3.9	3.4
Sweden	CPI	2.0	1–3	2021:M8	2022:M5	–	5.3	2.8
United Kingdom	CPI	2.0	1–3	2021:M8	2021:M12	–	3.4	2.2
<i>Median</i>				<i>2021:M5</i>	<i>2022:M2</i>	–	<i>3.7</i>	<i>2.4</i>
<i>Panel C: other advanced-economy inflation targeters</i>								
Australia	CPI	2.5	2–3	2021:M9	2022:M5	–	3.7	2.7
Iceland	CPI	2.5	1–4	2020:M5	2021:M5	–	1.9	1.7
South Korea	CPI	2.0 ^a	–	2021:M4	2021:M8	–	0.5	-0.7
Norway	CPI	2.0 ^b	–	2021:M1	2021:M9	–	2.0	-0.7
<i>Median</i>				<i>2021:M3</i>	<i>2021:M9</i>	–	<i>2.0</i>	<i>0.5</i>

Notes: The screening exercise reported in this table starts from the 38 OECD countries, retains advanced economies classified as inflation targeters in [Duncan et al. \(2026\)](#), and then keeps only countries with a constant 2% target or midpoint over 2012–2022 for the final donor pool. Japan is also an advanced-economy inflation targeter, but it is not shown in Panel C because it changed its inflation objective during the sample period and because the Bank of Japan’s QQE and overshooting framework was designed to escape persistent below-target inflation by raising inflation expectations toward the 2% target. This makes Japan conceptually distinct from the other post-pandemic inflation-targeting cases considered here. The target/midpoint column reports the official inflation target point or midpoint applicable during the post-pandemic surge, and the range/band column reports the relevant target range, tolerance band, variation band, or accountability/reporting band where one exists; these bands do not all have the same formal status. Sweden’s Riksbank publishes a 1–3% variation band around the 2% target, but it is not a target range; the U.K. has an open-letter accountability threshold around the 2% target. Iceland’s 1–4% band is a reporting/tolerance band around the 2.5% target.

Breach date is the first sustained post-pandemic observation in which the central bank’s preferred headline inflation measure exceeds the target point or midpoint. For the United States, the preferred target measure is headline PCE; CPI columns are shown for comparison with CPI/HICP-based inflation-targeting central banks. For New Zealand, the quarterly CPI reading is aligned to the middle month of the quarter to avoid treating a repeated quarterly value as three distinct monthly observations.

Rate-liftoff reference date reports the first post-pandemic policy-rate increase after the breach date. It is included only to make the inflation-gap calculation transparent. It is not a complete measure of the monetary-policy stance and does not rule out earlier changes in communication, balance sheet policy, or the expected policy path. The liftoff timing information is not used in donor-pool construction or in the synthetic-control estimation. Median rows are computed across countries within each panel; date medians use the underlying event dates, and inflation-gap medians are computed separately by inflation measure.

The inflation-gap columns report, for each inflation measure, the year-over-year inflation rate at the rate-liftoff reference date minus the relevant target point or midpoint, rounded to one decimal percentage point. Inflation rates are calculated as year-over-year growth rates using monthly data whenever available. The PCE gap is reported only for the United States; the CPI and Core CPI gaps are reported for all countries for comparability. Negative values indicate that the corresponding core measure was below the target point or midpoint at liftoff.

*Czechia is a special case: it is the only country in the table for which headline inflation was already above target before the pandemic—above the 2% target and above the upper end of the 1–3% tolerance band—before easing at the beginning of the pandemic. The reported breach date is the renewed sustained post-pandemic pickup after headline inflation reached its local trough.

^aSouth Korea has a 2% point target; the current open-ended formulation dates from 2019, while the move to a 2% point target occurred in 2016.

^bNorway’s current 2% target dates from 2018, replacing a prior 2.5% target.

B Insights from the Workhorse New Keynesian Model

This section develops an analytical solution based on the canonical New Keynesian model to examine monetary policy transmission and the anchoring of inflation expectations. It provides the derivations underlying Propositions 1–2 in the main text. The first key contribution lies in showing that the canonical New Keynesian model admits a forward-looking solution for inflation and the output and employment gaps, expressed entirely in terms of current and expected future effective monetary policy gaps—defined as deviations of the policy stance from its neutral counterpart under flexible prices. Away from the ELB, this policy stance can be read as the short-term policy rate. At the ELB, it is better interpreted as an effective or shadow policy stance that also summarizes the accommodation generated by forward guidance, balance sheet guidance, and asset purchases. This reformulation offers a novel and tractable approach to linking inflation and employment gaps, central to the Federal Reserve’s dual mandate, directly to monetary policy choices. It provides a powerful lens through which the role and effectiveness of forward guidance can be studied.

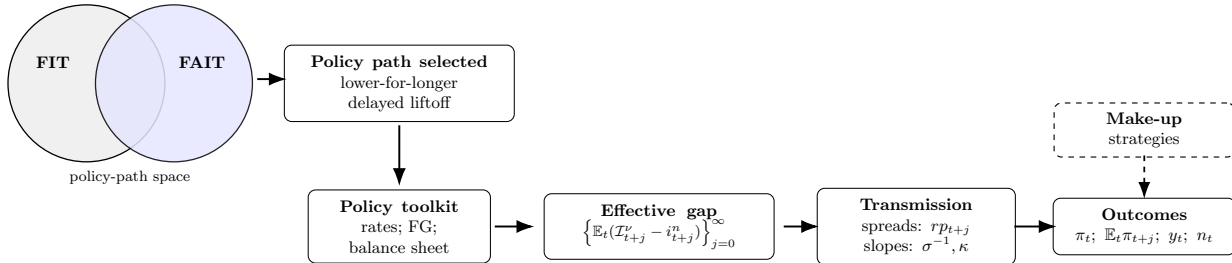
Second, this framework facilitates a counterfactual analysis of alternative policy choices and regimes, as encapsulated in equations (12)–(15) of the paper. These equations are employed to investigate how different monetary policy frameworks—to the extent they shift current and anticipated effective policy paths—can lead to distinct macroeconomic outcomes. The recursive structure of the weights on current and anticipated future effective policy gaps permits the examination of the effects of such counterfactuals not only on inflation and real activity, but also on the pass-through into inflation expectations. Understanding how the influence of effective policy gaps on expectations decays with the forecast horizon is key to evaluating whether expectations remain well-anchored in the long run, and to assessing the efficacy of the monetary transmission mechanism more broadly.

Third, the analysis incorporates the possibility of variation in the slope of the Phillips curve, allowing for a rich exploration of how changes in this structural parameter influence the effects of monetary policy across inflation, output and employment, and inflation expectations. In this respect, the policy shifts under the Federal Reserve’s FAIT (Flexible Average Inflation Targeting) framework serve as a quasi-natural experiment. To the extent that FAIT induced or permitted departures from the counterfactual policy path expected under the prior FIT (Flexible Inflation Targeting) regime, the resulting differences in outcomes can be used to test for evidence consistent with a steeper Phillips curve—a hypothesis that has gained traction due to the post-pandemic experience. This intersection of structural parameters, policy design and choices, and expectation formation lies at the heart of the empirical and theoretical contributions that underpin the paper.

Figure B1 summarizes the hierarchy that motivates the empirical interpretation. The treatment is the FAIT policy environment and its changed guardrails. The implementation tools are not separately identified treatments. They matter in the model insofar as they shift the expected effective policy-gap path, whose transmission to inflation and real activity depends on spreads and on structural parameters such as the slopes of the IS and Phillips curves. Make-up strategies are shown on the outcome side of the diagram because they are defined by the inflation outcomes that the framework permits, not by the particular toolkit used to implement policy.

Effective policy-gap interpretation at the ELB. The canonical model abstracts from the institutional details of unconventional monetary policy. This abstraction is useful only if the policy variable is interpreted

Figure B1. Policy guidelines, policy toolkit, and the effective policy path



Notes: The circles summarize policy paths that can be justified under FIT and FAIT. Most stabilization paths are shared, but FAIT made lower-for-longer paths more salient after persistent below-target inflation. The empirical treatment is the FAIT policy environment—that is, the change in policy guidelines or guardrails—not any individual instrument. Policy tools used for implementation matter insofar as they shift the expected effective policy-gap sequence. Transmission then operates through risk-premium or private-borrowing spreads, summarized by rp_{t+j} , and through the structural slopes of the IS and Phillips curves, σ^{-1} and κ . Make-up strategies are drawn at the outcome stage because they refer to permitted inflation outcomes—a temporary and moderate overshoot after past undershooting—rather than to a specific instrument.

correctly. Following the shadow-rate New Keynesian framework of [Wu and Zhang \(2019\)](#), let i_t denote the observed administered short-term policy rate and let s_t denote the shadow or unconstrained *nominal* policy stance. If the effective lower bound is \underline{i} , the observed rate is

$$i_t = \max\{\underline{i}, s_t\}. \tag{B1}$$

Away from the ELB, $i_t = s_t$. When the ELB binds, $i_t = \underline{i} > s_t$, and the observed short rate no longer summarizes the accommodation provided by policy. The stance relevant for aggregate demand is not the nominal rate alone but the ex ante real effective policy gap, $\mathcal{I}_t^\nu - \mathbb{E}_t \pi_{t+1} - r_t^n$. Because the target is normalized to zero in the frictionless allocation, this is equivalently written as $\mathcal{I}_t^\nu - \mathbb{E}_t \pi_{t+1} - i_t^n$.

To allow for partial substitutability between conventional and unconventional tools, define the effective nominal stance entering the IS curve as

$$\mathcal{I}_t^\nu \equiv \nu i_t + (1 - \nu) s_t, \quad 0 \leq \nu \leq 1. \tag{B2}$$

The notation follows [Wu and Zhang \(2019\)](#), except that their parameter v is denoted by ν here to avoid confusion with the non-policy shock term v_t below. If $\nu = 1$, the model collapses to the standard New Keynesian case in which only the observed policy rate enters aggregate demand and monetary policy becomes inactive at the ELB. If $\nu = 0$, the model is the shadow-rate case: the shadow stance replaces the observed rate in the IS curve, so unconventional tools can keep policy active even at the ELB. Intermediate values $0 < \nu < 1$ capture partial effectiveness of unconventional policies. This is a conservative way to state the mapping: the paper does not require perfect substitutability across tools, only that the full implementation package can be summarized by the expected effective stance $\mathbb{E}_t \mathcal{I}_{t+j}^\nu$. This interpretation is complementary to [Sims and Wu \(2020\)](#), who study how QE and conventional interest-rate policy can substitute for each other in a New Keynesian model with financial frictions, and to [Sims, Wu, and Zhang \(2022\)](#), who study QE transmission in a richer HANK environment.

The balance-sheet channel can be seen directly in the QE microfoundation of [Wu and Zhang \(2019\)](#). Let

r_t^B denote the private bond or borrowing return that enters the household Euler equation. Write

$$r_t^B = i_t + rp_t, \quad rp_t = rp - \varsigma(b_t^G - \bar{b}^G), \quad \varsigma > 0, \quad (\text{B3})$$

where rp_t is the risk premium, b_t^G is central bank bond holdings, and \bar{b}^G is the normal-times level of those holdings. Then

$$r_t^B - rp = i_t - \varsigma(b_t^G - \bar{b}^G). \quad (\text{B4})$$

Therefore a shadow stance consistent with the private return is

$$s_t = i_t - \varsigma(b_t^G - \bar{b}^G). \quad (\text{B5})$$

At the ELB with $\underline{i} = 0$ and $i_t = 0$, a negative shadow stance $s_t < 0$ can be implemented by asset purchases satisfying

$$b_t^G = \bar{b}^G - \frac{s_t}{\varsigma}. \quad (\text{B6})$$

Thus larger asset holdings lower the shadow stance even when the observed rate remains fixed. Balance sheet *guidance* works through the same object by shifting expectations of future b_{t+j}^G and therefore expectations of future s_{t+j} and \mathcal{I}_{t+j}^ν .

Combining equations (B2) and (B5) gives a transparent link between tools and the effective policy path:

$$\mathcal{I}_t^\nu = i_t - (1 - \nu)\varsigma(b_t^G - \bar{b}^G). \quad (\text{B7})$$

For any two regimes $m \in \{FAIT, FIT\}$, define $\Delta z_t \equiv z_t^{FAIT} - z_t^{FIT}$. Then

$$\Delta \mathcal{I}_t^\nu = \Delta i_t - (1 - \nu)\varsigma \Delta b_t^G. \quad (\text{B8})$$

If both regimes are at the ELB and the observed short rate is the same, $\Delta i_t = 0$, but a more persistent or larger balance sheet under FAIT gives $\Delta b_t^G > 0$ and therefore $\Delta \mathcal{I}_t^\nu < 0$ when $\nu < 1$. Forward guidance instead changes expectations of future i_{t+j} and s_{t+j} ; balance sheet policy and balance sheet guidance change expectations of b_{t+j}^G and hence s_{t+j} . In either case, the model's object is the expected effective policy gap:

$$\mathbb{E}_t (\mathcal{I}_{t+j}^\nu - i_{t+j}^n). \quad (\text{B9})$$

This is the formal sense in which the policy path is a sufficient statistic in the class of models used here. The empirical exercise does not identify LSAPs, rate guidance, balance sheet guidance, shortfalls language, or the averaging clause as separate treatments. It estimates the effect of the FAIT policy environment, whose tools and communications mattered insofar as they shifted the expected effective policy-gap path.

Policy-path equivalence. Conditional on the sequences of non-policy shocks and on the transmission parameters (β, σ, κ) , any two implementation packages that generate the same expected path for $\mathcal{I}_{t+j}^\nu - i_{t+j}^n$ generate the same inflation, output-gap, employment-gap, and expectations paths in the linearized model. Conversely, any difference in the policy mix affects these variables only through the induced difference in the expected effective policy-gap path, unless it also changes the non-policy shocks or the structural transmission parameters. This is the precise sense in which the policy stance is broader than the current short rate but

narrower than the full collection of institutional actions.

The generalized IS curve is therefore

$$x_t = \mathbb{E}_t x_{t+1} - \sigma^{-1} (\mathcal{I}_t^\nu - \mathbb{E}_t \pi_{t+1} - i_t^n) + \varepsilon_t. \quad (\text{B10})$$

The Phillips curve is unchanged:

$$\pi_t = \beta \mathbb{E}_t \pi_{t+1} + \kappa x_t + u_t. \quad (\text{B11})$$

Substituting the Phillips curve into the generalized IS curve gives the same second-order expectational difference equation as in the canonical model, except that the observed policy rate is replaced by the effective stance:

$$\pi_t = ((1 + \beta) + \kappa \sigma^{-1}) \mathbb{E}_t \pi_{t+1} - \beta \mathbb{E}_t \pi_{t+2} - \kappa \sigma^{-1} (\mathcal{I}_t^\nu - i_t^n) + e_t, \quad (\text{B12})$$

where $e_t \equiv \kappa \varepsilon_t - \mathbb{E}_t (u_{t+1} - u_t)$. Consequently, all forward-looking solutions below continue to hold after replacing the observed policy-rate gap with the effective policy gap. In particular,

$$\pi_t = -\kappa \sigma^{-1} \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t (\mathcal{I}_{t+j}^\nu - i_{t+j}^n) + v_t, \quad x_t = -\sigma^{-1} \sum_{j=0}^{+\infty} \gamma_j \mathbb{E}_t (\mathcal{I}_{t+j}^\nu - i_{t+j}^n) + w_t. \quad (\text{B13})$$

Using (B8), the inflation counterfactual can be written as

$$\pi_t^{FAIT} - \pi_t^{FIT} = -\kappa \sigma^{-1} \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t [\Delta i_{t+j} - (1 - \nu) \varsigma \Delta b_{t+j}^G], \quad (\text{B14})$$

with analogous expressions for output, employment, and expectations. Equation (B14) makes clear why the policy mix does not have to be separately identified for the paper's purposes. Rate guidance affects $\mathbb{E}_t \Delta i_{t+j}$; balance sheet policies and balance sheet guidance affect $\mathbb{E}_t \Delta b_{t+j}^G$ and therefore the shadow stance; both are summarized by $\mathbb{E}_t \Delta \mathcal{I}_{t+j}^\nu$. The strength of the mapping from the policy path to inflation and real activity depends on the transmission parameters, especially the Phillips-curve slope κ .

