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Lessons for the FOMC’s Monetary Policy Strategy

Carl E. Walsh*

August 6, 2025

Abstract

The current 5-year review of the FOMC’s *Statement on Longer-Run Goals and Monetary Policy Strategy* provides an opportunity to assess the revisions made in 2020. I review the rationale behind the 2020 revisions and then discuss the new operational objectives: asymmetric average inflation targeting and shortfalls from maximum employment. Macroeconomic developments since 2020 led to an environment that was very different than the one anticipated when the 2020 policy framework was adopted. In this new environment, the 2020 changes created a risk that the US would suffer a repeat of the 1970s, a risk compounded by the FOMC’s slow reaction as inflation rose during 2021-2022. I illustrate the consequences of such a delay in addressing high inflation. The experience of the past five years offers some new lessons for the current review of the policy framework, as well as reinforcing the importance of some old lessons.

1 Introduction

In Sec. 2A of the Federal Reserve Reform Act of 1977, Congress mandated that “The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy’s long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates.” The use of monetary and credit aggregates have long been viewed as not relevant for the formulation of U.S. monetary policy, and moderate long-term interest rates are seen as a consequence of maximum employment stable prices. Thus, the Congressionally assigned goals of promoting maximum employment and price stability are known

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as the Federal Reserve’s dual mandate. The 1977 Act did not, however, indicate how either goal should be measured.¹

The FOMC’s annual *Statement on Longer-Run Goals and Monetary Policy Strategy*, the policy framework or PF for short, translates this dual mandate into operational objectives. It also provides guidance on how policy will respond to deviations from these objectives. First issued in 2012, the PF defined price stability as 2 percent inflation as measured by the Personal Consumption Expenditure (PCE) price index. Maximum employment was not linked to a specific measure, but reference was made to “...FOMC participants’ estimates of the longer-run normal rate of unemployment” in the Summary of Economic Projections (SEP). At the time, the central tendency of this estimate was 5.2 percent to 6.0 percent.

In 2016, the PF was revised to make it clear the FOMC would response *symmetrically* to deviation of inflation from target. In 2020, the PF was again, and more significantly, revised. The new restatement that will emerge from the current review will be based on lessons learned since the 2019 review. It it will also depend on earlier lessons, ones from the Volcker disinflation, the Great Moderation, the Global Financial Crisis, and the Great Recession. The experiences across developed and emerging economics over the past several decades indicate that a central bank with instrument independence and responsible for achieving a transparent inflation target helps anchor longer-run inflation expectations and allows the central bank the flexibility to promote good macroeconomic outcomes.

The 2020 PF focused heavily on downside risks associated with the effective lower bound (ELB) on nominal interest rates. The ELB poses a real constraint on monetary policy, but the past five years have reminded us that it is not the only risk the FOMC faces. A new PF needs to recognize that the FOMC will face downside and upside risks to inflation and employment. While the 2020 PF maintained the 2 percent target for PCE inflation, it redefined the operational objective, moving policy towards an asymmetric form of average inflation targeting. The operational objective for the employment mandate was also redefined to emphasize shortfalls from maximum employment. A key decision for the FOMC in undertaking the current framework review is whether the revisions adopted in 2020 should be retained or revised. Lessons from macroeconomic developments since 2020 can provide lessons that can help inform this decision, but these developments are also a reminder that older lessons still remain relevant.

The rest of the paper is organized as follows. I begin in Section 2 with a review of macroeconomic developments leading up to the adoption of the 2020 Statement. In Section 3, I use a model commonly employed to study monetary policy during the last period of high inflation to show how each of the changes in the 2020 PF increased the inflationary bias of discretionary policy. While

¹Sec. 2A ended by stating that “Nothing in this Act shall be interpreted to require that such ranges of growth or diminution (of monetary and credit aggregates) be achieved if the Board of Governors and the Federal Open Market Committee determine that they cannot or should not be achieved because of changing conditions.”

this was, in part, by design to offset the deflationary bias due to the ELB, it naturally raised concerns when inflation surged during 2021 and 2022. Macroeconomic developments during the past five years are reviewed in Section 4. I discuss the consequences of not responding to a surge in inflation, and describe the gamble the FOMC took in delaying reacting until inflation was over 6 percent. Managing expectations was an objective of the 2020 PF, and the challenges of doing so are discussed in Section 5. In Section 6, I discuss the role of unemployment and the labor market with the objective of identifying the distortions a shortfalls policy might address and whether monetary policy is an effective instrument for addressing these distortions. Uncertainty and new challenges are discussed in Section 7, while conclusions and lessons are contained in Section 8. The concluding section also draws together some suggestions for the next iteration of the FOMC’s *Statement on Longer-Run Goals and Monetary Policy Strategy*.

2 Macroeconomic developments: 2012-2020

An overview of the general macroeconomic contours of the inflation and unemployment over the 20 years prior to the adoption of the 2020 *Statement on Longer-Run Goals and Monetary Policy Strategy* is provided by Figure 1. It plots quarterly data on the year-over-year inflation rate measured by the PCE price index minus the FOMC’s 2 percent target against the gap between the unemployment rate and an estimate of noncyclical unemployment rate from the Congressional Budget Office (CBO).² The vertical dashed line at zero is where the unemployment rate gap is zero; the horizontal solid line at zero is where inflation equals 2 percent.

The period between the adoption of the first PF in 2012 and the 2020 revision (shown as red diamonds) saw inflation rates consistently below 2 percent, with some quarters touching almost 2 percent below target (i.e., to zero percent inflation), while the unemployment gap was generally positive. The relationship between unemployment and inflation during this period sparked discussions of a flattening of the Phillips curve. The scatter points, however, reflect equilibrium outcomes, and do not identify any structural relationship, such as the Phillips curve.³ Bergholt, Furlanetto, and Vaccaro-Grange (2024), for example, argue that the weakened correlation between unemployment and inflation reflects an increased focus on inflation by the FOMC. The 2012-2020 period ended with the highest unemployment rate of the entire period, a result of the COVID pandemic.

In a basic new Keynesian model in which monetary policymakers attempt to balance deviations from the inflation target against deviations of the unemployment gap from zero, one would hope to see most data points in Figure 1 falling within quadrants 1 or 3.⁴ In quadrant 2, inflation is above

²The FOMC’s longer-run projection of the unemployment rate from the Summary of Economic Projections (SEP) is not available before the first quarter of 2009.

³See Hazell, Herreño, Nakamura, and Steinsson (2022), who use U.S. state-level data to identify the Phillips curve.

⁴With a quadratic loss function, the first-order condition under optimal discretionary policy takes the form $\gamma\pi_t = \lambda u_t$, where γ is the slope of the unemployment Phillips curve and λ is the relative weight placed on the unemployment



Figure 1: Inflation and unemployment gaps between 2001-Q1 and 2020-Q2: the period leading up to the 2020 Statement was characterized by low inflation and high unemployment. The vertical line at 0 indicate $u_t = u_t^{cbo}$, where u^{cbo} is noncyclical unemployment from the Congressional Budget Office (CBO).

target and the unemployment gap is negative. All else equal, that would reflect a policy that is too loose. In quadrant 4, inflation is below target and the unemployment gap is positive, suggesting that policy was too tight. The actual inflation and unemployment outcomes between 2012 and 2020 were predominately in quadrant 4, indicating inflation was below 2 percent and the unemployment gap was positive. As the FOMC began its PF review in 2019, the members' concerns were that the effective lower bound (ELB) had constrained monetary policy and that, with an apparently flat Phillips curve, the decision to raise rates at the end of 2015 had been a mistake.

Table 1 shows summary statistics on inflation and unemployment for the period before adoption of the 2012 PF, between 2012 and the adoption of the 2020 PF, and for the period since 2020. Means and variances are given for PCE inflation, two unemployment rate gaps, one using the CBO's estimate of noncyclical unemployment and other using the FOMC's longer-run unemployment projection from the SEP. Means and variances for the federal funds rate are also shown. Inflation averaged 64 basis points below the 2 percent target during the period leading up to the last review; only in four quarters did it exceed 2 percent, and then just barely. The unemployment gap was smaller during 2012-2020 than during 2001-2011 which included the Great Recession, but it still averaged 1 percentage point above the CBO's estimate of noncyclical unemployment.

During 2019, members of the FOMC were concerned with addressing several challenges as they considered revising the 2016 Statement. Transcripts of FOMC meetings reveal concerns over

objective. For this first-order condition to be satisfied, π_t and u_t need to be of the same sign. Recognizing that monetary policy acts with a lag, [Qvigstad \(2006\)](#) has argued that the forecasts for inflation relative to target and the unemployment rate gap should have the same sign.

Table 1: Means and variances: inflation (PCE, yoy) and unemployment gaps

	$\pi - 2$	$u - u^{lru}$	$u - u^{cbo}$	funds rate
Means				
2001Q1-2011Q4	0.11	nan	1.34	2.15
2012Q1-2020Q2	-0.64	0.67	1.00	0.73
2020Q3-2025Q1	1.82	0.18	0.18	2.75
2001Q1-2025Q1	0.18	nan	0.99	1.77
Variances				
2001Q1-2011Q4	1.13	nan	3.92	3.49
2012Q1-2020Q2	0.35	3.23	3.87	0.65
2020Q3-2025Q1	3.66	2.06	2.07	5.81
2001Q1-2025Q1	2.09	nan	3.70	3.45

financial stability, the ELB and low interest rates affecting the ability of monetary policy to deal with contractionary shocks to the economy, the use of balance sheet policies, and issues with communicating policy to the public. Chair Powell, reflecting the view that the FOMC lifted rates too soon in late 2015, said “Regarding our framework, clearly, it did serve us well. Equally clearly, we now know that we could have been, in hindsight, much more aggressive.” (FOMC Transcript, July 31, 2019, p. 79)

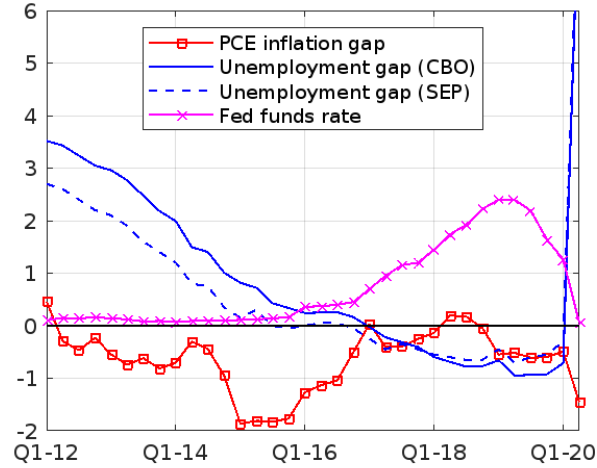


Figure 2: PCE inflation minus 2 percent, Unemployment minus CBO noncyclical rate, Unemployment rate minus FOMC’s LRU from the SEP, and the Federal Funds rate: Q1-2012 - Q3-2020

The members of the FOMC were also adopting a more optimistic view of longer-run unemployment. Figure 2 shows that prior to 2016, the unemployment gap measured using the FOMC’s

longer-run projection for the unemployment rate from the SEP was below the CBO's measure of non-cyclical unemployment (NROU). By 2017, the relationship flipped, with the FOMC projecting a slightly lower longer-run unemployment rate (higher unemployment rate gap); the FOMC's projection suggesting more slack in the labor market. The FOMC members discussed the apparent flattening of the Phillips curve and its implications. These were two. First, a more aggressive approach to lowering unemployment would carry little cost in terms of inflation. Second, if inflation were to rise, the cost in terms of unemployment to reduce inflation (the so-called sacrifice ratio) would be large.

The 2020 PF was designed to address these issues by reducing the constraint associated with the ELB and by reducing the possibility of choking off expansions too soon.

3 The 2020 Statement

Announced by Chairman Powell at the 2020 Jackson Hole Symposium, the new PF was designed to mitigate the limitations created by the ELB and to signal a willingness to support stronger, more broad-based and inclusive economic expansions. Five significant changes were made to the FOMC's PF:

1. The operational target for inflation became average inflation and the strategy for reacting to deviations of average inflation from 2 percent became asymmetric: "In order to anchor longer-term inflation expectations at this level, the Committee seeks to achieve inflation that averages 2 percent over time, and therefore judges that, following periods when inflation has been running persistently below 2 percent, appropriate monetary policy will likely aim to achieve inflation moderately above 2 percent for some time."
2. The SEP longer-run projection for unemployment was no longer mentioned in the context of an operational objective for maximum employment. Instead, "the Committee's policy decisions must be informed by assessments of the shortfalls of employment from its maximum level, recognizing that such assessments are necessarily uncertain and subject to revision."
3. The maximum employment level was now described as a "broad-based and inclusive goal that is not directly measurable and changes over time owing largely to nonmonetary factors that affect the structure and dynamics of the labor market."
4. The order in which the operational objectives are discussed was reversed. The 2020 PF discussed employment first and then inflation. In all previous PF statements since 2012, the inflation objective was discussed first.
5. New language was added describing the target range for the federal funds rate as the FOMC's

primary policy instrument: “The Committee’s primary means of adjusting the stance of monetary policy is through changes in the target range for the federal funds rate.”

Given that soon after this PF was adopted, inflation rose to levels not seen in 40 years, a useful starting point for considering the implications of these changes is to look at them through the lens of the standard monetary policy model of the 1980s and 1990s, one due to [Barro and Gordon \(1983a\)](#). This model serves as a reminder of how many economists thought about inflation during an earlier period when controlling inflation was at the center of monetary policy discussions and it provided a framework for designing solutions for high inflation.

The Barro-Gordon model, expressed in terms of unemployment, consisted of two components. The first was a natural rate Phillips curve,

$$\pi_t = \pi_t^e - \gamma(u_t - u_t^n) + v_t, \quad (1)$$

where π_t^e is expected inflation, u_t^n is the “natural” rate of unemployment, and v_t is a mean zero cost shock, taken for simplicity to be serially uncorrelated. The second component of the model was a policy objective given by a quadratic loss function of the form

$$L_t = \frac{1}{2} \left[(\pi_t - \pi_t^T)^2 + \lambda (u_t - u_t^*)^2 \right]. \quad (2)$$

In the loss function, π^T is the desired inflation rate (the target) and u_t^* is the socially desired unemployment rate, assumed to be less than the natural rate u_t^n . The central bank might be targeting an unemployment rate below the natural rate due to political pressures for more expansionary policies or it could be that real distortions in labor markets implied $u_t^n > u_t^*$.

In a discretionary policy environment, the central bank takes expected inflation as given when minimizing L_t . For simplicity, assume that u^n and u^* are nonstochastic and that expectations are formed before observing v_t while policy is determined after observing it. Solving the resulting first-order condition together with the Phillips curve (1) yields equilibrium inflation:

$$\pi_t = \pi_t^T + \frac{\lambda}{\gamma} (u^n - u^*) + \left(\frac{\lambda}{\lambda + \gamma^2} \right) v_t. \quad (3)$$

On average, inflation is equal to $\pi_t^T + (\lambda/\gamma) (u^n - u^*) > \pi^T$. The inflation bias is given by $(\lambda/\gamma)(u^n - u^*)$. Because $u^n > u^*$, the bias is positive. It increases 1) if the Phillips curve is flatter (a smaller γ) which lowers the perceived cost of a more expansionary policy; 2) if unemployment objectives are given more weight relative to the inflation objective (a larger λ); 3) if the desired unemployment rate u^* falls; and 4) if the implicit average inflation target is raised. Though the FOMC has not altered its 2 percent target for inflation, I include item (4) because the asymmetric preferences in response to inflation deviations in the 2020 PF produce an upward inflation bias, as shown by

Ruge-Murcia (2003), effectively raising π^T .⁵

Thus, the the first four changes to the PF were ones identified decades ago as creating a bias towards higher inflation.⁶ The revised PF could easily be viewed as a return to the 1970s. An employment objective that was prioritized over the inflation objective (a larger λ), an unsustainable employment mandate (a lower u^*), a belief that the Phillips curve was flat (a smaller γ), and an increase in the effective inflation target (π^T).

A major objective of the 2020 revisions was to alter the FOMC's operational objectives to offset the deflationary bias caused by the ELB. The asymmetric aspects of both the inflation objective and the shortfalls approach to unemployment would counteract the downward inflation bias caused by the ELB. The need to alter operational targets was based on the belief that keeping the policy rate lower for longer, as called for under an optimal commitment policy, could not be achieved when policy was characterized by discretionary decision making.

The final significant change to the PF was to state that the target range for the federal funds rate was the FOMC's primary instrument. Debate in the 1970s often focused on the Fed's operating procedures. Should it involve nonborrowed reserves, the monetary base, borrowed reserves, a credit aggregate or an interest rate? An important contribution of IT was to shift the focus away from instruments onto the Fed's goals. Instruments may change over time, and new instruments may be needed to face new challenges, as the financial crisis showed. The public needs to understand the FOMC's goals, and it is on these goals that the PF should focus.

Before discussing issues with asymmetric AIT, or AAIT, and the shortfalls approach to employment, it will be useful to briefly distinguish between alternative approaches to thinking about monetary policy frameworks.

3.1 Is a PF defined by a rule or a set of goals?

There are two interpretations of a monetary policy framework, leading to two approaches to evaluating alternative PFs. Monetary policy regimes can be interpreted as a choice of rules or as a choice of goals. The first approach treats the operational objective for inflation and employment as defining variables that appears in an instrument rule. Thus, inflation targeting (IT) has the inflation rate in the instrument rule while average inflation targeting (AIT) has average inflation in the instrument rule. With an employment mandate, an output gap or unemployment gap would be in the rule; with the shortfalls approach, an unemployment gap would affect instrument choice only when it is positive. The current PF of the FOMC would be modeled using an instrument rule.

