

## 19-16 Average Inflation Targeting Would Be a Weak Tool for the Fed to Deal with Recession and Chronic Low Inflation

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The Federal Reserve faces two important monetary policy challenges: First, since the Great Recession it has struggled to move inflation convincingly up to the 2 percent target level. Second, during the next recession it will struggle to deliver enough support to the economy unless the recession is unusually mild. As a result, the search is on for alternative policy frameworks that might allow the Fed to achieve its monetary policy objectives more effectively.

Among the alternatives that have been mentioned is average inflation targeting (AIT). The basic idea of AIT is simple: Instead of aiming to return inflation over the medium term to the target rate of 2 percent, the Fed would

aim to return the average of inflation over some period to the target rate. The crucial innovation of AIT is that when inflation has been running below the target rate, it would have the Fed aim for above-target inflation in the future, in order to bring average inflation up toward the target.

Simulations of the Fed's workhorse econometric model of the US economy (the FRB/US model) suggest that AIT would be a weak addition to the Fed's policy toolkit for dealing with recessions and persistently low inflation. In addition, simple versions of AIT would sometimes compel the Fed to run an undesirably restrictive monetary policy. AIT is thus not a very appealing alternative to the current framework. In a forthcoming Policy Brief we highlight other policy frameworks that would better position the Fed to deal with its current policy challenges.

### CHALLENGES TO MONETARY POLICYMAKING

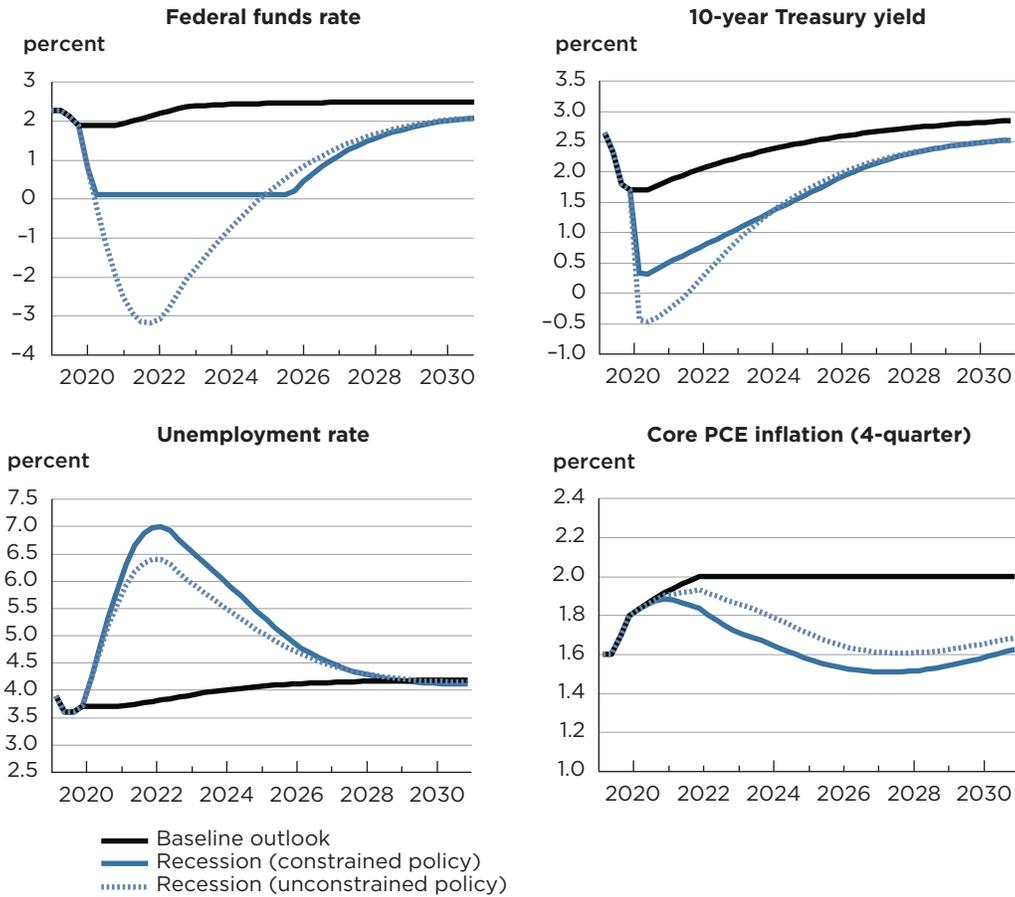
The Fed's traditional interest rate tool is no longer adequate to deal with an average recession, let alone a severe one. In each of the past three recessions, the Fed reduced the federal funds rate by 5 to 5½ percentage points. In the Great Recession it would have cut rates by much more if additional room had been available.<sup>1</sup> Today less than 2 percentage points of cutting room is available to the Fed before it will run up against the effective lower bound (ELB) on nominal interest rates. Other tools, such as large-scale asset purchases, are also available. The Fed will probably have to use them vigorously in the next recession, despite concerns about their efficacy and collateral costs. However, these tools operate by pushing down longer-term interest rates. It is thus concerning that the nominal interest rate on 10-year Treasury securities is currently around 1¾ percent while in each of the past three recessions the 10-year rate declined by 2½ percentage points or more. This combination of facts strongly suggests that the Fed is at serious risk of being constrained in fighting the next recession, no matter how vigorously it uses all the tools available to it.<sup>2</sup>

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1. These changes in the federal funds rate during recession windows are calculated as the maximum change during the period beginning six months before the start of the recession and ending two years after the end of the recession.

2. The Fed might also be able to provide more conventional accommodation if it were willing to push the federal funds

Figure 1  
**The Federal Reserve’s ability to fight a recession through conventional policy is limited**



PCE = personal consumption expenditure

Note: Results are based on simulations of the FRB/US model. The baseline outlook is designed to be consistent with the medians of the Federal Open Market Committee (FOMC) participants’ forecasts prepared for the September 2019 meeting. Expectations in financial markets are model-consistent but elsewhere are based on the predictions of a vector autoregression (VAR) model. Monetary policy responds to changes in economic conditions from baseline as prescribed by the balanced-approach rule.

Figure 1 uses two scenarios of the FRB/US model of the US economy to illustrate the adverse implications these constraints have for the depth and persistence of future recessions.<sup>3</sup> The baseline outlook, shown by the black lines, broadly matches the median outlook of Federal Open Market Committee (FOMC) participants, as reported in September 2019. The alternative scenarios hypothesize that the economy will be hit with adverse shocks starting in 2020 that will be sufficient to generate a recession roughly comparable in depth and persistence to the moderate recessions that began