This interpretation is also useful for understanding make-up strategies at the ELB. When the administered nominal rate cannot be reduced much further, additional accommodation works by lowering expected real rates, either by committing to keep future nominal rates lower for longer or by raising expected inflation through credible tolerance of temporary overshooting. This is the logic behind temporary price-level-targeting proposals for lower-bound episodes (Bernanke (2017)) and the classic New Keynesian analysis of history-dependent policy at the lower bound (Eggertsson and Woodford (2003)). In the present paper, the key object is therefore not the individual instrument used in late 2020, but the expected effective policy path that those instruments and communications jointly implied.

The Canonical New Keynesian Model. As described by Woodford (2008), fluctuations in equilibrium inflation around a stochastic trend—anchored by the central bank's target—are induced by nominal rigidities. The Beveridge-Nelson trend, defined as $\pi_t^T \equiv \lim_{j \rightarrow +\infty} \mathbb{E}_t (\pi_{t+j})$, aligns with the central bank's target $\bar{\pi}_t$, which is assumed to be incorporated into price-setters' information set. For analytical tractability, $\bar{\pi}_t$ is set to zero

and the model is log-linearized around the zero-inflation steady state (as shown in Galí (2015)).²⁷

The generalized log-linearized New Keynesian model comprises two primary equations representing aggregate household and firm behavior. The dynamic IS curve (on the demand side) is expressed by

$$x_t = \mathbb{E}_t(x_{t+1}) - \sigma^{-1} (\mathcal{I}'_t - \mathbb{E}_t(\pi_{t+1}) - i_t^n) + \varepsilon_t, \quad (\text{B15})$$

and the Phillips curve (aggregate supply) is given by

$$\pi_t = \beta \mathbb{E}_t(\pi_{t+1}) + \kappa x_t + u_t, \quad (\text{B16})$$

where $x_t \equiv (y_t - y_t^n)$ is the output gap, y_t is real output, π_t is inflation, and \mathcal{I}'_t is the effective policy stance defined in (B2). Potential output and the short-term natural (real) rate of interest under flexible prices are represented by y_t^n and r_t^n .

The disturbance ε_t in equation (B15) represents an exogenous demand shock, capturing fluctuations in aggregate demand that are not explained by movements in the real interest rate gap—defined as the deviation of the actual real rate from its natural counterpart—or by expectations of future output gaps. In contrast, the disturbance u_t in equation (B16) is a cost-push shock, assumed to be exogenous to monetary policy. As noted in Galí (2015), such shocks may stem from changes in desired price or wage markups or from variations in labor income taxes that influence firms' marginal costs.

Without nominal rigidities, inflation remains at its target in every period t and in steady state, as no exploitable trade-off exists between inflation and real activity. In this frictionless allocation the central bank can implement zero inflation, and expected inflation is therefore zero under the normalization used here. The short-term natural real rate r_t^n then coincides with the short-term neutral nominal rate under flexible prices, i_t^n . The latter serves as the benchmark rate for monetary policy consistent with price stability and full employment. The shadow stance s_t is not itself a natural rate; it is an effective nominal policy stance. What enters aggregate demand is the real gap between the effective nominal stance and the natural real rate, $\mathcal{I}'_t - \mathbb{E}_t\pi_{t+1} - r_t^n$, written equivalently as $\mathcal{I}'_t - \mathbb{E}_t\pi_{t+1} - i_t^n$ under the zero-inflation normalization.

Additionally, since x_t is proportional to the employment gap, $x_t = (1 - \alpha)(n_t - n_t^n)$, where n_t is employment and n_t^n is potential employment under flexible prices, equations (B15)–(B16) can also be expressed in terms of employment.

The key parameters are the discount factor $0 < \beta < 1$, the intertemporal elasticity of substitution $\sigma^{-1} > 0$, which corresponds to the slope of the IS curve, and the slope of the Phillips Curve, defined by $\kappa \equiv \left(\frac{(1-\theta)(1-\beta\theta)}{\theta} \right) \left(\frac{1-\alpha}{1-\alpha+\alpha\epsilon} \right) \left(\sigma + \frac{\varphi+\alpha}{1+\alpha} \right)$. Here, κ is a composite parameter dependent on β , σ , the Frisch elasticity of labor supply $\varphi^{-1} > 0$, the intratemporal elasticity of substitution between differentiated goods $\epsilon > 0$ which sets the steady-state price markup $\frac{\epsilon}{\epsilon-1}$, the Calvo (1983) price stickiness parameter $0 < \theta < 1$, which determines the average duration of prices $\frac{1}{1-\theta}$, and the returns-to-scale parameter $0 \leq \alpha < 1$.²⁸

By focusing on the canonical New Keynesian model, the analysis centers on the impact of potential changes in the slope of the IS curve and, especially, the Phillips curve—reflecting deeper structural transformations captured in a reduced-form manner—on the transmission of monetary policy. We allow for

²⁷Under monopolistic competition with Calvo (1983) staggered price-setting, nominal rigidities from price stickiness coexist with distortions from markup pricing. A labor subsidy is suggested to offset the markup, restoring the perfect competition allocation in the steady state.

²⁸The parameter α indicates diminishing returns to labor, with linear-in-labor technologies as the special case of constant returns to scale, represented by $\alpha = 0$.

exogenous demand and cost-push shocks to enter the IS and Phillips curves, respectively, capturing reduced-form location shifts in these relationships. However, for simplicity, we deliberately abstract from other factors—such as financial frictions, demographics, or capital accumulation—or from additional shocks that could also enter into or influence the IS and Phillips curves, in order to focus more directly on the monetary policy transmission mechanism.

The Forward-Looking Solution. Under the assumption that nominal rigidities vanish asymptotically, the model specified by equations (B15)–(B16) is solved forward, relating the output (or employment) gap and inflation to current and expected future effective monetary policy gaps—given as the deviation between the policy stance \mathcal{I}_t^ν and the benchmark or neutral policy rate i_t^n —as well as to current and expected realizations of the demand and cost-push shocks, ε_t and u_t , respectively. This approach relies on the assumption that $\lim_{j \rightarrow +\infty} \mathbb{E}_t(\pi_{t+j}) = \bar{\pi}_t = 0$, which ensures that long-term inflation expectations remain anchored to the central bank’s inflation target, consistent with the model’s zero-inflation steady state.

Using standard (Blanchard-Kahn) recursive substitution methods, the Phillips curve in equation (B16) is rearranged to express x_t as:

$$x_t = \frac{\pi_t - \beta \mathbb{E}_t(\pi_{t+1}) - u_t}{\kappa}. \quad (\text{B17})$$

This expression is substituted into the IS curve equation (B15), using the neutral nominal rate i_t^n :²⁹

$$\frac{\pi_t - \beta \mathbb{E}_t(\pi_{t+1}) - u_t}{\kappa} = \mathbb{E}_t(x_{t+1}) - \sigma^{-1} (\mathcal{I}_t^\nu - \mathbb{E}_t(\pi_{t+1}) - i_t^n) + \varepsilon_t. \quad (\text{B18})$$

Next, expectations are taken one period forward on equation (B17):

$$\mathbb{E}_t(x_{t+1}) = \frac{\mathbb{E}_t(\pi_{t+1}) - \beta \mathbb{E}_t(\pi_{t+2}) - \mathbb{E}_t(u_{t+1})}{\kappa}. \quad (\text{B19})$$

Equation (B19) is then substituted back into equation (B18):

$$\frac{\pi_t - \beta \mathbb{E}_t(\pi_{t+1}) - u_t}{\kappa} = \frac{\mathbb{E}_t(\pi_{t+1}) - \beta \mathbb{E}_t(\pi_{t+2}) - \mathbb{E}_t(u_{t+1})}{\kappa} - \sigma^{-1} (\mathcal{I}_t^\nu - \mathbb{E}_t(\pi_{t+1}) - i_t^n) + \varepsilon_t. \quad (\text{B20})$$

Simplifying equation (B20) results in:

$$\pi_t = ((1 + \beta) + \kappa \sigma^{-1}) \mathbb{E}_t(\pi_{t+1}) - \beta \mathbb{E}_t(\pi_{t+2}) - \kappa \sigma^{-1} (\mathcal{I}_t^\nu - i_t^n) + e_t, \quad (\text{B21})$$

which forms a second-order expectational difference equation for inflation, π_t , in relation to the monetary policy gap, $(\mathcal{I}_t^\nu - i_t^n)$ and the composite shock term $e_t \equiv \kappa \varepsilon_t - \mathbb{E}_t(u_{t+1} - u_t)$.

Expectations are then taken one period forward on equation (B21):

$$\mathbb{E}_t(\pi_{t+1}) = ((1 + \beta) + \kappa \sigma^{-1}) \mathbb{E}_t(\pi_{t+2}) - \beta \mathbb{E}_t(\pi_{t+3}) - \kappa \sigma^{-1} \mathbb{E}_t(\mathcal{I}_{t+1}^\nu - i_{t+1}^n) + \mathbb{E}_t(e_{t+1}). \quad (\text{B22})$$

²⁹In the frictionless equilibrium, i_t^n is equated to r_t^n because the expected inflation for next period is anchored at the central bank’s target and thus set to zero.

Equation (B22) is substituted into equation (B21):

$$\begin{aligned}
\pi_t &= \left[((1 + \beta) + \kappa\sigma^{-1})^2 - \beta \right] \mathbb{E}_t(\pi_{t+2}) \\
&\quad - ((1 + \beta) + \kappa\sigma^{-1}) \beta \mathbb{E}_t(\pi_{t+3}) - \kappa\sigma^{-1} (\mathcal{I}_t^\nu - i_t^n) \\
&\quad - \kappa\sigma^{-1} ((1 + \beta) + \kappa\sigma^{-1}) \mathbb{E}_t(\mathcal{I}_{t+1}^\nu - i_{t+1}^n) \\
&\quad + e_t + ((1 + \beta) + \kappa\sigma^{-1}) \mathbb{E}_t(e_{t+1}).
\end{aligned} \tag{B23}$$

Expectations two periods forward on equation (B21) lead to:

$$\mathbb{E}_t(\pi_{t+2}) = ((1 + \beta) + \kappa\sigma^{-1}) \mathbb{E}_t(\pi_{t+3}) - \beta \mathbb{E}_t(\pi_{t+4}) - \kappa\sigma^{-1} \mathbb{E}_t(\mathcal{I}_{t+2}^\nu - i_{t+2}^n) + \mathbb{E}_t(e_{t+2}). \tag{B24}$$

Substituting equation (B24) into equation (B23) yields:

$$\begin{aligned}
\pi_t &= ((1 + \beta) + \kappa\sigma^{-1}) \left(((1 + \beta) + \kappa\sigma^{-1})^2 - 2\beta \right) \mathbb{E}_t(\pi_{t+3}) \\
&\quad - \left(((1 + \beta) + \kappa\sigma^{-1})^2 - \beta \right) \beta \mathbb{E}_t(\pi_{t+4}) \\
&\quad - \kappa\sigma^{-1} (\mathcal{I}_t^\nu - i_t^n) - \kappa\sigma^{-1} ((1 + \beta) + \kappa\sigma^{-1}) \mathbb{E}_t(\mathcal{I}_{t+1}^\nu - i_{t+1}^n) \\
&\quad - \kappa\sigma^{-1} \left(((1 + \beta) + \kappa\sigma^{-1})^2 - \beta \right) \mathbb{E}_t(\mathcal{I}_{t+2}^\nu - i_{t+2}^n) \\
&\quad + e_t + ((1 + \beta) + \kappa\sigma^{-1}) \mathbb{E}_t(e_{t+1}) + \left(((1 + \beta) + \kappa\sigma^{-1})^2 - \beta \right) \mathbb{E}_t(e_{t+2}).
\end{aligned} \tag{B25}$$

Advancing expectations three periods forward on equation (B21) results in:

$$\mathbb{E}_t(\pi_{t+3}) = ((1 + \beta) + \kappa\sigma^{-1}) \mathbb{E}_t(\pi_{t+4}) - \beta \mathbb{E}_t(\pi_{t+5}) - \kappa\sigma^{-1} \mathbb{E}_t(\mathcal{I}_{t+3}^\nu - i_{t+3}^n) + \mathbb{E}_t(e_{t+3}). \tag{B26}$$

Equation (B26) is then substituted into equation (B25):

$$\begin{aligned}
\pi_t &= \left(\left(((1 + \beta) + \kappa\sigma^{-1})^2 - 2\beta \right) ((1 + \beta) + \kappa\sigma^{-1})^2 - \left(((1 + \beta) + \kappa\sigma^{-1})^2 - \beta \right) \beta \right) \mathbb{E}_t(\pi_{t+4}) \\
&\quad - ((1 + \beta) + \kappa\sigma^{-1}) \left(((1 + \beta) + \kappa\sigma^{-1})^2 - 2\beta \right) \beta \mathbb{E}_t(\pi_{t+5}) \\
&\quad - \kappa\sigma^{-1} (\mathcal{I}_t^\nu - i_t^n) - \kappa\sigma^{-1} ((1 + \beta) + \kappa\sigma^{-1}) \mathbb{E}_t(\mathcal{I}_{t+1}^\nu - i_{t+1}^n) \\
&\quad - \kappa\sigma^{-1} \left(((1 + \beta) + \kappa\sigma^{-1})^2 - \beta \right) \mathbb{E}_t(\mathcal{I}_{t+2}^\nu - i_{t+2}^n) \\
&\quad - \kappa\sigma^{-1} ((1 + \beta) + \kappa\sigma^{-1}) \left(((1 + \beta) + \kappa\sigma^{-1})^2 - 2\beta \right) \mathbb{E}_t(\mathcal{I}_{t+3}^\nu - i_{t+3}^n) \\
&\quad + e_t + ((1 + \beta) + \kappa\sigma^{-1}) \mathbb{E}_t(e_{t+1}) + \left(((1 + \beta) + \kappa\sigma^{-1})^2 - \beta \right) \mathbb{E}_t(e_{t+2}) \\
&\quad + ((1 + \beta) + \kappa\sigma^{-1}) \left(((1 + \beta) + \kappa\sigma^{-1})^2 - 2\beta \right) \mathbb{E}_t(e_{t+3}).
\end{aligned} \tag{B27}$$

Continuing this approach, expectations four periods forward on equation (B21) are taken:

$$\mathbb{E}_t(\pi_{t+4}) = ((1 + \beta) + \kappa\sigma^{-1}) \mathbb{E}_t(\pi_{t+5}) - \beta \mathbb{E}_t(\pi_{t+6}) - \kappa\sigma^{-1} \mathbb{E}_t(\mathcal{I}_{t+4}^\nu - i_{t+4}^n) + \mathbb{E}_t(e_{t+4}). \tag{B28}$$

Equation (B28) is substituted into equation (B27):

$$\begin{aligned}
\pi_t = & \left[\left(((1+\beta) + \kappa\sigma^{-1})^2 - 2\beta \right) \left((1+\beta) + \kappa\sigma^{-1} \right)^2 - 2 \left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - \beta \right) \beta + \beta^2 \right] \mathbb{E}_t(\pi_{t+5}) \\
& - \left[\left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - 2\beta \right) \left((1+\beta) + \kappa\sigma^{-1} \right)^2 - \left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - \beta \right) \beta \right] \beta \mathbb{E}_t(\pi_{t+6}) \\
& - \kappa\sigma^{-1} (\mathcal{I}_t^\nu - i_t^n) - \kappa\sigma^{-1} \left((1+\beta) + \kappa\sigma^{-1} \right) \mathbb{E}_t(\mathcal{I}_{t+1}^\nu - i_{t+1}^n) - \kappa\sigma^{-1} \left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - \beta \right) \mathbb{E}_t(\mathcal{I}_{t+2}^\nu - i_{t+2}^n) \\
& - \kappa\sigma^{-1} \left((1+\beta) + \kappa\sigma^{-1} \right) \left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - 2\beta \right) \mathbb{E}_t(\mathcal{I}_{t+3}^\nu - i_{t+3}^n) \\
& - \kappa\sigma^{-1} \left[\left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - 2\beta \right) \left((1+\beta) + \kappa\sigma^{-1} \right)^2 - \left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - \beta \right) \beta \right] \mathbb{E}_t(\mathcal{I}_{t+4}^\nu - i_{t+4}^n) \\
& + e_t + \left((1+\beta) + \kappa\sigma^{-1} \right) \mathbb{E}_t(e_{t+1}) + \left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - \beta \right) \mathbb{E}_t(e_{t+2}) \\
& + \left((1+\beta) + \kappa\sigma^{-1} \right) \left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - 2\beta \right) \mathbb{E}_t(e_{t+3}) \\
& + \left[\left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - 2\beta \right) \left((1+\beta) + \kappa\sigma^{-1} \right)^2 - \left(\left((1+\beta) + \kappa\sigma^{-1} \right)^2 - \beta \right) \beta \right] \mathbb{E}_t(e_{t+4}),
\end{aligned} \tag{B29}$$

and so on.

