Prefatory Note

The attached document represents the most complete and accurate version available based on original files from the FOMC Secretariat at the Board of Governors of the Federal Reserve System.

Please note that some material may have been redacted from this document if that material was received on a confidential basis. Redacted material is indicated by occasional gaps in the text or by gray boxes around non-text content. All redacted passages are exempt from disclosure under applicable provisions of the Freedom of Information Act.

Report to the FOMC
on Economic Conditions
and Monetary Policy

Book B

Monetary Policy:
Strategies and Alternatives

June 9, 2016

Prepared for the Federal Open Market Committee
by the staff of the Board of Governors of the Federal Reserve System

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Monetary Policy Strategies

The top panel of the first exhibit, "Policy Rules and the Staff Projection," provides near-term prescriptions for the federal funds rate from four policy rules: the Taylor (1993) rule, the Taylor (1999) rule, an inertial version of the Taylor (1999) rule, and a first-difference rule.[1] These prescriptions take as given the staff's baseline projections for the output gap and inflation in the near term, shown in the middle panels. The top panel also includes as an addendum the staff's baseline projection for the federal funds rate. All three Taylor-type rules call for values of the federal funds rate above the Tealbook baseline in the second half of 2016. The Taylor (1993) and Taylor (1999) rules, which feature no interest rate smoothing term, call for larger increases in the near term than the inertial Taylor (1999) rule and the first-difference rule. The prescriptions of the Taylor-type rules are similar to those in the April Tealbook because the staff's revisions to inflation and the output gap in the near term are small and have offsetting effects. The first-difference rule calls for levels of the federal funds rate that are slightly lower than in April because this rule is forward-looking and responds to the staff's projection of slower output growth over the next four quarters; the near-term prescriptions of that rule are a little below the Tealbook baseline.

The bottom panel of the exhibit reports the estimate of a Tealbook-consistent, medium-term notion of the equilibrium real federal funds rate that is generated using the FRB/US model. This Tealbook-consistent FRB/US r^* corresponds to the level of the real federal funds rate that, if maintained over a 12-quarter period, would close the output gap in the final quarter of that period in the model. The current-quarter estimate of r^*, at 0.96 percent, is below the estimate derived from the staff's outlook in April, reflecting lower levels of resource utilization in the current projection. The panel also reports the average level of the real federal funds rate in the Tealbook baseline projection for the same 12-quarter period used to compute r^*.[2] This average is -0.05 percent, about

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[1] The appendix to this section provides details on each of the four rules. The intercepts of the rules, where applicable, are constant and equal the staff's estimate of the real federal funds rate in the long run, which the staff revised down 25 basis points in the current Tealbook to 1 percent. To facilitate comparisons, the prescriptions labeled "Previous Tealbook, adjusted" reflect the current values of the intercepts.

[2] Although r^* and the average projected real federal funds rate are calculated over the same 12-quarter period, they need not be associated with the same macroeconomic outcomes even when their

Policy Rules and the Staff Projection

### Near–Term Prescriptions of Selected Policy Rules[1]

(Percent)

	2016:Q3	2016:Q4
Taylor (1993) rule	**2.43**	**2.51**
Previous Tealbook, adjusted	*2.40*	*2.55*
Taylor (1999) rule	**2.47**	**2.66**
Previous Tealbook, adjusted	*2.49*	*2.82*
Inertial Taylor (1999) rule	**0.72**	**1.01**
Previous Tealbook, adjusted	*0.72*	*1.04*
First–difference rule	**0.47**	**0.61**
Previous Tealbook, adjusted	*0.63*	*0.84*
Addendum:		
Tealbook baseline	**0.58**	**0.77**