⁵Eggertsson and Kohn (2023) reach a similar conclusion. Surico (2007) estimates that the Fed's asymmetric preferences contributed a 1.5 percent inflation bias in the pre-1979 period. In his post 1979 sample, he finds that preferences were symmetric.

⁶Under a commitment policy, the central bank internalizes the effects of its policy choice on expectations. Equilibrium inflation is then equal to $\pi_t^c = \pi_t^T + [\lambda/(\lambda + \gamma^2)]v_t$. On average, inflation is equal to target. Note also the optimal response to v_t is not distorted under discretion.

Such a rule might take the form

$$i_t = r^* + \pi^T + \phi_\pi (\pi_t^a - \pi^T) + \phi_u \max(0, u_t - u_t^*), \quad (4)$$

where π_t^a is average inflation over some prespecified window, π^T is the target for average inflation, and u_t^* is the unemployment rate associated with maximum employment.⁷

Using an instrument rule such as (4) allows a macroeconomic model of the economy to be solved without making any explicit assumption about how the policymaker weighs the trade-offs that arise between the inflation and employment components of the Fed’s dual mandate, that is, without specifying λ .⁸ To evaluate the effects of different averaging windows used to define π^a or the choices of ϕ_π and ϕ_u , however, would require the specification of a loss function that could be used to rank alternatives rules.

The alternative approach is to adopt a policy delegation or principal-agent approach. Operational objectives could be assigned to the central bank, or the central bank might choose them. These objectives define a loss function. The central bank then has the instrument independence to implement policy to minimize this loss function. Examples of central banks with such systems include the Reserve Bank of New Zealand, the Bank of Canada, the Bank of England, and the ECB. In the case of the U.S., the Congressional mandates need to be translated into operational objectives, which is done in the PF statements. The operational objectives then can be used to define an implicit metric, or loss function, by which policy alternatives are ranked. In this approach, IT would have inflation minus the inflation target in the loss function, AIT would have average inflation minus its target in the loss function.

The delegation approach would define a loss function representing the 2020 PF that might take the form

$$L_t = \frac{1}{2} \left[(\pi_t^a - \pi^T)^2 + \lambda \max(0, u_t - u_t^*)^2 \right], \quad (6)$$

where, u^* is the unemployment rate associated with maximum employment.

Both approaches make implicit assumptions about commitment. The rules approach assumes the central bank can credibly commit to follow a rule; the goals approach assumes the central bank can credibly commit to a loss function.

The FOMC does not follow a rule. It does provide examples of rules in its *Monetary Policy Report to Congress*. Because policy impacts occur with a lags, policymakers need to be forward-

⁷This simplifies by ignoring the asymmetry in the PF’s definition of average inflation targeting. A more complete specification of the 2020 PF would be

$$i_t = \phi_\pi^- I_{\pi_t^a \leq 2} (\pi_t^a - 2) + \phi_\pi^+ I_{\pi_t^a > 2} (\pi_t - 2) - \phi_u I_{u_t > u_t^*} (u_t - u_t^*), \quad (5)$$

where I_z is an index variable that equals 1 when z is true and 0 otherwise.

⁸The classic instrument rule is, of course, due to [Taylor \(1993\)](#). Svensson has written extensively on the “problems with Taylor rules” and discusses some of these problems in [Svensson \(2020\)](#).

looking. The information set that is useful for forecasting future inflation and economic activity is much larger than the 2 or 3 variables in typical instrument rules.⁹ In addition, many pieces of relevant information are not “ruleable” in the terminology of [Kocherlakota \(2016\)](#).¹⁰

Goals may be easier to communicate to the public. The central bank’s decision problem is to minimize loss subject to constraints which include the model of the economy, the ELB, and whether the policymaker can commit to future policy actions. The policy delegation approach in monetary policy played an important role in the research on solving the inflation bias that could arise under discretionary policy. [Rogoff \(1985\)](#) is a seminal example of this approach. More recent examples such as [Budianto, Nakata, and Schmidt \(2023\)](#), and [Kiley \(2024b\)](#) involve AIT, while [Gust, López-Salido, and Meyer \(2017\)](#) and [Kiley \(2024a\)](#) focuses on employment shortfalls.¹¹

The delegation approach raises the question of what the incentives of the central bank should be. In the Barro-Gordon framework, the optimal incentives should include a penalty for inflation ([Walsh \(1995\)](#), [Svensson \(1997\)](#)). In a NK model, the optimal incentives should induce history dependence under discretion. [Bilbiie \(2014\)](#) shows that the loss function assigned to the central bank in this case should include the standard quadratic terms in inflation and unemployment squared plus a term that takes the form

$$-\delta \left(\pi_t - \frac{\lambda}{\gamma} u_t \right) u_{t-1}. \quad (7)$$

The term in parentheses would equal zero under pure discretion. If the unemployment gap has been positive ($u_{t-1} > 0$), the central bank can reduce loss by ensuring this term is positive, i.e., it should set a more expansionary policy. [Persson and Tabellini \(2024\)](#) derive an optimal state contingent contract that replicates optimal commitment in the presence of the ELB. Of course, one could just hold the central bank accountable based on any deviation from the first-order condition for the optimal commitment policy. This is not feasible in practice, as the condition in any model useful for actual policy implementation would be quite complex.

Does it make a difference whether a strategy such as average inflation targeting is treated as part of a rule or as part of a loss function delegated to the central bank? In theory, yes.

⁹The first-order conditions from the policymaker’s loss minimization problem may included expectation of the future. In this case, the central bank would use all available information in forming its forecasts. [Billi, Söderström, and Walsh \(2023\)](#) show that money may be useful at the ELB; A central bank following a targeting rule will look at money if it is relevant, one following a rule will not do so unless money appears explicitly in the rule.

¹⁰In 2015, hearings were held on HR-5108 a bill was introduced in Congress that would have required the Fed to explain any deviations of policy from the Taylor rule. According to a Financial Times report on Janet Yellen’s February 25, 2015 testimony before the U.S. House Banking Committee, “The Fed chair swatted down calls from Republicans for the institution to be subject to mechanical rate-setting rules, saying she did not want its discretion to be ‘chained’.” See “Janet Yellen Defends US Central Bank Independence,” Financial Times, February 15, 2015 (available at <http://www.ft.com>). The bill failed to be enacted.

¹¹[Arias, Bodenstein, Chung, Drautzburg, and Raffo \(2020\)](#) follows both approaches, examining a number of instrument rules and a loss function that involves average inflation.

Consider an environment in which the central bank acts with discretion to minimize a loss function involving average inflation. Recall that with standard IT, optimal policy involves letting bygones-be-bygones. The central bank can make statements about future policy in an attempt to affect inflation expectations, but those statements lack credibility. With an instrument rule containing average inflation, or with average inflation in the loss function, a shortfall of inflation will require the central bank to return average inflation to the target. With average inflation in a rule, private agents know a fall in current inflation requires higher inflation in the future and they accordingly raise their expectations of future inflation. With average inflation as a goal, the central bank, operating with discretion, will take this effect on future expectations into account in setting its current policy; it does not just mechanically react to the level of a backward-looking average of inflation.

This induced reaction by a discretionary policymaker can be relevant when away from the ELB. [Gust, López-Salido, and Meyer \(2017\)](#) note that when minimizing a loss function in the face of uncertainty, “policymakers are mindful of the risks that current and future shocks might impose on policy actions, including those associated with the effective lower bound binding. (p. 446)”. This effect under optimal discretion is called the lower bound risk by [Budianto, Nakata, and Schmidt \(2023\)](#). The policymaker, acting with discretion, will take into account how its choice of inflation today becomes tomorrow’s lagged inflation, an endogenous state. The choice of policy today will affect tomorrow’s state and therefore private sector expectations of tomorrow’s inflation. Importantly, low inflation tomorrow increases the probability that the ELB will bind. This increased risk of hitting the lower bound leads a policymaker operating under discretion to aim for higher inflation today.

These insights are lost if AIT is treated simply as replacing one variable in a policy rule with another. There are new channels at work that would be missed. In the face of lagged variables, such as the lagged inflation rates that go into the calculation of average inflation, optimal policy becomes forward looking even under discretion. The importance, as Budianto et al stress, is that at the ELB, even a policymaker unable to commit beyond its choice of operational objectives will take into account the future probability of encountering the ELB.

The standard assumption is that discretionary policymaking under IT cannot sustain the lower-for-longer policy that is optimal at the ELB. AIT is a means of mimicking a lower-for-longer policy. However, [Nakata \(2017\)](#) shows that when episodes at the ELB are likely to be recurring events, the optimal commitment policy under IT can be sustained under discretion. Lower-for-longer is time inconsistent, but by yielding to the temptation to deviation from the optimal policy, even a discretionary policymaker knows that outcomes will be worse the next time the ELB binds. By sticking to a lower-for-longer policy, the policymaker builds credibility that leads to improved outcomes in the future. Simply using a rule to represent the way the policymakers behave risks ignoring the strategic aspects of the decision such a policymaker will actually face in the future.

This points out another issue with the rules approach. AIT is meant to solve a problem caused by discretionary policy. But following a simple rule is time inconsistent except in very special cases. Any policymaker operating with discretion would choose not to follow the rule. It seems far more plausible, at least to me, that policymakers are able to commit to operational objectives set out in statements such as the FOMC's PF and that such a commitment does constrain discretionary decision making.

3.2 Asymmetric average inflation targeting: AAIT

The FOMC's 2020 PF altered the inflation objective from a symmetric target around 2 percent to an asymmetric average inflation target of 2 percent.¹² The objective was now asymmetric; inflation would be allowed to rise above target following periods during which average inflation had fallen below 2 percent, but inflation would not run below target after episodes of higher than 2 percent inflation. Policy was to make up for target misses on the downside but not on the upside.¹³

The basic intuition for employing a makeup strategy such as average inflation targeting is well understood. Episodes when inflation is below target, caused for example when the ELB constrains the use of the policy interest rate to stimulate the economy, will require expansionary future policies to return average inflation to 2 percent. If credible, such a policy will generate expectations of future inflation that help raise current inflation directly by affecting the price setting decisions of firms and indirectly by lowering real interest rates, helping to stimulate current spending. If credible, so that it influences expectations, AIT has advantages that are confirmed in a variety of models. See, for example, the reviews of the literature in [Svensson \(2020\)](#), [Arias, Bodenstein, Chung, Drautzburg, and Raffo \(2020\)](#), [Ajello, Blanco, Curdia, Lubik, and Queralto \(2020\)](#), [Hebden, Herbst, Tang, Topa, and Winkler \(2020\)](#), a set of papers that were part of the 2019 review of the Fed's policy framework. More recent work on AIT includes [Budianto, Nakata, and Schmidt \(2023\)](#) and [Kiley \(2024b\)](#).

The unique aspect of averaging inflation target introduced in the 2020 PF was its asymmetry. The 2016 PF had emphasized symmetric responses to deviations above or below 2 percent. The 2020 PF describes appropriate monetary policy as allowing inflation to rise "moderately above 2 percent for some time" if inflation has been consistently below 2 percent. The makeup response does not apply if inflation has been averaging above the 2 percent target. This asymmetric treatment of inflation deviations induces a positive inflation bias ([Ruge-Murcia \(2003\)](#), [Arias, Bodenstein, Chung, Drautzburg, and Raffo \(2020\)](#), and [Eggertsson and Kohn \(2023\)](#)). This inflation bias is not

¹²The RBNZ's remit from Parliament in 2019 switched from a target range for inflation to an average inflation target, a range, and added an employment mandate. In 2023, under a new government, the RBNZ's remit was returned to a single inflation target range.

¹³The nonmakeup after periods with above target misses was made clear by Chair Powell in his press conference after the January 2022 FOMC meeting. Reporter Michael McGee asked "Do you want to go below 2 percent so that, on average, you get a 2 percent inflation rate?". Chair Powell responded "...there's nothing in our framework about having inflation run below 2 percent so that we would ...try to achieve that outcome. So the answer to that is, is 'no'."

a flaw but part of the design, intended to offset the downward bias created by the ELB. Given that inflation had averaged less than 2 percent between 2012 and 2020 (see Table 1), the hope was that introducing an upward bias would ensure inflation would, on average, actually equal 2 percent. In turn, this would help to more firmly anchor longer-run inflation expectations at 2 percent.

This asymmetry is relevant for evaluating the results in the literature on AIT. As far as I am aware, with the exception of [Arias, Bodenstein, Chung, Drautzburg, and Raffo \(2020\)](#), all the literature evaluates symmetric AIT. Asymmetric AIT means bygones are not bygones when inflation has averaged below target but they are when inflation has been above target.

The chief property of an AIT regime that requires specification is the averaging window; this was left unspecified in the 2020 PF.¹⁴ Prior to 2020, the FOMC had been targeting year-over-year inflation, an average over 4 quarters. Thus, the FOMC had already been practicing a form of AIT, but with a very short averaging window. The papers just cited evaluated performance over windows extending up to 8 years. The effects of lengthening the window follow directly from the fact that the shortest window yields traditional inflation targeting (IT), while as the window increases, (pure) AIT converges to price-level targeting (PLT).¹⁵ Thus, at one extreme (IT), bygones are bygones, deviations from 2 percent inflation leave permanent effects on the price level, at the other (PLT), deviations leave no permanent effect as the price level returns to a 2 percent trend line.

The 2020 PF defines the target as an average “over time”. Nowhere is the averaging window specified explicitly. But what does “over time” mean? Is it an average defined over 4 quarters, 2 years, 4 years, or longer? The window would presumably be longer than one year, but how much longer was not made explicit. From the perspective of creating transparency in monetary policy, the 2020 PF was a step backward.

The incomplete specification of the PF means model simulations which incorporate rational expectations on the part of all or even part of the agents in the model assume these agents know aspect of the policy regime that the FOMC has not revealed.

[Arias, Bodenstein, Chung, Drautzburg, and Raffo \(2020\)](#) (p. 12) noted that the FOMC could retain some discretion by “emphasizing a range of inflation averages.” This recalls the Fed’s response to Congressional mandates in the 1970s to set growth rate targets for credit and money. The Fed obliged by setting targets for multiple definitions of money. At least one definition would usually come in on target.¹⁶ Setting multiple targets was a means of avoiding accountability. It would be like setting inflation targets for several different price indexes. Doing so permits greater discretion but it loses the advantages of having a focal point for anchoring expectations.

What is critical for AIT and AAIT to work as designed is that private sector expectations

¹⁴[English and Sack \(2024\)](#) also note the failure to specify the window and describe this as providing the “flexibility” in flexible average inflation targeting.

¹⁵Relevant early contributions to the analysis of PLT and AIT are those of [Vestin \(2006\)](#) and [Ambler \(2009\)](#) on PLT and [Nessén and Vestin \(2005\)](#) on AIT.

¹⁶The Fed also practiced a form of bygones are bygones through the practice of base drift. See [Walsh \(1986\)](#)

cooperate, that is, that the public forms expectations consistent with the FOMC’s PF. The adoption of AAIT represented a shift away from a sole focus on anchoring longer-run inflation expectations toward a form of fine-tuning, in which shorter-run inflation expectations are to act as an automatic stabilizer.¹⁷ The hope was that by offsetting the downward bias from the ELB, inflation would average close to 2 percent and longer-term inflation expectations would be more firmly anchored. However, the gains in terms of supporting stabilization policies come from affecting expectations of inflation over the next year, not the next 10 years.¹⁸

It is also not clear that AAIT will ensure inflation averages 2 percent. In the third quarter of 2020, when the new PF was adopted, 8-year average inflation was 1.3 percent.¹⁹ How long would it take to get average inflation back to 2 percent. It would take 2 years with 4.1 percent inflation, 3 years with 3.2 percent inflation; 4 years with 2.7 percent inflation. Would longer-run expectations stay anchored at 2 percent with inflation running at 3.2 percent for 3 years? Perhaps. But then again, perhaps not.

Aligning private sector expectations in support of FOMC policies is made difficult if there is confusion about what AAIT actually is. The difficulties posed by not clearly defining AAIT showed up in the first press conference held after the August announcement of the new PF. In answer to a question about what “moderately above” and for “some time” meant, Chair Powell stated “... what does “moderate” mean? It means not large. It... means not very high above 2 percent. It means moderate. I think that’s a fairly well-understood word. In terms of,... “for a time,” what it means is not permanently and not for a sustained period. You know, we’re... resisting the urge to try to create some sort of a rule or a formula here. And I think the, the public will understand pretty well what we want. It’s actually pretty straightforward. We want to achieve inflation that averages 2 percent over time. And if we do that, inflation expectations will be right at 2 percent, and that’ll help us achieve 2 percent inflation over time and avoid the situation where the central bank loses its ability to support the economy.” The evidence reported in [Candia, Coibion, and Gorodnichenko \(2023\)](#) and [Coibion, Gorodnichenko, Knotek, and Schoenle \(2023\)](#) suggests the public did not understand.

While the argument for AIT is primarily based on theory (or rather on models based on theory), its adoption raises several questions.

Is AIT necessary? [Mertens and Williams \(2021\)](#), [Swanson \(2018\)](#), and [Debortoli, Galí, and Gambetti \(2019\)](#) argued that the ELB did not constrain US monetary policy. If balance sheet

¹⁷This creates a tension discussed by [Hebden, Herbst, Tang, Topa, and Winkler \(2020\)](#) (p. 19) who note that “It is desirable for shorter-run inflation expectations to be responsive to changes in the monetary policy stance, but it is also desirable to maintain longer-run inflation expectations anchored near the 2 percent objective. Given the uncertainty surrounding the expectations process and the imprecise nature of the communications process, it may be difficult to achieve this balance.”