More generally, the recursion given by equation (B29) can be expressed as:

$$\begin{aligned}
\pi_t = & \psi_5 \mathbb{E}_t(\pi_{t+5}) - \beta \psi_4 \mathbb{E}_t(\pi_{t+6}) \\
& - \kappa\sigma^{-1} \psi_0 (\mathcal{I}_t^\nu - i_t^n) - \kappa\sigma^{-1} \psi_1 \mathbb{E}_t(\mathcal{I}_{t+1}^\nu - i_{t+1}^n) - \kappa\sigma^{-1} \psi_2 \mathbb{E}_t(\mathcal{I}_{t+2}^\nu - i_{t+2}^n) \\
& - \kappa\sigma^{-1} \psi_3 \mathbb{E}_t(\mathcal{I}_{t+3}^\nu - i_{t+3}^n) - \kappa\sigma^{-1} \psi_4 \mathbb{E}_t(\mathcal{I}_{t+4}^\nu - i_{t+4}^n) \\
& + \psi_0 (e_t) + \psi_1 \mathbb{E}_t(e_{t+1}) + \psi_2 \mathbb{E}_t(e_{t+2}) \\
& + \psi_3 \mathbb{E}_t(e_{t+3}) + \psi_4 \mathbb{E}_t(e_{t+4}),
\end{aligned} \tag{B30}$$

where the weights ψ_j correspond to the weights given by this recurrence relation:

$$\begin{aligned}
\psi_j &= \left((1+\beta) + \kappa\sigma^{-1} \right) \psi_{j-1} - \beta \psi_{j-2}, \quad \forall j \geq 1, \\
\psi_0 &= 1, \quad \psi_{-1} = 0.
\end{aligned} \tag{B31}$$

Hence, if the recursion in (B30) is expanded forward to express inflation solely in terms of current and expected future effective monetary policy gaps and composite shocks, inflation admits the following general recursive representation:

$$\pi_t = -\kappa\sigma^{-1} \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t(\mathcal{I}_{t+j}^\nu - i_{t+j}^n) + v_t, \tag{B32}$$

where the term $v_t \equiv \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t(e_{t+j})$ collects the contributions from current and expected future composite shocks. For the general recursive form in (B32) to hold, that requires the following limiting condition to hold:

$$\lim_{j \rightarrow \infty} (\psi_j \mathbb{E}_t(\pi_{t+j}) - \beta \psi_{j-1} \mathbb{E}_t(\pi_{t+j+1})) = 0, \tag{B33}$$

which ensures that long-term inflation expectations are bounded and do not deviate from the central bank

target (i.e., $\lim_{j \rightarrow +\infty} \mathbb{E}_t(\pi_{t+j}) = \bar{\pi}_t = 0$).

By substituting (B32) together with (B31) into the Phillips curve in (B17), the following expression for the output gap is obtained:

$$x_t = -\sigma^{-1} \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t (\mathcal{I}_{t+j}^\nu - i_{t+j}^n) + \beta \sigma^{-1} \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t (\mathcal{I}_{t+1+j}^\nu - i_{t+1+j}^n) + \frac{v_t - \beta \mathbb{E}_t (v_{t+1}) - u_t}{\kappa}. \quad (\text{B34})$$

By redefining the summation index $k = j + 1$, this expression can be rewritten as:

$$x_t = -\sigma^{-1} \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t (\mathcal{I}_{t+j}^\nu - i_{t+j}^n) + \beta \sigma^{-1} \sum_{k=1}^{+\infty} \psi_{k-1} \mathbb{E}_t (\mathcal{I}_{t+k}^\nu - i_{t+k}^n) + w_t, \quad (\text{B35})$$

where $w_t \equiv \frac{v_t - \beta \mathbb{E}_t (v_{t+1}) - u_t}{\kappa}$. Rewriting the second summation back in terms of j , the output gap solution is expressed in general recursive form as:

$$x_t = -\sigma^{-1} \sum_{j=0}^{+\infty} \gamma_j \mathbb{E}_t (\mathcal{I}_{t+j}^\nu - i_{t+j}^n) + w_t, \quad (\text{B36})$$

where the weights γ_j are given by:

$$\gamma_j = \psi_j - \beta \psi_{j-1}, \quad \forall j \geq 0. \quad (\text{B37})$$

This result demonstrates that, if the limit condition in (B33) holds, the weights defined in (B31), inflation π_t as given by (B32), the output gap x_t from (B36)–(B37), and, through $x_t = (1 - \alpha)(n_t - n_t^n)$, the employment gap, are all fully determined by current and expected deviations of the effective policy stance \mathcal{I}_t^ν from the neutral rate i_t^n as well as by the composite shocks v_t and w_t , which summarize the impact of present and expected future demand and cost-push disturbances.

The Limiting Condition and the Central Bank Target. Given the recursion and initial conditions for the weights ψ_j specified in (B31), we begin by solving the second-order characteristic equation:

$$r^2 - ((1 + \beta) + \kappa \sigma^{-1})r + \beta = 0, \quad (\text{B38})$$

whose discriminant satisfies that $\Delta \equiv ((1 + \beta) + \kappa \sigma^{-1})^2 - 4\beta > 0$ under the maintained parameter assumptions $0 < \beta < 1$, $\sigma^{-1} > 0$, and $\kappa > 0$. The roots are determined as follows:

$$r_1 = \frac{((1 + \beta) + \kappa \sigma^{-1}) + \sqrt{((1 + \beta) + \kappa \sigma^{-1})^2 - 4\beta}}{2}, \quad r_2 = \frac{((1 + \beta) + \kappa \sigma^{-1}) - \sqrt{((1 + \beta) + \kappa \sigma^{-1})^2 - 4\beta}}{2}, \quad (\text{B39})$$

such that $r_1 > r_2 > 0$. Consequently, the general solution for the weights ψ_j is:

$$\psi_j = Ar_1^j + Br_2^j. \quad (\text{B40})$$

Employing the initial conditions, we derive the system of equations: $1 = A + B$, and $(1 + \beta) + \kappa\sigma^{-1} = Ar_1 + Br_2$; leading to the coefficients:

$$A = \frac{(1 + \beta) + \kappa\sigma^{-1} - r_2}{r_1 - r_2}, \quad B = \frac{r_1 - (1 + \beta) - \kappa\sigma^{-1}}{r_1 - r_2}, \quad (\text{B41})$$

or, simply put:

$$A = \frac{r_1}{\sqrt{((1 + \beta) + \kappa\sigma^{-1})^2 - 4\beta}}, \quad B = -\frac{r_2}{\sqrt{((1 + \beta) + \kappa\sigma^{-1})^2 - 4\beta}}. \quad (\text{B42})$$

The analytical expression for the weights ψ_j then becomes:

$$\psi_j = \left(\frac{1}{\sqrt{((1 + \beta) + \kappa\sigma^{-1})^2 - 4\beta}} \right) \left[r_1^{j+1} - r_2^{j+1} \right]. \quad (\text{B43})$$

To assess whether the sequence ψ_j given in (B43) converges or diverges as $j \rightarrow \infty$, we evaluate the magnitudes of the roots r_1 and r_2 . If either root exceeds a magnitude of 1, the sequence diverges. The sum and product of the roots are given by:

$$r_1 + r_2 = (1 + \beta) + \kappa\sigma^{-1}, \quad (\text{B44})$$

$$r_1 r_2 = \beta. \quad (\text{B45})$$

For any $\kappa\sigma^{-1} > 0$, the characteristic polynomial satisfies $p(1) = 1 - [(1 + \beta) + \kappa\sigma^{-1}] + \beta = -\kappa\sigma^{-1} < 0$, while $p(r) \rightarrow +\infty$ as $r \rightarrow +\infty$. Hence one root lies above unity, $r_1 > 1$, and because $r_1 r_2 = \beta < 1$, the second root satisfies $0 < r_2 < 1$. The weights ψ_j therefore generally grow with the forecast horizon. The forward-looking representation remains valid only under the terminal condition in (B33): expected long-run inflation must remain anchored and the expected policy gap and shock terms must close sufficiently fast for the explosive terminal component to be ruled out.

This highlights the critical nature of monetary policy forward guidance and the necessity for the central bank to anchor long-term inflation expectations effectively at the target, i.e., $\lim_{j \rightarrow +\infty} \mathbb{E}_t(\pi_{t+j}) = \bar{\pi}_t = 0$. Implementing a reaction function in the spirit of the [Taylor \(1993\)](#) rule can ensure that the effective policy stance returns to its neutral level promptly, closing the monetary policy gap and avoiding destabilizing outcomes.

This is consistent with the Blanchard-Kahn conditions, which necessitate a robust response to deviations in inflation from target to avert expectation-driven explosive outcomes, thus securing determinacy and uniqueness of equilibrium under the selected policy rule. It is critical to recognize that while any monetary policy framework defines broad strategic objectives and key constraints, it also allows policymakers considerable flexibility in adopting various policy rules and paths, leading to diverse outcomes in practice, even if major objectives of the monetary policy framework like maintaining well-anchored long-term inflation expectations are met.

Therefore, the evaluation of the new FAIT framework's adoption raises two pivotal questions: First, to what extent did FAIT limit policies that would have been viable under the previous regime? Second, how profoundly did FAIT influence the actual conduct of monetary policy, irrespective of whether it formally

constrained the policy path? These questions are fundamental to our analysis, as the adoption of make-up strategies within FAIT, combined with the strategic approach to not overreact to perceived transitory inflation spikes, may have significantly altered the practical conduct of monetary policy. This could explain the notable differences in outcomes when comparing the performance under FAIT against that of other central banks that retained the FIT framework. This shift in the conduct of policy goes beyond mere recognition in strategic policy formulation under the new framework.

Policy Transmission and the Slope of the Phillips Curve. The forward-looking solution, validated under the limiting condition in (B33), critically underpins policy analysis by evaluating the effects on inflation and economic activity of anticipated changes in the effective policy gap relative to the neutral rate. This solution not only substantiates the use of forward guidance as a policy tool but also emphasizes the distinct roles of the Phillips curve and IS curve slopes, κ and σ^{-1} respectively, which are fundamental to understanding the monetary policy transmission mechanism.

Firstly, analyzing the effects of the Phillips curve slope κ on the model's forward-looking solution reveals its dual impact: altering the inflation scaling factor and adjusting the weights influencing effective policy gaps' effect on inflation and output (and employment) gaps. The derivative of the weight ψ_j with respect to κ , denoted $\Psi_j \equiv \frac{\partial \psi_j}{\partial \kappa}$, is computed by differentiating the recurrence in (B31). Ψ_j satisfies the recursion:

$$\Psi_j = ((1 + \beta) + \kappa\sigma^{-1}) \Psi_{j-1} + \sigma^{-1}\psi_{j-1} - \beta\Psi_{j-2}, \quad \forall j \geq 2, \quad (\text{B46})$$

with initial conditions:

$$\Psi_0 = 0, \quad \Psi_1 = \sigma^{-1}. \quad (\text{B47})$$

The related $\Gamma_j \equiv \frac{\partial \gamma_j}{\partial \kappa}$, representing the derivative of γ_j with respect to κ , is obtained after differentiating the recurrence in (B37). Γ_j is given by the recursion:

$$\Gamma_j = \Psi_j - \beta\Psi_{j-1}, \quad \forall j \geq 1, \quad (\text{B48})$$

with initial conditions:

$$\Gamma_0 = \Psi_0 = 0, \quad \Gamma_1 = \Psi_1 = \sigma^{-1}. \quad (\text{B49})$$

These derivatives demonstrate that κ not only scales the impact of monetary policy gaps on inflation but subtly modifies the transmission of expected future policy gaps across all endogenous variables, enhancing our understanding of forward guidance's complex and nonlinear effects under different Phillips curve slope scenarios.

Secondly, a quantitative exploration of κ 's influence on monetary policy effectiveness leverages standard (pre-pandemic) parameterizations, drawing on the referential work of Galí (2015). The baseline calibration sets preference parameters with $\beta = 0.99$ indicating a steady-state annualized real return $((\frac{1}{\beta})^4 - 1)$ of approximately 4%; $\sigma = 1$ for log utility; and $\varphi = 1$ reflecting unitary Frisch elasticity of labor supply, though exploring $\varphi = 3$ accommodates a broader range observed in New Keynesian models.³⁰ The capital share α is preset at $\frac{1}{3}$, implying a two-thirds labor share, with variations like $\alpha = \frac{1}{4}$ considered to bring the

³⁰Frisch elasticity, measured by φ^{-1} , denotes labor supply's responsiveness to real wage changes, keeping wealth's marginal utility constant. While $\varphi = 1$ is standard as noted in Galí (2015), $\varphi = 3$ implies a lower Frisch elasticity of $\frac{1}{3}$, aligning more closely with empirical evidence from micro-level data suggesting lower responsiveness.

labor share up to three-quarters. The elasticity of substitution among differentiated goods is set at $\epsilon = 11$, corresponding to a 10% steady-state markup consistent with the business cycle literature, though $\epsilon = 6$ is also considered for a higher 20% markup as preferred by Galí (2015). Price stickiness is modeled by $\theta = \frac{3}{4}$, reflecting an average price duration of four quarters in line with empirical pre-pandemic findings, whereas $\theta = \frac{2}{3}$ indicates more frequent price adjustments, happening every three quarters on average.

Using the baseline calibration $\beta = 0.99$, $\sigma = \varphi = 1$, $\alpha = \frac{1}{3}$, $\epsilon = 11$, and $\theta = \frac{3}{4}$, the slope of the Phillips curve is $\kappa = 0.02641$. Reducing θ to $\frac{2}{3}$ increases the frequency of price adjustments, raising κ to 0.052308. A further increase in φ to 3, which decreases labor supply responsiveness to real wage changes, elevates the slope to $\kappa = 0.091538$. Decreasing ϵ to 6, which corresponds to a 20% markup, further steepens the slope to $\kappa = 0.14875$. Lastly, increasing the labor share to $1 - \alpha = \frac{3}{4}$ pushes κ to 0.204.³¹ This analysis suggests that κ 's range from a relatively flat 0.02641 to a steeper 0.204 reflects significant variability in Phillips curve steepness, nearly tenfold based on plausible pre-pandemic values.

Before the pandemic, the standard parameterization of the New Keynesian model, with $\kappa = 0.02641$, reinforced the conventional view that the Phillips curve was relatively flat. However, post-pandemic structural adjustments—including more frequent price adjustments, diminished labor supply responsiveness to real wage changes, increased markups, and a higher labor share—suggest a potentially steeper Phillips curve, possibly approaching $\kappa = 0.204$. These shifts, even when analyzed using pre-pandemic parameter values, suggest a substantial modification in the dynamics of the model, a hypothesis that is consistent with this paper's findings.