Key Elements of the Staff Projection

GDP Gap
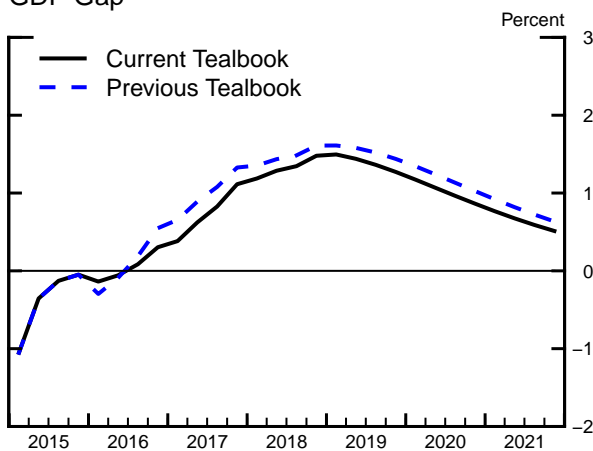
PCE Prices Excluding Food and Energy
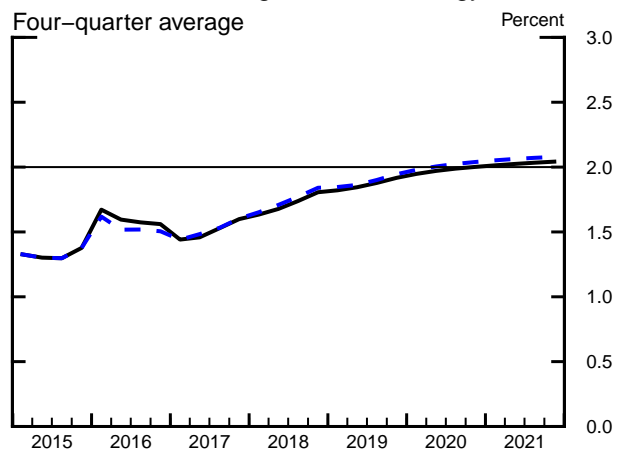
Real Federal Funds Rate Estimates[2]

(Percent)

	Current Tealbook	*Previous Tealbook, adjusted*
Tealbook–consistent FRB/US *r**	0.96	*1.35*
Average projected real federal funds rate	−0.05	*0.12*

1. The lines denoted "Previous Tealbook, adjusted" report rule prescriptions based on the previous Tealbook's staff outlook using the current rule specifications, where intercept terms have been adjusted for the staff's downward revision to the longer–run real federal funds rate, and where rules with the lagged policy rate as a right–hand–side variable are conditional on the current–Tealbook value of the lagged policy rate.

2. The "Tealbook–consistent FRB/US *r**" is the level of the real federal funds rate that, if maintained over a 12–quarter period (beginning in the current quarter) in the FRB/US model, sets the output gap equal to zero in the final quarter of that period. The "average projected real federal funds rate" is calculated under the Tealbook baseline projection over the same 12–quarter period as the Tealbook FRB/US *r**. Statistics from the previous Tealbook have been adjusted to reflect the staff's downward revision to the longer–run real federal funds rate as well as the introduction of a time–varying intercept in the interest rate reaction function.

1 percentage point below the estimate of Tealbook-consistent FRB/US $r*$. The difference between $r*$ and the average projected real federal funds rate is a little larger than in the April Tealbook as a result of the downward revision of the projected output gap.