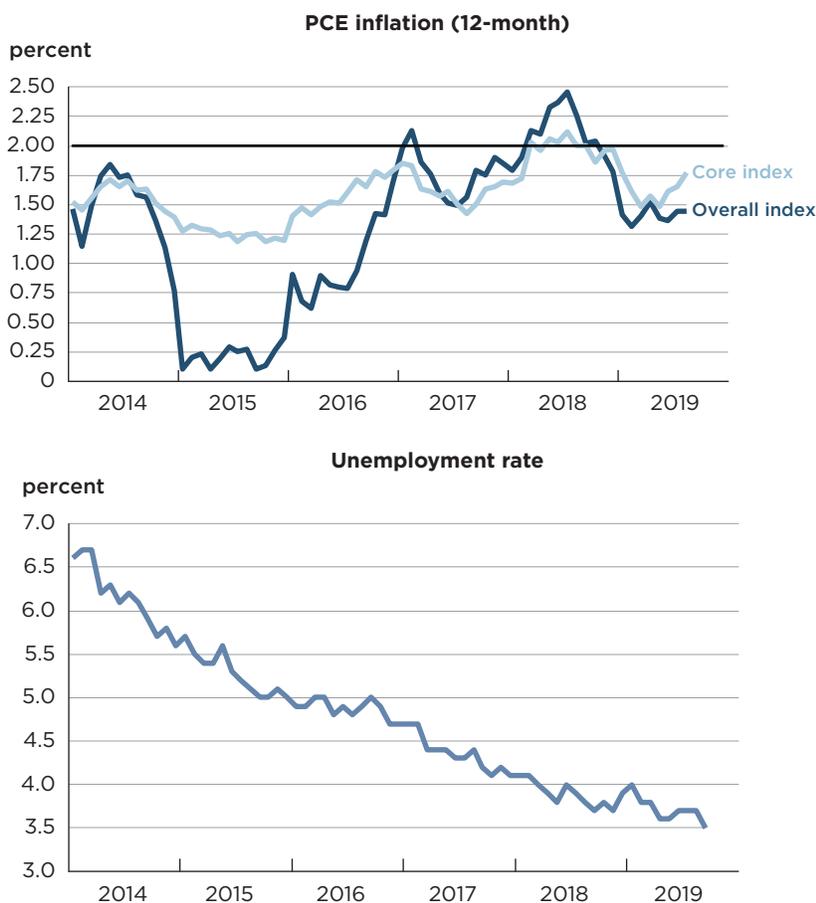
in 1990 and 2001. The dashed blue lines show the outcomes that could be achieved if the Fed were not constrained by the ELB; the solid blue lines show outcomes when interest rates cannot be pushed below zero. In both cases the federal funds rate responds to movements in real activity and inflation as prescribed by the “balanced-approach rule,” a simple rule for setting the funds rate that approximates reasonably well how the FOMC responded to changing economic circumstances during the decades leading up to the financial crisis. In the case of the solid blue lines, the prescription of the rule is overridden if it calls for a negative funds rate, and the rate instead is set at the ELB.

When the constraint on how low the funds rate can go is not imposed, the Fed responds to the recession by cutting the funds rate about 5 percentage points in the simulation, much as it did in the past three recessions. The unemployment rate

rate into negative territory, as some other central banks have done.

3. For additional information on the FRB/US model and the methodology used to generate the scenarios and the other simulations reported in this Policy Brief, see appendix A.

Figure 2  
**Inflation has tended to run below 2 percent despite a return to strong labor market conditions**



PCE = personal consumption expenditure

Sources: Bureau of Economic Analysis for inflation; Bureau of Labor Statistics for the unemployment rate.

rises to 6.4 percent, 2.6 percentage points above baseline, and core personal consumption expenditure (PCE) inflation bottoms out at 1.6 percent somewhat later. However, when the federal funds rate is prevented from falling below zero, the unemployment rate peaks at a little over 7 percent, and households endure an additional 2½-percentage-point years of unemployment from 2020 to 2025 relative to what would occur under unconstrained policy. By comparison, the inflation cost of the ELB is minor—a reflection of how flat the Phillips curve has become in recent years.<sup>4</sup>

4. The simulations in figure 1 understate the ELB costs if the FOMC would prefer to respond more aggressively than called for by the balanced-approach rule. Such would be the case if policymakers wished to pursue an “optimal” strategy that set interest rates to minimize expected deviations of inflation from 2 percent and the unemployment rate from its sustainable long-run level. In the absence of the ELB constraint, by late 2021 such a strategy would cut the federal funds rate by 9 percentage points in the recession scenario,

Another important challenge confronting monetary policymakers currently is that inflation has generally undershot the Fed’s 2 percent objective in recent years. The shortfall is illustrated in the top panel of figure 2, which shows 12-month percent changes in the overall PCE price index (the dark blue line) and the index that excludes food and energy prices—the so-called core index (the light blue line). This shortfall occurred despite the decline in the unemployment rate to a level noticeably below FOMC participants’ current estimates of the rate that could be sustained in the long run (bottom panel).

followed by a gradual removal of accommodation over the next five years. With the ELB imposed, such deep cuts would not be possible. Constrained optimal policy would instead call for keeping the federal funds rate near zero for nine years—a much less effective response that would result in 7-percentage-point years of additional cumulative unemployment from 2020 to 2025 relative to unconstrained optimal policy.

By historical standards, inflation has been very well-behaved during the past 20 years or so. However, the persistent failure of PCE inflation to meet the FOMC's 2 percent inflation target heightens the risk that inflation expectations may slip over time. Given the proximity of the ELB, even a small slippage of inflation expectations would be problematic, because it would imply a commensurate reduction in the policy space available to the Fed.

### CURRENT POLICY FRAMEWORK

The two challenges—insufficient traditional weaponry to fight the next recession and the persistent undershoot of inflation relative to the 2 percent target—have arisen under a policy framework that was many years in the developing. Although some aspects of it can trace their roots back to at least the late 1990s, the framework did not take its current form until January 2012. At that time, the FOMC announced that it would aim to fulfill the instructions given to it by Congress (often referred to as “the dual mandate”) by seeking “to mitigate deviations of inflation from its longer-run goal [of 2 percent] and deviations of employment from the Committee’s assessments of its maximum level.”<sup>5</sup> The FOMC also stated that it would take a “balanced approach” in pursuing its employment and inflation objectives and that in situations in which the two objectives might temporarily conflict, it would not elevate bringing inflation back to 2 percent over returning labor utilization to normal or vice versa. Importantly, if inflation persistently runs below (above) 2 percent, the current strategy does not call for running inflation above (below) target for a time to compensate. Instead, the FOMC is content to let bygones be bygones and simply bring inflation back to 2 percent.

5. The FOMC does not provide an explicit quantitative definition of maximum employment, because it changes over time and can be estimated only imprecisely. That said, loosely speaking the FOMC can be thought of as aiming to bring the unemployment rate over time to a level consistent with inflation stabilizing at 2 percent in the long run. Although the current unemployment rate is modestly below FOMC participants’ point estimates of its longer-run sustainable level (known as  $U^*$ ), the FOMC currently does not appear to be actively trying to close the gap. As Chair Jerome Powell noted in a speech in 2018, because inflation now appears to be much less sensitive to labor utilization than in the past and  $U^*$  is highly uncertain and could easily be appreciably lower than estimated, the risk seems low that significant inflationary pressures could emerge any time soon in response to labor market overheating (see [www.federalreserve.gov/newsevents/speech/powell20180824a.htm](http://www.federalreserve.gov/newsevents/speech/powell20180824a.htm)).

