Monetary Policy Strategy and its Communication

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I.   Introduction

Monetary policy strategy and its communication are inexorably linked. Monetary policy actions are most effective in promoting good macroeconomic performance when the public understands their rationale and can predict how the monetary authority will respond to changes in the economic outlook. This requires clarity about the central bank's policy objectives as well as the central bank's policy reaction function. Clear communication of an independent central bank's strategy disciplines the use of discretion, which is essential for ensuring that policy remains systematic. Furthermore, transparency fosters accountability, which is critical for protecting the central bank from political interference and other factors that threaten to steer policy away from what would best serve the public interest. These principles have not always been embraced in central bank practice. Historical experience suggests that monetary policy strategy and its communication tend to evolve slowly over time. This reflects numerous factors such as institutional stodginess, the incomplete and evolving understanding of best practices and reluctance to relinquish discretionary power. Crises present opportunities for more drastic change. Circumstances that reveal the limitations of current practice become key drivers for change to address pressing challenges.

The long and unpleasant encounter with the zero lower bound (ZLB) has been a transformative experience for the Federal Reserve. The Federal Reserve's main policy response was the prompt and decisive expansion of its balance sheet—quantitative easing—the indicated response when short-term interests rates become constrained. A comparison of the decisive policy actions following the events of September 2008 to the policy response to the financial crisis of October 1929 illustrates the stark differences (Chart 1). Decisive action averted a repetition of the Great Depression. The policy response proved effective. By mid-2019, the decade-long expansion became the longest on record. Inflation and unemployment returned to levels consistent with the Federal Reserve's objectives (Chart 2). Recent inflation readings have been somewhat below 2% when measured with personal consumption expenditure (PCE) and core PCE deflators; and exactly 2%, in line with the Federal Reserve's goal, when measured with trimmed-mean PCE. The rate of unemployment has declined to its lowest level in decades and stands below estimates corresponding to full employment.

The legacy of the 2008 crisis response is broader than the observation that the Federal Reserve avoided repeating major mistakes and succeeded in facilitating a recovery. Faced with the ZLB, and recognizing that an improved monetary policy framework could enhance the effectiveness of policy actions, the Federal Reserve embraced important changes to its policy strategy and communication. The Federal Reserve adopted a clear numerical definition of price stability—a 2% symmetric inflation goal;[1] it provided more information about its assessment of the economic outlook and forward guidance regarding interest rates policy;[2] it started providing limited but useful information about policy rules.[3]

Nonetheless, challenges remain. While the adoption of a clear symmetric inflation goal has been an important achievement, success with other aspects of monetary policy strategy and its communication has not been uniform. Ideally, communication should add clarity, rather than ambiguity. This has proven elusive. Overly Delphic language is not uncommon: The Federal Reserve will be "data dependent," the Federal Reserve will "act as appropriate," the Federal Reserve will follow a "balanced approach." Pythia would have been proud.

Chart 1
Policy Rate and Balance Sheet Size

Percent/Percent of GNP/GDP | Percent/Percent of GNP/GDP
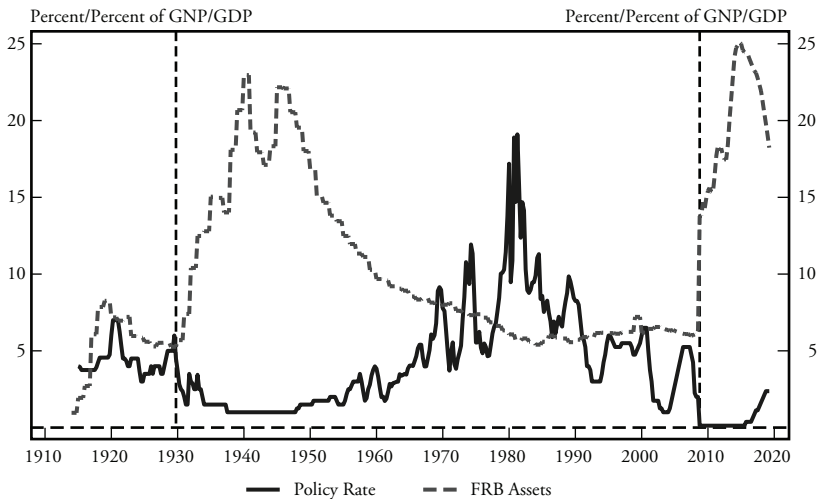
Notes: Policy rate is the federal funds rate target (or midpoint of target range) at the end of each quarter since 1989, the average effective rate in the last month of the quarter between 1966 and 1989, and the discount window rate prior to that. FRB assets is the balance sheet size as a percent of nominal GNP or GDP. Annual data shown until 2002, quarterly data from the first quarter of 2003 on. Vertical lines in the fourth quarter of 1929 and fourth quarter of 2008 correspond to the 1929 and 2008 crises, respectively.

Overall, the policy normalization process from the ZLB has not been as uneventful as might have been desired. Tantrums were associated with uncertainty about liftoff. The normalization of the balance sheet—quantitative tightening—was initiated with insufficient clarity regarding the new normal.[4] Reconciling interest rate policy changes with the evolution of risks to the outlook for inflation and economic activity has not been as straightforward as could have been with a better-understood policy reaction function.
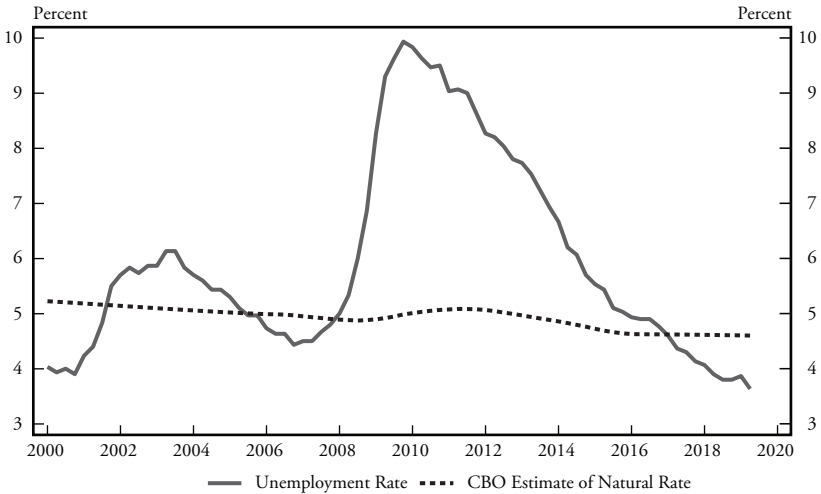
This paper takes stock of the Federal Reserve's current policy and communication framework, with a focus on some of the key changes that have been adopted since the crisis, and examines areas where additional adaptation could lead to further improvement. The paper builds on the large body of research literature on monetary policy, including work evaluating historical policy and policy frameworks and communications for the Federal Reserve and for other central banks.[5] It draws extensively on the historical information provided by the Federal Reserve regarding policy deliberations—including policy transcripts and related material.

Chart 2
Inflation and Unemployment

A. PCE, Core PCE and Trimmed-Mean PCE Inflation Rate

Percent   Percent

—— PCE   ••••• Core PCE   – – Trimmed–Mean PCE
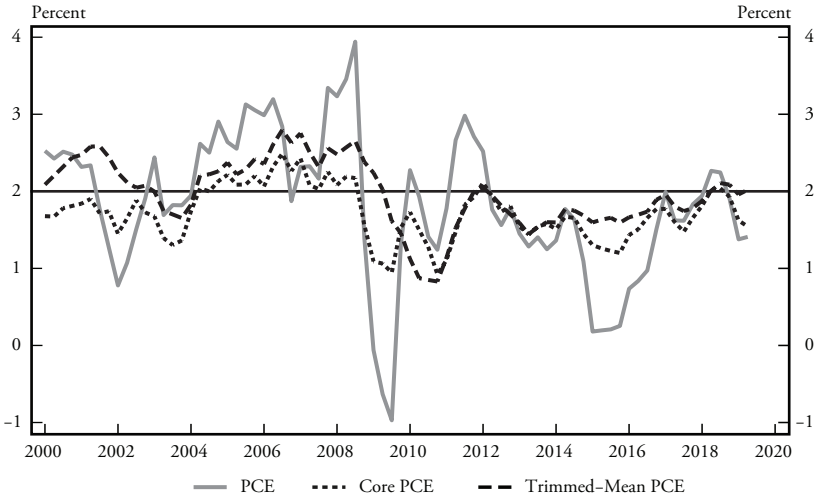
B. Unemployment and CBO Estimate of Its Natural Rate

Percent   Percent

—— Unemployment Rate   ••••• CBO Estimate of Natural Rate

The paper is organized in nine sections. Following this introduction, Section II briefly discusses the Federal Reserve's dual mandate and the challenges it poses for the design and communication of the Federal Reserve's policy strategy. Section III reviews the role of the crisis in facilitating the adoption of a clear numerical inflation goal and discusses the benefits associated with this decision in anchoring inflation expectations. Section IV focuses on the FOMC's related attempt to reach a consensus on a commonly agreed policy strategy, as presented in the FOMC's annual *Statement on Longer-Run Goals and Policy Strategy*. Section V examines the challenge of providing forward guidance at the ZLB in the absence of a clear description of how policy relates to the evolution of the economy, and the publication of FOMC participants' interest rate projections—the "dots." Section VI draws on analysis of monetary policy rules presented in the Federal Reserve's semiannual *Monetary Policy Report* (MPR) to discuss how these rules can improve the monetary policy process. After a comparison of the rules that appear in the MPR with forecast-based, real-time variants, it examines how the projections of FOMC participants that are provided in the FOMC's quarterly *Summary of Economic Projections* (SEP) can be employed in policy rule analysis to communicate monetary policy. Section VII draws on the Federal Reserve's implementation of quantitative easing programs during the crisis to discuss how policy could be formulated in a systematic fashion at the ZLB. Section VIII suggests refinements of the current framework that could address existing challenges with policy and its communication, and Section IX concludes.

II.   The Federal Reserve's Dual Mandate

A central bank's monetary policy strategy and its communication is shaped by its statutory mandate and expectations about the central banks' role in the economy. To facilitate the subsequent discussion, it is useful to review the Federal Reserve's dual mandate and briefly compare it to the Inflation Targeting framework that has become common in many other economies over the past few decades.

A critical issue is whether price stability is recognized as the primary objective of monetary policy. Multiple and potentially conflicting goals

invite short-term-oriented discretionary policymaking that sooner or later compromises price stability, which monetary policy is best placed to achieve. Since its introduction in the late 1980s, Inflation Targeting has become a common policy framework that has been applied with considerable success around the world. The framework recognizes the primacy of price stability as a goal for the central bank over other desirable public policy goals. In addition, it defines a numerical goal for inflation that serves as the nominal anchor in the economy and as the guide for formulating policy. By focusing on a single primary goal, the central bank can better preserve price stability in the medium run, which anchors inflation expectations and improves stabilization trade-offs. In this manner, monetary policy promotes sustainable growth and enhances overall economic welfare.