¹⁸The challenges of managing expectations will be discussed in section 5

¹⁹This is the window adopted in [Arias, Bodenstein, Chung, Drautzburg, and Raffo \(2020\)](#) and [Hebden, Herbst, Tang, Topa, and Winkler \(2020\)](#).

policies have effectively neutralized the ELB constraint, the primary argument for AIT, especially AAIT, goes away. AIT is unnecessary unless those other instruments have costs associated with them. During 2019, FOMC discussions of the PF review did express concerns about the use of balance sheet policies, and [Greenlaw, Hamilton, Harris, and West \(2018\)](#) concluded that balance sheet policies had not been effective. During the 2012-2000 period, inflation was below target on average, while the unemployment rate gap was positive. These outcomes, shown in [Figure 1](#), do suggest monetary policy was insufficiently expansionary before the 2020 revisions to the PF. The problems these revisions were designed to overcome were real. If so, then the introduction of a make-up strategy such as AIT (asymmetric or symmetric) was appropriate.

The need for AIT was originally motivated as a means of addressing the perceived inability of a policymaker, acting with discretion, to implement the type of lower for longer policy that is called for at the ELB. However, as mentioned above, when future episodes at the ELB are possible, [Nakata \(2017\)](#) has shown that even under discretion the optimal commitment policy can be sustainable. A discretionary policy policymaker will recognize that failing to keep rates lower for longer means a loss of credibility that will make outcomes worse when the next period at the ELB occurs.

Will AIT work effectively? Two issues are salient. First, how important are forward-looking expectations for aggregate demand and price setting behavior? The answer from modern theory is that forward-looking expectations are very important. Purely forward-looking empirical models, however, have difficulty matching macro dynamics. At the other extreme, in a backward-looking model, optimal policy needs to be forward-looking, not history dependent. Over twenty years ago, [Levin and Williams \(2003\)](#) showed that forward-looking models are easier to control than backward-looking models and that policies optimized for a forward-looking model may fail to be consistent with an equilibrium in a backward-looking model. While AIT generally performs well in a range of empirical models, its advantages over IT decline as backward-looking aspects of private sector behavior becomes more important. [Fuhrer \(2017\)](#) argues that some of aspect of empirical models designed to better match data such as price indexation and habits in consumption may actually reflect deviations from rational expectations. The issue of whether expectations are affected by the FOMC's choice of PF becomes paramount.²⁰

How credible is a long-window for AIT? Papers by the Board staff prepared for the 2019 review analyzed AIT assuming an 8-year window. Such a long window makes policy very unresponsive to current inflation. As discussed later, as inflation rose to close to 7 percent in 2022, the 8-year average PCE inflation was still below 2 percent. Even with shorter windows, AIT weakens the initial response to deviations of inflation above 2 percent. Unless the policy framework is well understood, a weak reaction to increases or decreases in inflation risks seeing short-run inflation

²⁰Using the FRB/US model, [Hebden, Herbst, Tang, Topa, and Winkler \(2020\)](#) finds that “makeup strategies can moderately offset the real effects of adverse economic shocks, even when much of the public is uninformed about the monetary strategy.”

expectations follow actual inflation, amplifying the initial deviation of inflation.

Can the FOMC influence expectations through its choice of a policy framework? I return to the issue of managing expectations in section 5. The fundamental problem, however, is that we do not understand enough about expectations. Believing a change in the PF can effectively turn short-run inflation expectations into an instrument of monetary policy takes fine-tuning to the extreme. The common practice of assuming rational expectations when evaluating alternative policy regimes makes little sense when predicting the immediate effects of a shift in the policy framework.²¹

3.3 Employment shortfalls

The operational objective for maximum employment has always been less clearly defined by the FOMC than its inflation objective. For the past 45 years, the dominant view among economists has been that the natural rate hypothesis holds; monetary policy cannot affect the real economy in the longer run. Consistent with this view, the 2012 PF described maximum employment as “...largely determined by nonmonetary factors that affect the structure and dynamics of the labor market. These factors may change over time and may not be directly measurable. Consequently, *it would not be appropriate to specify a fixed goal for employment*; rather, the Committee’s policy decisions must be informed by assessments of the maximum level of employment, recognizing that such assessments are necessarily uncertain and subject to revision.” (emphasis added) The 2012 PF then referred to the longer-run normal rates of output growth and unemployment published in the FOMC’s SEP, noting that, at the time, the central tendency of these projections for the unemployment rate was 5.2 to 6 percent.

The 2020 PF revised the language around maximum employment and dropped any reference to a numerical range for the unemployment rate consistent with the employment mandate. New language was added (old language indicated by strikethrough): “The maximum level of employment is a *broad-based and inclusive goal* that ~~may not be~~ *is not directly measurable* and changes over time owing largely to nonmonetary factors that affect the structure and dynamics of the labor market. Consequently, it would not be appropriate to specify a fixed goal for employment; rather, the Committee’s policy decisions must be informed by assessments of the ~~maximum level of employment~~ *shortfalls of employment from its maximum level*, recognizing that such assessments are necessarily uncertain and subject to revision. The Committee considers a wide range of indicators in making these assessments.” (emphasis added)

The expansion of the Fed’s interpretation of its employment mandate from “maximum sustainable employment” to shortfalls from a broad-based and inclusive interpretation of maximum employment was an outcome of the FedListens events in 2019. The notion of fostering a more inclusive interpretation of maximum employment is actually not new. The “Full employment and

²¹Doing so is a practice I plead guilt to.

Balanced Growth Act of 1978” called for what we might today describe as broad-based, inclusive economic growth, noting that “Increasing job opportunities and full employment would greatly contribute to the elimination of discrimination based upon sex, age, race, color, religion, national origin, handicap, or other improper factors” (Sec. 2b (4)). The Act directed the Economic Report of the President to establish “employment objectives for certain significant subgroups of the labor force, including youth, women, minorities, handicapped persons, veterans, and middle-aged and older persons”.

Unlike the FOMC’s PF statements, the 1978 Act set specific medium-term numerical goals for unemployment and inflation. These goals were given in Sec. 4 as

1. “reducing the rate of unemployment ...to not more than 3 per centum Supra. among individuals aged twenty and over and 4 per centum among individuals aged sixteen and over within a period not extending beyond the fifth calendar year after the first such Economic Report; and
2. reducing the rate of inflation, ...to not more than 3 per centum within Supra. a period not extending beyond the fifth calendar year after the first such Economic Report: Provided, That policies and programs for reducing the rate of inflation shall be designed so as not to impede achievement of the goals and timetables specified in clause (1) of this subsection for the reduction of unemployment.”

The 1978 Act did two things. It established numerical goals for unemployment that for most of the past 45 years have been viewed as overly ambitious, and it prioritized unemployment goals over reducing inflation which, in 1978, averaged just under 7 percent (PCE). In March 2022, the unemployment rate for those 16 years and older was 3.8 percent. PCE inflation was just under 7 percent. The changes to the employment objective in the 2020 PF were another example of how the the new framework seemed to represent a return the 1970s.

One purpose of an operational objectives is to provide benchmarks that aids the public in understanding what the Fed is doing. Between 2012 and the adoption of the 2020 PF, the employment mandate was implicitly linked to the longer-run unemployment projection in the SEP. This provided a means of judging the Fed’s performance and supported accountability. Making a performance measure unmeasurable defeats that purpose. Operational objectives also play a role in constraining discretionary policymaking; an unmeasurable constraint is no constraint at all.

3.3.1 Issues with a shortfalls objective

Just as the move to asymmetric AIT introduced an inflationary bias to offset the negative bias created by the ELB, the 2020 PF introduced a bias towards running the economy hot, or at least ruling out preemptive tightening based on forecasts of higher inflation.

A number of authors have analyzed policies that respond asymmetrically to employment. Examples include [Cairó and Lipton \(2023\)](#), [Gust, López-Salido, and Meyer \(2017\)](#), [Kiley \(2024a\)](#), and [Bundick and Petrosky-Nadeau \(2025\)](#).²² To capture the FOMC’s shortfalls in an instrument rule, the unemployment gap term is replaced by $\phi_u \max(0, u_t - u_t^n)$ or, under a policy objective approach, $[\max(0, u_t - u_t^n)]^2$ is included in the loss function. That is, the natural rate of unemployment is used as a proxy for the unemployment at maximum employment.

Responding asymmetrically to movements in unemployment under a shortfalls policies imparts an upward bias to inflation, as the central bank stabilizes shocks that push unemployment up but not to ones that lower it.²³ [Gust, López-Salido, and Meyer \(2017\)](#) considers optimal discretionary policy when the policymaker adopts an asymmetric output (employment) objective. In the absence of the ELB and with an asymmetric loss function, they find that inflation averages 1 percentage point above target. The mean output gap in the stochastic equilibrium is 0.25 percentage points higher.²⁴ In the presence of the ELB constraint, average inflation averages just 4 basis points above target, compared with 29 basis points below target with a symmetric objective. The upward inflationary bias from the asymmetric output gap preferences offsets the negative bias induced by the occasionally binding ELB. The mean output gap declines slightly from 0.25 percent to just 0.22 percent. The asymmetric output gap preferences had little impact on the variance of inflation, but in the presence of the ELB, the variance of the output gap increases from 0.59 with symmetric preferences to 1.06 with the shortfalls objective.²⁵

In contrast to the model used by Gust, et al, [Cairó and Lipton \(2023\)](#) and [Bundick and Petrosky-Nadeau \(2025\)](#) analyze employment shortfalls in models that incorporates a search and matching model of the labor market as well as the ELB.²⁶ Policy is modeled as an instrument rule, and both papers compare performance under a rule that responds symmetrically to deviations in the unemployment rate and one that responds to shortfalls only (i.e., only when unemployment falls short of its long-run level). As expected, average inflation is higher under the shortfalls rule; Cairo and Lipton and Bundick and Petrovsky-Nadeau find it increases by 0.5 and 0.9 percentage points respectively. Other effects are less clear cut. [Cairó and Lipton \(2023\)](#) find the shortfall rule lowers mean unemployment by 0.7 percentage points, while increasing its volatility from 1.11 under the deviations rule to 1.68 under the shortfalls rule. The volatility of inflation is affected very little.²⁷

²²[Cairó and Lipton \(2023\)](#) and [Bundick and Petrosky-Nadeau \(2025\)](#) employ a search and matching model of the labor market. See section 6.

²³If u_t^n is also the unemployment rate associated with maximum employment, the inflation bias term in (3) would be zero, but the asymmetric response to the unemployment gap would still impart an upward inflation bias.

²⁴The long-run trade-off in their model is given from the Phillips curve by $x = [(1 - \beta)/\kappa]\pi$. Using their calibration ($\beta = 0.9975, \kappa = 0.01$), the slope of this relationship is $0.0025/0.01 = 0.25$, so a 1 percentage point rise in mean inflation increases the mean output gap by 0.25.

²⁵See also [Kiley \(2024a\)](#).

²⁶Models that combine new Keynesian features with search and matching in the labor market are discussed in section 6.

²⁷[Kiley \(2024a\)](#) argues a shortfalls approach skews the distribution of output around the natural rate.

Bundick and Petrosky-Nadeau (2025) find the mean and standard deviation of unemployment are the same under the two rules, but the standard deviation of inflation is cut in half under the shortfalls rule.

Perhaps the most striking result from Bundick and Petrosky-Nadeau (2025) is that the unconditional probability of being at the ELB falls from 26 percent to 0.9 percent with the shortfalls rule as a result of higher average inflation. Interestingly, they find that a more aggressive reaction to inflation, increasing the weight on inflation in the policy rule from 2 to 3, almost completely offsets the inflation bias of the shortfalls rule (mean inflation is now 2.1 percent) while having little effect on the variances of either inflation or unemployment. It does, however, increase the probability of hitting the ELB to 3.4 percent, still significantly below the 26 percent probability under a symmetric policy rule.

The research on also shortfalls highlights differences between the loss function and the rules approach. Using a loss function approach, Gust, López-Salido, and Meyer (2017) find that a shortfalls objective increases the frequency of the ELB. Using an instrument rule, Bundick and Petrosky-Nadeau (2025) using a rules approach finds a shortfalls approach reduces the frequency of the ELB. This difference arises because a central bank minimizing a loss function that includes a shortfalls variable, as in Gust, et al, will react more aggressively in the face of a negative demand shock. This pushes the policy rate to zero more frequently. Bundick and Petrosky-Nadeau hold the coefficient on inflation fixed in their policy rule and find that putting a shortfalls variable in the rule greatly reduces the probability of the ELB. They do find, however, that when they increase the coefficient on inflation, the frequency of hitting the ELB increases, though it is still less than in the baseline rule that responds to unemployment deviations, not to shortfalls.

By prioritizing the employment mandate, the 2020 PF shifted policy away from forecast-inflation targeting (Svensson (2020)) and the idea of presumptive tightening in the face of a forecast of rising inflation. It also represented a shift away from the Fed's traditional role as described in 1955 by then Fed Chair Martin as taking away the punchbowl before the party gets too hot. The shortfalls approach to employment was designed to prevent preemptive tightening and to allow the economy to run hot for longer as means of seeking a broader-based and more inclusive recovery. If the Phillips curve really was flat, this seemed like a reasonable risk to take.

3.4 Summary on the 2020 Statement

An objective of the 2020 PF was to offset the downward inflation bias due to the ELB. Both the employment shortfalls approach and asymmetric average inflation targeting are substitutes in that each imparts a positive bias to inflation. The 2020 PF introduced both mechanisms. Was this necessary? Would one have done as well? Bundick and Petrosky-Nadeau (2025) modify the instrument rule they used to analysis a shortfalls policy by replacing the inflation term with a

measure of average inflation. They do not evaluate an asymmetric AIT rule. They find the addition of AIT to the shortfalls rules amplifies the inflation effects of responding to shortfalls. The reason for this result is that when policy responds to average inflation, the impact of current inflation on the policy rate is reduced. For a given coefficient on the inflation term in the instrument rule, current inflation has less immediate impact on the policy rate as the averaging window increases. They find that a relatively short window of 1.5 years doubles the inflationary impact of a shortfalls rule. This is a large impact for a relatively short averaging window. For perspective, papers prepared for the 2019 review, such as [Hebden, Herbst, Tang, Topa, and Winkler \(2020\)](#) and [Arias, Bodenstein, Chung, Drautzburg, and Raffo \(2020\)](#) considered windows of up to 8 years.

The advantages of asymmetric AIT depend on the impact it has on private sector expectations. Inflation expectations become a type of automatic stabilizer. This works if the policy is well understood and credible. If not, the overshooting after a period of below target inflation might cause inflation expectations to rise and act in a destabilizing fashion.²⁸ An averaging window that is short would not differ significantly from IT, while a window that is too long would delay any policy reaction to a surge inflation.

The shortfalls approach also raises average inflation by letting the economy run hot, helping to offset the effects of the ELB and generating stronger recoveries after ELB episodes. This effect is less dependent on affecting expectations directly, but it would be weakened if the Phillips curve really is flat. It may be easier to explain the shortfalls approach than asymmetric AIT. Whether a shortfalls policy would decrease the frequency of a binding ELB is unclear.

A key difference between the AAIT and shortfalls is that for AIT to be effective requires private sector inflation expectations to cooperate. The employment shortfalls approach relies instead on a non-linear policy response to unemployment. Using the model of bounded rationality due to [Gabaix \(2020\)](#), [Budianto, Nakata, and Schmidt \(2023\)](#) find that the welfare gains from dropping IT for AIT are small when the deviation from rational expectation is large.²⁹ [Bundick and Petrosky-Nadeau \(2025\)](#) argue their key results on shortfalls carry over under bounded rationality. Both these papers use a relatively short averaging window (1.5 years), but their results suggest a shortfalls approach might be a more reliable way of offsetting the negative inflation bias of the ELB.

A shortfalls approach requires a careful assessment of the unemployment rate that corresponds to maximum employment. If it is not the natural rate, the FOMC's employment and inflation objectives will not be complementary. If the unemployment rate associated with maximum employment is less than the natural rate of unemployment, there will be employment shortfalls when average inflation is 2 percent. The 2020 PF stated that when the objectives are not complementary, "it takes into account the employment shortfalls and inflation deviations and the potentially different time horizons over which employment and inflation are projected to return to levels judged

²⁸This is found in experimental lab settings; see [Kostyshyna, Petersen, and Yang \(2025\)](#) and section 5.

²⁹They also find that AIT plus a Rogoff conservative central bank can help by mitigating any deflationary bias.

consistent with its mandate.” But what if the longer-run levels of the mandates are inconsistent?

Over time, the unemployment rate will equal its natural rate. But if the unemployment rate associated with maximum employment is on average less than the natural rate, actual employment shortfalls will remain positive. 2 percent inflation will not be consistent with maximum employment. If monetary policy then pushes employment to its maximum, inflation will move above 2 percent. The goals are not complementary. The concerns expressed before the last review are certainly important.

In an environment with a low r^* and a 2 percent target, the ELB is a real concern. And, at least in the U.S., the political climate leading up to the 2019 review had begun to focus on the gains achieved as unemployment fell to levels previously viewed as inflationary. While designed to help keep inflation near the 2 percent target, asymmetric AIT weakens the commitment to a clear and transparent inflation target. Instead of ensuring the operational target for unemployment was anchored by an estimate of a sustainable goal, the 2020 PF introduced a goal that was not just hard to measure but was, according to the FOMC, unmeasurable. By also prioritizing the employment goal, the 2020 PF risked directing attention away from what should be any independent central bank’s primary responsibility – controlling inflation.

In the next section, I briefly review how the economic environment since the 2019 framework review has altered the challenges the Fed now faces and how the FOMC’s response to surging inflation was affected by the new PF.