The apparent steepening of the Phillips curve during the pandemic might reflect more complex nonlinear dynamics. Shifts in aggregate supply and demand could have temporarily nudged the economy onto a steeper segment of the Phillips curve. Consequently, it is important to recognize that this steepening might be transient if economic conditions revert to a flatter segment of the curve. This insight is particularly relevant because it means that current inflationary patterns and real economic activity trade-offs might not reliably forecast future dynamics if the underlying economic structure returns to its earlier norm over time.

Employing $\beta = 0.99$, $\sigma^{-1} = 1$ (indicating the slope of the IS curve), and κ values ranging from 0.02641 to 0.204 to reflect the varying steepness of the Phillips curve, we quantify the effects of monetary policy gaps on inflation and the output gap over a three-year period, spanning quarters $j = 0, \dots, 11$. This duration typically exceeds the conventional timeframe of forward guidance. Notably, the extended monetary accommodation post-pandemic was curtailed earlier as inflation exceeded 2% by 2021, prompting a policy reversal by March 2022, exactly two years after the pandemic's onset in the U.S. The impacts of a one-unit change in both current and expected effective policy gaps are detailed in Table B1.

This table underscores the efficacy of forward guidance within the New Keynesian model by demonstrating that anticipated effective policy gaps have a progressively greater impact on current endogenous variables the further into the future they extend, particularly amplifying the effects on inflation relative to the output gap at extended horizons. This highlights the critical nature of timing in policy implementation to minimize

³¹With the baseline calibration, the characteristic equation roots from (B38) for $\kappa = 0.02641$ are $r_1 = 1.1709$ and $r_2 = 0.84549$. Reducing θ to $\frac{2}{3}$ adjusts κ to 0.052308, changing the roots to $r_1 = 1.2508$ and $r_2 = 0.79147$. An increase in φ to 3 raises κ to 0.091538, with resultant roots $r_1 = 1.3461$ and $r_2 = 0.73548$. Decreasing ϵ to 6 for $\kappa = 0.14875$ yields roots $r_1 = 1.4612$ and $r_2 = 0.6775$. Finally, setting $\alpha = \frac{1}{4}$, which raises the labor share to $1 - \alpha = \frac{3}{4}$, for $\kappa = 0.204$ results in $r_1 = 1.5590$ and $r_2 = 0.63504$. Across this spectrum of κ values, one root consistently remains outside the unit circle, indicating inherent instability in the forward-looking solutions. Therefore, ensuring economic stability necessitates firmly anchoring long-term expectations and timely closure of the effective policy gap. Failure to do so, especially under prolonged deviations from the neutral rate, would likely manifest in a rapid onset of instability.

the economic costs associated with reducing inflation. Postponing interest rate hikes above the neutral rate, rather than immediate action, enhances their inflationary impact, allowing for smaller policy adjustments to achieve the same reduction in inflation and a reduced sacrifice ratio—the necessary output loss for a specified decrease in inflation. Conversely, providing monetary accommodation sooner, ideally immediately, offers a substantial boost to economic activity with lesser inflationary consequences than relying on forward guidance would. These results hold true qualitatively irrespective of whether the Phillips curve’s slope (κ) is flat or steep.

The table also illustrates that maintaining “low-for-longer” rates intensifies inflationary pressures when prolonged monetary accommodation is announced, as opposed to direct monetary action through significant rate cuts below the neutral rate. Notably, forward guidance cannot perfectly substitute for immediate monetary accommodation, especially under ELB constraints that limit immediate policy actions, compelling reliance on forward guidance. Conversely, a “high-for-longer” strategy to combat inflation proves advantageous, necessitating smaller rate increases for the same inflation reduction, achieving this with lower negative impacts on output and employment. Therefore, forward guidance is asymmetrically effective, less so in providing accommodation but more so in tightening.

Moreover, the influence of the Phillips curve’s slope on the differential effects of expected monetary policy gaps on inflation versus output is pronounced. As [Table B1](#) shows, a steeper Phillips curve significantly heightens the inflationary effects of forward guidance compared to its impact on economic activity, effectively reducing the sacrifice ratio—the output adjustment needed to achieve a comparable change in inflation. Thus, if the Phillips curve has steepened since the pandemic, this would have markedly escalated the inflationary costs associated with the “low-for-longer” policies initiated after FAIT’s introduction in August 2020 and with the subsequent guidelines on balance sheet normalization in September and December of 2020 ([Waller \(2022\)](#)). The soft-landing path that emerged after the policy shift in March 2022 likely resulted more from the increased effectiveness of “high-for-longer” strategies in managing inflation with reduced output costs within a steep Phillips curve environment, rather than from the initial aggressiveness of the Federal Reserve.

Furthermore, the inflation risks associated with prolonged accommodative stances or perceived delays in policy tightening under FAIT are heightened in scenarios with a steeper Phillips curve, a situation that may be difficult to recognize in real-time. Lessons from the post-GFC era, which highlighted the potential benefits of a more assertive monetary policy had a flatter-than-expected Phillips curve been identified earlier (as discussed in [Caldara et al. \(2021\)](#)), could have been misapplied during the pandemic. By adhering to a “low-for-longer” strategy at the ELB, and operating under the assumption of a flat Phillips curve, policymakers may have underestimated the inflationary consequences of make-up strategies designed to offset pre-pandemic inflation shortfalls. This miscalculation likely contributed to the inflation surge, as early and aggressive accommodation interacted with stronger-than-expected price pressures. The failure to swiftly dispel expectations of a slow policy response may have further exacerbated those inflationary pressures, particularly in a steep Phillips curve scenario.

Table B1. Weight on the Monetary Policy Gap at Horizon j :

		$j = 0$	$j = 1$	$j = 2$	$j = 3$	$j = 4$	$j = 5$	$j = 6$	$j = 7$	$j = 8$	$j = 9$	$j = 10$	$j = 11$
$\beta = 0.99, \sigma = 1, \kappa = 0.0264$													
Inflation	$-\kappa\sigma^{-1}\psi_j$	= -0.026	-0.053	-0.081	-0.111	-0.144	-0.180	-0.220	-0.266	-0.318	-0.378	-0.448	-0.528
Output Gap	$-\sigma^{-1}\gamma_j$	= -1.000	-1.026	-1.080	-1.161	-1.272	-1.416	-1.595	-1.815	-2.081	-2.398	-2.776	-3.224
$\frac{\text{Output Gap}}{\text{Inflation}}$	$\frac{-\sigma^{-1}\gamma_j}{-\kappa\sigma^{-1}\psi_j}$	= 37.879	19.257	13.297	10.449	8.858	7.886	7.257	6.833	6.545	6.345	6.203	6.104
$\beta = 0.99, \sigma = 1, \kappa = 0.052$													
Inflation	$-\kappa\sigma^{-1}\psi_j$	= -0.052	-0.107	-0.166	-0.234	-0.313	-0.408	-0.523	-0.665	-0.840	-1.057	-1.327	-1.664
Output Gap	$-\sigma^{-1}\gamma_j$	= -1.000	-1.052	-1.159	-1.326	-1.560	-1.873	-2.281	-2.804	-3.469	-4.309	-5.366	-6.692
$\frac{\text{Output Gap}}{\text{Inflation}}$	$\frac{-\sigma^{-1}\gamma_j}{-\kappa\sigma^{-1}\psi_j}$	= 19.118	9.850	6.966	5.663	4.978	4.589	4.358	4.218	4.132	4.078	4.044	4.023
$\beta = 0.99, \sigma = 1, \kappa = 0.092$													
Inflation	$-\kappa\sigma^{-1}\psi_j$	= -0.092	-0.191	-0.306	-0.448	-0.630	-0.868	-1.183	-1.603	-2.165	-2.921	-3.935	-5.301
Output Gap	$-\sigma^{-1}\gamma_j$	= -1.000	-1.092	-1.282	-1.588	-2.036	-2.667	-3.535	-4.718	-6.320	-8.486	-11.406	-15.342
$\frac{\text{Output Gap}}{\text{Inflation}}$	$\frac{-\sigma^{-1}\gamma_j}{-\kappa\sigma^{-1}\psi_j}$	= 10.924	5.729	4.190	3.542	3.231	3.072	2.988	2.943	2.919	2.906	2.898	2.894
$\beta = 0.99, \sigma = 1, \kappa = 0.149$													
Inflation	$-\kappa\sigma^{-1}\psi_j$	= -0.149	-0.318	-0.533	-0.825	-1.237	-1.829	-2.688	-3.937	-5.759	-8.420	-12.307	-17.985
Output Gap	$-\sigma^{-1}\gamma_j$	= -1.000	-1.149	-1.467	-2.000	-2.825	-4.063	-5.892	-8.580	-12.516	-18.276	-26.696	-39.003
$\frac{\text{Output Gap}}{\text{Inflation}}$	$\frac{-\sigma^{-1}\gamma_j}{-\kappa\sigma^{-1}\psi_j}$	= 6.723	3.611	2.751	2.423	2.283	2.221	2.192	2.179	2.173	2.171	2.169	2.169
$\beta = 0.99, \sigma = 1, \kappa = 0.204$													
Inflation	$-\kappa\sigma^{-1}\psi_j$	= -0.204	-0.448	-0.780	-1.268	-2.010	-3.155	-4.932	-7.698	-12.006	-18.720	-29.185	-45.500
Output Gap	$-\sigma^{-1}\gamma_j$	= -1.000	-1.204	-1.652	-2.432	-3.700	-5.710	-8.865	-13.798	-21.495	-33.501	-52.220	-81.405
$\frac{\text{Output Gap}}{\text{Inflation}}$	$\frac{-\sigma^{-1}\gamma_j}{-\kappa\sigma^{-1}\psi_j}$	= 4.902	2.690	2.117	1.917	1.840	1.810	1.798	1.793	1.790	1.790	1.789	1.789

Note: All values are rounded to three decimal places. The sacrifice ratio, which represents the trade-off between the output gap and inflation, quantifies the inherent compromises in monetary policy. Since monetary policy does not affect potential output, any impact on the output gap arises solely from monetary policy effects on actual output. Thus, the sacrifice ratio effectively measures the trade-off between output and inflation.

In summary, the introduction of FAIT and supplementary balance sheet guidance may have also modified monetary policy responses to inflation compared to the FIT regime. FAIT could have opened up the door to more assertive expansionary forward guidance at the ELB, sidestepping earlier tendencies towards excessive caution in providing accommodation. However, such a policy might have been more effective had the Phillips curve not steepened beyond its pre-pandemic level.³²

The Pass-Through Into Inflation Expectations. Given that the forward-looking solution for inflation can be expressed in recursive form as in (B32), it follows naturally that:

$$\begin{aligned}\mathbb{E}_t(\pi_{t+\tau}) &= -\kappa\sigma^{-1} \sum_{j=0}^{+\infty} \psi_j \mathbb{E}_t(\mathcal{I}_{t+j+\tau}^\nu - i_{t+j+\tau}^n) + \mathbb{E}_t(v_{t+\tau}) \\ &= -\kappa\sigma^{-1} \sum_{j=0}^{+\infty} \left(\frac{\psi_j}{\psi_{j+\tau}} \right) \psi_{j+\tau} \mathbb{E}_t(\mathcal{I}_{t+j+\tau}^\nu - i_{t+j+\tau}^n) + \mathbb{E}_t(v_{t+\tau}), \quad \forall \tau \geq 1,\end{aligned}\tag{B50}$$

where the weights ψ_j satisfy the recurrence relation in (B31). The parameter τ denotes the forecast horizon for inflation. While interest typically centers on shorter-term inflation expectations, as $\tau \rightarrow \infty$, long-run inflation expectations increasingly depend on distant effective policy gaps and converge to the zero-inflation steady state targeted by the central bank, provided that the effective monetary policy gap ($\mathcal{I}_{t+j}^\nu - i_{t+j}^n$) converges to zero and the demand and cost-push shocks ε_{t+j} and u_{t+j} vanish in expectation as $j \rightarrow \infty$. This assumption ensures that long-run inflation expectations are anchored and that the economy returns to its steady state over time.

Several key inferences follow from equation (B50):

First, current monetary policy gaps do not directly influence future inflation expectations. Rather, it is the expected path of the policy gap that matters—more precisely, expectations about that path at and beyond the forecast horizon τ . Anticipated policy shifts that occur before τ should not influence expectations at that horizon. This underscores the central role of forward guidance. If policy rates are expected to remain “lower for longer”—as was widely perceived during the early stages of the COVID-19 pandemic following the Federal Reserve’s adoption of FAIT—then not only are current inflation outcomes affected, but expectations over the horizon targeted by forward guidance are also shaped accordingly. Still, expectations remain anchored in the long run, provided the policy gap is closed appropriately and the central bank’s credibility is preserved—assumptions that are embedded in the model and consistent with empirical evidence.

Second, the effect of expected monetary policy gaps on inflation expectations, as captured by (B50), is governed by two components. One is $\psi_{j+\tau}$, which also determines the impact of future policy gaps on actual inflation. The other is the ratio $\frac{\psi_j}{\psi_{j+\tau}}$, which scales the influence of those future policy gaps on inflation expectations relative to actual inflation. From the analytical solution in (B43), this ratio admits the following limiting form:

³²The analysis in this paper complements the structural approach of [Duncan et al. \(2022\)](#), which examines FAIT’s implications for cyclical inflation through the two-country New Keynesian DSGE model of [Martínez-García and Wynne \(2010\)](#) and [Martínez-García \(2019\)](#). That structural model describes pre-FAIT monetary policy using a [Taylor \(1993\)](#) rule, augmented with monetary policy news shocks [Del Negro et al. \(2012\)](#), allowing for different ways of responding to past misses under FAIT via moving averages of past inflation.

$$\lim_{j \rightarrow +\infty} \frac{\psi_j}{\psi_{j+\tau}} = \frac{1}{r_1^\tau}, \quad \text{with } r_1 = \frac{((1+\beta) + \kappa\sigma^{-1}) + \sqrt{((1+\beta) + \kappa\sigma^{-1})^2 - 4\beta}}{2} > 0. \quad (\text{B51})$$

More generally, the ratio may be expressed as:

$$\frac{\psi_j}{\psi_{j+\tau}} = \frac{r_1^{j+1} - r_2^{j+1}}{r_1^{j+1+\tau} - r_2^{j+1+\tau}} = \frac{1}{r_1^\tau} \cdot \frac{1 - \left(\frac{r_2}{r_1}\right)^{j+1}}{1 - \left(\frac{r_2}{r_1}\right)^{j+1+\tau}}, \quad (\text{B52})$$

where $r_2 = \frac{(1+\beta) + \kappa\sigma^{-1} - \sqrt{((1+\beta) + \kappa\sigma^{-1})^2 - 4\beta}}{2}$. Since $\frac{r_2}{r_1} < 1$, it follows that $\left(\frac{r_2}{r_1}\right)^j \rightarrow 0$ as $j \rightarrow +\infty$, which confirms the limiting result in (B51).

Because $\kappa\sigma^{-1} > 0$ implies $r_1 > 1$, the sequence of policy-gap weights is forward-looking and potentially explosive unless the terminal condition is imposed. In this empirically relevant case, the influence of a policy gap at horizon $j + \tau$ on inflation expectations at horizon τ is attenuated relative to its impact on actual inflation by approximately $1/r_1^\tau < 1$, and that attenuation becomes stronger as τ grows.

The initial value of the ratio sequence, given by $\frac{\psi_0}{\psi_\tau}$, is strictly positive and lower than 1 for any $\tau > 0$, since $\psi_0 = 1$ and $\psi_\tau > 1$ under the maintained parameterization. Moreover, with $x := r_2/r_1 \in (0, 1)$, equation (B52) can be written as

$$\frac{\psi_j}{\psi_{j+\tau}} = \frac{1}{r_1^\tau} g_j, \quad g_j := \frac{1 - x^{j+1}}{1 - x^{j+1+\tau}}.$$

The sequence g_j is increasing in j .³³ This then implies that: $\frac{\psi_j}{\psi_{j+\tau}} < \frac{\psi_{j+1}}{\psi_{j+1+\tau}}$, $\forall j \geq 0, \tau > 0$, which confirms that the ratio sequence $\frac{\psi_j}{\psi_{j+\tau}}$ is strictly increasing in j for any given $\tau > 0$.