### POSSIBLE ALTERNATIVE TO THE CURRENT POLICY FRAMEWORK: AVERAGE INFLATION TARGETING

The current operating framework is one approach to fulfilling the Congressional mandate to the Fed to promote maximum employment and stable prices. Other approaches are also possible. Indeed, motivated by the two challenges, the Fed is in the midst of an extensive review and assessment of whether the current framework is the best available.<sup>6</sup>

One possible alternative to the current framework that has received considerable interest of late from FOMC participants is AIT.<sup>7</sup> Instead of aiming to return inflation to the longer-run goal level, as under the current framework, an AIT policy framework would have the Fed strive to keep the average rate of inflation over some specified period close to the target rate. If (as in the current circumstance) inflation has been running persistently below 2 percent, an AIT framework can be interpreted as having the FOMC aim for inflation above 2 percent for a time in order to drive the average back to the target. In other words, bygones would no longer be bygones with respect to inflation misses. Under an AIT strategy, the FOMC would presumably continue to promote maximum employment to ensure compliance with the dual mandate.

Before the Fed could adopt an AIT strategy, the FOMC would have to settle several implementation details that could have important implications for the practical effect of the new framework. Most fundamentally, the FOMC would need to set the length of the inflation averaging period, including whether it is fixed (such as the most recent five

6. See [www.federalreserve.gov/monetarypolicy/review-of-monetary-policy-strategy-tools-and-communications.htm](http://www.federalreserve.gov/monetarypolicy/review-of-monetary-policy-strategy-tools-and-communications.htm).

7. For example, the minutes of the FOMC’s September 2019 meeting include the following observation: “Because of the downside risk to inflation and employment associated with the ELB, most participants were open to the possibility that the dual-mandate objectives of maximum employment and stable prices could be best served by strategies that deliver inflation rates that over time are, on average, equal to the Committee’s longer-run objective of 2 percent.” This sentence could be consistent with the AIT approach analyzed in this Policy Brief; it could also be consistent with closely related approaches, such as one that would have the Committee adopt a “virtual” inflation objective that is higher than the official objective, to compensate for the tendency of actual inflation to undershoot the objective when the ELB is binding much of the time. See also the summary of the FOMC’s discussion of alternative frameworks in the minutes from the July 2019 meeting ([www.federalreserve.gov/monetarypolicy/fomcminutes20190731.htm](http://www.federalreserve.gov/monetarypolicy/fomcminutes20190731.htm)), Chair Powell’s remarks earlier in the year on the possibility ([www.federalreserve.gov/newsevents/speech/powell20190308a.htm](http://www.federalreserve.gov/newsevents/speech/powell20190308a.htm)), and Lars Svensson’s presentation at a June 2019 conference devoted to rethinking the Fed’s policy framework ([www.chicagofed.org/-/media/others/events/2019/monetary-policy-conference/1-svensson-strategies-pdf.pdf](http://www.chicagofed.org/-/media/others/events/2019/monetary-policy-conference/1-svensson-strategies-pdf.pdf)).

years) or varies over time (such as starting the averaging window at the last business cycle peak and continuing it through the present). In addition, the FOMC would need to determine how aggressively it would aim to move average inflation back to target. Would the adoption of inflation targeting be a commitment to try to return average inflation to 2 percent within a few years (quite ambitious, given how flat the Phillips curve is) or something less aggressive?

### USING SIMPLE POLICY RULES TO EVALUATE THE IMPLICATIONS OF AVERAGE INFLATION TARGETING

Operationally, how might an AIT strategy differ from the Fed's current policy approach? One way to shed light on this question is to compare the behavior of various simple rules for setting the federal funds rate.<sup>8</sup> To this end, consider the balanced-approach rule, a simple policy rule that has featured prominently in Fed documents and speeches in recent years.<sup>9</sup> This rule, whose prescriptions track the historical actions of the FOMC reasonably well in the years before the financial crisis and the extended ELB episode that followed, takes the form:

$$I_t = R^* + \pi_{c,t} + 0.5[\pi_{c,t} - 2] - 2.0[U_t - U^*] \quad (1)$$

where  $I_t$  is the nominal federal funds rate,  $R^*$  is the neutral real federal funds rate,  $\pi_{c,t}$  is the four-quarter percentage change in the core PCE price index,  $U_t$  is the unemployment rate, and  $U^*$  is the natural rate of unemployment consistent with stable inflation in the longer run. (The difference between  $U$  and  $U^*$  multiplied by the coefficient in Okun's Law [-2] is a simple proxy for the output gap, defined as the percentage difference between real GDP and potential output.) According to this rule, policymakers should cut the

8. Obviously, the Fed does not base its actions and guidance on the prescriptions of any mechanical rule or rules; FOMC decision making is a complicated judgmental process that involves monitoring a wide range of economic and financial indicators, reviewing forecasts and other policy analyses derived from various models, and weighing a variety of risks and uncertainties. But as the Federal Reserve Board notes on its website, because Taylor-type and other simple policy rules embody the key principles of good monetary policy and condition on quantitative factors that influence FOMC decisions, their policy prescriptions are useful benchmarks for judging how to adjust the federal funds rate in response to changing economic conditions (see [www.federalreserve.gov/monetarypolicy/principles-for-the-conduct-of-monetary-policy.htm](http://www.federalreserve.gov/monetarypolicy/principles-for-the-conduct-of-monetary-policy.htm) and [www.federalreserve.gov/monetary-policy/policy-rules-and-how-policymakers-use-them.htm](http://www.federalreserve.gov/monetary-policy/policy-rules-and-how-policymakers-use-them.htm)).

9. This rule was first proposed by John Taylor (1999). It was given its current name by then Vice Chair Janet Yellen in 2012 (see <https://www.federalreserve.gov/newsevents/speech/yellen20120606a.htm>).

federal funds rate 2 percentage points for every 1 percentage point increase in the unemployment rate and 1½ percentage points for every percentage point decline in core inflation. Although responding to core rather than headline PCE inflation would appear to conflict with the FOMC's formal definition of its price objective, basing the balanced-approach rule's prescriptions on core inflation has the advantage of causing the rule to look through the effects of movements in food and energy prices, which have little predictive value for headline inflation.

One simple way to capture the basic idea of AIT is to add a term to the balanced-approach rule that calls for the Fed to run a looser policy whenever the average pace of inflation over some previous period has fallen short of the 2 percent objective. Equation 2 shows one possible way to formulate such a modification, with average headline PCE inflation based on the previous  $NN$  quarters,  $\pi_{h,t}^{NN}$ :

$$I_t = R^* + \pi_{c,t} + 0.5[\pi_{c,t} - 2] - 2.0[U_t - U^*] + \alpha[\pi_{h,t}^{NN} - 2] \quad (2)$$

A key parameter in equation 2 is  $NN$ , the length of the averaging period. At one extreme, if the FOMC were to set  $NN$  equal to 4, AIT would simplify to the FOMC's current let-by-gones-be-by-gones strategy as approximated by the balanced-approach rule, except to the extent that a positive value for  $\alpha$  would increase the overall responsiveness of monetary policy to movements in inflation (by raising it from 1.5 to  $1.5 + \alpha$ ). At the other extreme, if the FOMC were instead to choose a very long averaging window—say, over the past decade or longer—AIT would operate more like price-level targeting, in which past inflation deviations from the target rate are never forgotten. Intermediate choices for  $NN$  would place AIT on a spectrum between the current approach and price-level targeting in terms of the speed with which past inflation misses would drop off the policy radar.