4 Macroeconomic developments: 2020-2025

The 2020 PF was adopted just as the US was affected by COVID lockdowns and about to shift from the low inflation, weak labor market environment for which the PF had been designed to a high inflation, strong labor market environment. The period since adoption has experienced re-openings from the pandemic, shifts from in-office to at home work patterns, supply chain disruptions, and shocks to energy and commodity markets as a result of Russia’s invasion of Ukraine and the continuing military conflict there. Both fiscal and monetary policies have been expansionary, and concerns over growing debt levels are widespread. By 2022, US inflation was at levels not seen since the Great Inflation of the 1970s.

Inflation minus 2 percent, and the fed funds rate since 2012 are shown in the top panel of Figure 3. Inflation (red squares) was below target during the pre-2020 period but rose well above target in 2021 and 2022. By 2024, it had fallen back below 2.5 percent but had not quite returned to the 2 percent target. The unemployment gap (lower panel) using the CBO estimate of noncyclical unemployment rate (blue solid line) and using the FOMC’s longer-run projection for the unemployment rate from the SEP (blue dashed line), and an estimate of the stable price unemployment rate (SPU, dot-dashed line) from [Crump, Nekarda, and Petrosky-Nadeau \(2020\)](#) are shown in the

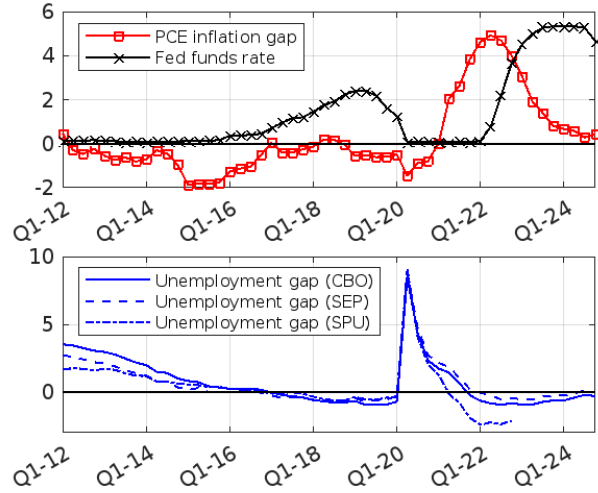


Figure 3: Top panel PCE inflation (red squares) and the federal funds rate (black diamonds). Bottom panel: Three unemployment rate gaps using CBO noncyclical unemployment (blue, solid line), the SEP longer-run unemployment (blue dashed line), and the stable-price unemployment rate SPU) from [Crump, Nekarda, and Petrosky-Nadeau \(2020\)](#)

bottom panel. Unemployment spiked during COVID but then rapidly recovered, in contrast to the long and slow recovery from the Global Financial Crisis. The SPU gap became negative in the second quarter of 2021 and was indicating unemployment was well below the rate consistent with stable inflation. The CBO and SEP unemployment rate gaps turned negative in early 2022.

Various authors have emphasized different aspects of the shocks that produced the inflation surge. Both aggregate demand and supply were affected by these shocks. [Reis \(2023\)](#) emphasizes the role of the COVID-19 pandemic and Russia's invasion of Ukraine; [Bernanke and Blanchard \(2025\)](#) add goods market disruptions that increased prices relative to wages; [Benigno and Eggertsson \(2024\)](#) highlight the role of demand and tight labor markets in the US; [Gagliardone and Gertler \(2023\)](#) cite oil shocks and loose monetary policy, while [Giannone and Primiceri \(2024\)](#) focus on demand shocks and monetary policy.

The textbook monetary policy response to contractionary supply and expansionary demand shocks under IT is to tighten policy. Negative supply shocks that are believed to be temporary reduce aggregate supply more than demand. If the divine coincidence holds, the output gap can be kept at zero while also maintaining inflation at its target. This requires a rise in interest rates to reduce demand. Fiscal expansion boosts demand. By itself, this too would require an increase in interest rates. Instead, the FOMC cut rates aggressively in 2020. At the same time, fiscal policy was turning expansionary. As noted by [Gagliardone and Gertler \(2023\)](#), [Giannone and Primiceri \(2024\)](#), [Romer and Romer \(2024\)](#) and [Eggertsson and Kohn \(2023\)](#), monetary policy contributed to the rise in inflation.

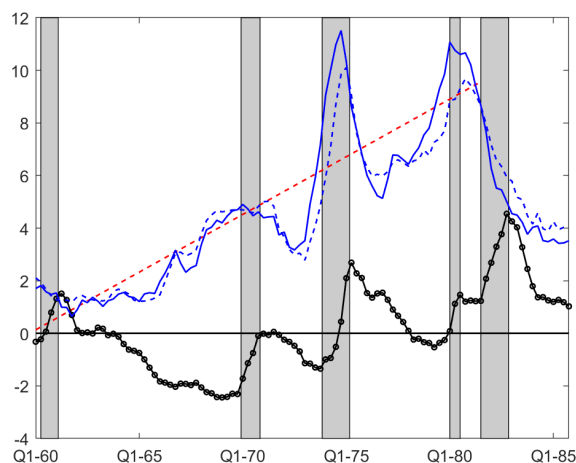


Figure 4:

The Great Inflation: U.S. PCE inflation, core-PCE inflation (both yoy percent change), and the civilian unemployment rate minus CBO natural rate (percent): 1960-1985. The red dashed line shows a linear trend line from 1960 through 1980.

A comparison with the 1970s is highly relevant. It too was a period in which economies were buffered by a combination of supply and demand shocks (Blinder and Rudd (2013)). Inflation spikes associated with energy shocks can be seen clearly in Figure 4, which plots US inflation and the unemployment rate gap from 1960 to 1985.³⁰ The period is remembered for oil price shocks and embargoes, but the impact of the Peruvian anchovy crises on food prices, expansionary fiscal policy (in the US, Johnson’s war on poverty and the Vietnam War spending) and, critically, monetary policy also played significant roles.

The policy error of the 1970s was not that monetary policy allowed temporary spikes in inflation. It was in allowing the upward drift in the inflation rate that is illustrated by the dashed red line in the figure.

Four factors are frequently cited as explanations for the policy errors of the 1970s, each of which has a parallel with developments during 2021-2022. These include 1) The wrong theory of inflation, a static Phillips curve (for example, see Romer and Romer (2002)) or a nonmonetary theory of inflation (Nelson (2005)); 2) Forecasting errors, overestimating potential GDP (Orphanides (2003)) and underestimating the persistence of shocks (see Reis (2021)); 3) Overly ambiguous and unachievable objectives (see Kydland and Prescott (1977), Barro and Gordon (1983b)); 4) A failure of the Fed to accept responsibility for inflation (see Weise (2012)).

Unfortunately, each of these factors was also present to some degree in the 2021-2022 inflation

³⁰Inflation is measured by the PCE index, the unemployment gap is measured by the difference between the civilian unemployment rate and the CBO’s estimate of the non-cyclical unemployment rate

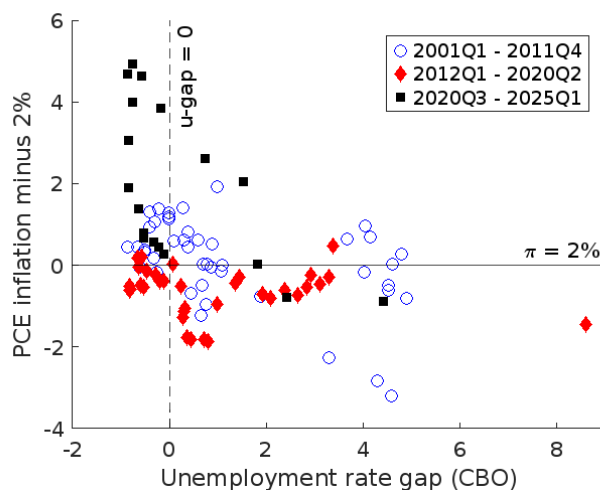


Figure 5: Unemployment and inflation gaps: 2001-Q1 - 2025-Q1

surge. First, the Phillips curve was believed to be flat, implying that an attempt to dampen the rise in inflation would require a significant and costly rise in unemployment. Second, the FOMC consistently underestimated the persistence of the shocks causing inflation. Third, the 2020 PF shifted attention from inflation to running the economy hot. And fourth, as inflation rose sharply in 2021, the FOMC failed to react, pointing the figure instead at exogenous and transitory shocks (team transitory).

As a result, the relationship between unemployment and inflation since 2020 has been strikingly different than that seen in the 2012-2020 period. The first quarter of 2021 saw PCE inflation breach 2 percent and then rise, peaking at almost 7 percent in the second quarter of 2022. Figure 5 adds unemployment and inflation outcomes from the past five years to the 2001-2011 period shown in Figure 1. The recent period appears as black squares. Whereas the 2012-2019 relationship could be characterized as relatively flat, with the exception of 2020 (the impact of COVID), the data points since 2021 could almost be described as vertical.

What role did the 2020 PF play in this very different inflation experience? It is hard to assess whether the shift to AAIT and a shortfalls approach played a direct role. The environment since 2021 has made many of the revisions to the policy framework largely irrelevant. Instead, the key changes that affected policy during 2021 were the prioritization of the employment mandate with its focus on maximum employment over the inflation mandate, leading to forward guidance that constrained the FOMC in responding to inflation as PCE inflation rose from 1.1 percent in the third quarter of 2020 (1.3 percent for core PCE) to 6.9 percent (5.6 percent for core) in the second quarter of 2022.

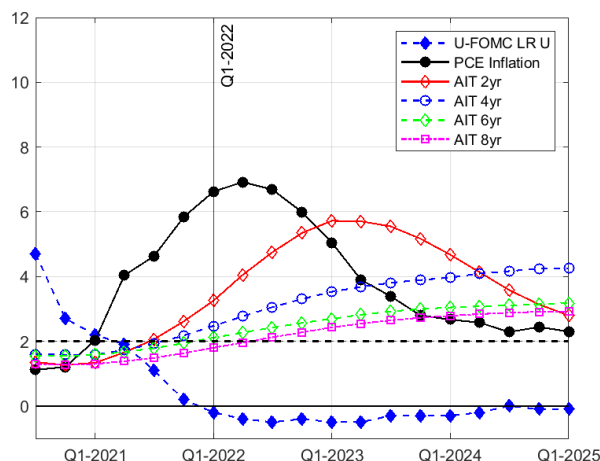


Figure 6: PCE inflation and various measure of average inflation

4.1 Why did the FOMC delay responding to inflation?

[Eggertsson and Kohn \(2023\)](#), [English and Sack \(2024\)](#), and [Romer and Romer \(2024\)](#) point to the shortfalls from the employment objective and the Fed’s forward guidance as hindering a pivot to deal with inflation, arguing that the FOMC had become trapped by its own forward guidance. The FOMC had said the policy rate would not be raised until the employment shortfall had been eliminated. The fight against rising inflation was held hostage to running the economy hot.

This form of lexicographic preference ordering in which the employment goal had to be reached before dealing with inflation was consistent with the 2020 policy framework. The 2020 PF reversed the traditional order in which the mandates were discussed, implicitly prioritizing the employment objective over the inflation objective. It was another example of a back to the 70s approach; the 1978 Humphrey-Hawkins Act called for inflation to be reduced *provided* it did not jeopardize unemployment goals.

Setting aside the lexicographic preferences issue, could the 2020 PF account for the year-long delay in responding as inflation rose above 2 percent? Any attempt to answer this question runs into the problem that the 2020 PF does not provide a clear answer. The answer depends on the unspecified inflation averaging window and the unmeasurable employment shortfall.

Figure 6 shows PCE inflation, together with average inflation for 2, 4, 6, and 8-year averaging windows. All but the average using an 8-year window were above 2 percent by the first quarter of 2022. This was also the case for average core inflation (not shown). Also shown is the unemployment rate gap as measured using the FOMC’s longer-run projection for unemployment from the SEP. The vertical line at the first quarter of 2022 marks the point at which the federal funds rate was

first raised.³¹ Note that this was the quarter in which the unemployment gap reached zero; the 8-year average inflation rate reached 1.96 percent in 2022-Q2. This long-window measure of average inflation has continued to rise and reached 2.92 percent in 2025-Q1.³²

Inflation averages using shorter windows crossed above 2 percent earlier. Averages using 2, 4 and 6-year windows exceeded 2 percent during 2021. According to the 2020 PF, “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.” But what was meant by “sometime”? And it is doubtful that 6 percent could be described as “moderately” above 2 percent. The unemployment rate gap, as measured using the FOMC’s longer-run projection for unemployment turned negative in the first quarter of 2022. Under earlier PFs, a falling unemployment gap and inflation at more than double the target, as was the case in the second quarter of 2021, would have signaled clearly that policy needed to tighten. As I will discuss in section 4.3, waiting a year to respond a gamble by the FOMC, one that, so far, seems to have paid off.

During the last framework review, background papers often used windows of up to 8 years for average inflation. Figure 6 suggests such a window is too long. The 8-year average only rose above 2 percent in the third quarter of 2022 when actual inflation was approaching 7 percent. This suggests that such a long window could unduly delay a response to rising inflation.

While the FOMC’s forward guidance may have led the FOMC to wait until their unemployment objective was reached before raising the funds rate, several other factors also contributed to delay. Among these, three have been cited frequently: 1) The FOMC was caught by surprise; 2) The ELB meant the policy rate was already too high; and 3) The Phillips curve was flat, so slowing the economy down would have had little effect in reducing inflation.

1. There is no question that the FOMC members were caught by surprise by the surge in inflation and by its persistence. In this they were not alone. Inflation projections from the SEP between December 2020 and December 2021 show how each subsequent SEP saw a jump in the projection for 2021 inflation; see Figure 7. As late as September 2021, the SEP indicated FOMC members expected 2022 inflation to return to close to 2 percent. Even in December 2021, the projected inflation for 2022 was 2.6 percent (it came in at 6 percent.)

A common benchmark for policy guidance is the Taylor rule. It performs well in a wide range of models, and is one of the rules featured in the Fed’s *Monetary Policy Report*. Neither the Taylor rule, nor the other five rules in the Report rely in any way on knowing how persistent shocks are. All five rules indicated the funds rate should have been raised from the ELB by mid-2021; see Figure 8. Similarly, in a basic NK model with no lagged endogenous state variables, optimal policy

³¹The rate was raised in March, so the impact on the first quarter funds rate was small (4 basis points).

³²Under pure AIT, the fact that the average had risen above 2 percent would cause expected inflation to fall as the FOMC would aim for below 2 percent inflation. However, the 2020 PF switches to IT when average inflation exceeds 2 percent. Inflation itself (i.e., year-over-year PCE) has exceeded 2 percent since 2021-Q1.

can be characterized by targeting rules that also do not depend on the persistence of underlying shocks. In models involving lagged state variables, however, forecasts of the future enter into the policymakers first-order conditions and therefore are dependent on assessment of the persistence of shocks. Forecast errors can lead to policies that, ex post, turn out to be wrong.

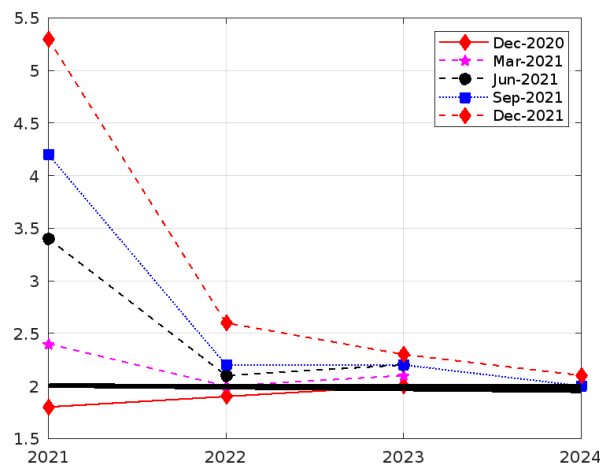


Figure 7: FOMC projections of PCE inflation at various meeting dates.

The question is, what should policymakers do when caught by surprise and when the persistence of the shocks is unknown? [Söderström \(2002\)](#) showed that uncertainty about inflation dynamics called for monetary policy to be more, not less, aggressive in reacting.³³ If the inherent dynamics of inflation turned out to generate more inflation persistence than expected, a failure to stamp out the initial flames of inflation risked leading to higher and more persistent inflation. This was a lesson that seems to have been either forgotten or ignored.

In a paper I presented at Jackson Hole in 2003 ([Walsh \(2003\)](#)), I argued that a policymaker should actually *overestimate* the persistence of inflation shocks. [Tetlow \(2019\)](#) also offers support for this view. The FOMC members consistently *underestimated* the persistence of inflation (see [Figure 7](#)).

From the perspective of robust control ([Hansen and Sargent \(2002\)](#)), there is an evil agent who is out to make the policymaker look as bad as possible. Such an agent will make a shock to inflation more persistent ([Walsh \(2004\)](#)). To protect against this possibility, the policymaker should design policy by overestimating the persistence of inflation shocks. While central bankers were caught by surprise, their failure to react quickly went against what we knew about dealing with uncertainty about shocks and inflation dynamics.

Given a belief that the shocks causing inflation to rise in 2021 were temporary, were there risks

³³See also [Ilbas, Roisland, and Sveen \(2012\)](#) and [Tetlow \(2019\)](#)

in not reacting? A failure to react raised two risks. First, suppose we accept the premise that longer-run inflation expectations are firmly anchored. Not responding does not ensure a unique equilibrium. There are many possible inflation paths. Inflation can persist beyond the time the temporary shocks have disappeared. An example is provided in section 4.3.

Second, the inflation anchor depends on beliefs about future policy actions. Failing to be seen to be addressing surging inflation risked weakening the public's confidence in the 2 percent anchor.