In practical terms, this result implies that the influence of future expected monetary policy gaps on inflation expectations is attenuated relative to their effect on actual inflation, but becomes relatively stronger at longer horizons than at shorter ones. Near-term policy gaps—those at or above and close to $j + \tau$ —are downweighted more heavily than distant ones. Consequently, forward guidance involving “lower for longer” commitments is expected to exert a stronger influence on near-term inflation expectations, especially due to its duration. Hence, the potency of forward guidance at long horizons is all the more important in shaping expectations.

Third, the slope of the Phillips curve κ plays a critical role in mediating the strength of this effect. To illustrate, consider two parameterizations: a flat Phillips curve with $\beta = 0.99$, $\sigma = 1$, and $\kappa = 0.0264$, and a steep Phillips curve with $\beta = 0.99$, $\sigma = 1$, and $\kappa = 0.204$. Under the flat case, the limiting value of the ratio sequence is approximately $\frac{1}{r_1^\tau} \approx 0.8540^\tau$, while in the steep case, the limit falls to $\frac{1}{r_1^\tau} \approx 0.6415^\tau$. This suggests that a steeper Phillips curve diminishes the transmission of forward guidance into inflation expectations.

Together, these results indicate that both the structure of expectations and the slope of the Phillips curve jointly determine the effectiveness and persistence of monetary policy’s influence on short-run inflation expectations. Although a steeper Phillips curve reduces the strength of forward guidance effects on inflation expectations, those effects remain sizable—converging to approximately two-thirds the size of the impact on

³³For $a = j + 1$, compare g_{a+1} with g_a . Cross-multiplication gives $(1 - x^{a+1})(1 - x^{a+\tau}) - (1 - x^a)(1 - x^{a+1+\tau}) = x^a(1 - x)(1 - x^\tau) > 0$, so $g_{a+1} > g_a$.

actual inflation at very short horizons, but fading quickly at medium-term horizons, in line with empirical evidence.

C Robustness to Donor Pool Composition and an Alternative Identification Strategy

So far, we have conducted several econometric exercises to assess the sensitivity of our baseline results on headline and core CPI inflation rates, as well as short- and long-run inflation expectations. In summary, we find that our conclusions are not sensitive to: (1) the exclusion of Canada—the unit with the highest estimated weight—from the donor pool (see [Table 1–Table 3](#), columns 4 and 8); (2) the sequential removal of control units, as shown in the Leave-One-Out tests ([Figures S3–S4 in Supplementary Appendix E](#)); and (3) the use of the spillover-adjusted SCM proposed by Cao and Dowd (2019) (see [Figure S5 in Supplementary Appendix E](#)). Qualitatively, our main conclusions remain intact. That said, it is still worthwhile to consider approaches that estimate causal effects without relying on a donor pool.

Causal-ARIMA (C-ARIMA), recently proposed by [Menchetti et al. \(2023\)](#), is a time series modeling framework designed to estimate the causal effect of an intervention by embedding it within a standard ARIMA structure. Based on the Rubin Causal Model, C-ARIMA bridges traditional intervention analysis (e.g., interrupted time series analysis; [Box and Tiao \(1975\)](#)) with causal inference by modeling the counterfactual trajectory of the treated series using ARIMA dynamics learned from the pre-intervention period. Unlike the SCM that relies on a donor pool of untreated units, C-ARIMA identifies causal effects from a single treated time series, using a set of predictors, assuming the intervention is exogenous and other structural assumptions (e.g., no anticipatory effects) hold. This makes C-ARIMA especially valuable in settings where the practitioner might be uncertain about the availability or suitability of control units for building a fully credible synthetic counterfactual.

To examine causal effects without a donor pool, we replicate the exercises from Section 3 using C-ARIMA. As in the SCM application, we include the same covariates for the model estimation: the Global Supply Chain Pressures Index, the Kilian Index, global energy price inflation, international food price inflation, government surplus as a share of GDP, M3 growth, industrial production growth, and the overnight rate. [Table S6](#) presents the results for the four outcome variables. [Figure S6 in Supplementary Appendix E](#) displays the observed outcomes alongside the estimated counterfactuals and their corresponding confidence intervals. The estimated causal effects on headline and core inflation are positive and statistically significant, as is the effect on short-run inflation expectations. The average treatment effects on the treated (ATTs) for these outcomes range between 1.1 and 1.5 percentage points. As before, FAIT appears to have had no significant impact on long-run expectations. The low RMSPE and MAPE values indicate a strong fit in the pre-intervention period.

Returning to our original SCM results and identification strategy, we note that: (1) all control units are OECD economies operating under inflation targeting regimes with the same inflation target; (2) inflation rates across control units evolved similarly during the pre-intervention period (2012–2020; see [Figure S1 in Supplementary Appendix E](#)); (3) the SCM estimates are robust to donor pool variation, as discussed above; and (4) C-ARIMA produces qualitatively similar results. Taken together, all these points increase our confidence that the conclusions are not sensitive to the choice or composition of the donor pool.

D Robustness to Alternative Measures of Fiscal Shocks

One could argue that the fiscal response to the COVID-19 pandemic may have contributed to higher inflation in the U.S. economy during our period of analysis (see, e.g., [Bianchi et al. \(2023\)](#)). It is worth recalling that we have already addressed this possibility in our SCM estimations: (1) we use government surplus as a share of GDP as a predictor to estimate synthetic control weights, and, more importantly, (2) we also use the same indicator to residualize inflation rates and other outcome variables over the full sample prior to applying the SCM. In other words, our synthetic control estimates already account for or remove the effect of fiscal measures. That said, it remains worthwhile to explore more direct measures of post-COVID fiscal shocks.

The COVID-19 fiscal stimulus primarily consisted of two major packages: the Coronavirus Aid, Relief, and Economic Security Act (CARES; signed into law on March 27, 2020), and the American Rescue Plan Act (ARPA; March 11, 2021). Following [Bianchi et al. \(2023\)](#), these two unusually large government transfer shocks can be captured by computing the growth rate of real government transfer payments. This series is constructed as follows: first, we sum government social benefits (B087RC1Q027SBEA) and other current transfer payments, including grants-in-aid to state and local governments (FGSL); second, we deflate this total using the GDP price deflator (GDPDEF); third, we interpolate the resulting series from quarterly to monthly frequency; and finally, we compute monthly growth rates (see the data appendix in [Bianchi et al. \(2023\)](#)).

While this measure of fiscal policy is promising, it presents one limitation: it is only available for the treated unit (the U.S.) and not for the donor pool. This constraint explains why it could not be incorporated into the SCM exercises in earlier sections. Here again, we turn to C-ARIMA, which allows us to estimate the counterfactual trajectories of the outcome variables using an ARIMA structure and relevant predictors, without relying on control units (see [Menchetti et al. \(2023\)](#) or [Supplementary Appendix C](#) for additional details).

[Table S7](#) in [Supplementary Appendix E](#) presents the results for the four outcome variables: headline and core CPI inflation, as well as short-run and long-run inflation expectations. The estimated ATTs for the first three outcomes range between 0.85 and 1.2 percentage points (columns [1]–[3], [Table S7](#) in [Supplementary Appendix E](#)). Once again, we confirm that long-run expectations remained well anchored (see also [Figure S7](#) in [Supplementary Appendix E](#)).

Another possibility is that our fiscal deficit measure is endogenous to overall economic conditions. Over time, this endogeneity makes it unclear whether the estimated coefficient on deficits should be interpreted as capturing the effect of an exogenous change in the deficit. A natural alternative is to use a measure such as the full-employment, or cyclically adjusted, fiscal surplus, which accounts for the feedback from the economy to the deficit. This series, produced by the Congressional Budget Office, is defined as net federal government revenues and outlays excluding automatic stabilizers, expressed as a percentage of potential GDP. The main results using this measure are reported in [Table S8](#). The estimated ATTs for the first three outcomes range between 1.1 and 1.3 percentage points (columns [1]–[3], [Table S8](#)), while the effect on long-run expectations remains statistically insignificant (column [4]; see also [Figure S8](#)).

If we compare column (1) in [Table S7](#) with column (1) in [Table S6](#), we can infer that including real government transfer payments reduces the average effect on CPI inflation by about 0.6 percentage points when using the C-ARIMA method. While existing studies suggest that the fiscal stimulus contributed to

inflation, particularly in 2021, the precise magnitude of this effect remains debated. For instance, [Barnichon et al. \(2021\)](#) report effects of around 0.3 percentage points, whereas [Jordà et al. \(2022\)](#) find effects closer to 3 percentage points.

In sum, we conclude that while fiscal policy could have contributed to the post-COVID surge in inflation, this does not preclude an independent effect of FAIT. Our findings using C-ARIMA suggest that FAIT had a measurable impact consistent with the results reported in the main analysis.

E Supplementary Tables and Figures

Table S1. Descriptive Statistics

Variable/Unit	Period	Mean	Median	Min.	Max.	Std. Dev.
CPI Inflation (%)						
U.S.	Pre-intervention	1.58	1.70	-0.23	2.96	0.76
U.S.	Post-intervention	5.28	6.05	1.16	8.56	2.65
U.S.	Full period	2.39	1.76	-0.23	8.56	2.08
Control group	Pre-intervention	1.27	1.36	-1.60	3.67	1.00
Control group	Post-intervention	4.67	3.81	-0.80	16.42	3.83
Control group	Full period	2.01	1.51	-1.60	16.42	2.44
PCE Inflation (%)						
U.S.	Pre-intervention	1.34	1.45	0.04	2.54	0.59
U.S.	Post-intervention	4.49	5.27	1.11	6.88	2.05
U.S.	Full period	2.03	1.53	0.04	6.88	1.70
Control group	Pre-intervention	1.27	1.36	-1.60	3.67	1.00
Control group	Post-intervention	4.67	3.81	-0.80	16.42	3.83
Control group	Full period	2.01	1.51	-1.60	16.42	2.44
Core CPI Inflation (%)						
U.S.	Pre-intervention	1.94	1.97	1.17	2.35	0.26
U.S.	Post-intervention	4.20	4.49	1.28	6.43	1.87
U.S.	Full period	2.44	2.04	1.17	6.43	1.29
Control group	Pre-intervention	1.22	1.28	-0.89	3.64	0.82
Control group	Post-intervention	3.99	3.40	-0.31	13.76	3.09
Control group	Full period	1.82	1.42	-0.89	13.76	1.98
Short-term Expected Inflation (%)						
U.S.	Pre-intervention	1.72	1.80	-0.11	2.77	0.61
U.S.	Post-intervention	4.79	5.41	0.64	8.07	2.33
U.S.	Full period	2.39	1.90	-0.11	8.07	1.75
Control group	Pre-intervention	1.56	1.61	-0.56	3.40	0.73
Control group	Post-intervention	4.20	3.14	-0.66	15.10	3.47
Control group	Full period	2.14	1.73	-0.66	15.10	2.06

Note: Table continues on the next page.

Table S1. Descriptive Statistics (Cont.)

Variable/Unit	Period	Mean	Median	Min.	Max.	Std. Dev.
Short/medium-term Expected Inflation (%)						
U.S.	Pre-intervention	1.67	1.82	0.11	2.54	0.67
U.S.	Post-intervention	4.60	4.38	0.86	8.08	2.57
U.S.	Full period	2.31	1.93	0.11	8.08	1.80
Control group	Pre-intervention	1.46	1.58	-0.50	3.36	0.82
Control group	Post-intervention	3.92	2.83	-0.60	15.70	3.47
Control group	Full period	2.00	1.69	-0.60	15.70	2.05
Medium-term Expected Inflation (%)						
U.S.	Pre-intervention	2.06	2.10	1.33	2.35	0.18
U.S.	Post-intervention	2.94	2.89	1.73	4.21	0.77
U.S.	Full period	2.26	2.12	1.33	4.21	0.54
Control group	Pre-intervention	1.88	1.93	0.66	2.70	0.37
Control group	Post-intervention	2.76	2.24	0.54	9.07	1.73
Control group	Full period	2.07	1.96	0.54	9.07	0.95
Long-term Expected Inflation (%)						
U.S.	Pre-intervention	2.24	2.23	2.08	2.43	0.07
U.S.	Post-intervention	2.25	2.26	2.09	2.37	0.06
U.S.	Full period	2.24	2.24	2.08	2.43	0.07
Control group	Pre-intervention	2.07	2.03	1.60	2.89	0.17
Control group	Post-intervention	2.07	2.05	1.91	2.33	0.09
Control group	Full period	2.07	2.03	1.60	2.89	0.16
Unemployment Rate (%)						
U.S.	Pre-intervention	5.68	5.00	3.50	14.70	2.04
U.S.	Post-intervention	4.99	4.50	3.50	8.40	1.48
U.S.	Full period	5.53	5.00	3.50	14.70	1.95
Control group	Pre-intervention	5.74	5.80	1.80	14.10	1.69
Control group	Post-intervention	5.06	4.60	2.20	10.20	2.12
Control group	Full period	5.59	5.55	1.80	14.10	1.81

Note: Table continues on the next page.

Table S1. Descriptive Statistics (Cont.)

Variable/Unit	Period	Mean	Median	Min.	Max.	Std. Dev.
Industrial Production (percent change)						
U.S.	Pre-intervention	0.33	1.60	-18.95	4.34	3.78
U.S.	Post-intervention	2.25	3.06	-6.94	15.00	5.42
U.S.	Full period	0.75	1.86	-18.95	15.00	4.25
Control group	Pre-intervention	1.24	1.68	-41.68	11.34	4.58
Control group	Post-intervention	3.11	1.99	-12.07	42.64	7.59
Control group	Full period	1.65	1.70	-41.68	42.64	5.44
Government Surplus (% of GDP)						
U.S.	Pre-intervention	-6.74	-5.80	-25.70	-0.80	3.83
U.S.	Post-intervention	-8.71	-5.90	-20.30	-2.50	5.61
U.S.	Full period	-7.17	-5.85	-25.70	-0.80	4.34
Control group	Pre-intervention	-1.86	-1.27	-25.70	1.86	3.42
Control group	Post-intervention	-4.02	-3.59	-14.00	2.50	3.88
Control group	Full period	-2.33	-1.70	-25.70	2.50	3.63
M3 (percent change)						
U.S.	Pre-intervention	6.45	5.99	3.12	20.88	2.97
U.S.	Post-intervention	12.12	12.00	-0.89	23.79	7.46
U.S.	Full period	7.70	6.24	-0.89	23.79	4.93
Control group	Pre-intervention	6.33	6.51	-3.37	15.23	3.01
Control group	Post-intervention	9.14	8.15	1.76	21.27	3.95
Control group	Full period	6.94	6.81	-3.37	21.27	3.44
Overnight interest rate (%)						
U.S.	Pre-intervention	0.71	0.17	0.05	2.44	0.82
U.S.	Post-intervention	0.81	0.09	0.05	4.33	1.30
U.S.	Full period	0.73	0.15	0.05	4.33	0.94
Control group	Pre-intervention	0.75	0.50	-5.52	3.53	0.99
Control group	Post-intervention	1.08	0.23	-1.11	7.00	1.77
Control group	Full period	0.82	0.46	-5.52	7.00	1.21

Note: Table continues on the next page.

Table S1. Descriptive Statistics (Cont.)						
Variable	Period	Mean	Median	Min.	Max.	Std. Dev.
Global Supply Chain Pressures Index (GSCPI)						
	Pre-intervention	-0.03	-0.23	-0.94	3.19	0.76
	Post-intervention	2.26	2.36	0.11	4.33	1.13
	Full period	0.47	0.06	-0.94	4.33	1.28
Kilian Index						
	Pre-intervention	-47.19	-46.85	-127.93	19.05	33.23
	Post-intervention	23.51	42.85	-38.88	79.41	40.47
	Full period	-31.66	-35.36	-127.93	79.41	45.53
Global Energy Price Inflation (%)						
	Pre-intervention	-10.01	-4.84	-93.72	49.86	29.59
	Post-intervention	45.84	65.23	-29.35	98.89	40.92
	Full period	2.26	0.15	-93.72	98.89	39.73
Global Food Price Inflation (%)						
	Pre-intervention	-2.73	-1.34	-25.85	14.33	7.63
	Post-intervention	16.47	19.05	0.37	34.55	10.02
	Full period	1.49	-0.04	-25.85	34.55	11.42
Real Government Transfer Payments (%)						
	Pre-intervention	4.56	2.09	-4.30	105.00	15.00
	Post-intervention	16.80	1.84	-29.20	89.30	33.60
	Full period	6.47	2.05	-29.20	105.00	19.50
Cyclically-adjusted Fiscal Surplus (% of potential GDP)						
	Pre-intervention	-4.07	-3.41	-20.80	-1.64	2.79
	Post-intervention	-10.70	-10.40	-16.60	-4.82	3.63
	Full period	-5.10	-4.11	-20.80	-1.64	3.79

Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.