Section 2A of the Federal Reserve Act provides the Federal Reserve's so called "dual" mandate:[6]

> *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.*

Formulated during the second half of the 1970s, this revision to the Federal Reserve Act reflected the recognition of the pernicious effects of high and volatile inflation and was intended to facilitate the adoption of monetary policies that would restore price stability. It also captured the diversity of priorities and policy preferences in the Congress. On one hand, it recognized the importance of constraining the growth of money and credit in line with the economy's long-run potential, something that the Federal Reserve had failed to do earlier in the decade. At the same time, it expressed the difficulty of escaping the political reality that compromising high employment in the pursuit of price stability is politically undesirable.

A complication with this formulation is that it asks monetary policy to deliver more than it can practically achieve. Easier monetary policy can always deliver some more employment in the short run, at the cost of compromising price stability later on—price stability is not compatible with *maximum* employment. As a result, the Federal

Reserve has had to interpret its mandate in a way that would be consistent with the constraints imposed by the structure of the economy and limits of monetary policy.

Under Chairmen Volcker and Greenspan, this conundrum was addressed by acknowledging the primacy of price stability as an *operational* goal for monetary policy, while stressing that by achieving and maintaining price stability the Federal Reserve fulfilled its mandate by contributing toward the attainment of maximum *sustainable* growth and employment. Implicitly, the Federal Reserve operated in a manner that could be recognized today as similar to Inflation Targeting, but without an explicit numerical definition of price stability and exhibiting somewhat greater sensitivity to maintaining high employment during the disinflationary process. The resulting policy strategy was later characterized as the "opportunistic approach" to disinflation: Once inflation moderated in the aftermath of the 1980 and 1982 twin recessions, the Federal Reserve would resist incipient increases of inflation and wait for exogenous circumstances, such as unforeseen recessions and favorable supply shocks, to deliver further desired reductions in inflation.[7]

III. The Federal Reserve's Inflation Goal

By January 2004, Chairman Greenspan could declare that price stability had been achieved: "Our goal of price stability was achieved by most analysts' definition by mid-2003. Unstinting and largely preemptive efforts over two decades had finally paid off." (Greenspan 2004, p. 35). Yet the meaning of the price stability goal remained vague.

As progress toward price stability was being achieved, some of the drawbacks associated with the lack of clarity regarding the definition of price stability attracted attention. Without a numerical definition of price stability, there was no focal point that could serve as an anchor to inflation expectations in the private sector. This could lead to episodes of inflation scares, and the associated deterioration of policy trade-offs.[8] Furthermore, without a commonly agreed inflation goal, there was no common basis for policy deliberations.[9] While these considerations were seen as less critical as long as inflation remained above the level that most FOMC participants considered consistent

with price stability, they were harder to ignore once inflation approached that level.

On multiple occasions during Chairman Greenspan's tenure, the Committee discussed how to improve communications, including regarding the definition of price stability and the possible adoption of an explicit inflation target. FOMC participants recognized that communicating an inflation target had the potential to improve the effectiveness of monetary policy. On the other hand, the potential loss of policy flexibility was a concern and reaching a consensus was not trivial in light of differences regarding the preferred definition of price stability. The formulation of the Federal Reserve's mandate presented another risk: Adoption of an explicit numerical definition of price stability, without a parallel numerical declaration of the meaning of "maximum employment" might be viewed as inconsistent with the Federal Reserve's dual mandate. This suggested that consultation with the administration and the Congress would be advisable, in case the Committee decided to proceed with the adoption of a numerical goal for inflation.

The appointment of Chairman Bernanke in 2006 provided additional impetus for improving communications and clarity regarding the Federal Reserve's price stability goal. As an academic, Bernanke had been a strong proponent of the Inflation Targeting approach to monetary policy.[10] In 2003, Governor Bernanke had argued in favor of simply adopting a numerical definition of price stability while fully respecting the Federal Reserve's dual mandate, that is without moving in the direction of Inflation Targeting beyond the adoption of an inflation target.[11]

The Committee did not reach a consensus on the announcement of an inflation goal before the crisis. However, it proceeded to provide pertinent information indirectly, through the publication of participants' economic projections. The Federal Reserve had been publishing the so-called Humphrey-Hawkins projections in the semiannual MPR since 1979. Those projections, with horizons of about three to five quarters, were useful for conveying the Committee's views regarding the near-term outlook of inflation, growth and unemployment. On Nov. 14, 2007, the

Committee announced the replacement of the Humphrey-Hawkins projections with a quarterly Summary of Economic Projections (SEP). The SEP would include projections with horizons up to three years. This was considered sufficiently long so that the projections of PCE and core PCE inflation could be read as indicative of the Committee participants' views regarding the numerical definition of price stability. Similarly, the projections of GDP growth and the unemployment rate could be interpreted as indirectly providing participants' views about the economy's potential output growth and the natural rate of unemployment in the long run.[12]

The first SEP, which was associated with the October 2007 FOMC meeting, was published Nov. 20, 2017, together with the minutes from the October meeting. The publication included projections for the calendar years 2007 to 2010. The projections for both headline PCE and core PCE inflation for 2010 ranged from 1.5 to 2% with a median of 1.8%.

As the economy deteriorated during 2008, however, these projections did not prove particularly useful for communicating the Committee's inflation goal. The October 2008 SEP revealed that the Committee projected a severe downturn and a disinflation through 2011, the longest horizon included in the projection. The range of projections for that year, both for headline and core PCE inflation, was 0.8 to 1.8%. The median was just 1.5%. This suggested that longer horizons would be needed to provide useful information about the inflation goal.

At the December 2008 meeting, it was recognized that in light of the deteriorating circumstances, the costs associated with the lack of clarity regarding the Committee's inflation goal had become more significant. As the Committee reached the ZLB on interest rates, communication became far more important for policy effectiveness and the risk of disanchoring inflation expectations became far greater. On one hand, public concerns that the Federal Reserve had "run out of ammunition" and would be unable to provide adequate accommodation risked disanchoring inflation expectations to the downside. This risked a pernicious increase in real interest rates and further deterioration of the economy. On the other hand, as

the Committee discussed a potentially large expansion of its balance sheet, concerns could be raised that the Federal Reserve would tolerate high inflation in the medium run, disanchoring inflation expectations to the upside. This would worsen policy trade-offs. Under these circumstances, adopting a numerical inflation goal appeared particularly attractive.

The adoption of an inflation target was considered at the December 2008 meeting, together with the decisions to ease policy, through the addition of the following sentence to the policy statement:[13]

> *"In support of its dual mandate, the Committee will seek to achieve a rate of inflation, as measured by the price index for personal consumption expenditures, of about 2 percent in the medium term."*

However, in light of the political sensitivity associated with the Federal Reserve's "dual mandate," Chairman Bernanke indicated that he needed more time to consult with the Congress before the Committee decided to adopt an inflation target.

The Committee's discussion continued in January 2009. In preparation of that discussion, participants were also surveyed regarding their "longer-run" projections, which for inflation would correspond to each participant's preferred inflation target. Responses for total PCE inflation ranged from 1.5 to 2%, but for 11 out of 16 participants the answer was exactly 2%.[14] This effectively established 2% as the Committee's implicit inflation target. In the end, the Committee decided to proceed with publication of the "longer-run" projections, while Chairman Bernanke continued his consultations with political authorities.

The formal adoption of an explicit 2% inflation goal was delayed for three more years. It was finally announced in January 2012 with the FOMC's *Statement on Longer-Run Goals and Policy Strategy* which is further discussed below.

Evidence since January 2012, suggests that the Federal Reserve's adoption of a 2% longer-run target for inflation has been successful in improving the anchoring of long-term inflation expectations. One way to look at the issue is by examining the response of inflation compensation measures implicit in government

bonds to inflation surprises associated with the monthly releases of inflation statistics. Examining the five-year, five-year forward inflation compensation implied by the spread between Treasury yields and yields on Treasury inflation-protected securities, Bundick and Smith (2018) report a notable and statistically significant reduction in this response. Before 2012, positive inflation surprises tended to raise inflation compensation. In contrast, since 2012, the reaction has been indistinguishable from zero.

Additional supporting evidence can be provided by examining the characteristics of long-term survey forecasts. The top panel in Chart 3 presents the median of long-term forecasts (average for the next 10 years) of PCE inflation together with the core and trimmed-mean PCE measures shown in Chart 2. The survey forecasts are from the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters (SPF), which has included a question on long-term forecasts of PCE inflation in every quarter since the first quarter of 2007. Since the formal adoption a 2% inflation goal, the median long-term expectation has converged to this goal. The bottom panel of the figure presents the interquartile range of the long-term inflation forecasts. The dispersion of long-term forecasts for PCE inflation has declined notably since 2012.[15] This evidence suggests that the Federal Reserve's adoption of an inflation target can be associated with an improved anchoring of inflation expectations.

IV.   Communicating the FOMC's Policy Strategy

The FOMC announced its 2% inflation target with a concise *Statement on Longer-Run Goals and Policy Strategy* on Jan. 25, 2012. The statement explained the Committee's rationale for adopting an inflation goal in the context of the Federal Reserve statutory mandate and also attempted to provide some information about the FOMC's policy strategy. The statement was proposed by the subcommittee on communications and was discussed extensively at the December 2011 and January 2012 FOMC meetings.[16]

The statement provided an elegant solution to the communication conundrum associated with the dual mandate. With regard to price stability, the 2% inflation target was presented as the Committee's

Chart 3
Long-Term Inflation Expectations

A. Inflation and Median of Long-Term Expectations

Percent   Percent

Long–Term Expectations (PCE) ···· Core PCE – – Trimmed–Mean PCE
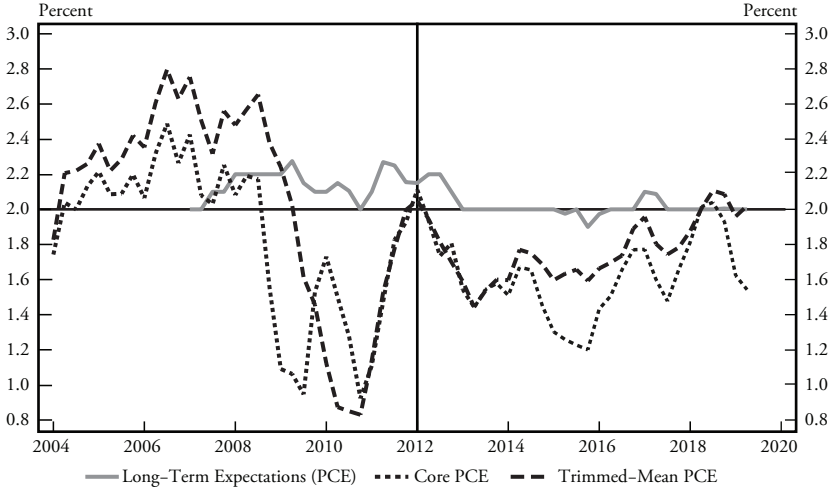
B. Dispersion of Long-Term Inflation Expectations