2. A binding lower bound Another rationale for not raising policy rates during 2021 was that a binding lower bound meant that the policy rate during 2021 was already too high. In assessing this rationale, one can look at the guidance provided by simple instrument rules. The Fed publishes alternative policy rules in its Monetary Policy Reports.³⁴

Figure 8 illustrates the path of the federal funds rate and the value of the rate implied by four of the alternative policy rules listed in the Monetary Policy Report. These include the original Taylor (1993) rule, the balanced-approach rule that doubles the weight on unemployment, the shortfalls version of the balanced-approach that reacts to unemployment only when it exceeds the natural rate, and a first-difference rule.³⁵ Each rule is based on inflation relative to 2 percent and the unemployment rate relative to a measure of the natural rate of unemployment.

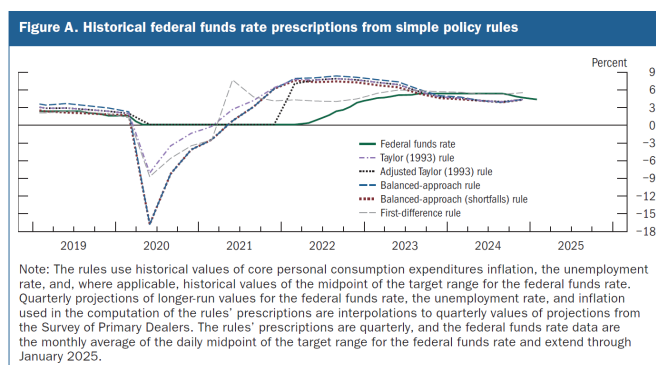


Figure 8: Policy rules from the Monetary Policy Report, Feb. 2025. Source: Federal Reserve Monetary Policy Report, Feb. 2025, p. 48.

Four of the five rules indicated the funds rate should have been increased before the end of 2021. All four implied the funds rate should have been in the 6-9 percent range rate by March 2022 when the Fed finally acted by raising the funds rate from the ELB by 25 basis points.

³⁴In Feb. 2020, the rules were Taylor (1993), Adjusted Taylor, a price level rule, and a first-difference rule. None of the rules contained average inflation. The Box on Monetary Policy Rules was dropped from the June 2020 Report. They were reinstated in the next Report (February 2021.), with the price level rule replaced by a balanced-approach shortfalls rule containing $(\pi - 2)$ and $\min(u_t^{lru} - u_t)$, where u_t^{lru} given by the long-run unemployment projection from the SEP.

³⁵See the Appendix provides more detail on the different rules.

Even if the FOMC believed the funds rate was too high due to the ELB constraint, it could have responded by engaging in quantitative tightening. It did not do so. The Fed did not begin to shrink its balance sheet until March 2022, the same time as it first raised the funds rate.³⁶

3. The Phillips curve and unemployment

A third reason given for delay was the belief that the Phillips curve had flattened. In this case, any attempt to offset rising inflation by engineering an economic slowdown would have required a significant rise in unemployment.³⁷ The Fed's 2021 strategic policy framework called for focusing on employment shortfalls, and throughout 2021, FOMC projections for the unemployment rate exceeded the SEP's estimate of the longer-run level of unemployment.³⁸ Thus, given the Fed's tolerance for above 2 percent inflation that was signaled by the shift to average inflation targeting and the view that the US economy was still short of maximum sustainable employment, no reaction was called for as inflation began to rise.

The September 2021 projections are worth noting (see Figure 7). While projecting inflation to end the year at 4.2 percent, over twice the Fed's target, the funds rate was projected to end 2021 unchanged from its 2020's level, before rising from 10 basis points to just 30 basis points during 2022. With the funds rate barely moving, unemployment was projected to fall from 4.3 percent at the end of 2021 to 3.8 percent at the end of 2022. Inflation was projected to decline to 2.2 percent.

Projecting falling inflation *and* unemployment with only a slight rise in the funds rate seems, in retrospect, an amazingly optimistic forecast, and one that violated the [Qvigstad \(2006\)](#) condition on desirable properties of an interest rate projection as the inflation gap was projected to still be positive while the unemployment gap was projected to be negative. It also reflected the FOMC's apparent belief that the Phillips curve was flat. As discussed below, this belief reflected a view that the unemployment rate was an inadequate measure of economic slack in the labor market.

By December 2022, it was obvious that the 2022 projections from September 2021 had clearly been wrong. Instead of a funds rate of 30 basis points, inflation at 2.2 percent and unemployment at 3.8 percent (below the FOMC's estimate of the longer-run rate), the FOMC acknowledged that the year-end figures were running at 4.4, 5.6 and 3.7 percent respectively.

Both [Romer and Romer \(2024\)](#) and [Eggertsson and Kohn \(2023\)](#) argue that the FOMC's forward guidance had restricted their flexibility in reacting. The FOMC had been indicating that any rate increases would not occur until two conditions had been satisfied: 1) any shortfall in employment had been eliminated and 2) they had begun to shrink the Fed's balance sheet. While the FOMC had given itself some flexibility to react to emerging risks, Eggertsson and Kohn conclude that the

³⁶[Eggertsson and Kohn \(2023\)](#) discuss how the FOMC felt constrained in responding to inflation by its prior forward guidance that it would shrink the balance sheet before lifting rates.

³⁷On the effect of monetary policy on the Phillips curve, see [Berghoff, Furlanetto and Vaccaro-Grange \(2024\)](#).

³⁸The estimate of the stable price unemployment (SPU) rate from [Crump, Nekarda, and Petrosky-Nadeau \(2020\)](#) suggests actual unemployment was well below SPU. See Figure 3 .

FOMC “appears to have viewed the commitment to attain maximum employment as binding” (p. 17).

The move to average inflation targeting was an attempt to mimic the properties of an optimal commitment policy. Optimal commitment in the face of an inflation rate that is too low promises above-target inflation in the future. That is the rationale for AAIT. But it does not mean that policymakers should look through exogenous shocks that push up inflation. Under AAIT, the idea is that expectations of future inflation will increase *because* the central bank is expected to maintain an expansionary policy stance, not because exogenous shocks caused inflation to rise.

4.2 The consequences of delay

Research on alternative policy strategies, be they instrument rules or alternative loss functions, always assume the central bank reacts without delay. What are the consequences of delay? Mai Hakamada and I abstract from recent events and explore how inflation and the output gap are affected when there is a persistent shock to inflation and a delay in the reaction of policy.³⁹ We focus on an inflation shock, as these are the shocks that present policymakers with a conflict between the elements of the dual mandate.

If the economy experiences a demand shock, there is no conflict between employment and inflation objectives. Any delay can only lead to worse outcomes. Unless, that is, the employment objective is linked to an unsustainable objective. If u^* is less than the natural rate, delay in the face of a persistent increase in inflation lowers the real rate and stimulates an expansion in demand. This pushes inflation up further, but it also reduces the employment shortfall. The two objectives are not complements. If employment shortfalls are weighted as more costly than the cost of inflation above 2 percent, a central bank might chose to wait and let the economy run hot.

We assume a policy rule that incorporates inertia. We assume, however, that the policy rule only kicks in k periods after the shock:⁴⁰

$$i_t = (1 - \rho_i)i_{t-1} + \rho_i(\phi_\pi\pi_t + \phi_u u_t) \text{ if } t > k, \quad (8)$$

while $i_t = 0$ if $t \leq k$.⁴¹

In a model calibrated at a quarterly frequency, $k = 4$ means there is no policy reaction until one year after the initial shock. We calibrate the size of the inflation shock such that with a policy delay of one year, inflation peaks at roughly 7 percent. To be clear, the objective is not to model

³⁹See [Hakamada and Walsh \(2024\)](#) for details on the model and calibration. The model is a basic NK model with habits and indexation in price setting. Long-run inflation expectations are anchored and expectations are rational.

⁴⁰While I have criticized using instrument rules, it is hard to avoid them in studying policy delay. An optimizing policymaker would respond to any new information that was relevant, even if the information was very noisy. The simplest approach is the one followed here. Details of the model can be found in the appendix.

⁴¹Details of the model and its calibration can be found in the Appendix.

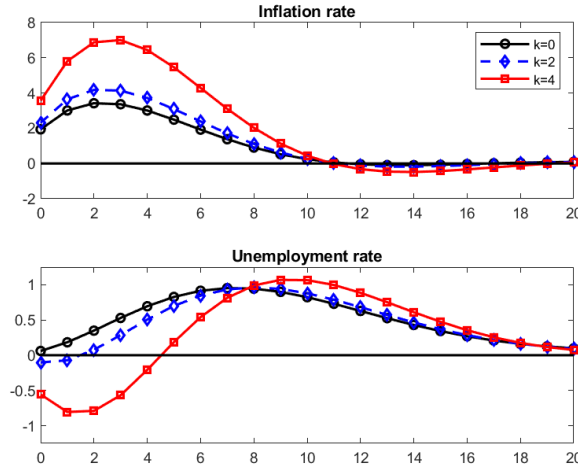


Figure 9: Responses to the inflation shock for different values of k : top panel shows the inflation rate, the bottom panel shows the unemployment rate.

the 2021-2022 inflation surge. We assume all agents know the true shock process and have rational expectations. This implies that longer-run inflation expectations are anchored, and the delay is fully expected.⁴² When policy does act, it follows (8).

Figure 9 shows the paths of inflation (top panel) and the unemployment rate (bottom panel) for $k = 0, 2, 4$. The standard assumption, that policy reacts immediately, is shown by the black line (circles). This yields the standard result. Unemployment rises to partially dampen the rise in inflation. I will focus on the case of $k = 4$ (shown as red squares) as the FOMC delayed one year before reacting to the inflation surge.

Inflation is increasing in delay. By reacting immediately, inflation peaks at 3.4 percent. By delaying until $k = 4$, inflation peaks at 7 percent, illustrating how a failure of policy to react can significantly increase the rise in inflation. Inflation is not independent of monetary policy, even if the policy rate is left unchanged. Not acting is a policy decision. In this simple example, it causes peak inflation to double. Increasing k shifts the inflation IRF upwards, and the size of the upward shift increases with k . That is, the marginal inflation effect increases with greater delay.

The cost of reacting immediately, i.e. $k = 0$, is a recession. Unemployment rises and then converges back to baseline. In contrast, a short delay of $k = 2$ causes unemployment to dip slightly initially before rising. A longer delay, $k = 4$, actually produces a sizable and persistent fall in unemployment. Unemployment does eventually rise once the policy rate is lifted, and it ultimately peaks at a slightly higher level than when $k = 0$, though the peak is pushed back by two quarters. The initial boom when $k = 4$ is a result of a fall in the real interest rate. With the nominal rate

⁴²See ? for a model that allows for learning and for longer-run expectations to become de-anchored.

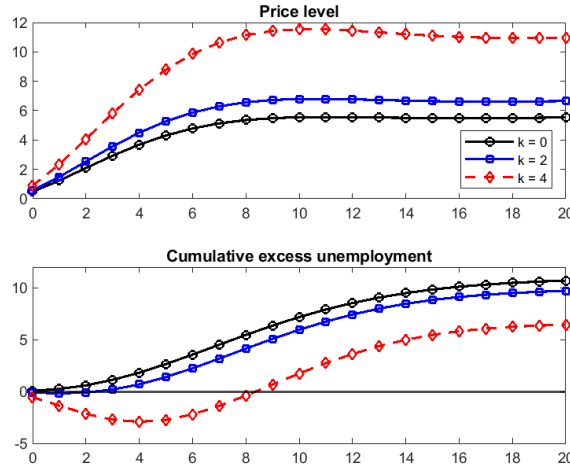


Figure 10: Effects of delay on the price level and cumulative excess unemployment

fixed until period k , the longer the delay and the higher inflation rises, the greater is the decline in the real rate. This boosts demand.

A slightly different perspective on the effects of delay is provide in Figure 10 which plots the price level (top panel) and the cumulative unemployment rate gap. Given the popular attention to the price level, together with evidence from surveys that many people do not understand inflation, it is interesting to assess the trade-offs from delay in terms of two levels: the cumulative points of excess unemployment divided by the rise in the price level. After 20 quarters, this ratio is 1.92 for $k = 0$, 1.45 for $k = 2$ and 0.58 for $k = 4$.

Delay worsens inflation outcomes and improves unemployment outcomes, at least initially. To assess whether there are benefits from delay, we need a metric for evaluating these effects. The first metric is a simple quadratic balanced-approach loss function as in Svensson (2020) defined as

$$L_t^q = \sum_i \beta^i \left[(\pi_t - 2)^2 + \lambda (u_t - u_t^n)^2 \right]. \quad (9)$$

Assuming equal weight on output gap deviations and deviations of annualized inflation from 2 percent, and an Okun's Law coefficient of 2, implies $\lambda = 0.25$.

Column 1 of Table 2 reports the value of L^q for values of k from 0 to 5 when the policy rule uses the baseline values of $\phi_\pi = 1.5$ and $\phi_u = 0.25$.⁴³ Loss is increasing in k . And the marginal cost of delay raises with k . When $k = 0$, loss is reduced by responding more strongly to inflation ($\phi_\pi = 3.0$, column 2).

⁴³This last value corresponds to a Taylor rule coefficient of 0.5/4 on the output gap and a Okun's Law coefficient of 2.

Table 2: Loss from inflation shock
Quadratic Loss L^q : $\lambda_u = 0.25$

$$i_t = \rho_i i_{t-1} + \rho_i (\phi_\pi \pi_t + \phi_x x_t)$$

	$\phi_\pi = 1.5$ $\rho_i = 0.85$ (1)	$\phi_\pi = 3.0$ $\rho_i = 0.85$ (2)	$\phi_\pi = 1.5$ $\rho_i = 0.5$ (3)	$\phi_\pi = 3.0$ $\rho_i = 0.5$ (4)
k=0	0.0535	0.0340	0.0646	0.0352
k=1	0.0581	0.0348	0.0664	0.0352
k=2	0.0703	0.0373	0.0724	0.0358
k=3	0.0990	0.0436	0.0880	0.0379
k=4	0.1754	0.0598	0.1284	0.0444
k=5	0.4549	0.1058	0.2545	0.0621

If monetary policy reacts with delay, should the response then be more aggressive? In terms of the policy rule (8), there are two ways to interpret a more aggressive policy. It could be a stronger response to movements in inflation: a larger ϕ_π . It could be a less inertial response: a smaller ρ_i . Because the contemporaneous policy rate reaction to inflation is equal to $(1 - \rho_i)\phi_\pi$, either change causes the policy rate to increase more to a rise in inflation. Comparing columns (1) and (2), for all k loss falls if the response to inflation is increased. The effect is significant as the delay becomes longer. The best policy rule for each k is indicated in boldface. As k increases past 2, loss can also be reduced by employing less inertia in the policy rule, reducing ρ_i from 0.85 to 0.5 (column 4). Even a delay of 4 periods can improve over the no delay response under the baseline policy if the policy rate responds strongly to inflation and with less inertia than under the baseline rule.

The results can also be ranked using a loss function based on shortfalls which only count as losses those periods in which unemployment rate exceeds the rate associated with maximum employment. The unemployment rate in the model should be thought of as unemployment relative relevant to the longer-run unemployment rate, i.e. the natural rate. Let $u^n - u^* = \delta > 0$. Then a shortfalls loss function would penalize outcomes in which $u_t + \delta$ is positive. The shortfalls loss function would take the form

$$L^{sf} = \sum_i \beta^i [(\pi_t - 2)^2 + \lambda \max(0, u_t + \delta)^2]. \quad (10)$$

If $\delta = 0$, that is, when the natural rate is equal to the unemployment rate at maximum employment, the results (not shown) are very similar to those reported in Table ???. The reason is that inflation dominates the loss, both because there is a larger relative weight placed on squared inflation and because inflation varies more.

Different results are obtained when δ is greater than zero. That is, there is distortion so that even being at the natural rate of unemployment yields losses. Table 3 reports results when the natural rate is one percent higher than the unemployment rate at maximum employment ($\delta = 1.0$).

Table 3: Loss from shortfalls loss
Loss L^{sf} under rational expectations, $\lambda_u = 1.0$, $\delta = 1.0$

$i_t = \rho_i i_{t-1} + \rho_i (\phi_\pi \pi_t + \phi_x x_t)$			
$\phi_\pi = 1.5$ $\rho_i = 0.85$ (1)	$\phi_\pi = 3.0$ $\rho_i = 0.85$ (2)	$\phi_\pi = 1.5$ $\rho_i = 0.5$ (3)	$\phi_\pi = 3.0$ $\rho_i = 0.5$ (4)
k=0	0.2143	0.2041	0.2280
k=1	0.2174	0.2037	0.2288
k=2	0.2261	0.2038	0.2324
k=3	0.2488	0.2065	0.2436
k=4	0.3143	0.2171	0.2765
k=5	0.5645	0.2534	0.3878
			0.2055
			0.2078
			0.2194

Now, unemployment gaps in the range $-\delta < u_t < 0$ are still penalized as shortfalls. Losses are higher as even some negative unemployment gaps (measured using the natural rate) contribute to the loss measure. For each policy rule, loss is still increasing in delay, except for the rule with a large coefficient on inflation and the baseline degree of inertia (column 2). The best rule for each k is indicated in boldface. The lowest loss occurs with a delay of one period ($k = 1$, $\phi_\pi = 3.0$, and $\rho_i = 0.85$). Loss is now lowest with a delay of one period. When delay rises to 4 or more periods, the best rule involves less inertia. The most aggressive policy rule (column 4) yields a lower loss than the no delay, baseline rule case for delays less than 5 periods. An aggressive policy can compensate for a significant delay.

4.2.1 Lessons on delay

Delay worsens the inflation surge, but because this also lowers the real rate of interest, delay can lead to a short-term fall in the unemployment rate. The two mandates are not complementary, as one would expect when a direct shock to inflation is concerned. Thus, evaluating the costs and benefits of delay requires a metric for ranking alternative outcomes. With the quadratic loss function, the lowest loss occurs with no delay but a stronger response to inflation (a larger ϕ_π) than in the baseline policy rule. Using a shortfalls loss function, results are unchanged. However, if a larger weight is given to shortfalls in the loss function and the unemployment target in the loss function is less than the one that defines the unemployment gap in the Phillips curve, a short delay can lead to lower loss if combined with a more aggressive policy response to inflation. If delay becomes longer, a less inertial policy rule (a smaller ρ_i) improves outcomes. With the most aggressive rule, a delay of as many as 4 periods yields a lower loss than is achieved with no delay and the benchmark policy rule.