An equivalent way to think about AIT is to hypothesize that the Fed would raise its near-term inflation target any time inflation over the previous  $NN$  quarters had fallen short of the long-run 2 percent goal and vice versa. Equation 3 takes this approach:

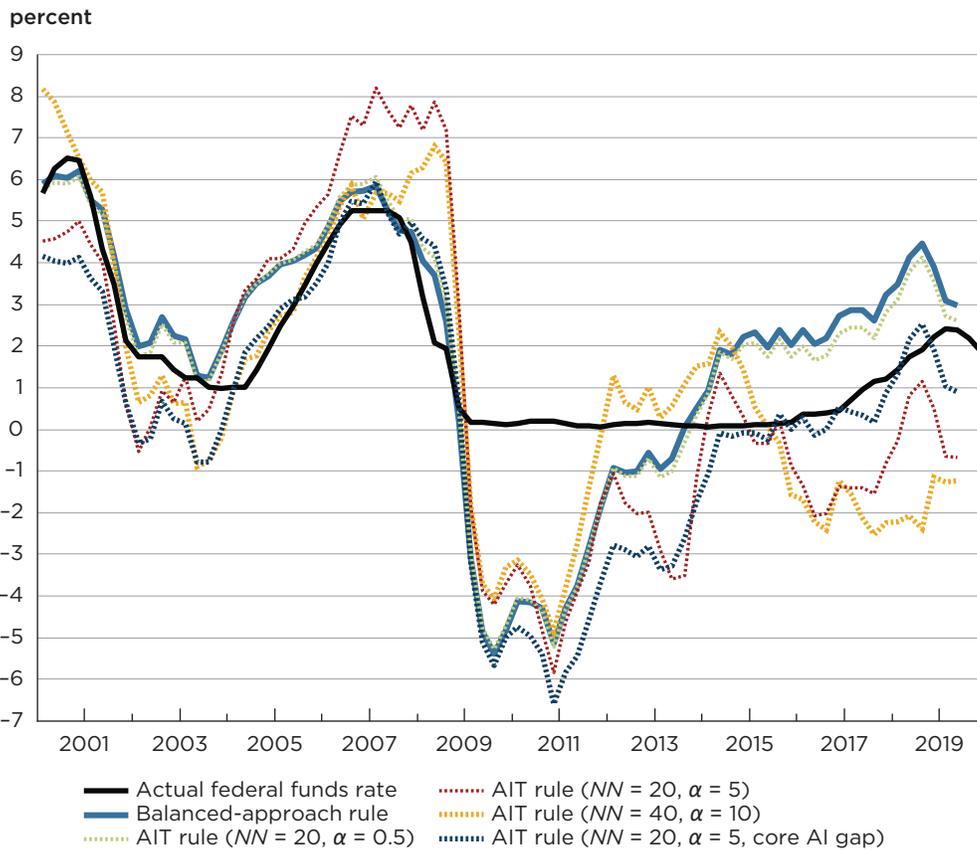
$$I_t = R^* + \pi_{c,t} + 0.5[\pi_{c,t} - \pi_t^{**}] - 2.0[U_t - U^*], \quad (3)$$

where  $\pi_t^{**} = 2 - \beta[\pi_{h,t}^{NN} - 2]$

A few algebraic manipulations show that, with the correct parameterization, equation 3 generates the same policy prescriptions as equation 2. The two specifications are thus equivalent.

Targeting the price level or nominal GDP is sometimes proposed as a substitute for the policy framework now in place at the Fed and many other central banks. Although policymakers have so far displayed little interest in these

Figure 3  
**Some AIT rules would have called for a quite different federal funds rate in recent years**



AIT = average inflation targeting

Note: Rule prescriptions are computed using revised historical data for inflation and the unemployment rate as currently published but contemporaneous estimates of  $R^*$  and  $U^*$ . From 2012 to the present, the latter equal the medians of the Federal Open Market Committee (FOMC) participants' longer-run projections of the real federal funds rate and the unemployment rate reported quarterly in the *Summary of Economic Projections*. Before 2012, the  $R^*$  and  $U^*$  estimates are based on the long-run forecasts reported in the March and October releases of *Blue Chip Economic Indicators*.

alternative frameworks, with suitable parameterization, AIT rules of the sort shown above would have similar policy implications. Specifically, if the averaging period were quite long (say, the previous 10 years) and policymakers responded aggressively to deviations of average inflation to 2 percent (by, say, setting  $\alpha = NN/4$ ), targeting average inflation should be almost the same as targeting the price level.<sup>10</sup> Under these assumptions, our AIT rule would be almost equivalent to what is conventionally referred to as flexible price-level targeting. Moreover, because the AIT rule also calls for adjusting the federal funds rate one for one with

movements in the real output gap, as proxied by  $-2(U - U^*)$ , it would be similar in many respects to targeting the level of nominal GDP, except that it would adjust the target for estimated changes in  $U^*$ .

**POLICY IMPLICATIONS OF AVERAGE INFLATION TARGETING, 2000-19**

To get a sense of what AIT might have implied for the conduct of monetary policy in the recent past, figure 3 compares federal funds rate prescriptions from the balanced-approach rule from 2000 to the present (the solid blue line) with prescriptions from four different specifications of equation 2, with no lower bound imposed on the prescriptions, in order to illustrate the extent to which conventional policy would have been constrained during this period under the different rules. In all cases, the prescriptions reported in this figure are computed statically using the actual evolution of

10. To see this, consider the average inflation gap term in equation 2,  $\alpha[\pi_t^{NN} - 2]$ . If  $\alpha = NN/4$ , this gap can be rewritten as  $100 \ln(P_t/P_t^*)$ , where  $P_t$  is the current price level and  $P_t^*$  is a target price trend that hops off from the actual price level  $NN$  quarters earlier and thereafter increases at an annual rate of 2 percent.

inflation and unemployment over this period—that is, they do not allow the alternative settings of the federal funds rate to influence the historical paths of inflation or unemployment. In addition, the values of  $R^*$  and  $U^*$  used to calculate the rules' prescriptions at each point in time equal the values estimated by FOMC participants or other forecasters at that time, making the counterfactual historical prescriptions more comparable to the actual setting of federal funds rate chosen by policymakers (the black line).

The first version of an AIT rule, shown by the dashed light green line, defines the additional gap term using the average deviation of headline PCE inflation from 2 percent over the previous 20 quarters with  $\alpha$  set at 0.5—the same weight applied to the current inflation gap. The second AIT rule (the dashed red line) is the same, except that  $\alpha$  is set equal to 5—more in line with the inflation responsiveness embedded in a price level–targeting rule. The third AIT rule, denoted by the dashed yellow line, moves farther in the direction of price-level targeting by setting  $N$  equal to 40 quarters and raising  $\alpha$  to 10. The last AIT rule (the dashed blue line) defines the average inflation gap in terms of core PCE (rather than headline) inflation over the past 20 quarters (with  $\alpha = 5$ ). The use of core inflation makes the prescriptions of this rule less variable but also less closely tied to the price index that the FOMC has chosen as the centerpiece for how it will measure inflation performance.