Percent   Percent
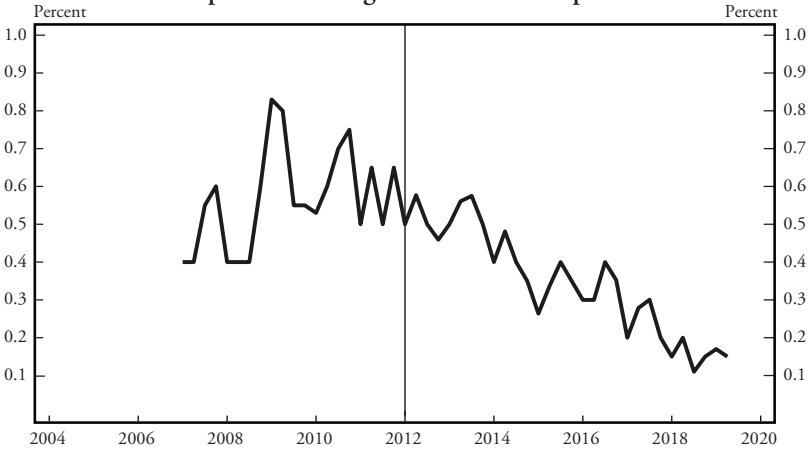
Notes: Dispersion as measured by the interquartile range of individual forecasts in the Federal Reserve Bank of Philadelphia's SPF. Vertical line in the first quarter of 2012 reflects the FOMC's adoption of a numerical inflation goal.

judgment of the rate of inflation "most consistent over the longer run with the Federal Reserve's statutory mandate."[17] In contrast, no corresponding target was specified regarding the Committee's interpretation of "maximum employment." Instead, the statement explained that the "maximum level of employment is largely determined by nonmonetary factors" and referred to the Committee's longer-run "normal" rate of unemployment as reflected in the SEP.

The statement also provided a description of the FOMC's policy strategy, which evoked comparisons with so-called "flexible" formulations of Inflation Targeting and some simple policy rules:[18]

> *In setting monetary policy, the Committee seeks to mitigate deviations of inflation from its longer-run goal and deviations of employment from the Committee's assessments of its maximum level. These objectives are generally complementary. However, under circumstances in which the Committee judges that the objectives are not complementary, it follows a balanced approach in promoting them, taking into account the magnitude of the deviations and the potentially different time horizons over which employment and inflation are projected to return to levels judged consistent with its mandate.*

In algebraic terms, one way to describe the Federal Reserve's policy problem is in terms of the current and future deviations of the inflation rate, π, from the inflation goal, π^*, and the deviations of the current and future unemployment rate, u, from the assessment of "normal" unemployment—the natural rate of unemployment, u^*. The policy problem can then be described as simultaneously closing two gaps, the inflation gap, $\pi - \pi^*$, and the unemployment gap, $u - u^*$.

In modeling exercises, this can be expressed as the minimization of a quadratic "loss function" over time, where the "loss" in each period is summarized with:

$$\omega(\pi - \pi^*)^2 + (1 - \omega)(u - u^*)^2 \tag{1}$$

where ω, a parameter with a value between 0 and 1, represents the relative weight placed on price stability relative to the weight placed on maximum employment.

Under the assumption that inflation dynamics are governed by some form of a short-run Phillips curve (as in Federal Reserve staff models employed for policy analysis) the two objectives could be

characterized as complementary when the two gaps have opposite signs. For example, if inflation is projected to be too low and the unemployment rate too high, the two objectives would be complementary in the sense that easing monetary policy would be expected to reduce the absolute size of both gaps.

The policy problem becomes more challenging when the inflation and unemployment gaps have the same sign. Then a policy trade-off emerges: Monetary policy aiming to close one of the two gaps can drive the other gap further away from zero. This tension is what makes stagflationary episodes so costly to address.

To be informative, a description of policy strategy needs to explain how policy intends to resolve challenging trade-offs of this nature. The answer depends on the constraints imposed by the dynamic relationships describing the macroeconomy as well as the relative weight policy places on defending price stability relative to defending maximum employment. FOMC participants can have diverse views on the macroeconomy and, more critically, on the most appropriate way to balance maximum employment against price stability when the two goals are in conflict. In a Committee setting, the dual mandate complicates reaching agreement on a common strategy.

The urgency to improve policy effectiveness that drove the FOMC to its decision to adopt 2% as a common inflation goal proved insufficient for the adoption of a clear common policy strategy. The only guidance provided in the FOMC's January 2012 statement about policy tradeoffs was that a "balanced approach" would be followed in promoting price stability and maximum employment, without any explanation what a "balanced approach" meant. This represented a notable weakness.

Despite this weakness, the statement was adopted with no dissenting votes. The minutes of the meeting recorded: "All FOMC members voted to adopt this statement except Daniel Tarullo, who abstained because he questioned the ultimate usefulness of the statement in promoting better communication of the Committee's policy strategy." The transcript of the meeting (which was released about six years later), provided additional clarity: Governor Tarullo

explained: "I think the document has made vagueness a virtue to an excessive degree …"

V.   Forward Guidance and the Dots

In addition to the adoption of an explicit 2% inflation goal, the January 2012 FOMC meeting was notable for a significant modification of the SEP that was released at the conclusion of that meeting. This was the introduction of the "dots," a figure containing detailed information about what individual participants considered to be the "appropriate pace of policy firming" associated with their projections of inflation and economic activity.

The projections provided in the SEP had already been conditional on each participant's "appropriate policy." The FOMC had considered whether to collect and disseminate information about conditioning assumptions when the SEP was introduced in 2007. At that time, doing so enjoyed limited support. The encounter with the ZLB shifted the perceived cost-benefit calculus.

With policy rates constrained, one of the ways in which additional policy accommodation can be provided is by communicating that future policy rates will remain low for longer than households and businesses might otherwise expect.[19] This can be achieved through forward guidance.

The Federal Reserve implemented forward guidance in ways that evolved over time. At the peak of the crisis, the FOMC provided guidance in rather vague qualitative terms—as it had also done, on occasion, before the crisis. Specifically, on Dec. 16, 2008, the FOMC announced that: "[T]he Committee anticipates that economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time." Assessing there would be benefits to stronger commitment, the Federal Reserve later introduced explicit dates in its communication. On Aug. 9, 2011, it communicated: "The Committee currently anticipates that economic conditions— including low rates of resource utilization and a subdued outlook for inflation over the medium run—are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013."

A concern with date-based forward guidance, however, was that the information it provided about the likely path of future policy might be misinterpreted. Extending the date "at least through" which the federal funds rate would be close to zero could be misread as signaling a significant deterioration of the economic outlook, even if no such deterioration had occurred. Publishing participants' views on the appropriate level of the federal funds rate, together with their projections of inflation and economic activity, could mitigate this concern by underscoring the conditional nature of forward guidance on the evolving economic outlook. To the extent their conditional nature was well understood, the dots could serve as a useful communication device at the ZLB, communicating in simple terms the FOMC's commitment to keep policy accommodative as long as this was needed for the economy to recover.

Nonetheless, date-based communication of forward guidance continued even after publications of the dots with the SEP, undermining the conditional nature of forward guidance. As President Plosser observed: "*Date*-based forward guidance is problematic. Instead, a systematic approach provides *data*-based forward guidance. Policy decisions should be made and explained in terms of economic conditions, not the calendar." (Plosser 2012, p. 8, emphasis in the original.)

Forward guidance evolved further, with the introduction of thresholds on inflation and unemployment. This blended date-based and data-based forward guidance (Mester 2014). The effort could be read as an attempt to provide some limited information regarding the Federal Reserve's reaction function. Without a framework that could form the basis of a systematic approach to monetary policy (beyond the unhelpfully vague description in the *Statement on Longer-Run Goals and Policy Strategy*) forward guidance would remain a challenge.

VI.   Monetary Policy Rules

A straightforward way to explain how monetary policy responds to changing economic conditions over time is with a monetary policy rule.[20] Monetary policy rules are appealing for several reasons: They constrain the inefficient use of policy discretion; they can assure that policy remains consistent with sound policy principles; they offer a

clear summary description of policy strategy; they provide reliable forward guidance, appropriately conditioned on the future evolution of the economy.

The appeal of policy rules as a tool for providing guidance for policymakers has long been recognized by the Federal Reserve, notwithstanding the demonstrated preference for meeting-by-meeting discretion. Since the 1990s, following the seminal article by John Taylor (1993), simple interest rate rules have been discussed in public by Federal Reserve officials, routinely monitored as part of the policy deliberation process and often discussed at FOMC meetings.[21]

The Taylor rule provides a simple formula for setting the federal funds rate in response to inflation and economic activity. The original formulation can be expressed as follows:

$$i = r^* + \pi + 0.5[(\pi - \pi^*) + y] \tag{2}$$

Here, i is the prescription for the federal funds rate; r^* is a measure of the equilibrium or natural real interest rate, originally assumed to equal 2%; and y is a measure of the output gap, which was originally defined as the deviation of real GNP from its trend. This rule proved attractive because it simultaneously appeared to describe Federal Reserve policy reasonably well (at least for the late 1980s and early 1990s) and was shown to have desirable robustness characteristics in early model-based policy evaluation exercises.[22]

Another appealing characteristic of this rule is that it can be conveniently associated with the Federal Reserve's dual mandate. As Governor Yellen noted in 1996: "According to the Taylor rule, the Fed's key instrument, the federal funds rate, should respond to gaps between actual and ideal performance on each of the Fed's dual objectives—price stability and output stability" (Yellen 1996, p. 4-5).[23] Employing Okun's law to approximate the output gap, y, in the original formulation with an unemployment gap, u^*–u, could bring the rule even closer to the Federal Reserve's interpretation of its dual mandate, as reflected in the 2012 description of policy strategy. The Taylor rule could also be adapted to be more or less activist in its response to the output/unemployment gap, depending on views about the structure of the economy, concerns about robustness and

preferences regarding the appropriate relative weight of the Federal Reserve's price stability and maximum employment objectives (the parameter ω in equation (1)).[24]

Indeed, Federal Reserve officials (notably Janet Yellen as vice chair and as chair), have utilized versions of the Taylor rule in a number of speeches as a device to describe monetary policy.[25] This included a version that eventually came to be known as the "balanced approach" rule, evoking the Federal Reserve's policy strategy that had been adopted in January 2012. The "balanced approach" rule is a more activist version of the original Taylor rule, responding twice as strongly to perceived unemployment gaps.