Note: The control group consists of Canada, the Czech Republic, Israel, New Zealand, Sweden, and the U.K. The pre-intervention period spans from 2012:M1 to 2020:M7, while the post-intervention period extends from 2020:M8 to 2022:M12.

Table S2. The Effect of FAIT on PCE Inflation and Medium-Run Expected Inflation						
	PCE Inflation Rate		Medium-Term Expected Inflation		Medium-Term Expected Inflation	
			Annual, Current Year		Annual, Next Year	
	[1]	[2]	[3]	[4]	[5]	[6]
ATT	1.059	0.964	0.992	0.905	0.288	0.252
p-value	0.000	0.000	0.000	0.000	0.065	0.001
Bias correction	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Residualization	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
Weights						
Canada	0.336	0.440	0.452	0.510	0.813	0.851
Czech Republic	-0.004	0.125	-0.013	0.070	0.016	0.004
Israel	0.126	0.059	-0.013	-0.003	-0.051	0.042
New Zealand	0.157	0.119	-0.002	0.066	-0.001	-0.010
Sweden	0.076	-0.065	0.128	-0.046	-0.016	-0.012
United Kingdom	0.309	0.323	0.448	0.403	0.240	0.125
Diagnostics & Robustness						
RMSPE	0.208	0.327	0.193	0.250	0.119	0.103
MAPE	0.172	0.261	0.154	0.199	0.096	0.081
Estimated bias	-0.027	0.025	-0.025	0.003	0.074	-0.007
Improv. vs. unif. weights	30.98	25.05	48.90	28.38	57.02	48.14
No anticipation (p-val)	0.056	0.199	0.258	0.666	0.519	0.669
In-time placebo (p-val)	0.048	0.000	0.992	0.178	0.530	0.943

Source: Dallas Fed's Database of Global Economic Indicators (Grossman et al. (2014)); authors' calculations.

Note: Columns [3]–[4] represent the expected annual inflation rate for the current year, while columns [5]–[6] correspond to the expected annual inflation rate for the following year. The p-value for the average treatment on the treated (ATT) unit corresponds to the joint null hypothesis that all effects are zero over the post-intervention period. RMSPE and MAPE denote the pre-intervention root mean squared prediction error and pre-intervention mean absolute prediction error, respectively. When the Augmented SCM is used, the estimated bias from a potentially weak pre-intervention fit is reported. The auxiliary predictors used are the government surplus as a share of GDP and percent changes in M3. The row labeled 'Improv. vs. unif. weights' shows the percentage improvement relative to using uniform weights instead of synthetic control weights. The no anticipation test (p-val) provides the p-value for the null hypothesis that the outcome gap was zero one month before FAIT adoption. The in-time placebo test (p-val) tests the null hypothesis that the ATT was zero during the 24-month period between the placebo treatment date (2018:M8) and the actual treatment date (2020:M8). Residualization of outcome variables is conducted using country effects and key macroeconomic factors, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR).

Table S3. The Effect of FAIT—Extended Post-Intervention Period (2020:M8-2022:M12)

	Headline CPI Inflation				Core CPI Inflation			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ATT	0.618	0.651	0.637	0.621	0.872	0.843	0.539	0.423
p-value	0.000	0.000	0.002	0.012	0.066	0.037	0.632	0.896
Bias correction	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Residualization	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>
Dropping Canada	<i>No</i>	<i>No</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>Yes</i>
Weights								
Canada	0.438	0.438	0.569	...	0.541	0.575	0.703	...
Czech Republic	0.061	0.047	0.377	0.703	0.000	-0.016	-0.038	0.035
Israel	0.000	-0.006	-0.026	0.187	0.000	-0.040	0.002	0.295
New Zealand	0.080	0.065	-0.003	-0.020	0.000	0.026	0.031	0.024
Sweden	0.039	0.041	-0.198	-0.101	0.000	-0.056	-0.156	-0.126
United Kingdom	0.381	0.414	0.281	0.231	0.459	0.511	0.458	0.772
Diagnostics & Robustness								
RMSPE	0.282	0.283	0.516	0.828	0.360	0.302	0.592	0.892
MAPE	0.226	0.226	0.405	0.649	0.313	0.253	0.459	0.734
Estimated bias	...	-0.009	-0.024	-0.071	...	0.009	-0.064	0.074
Improv. vs. unif. weights	40.89	40.78	55.69	35.47	55.44	62.62	48.07	28.91
No anticipation (p-val)	0.356	0.336	0.654	0.762	0.310	0.197	0.382	0.741
In-time placebo (p-val)	0.982	0.979	0.001	0.044	0.824	0.571	0.000	0.033

Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.

Note: The p-value for the average treatment on the treated (ATT) unit corresponds to the joint null hypothesis that all effects are zero over the post-intervention period. RMSPE and MAPE represent the pre-intervention root mean squared prediction error and pre-intervention mean absolute prediction error, respectively. When the Augmented SCM is used, the estimated bias from a potentially weak pre-intervention fit is reported. The auxiliary predictors used are the government surplus as a share of GDP and percent changes in M3. The row labeled 'Improv. vs. unif. weights' shows the percentage improvement relative to using uniform weights instead of synthetic control weights. The no anticipation test (p-val) provides the p-value for the null hypothesis that the outcome gap was zero one month before FAIT adoption. The in-time placebo test (p-val) tests the null hypothesis that the ATT was zero during the 24-month period between the placebo treatment date (2018:M8) and the actual treatment date (2020:M8). Residualization of outcome variables is conducted using country effects and key macroeconomic factors, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR). Specifications [4] and [8] exclude Canada from the donor pool as part of a sensitivity analysis.

Table S4. The Effect of FAIT—Extended Post-Intervention Period (2020:M8-2022:M12)

	Inflation Expectations Short Term				Inflation Expectations Long Term			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
	ATT	0.648	0.594	0.359	0.389	0.117	0.110	0.017	0.017
p-value	0.000	0.000	0.000	0.000	0.341	0.560	0.496	0.547
Bias correction	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Residualization	No	No	Yes	Yes	No	No	Yes	Yes
Dropping Canada	No	No	No	Yes	No	No	No	Yes
Weights								
Canada	0.585	0.586	0.579	...	0.000	-0.034	0.722	...
Czech Republic	0.000	-0.004	0.354	0.732	0.042	0.07	0.111	0.637
Israel	0.000	-0.017	0.045	0.25	...	...	...	...
New Zealand	0.073	0.05	-0.007	-0.009	0.000	-0.031	0.077	0.271
Sweden	0.061	0.07	-0.192	-0.108	0.311	0.33	-0.007	0.093
United Kingdom	0.282	0.315	0.222	0.135	0.647	0.665	0.096	-0.001
Diagnostics & Robustness								
RMSPE	0.237	0.235	0.426	0.615	0.129	0.128	0.049	0.058
MAPE	0.184	0.184	0.337	0.499	0.107	0.106	0.04	0.043
Estimated Bias	...	0.003	0.007	-0.006	...	0.009	0.000	0.001
Improv. vs. unif. weights	36.976	37.342	56.313	42.801	26.24	27.011	20.797	20.204
No anticipation (p-val)	0.704	0.746	0.371	0.442	0.768	0.898	0.942	0.667
In-time placebo (p-val)	1.000	1.000	0.005	0.009	1.000	1.000	0.001	0.377

Source: Dallas Fed's Database of Global Economic Indicators (Grossman et al. (2014)); authors' calculations.

Note: Short-term expected inflation refers to the projected four-quarter change, one quarter ahead, while long-term expected inflation corresponds to the expected rate 6-10 years into the future. The p-value for the average treatment on the treated (ATT) unit corresponds to the joint null hypothesis that all effects are zero over the post-intervention period. RMSPE and MAPE represent the pre-intervention root mean squared prediction error and pre-intervention mean absolute prediction error, respectively. When the Augmented SCM is used, the estimated bias from a potentially weak pre-intervention fit is reported. The auxiliary predictors used are the government surplus as a share of GDP and percent changes in M3. The row labeled 'Improv. vs. unif. weights' shows the percentage improvement relative to using uniform weights instead of synthetic control weights. The no anticipation test (p-val) provides the p-value for the null hypothesis that the outcome gap was zero one month before FAIT adoption. The in-time placebo test (p-val) tests the null hypothesis that the ATT was zero during the 24-month period between the placebo treatment date (2018:M8) and the actual treatment date (2020:M8). Residualization of outcome variables is conducted using country effects and key macroeconomic factors, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR). Specifications [4] and [8] exclude Canada from the donor pool as part of a sensitivity analysis.

Table S5. The Effect of FAIT using Spillover-Adjusted Synthetic Control Method								
	Headline CPI		Core CPI		Inflation Exp.		Inflation Exp.	
	Inflation		Inflation		Short Term		Long Term	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ATT	1.336	1.852	0.280	0.600	1.354	1.900	0.008	0.026
Residualization	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
Weights								
Canada	0.420	0.434	0.458	0.422	0.626	0.536	0.472	0.623
Czech Republic	0.073	0.144	0.000	0.000	0.020	0.038	0.307	0.170
Israel	0.000	0.006	0.128	0.140	0.000	0.078	...	...
New Zealand	0.104	0.014	0.189	0.147	0.052	0.049	0.221	0.207
Sweden	0.044	0.000	0.020	0.000	0.013	0.000	0.000	0.000
United Kingdom	0.359	0.401	0.206	0.291	0.289	0.300	0.001	0.000
Diagnostics & Robustness								
RMSPE	0.393	0.481	0.348	0.393	0.403	0.429	0.059	0.072
MAPE	0.314	0.385	0.271	0.314	0.319	0.340	0.042	0.053

Source: Dallas Fed's Database of Global Economic Indicators (Grossman et al. (2014)); authors' calculations.

Note: We use the spillover-adjusted SCM method proposed by Cao and Dowd (2019), which explicitly accounts for potential spillover effects. The authors do not report p-values for the full-period ATT. However, confidence intervals are provided for the dynamic treatment effect (see Figure S5). Short-term expected inflation (columns [5]-[6]) refers to the projected four-quarter change, one quarter ahead, while long-term expected inflation (columns [7]-[8]) corresponds to the expected rate 6-10 years into the future. RMSPE and MAPE denote the pre-intervention root mean squared prediction error and pre-intervention mean absolute prediction error, respectively. Israel is excluded from specifications [7]-[8] due to the unavailability of long-term expected inflation data.

Table S6. The Effect of FAIT—Using Causal-ARIMA and No Donor Pool				
	Headline CPI	Core CPI	Inflation Expectations	
	Inflation	Inflation	Short Term	Long Term
	[1]	[2]	[3]	[4]
ATT	1.422	1.467	1.073	−0.015
s.e.	0.379	0.153	0.124	0.046
p-value	0.000	0.000	0.000	0.737
Diagnostics & Robustness				
RMSPE	0.211	0.082	0.339	0.013
MAPE	0.167	0.066	0.248	0.009
Log-likelihood	12.96	110.85	−35.39	296.52
AICC	−1.02	−191.60	106.30	−562.94
ACF1	0.072	−0.074	−0.042	−0.019
No anticipation (p-val)	0.622	0.306	0.000	0.108

Source: Dallas Fed’s Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors’ calculations. Note: Results are estimated using maximum likelihood and the Causal-ARIMA approach ([Menchetti et al. \(2023\)](#)), which does not rely on data from control units. *S.e.* denotes standard errors. The p-value for the average treatment on the treated (ATT) corresponds to the null hypothesis that the average post-intervention effect is zero. RMSPE and MAPE represent the pre-intervention root mean squared prediction error and pre-intervention mean absolute prediction error, respectively. AICC refers to the Corrected Akaike Information Criterion. ACF1 (autocorrelation function at lag 1) measures the correlation of residuals with their own lagged values. The no-anticipation test (p-val) reports the p-value for the null hypothesis that the outcome gap was zero one month prior to the adoption of FAIT. Covariates include the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR). No data from control units were used in the estimation.

Table S7. The Effect of FAIT—Adding Government Transfer Payments

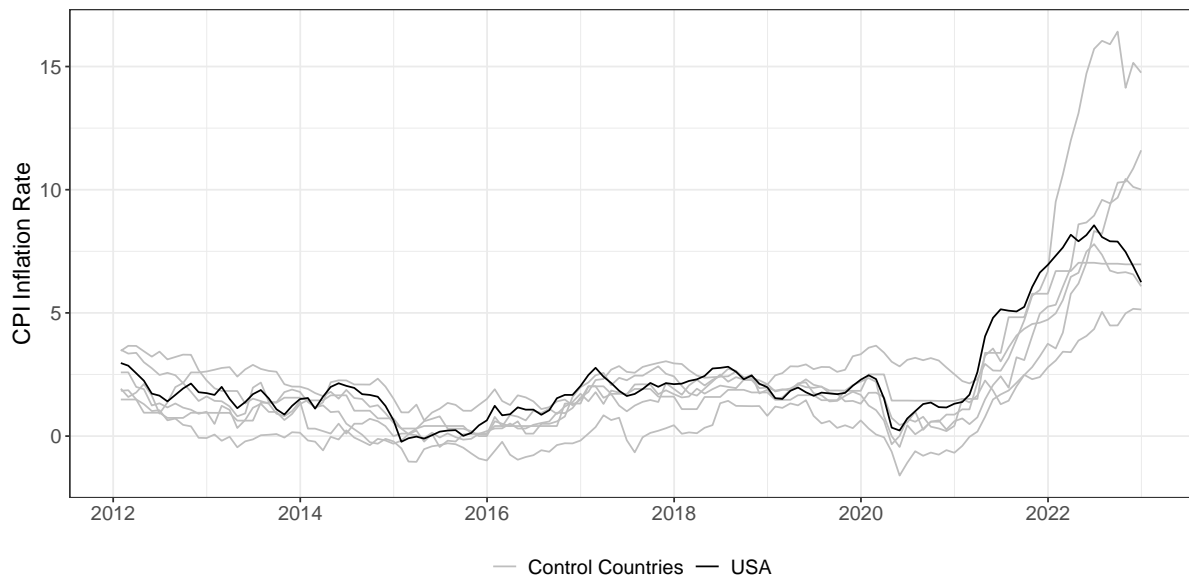
	Headline CPI	Core CPI	Inflation Expectations	
	Inflation	Inflation	Short Term	Long Term
	[1]	[2]	[3]	[4]
ATT	0.846	1.166	0.913	−0.018
s.e.	0.326	0.146	0.121	0.046
p-value	0.010	0.000	0.000	0.692
Diagnostics & Robustness				
RMSPE	0.207	0.077	0.335	0.013
MAPE	0.167	0.065	0.243	0.009
Log-likelihood	15.30	117.17	−34.14	296.76
AICC	−3.14	−198.82	106.60	−560.75
ACF1	0.077	−0.034	−0.045	−0.019
No anticipation (p-val)	0.003	0.014	0.000	0.390

Source: Dallas Fed’s Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors’ calculations. Note: Results are estimated using maximum likelihood and the Causal-ARIMA approach ([Menchetti et al. \(2023\)](#)), which does not rely on data from control units. *S.e.* denotes standard errors. The p-value for the average treatment on the treated (ATT) corresponds to the null hypothesis that the average post-intervention effect is zero. RMSPE and MAPE represent the pre-intervention root mean squared prediction error and pre-intervention mean absolute prediction error, respectively. AICC refers to the Corrected Akaike Information Criterion. ACF1 (autocorrelation function at lag 1) measures the correlation of residuals with their own lagged values. The no-anticipation test (p-val) reports the p-value for the null hypothesis that the outcome gap was zero one month prior to the adoption of FAIT. Covariates include the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), the overnight rate (ONR), and the growth of real government transfer payments (RGTPP; as in [Bianchi et al. \(2023\)](#)). No data from control units were used in the estimation.