One lesson of this figure is that following an AIT strategy would not have mattered much in recent years if policymakers had not been prepared to respond much more aggressively to deviations of inflation from target than appears to have been the case historically. This point is demonstrated by the near identity of prescriptions from the balanced-approach rule and the AIT rule that sets  $\alpha$  equal to 0.5. The reason for this similarity is easy to see: Inflation has run about half a percentage point below target on average over the past decade, which under this nonaggressive version of the unconstrained AIT rule would have reduced the prescribed level of the federal funds rate by only 25 basis points on average (holding real activity and inflation constant)—not enough to have markedly altered economic conditions. If policymakers were instead willing to respond aggressively to persistent deviations of headline inflation from target, as occurs under the second and third versions of the AIT rule, then an unconstrained AIT strategy under static assumptions would have called for keeping the federal funds rate below zero on average since late 2013, a materially easier monetary policy than the one the FOMC actually ran. The aggressive AIT rule defined in terms of core PCE inflation would have tracked the actual path of the federal funds rate in recent years reasonably well, reflecting the fact that it would not have called for policy to respond

to the headline inflation consequences of the sizable declines in relative food and energy prices that have occurred since late 2013.<sup>11</sup>

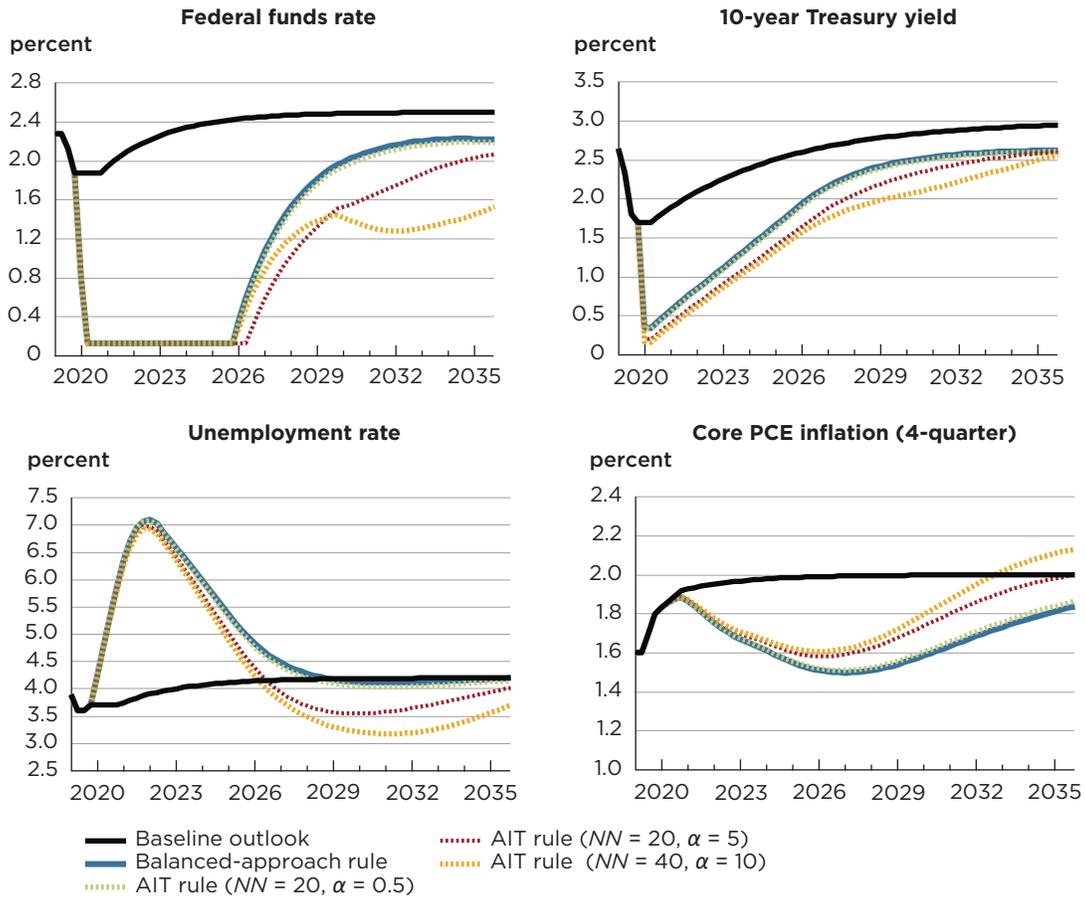
A second lesson of figure 3 is that AIT has the potential to produce highly undesirable policy responses at times. This problem is impressively illustrated by the 2006–08 prescriptions of the aggressive 20-quarter AIT rule based on headline inflation (the dashed red line). Because oil prices rose markedly in the years preceding the Great Recession, overall five-year inflation averaged well above 2 percent during this period. As a result, this rule would have prescribed holding the federal funds rate near 8 percent even as the housing market collapsed, financial stress intensified, and the economy slipped into recession. Only at the very end of 2008, with the financial crisis peaking and the economy in free fall, would it finally have called for policy to ease.

As indicated by the dashed blue line, an aggressive AIT strategy that was tied to core inflation would have yielded less problematic policy advice on the eve of the Great Recession. But one should be wary of concluding that a symmetric AIT strategy that focuses on core rather than headline inflation would yield desirable policy responses in all circumstances. According to the FRB/US model's accounting, almost all the variation in core inflation from year to year since the mid-1990s reflects idiosyncratic shocks that were unrelated to movements in resource utilization, exchange rates, shifts in long-run inflation expectations, or other fundamental factors. Calculations based on stochastic simulations of the model suggest that such shocks generate substantial volatility even in average five-year core inflation, implying that average inflation could very plausibly move noticeably above 2 percent from time to time even though the unemployment rate was at or above its sustainable long-run level.<sup>12</sup> Under

11. Figure 3 also shows that actual policy over the past few years has been persistently easier than prescribed by the balanced-approach rule. Based on comments by Fed Chairs Yellen and Powell as well as other FOMC participants, this discrepancy seems to have largely reflected risk-management concerns not accounted for by the balanced-approach rule, such as those related to asymmetric ELB risks and uncertainty about the true values of  $R^*$  and  $U^*$ . Discomfort with persistent inflation undershooting may have been a factor as well, both on its own account and because it may have exacerbated concerns that inflation expectations could be slipping, thereby intensifying the asymmetric risks and costs of the ELB.

12. The standard deviation of the 60-month moving average of core PCE inflation since the mid-1990s is about 0.4 percentage point. Stochastic simulations of the FRB/US model in which the model is repeatedly subjected to wage-price shocks of the sort experienced from 1995 to 2018 with real activity held fixed at its baseline values suggest that idiosyncratic shocks accounted for essentially all of the observed variability in average five-year PCE inflation. Based on our experience with a wide range of inflation forecasting

Figure 4  
**Average inflation targeting might be somewhat helpful in a recession**



AIT = average inflation targeting; PCE = personal consumption expenditure

Note: Results are based on simulations of the FRB/US model. The baseline outlook is designed to be consistent with the medians of the Federal Open Market Committee (FOMC) participants' forecasts prepared for the September 2019 meeting. Expectations in financial markets are model-consistent but elsewhere are based on the predictions of a vector autoregression (VAR) model. Monetary policy responds to changes in economic conditions from baseline as prescribed by the various rules.

an aggressive AIT strategy, such conditions would prompt a substantially tighter stance of monetary policy than the current framework would call for, even though the inflation effects of the idiosyncratic shocks would be expected to dissipate over time. Such a policy action would be very hard to justify to the public.

equations, other empirical models would reach a similar conclusion. This inherent volatility would almost certainly also be a problem for an AIT strategy that used an alternative “smoothed” measure of inflation, such as the trimmed mean PCE inflation measure published by the Federal Reserve Bank of Dallas. Although the trimmed mean measure is less volatile on a 3- or 12-month basis, its standard deviation is the same as that of core PCE inflation when measured on a 60-month basis.