One limit to the robustness of this family of rules is that their implementation requires estimates of the natural rates of interest and unemployment, r^* and u^*, which are uncertain and can vary notably over time. The uncertainty regarding these "stars" has been a challenge for monetary policy, as has been highlighted recently by Federal Reserve officials.[26] Policy frameworks that rely heavily on the stars can inadvertently destabilize the economy when policymaker beliefs about these stars prove to be incorrect. Misperceptions result in policy being systematically too easy or too tight, a major policy mistake. For example, during the 1970s, when policymakers had overly optimistic estimates of the natural rate of unemployment and the output gap, the attempt to close these gaps resulted, instead, in high overall inflation and in greater instability of both real economic activity and inflation. Following a rule along the lines of the "balanced approach" rule, would not have avoided the Great Inflation.[27]

Alternative simple policy rules can be formulated to be robust to misperceptions regarding natural rates. Prescriptions from policy rules with desirable stabilization properties and robustness characteristics need not rely on uncertain estimates of the natural rates of either the interest rate or the unemployment rate (Orphanides and Williams 2002). One alternative approach is to focus on adjusting the stance of monetary policy in response to inflation deviations from its target, $\pi - \pi^*$, and deviations of economic growth from its normal rate. Specifically, with respect to economic activity, policy could respond to the shortfall or excess of real GDP growth,

g, relative to potential real GDP growth, g^*: Effectively, focusing on the growth gap, $g–g^*$, instead of the output gap, *y*, which is particularly well suited when estimates of the level of potential output are highly uncertain. In even simpler terms, policy could be guided by comparing nominal income growth, *n*, to its natural growth rate, n^*, which is approximately equal to the sum of the inflation goal, π^*, and potential real GDP growth, g^*. Such formulations also relate to nominal income targeting frameworks that had attracted attention before the advent of inflation targeting as a robust approach to policy.[28] An illustrative formulation of this rule, with an interest rate policy instrument, can be expressed as follows:

$$\Delta i = 0.5(n - n^*) \tag{3}$$

where Δi is the rule's prescription for the quarterly change of the policy rate from its setting in the previous quarter. Noting that the difference between GDP growth and its potential, $g–g^*$, can be approximated by the change in the output gap, Okun's law can be employed to obtain a version of this rule expressed in terms of the change in the rate of unemployment.

VI.i.   Rules in the Monetary Policy Report

Since July 2017, the Federal Reserve has included analysis regarding monetary policy rules and their relationship to Federal Reserve policy in the semiannual MPR. This represents a welcome addition to the MPR, one that provides valuable analysis and information on how simple rules can be employed as part of the Federal Reserve's policy strategy. As discussed below, it also presents opportunities for further improvement.

The MPR has been reporting alternative rules, three of which are reproduced below:

Taylor (1993) rule:

$$i_t^T = r_t^* + \pi_t + 0.5(\pi_t - \pi^*) + (u_t^* - u_t) \tag{4}$$

Balanced-approach rule:

$$i_t^B = r_t^* + \pi_t + 0.5(\pi_t - \pi^*) + 2(u_t^* - u_t) \qquad (5)$$
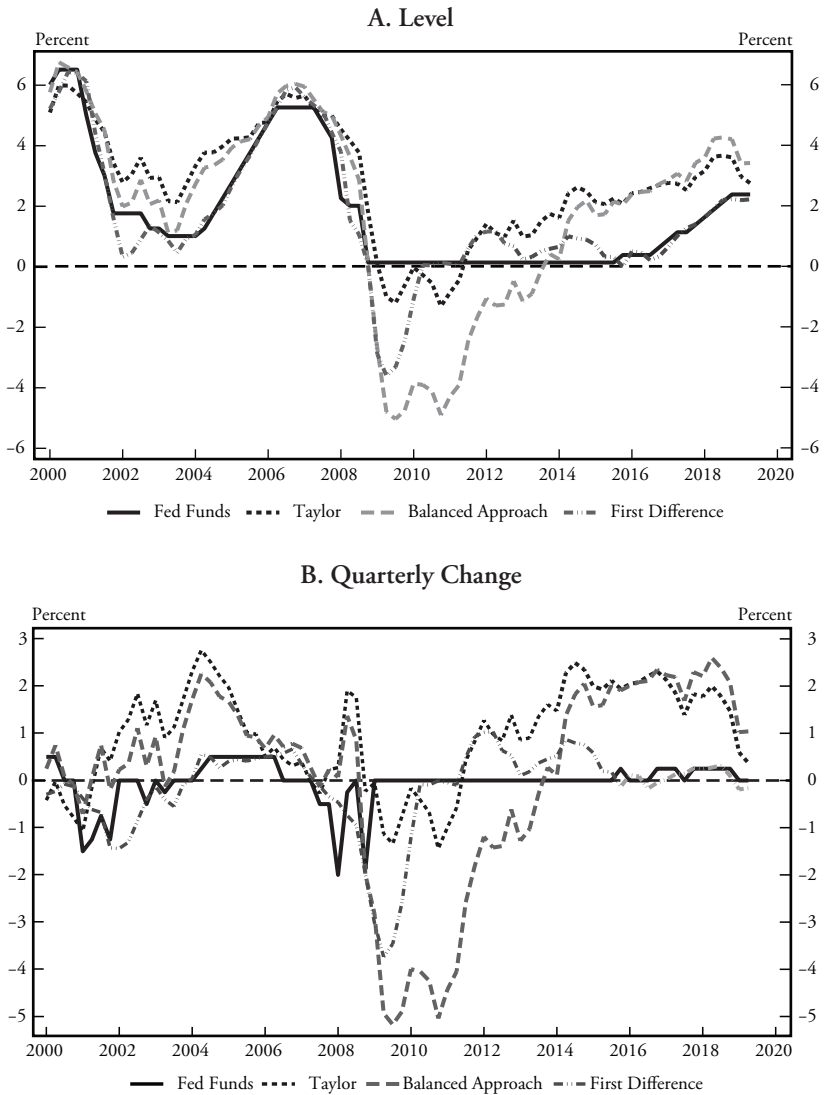
First-difference rule:

$$i_t^F = i_{t-1} + 0.5(\pi_t - \pi^*) + (u_t^* - u_t) - (u_{t-4}^* - u_{t-4}) \qquad (6)$$

The rule referred to as Taylor 1993 is a version of the original Taylor rule, equation (2), using the unemployment gap in the place of the output gap.[29] As already noted, the balanced approach rule is a more activist version of the Taylor 1993 rule, responding twice as strongly to perceived unemployment gaps. Implementation of these two rules requires estimates of the natural rates of interest and unemployment, which, as noted before, are highly uncertain and vary notably over time. In light of this complication, the MPR has presented these two rules with time-varying estimates of the natural rates, inferred from surveys. Finally, the rule referred to as first-difference rule, is a version of the natural growth rule, equation (3), expressed in terms of the unemployment rate using the approximation suggested by Okun's law.

The top panel of Chart 4 presents prescriptions from these three rules together with the federal funds rate target (or midpoint of target range) replicating Figure B of part 2 of the July 2019 MPR. In each quarter, the policy rate shown reflects the level of the federal funds rate target at the end of the quarter. The bottom panel of the figure presents the prescription for the quarterly change of the federal funds rate target implied by the rules in the top panel together with the actual quarterly change of the target rate.

The prescriptions shown in the figure are static—simply recording what each rule prescribes in a particular quarter. As such they cannot capture the counterfactual performance of the economy, had the rule been followed over time. Still, the prescriptions and deviations from actual policy contain information that can potentially be useful to assess policy. As can be seen, all three rules suggested that in the aftermath of the crisis policy was constrained by the ZLB. All three would have prescribed negative settings for the federal funds rate for some time, if that were possible. When a rule prescription suggests a negative setting, this corresponds to a recommendation

Chart 4
Policy Rule Prescriptions: MPR

A. Level

Fed Funds ⋯⋯ Taylor – – Balanced Approach –·– First Difference

B. Quarterly Change

Fed Funds ⋯⋯ Taylor – – Balanced Approach –·– First Difference

Note: Policy rules based on July 2019 MPR (BOG 2019.)

for additional policy accommodation, for example through quantitative easing, which we examine further below. Another interesting observation is that all three of these rules would have prescribed lift-off at a much earlier date than the fourth quarter of 2015, when lift-off actually occurred. None of these three rules appears to capture the contours of policy particularly well, even accounting for the proper interpretation of prescriptions at the ZLB. On this basis, and to the extent policy is considered to have been reasonably good over the sample shown, their usefulness as a tool for understanding Federal Reserve policy would appear to be limited. As explained below, this appears to be a reflection of the specific implementation of the rules presented in the MPR.

An important limitation of the rules presented in the MPR is that they do not reflect the information available to the FOMC when decisions are made: They are not operational. For example, the inflation and unemployment series used to construct the prescriptions shown in the MPR (and replicated in Chart 4) correspond to the latest time-series data on historical unemployment and core PCE inflation. For each quarter, t, implementation uses data for the unemployment and inflation rate for quarter t, as available at the time the MPR is produced. In fact, information about the actual data for quarter t only becomes available with a lag and is subject to subsequent revisions.[30]

To assess the practical usefulness of simple policy rules it is critical to present prescriptions with information that could realistically be available in real time (Orphanides 2001). Indeed a major challenge in designing and implementing a monetary policy rule is the precise choice of inputs that can be available at the time policy decisions are made and can usefully summarize the current state of the economy and its direction. Lagged data on inflation and real economic activity, which can be available when decisions are made, is one way to make simple rules operational. However, lagged data often reflect transient noise and do not capture the current state of the economy as well as assessments that can fold in additional information.

An alternative is to rely on near-term forecasts of inflation and economic activity. To the extent policymakers view near-term forecasts as more useful summary descriptions of the current state of the

economy, these forecasts would also be more useful inputs for simple policy rules.

Indeed, Federal Reserve policymakers have stressed the role of forecasts in policy deliberations, in recent decades. Characteristic is the following observation by Chairman Greenspan: "Increasingly since 1982 we have been setting the funds rate directly in response to a wide variety of factors and forecasts" (Greenspan 1997). Accordingly, near-term forecasts have been extensively employed for policy rule evaluation analysis and to describe Federal Reserve policy. Similar analysis could be incorporated in the MPR.