The second exhibit, "Policy Rule Simulations," reports dynamic simulations of the FRB/US model under the Taylor (1993) rule, the Taylor (1999) rule, the inertial Taylor (1999) rule, and the first-difference rule. These simulations reflect the endogenous responses of the output gap and inflation when the federal funds rate follows the paths implied by the different policy rules.[3] The intercept terms of the Taylor rules correspond to the staff's assumption that the longer-run normal level of the real federal funds rate equals 1 percent. The results for each rule presented in these and subsequent simulations depend importantly on the assumptions that policymakers will adhere to the rule in the future, and that market participants as well as price and wage setters fully understand the implications for real activity and inflation of the policy rule.
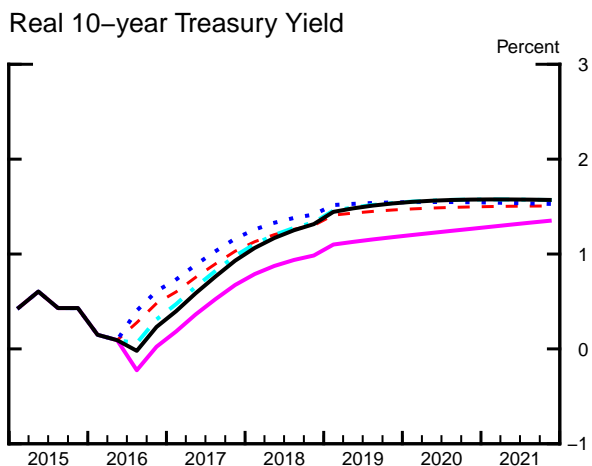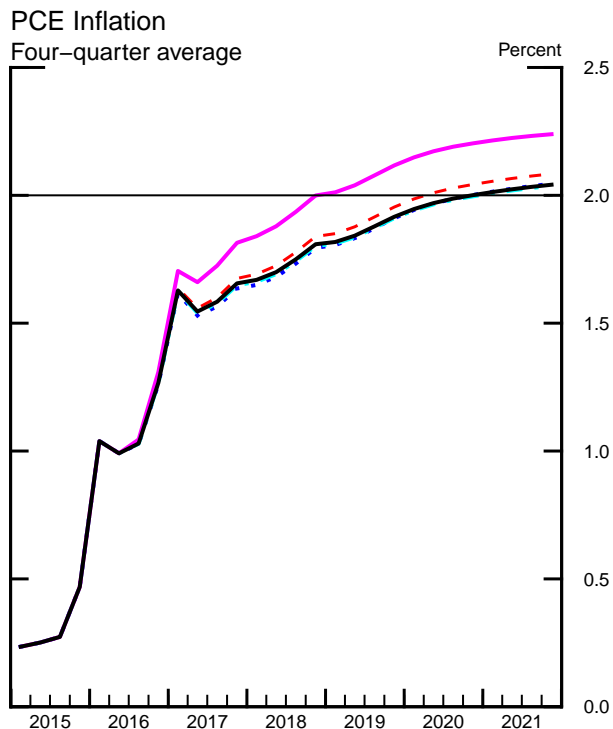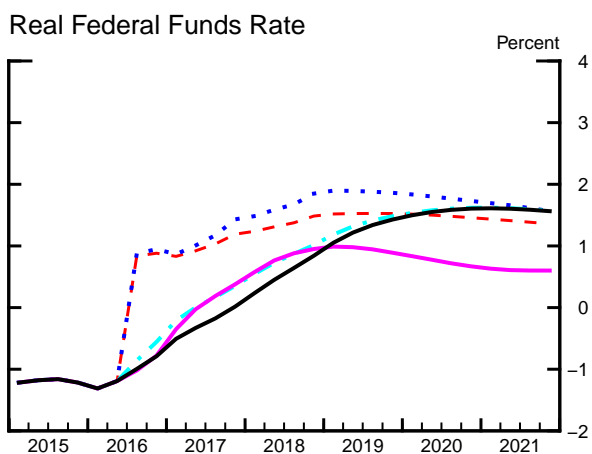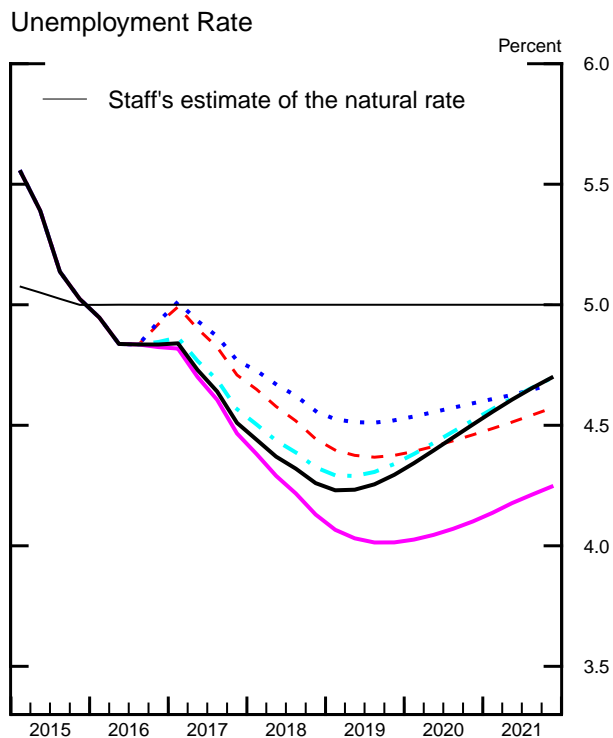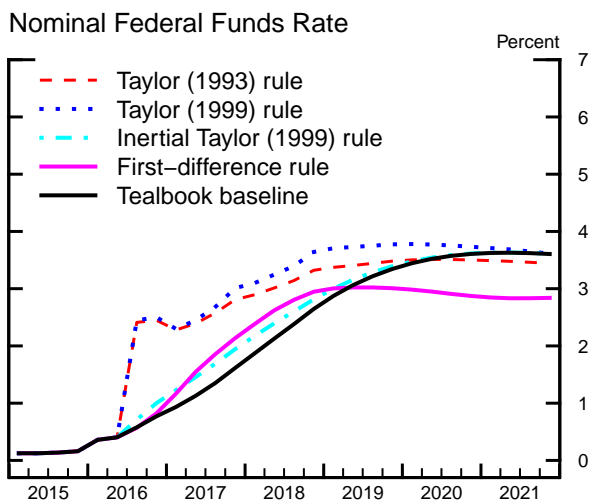
Starting with this Tealbook, the baseline policy path in the staff forecast is based on a modified version of the inertial Taylor (1999) rule with a time-varying intercept.[4] The implications of this adjustment to the intercept in the model can be seen by comparing the outcomes under the inertial Taylor rule, which contains no adjustment, with those of the baseline. In the Tealbook baseline, the nominal federal funds rate increases by an average of ¼ percentage point per quarter through the fourth quarter of 2018, when it reaches 2.6 percent. The pace of tightening subsequently slows, and the federal funds rate peaks at 3.6 percent in 2021, before eventually returning to its longer-run normal level of 3 percent. The inertial Taylor (1999) rule prescribes a slightly higher path for the federal funds rate than in the Tealbook baseline because, until late 2018, its intercept is higher than in the modified version of the rule used to construct the baseline.