### RECESSION SCENARIO UNDER AVERAGE INFLATION TARGETING

For another perspective on how an AIT strategy might influence policy, we return to the recession scenario discussed earlier and consider how outcomes would have differed under various versions of the AIT rule. In contrast to the static assumptions used to construct the historical counterfactual policy prescriptions shown in figure 3, the simulations in figure 4 allow changes in monetary policy to influence real activity and inflation. Because this scenario involves no shocks to relative food or energy prices, the results are the same whether policymakers target average headline or core inflation.

Not surprisingly, a nonaggressive form of AIT that sets  $\alpha$  equal to 0.5 (the dashed light green lines) delivers recession outcomes that are almost identical to those generated under

the balanced-approach rule (the blue lines). The two aggressive AIT rules generate outcomes (shown by the dashed red and dashed yellow lines) that are more noticeably improved. Because these two rules call for liftoff from the ELB to occur a bit later than does the balanced-approach rule and more importantly call for a more gradual pace of tightening post-liftoff, they result in lower real bond yields and more favorable financial conditions overall during the recession and recovery period, thereby stimulating consumption, investment, and net exports to a greater extent. Nevertheless, the boost to aggregate demand is fairly modest. As a result, labor market conditions improve only a bit more quickly and inflation hews only a little more closely to the 2 percent target.<sup>13</sup>

Importantly, neither rule delivers much if any overshooting of inflation relative to the FOMC's 2 percent longer-run target. The combination of the ELB constraint and the flatness of the Phillips curve prevents monetary policy from raising inflation back to 2 percent quickly; with the return instead taking many years, the average inflation gap is thus modest by the time actual inflation is close to 2 percent again. As a result, the rules do not call for a materially easier stance of policy at that point compared with the balanced-approach rule and so do not support the tight labor market conditions needed to push inflation materially above target. One implication of these results is that adoption of even an aggressive form of AIT would not necessarily generate a period of inflation overshooting following a period of inflation undershooting. Unless that reality was clearly conveyed to the public—no small task—it could severely undermine the Fed's credibility by leaving the impression that the Fed had failed to follow through on its pledge.<sup>14</sup>

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13. Model simulations suggest that going farther by adopting full price-level targeting would be somewhat more effective in dealing with a recession, although doing so would exacerbate the problems associated with idiosyncratic shocks discussed earlier. More generally, as documented by Bernanke, Kiley, and Roberts (2019), stochastic simulations of the FRB/US model suggest that macroeconomic performance would deteriorate under flexible price-level targeting relative to performance under the balanced-approach rule when only financial market participants have model-consistent expectations. Aside from these concerns, price-level targeting would pose nontrivial operational issues, such as how to adjust the target price level in response to rebasing and methodological changes in price measurement.

14. This lack of overshooting suggests that average inflation targeting might do little to address a problem noted by Reifschneider and Williams (2000), Nakata and Schmidt (2016), and others: Under the FOMC's traditional let-by-gones-be-by-gones policy framework, the ELB causes actual inflation averaged over long periods to be noticeably biased downward relative to the official inflation target if  $R^*$  is low. Kiley and Roberts (2017) estimate this bias to be more than 100 basis points if  $R^*$  is less than 1 percent, based

On the surface then, these FRB/US simulation results would seem to suggest that AIT could modestly help mitigate the adverse consequences of the ELB constraint on conventional monetary policy, implying that it might be worth adopting. In our view, that would be too favorable a conclusion, for several reasons. First, none of the AIT rules markedly improves simulated labor market conditions or checks disinflationary pressures during the first five years after the onset of a recession. This framework is thus far from a panacea. Second, even an aggressive AIT strategy would fail to generate more downward pressure on the federal funds rate during a recession compared with the balanced-approach rule if inflation failed to run noticeably below 2 percent—a strong possibility given the importance of idiosyncratic shocks in driving inflation, as noted earlier. Third, the effectiveness of AIT in mitigating the adverse effects of the ELB constraint depends critically on market participants' complete confidence in the FOMC's commitment to following the prescriptions of the aggressive AIT rules for many, many years into the future—a debatable proposition. Fourth, and most importantly, any benefits from a strategy of aggressive AIT in dealing with a recession would need to be weighed against its potential costs at other times, assuming that the strategy is intended to be applied at all times and symmetrically with regards to both overshooting and undershooting of the inflation target.<sup>15</sup>

## A PERSISTENT LOW-INFLATION SCENARIO

The results presented in figure 4 suggest that AIT may not be a particularly effective way to mitigate the ELB problem. Would this strategy do better at dealing with the Fed's other current problem, persistent inflation undershooting?

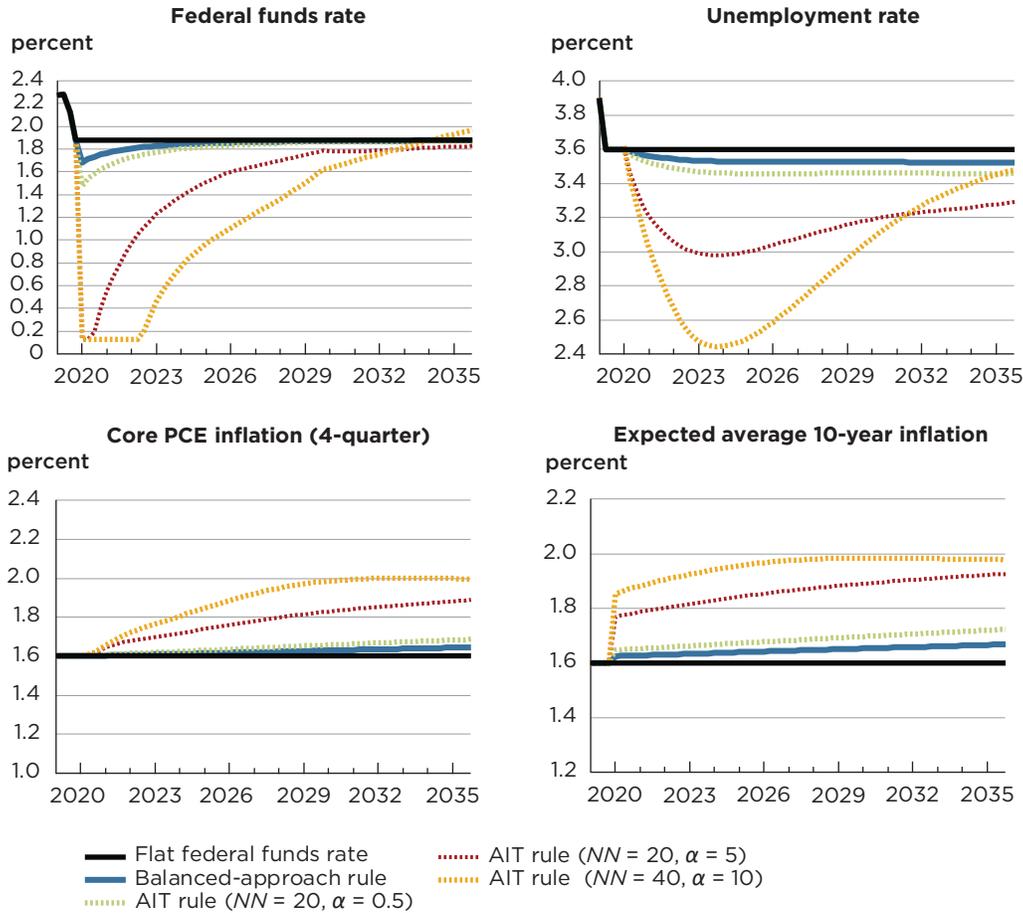
To address this question, figure 5 considers an alternative to the baseline outlook in which inflationary forces are persistently much weaker than in the baseline. In this scenario, the