VI.ii. Forecast-Based Real-Time Rules

Near-term forecasts of inflation and economic activity, for example those constructed by Federal Reserve staff and professional forecasters in the private sector, provide good summary descriptions of the current state of the economy because they incorporate immense information that can filter transitory factors and fold in qualitative information that influences incipient production and pricing decisions.[31] This informational advantage is most clearly evident for very short horizons—most importantly for the current and subsequent quarters.[32] For this reason, near-term forecasts are more useful as inputs for simple policy rules than available historical data.[33]

To illustrate how near-term forecasts could be employed for expanding the analysis currently presented in the MPR, this section presents an example application using forecasts from the Survey of Professional Forecasters (SPF). The SPF, which has been maintained by the Federal Reserve Bank of Philadelphia, is well-suited for this illustration as it provides representative forecasts at a quarterly frequency over a long sample.[34]

As a starting point, consider a forecast-based implementation of the rule in equation (3). We focus on three-quarter-ahead forecasts of growth over four quarters. For each quarter, t, we can employ as an input the median three-quarter-ahead forecast of nominal GDP growth from quarter $t-1$ (which is the last quarter for which historical data are available), until quarter $t+3$. We denote this forecast with $n_{t+3|t}$, where the double subscript, $t+3|t$, is introduced to

facilitate keeping track of alternative vintages of forecasts and data. Also needed is a proxy for the natural growth of income, n_t^*. This can be constructed as the sum of the median forecast of GDP over the next 10 years (as a proxy for the growth rate of potential GDP) and the 2% inflation goal. Note that since estimates of potential output growth vary over time (reflecting the evolution of trend productivity and the growth of the labor force), n_t^* will exhibit some time-variation even with a constant inflation goal.[35]

The resulting near-term forecast of nominal income growth and corresponding estimate of its natural growth are shown in Chart 5. The rule prescribes that policy should be eased, when the near-term growth forecasts falls short of the natural growth estimate, and tightened otherwise. More precisely, the rule can be expressed as follows:[36]
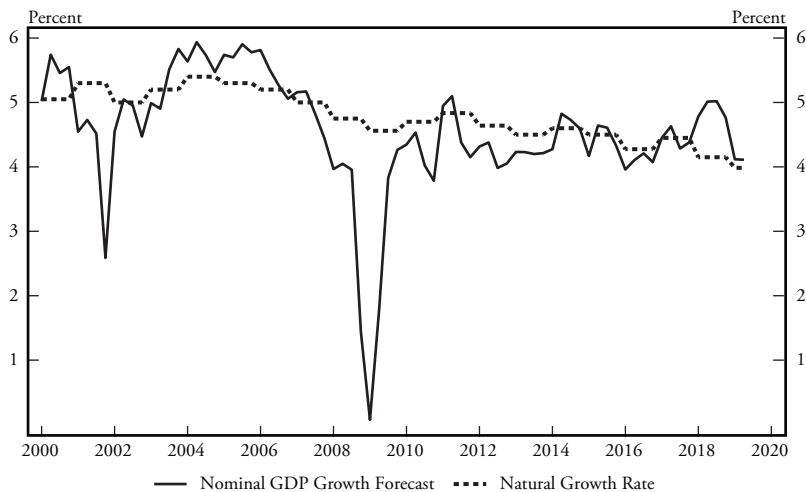
Natural-growth rule:

$$i_t^N = i_{t-1} + 0.5(n_{t+3|t} - n_t^*) \tag{7}$$

Chart 6 presents the resulting prescriptions from the natural growth rule, based on the near term forecasts in the SPF. In contrast to the three rules in the MPR, this illustrative forecast-based rule broadly captures the contours of actual policy. Unlike the MPR rules, it suggests that further easing of policy was virtually consistently required over the period 2009-13, broadly in line with the quantitative easing policies adopted. That said, the timing of the survey employed as an input does not match regularly scheduled FOMC meetings, when most policy changes occurred during the sample shown in the figure, and the assessment of the current state of the economy reflected in the SPF forecasts may not match the consensus assessment of the FOMC. As a result, the relation between the resulting policy prescriptions shown in Chart 6 should not be expected to match actual policy very closely.

In light of the Federal Reserve's preference to state its inflation objective using PCE inflation and the preference to focus on core PCE inflation and the unemployment rate (as reflected in the MPR rules) it is instructive to check the sensitivity of rule prescriptions to the

Chart 5
Inputs to Natural Growth Rule: SPF

Notes: The solid line is the three-quarters-ahead forecast of nominal GDP growth over four quarters, $n_{t+3|t}$. The dashed line is a proxy of natural growth, n_t^*, constructed as the sum of the forecast of real GDP over the next 10 years and the 2% inflation target.

alternative choice of inputs. Consider the following two forecast-based, real-time variations of the MPR first difference rule:

Forecast-based first-difference rule with growth:

$$i_t^G = i_{t-1} + 0.5(\pi_{t+3|t} - \pi_t^*) + 0.5(g_{t+3|t} - g_t^*) \tag{8}$$

Forecast-based first-difference rule with unemployment:

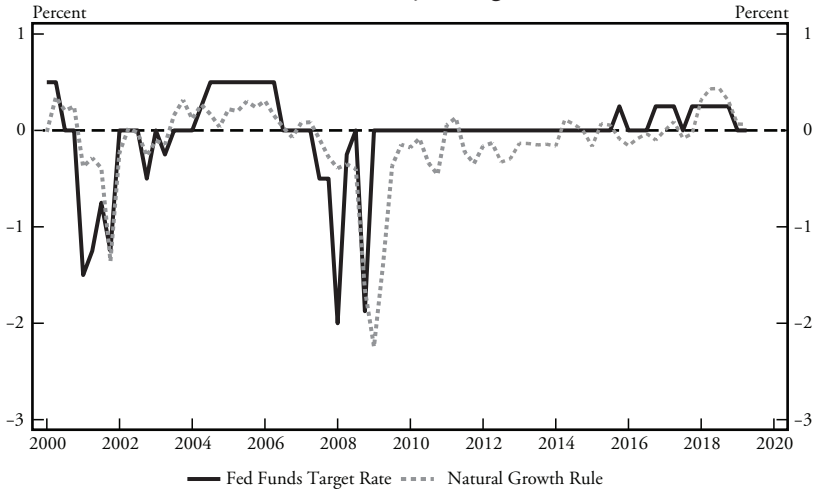$$i_t^U = i_{t-1} + 0.5(\pi_{t+3|t} - \pi^*) - (u_{t+3|t} - u_{t-1|t}) \tag{9}$$

Prescriptions from these two rules, together with the corresponding prescriptions from the natural growth rule are shown in Chart 7. Note that since the SPF only started collecting survey forecasts of core PCE in 2007 this comparison is limited to the first quarter of 2007 to the second quarter of 2019 sample. Nonetheless, the comparison suggests two informative conclusions. First, the policy prescription using near-term forecasts of core PCE inflation and real GDP growth is very similar to that based on nominal income. Thus, differences between using the implicit GDP deflator and the core PCE deflator for inflation are small and the two can serve as substitutes, for practical purposes. Second, the same does not hold for policy
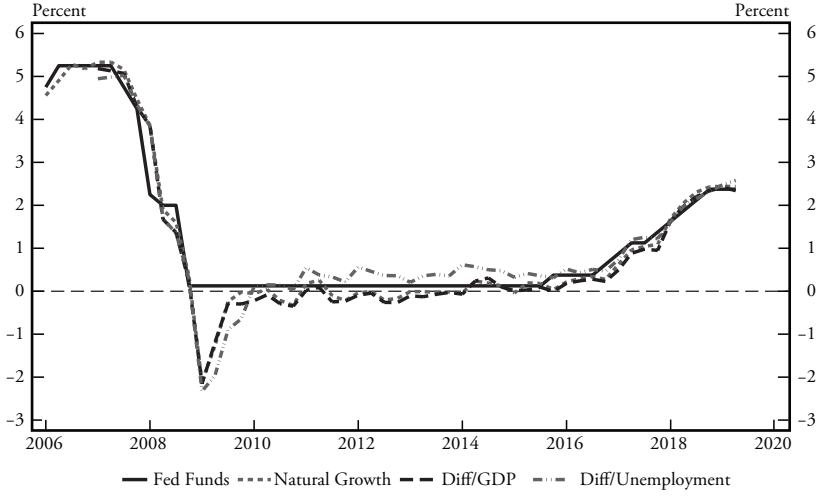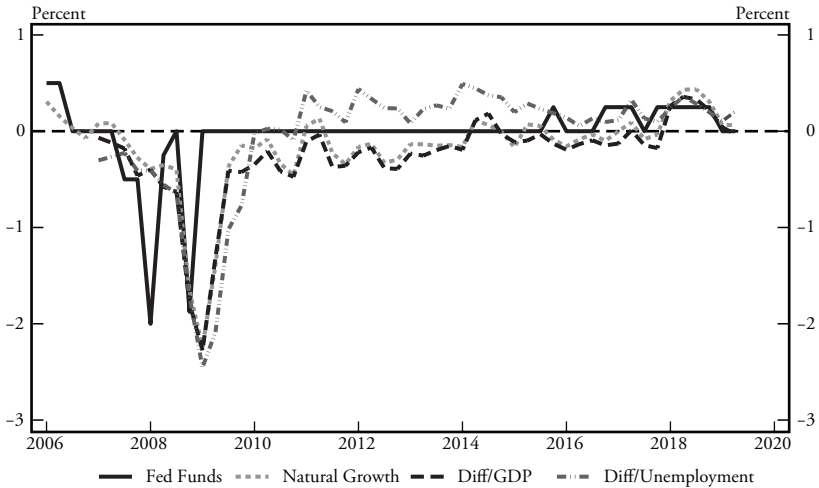
Chart 6
Natural Growth Rule: SPF

A. Level

Percent — Percent

Fed Funds Target Rate — — — Natural Growth Rule

B. Quarterly Change

Percent — Percent
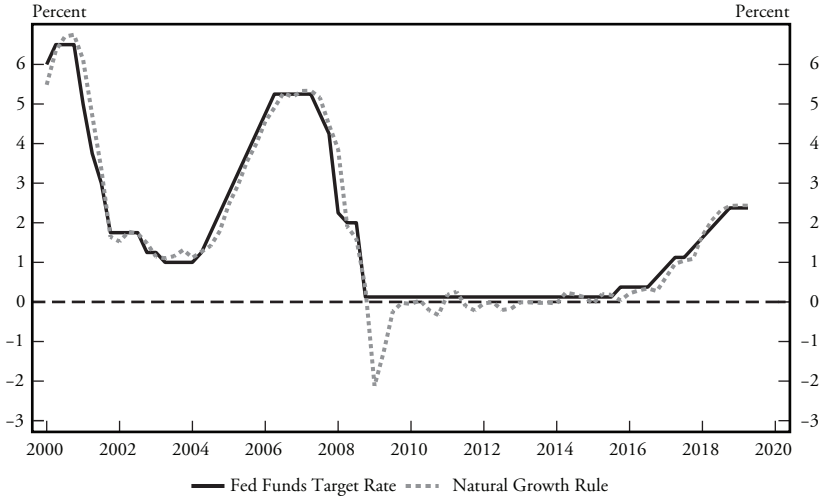
Fed Funds Target Rate — — — Natural Growth Rule

Note: Natural growth rule based on SPF forecasts of nominal income growth.