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values are identical. The reason is that, when calculating $r*$, the real federal funds rate is held constant over the entire 12-quarter period, whereas, in the Tealbook baseline, the real federal funds rate can vary over time. Distinct paths of real short-term rates can, in turn, generate different paths for inflation and economic activity, even if they have the same 12-quarter average.

[3] Because of these endogenous responses, prescriptions from the dynamic simulations can differ from those shown in the top panel of the first exhibit.

[4] The Taylor-type rules used in the exhibit do not incorporate time-varying intercepts. For a discussion of the intercept adjustment made to the Tealbook baseline policy rule, see Christopher Erceg, Etienne Gagnon, David López-Salido, Matthias Paustian, and James Trevino (2016), "Changes to the Interest-Rate Reaction Function Used in the Tealbook," memorandum to the Federal Open Market Committee, Board of Governors of the Federal Reserve System, Divisions of International Finance, Monetary Affairs, and Research and Statistics, June 3.

Policy Rule Simulations

Strategies

Nominal Federal Funds Rate

Percent

- – – – Taylor (1993) rule
- ········· Taylor (1999) rule
- –·–·– Inertial Taylor (1999) rule
- ⸺ First–difference rule
- ⸺ Tealbook baseline

Real Federal Funds Rate

Percent

Real 10–year Treasury Yield

Percent

Unemployment Rate

Percent

⸺ Staff's estimate of the natural rate

PCE Inflation
Four–quarter average

Percent

Note: The policy rule simulations in this exhibit are based on rules that respond to core inflation. This choice of rule specification was made in light of the tendency for current and near–term core inflation rates to outperform headline inflation rates as predictors of the medium–term behavior of headline inflation.

However, this difference in policy rates is too small and short-lived to have a material effect on the real longer-term interest rates that influence economic activity in FRB/US, so macroeconomic outcomes are very similar to the Tealbook baseline.