4.3 The Fed's gamble

The FOMC's decision not to react to rising inflation in 2021 and instead to look through what were viewed as temporary shocks represented a gamble. It was a bet that inflation expectations would remain anchored even as actual inflation rose sharply and that the shock would quickly die away. At the Jackson Hole Symposium in 2021, Chair Powell stated "Policymakers and analysts generally believe that, as long as longer-term inflation expectations remain anchored, policy can and should look through temporary swings in inflation."⁴⁴ This was at a time when PCE inflation had reached 4.6 percent, over twice the FOMC's target. Core PCE inflation was at 4 percent. Chair Powell's statement could easily have been interpreted as meaning the Fed would not respond to the surge in inflation, that the inflation was caused by temporary exogenous shocks and that once these passed, inflation would return to 2 percent.

This was a gamble, because this was not the only possible outcome. Another possibility was that longer-run inflation expectations would remain anchored, yet inflation would persist above 2 percent after the shocks had disappeared.

To see why, consider a basic NK model given by the following standard two equations in inflation and the output gap:

$$x_t = E_t x_{t+1} - \frac{1}{\sigma} (i_t - E_t \pi_{t+1} - r_t^n) \quad (11)$$

and

$$\pi_t = \beta E_t \pi_{t+1} + \kappa x_t, \quad (12)$$

where r_t^n is an exogenous shock to demand; x_t , π_t and i_t should all be interpreted as deviations from their long-run values. In the case of inflation, this is 2 percent. Initial conditions are $\pi_0 = x_0 = i_0 = 0$. At $t = 1$, the inflation shock ψ_1 takes on a positive value and remains at this level for 4 periods. It then reverts to zero in period 5 and remains at 0 thereafter. Given that the shock is temporary, the central bank leaves the policy rate unchanged. In one equilibrium, π and x also revert to zero in period 5 and remain there. This is the standard rational expectations equilibrium.

The blue line (circles) in Figure 11 illustrates this equilibrium, the one the Fed was hoping for. Inflation rises when the shock occurs and then converges back to its long-run equilibrium value of 2 percent in period 5. Because inflation will be higher until period 5, expected inflation rises although long-run expectations remain anchored at 2 percent. With the nominal rate unchanged, the real interest rate falls. This boosts aggregate spending and the output gap rises, which also contributes to the rise in inflation. The output gap (not shown) converges back to its long-run

⁴⁴The look through view is based on [Bodenstein, Erceg, and Guerrieri \(2008\)](#) who show that optimal policy in the face of a shock that pushes up energy prices is close to a policy that stabilizes the output gap. However, the optimal policy leads to a *fall* in headline inflation, clearly not what occurred in 2021 when the US was hit by energy and demand shocks. By the third quarter of 2021, rising core and headline inflation core inflation while the unemployment rate was falling suggested a demand shock which would call for higher real rates.

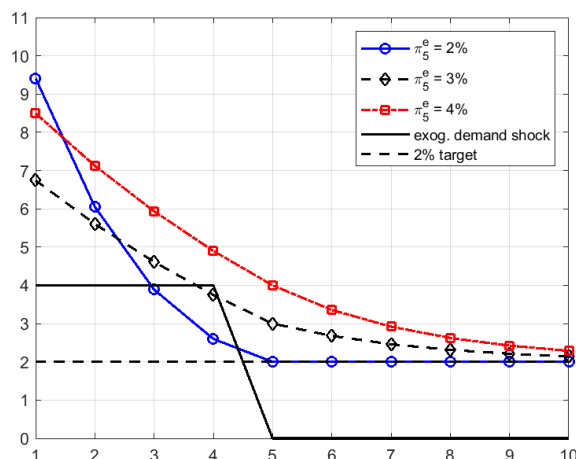


Figure 11: Effects of a temporary demand shock: Different equilibrium inflation paths with a constant policy rate.

value of zero in period 5.

But this is not the only possibility. There is a continuum of equilibrium paths, each indexed by the inflation rate expected to occur when the shock returns to zero in period 5. The black (diamonds) and red (squares) lines illustrate two such alternative equilibrium paths for inflation and the output gap when the policy rate is held fixed in the face of the same shock. Each makes a different assumption about expected inflation in period 5, that is, for the period when the shock has ended.

The black line shows the equilibrium paths of inflation and the output gap if the expected inflation rate in period 5 is 3 percent rather than 2 percent. The red line shows the equilibrium when inflation in period 5 is expected to be 4 percent.

In each of these equilibria, long-run expectations are firmly anchored at 2 percent. It is short-run expectations that have drifted. With the Fed saying it will “look through” the rise in inflation, what is the rational expectation for inflation? For transitory shocks to have temporary effects on inflation in the absence of a policy response requires more than keeping longer-run expectations anchored. Longer-run expectations may remain anchored, but that does not pin down an equilibrium if short-run expectations rise.

Perhaps the effects in Figure 11 look small, but if a new inflationary shock hits when inflation is still not back to target, expectations could easily become de-anchored. These equilibria, all consistent with the same constant interest rate path, are reminders that inflation is not independent of what monetary policy does (or doesn't) do. The FOMC was gambling that outcomes would follow the standard equilibrium, but in the absence of a policy response, there is no reason to believe that

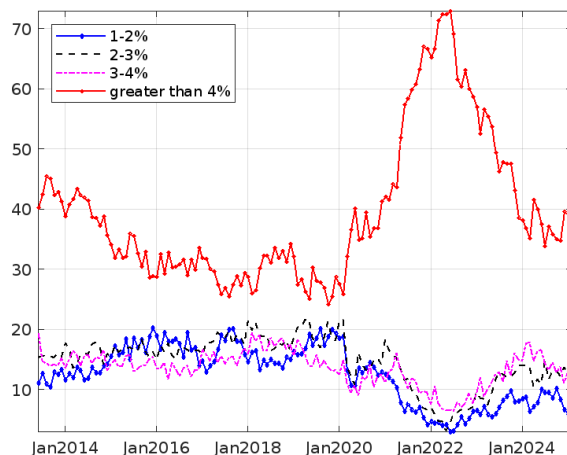


Figure 12: Distribution of 1-year ahead inflation expectations from the NYFRB SCE

equilibrium will be selected.

Some evidence that the FOMC was taking a gamble is provided by Figure 12, based on the NY Fed's SCE survey of one-year ahead inflation expectations. The figure illustrates the distribution of one-year ahead expectations across households. By Spring of 2022, the fraction of households whose expectations of inflation over the coming year exceeded 4 percent had risen to over 70 percent, peaking in June 2022. Once the Fed started raising interest rates, this fraction began to recede. It is worrying to think what might have happened if the FOMC had waited even longer to react.

In late 2021, Chair Powell began adding to his post-FOMC meeting press conferences statements affirming the FOMC's commitment to its longer-run inflation target. In December 2021, this language changed to "We are committed to our price-stability goal." By May, press conferences opened with the statement that "We have both the tools we need and the resolve that it will take to restore price stability on behalf of American families and businesses." At Jackson Hole in August 2022, Powell declared "The Federal Reserve Open Market Committee's (FOMC) overarching focus right now is to bring inflation back down to our 2 percent goal. Price stability is the responsibility of the Federal Reserve and serves as the bedrock of our economy." He ended his speech by pledging "We will keep at it until we are confident the job is done." Such statements, combined with policy actions, undoubtedly helped prevent short-run inflation expectations from drifting up further.

Macroeconomic developments since 2000 provide little evidence for the effectiveness of AAIT or the shortfalls approach in the environments for which they were designed. Drawing conclusions about the 2020 PF is also made difficult because the FOMC never specified the averaging window it was using nor was maximum employment quantified. Because the operational objectives had become less clear, the Fed's policy actions and explicit statements of a commitment to controlling

inflation were important in supporting a decline in inflation.

5 Managing expectations

The effects of any new policy framework are likely to change over time as the public comes to better understand the implications of the framework for the macro economy. This is particularly true of AAIT. As [Svensson \(2020\)](#) pointed out, “the automatic stabilization requires that the strategies have become credible and that the private sector believes that the central bank will deliver and make up according to the strategy. This probably requires that economic agents need to see the policy practiced and its principles obeyed for some time, in order to believe that it will be maintained and be successful in the future. This is similar to how the first inflation-targeting central banks had to earn the credibility of their inflation target.” This is a problem for attempts to evaluate whether the 2020 PF had any direct effect on expectations as AAIT was designed for an economic environment that quickly disappeared once it was adopted. There was no experience with the PF for the public to draw upon.

What evidence there is suggests that the announcement of the 2020 PF had little to no impact on non-financial market expectations. For example, [Coibion, Gorodnichenko, Knotek, and Schoenle \(2023\)](#) find there was little effect observed from their survey of household expectations, even among the relatively few households who seemed to be aware of the new policy. [Detmeister, Jorente, Massaro, and Peneva \(2015\)](#) found the 2012 establishment of the 2 percent target affected professional forecasters’ longer-run inflation expectations, but not households’.

Figure [13](#) shows 1- and 3-year horizon inflation expectations from January 2020 to December 2023. This covers the period during which the 2020 PF was announced and the FOMC first raised the funds rate. The top panel shows expectations from the NY FRB’s household Survey of Consumer Expectations, while the bottom panel shows those from the Cleveland FRB which come from financial markets and Blue Chip Forecasts. There are two vertical dashed lines; the leftmost one is at August 2020 when the 2020 PF was announced, the rightmost one is at March 2022 when the FOMC lifted interest rates. The SCE series do not seem to have reacted to the PF or to the increase in the funds rate; the 1-year SCE expectations seem to simply track actual inflation. The Cleveland Fed expectations series began rising before the August announcement, with the 1-year expectation rising from -0.22 in May to 1.68 in August before falling back to 1.42 in November. Corresponding figures for the 3-year expectations were 0.9, 1.39, and 1.28. This suggests the August 2020 announcement was at least partially anticipated. The Cleveland Fed series remained much lower than actual inflation, though they began to increase prior to the March 2022 policy actions and continue to rise until inflation peak in the spring and summer of 2022. Importantly, all these measures of short-run expectations stabilized or fell to lower levels once *actual* inflation began to decline.

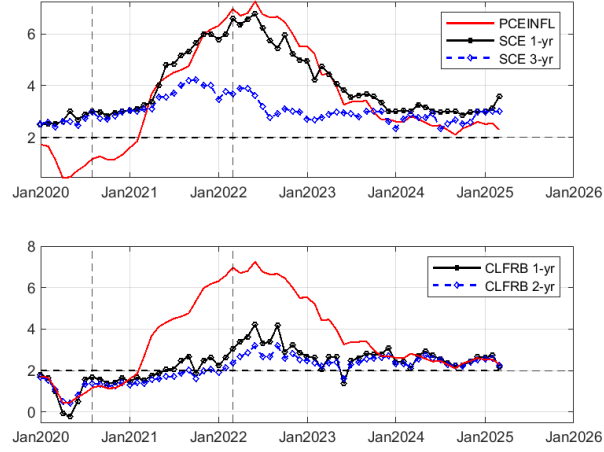


Figure 13: PCE inflation and 1- and 3-year measures of expected inflation from the NY Fed SCE : top panel. Inflation and 5- and 10-year inflation expectations: bottom panel from the Clev. Fed. The vertical lines indicate August 2020 when the 2020 PF was announced.

Measures of inflation expectations coming from financial market participants are favored by some over those from household surveys. [Coibion, Gorodnichenko, Knotek, and Schoenle \(2023\)](#) find little evidence that financial-market based inflation expectations reacted to the August 2020 announcement of the new PF. If one looks at Figure 13, the 1-year expectations from the SCE household surveys certainly track inflation more closely than the Cleveland 1-year inflation expectations. Financial markets are undoubtedly better informed of FOMC thinking, but then the question is whether the expectations from financial markets are simply a mirror; the FOMC sees what the FOMC has told the markets.

Figure 14 plots PCE inflation and 5-year expected inflation from the Cleveland Fed.⁴⁵ Longer-run expectations were well anchored during the inflation surge in 2021-2022. The 5-year expectations rose as inflation moved above 2 percent in 2020 but never rose above 2.5 percent. Since March 2022, the 5-year expected rate has exceeded 2 percent in all but one month. Through much of 2024, these longer-run expectations have tracked actual PCE inflation closely.

What expectations are most relevant depends on the question being asked. If the objective is to understand consumption spending which, as [Coibion, Gorodnichenko, Knotek, and Schoenle \(2023\)](#) point out is 70 percent of GDP (100 percent in basic NK models), evidence from households might be the most relevant. For inflation itself, the relevant expectations are those of firms making decisions on price setting. It is these expectations that have motivated the interest in AIT. [Kumar, Coibion, Afrouzi, and Gorodnichenko \(2015\)](#) and [Candia, Coibion, and Gorodnichenko \(2023\)](#) suggest firm

⁴⁵The 10-year expectations series moves closely with 5-year expectations.

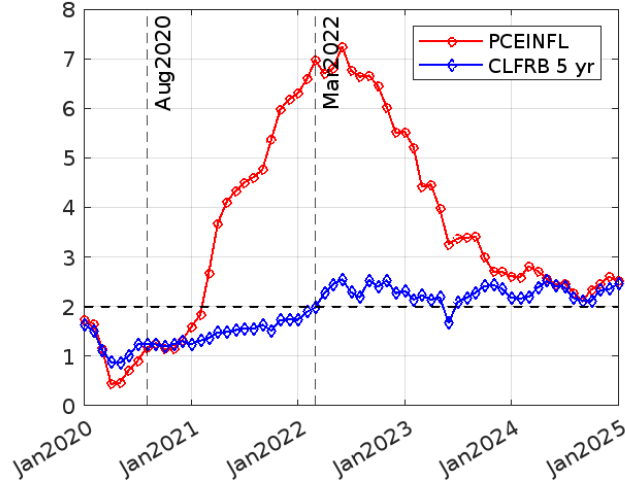


Figure 14: PCE inflation and expected inflation at 5- and 10-year horizons from the Cleveland FRB. Vertical lines indicate dates the 2020 PF was adopted and the funds rate was first raised.

mangers' expectations more closely match those of households. And [Fuhrer \(2017\)](#) argues that the persistence usually captured in empirical models by introducing habits in consumption and/or indexation in price setting may reflect sluggish adjustment of expectations.

Surveys provide important information on expectations, but additional evidence on expectations formation comes from experimental laboratory results.⁴⁶ [Kostyshyna, Petersen, and Yang \(2025\)](#) evaluate various monetary policy frameworks including AIT and PLT in a lab environment. They find evidence of backward-looking expectations, that regimes involving inflation *rates* perform better than *level* regimes such as PLT. Moving from IT to AIT to PLT is found to worsen performance, a complete reversal of the results based on rational expectations.

PLT did poorly in these experiments due to a tendency for lab participants to form expectations by extrapolating trends, which occurred more frequently with PLT than with IT or AIT. AIT and PLT work by inducing a degree of negative serial correlation in inflation; low inflation now induces expectations of higher future inflation. Extrapolation does the reverse. Lower inflation now is projected into the future. While the destabilizing impact of this was most prevalent under PLT, it was also a danger with long-window AIT. As inflation rises after a period of below target inflation, extrapolative expectations can lead to overshooting, which further amplifies inflation and expectations of inflation. This leads to increased volatility under AIT in a manner similar to the case of de-anchored longer-run expectations in the FRB/US simulations reported in [Hebden, Herbst, Tang, Topa, and Winkler \(2020\)](#).⁴⁷ Kostyshyna et al conclude that “...shorter-history

⁴⁶Participants in lab experiments do have “skin in the game” as they receive a payout based on the ex-post accuracy of their forecasts.

⁴⁷[Ball and Zhang \(2024\)](#) considers optimal simple IT with partially anchored expectations.

dependence works better to manage the economy. While modest history-dependence can guide inflation expectations, excessive history-dependence can be detrimental.”

This evidence from an experimental lab environment is, therefore, particularly troubling for policy frameworks such as long-horizon AIT and especially PLT, regimes that generally perform well under rational expectations. The one bright spot is the finding that clearly communicating the central bank’s projections for inflation and the output gap aided lab participants by guiding expectations. This can play a major role in producing better performance under long-horizon targeting regimes.

What does this suggest about managing expectations? There are several points. First, revisions to policy frameworks are likely to need to be in place for some time before their implications are fully understood and incorporated into households’ and firms’ expectations. Given the post-2020 economic environment and the lack of clarity in the new PF, it was unlikely that such internalization would have occurred quickly.

Second, the advantages of AIT rest on private sector decision makers 1) understanding how monetary policy affects inflation and the real economy and 2) incorporating future monetary policy actions when forming expectations. The evidence from surveys is that neither of these conditions are met (Coibion, Gorodnichenko, Knotek, and Schoenle (2023), Binetti, Nuzzi, and Stantcheva (2024), Stantcheva (2024)).

Third, attempting to use expectations as automatic stabilizers seems a degree of fine-tuning well beyond the capabilities of even the best central banker. We know too little about expectations formation to rely on this channel. Anchoring longer-run inflation expectations should be the first priority. It is important that the PF establishes clear and easily understandable operational objectives and then, critically, shape communications to be consistent with the PF. This would require, for example, that when inflation has been below 2 percent, saying clearly where average inflation is relative to 2 percent. For example, the SEP from September 2020, projected year-end inflation of 1.2 percent. It then projected inflation converging to 2 percent from below. This seems inconsistent with the PF that had just been adopted the previous month.