Table S8. The Effect of FAIT—Using Cyclically-Adjusted Government Surplus				
	Headline CPI	Core CPI	Inflation Expectations	
	Inflation	Inflation	Short Term	Long Term
	[1]	[2]	[3]	[4]
ATT	1.139	1.338	1.112	−0.010
s.e.	0.399	0.168	0.127	0.045
p-value	0.004	0.000	0.000	0.828
Diagnostics & Robustness				
RMSPE	0.209	0.080	0.339	0.013
MAPE	0.166	0.066	0.244	0.009
Log-likelihood	14.197	112.500	−35.417	296.648
AICC	−3.493	−194.910	106.351	−563.206
ACF1	0.064	−0.072	−0.036	−0.017
No anticipation (p-val)	0.107	0.056	0.002	0.324

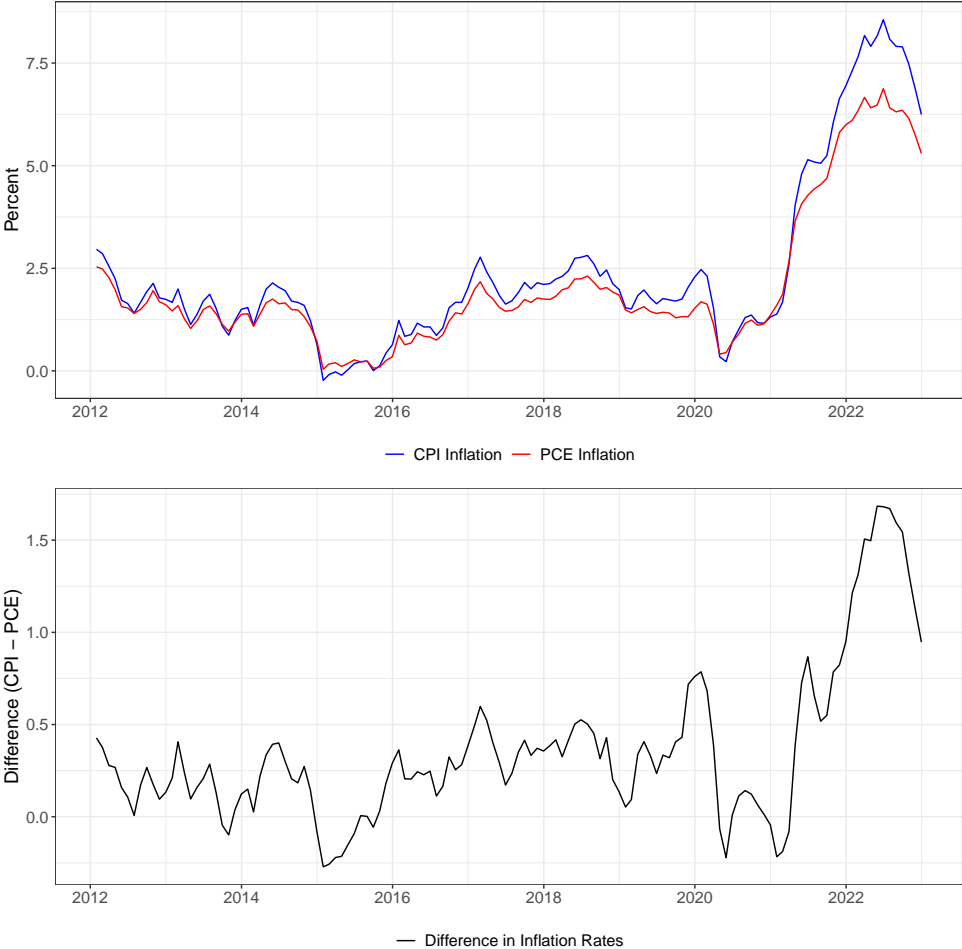
Source: Dallas Fed’s Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors’ calculations.
Note: Results are estimated using maximum likelihood and the Causal-ARIMA approach ([Menchetti et al. \(2023\)](#)), which does not rely on data from control units. *S.e.* denotes standard errors. The p-value for the average treatment on the treated (ATT) corresponds to the null hypothesis that the average post-intervention effect is zero. RMSPE and MAPE represent the pre-intervention root mean squared prediction error and pre-intervention mean absolute prediction error, respectively. AICC refers to the Corrected Akaike Information Criterion. ACF1 (autocorrelation function at lag 1) measures the correlation of residuals with their own lagged values. The no-anticipation test (p-val) reports the p-value for the null hypothesis that the outcome gap was zero one month prior to the adoption of FAIT. Covariates include the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), M3 growth (M3P), industrial production growth (IPP), the overnight rate (ONR), and cyclically-adjusted government surplus as a share of potential GDP (CAGSGDP). No data from control units were used in the estimation.

Figure S1. CPI Inflation Rates for the U.S. and the Control Units



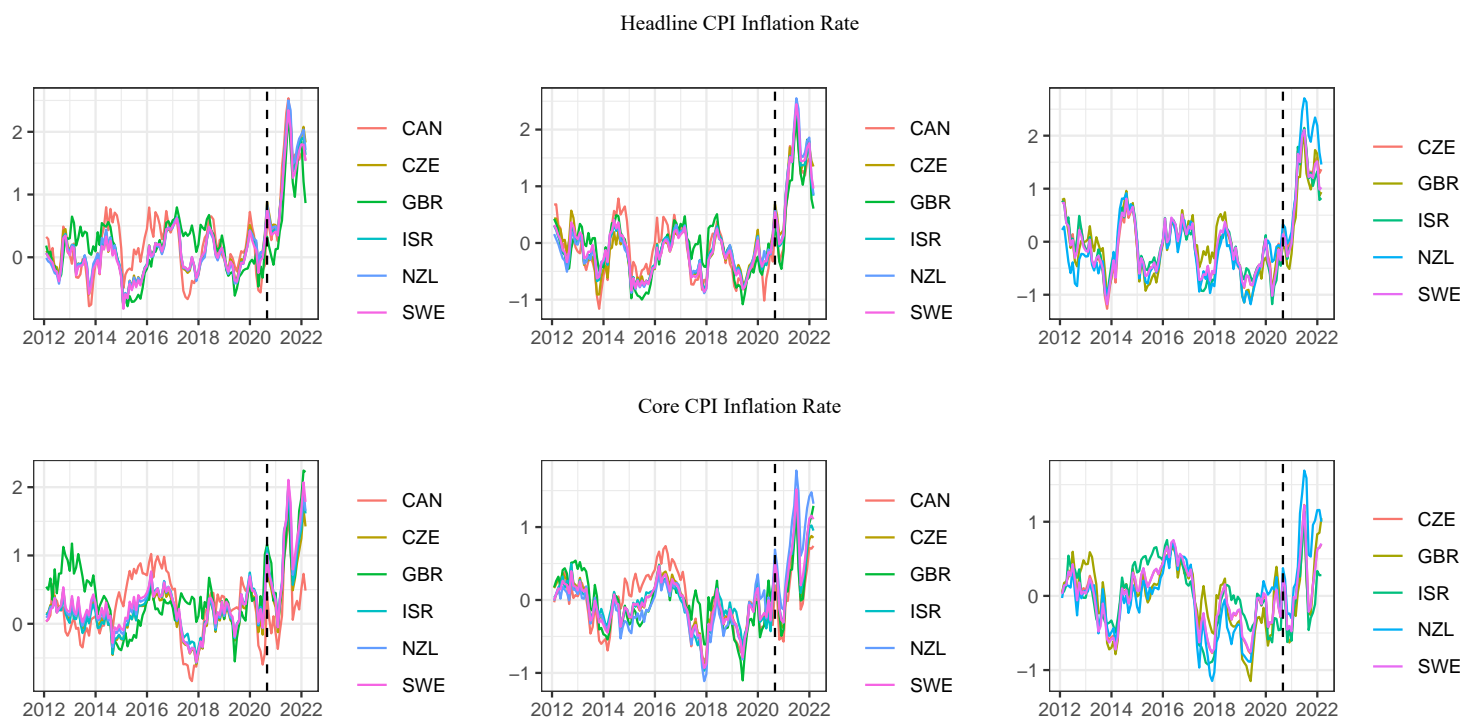
Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.
Note: The CPI inflation rate is calculated as the year-over-year percent change (12-month percent change in the logged index). The plot displays the CPI inflation rate for the U.S. (dark line) alongside the corresponding CPI inflation rates for the control units (gray lines).

Figure S2. CPI and PCE Inflation Rates for the U.S. and Their Differential



Sources: U.S. Bureau of Labor Statistics; U.S. Bureau of Economic Analysis; authors' calculations.
 Note: The top panel plots the year-over-year inflation rates for the CPI and PCE series. The bottom panel displays the differential series, calculated as the difference between the year-over-year inflation rates (12-month percent change in the logged index) of each series.

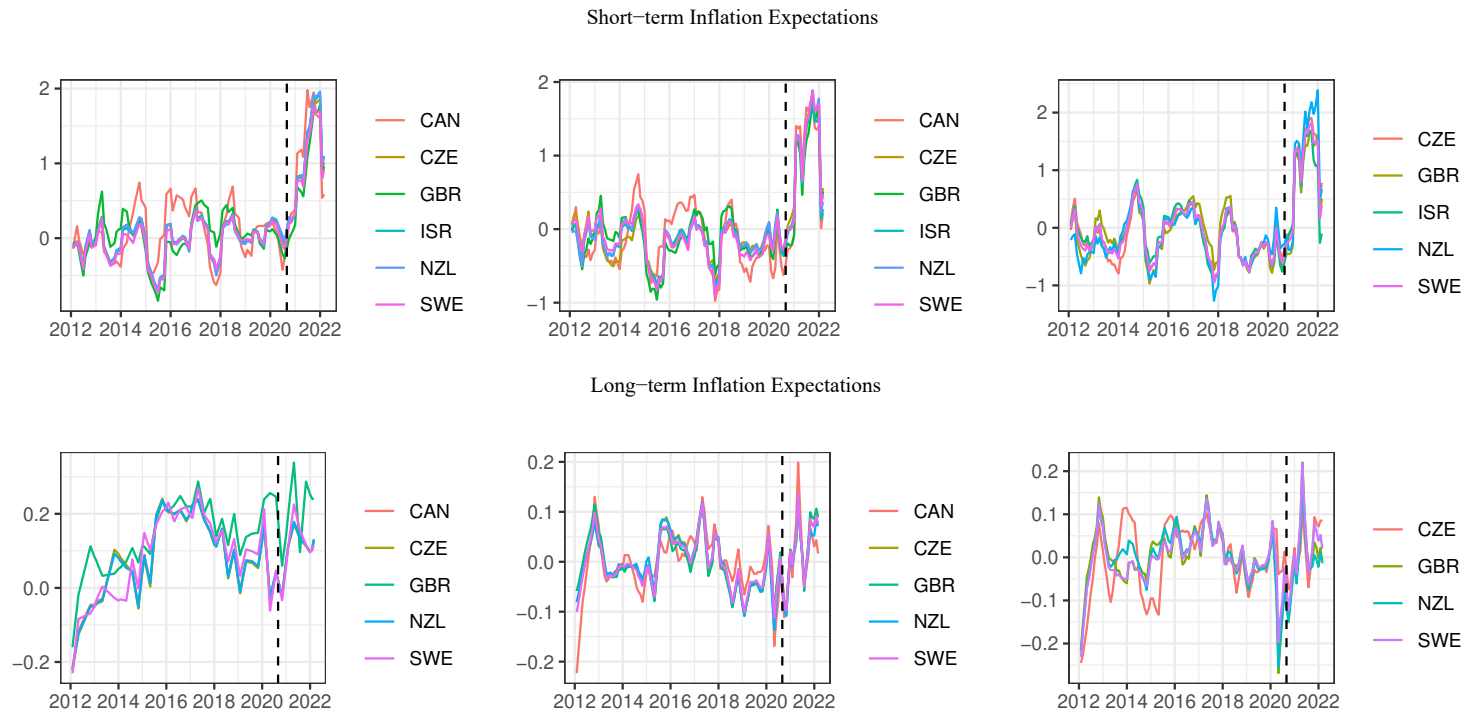
Figure S3. Leave-One-Out Test: Headline and Core CPI Inflation Rates



Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.

Note: The figures display the gaps between actual values and synthetic estimates of the outcome variable when removing a single donor country. The intervention date (August 2020) is marked by a dashed vertical line in each plot. The left panels show the augmented SCM estimates (columns [2] and [6] in [Table 1](#)), the center panels present the augmented SCM estimates with residualization (columns [3] and [7] in [Table 1](#)), and the right panels display the augmented SCM estimates with residualization, excluding Canada from the donor pool (columns [4] and [8] in [Table 1](#)). Residualization of inflation rates is conducted using country effects and key macroeconomic factors, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR).

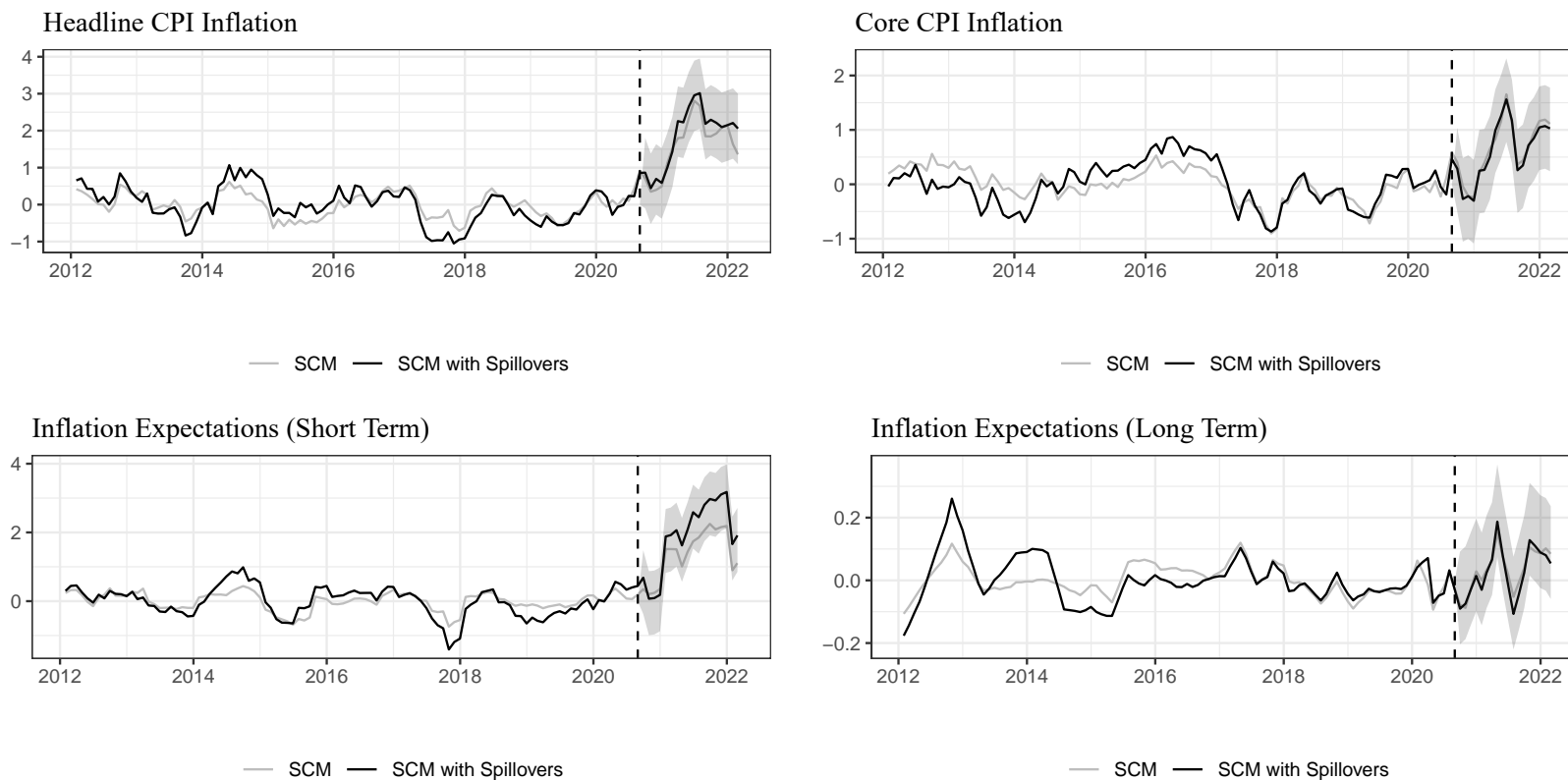
Figure S4. Leave-One-Out Test: Short-Term and Long-Term Expected Inflation Rates



Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.