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on simulations of both FRB/US and a dynamic stochastic general equilibrium (DSGE) model.

15. Outcomes in the recession scenario change only modestly when wage-price setters are also assumed to have model-consistent expectations. This result may seem surprising, given that the long-run expectations that drive inflation are fixed at 2 percent in the scenario under model-consistent expectations whereas they are free to fall under VAR-based expectations—behavior that should exacerbate the slump by putting upward pressure on real bond yields. But the extent to which VAR-based long-run inflation expectations fall in the simulations is limited by the assumption that they are partially anchored by the FOMC's fixed 2 percent inflation goal, as noted in appendix A. Because this partial anchoring prevents expected long-run inflation from deviating very much from 2 percent—in contrast to what might occur if expectations were purely adaptive—the two expectational assumptions do not yield an appreciable difference in inflation and unemployment outcomes.

Figure 5  
**Average inflation targeting might be very slow to achieve its objective if the Fed has to confront a chronic low-inflation scenario rather than the baseline outlook**



AIT = average inflation targeting; PCE = personal consumption expenditure

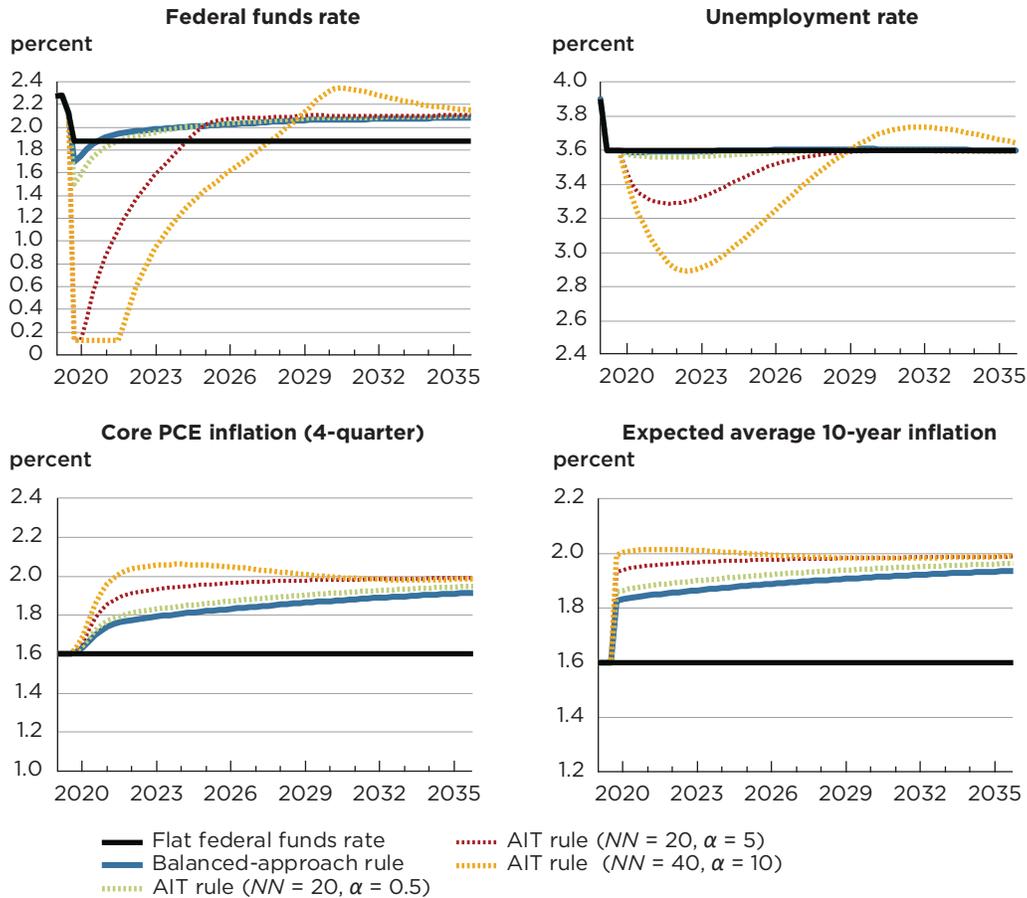
Note: Results are based on simulations of the FRB/US model, using a baseline in which inflation remains near 1½ percent indefinitely if unemployment and the federal funds rate remain at current levels. Expectations in financial markets are model-consistent but elsewhere are based on the predictions of a vector autoregression (VAR) model. Monetary policy follows the prescriptions of the various rules, conditioned on the assumption that  $R^* = 0.3$  percent and  $U^* = 3.6$  percent. The inflation expectations plotted in the lower-right panel are those of financial market participants only.

FOMC’s recent difficulty in achieving its inflation objective despite what appears to be a return to strong labor market conditions reflects a much different underlying economic structure than is assumed in the baseline. Its key features are that the neutral real federal funds rate is only 0.3 percent, the natural rate of unemployment is around 3½ percent (about equal to the current unemployment rate), and long-run inflation expectations have drifted down to 1.6 percent and now respond only to actual movements in inflation. Given those assumptions, if the Fed were to hold the federal funds rate just below 2 percent going forward (as embedded in the results indicated by the black lines), actual and expected inflation would remain unchanged at just above 1½ percent and the unemployment rate would stay close to 3½ percent. In effect, the FOMC under this strategy would be acting as if

its true inflation goal were 1.6 percent. The other lines of the figure indicate how real activity and inflation would evolve if the federal funds rate instead followed the prescriptions of the balanced-approach rule and the three versions of the AIT rule, conditional on policymakers striving to return inflation to 2 percent and immediately taking on board the lower values of  $R^*$  and  $U^*$ .<sup>16</sup> (The 10-year inflation expectations reported in the lower-right panel are for financial market participants only.)

16. Assuming instead that policymakers only gradually revise their estimates of  $R^*$  and  $U^*$  to conform with actual conditions in this scenario does not qualitatively change the results.