Chart 7
Difference Rules: SPF

A. Level

Fed Funds ···· Natural Growth — — Diff/GDP —·—· Diff/Unemployment

B. Quarterly Change

Fed Funds ···· Natural Growth — — Diff/GDP —·—· Diff/Unemployment

Note: Alternative difference rules based on SPF forecasts.

prescriptions using the unemployment version of the rule, after application of Okun's law. Evidently, the cyclical properties of changes of the unemployment rate, relative to GDP growth dynamics, are sufficiently different that a translation of simple rules based on real GDP to rules based on the unemployment rate changes cannot be simply obtained using Okun's law. This suggests that caution is required in the interpretation of alternative implementations of the rule.
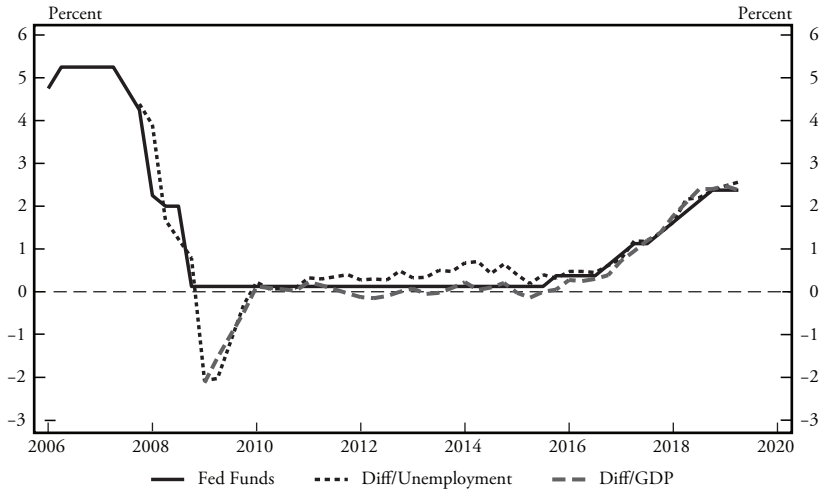
VI.iii. SEP-Based Rules

Ultimately, monetary policy decisions reflect policymakers' own views about the macroeconomic outlook. Consequently, simple rules based on policymakers' own near-term projections of inflation and economy can better serve as a tool to communicate policy. In the case of the Federal Reserve, the SEP could provide the pertinent information.

To illustrate the potential role of simple rules based on the SEP, we next present some examples of real-time forecast based versions of the rules presented in the MPR. To that end, we can employ the median projections of core PCE, real GDP growth and the unemployment rate. (When the medians are not available, we use the midpoints of the available central tendencies instead.) Unfortunately, at present, the SEP only provides calendar year projections so consistent three-quarter-ahead projections, similar to those that can be constructed with the SPF are not available for all quarters. For projections published in the first quarter of the year, the current calendar year projections can be used directly. For the second, third and fourth quarters, a weighted average of the projections for the current and following years is used as an approximation.[37]
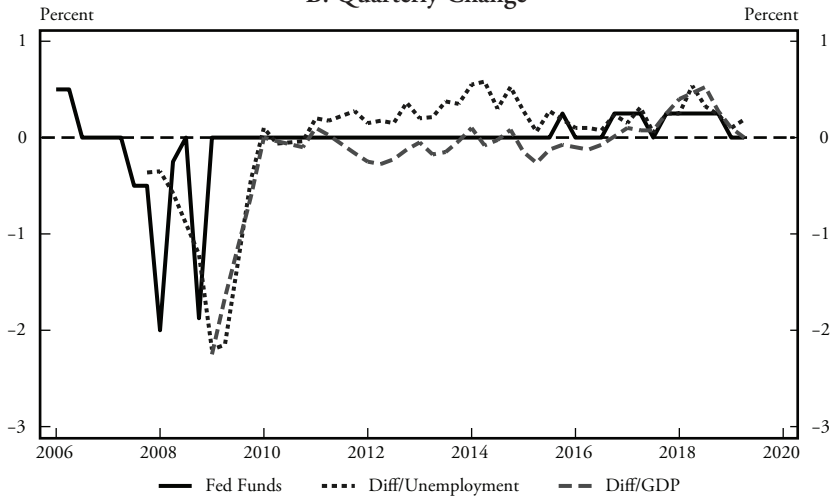
Chart 8 shows the prescriptions obtained using the SEP projections for the two forecast-based versions of the first difference rule, equations (8) and (9). For the version based on GDP growth, the rule is only shown since the first quarter of 2009, when the FOMC first published projections for the long run. The median of these projections is used as a proxy for the growth rate of potential GDP. Note that since the SEP does not include projections for nominal GDP growth, the natural growth version of this rule cannot be constructed. As can be seen, these two rules suggest broadly similar policy

Chart 8
Difference Rules: SEP

A. Level

Percent   Percent

| | Fed Funds | Diff/Unemployment | Diff/GDP |

B. Quarterly Change

Percent   Percent

| | Fed Funds | Diff/Unemployment | Diff/GDP |

Note: Alternative difference rules based on SEP projections.

prescriptions to the corresponding rules based on the SPF, shown in Chart 7. And as with the SPF implementation, the rule based on the change in the unemployment rate fails to describe policy well. For completeness, Chart 9 presents the inputs of this rule, in a format that can be compared with the inputs of the natural growth rule using the SPF (shown earlier in Chart 5).

The SEP can also be used to construct prescriptions corresponding to the forecast-based versions of the Taylor (1993) and balanced-approach rules presented in the MPR. Specifically:

Forecast-based Taylor (1993) rule:

$$i_t^{FT} = r_t^* + \pi_{t+3|t} + 0.5(\pi_{t+3|t} - \pi^*) + (u_t^* - u_{t+3|t}) \tag{10}$$

Forecast-based balanced-approach rule:

$$i_t^{FB} = r_t^* + \pi_{t+3|t} + 0.5(\pi_{t+3|t} - \pi^*) + 2(u_t^* - u_{t+3|t}) \tag{11}$$

Since the first quarter of 2012, when the dot plot was first presented, the SEP, specifically the median longer-term projection of the federal funds rate, can be used as a source of information for r^*. Together with the median longer-term projection for the unemployment rates, the necessary stars to obtain prescriptions from these two rules are both available. The result is shown in Chart 10. For ease of comparison, this figure also reproduces the two versions of the SEP based first-difference rules from Chart 7.

As can be seen in Chart 10, and similar to the versions of the rules shown in the MPR, neither the Taylor rule, nor the balanced approach rule appear to capture the contours of Federal Reserve policy in the past several years. In contrast, the first-difference rule based on the SEP forecasts of core PCE inflation and GDP growth does. Evidently, even though the FOMC has not clearly articulated a policy strategy, its policy decisions can be broadly characterized with a simple and robust monetary policy rule that is based on participants' economic projections and is consistent with sound policy principles, as articulated in the MPR.

Simple policy rules based on near-term projections of inflation and economic activity can serve as a useful tool to communicate the

Chart 9
Inputs to Approximate Natural Growth Rule: SEP

Percent   Percent

Nominal GDP Growth Proxy — — Natural Growth Rate Proxy
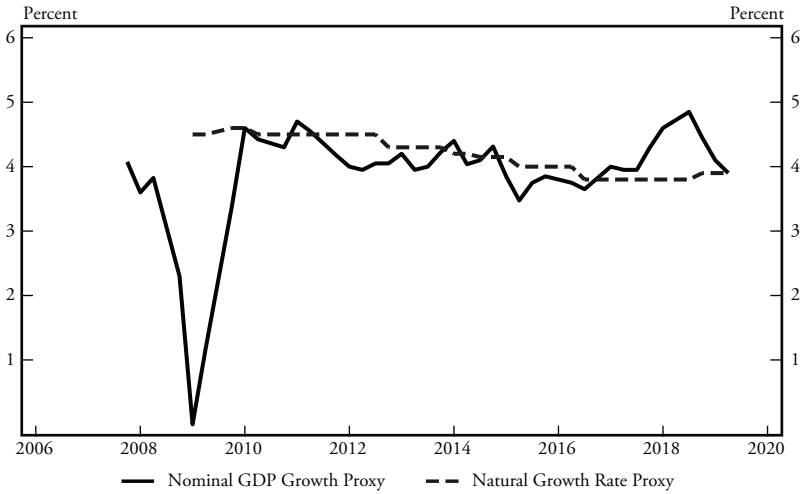
Notes: The solid line is a proxy of projected nominal income growth, constructed as the sum of the three-quarters-ahead forecasts of core PCE inflation and real GDP growth. The dashed line is a proxy of natural growth. This is constructed as the sum of the longer-run projection of real GDP and the 2% inflation target.

Chart 10
Alternative Forecast-Based Rules: SEP

Percent   Percent

— Fed Funds ····· Diff/Unemployment — — Diff/GDP —·— Taylor —··— Balanced
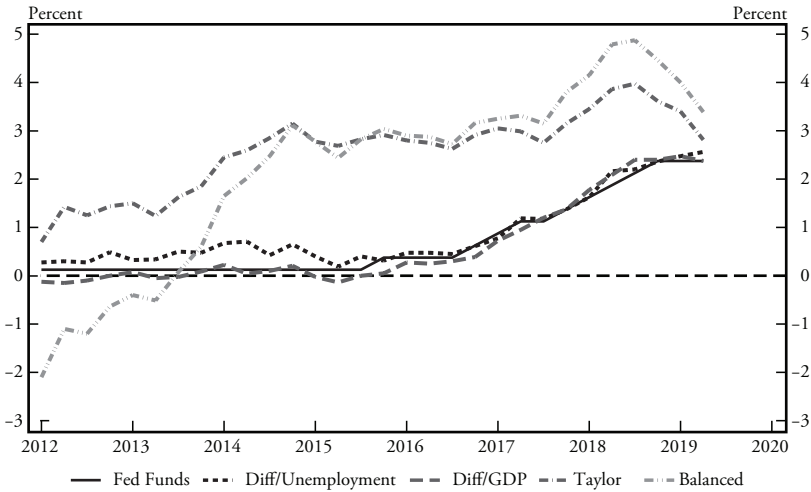
Note: Alternative rules based on SEP projections.

Federal Reserve's strategy and provide a rationale for policy decisions. When viewed through the lens of a policy rule, otherwise vague language, such as the characterization that the Federal Reserve will be "data dependent" acquires concrete meaning. Armed with a rule that describes policy strategy, the public can assess how monetary policy will likely be adjusted in response to incoming data: The policy response would be expected to broadly reflect how incoming information changes the outlook for inflation and economic activity.