Experience is the best teacher. Any new PF is unlikely to have much impact on expectations unless the FOMC is, and is perceived to be, actually following the PF. Clear, direct statements such as Chair Powell delivered in 2022 at Jackson Hole are more likely to affect expectations than the PF statement itself.

6 Labor markets and inclusive expansions

The increased emphasis the 2020 PF places on the employment side of the dual mandate makes it unfortunate that the FOMC has been unwilling to provide an estimate of the unemployment rate u_t^* associated with maximum employment. Shifts in productivity, labor force participation,

demographics, and work patterns, as well as technological developments such as AI, mean that u_t^* , and the natural rate u_t^n change over time, and neither is observable directly.⁴⁸ The same can be said of the longer-run unemployment rate and r-star, yet FOMC members do provide quarterly projections of both, either directly (unemployment) or indirectly (r-star).

Prior to 2020, the FOMC's PFs made reference to the SEP's longer-run projection of the unemployment rate, suggesting the benchmark employment level for the dual mandate was linked to a notion of a natural rate of unemployment. Is maximum employment the same as the natural rate of employment? Or is it higher? How does the unemployment rate associated with maximum employment (u_t^*) compare to the natural rate of unemployment, or to the unemployment rate consistent with stable prices (u_t^{spu})? How do these compare to the unemployment rate consistent with a efficiency or welfare measure? What distortions affect the wedges between these measures? Is monetary policy an effective tool for addressing distortions in the labor market?

Standard monetary policy models do not offer a rationale for an asymmetric response to employment (or unemployment). The asymmetric AIT was motivated by a recognition that inflation that was too low posed a greater threat than inflation that was too high. The former situation could find monetary policy constrained by the ELB; the latter situation central banks are supposed to know how to deal with. But why is a 1 percent rise in the unemployment rate from the natural rate more costly than a 1 percent fall? It could be that the steady-state natural rate is inefficiently high. But attempt to close this steady-state gap would likely just be unsuccessful while raising inflation. Several researchers have argued that the Phillips curve is nonlinear, becoming steeper as unemployment falls. See, for example, [Benigno and Eggertsson \(2023, 2024\)](#). However, this would suggest responding more strongly to unemployment if it falls below the natural rate, not when it rises above the natural rate.

I think it is a widely shared belief that, all else equal, 3 percent unemployment is better than 5 percent, primarily for distributional reasons, but most policy models leave one in a situation that is much like that characterizing the inflation bias in the Barro-Gordon model. There was nothing in that model itself that explained why one inflation rate was better than another. A perfectly anticipated 20 percent inflation was the same as a perfectly anticipated 2 percent inflation. One contribution of the new Keynesian framework was that there was an actual, welfare-reducing distortion introduced by sticky prices, a distortion that monetary policy could address.⁴⁹

An evaluation of shortfalls from maximum employment as an appropriate objective for policy-makers requires a better understanding of labor market distortions. For example, in search and matching models of the labor market, equilibrium unemployment can be inefficiently high or low.

⁴⁸See [Crump, Eusepi, Giannoni, and Sahin \(2019\)](#), [Crump, Nekarda, and Petrosky-Nadeau \(2020\)](#) and [Bok, Crump, Nekarda, and Petrosky-Nadeau \(2023\)](#) for discussions of alternative approaches to measuring unemployment benchmarks.

⁴⁹See, for example, [Coibion, Gorodnichenko, and Wieland \(2012\)](#), [Ascari and Sbordone \(2014\)](#), and [Nakamura and Steinsson \(2010\)](#).

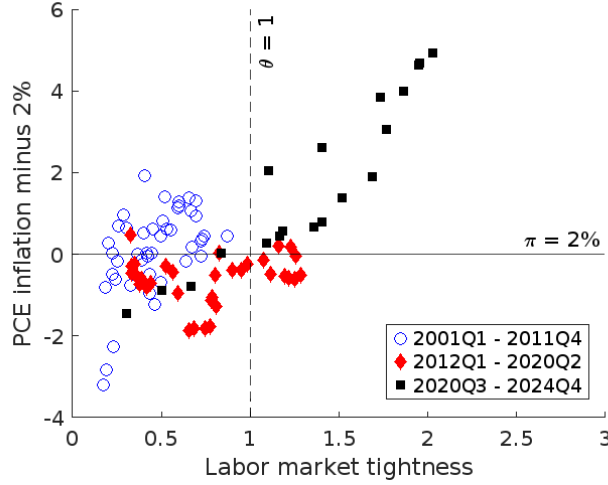


Figure 15: Labor market tightness and inflation

It is not sufficient to simply argue that low unemployment brings benefits to marginalized workers. One must assess how effective monetary policy is as a tool for achieving these benefits. To do this, it is necessary to move beyond the neoclassical labor market that underpins most NK models.

The natural alternative is the search and matching framework of Diamond, Mortensen and Pissarides embedded in a new Keynesian framework (SM+NK).⁵⁰ In this framework, the state of the labor market is summarized by market tightness, measured by the ratio of job vacancies to unemployment workers, typically denoted by θ .⁵¹ When θ is high, firms find it harder to fill job vacancies, while workers find it easier to find jobs. Tighter labor markets lead to wage increases and inflation. θ is, therefore, a natural candidate for a measure of slack in the Phillips curve.⁵²

Figure 15 plots inflation against labor market tightness; it can be compared to Figure 1 which plotted inflation against the unemployment rate. While the period leading up to the 2019 review and 2020 PF might have suggested the relationship between θ and inflation was, like the unemployment-inflation relationship, relatively flat, the post 2020 data suggest otherwise. An historically tight labor market was associated with the surge in inflation.⁵³

When expressed in terms of the unemployment rate and inflation, two important differences from standard NK models arise. The lagged unemployment rate appears due to the dynamics adjustment of unemployment. This adds an additional endogenous state variable.⁵⁴ And the real

⁵⁰Bundick and Petrosky-Nadeau (2025) provide a nice review both of the older and the recent SM+NK literature. In SM+NK models, the existing number of filled jobs becomes an endogenous state variable.

⁵¹At the 2019 conference held as part of the review leading to the 2020 PF, ? develop an adjusted tightness measure that takes into account factors such as on the job search leading to job-to-job transitions.

⁵²See Ravenna and Walsh (2008) and, more recently, Benigno and Eggertsson (2023).

⁵³Association, of course, does not imply causality. The recovery from COVID involved fiscal and monetary stimuli which would increase tightness and inflation. A high level of θ and high inflation would suggest policy is too loose.

⁵⁴Bundick and Petrosky-Nadeau (2025) find the effects of shortfall policies are increased by the addition of this

interest rate appears in the NKPC due to the role of the real rate in affected the present discounted value of job matches and firms' effective cost of labor. SM+NK models are useful for analyzing labor market distortions and the effectiveness of monetary policy in correcting them. [Ravenna and Walsh \(2011\)](#) consider optimal monetary policy in such a model. They show that if tax/subsidies are available to ensure the steady-state is efficient, a second-order approximation to the welfare of the representative family takes the form

$$L_t = \pi_t^2 + \lambda_x x_t^2 + \lambda_\theta (\theta_t - \theta_t^e)^2 \quad (13)$$

where θ_t^e is the efficient value of θ . The first two terms are standard. Fluctuations of labor market tightness around its efficient level also generate welfare losses. Fluctuations in employment require moving workers between home production and market production; this involves matching costs. With a matching function that displays diminishing marginal productivity with respect to labor market tightness, the costs of job posting rise more when vacancies increase than they fall when vacancies decline. Thus, volatility in θ_t around its efficient level θ_t^e leads to lower welfare.⁵⁵

There is, therefore, a rationale for monetary policymakers to seek to stabilize θ . But θ_t^e is not directly observable, much like u_t^* , so it adds another *star* variable to the policy problem.⁵⁶ And if θ^e is not equal to the natural rate of market tightness, the same issues arise as in defining what one means by the output gap or the unemployment gap. In deriving (13), the assumption was that $\theta_t^e = \theta_t^n$, the value consistent with stable prices.

One source of deviations between θ and θ^e arises if there are random deviations from efficient surplus sharing between workers and firms.⁵⁷ For example, suppose a worker and a firm engage in Nash bargaining over the match's joint surplus and the resulting division of the surplus in the steady-state satisfies the Hosios efficiency condition. Suppose the bargaining shares varies stochastically around its steady-state value. In that case, [Ravenna and Walsh \(2008\)](#) show that fluctuations in the bargaining share play a role similar to that of the markup shock or cost shock that is a standard assumption in NK models.

[Ravenna and Walsh \(2012\)](#) investigate the volatility of inflation that would arise if monetary policy attempted to offset distortion in the labor market. When the Hosios condition does not hold, the welfare costs are large but are almost all accounted for by the steady-state loss. Monetary policy cannot address this loss. A policy of price stability turns out to be close to optimal; using

source of history dependence.

⁵⁵The first two terms in 13 reflect inefficient composition of consumption across individual goods caused by price dispersion, and inefficient fluctuations of aggregate consumption when households are risk averse ($\lambda_x = 0$ if they are risk neutral). Fluctuations in θ reflect inefficient allocation of workers between market production and non-market activity.

⁵⁶[Michaillat and Saez \(2024\)](#) develop a model in which the efficient value of tightness is $\theta^e = 1$. See Figure 6.

⁵⁷[Afrouzi, Halac, Rogoff, and Yarad \(2024\)](#) develop a model of inflation in which labor's share plays an important role.

monetary policy to generate markup volatility does little to address the steady-state welfare cost while introducing costly inflation volatility.

6.1 Inclusive labor markets

Recall that the FOMC delayed responding to surging inflation because their employment goal had not been reached. Based on the unemployment gap measured using the FOMC's LRU, the gap hit zero in the second quarter of 2022, the quarter the FOMC raised the funds rate. That same quarter, θ rose above 2, its highest level since the JOLTS data on vacancies were first released in 2000. The first quarter of 2022 also saw the unemployment rate at an all time low relative to the rate consistent with stable prices as estimated by [Crump, Nekarda, and Petrosky-Nadeau \(2020\)](#). The labor market was very tight in 2022.

The 2020 PF describes the employment mandate as “a broad-based and inclusive goal”. The standard macro models discussed so far were not designed to cast light on how inclusive an economic expansion might be. The general presumption was that a stronger expansion was, almost by definition, a more inclusive expansion. To say more requires a richer model of the labor market that recognizes that workers experience differences in labor market outcomes with, for example, some workers systematically experiencing more frequent and longer-lasting episodes of unemployment. One can then investigate how monetary policy might affect these outcomes.

[Ravenna and Walsh \(2021, 2025\)](#) develop a model that identifies a new negative externality that implies some workers experience unemployment spells that are inefficiently long and frequent. Other workers experience spells that are inefficiently short and infrequent. Expansionary monetary policy can reduce the distortion in outcomes for the first group of workers, but only by the increasing the distortion in the outcomes for the second group.

In the model, skill-heterogeneity leads to a selection bias that creates matching inefficiencies, even when the Hosios condition is satisfied. Think of matching as a two-stage process. The first stage parallels the standard matching process in search and matching model. But matches do not automatically lead to jobs. Instead, a match produces an interview at which a firm learns additional information about the applicant, information that is unobservable prior to an interview. On the basis of the interview, a worker is either hired or screened out and returns to the pool of job seekers.

At the start of the period, aggregate shocks that affect the joint surplus of worker-firm matches are observed. Firms post job vacancies and set a cutoff productivity level such that any employee (interviewee) with productivity above the cutoff is retained (hired). In a recession, unemployment rises. In a standard SM model, the rise in unemployment makes it easier for firms to find workers, job postings rise, and unemployment quickly returns to steady state. With productivity varying across workers, firms become more selective in a recession. They layoff their less productive workers

and screen out more of the workers they interview. This reduces the average productivity of the pool of unemployed. A firm that posts a vacancy is less likely to interview a worker whose productivity will generate a positive surplus. The incentive to post vacancies falls relative to a standard SM model. As a result, the low-productivity workers see a larger rise in unemployment and a longer duration of unemployment in a downturn.

We show this selection process introduces a new distortion. In a standard SM model, a firm that posts a vacancy lowers the probability other firms will make a match. This externality is eliminated if the Hosios condition holds. A selection externality is also present. A firm that separates from low-efficiency employees or screens out such workers at the interview stage affects the average productivity level of the pool of searching workers. This effect is ignored by the individual firm, which takes the size of the unemployment pool *and* its average quality as given. The externality arising from the impact on the size of the pool of unemployed workers is eliminated when the Hosios condition is satisfied. The effect on the quality of the pool is not. Low-productivity workers experience spells of unemployment that are inefficiently frequent and average unemployment durations that are inefficiently long.

This distortion provides a rationale for policies that generate stronger recoveries from recessions. However, there is a flip side. Relative to the social planner's equilibrium, high-productivity workers experience spells of unemployment that are inefficiently infrequent and average durations of unemployment that are inefficiently short. Monetary policy cannot selectively target the unemployment experiences of different groups in the labor force. Expansionary monetary policy reduces the frequency of unemployment and shortens its duration for all workers. Thus, monetary policy is an inefficient instrument for addressing labor market distortions, even when these distortions lead to large steady-state welfare losses.

Cairó and Lipton (2023) also develop a SM+NK model with two types of workers, but they identify these types as reflecting racial differences and assume firms discriminate against one type. This allows them to assess the model using data on Black-white differences in labor market outcomes and to develop a model-based measure of discrimination. They use the model to evaluate the effects on labor market outcomes for the two types of workers if monetary policy moves from a policy rule that responds to unemployment deviations to one that responds to employment shortfalls.

The underlying mechanism in the Cairo and Lipton model is similar to that in Ravenna and Walsh. The Black worker facing discrimination must have higher productivity to be hired and/or retained than the white worker who does not face discrimination. Model-based measures of discrimination decline under the shortfalls rule, but they also become more volatile. Black workers experience a larger fall in average unemployment rates, but white workers experience slightly larger increases in average wages and consumption. As a result, a consumption based welfare measure shows white households benefit more than Black households from a switch to a shortfalls rule, though the gains are small.

A third paper that focuses on inclusive expansions is a heterogeneous agent NK (HANK) model due to [Alves and Violante \(2025\)](#). Heterogeneous agent new Keynesian models can study distributional effects, but their focus has primarily been on asset holding and consumption decisions rather than on distortions arising in the labor market. The Alves and Violante paper is an exception. In their model, running a hot economy improves outcomes for low-wage workers. These benefits are long lasting, increasing labor force participation, earnings and upward mobility. As they point out, a recession prolonged by the ELB “creates a vicious cycle of prolonged unemployment, diminished labor force attachment, and skill erosion, leaving low-skilled workers with lasting scars”. The gains from running a hot economy come at the cost of higher inflation,

Alves and Violante highlight that AIT and shortfall policies both improve outcomes for low-skilled workers, but they do so in different ways. The frequency and duration of ELB episodes are reduced under AIT. This lowers the negative, long-lasting effects of recessions on low-skill workers. Shortfall policies lead to longer and stronger economic expansions as the economy runs hot. Low-skill workers are able to make up for recession-induced losses, but this also means higher cyclical volatility for low-skilled workers. AIT and Shortfall policies both create higher average inflation, so policymakers face a trade-off between inclusion and inflation.

In their model, however, it is not clear whether the market equilibrium is efficient or not. Is there a distortion that can be addressed by moving to a higher inflation more inclusive point on the trade-off frontier?

Good policy design begins with an understanding of the issue that needs addressing. Individuals experience very different labor market experiences. Which of these differences are a sign the labor market is functioning efficiently? Which are signs of distortions and inefficiencies? Is monetary policy a good tool for dealing with the later? The best strategy might be for the FOMC to ensure its employment objective is consistent with its inflation objective and then decide whether responding to deviations symmetrically or asymmetrically is the best way to support strong economy growth and employment.

7 Dealing with uncertainty and new challenges

The pre-pandemic year of 2019 during which the 2020 PF was developed seems a world away from the economic disruptions seen since and from the level of uncertainty that must be embedded into any forecast of the future is much greater. Toward the end of the Great Moderation, there was a debate over whether good monetary policy or good luck was responsible. During the last five years, the question instead is whether it has been bad luck or bad policy. Fundamentally, it has been period of bad luck. Monetary policy played a role in exacerbating the surge in inflation but a recession was avoided. The past six years have witnessed geopolitical, health, trade, military conflict, and political disruptions that have not made life easy for central bankers. Nor is the

forecast for the future one of calm seas and clear sailing.

A trade war is an example of disruption that pushes prices up and activity down. In the face of such disruptions, the FOMC's objectives are not complementary. The FOMC will be forced to make tough choices. And with much of the uncertainty arising from political sources, forecasting will be even more difficult than it usually is. As [Afrouzi, Halac, Rogoff, and Yarad \(2024\)](#) have argued, political pressures on central banks may jeopardize their ability to anchor longer-run inflation expectations.

Inflation dynamics are an important source of uncertainty, one that played a prominent role in 2021 as the Fed and others consistently underestimated the persistence of the inflation surge. [Reis \(2021\)](#) has noted with respect to policy failures in the 1970s, that “.. internal forecasts (by the Fed) that all shocks had temporary effects led to a belief that inflation expectations remained anchored.” In 2021, the Fed seemed on track to repeat this mistake. It consistently underestimated the persistence of the shocks.

The use of scenario modeling can be useful. What happens if shocks turn out to be more persistent than expected? What if they turn out to be less persistent? What if a trade war breaks out with inflation not firmly anchored at 2 percent? Some of the background papers for the 2019 review prepared by the Board staff started with a benchmark recession scenario generated from the FRB/US model. They then replace the policy rule used for the scenario with alternatives such as AIT. Robustness was assessed by altering aspects of the FRB/US model such as the assumptions about expectations. These exercises are certainly useful, but they have their limitations. What if new shocks, not foreseen in the baseline scenario occur? Does the relative performance of alternative policies depend on what other types of shocks arise? Was the possibility that above target inflation would unanchor inflation expectations considered?