Figure 6  
**Average inflation targeting would be more effective in dealing with chronically low inflation if monetary policy could directly influence expectations in wage and price setting**



AIT = average inflation targeting; PCE = personal consumption expenditure

Note: Results are based on simulations of the FRB/US model, using a baseline in which inflation remains near 1½ percent indefinitely if unemployment and the federal funds rate remain at current levels. Expectations in financial markets and wage-price setting are model-consistent but elsewhere are based on the predictions of a vector autoregression (VAR) model. Monetary policy follows the prescriptions of the various rules, conditioned on the assumption that  $R^* = 0.3$  percent and  $U^* = 3.6$  percent. The inflation expectations plotted in the lower-right panel are those of both financial market participants and wage-price setters.

One takeaway from these simulations is that even a very aggressive AIT strategy might not succeed in returning inflation to target any time soon if the structure of the economy more closely resembles the alternative assumed here. In particular, if the Fed now confronts chronically low inflation because long-run inflation expectations have drifted below 2 percent and current labor conditions are not in fact tight—possibilities that cannot be ruled out given the imprecision of  $U^*$  estimates and uncertainty about inflation dynamics more generally—getting inflation back to target might take many years. This slow convergence occurs even when, under the 10-year AIT rule, the FOMC takes the highly aggressive step of cutting the federal funds rate immediately to zero and then only slowly allowing it to rise back toward its current

level. Another takeaway is that aiming to bring the average rate of inflation rate back to 2 percent following a period of persistent undershooting would not necessarily imply a noticeable amount of overshooting in the future if, because of the flatness of the Phillips curve and the constraints on monetary policy, progress back to the 2 percent objective is unavoidably gradual.

Admittedly, these pessimistic results are generated in the context of just one model representation of the US economy—and the FRB/US simulations would have been more supportive of AIT if monetary policy had been assumed to have a direct influence on the expectations driving inflation. This effect is illustrated by figure 6, which reports outcomes for the low-inflation scenario when not

only financial market participants but also wage-price setters have model-consistent expectations and thus correctly and immediately understand the full implications of the FOMC adopting an AIT strategy for setting the funds rate. (The inflation expectations shown in the lower-right panel now reflect those of both financial market participants and wage-price setters.) Because wage-price setters now view any change in the FOMC's strategy as completely credible and fully understand its economic implications, they immediately revise their expectations for future inflation and other factors. As a result, the switch to a strategy of aggressively targeting average inflation causes their long-run inflation expectations to jump sharply, causing actual inflation to move back to 2 percent more quickly, especially when the inflation averaging period is long. But much of this response arises from the extent of the credibility enjoyed by the FOMC in this simulation, which allows it to boost inflation expectations by merely announcing that it has revised down its estimates of  $R^*$  and  $U^*$  and will not accept inflation running permanently below 2 percent—a heroic credibility assumption that also markedly improves the effectiveness of the balanced-approach rule.

That monetary policy could influence long-run inflation expectations so quickly seems highly unlikely, especially as empirical evidence for this sort of direct influence of policy announcements on expectations is weak. If inflation expectations have truly slipped, it seems more plausible that a slow, grinding process of reanchoring would be required.

## CONCLUSION

The Federal Reserve confronts a challenging situation, largely as a result of the marked decline—in both the United States and abroad—in equilibrium interest rates. The resulting proximity of the ELB will severely hamper the ability of the FOMC to fight the next recession. Although more analysis remains to be done, our analysis so far suggests that AIT would not be an especially effective way to mitigate the ELB problem—and that if implemented in a symmetric, always-on manner, it could have highly undesirable policy consequences at other times. Nor would AIT be likely to do much to reanchor inflation expectations at 2 percent any time soon, in the event they had drifted down in recent years. This unfavorable assessment thus leads to the question: What should the Fed do? We address that issue in a forthcoming Policy Brief.

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## APPENDIX A THE FRB/US MODEL AND SIMULATION METHODOLOGY

FRB/US is a large-scale model of the US economy that is extensively used by the Federal Reserve for policy analysis and forecasting. The version of the model used to generate the simulations reported in this Policy Brief is the one posted on the Federal Reserve Board's website in May 2019, except that the term premiums embedded in long-term US Treasury yields have been exogenized. Unless otherwise indicated, the ELB on the nominal federal funds rate in the simulations is set at 12½ basis points, the same as the midpoint of the target range for the federal funds rate set by the FOMC from late 2008 to late 2015. Detailed documentation and the source code for the model is available at [www.federalreserve.gov/econres/us-models-about.htm](http://www.federalreserve.gov/econres/us-models-about.htm).

The baseline outlook used to generate the recession scenarios shown in figures 1 and 4 conforms with the median projections reported by FOMC participants in September 2019. Specifically, it shows core PCE inflation stabilizing at around 2 percent by 2021 and the unemployment rate and the federal funds rate gradually converging to their longer-run sustainable levels of 4.2 and 2.5 percent, respectively, several years later.

In the recession simulations, financial market participants are assumed to fully anticipate both the response of monetary policy to movements in real activity and inflation relative to baseline and the implications of that response for economic conditions—that is, their expectations are model consistent. In contrast, expectations of households and nonfinancial firms, including wage-price setters, are based on the predictions of a small-scale vector autoregression (VAR) model; these actors are thus assumed to be less informed about future conditions and to base their expectations on the average correlations in the data seen historically. An implication of this assumption is that the long-run inflation expectations that influence wage-price setting in this scenario are not perfectly anchored but instead drift in response to persistent movements in inflation relative to baseline. The extent of that

drift is limited by the FOMC's commitment to stabilizing inflation at 2 percent over time. Specifically, long-run inflation expectations in the recession scenario evolve according to the formula  $\pi_t^e = 0.9\pi_{t-1}^e + 0.05\pi_{t-1} + 0.05\pi^*$ , where  $\pi_t^e$  is the expected long-run rate of inflation (calibrated historically to match the long-run inflation projections reported in the Survey of Professional Forecasters),  $\pi_{t-1}$  is the lagged rate of core PCE inflation, and  $\pi^*$  is the FOMC's official 2 percent inflation goal.

In contrast, the long-run inflation expectations of wage-price setters in the low-inflation scenario reported in figure 5 are assumed to be completely adaptive under VAR-based expectations and thus are not even partially tied down directly by monetary policy. Specifically, they are assumed to evolve according to the formula  $\pi_t^e = 0.95\pi_{t-1}^e + 0.05\pi_{t-1}$ . When wage-price setters in the low-inflation scenario are instead assumed to have model-consistent expectations, as shown in figure 6, their expectations for inflation in the very long run are effectively fixed at 2 percent whereas their expectations for average inflation over shorter horizons, such as the next 10 years, equal the actual path of inflation over this period generated in the simulations.

In figure 3, the counterfactual paths of the federal funds rate under various rules are computed using currently published historical data for unemployment and inflation. However, the values of  $R^*$  and  $U^*$  are based on the actual estimates of  $R^*$  and  $U^*$  made by policymakers and forecasters at the time. Specifically, from 2012 on the “real-time” estimates of  $R^*$  and  $U^*$  are based on the medians of the longer-run projections of FOMC participants reported quarterly in the *Summary of Economic Projections*; for earlier dates, we use the long-run projections reported in the March and October releases of *Blue Chip Economic Indicators*. Computing rule prescriptions using real-time data on the unemployment rate and PCE inflation would have made little difference in the case of the balanced-approach rule and the nonaggressive AIT rule but would have modestly lowered the prescriptions of the aggressive AIT rules during 2003–05.

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