VII.   Systematic Policy at the ZLB

A policy rule formulated with the short-term policy interest rate as its instrument does not provide a complete description of monetary policy strategy at the ZLB. Nonetheless, to the extent other monetary instruments, such as the size of the balance sheet, can provide monetary accommodation equivalent to what would have otherwise been provided with further interest rate reductions, interest-rate policy rules can continue to provide policy guidance at the ZLB. This section briefly discusses the quantitative easing policy implemented by the Federal Reserve since the crisis, in the context of a rules-based policy approach.

As already mentioned, in response to the crisis and reaching the ZLB, the Federal Reserve implemented decisive quantitative easing. This provided additional monetary accommodation that served as a substitute to further reductions in the federal funds rate. Before 2012, for the so-called QE1 and QE2 programs, the Federal Reserve announced a fixed total quantity of assets to be purchased, and the monthly rate of purchases until the total quantity was reached. Starting in September 2012, with the so-called QE3 program, it changed its approach: Specifically, it announced a monthly pace of purchases that would be open-ended and provided guidance about how the provision of accommodation related to the progress of the economy in recovering from the recession. However, the conditions for ending the purchases and reversing the accommodation were not initially clearly communicated. Understandably, this attracted criticism and calls for the Federal Reserve to adopt a more systematic policy approach.[38] An unchecked expansion of the Federal Reserve's balance sheet risked eventually compromising price stability.

A monetary policy rule could have facilitated the communication of the Federal Reserve's QE policy and ameliorated concerns about the adverse consequences of its discretionary approach. For example, consider how QE3 could have been described in terms of a forecast-based difference rule, along the lines of the SEP-based interest rate rules described in the previous section. The main difference is the use of changes in the size of the balance sheet instead of changes in the federal funds rate as the policy instrument. As an illustration, consider the approximate natural growth rule, based on the SEP projections,[39] summarized with the inputs shown in Chart 9. Recall that determining policy moves, whether to provide additional accommodation or to remove accommodation, is summarized with a simple comparison. When the near-term projection of nominal income falls short of its natural growth, policy should be eased somewhat. When the near-term projection of nominal income exceeds its natural growth, consistent with the 2% inflation goal, policy should be tightened. The open-ended nature of QE3, with monthly purchases of assets continuing while the near-term outlook was perceived to be w eaker than normal, could be seen as communicating the equivalent accommodation of interest rate cuts. An advantage of communicating QE in this rule-like manner, is that it would have clearly provided guidance regarding the conditions that would have ended the QE3 program, as part of a consistent policy strategy.

As with any policy instrument, practical implementation of QE policies requires some information regarding their multiplier effects on inflation and economic activity. Calibrating the increments of the size of the balance sheet needed to deliver accommodation equivalent to a 25-basis-point change in the federal funds rate is not straightforward. Indeed, this is an empirical matter for which scant empirical evidence existed before the crisis but for which useful information has accumulated over the past decade.

Overall, during its encounter with the ZLB the Federal Reserve increased its balance sheet by about 20 percentage points of nominal GDP (Chart 1). The cumulative monetary policy accommodation provided through QE programs has been significant, though estimates are uncertain. Federal Reserve models capture the

accommodation provided by quantitative easing through its effect on depressing longer-term interest rates. As summarized by Fischer (2015), quantitative easing is estimated to have depressed 10-year Treasury yields by over 100 basis points. This is similar to the easing that would have been associated with a reduction of the federal funds rate by a few percentage points. Results reported by Doniger et al. (2019), based on Federal Reserve estimates and model simulations, suggest that an expansion/contraction of the Federal Reserve balance sheet by 2 percentage points of GDP has macroeconomic effects that are roughly equivalent to a 25-basis-point cut/increase in the federal funds rate. Such estimates can serve as an approximate guide for adjusting the size of the balance sheet at the ZLB, in the context of a policy rule with an interest rate instrument.

The size of the balance sheet is not the only alternative way to implement policy in a systematic manner at the ZLB. Monetary policy influences real economic outcomes through its impact on overall financial conditions. These are shaped by the availability and cost of credit, the pricing of bonds, equity and other asset prices, all of which can be influenced by central bank operations. The best choice of operating instrument when a central bank is faced with the ZLB is not necessarily the same under all circumstances. What matters most, with whatever instrument is judged as most appropriate at the ZLB, is that monetary policy should remain systematic and respond to the evolution of the economic outlook in a similar fashion as when the ZLB does not constrain overnight interest rates.

VIII.   Refining the Current Framework

Revisiting the Federal Reserve's policies over the past decade suggests that despite progress in improving policy strategy and its communication, most significantly with the adoption of a 2% symmetric inflation goal, room for improvement remains. This section focuses on three areas where improvement could address some existing challenges and bring lasting benefits.

VIII.i. Monetary Policy Strategy

The most significant gains would result from the adoption and communication of a concrete monetary policy strategy. The importance of having a common strategy is understood by FOMC participants, as evidenced by the effort to formulate and communicate a common strategy in January 2012. While that effort succeeded in bringing about the adoption of a 2% symmetric inflation goal, consensus on a policy strategy could only be achieved with an unhelpfully vague description of said strategy.

In light of the Federal Reserve's dual mandate, reaching a consensus on policy strategy is certainly not as straightforward as reaching a consensus under Inflation Targeting. The diversity of views among FOMC participants regarding the most appropriate weight to be given to each of the Federal Reserve's ultimate goals, suggests participants could have diverse preferred strategies for fulfilling the Federal Reserve's mandate. Nonetheless, lack of agreement on a concrete strategy perpetuates the costs of formulating policy under discretion. Without a common strategy, FOMC decisions are reached with meeting-by-meeting discretion, resulting in worse policy trade-offs and worse economic performance over time.

The FOMC faced a similar challenge when participants considered the adoption of a common inflation goal. There was diversity of views on the most appropriate definition of price stability—what each participant viewed as most consistent with the Federal Reserve's mandate. The crisis made the costs associated with continued lack of consensus more salient. Acknowledging that agreement on a common goal would have lasting benefits for the economy, which was desirable for the Committee as a whole, FOMC participants decided to put aside their individual differences and agree on a common goal.

One approach for the FOMC to describe its policy strategy would be to embrace a framework for the evaluation and adoption of a simple policy rule that could serve as a benchmark for monetary policy decisions. The Committee could select a rule that in its judgement fulfills the Federal Reserve's dual mandate over time, based on a rigorous evaluation process, benefiting from policy research that

has been conducted in central banks and in academic institutions over the past several decades. To best contribute to the attainment of the Federal Reserve's mandate in practice, the selected simple rule should be robust to the uncertainties associated with our imperfect knowledge of the macroeconomy. Recognizing that the structure of the economy as well as our understanding of this structure evolves over time, the framework should foresee periodic review and adaptation of the benchmark rule.

The selected rule, could be presented every January as part of an expanded annual *Statement on Longer-Run Goals and Monetary Policy Strategy*. Incorporating a benchmark rule in the Statement would provide a clear description of the Federal Reserve's strategy. The rule's periodic evaluation, and occasional adaptation, would ensure that it reflects and properly communicates the evolving nature of our understanding of the economy and how this influences monetary policy.

In adopting this change, the FOMC would take an incremental step toward constraining its discretion in a constructive manner. This would improve policy trade-offs, enhance transparency and promote accountability.[40] Discretion is more constructively employed to periodically adapt a benchmark policy rule, rather than to adjust policy on a meeting-by-meeting basis.

VIII.ii. Quarterly FOMC Monetary Policy Report

Publication of a simple policy rule describing the FOMC's policy strategy would facilitate the communication of policy decisions and clarify their relation to the evolution of data and the economy's outlook. To that end, the SEP could be expanded into a quarterly FOMC monetary policy report that would simultaneously provide FOMC participants' projections and the rationale for monetary policy decisions. Policy actions would be described in terms of the evolving economic outlook, as reflected in FOMC members' projections.

Consider, for example, a benchmark rule formulated in terms of near-term projections of inflation and economic activity (with a horizon less than one year), similar to the rules discussed earlier. In most

circumstances, policy would be expected to closely align to the prescription of the benchmark policy rule corresponding to the median projections of FOMC members. The enhanced transparency that would arise from this process under normal circumstances would enhance overall policy credibility, which is an exceptionally valuable asset in more challenging times.

The benchmark rule would thus also help communicate policy in exceptional circumstances, when the Committee judges that a deviation from its benchmark rule is warranted. Such deviations could arise, for example, if risks to the outlook were deemed to be notably asymmetric and if the Committee judged that a policy setting that differed from that corresponding to modal projections would better promote the Committee's mandate over time.[41] In such circumstances, an explanation for the deviation would be provided, with reference to the Committee's risk assessment and uncertainty of the economic outlook. The overall credibility gained by the enhanced transparency of the policy process would protect against the potential loss of credibility in these more challenging episodes.

The introduction of a quarterly FOMC monetary policy report along these lines could be accompanied with other changes, streamlining the policy process. One implication is that it would make the associated four meetings per year more informative, and any other regularly scheduled meetings much less so. In light of the obvious advantages of providing as thorough as possible analysis when policy decisions are made, the Committee could consider reducing the frequency of regularly scheduled monetary policy meetings to just four per year. As always, when circumstances call for an additional meeting, a conference call could be arranged. When a central bank's policy strategy is well understood, and monetary policy remains systematic, fewer meetings are needed for the effective conduct of policy.

In conjunction with the Committee's projections, a benchmark rule would reduce the ambiguity of forward guidance provided with the SEP dots and add concrete meaning to data dependence and policy conditionality. Indeed, the dots need not be part of the quarterly FOMC monetary policy report. A rule provides the best way to communicate forward guidance (Plosser 2012).

VIII.iii. Communicating Uncertainty

The third area of potential improvement is the communication of the uncertainty associated with the economic outlook.

Acknowledging uncertainty is critical for successful monetary policy communication (Mester 2016). At present, the uncertainty faced by FOMC members is not adequately reflected in the SEP. The SEP provides more information about disagreement regarding modal projections. This is informative regarding the diversity of views about the most likely economic outlook. Indeed, information about this diversity of views is one of the most useful features of the SEP. However, this is not informative regarding the uncertainty of individual participants' projections or about the evolution of this uncertainty over time.[42]

The communication of uncertainty could be improved in several ways. The SEP could incorporate information about the probability distribution of individual projections. This need not be provided for all variables nor for all horizons. It would be most informative for core PCE inflation, real GDP growth and the unemployment rate.