Note: The figures display the gaps between actual values and synthetic estimates of the outcome variable when removing a single donor country. The intervention date (August 2020) is marked by a dashed vertical line in each plot. The left panels show the augmented SCM estimates (columns [2] and [6] in [Table 2](#)), the center panels present the augmented SCM estimates with residualization (columns [3] and [7] in [Table 2](#)), and the right panels display the augmented SCM estimates with residualization, excluding Canada from the donor pool (columns [4] and [8] in [Table 2](#)). Residualization of inflation rates is conducted using country effects and key macroeconomic factors, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR).

Figure S5. Outcome Gaps using the Synthetic Control Method with and without Spillover Effects

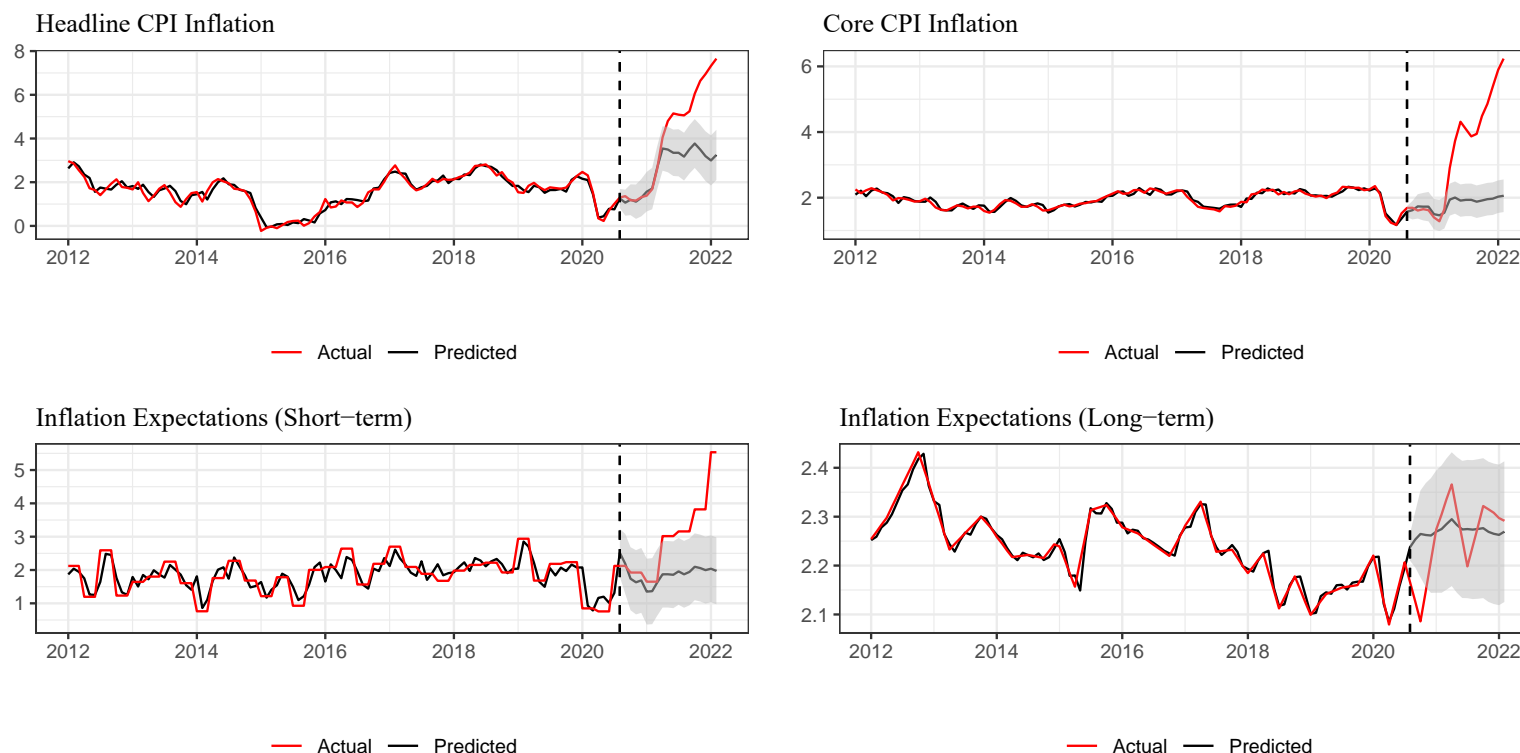


70

Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.

Note: The figures depict the outcome gaps for the canonical synthetic control (gray line, labeled SCM) and the spillover-adjusted synthetic control (dark line, labeled SCM with Spillovers), along with its 95% confidence interval. The intervention date (August 2020) is marked by a dashed vertical line in each plot. The upper left panel presents the DTE for headline CPI inflation, while the upper right panel displays the DTE for core CPI inflation. The lower left panel illustrates the DTE for short-run inflation expectations, and the lower right panel shows that for long-run inflation expectations. All panels use residualized outcome variables, assuming potential spillover effects on Canada. Residualization of inflation rates is conducted using country effects and key macroeconomic factors, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR).

Figure S6. Actual and Estimated Counterfactual Outcomes using Causal-ARIMA and No Donor Pool

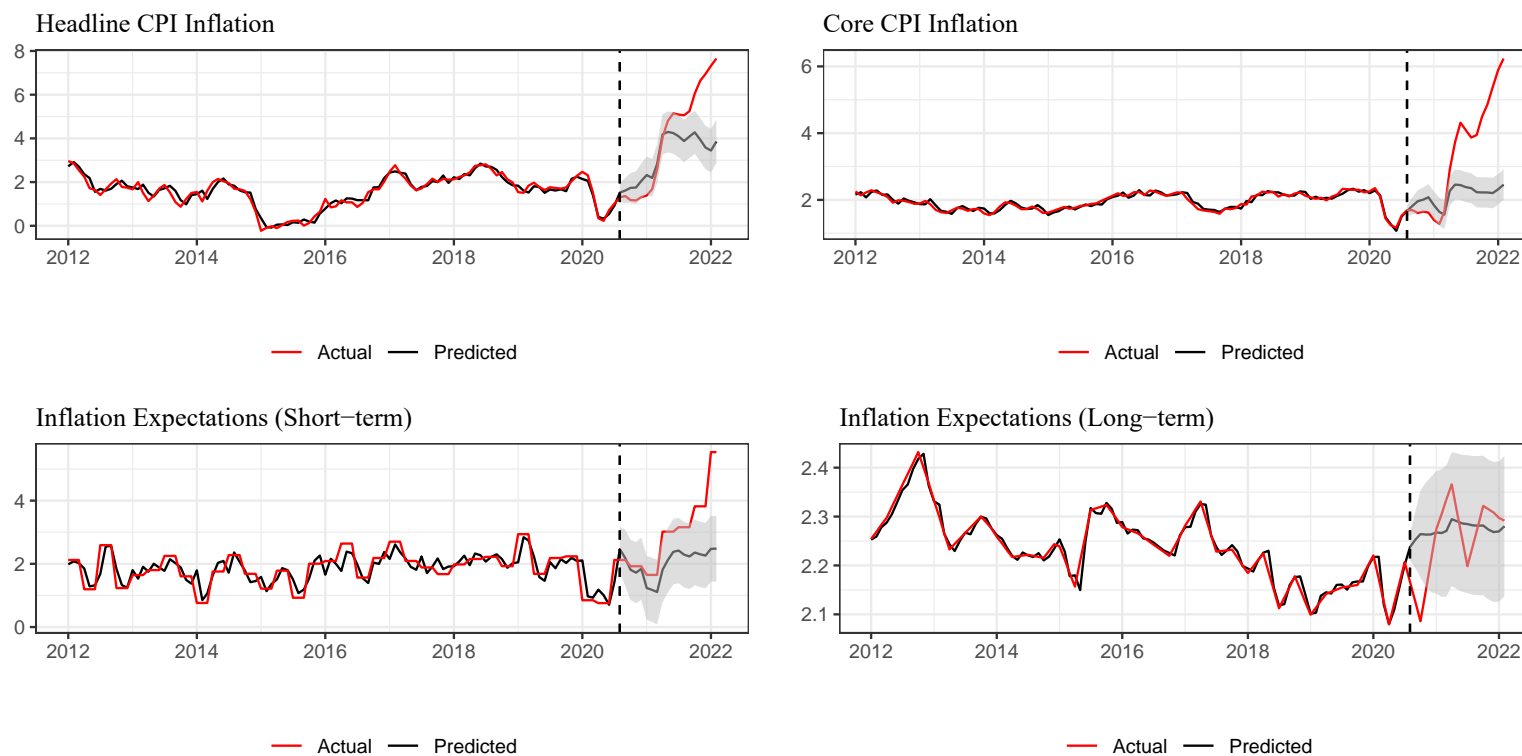


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Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.

Note: The figures show the actual outcome variables (red line) and the corresponding estimated counterfactuals (gray line) with 95% confidence intervals using Causal-ARIMA ([Menchetti et al. \(2023\)](#)). The intervention date (August 2020) is indicated by a dashed vertical line in each panel. The upper-left panel reports headline CPI inflation as the outcome variable, while the upper-right panel displays core CPI inflation. The lower-left panel shows short-run inflation expectations, and the lower-right panel shows long-run inflation expectations. All counterfactuals are estimated using macroeconomic indicators, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), and the overnight rate (ONR). No data from control units were used in the estimation.

Figure S7. Actual and Estimated Counterfactual Outcomes using Causal-ARIMA, No Donor Pool, Adding Government Transfer Payments

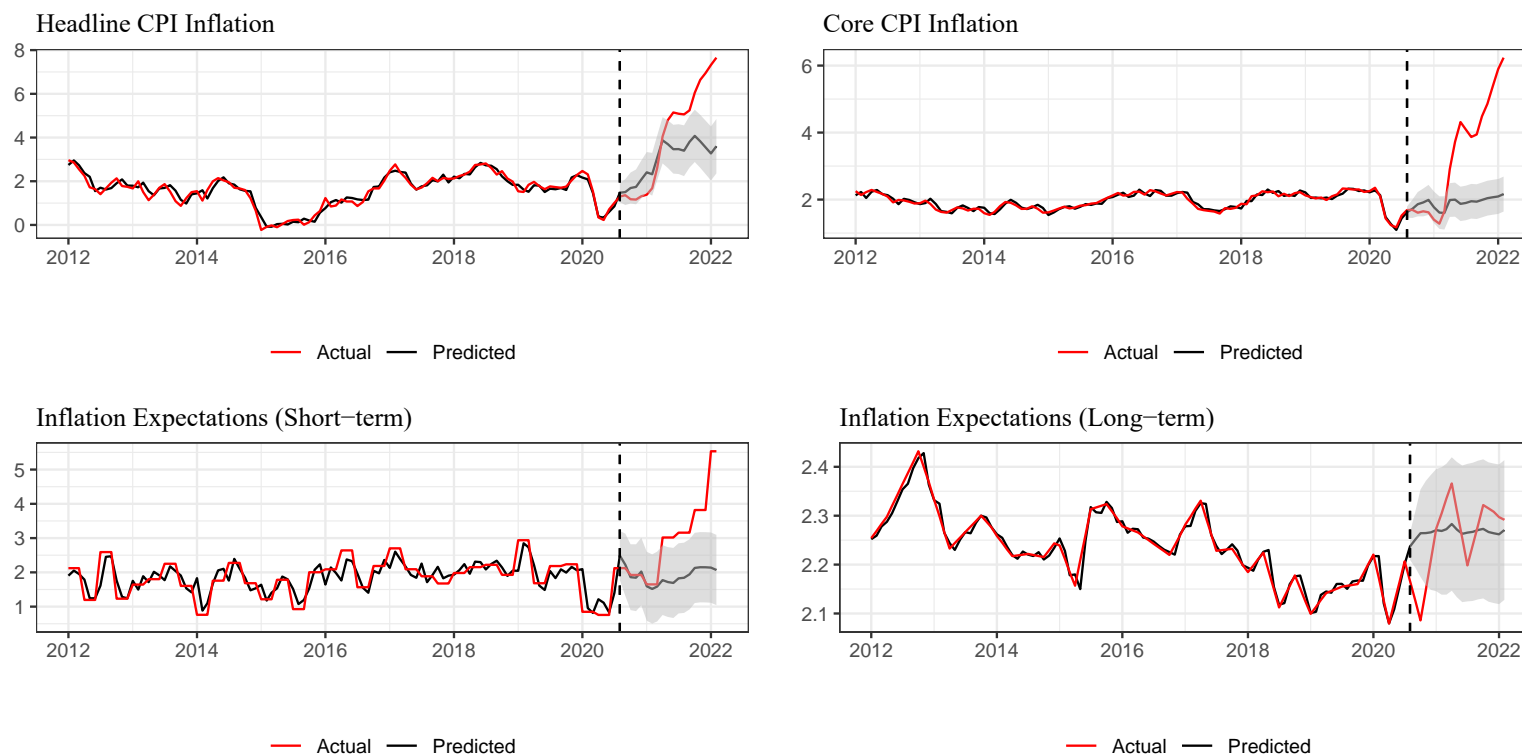


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Source: Dallas Fed’s Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors’ calculations.

Note: The figures show the actual outcome variables (red line) and the corresponding estimated counterfactuals (gray line) with 95% confidence intervals using Causal-ARIMA ([Menchetti et al. \(2023\)](#)). The intervention date (August 2020) is indicated by a dashed vertical line in each panel. The upper-left panel reports headline CPI inflation as the outcome variable, while the upper-right panel displays core CPI inflation. The lower-left panel shows short-run inflation expectations, and the lower-right panel shows long-run inflation expectations. All counterfactuals are estimated using macroeconomic indicators, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), government surplus as a share of GDP (GSGDP), M3 growth (M3P), industrial production growth (IPP), the overnight rate (ONR), and the growth of real government transfer payments (RGTPP; as in [Bianchi et al. \(2023\)](#)). No data from control units were used in the estimation.

Figure S8. Actual and Estimated Counterfactual Outcomes using Causal-ARIMA, No Donor Pool, and Cyclically-Adjusted Government Surplus (% Potential GDP)



Source: Dallas Fed's Database of Global Economic Indicators ([Grossman et al. \(2014\)](#)); authors' calculations.

Note: The figures show the actual outcome variables (red line) and the corresponding estimated counterfactuals (gray line) with 95% confidence intervals using Causal-ARIMA ([Menchetti et al. \(2023\)](#)). The intervention date (August 2020) is indicated by a dashed vertical line in each panel. The upper-left panel reports headline CPI inflation as the outcome variable, while the upper-right panel displays core CPI inflation. The lower-left panel shows short-run inflation expectations, and the lower-right panel shows long-run inflation expectations. All counterfactuals are estimated using macroeconomic indicators, including the Global Supply Chain Pressures Index (GSCPI), the Kilian Index, global energy price inflation (ENERGY), international food price inflation (FOOD), M3 growth (M3P), industrial production growth (IPP), the overnight rate (ONR), and cyclically-adjusted government surplus as a share of potential GDP (CAGSGDP). No data from control units were used in the estimation.