In this regard, imagine it is 1976, Inflation has fallen by half from a peak of 11 percent. It looks like the effects of temporary shocks such as the oil embargo are fading. But the battle to control inflation was far from over. The second oil shock was still to come, and five years later inflation was back in double digits. the solid blue line in [Figure 16](#) shows monthly data on inflation beginning in January 1970. The red dashed line shows inflation starting from August 2017. Except for the fact recent inflation starts from a lower level than the 1970s inflation did, the paths look quite similar, at least so far. Will 2025 mark a sustained return to 2 percent inflation, or will the next few years parallel the late 1970s? We might not be out of the inflation woods yet.⁵⁸ Will the Trump tariffs lead to another spike in inflation?

When the FOMC said that it would wait to raise rates “until labor market conditions have reached levels consistent with the Committee’s assessments of maximum employment and inflation has risen to 2 percent and is on track to moderately exceed 2 percent for some time” (Chair Powell, September 16, 2020 press conference), I do not imagine they foresaw inflation nearing 6

⁵⁸The figure is an updated version of one presented by John Cochrane at a Hoover conference last year.

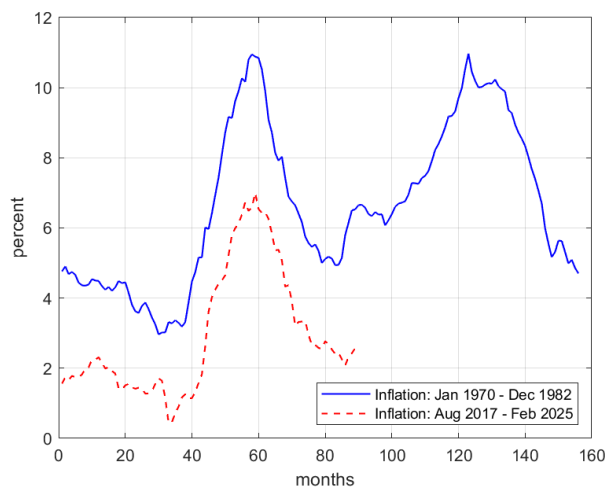


Figure 16: We’ve been here before.

percent before labor market conditions would justify a rate increase. Forward guidance has an important role to play, but “we cannot provide certainty by committing to a particular rate path. Otherwise, forward guidance may constrain policy agility in the face of abrupt changes to the inflation environment.” (Lagarde (2025)).

Do target ranges have a role to play in a more uncertain environment? The use of target ranges have always been part of the policy framework of the parent of inflation targeting, the Reserve Bank of New Zealand. The December 2023 Remit to the RBNZ states the RBNZ should “Achieve and maintain future annual inflation between 1 and 3 percent over the medium term, with a focus on keeping future inflation near the 2 percent mid-point.” Ranges were discussed during the review leading to the 2020 PF but not adopted. Inflation rates of 1.6 and 2.4 percent both round to 2 percent. Is that, as the saying goes, close enough for government work? Probably not for central bank work, but what about 1.75 to 2.25 percent? Entering a world of greater uncertainty, a range might help the FOMC to convey that its control over inflation is not precise; small deviations will occur. This, to me, is primarily an issue of communications, but pretending too much precision can risk damaging credibility.

The 2020 PF was adopted on the cusp of a greatly changed economic environment. In considering revisions to the policy framework, the FOMC will need to recognize that the challenges to be faced over the next few years will be very different from those that motivated the 2020 revisions to the PF. Let me briefly mention some challenges.

Recent work questions the natural rate hypothesis. A convenient rationale for central bank independence is that in the longer run, it is neutral with respect to the real economy. If that is not correct, what is the case for insulating the central bank from more direct political involvement

with monetary policy? Virtually all monetary policy models impose superneutrality, assume other policies eliminate steady-state distortions, or make other assumptions to ensure long-run neutrality holds. Recent work by Nakamura and Steinsson (2010), Bonomo, Carvalho, Garcia, Malta, and Rigato (2023), Cerra, Fatás, and Saxena (2023), ?, Hobijn and Şahin (2021), Aaronson, Daly, Washer, and Wilcox (2019) question this assumption.

Then there are the external, primarily political, factors that may affect monetary policy. A trade war is a classic example of a supply shock that has price level effects. In the short run, the FOMC's two objectives will not be complementary, forcing the FOMC to make difficult trade-off decisions while defending central bank independence.

High quality data is crucial for monitoring the current state of the economy and for forecasting. Historical data is necessary for understanding the past. The availability of huge micro data sets has had a major impact on both microeconomic and macroeconomic research. In March, Commerce Secretary Lutnick proposed removing government from the GDP accounts.⁵⁹ If there is a large scale reduction in the professional staff at the BEA, the BLS, the Census Bureau, and other Federal agencies that collect data, data quality will be threatened.⁶⁰

Will the US face a federal government debt crisis? Discussions of monetary policy strategies presume an environment of active monetary policy and passive fiscal policy. What if fiscal policy is unconcerned with ensuring longer-run budget sustainability? Bianchi and Melosi (2019) show how the economy can be affected by the public's expectations about how a conflict between active monetary policy and active fiscal policy will be resolved.

By taking on a broader employment mandate, the Fed risks becoming drawn into distributional issues for which the rationale for central bank independence is weak. We often use a model consistent loss function and say optimal policy maximizes social welfare. But this is, of course, a fiction. Social welfare depends on much more than inflation and unemployment volatility. Independent central bankers are tasked with providing low and stable inflation. They are best able to help cushion the real economy from shocks in an environment of low and stable inflation. The public may not fully understand inflation or its causes, but they know they do not like it. (Stantcheva (2024), Binetti, Nuzzi, and Stantcheva (2024) and Afrouzi, Halac, Rogoff, and Yarad (2024)). Achieving the dual mandate is hard enough without taking on a broader mission.

8 Lessons and Conclusions

The economic environment has evolved quite differently than had been envisioned when the 2020 PF was adopted. Rather than the continuation of a low inflation environment in which the ELB was a major concern, high inflation became the chief challenge, and many factors were in place

⁵⁹<https://www.reuters.com/world/us/us-commerce-secretary-wants-remove-government-spending-gdp-2025-03-03/>.

⁶⁰<https://www.ft.com/content/57ef7cef-3391-4282-bdb7-a4a0186370cd>

that suggested the US could easily have entered another Great Inflation. That we did not is due, in large part, to the credibility the Fed developed over the thirty years prior to 2020. This credibility helped ensure longer-run inflation expectations remained anchored. The importance of controlling inflation is supported by the survey evidence in [Binetti, Nuzzi, and Stantcheva \(2024\)](#) which finds the public dislikes inflation, viewing it as “an unambiguously negative phenomenon without any potential positive economic correlates.”

The past five years has reinforced the importance of several lessons learned during and after the Great Inflation of the 1970s. The most important lesson is to keep longer-run inflation expectations anchored. Doing so allows policymakers more flexibility to respond to shocks, and limits the damage of possible policy mistakes. The best way to anchor longer-run inflation expectations is with a central bank that has instrument independence and a clear operational objective for inflation.

Keep the policy framework simple. Asymmetric AIT/IT and the shortfalls approach to employment may make sense in standard models, particularly when agents are assumed to have rational expectation. But neither operational objective was clear or transparent. In the case of AIT, this was due to the failure to specify the averaging window.⁶¹ The benchmark of maximum employment was explicitly called unmeasurable. Unmeasurable operational objectives do not help the public understand monetary policy or the FOMC’s strategy. They also do not constrain discretion. An unmeasurable performance measure is not a performance measure at all.

The experiences of the past five years offer several additional lessons.⁶²

Lesson 1: The operational mandate for unemployment must be consistent with the operational objective for price stability, i.e., the inflation target.

The FOMC is right to want longer-run expected inflation equal to its 2 percent target. It should also ensure its operational objective for employment can be met in the longer-run. While meeting the inflation objective is achievable through the actions of the FOMC, achieving its unemployment objectives depends on choosing an objective that is consistent with its inflation objective. If achieving maximum employment is not consistent with the economy’s longer-run equilibrium, the inflation and employment objectives will not be complementary.

Lesson 2: Inflation depends on what monetary doesn’t do, not just on what it does.

Not responding to an inflation surge ensures inflation will rise higher even if the source of the surge are transitory, exogenous shocks. Looking through temporary supply shocks does not mean policy rates should remain constant. “Looking through” is too easily confused with “ignore”. If temporary shocks to inflation do occur, it is important that the FOMC communicate its commitment to return inflation to target even if it decides not to take any immediate action.

⁶¹The survey evidence in [Coibion, Gorodnichenko, Knotek, and Schoenle \(2023\)](#) suggests AIT does not meet the requirements for a clear and transparent objective.

⁶²These lessons are broadly consistent with the suggestions made by [Eggertsson and Kohn \(2023\)](#), [English and Sack \(2024\)](#), and [Romer and Romer \(2024\)](#).

Lesson 3: If policy is behind the curve, the response needs to be more aggressive.

When the FOMC began to lift its policy rate in 2022, it did adopt a more aggressive response, with rate increases that exceeded the normal 25 basis point changes. Optimal policies generally depend on the past, but less inertia is called for if the delay in reacting becomes too long.

Lesson 4: Don't be trapped by one's own forward guidance.

Forward guidance is a contingent promise. Do not let past guidance prevent responding to new events; optimal commitment policies adjust to new developments. In 2021, controlling inflation was held hostage by the need to eliminate shortfalls of employment. Yet ensuring low inflation is what aids monetary policy in promoting full employment.

Lesson 5: The policy framework should be robust, not tailored to a particular economic environment.

Shocks can be inflationary or deflationary, expansionary or contractionary. A policy framework must be robust and flexible enough to provide guidance for all combinations. Stress test proposed operational objectives. In general, designing policies as if shocks will be persistent yields better outcomes than assuming shocks are transitory. Responding to deviations is easy to explain; asymmetric operational objectives not so much. This does not mean the strength of the response should be the same regardless of the sign of the deviation. If the risks of 1 percent inflation are greater than the risks of 3 percent inflation, the FOMC can explain why this is so in justifying asymmetric responses.

Lesson 6: Objectives are often not complementary, and making trade-offs is tough, but avoid lexicographic preferences and mission creep.

Promoting broad-based and inclusive economic growth is a worthy goal, but expanding the mandate requires an understanding of what inefficiencies or distortions are hindering social welfare and an assessment of whether monetary policy is an effective tool for addressing them. Prioritizing other objectives over the inflation objective is problematic, especially if the objective is not measurable. Responding more strongly to increases in unemployment than decreases can be appropriate, but the rationale needs to be clearly explained, just as the rationale for an asymmetric response to inflation deviations needs to be.

The 2020 *Statement on Longer-Run Goals and Monetary Policy Strategy* opens with the following paragraph: "The Federal Open Market Committee (FOMC) is firmly committed to fulfilling its statutory mandate from the Congress of promoting maximum employment, stable prices, and moderate long-term interest rates. The Committee seeks to explain its monetary policy decisions to the public as clearly as possible. Such clarity facilitates well-informed decision making by households and businesses, reduces economic and financial uncertainty, increases the effectiveness of monetary policy, and enhances transparency and accountability, which are essential in a democratic society."

In failing to specify the window for determining average inflation and stating that maximum employment cannot be measured, the 2020 PF failed to explain the FOMC's operational objectives clearly. AIT "works" by affecting expectations, but this requires that knowledge of the averaging window be provided. The *Statement on Longer-Run Goals and Monetary Policy Strategy* may not be the appropriate place to provide it, but the FOMC's assessment of where average inflation is could be part of every post-meeting press release. Unobservables are important for monetary policy. For example, r^* . If shortfalls from maximum employment are to play a crucial role, the FOMC should work to develop definitions of, and measures of longer-run maximum employment. The range of longer-run unemployment projections from the SEP could be a starting point.

The unique responsibility of the central bank is to control inflation. The next *Statement on Longer-Run Goals and Monetary Policy Strategy* should return to the pre-2020 practice of discussing the operational objective for inflation first, before turning to the employment objective.

The 2012 *Statement on Longer-Run Goals and Monetary Policy Strategy* was an important step forward for the Federal Reserve. It laid out a clear goal for inflation and articulated what monetary could control in the longer run and what it could not. It provided a framework for communicating FOMC policy actions. The 2020 revisions were more ambitious. The changes represented an attempt to enlist private sector expectations to serve as automatic stabilizers, and it established an employment mandate that was not clearly consistent in the longer-run with the inflation target. Whether these changes could lead to improved macroeconomic outcomes was never tested as the world for which they were design quickly disappeared.

The problems the 2020 revisions were designed to address, the ELB constraint and labor market distortions, are real. Disturbances that mean the elements of the dual mandate are not complementary pose challenges even when away from the ELB. It is important for the public and Congress to recognize the FOMC will need to make tough choices but also to understand how the Committee approaches the task of balancing its objectives.

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9 Appendix

9.1 Policy rules in the FRB's Monetary Policy Report

Table A. Monetary policy rules	
Taylor (1993) rule	$R_t^{T93} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + (u_t^{LR} - u_t)$
Balanced-approach rule	$R_t^{BA} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 2(u_t^{LR} - u_t)$
Balanced-approach (shortfalls) rule	$R_t^{BAS} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 2\min\{u_t^{LR} - u_t, 0\}$
Adjusted Taylor (1993) rule	$R_t^{T93adj} = \max\{R_t^{T93} - Z_t, \text{ELB}\}$
First-difference rule	$R_t^{FD} = R_{t-1} + 0.5(\pi_t - \pi^{LR}) + (u_t^{LR} - u_t) - (u_{t-4}^{LR} - u_{t-4})$
Note: R_t^{T93}, R_t^{BA}, R_t^{BAS}, R_t^{T93adj}, and R_t^{FD} represent the values of the nominal federal funds rate prescribed by the Taylor (1993), balanced-approach, balanced-approach (shortfalls), adjusted Taylor (1993), and first-difference rules, respectively. R_{t-1} denotes the average midpoint of the target range for the federal funds rate in quarter $t-1$, u_t is the average unemployment rate in quarter t, and π_t denotes the 4-quarter core personal consumption expenditures price inflation for quarter t. In addition, u_t^{LR} is the rate of unemployment expected in the longer run, and r_t^{LR} is the level of the neutral real federal funds rate in the longer run that is expected to be consistent with sustaining maximum employment and keeping inflation at the Federal Open Market Committee's 2 percent longer-run objective, represented by π^{LR}. Z_t is the cumulative sum of past deviations of the federal funds rate from the prescriptions of the Taylor (1993) rule when that rule prescribes setting the federal funds rate below an effective lower bound (ELB) of 12.5 basis points. Box note 1 provides references for the policy rules.	

Figure 17: From the FRB Monetary Policy Report, February 2025

Figure 17 from the Federal Reserve's Monetary Policy Report provides details on the alternative policies rules shown in Figure 8.

9.2 Model of delay

The model used in section 4.2 to analyze policy delay consists of an aggregate demand equation and a Phillips curve, both expressed in terms of unemployment and inflation:

$$(1 + h)u_t = E_t u_{t+1} + h u_{t-1} + \frac{1 - h}{\sigma} (i_t - E_t \pi_{t+1}), \quad (14)$$

$$(1 + \beta\mu)\pi_t = \beta\pi_{t+1} + \mu\pi_{t-1} - \kappa_1 u_t + \kappa_0 u_{t-1} + v_t, \quad (15)$$

where u_t is the unemployment rate, π_t is the inflation rate, i_t is the nominal policy interest rate, and v_t is an exogenous stochastic shock to inflation. Parameter values are $\beta = 0.995$, $\sigma = 1$, while $\kappa_0 = 0.01$ and $\kappa_1 = 0.05$ are model consistent functions of underlying parameters. See [Hakamada and Walsh \(2024\)](#) for details.⁶³ Habits are external with $h = 0.76$ and the indexation parameter μ is set to 1.

For $t > k$, these two equations are solved together with a policy rule:

$$i_t = \rho_i i_{t-1} + (1 - \rho_i) [\phi_\pi \pi - \phi_u u_t]. \quad (16)$$

⁶³ κ is a function of underlying structural parameters from a Calvo model of price adjustment. The Calvo parameter is set to 0.75, the inverse labor supply elasticity is 1, and the degree of decreasing returns is 0.25.

The standard rational expectations solution yields $u_t = H_{uu}u_{t-1} + H_{u\pi}\pi_{t-1} + H_v v_t$ and $\pi_t = Q_{\pi u}u_{t-1} + Q_{\pi\pi}\pi_{t-1} + Q_v v_t$. For $t = k + 1$, these solutions imply

$$u_{k+1} = H_{uu}u_k + H_{u\pi}\pi_k + H_v v_{k+1} \quad (17)$$

and

$$\pi_{k+1} = Q_{\pi u}u_k + Q_{\pi\pi}\pi_k + Q_v v_{k+1} \quad (18)$$

. For $0 \leq t \leq k$, $i_t = 0$. Inflation and unemployment must satisfy 14 and 15

$$(1 + h)u_t = E_t u_{t+1} + h u_{t-1} - \left(\frac{1 - h}{\gamma \sigma} \right) E_t \pi_{t+1}, \quad (19)$$

$$(1 + \beta\mu)\pi_t = \beta\pi_{t+1} + \mu\pi_{t-1} - \kappa_1 u_t + \kappa_0 u_{t-1} + v_t, \quad (20)$$

with terminal conditions u_{k+1} and π_{k+1} given by (17) and (18). This yields $k + 1$ equations for periods $t = 0$ to $t = k$.