Information about the probability distribution of the projections for each variable could be provided in different ways. The simplest would be to provide a standard deviation. Alternatively, participants could be asked for uncertainty ranges, for example the 70% and 90% confidence intervals associated with their modal projections. Such information would be useful for examining the evolution of overall uncertainty over time. However, it would not suffice for communicating notable asymmetries nor the emergence of perceived tail risks to the outlook. Such information could be particularly useful to communicate in circumstances when policy decisions do not align with what would have been expected on the basis of modal projections of the economic outlook. One way to provide such information is with probabilistic questions, similar in format to the probabilistic questions in the SPF that effectively ask survey participants to provide an approximate probability distribution for their forecasts.

Another approach to providing information about uncertainty would be through the addition of alternative risk scenarios as part of the SEP. This approach could be patterned after the risk analysis associated with the Federal Reserve's staff forecast that is presented in the *Tealbook*. It would be especially useful for explaining the impact of plausible but low probability events that may have asymmetric consequences on the economy. Occasionally, analysis of such scenarios may reveal projected outcomes that are sufficiently concerning to meaningfully influence the setting of monetary policy.

As an example, consider the *Tealbook* prepared for the September 2012 FOMC meeting (at which the FOMC took the decision to initiate open-ended quantitative easing, QE3). In addition to the baseline projection, the September 2012 *Tealbook* included eight alternative scenarios. Two of these scenarios were focused on foreign developments, specifically Europe: One of these was referred to as "Faster European recovery" while the other was referred to as "European crisis with severe spillovers." Both of these scenarios could have been deemed similarly plausible, depending on economic and political developments in Europe. Yet, they had vastly asymmetric implications for the U.S. economic outlook. Consider the implications reported for the projection for the unemployment rate for 2013: Under the baseline *Tealbook* projection, unemployment was projected to decline to 8%. Under the "Faster European recovery" scenario, a larger decline was projected, to 7.8%. But under the "European crisis with severe spillovers" scenario, the unemployment rate was projected to reverse its decline and rise to 10.4%.

Presentation of plausible scenarios such as these can highlight asymmetric risks that may be of concern, especially when associated with high impact developments. In the context of the SEP, FOMC participants could be presented with two or more alternative scenarios, and could be asked to provide their assessment of the evolution of the U.S. economy in these scenarios, relative to their baseline projections. These scenarios could be a subset of those that are also presented in the *Tealbook,* facilitating policy discussions. The systematic inclusion of such scenarios in the quarterly FOMC monetary policy report, would provide a tool allowing the FOMC to better explain

the role of uncertainty in policy decisions, especially under exceptional circumstances, when policy deviated from the benchmark rule prescription based on the modal projection of the economic outlook.

IX.   Conclusion

Monetary policy is most effective when it is formulated in a systematic manner, following a clearly communicated monetary policy rule. Even with the best intentions, discretionary policy worsens policy tradeoffs and yields inferior economic performance over time. In an environment of uncertainty, the rationale for discretionary policy decisions may be misunderstood. Discretion may invite perceptions of political interference that damage the credibility of the central bank and threaten its independence.

In a recent article, four former Federal Reserve Chairs reminded their audience that:

> [A]n economy is strongest and functions best when the central bank acts independently of short-term political pressures and relies solely on sound economic principles and data. … Even the perception that monetary policy decisions are politically motivated, or influenced by threats that policy makers won't be able to serve out their terms of office, can undermine public confidence that the central bank is acting in the best interest of the economy. That can lead to unstable financial markets and worse economic outcomes (Volcker et al. 2019).

A systematic monetary policy framework that is clearly communicated and well understood protects against such threats.

Central banks are the most important public policy institutions for promoting long-term stability and growth. But they are not perfect—no human institution can ever be. In an evolving economy, it is inevitable that what is understood to be best practice will change over time. Circumstances that illuminate the weaknesses of current practice present opportunities for adaptation and improvement. Since the 2008 crisis, too many such opportunities have arisen in the global central banking world. The search for improvement is never done.

Endnotes

[1]First communicated in January 2012, and since then reaffirmed every year in the FOMC's *Statement on Longer-Run Goals and Monetary Policy Strategy*.

[2]Presented in the quarterly *Summary of Economic Projections* and in FOMC statements.

[3]Since July 2017, this has become a feature of the biannual *Monetary Policy Report*.

[4]And, for a time, quantitative tightening has been more aggressive than that associated with the Federal Reserve's earlier encounter with the ZLB (Chart 1).

[5]Pertinent research, with a focus on the Federal Reserve, includes Meltzer (2003, 2014a, 2014b) and Hetzel (2010), who provide historical analyses of monetary policy; Taylor and Williams (2011), who review robust monetary policy rules; Fuhrer et al. (2018) who examine the evolution of the policy framework; Eberly, Stock and Wright (2019) who evaluate the current framework; and Lindsey (2003), Kliesen, Levine and Waller (2019) and Cecchetti and Schoenholtz (2019), who focus on the communication of monetary policy.

[6]U.S. Congress (1977).

[7]See Orphanides and Wilcox (2002) for a description of the framework and pertinent references to FOMC discussions.

[8]Goodfriend (1993) and Orphanides and Williams (2005a, b) discuss the policy inefficiency associated with inflation scares arising from the absence of a clear inflation goal. This inefficiency is a major disadvantage of the opportunistic approach to disinflation, as well as alternative approaches that allow the central bank's inflation objective to drift over long time intervals.

[9]To facilitate policy deliberations that could accommodate alternative views among FOMC participants, the staff routinely presented policy analysis based on multiple alternative assumptions regarding the Committee's desired long-run inflation goal.

[10]See Bernanke and Mishkin (1997), Bernanke et al. (1998) and Bernanke and Woodford (2005).

[11]Bernanke (2003) introduced the concept of the optimal long-run inflation rate (OLIR), defined as the inflation rate consistent with the best average economic performance of the economy with respect to the Federal Reserve's dual mandates. He also pointed out that available research at the time, including regarding the ZLB, suggested the OLIR might be around 2%.

[12]This interpretation was reinforced by Chairman Bernanke in a speech on *Federal Reserve Communications*, delivered the same day, Bernanke (2007).

[13]This was presented under Alternative A in the December 2008 *Bluebook*.

[14]Interestingly, some responses appeared to be influenced by the discussion regarding publication of a common target. A trial run had first collected participants' longer-term economic projections in October 2008. In the replies to that survey, a large majority of participants had identified not 2.0 but 1.7 to 1.8% as their preferred inflation goal.

[15]No similar decline has been observed in the dispersion of long-term forecasts of real GDP growth or the unemployment rate (not shown).

[16]The subcommittee was chaired by Vice Chair Janet Yellen with Governor Sarah Bloom Raskin, Chicago President Charles Evans and Philadelphia President Charles Plosser serving as members.

[17]Effectively, the OLIR concept in Bernanke (2003).

[18]See English et al. (2015) for an interpretation along the lines of "flexible" inflation targeting. The relation with simple policy rules is discussed in Section VI.

[19]Reifschneider and Williams (2000), Eggertsson and Woodford (2003).

[20]See Taylor and Williams (2011), Bordo (2019) and Tavlas (2019) for reviews of the merits and discussions of the historical origins of policy rules.

[21]Public discussions of the Taylor rule by Federal Reserve officials in the 1990s include Yellen (1996), Meyer (1996) and Greenspan (1997).

[22]The descriptive ability was first noted in Taylor (1993). The robustness characteristics were first documented in the Brookings project on policy regime evaluation reported in Bryant, Hooper and Mann (1993a). What later became known as the Taylor rule is identified as Regime 2B, and referred to as "real-GNP-plus-inflation targeting" in the Brookings volume.

[23]This was not a coincidence but a reflection of the rule's origins: In their description of the alternative rules evaluated in the Brookings project, Bryant, Hooper and Mann (1993b) noted that a motive for including the "real-GNP-plus-inflation targeting" specification in the comparison was that it seemed "consistent with the stated dual objectives of many central banks" (p. 225).

[24]In highly stylized models where the Taylor rule represents optimal policy for minimizing the quadratic loss function (1), a monotonic mapping links the preference weight ω to the relative responsiveness of the rule to inflation and the output/unemployment gap.

[25]See, e.g., Yellen (2012, 2015, 2017).

[26]See, in particular, Powell (2018) and Clarida (2018).

[27]Indeed, the balanced approach rule would have likely led to much worse outcomes, with even higher inflation and greater instability than was observed at the time. See Bullard and Eusepi (2005) and Orphanides and Williams (2005c).

[28]See Taylor (1985), McCallum (1988) and Hall and Mankiw (1994). Orphanides (2003) relates the alternative frameworks to interest rate rules while Orphanides and Wieland (2013) and Tetlow (2014) present comparisons of the robustness characteristics of pertinent interest rate rules across models.

[29]The translation uses Okun's law $y_t = 2(u_t^* - u_t)$.

[30]As a consequence, the rules presented are never current. For example, the latest MPR, which was published July 5, 2019, did not include rule prescriptions for the second quarter of 2019 since the necessary data had not been published. The rule prescriptions for the second quarter of 2019 shown in Chart 4 are based on data that became available in the third quarter of 2019.

[31]This includes factors such as weather-related events, strikes and other temporary disruptions in supply chains, as well as information about near-term production and pricing plans from industry sources.

[32]Faust and Wright (2009) and Ang, Bekaert and Wei (2007) document this informational advantage for Federal Reserve and private-sector forecasts, respectively.

[33]Medium- and longer-term forecasts are not similarly useful. Indeed, as shown by Levin, Wieland and Williams (2003), policy shaped by inflation forecasts at horizons beyond one year can be destabilizing because of the sensitivity of such forecasts to misspecification.

[34]For more information about this survey see Croushore and Stark (2019).

[35]This ensures that policy remains consistent with the constant inflation goal, and differs from nominal income targeting frameworks that focus on maintaining a constant growth rate of nominal GDP.

[36]To distinguish this formulation from the forecast-based version of the related rule in the MPR, which is further discussed below, and following Orphanides (2003), this specification is referred to as the natural growth rule.

[37]This draws on Lindsey, Orphanides and Wieland (1997), who used the calendar-year Humphrey-Hawkins projections to obtain comparable three-quarter-ahead forecasts.

[38]Meltzer (2013) and Taylor (2013) present more detailed critiques of the Federal Reserve's QE policies.

[39]As noted earlier, in this illustration the sum of core PCE inflation and real GDP growth from the SEP are used as a proxy for nominal income growth.

[40]It would also render unnecessary suggested improvements along these lines through changes in legislation, as discussed in Taylor (2011).

[41]Such decisions could include deviation toward easier policy as well as tighter policy, consistent with the risk-management paradigm described in Greenspan (2004).

[42]D'Amico and Orphanides (2014) discuss the relationship and informational content of measures of uncertainty and disagreement of modal forecasts in the SPF.

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