The Taylor (1993) and Taylor (1999) rules call for an immediate sharp tightening and produce paths for the real federal funds rate that lie significantly above the Tealbook baseline path over the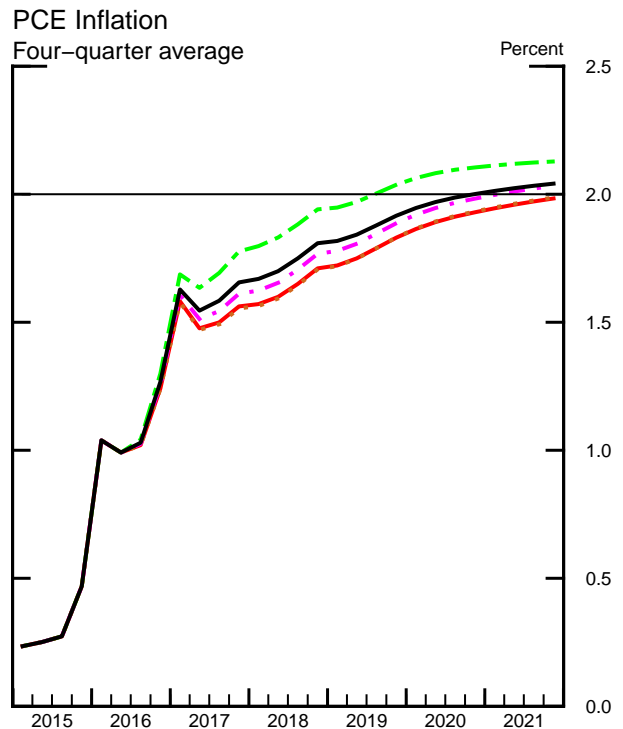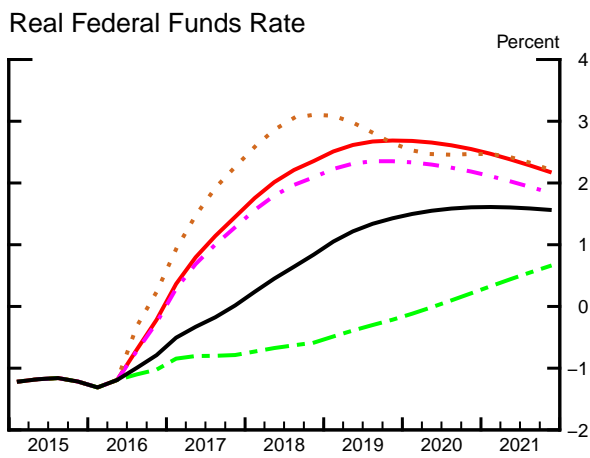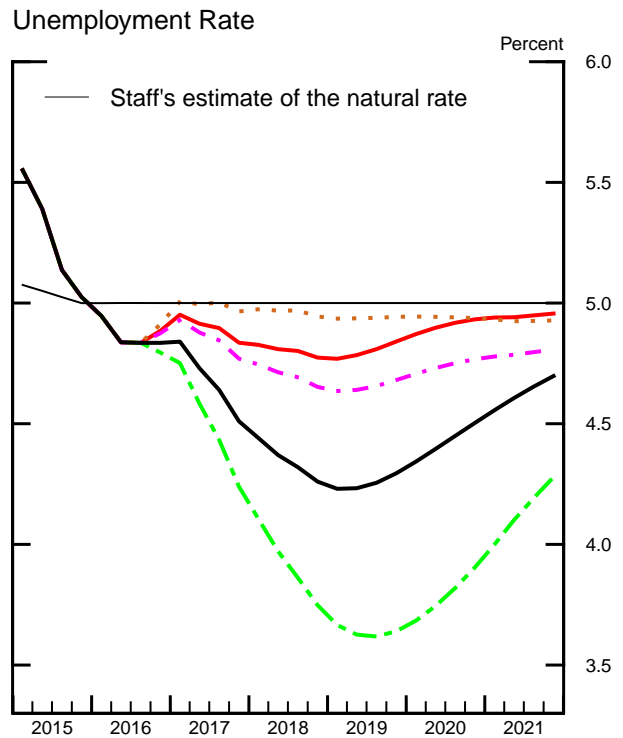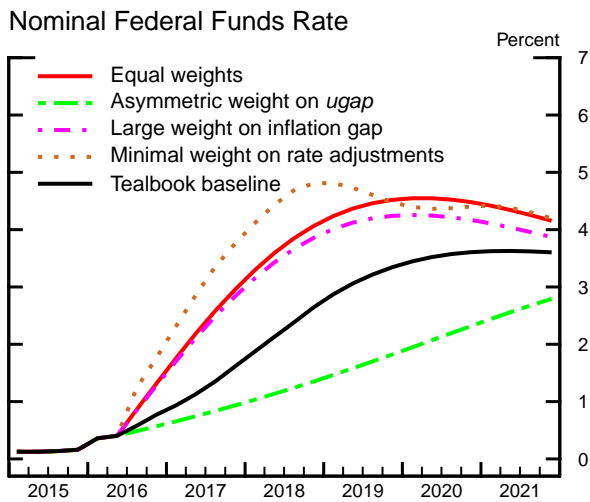 next few years. The sharp initial tightening occurs in part because these rules do not include lagged values of the federal funds rate as a determinant of their current policy prescriptions. With the output gap essentially closed, core inflation only ½ percentage point below the Committee's objective, and an intercept term of 1 percent, the Taylor (1993) and Taylor (1999) rules prescribe rates that are ½ percentage point below their longer-run level of 3 percent in the near term. Over the next few years, these rules would cause the unemployment rate to undershoot the staff's estimate of the natural rate by less than in the staff's baseline projection. The Taylor (1999) rule calls for somewhat higher policy rates than the Taylor (1993) rule over the period shown because it places more weight on the output gap and output is projected to rise above potential for the next few years. As a consequence, the Taylor (1999) rule generates a higher trajectory of the unemployment rate and a slightly lower trajectory of inflation than the Taylor (1993) rule.

The first-difference rule prescribes a moderately higher path for the federal funds rate through 2018 than in the Tealbook baseline. Thereafter, the federal funds rate levels off under the first-difference rule, whereas it keeps rising under the Tealbook baseline. This divergence occurs because the first-difference rule, which responds to the expected change in the output gap rather than to its level, reacts to the slower pace of economic growth projected late in the decade. The lower path of the federal funds rate beyond 2018 under the first-difference rule, in conjunction with expectations of higher price and wage inflation in the future, implies lower longer-term real rates over the entire projection period, as well as higher levels of resource utilization and inflation. The first-difference rule generates outcomes for the unemployment rate over the forecast period that are markedly below the unemployment rate paths generated under the other policy rules and well below the staff's estimate of the natural rate. Accordingly, the first-difference rule also leads to somewhat higher inflation over the period shown relative to the other simple rules.

Optimal Control Simulations under Commitment

Strategies

Nominal Federal Funds Rate

Percent

— Equal weights
-·- Asymmetric weight on *ugap*
-·- Large weight on inflation gap
···· Minimal weight on rate adjustments
— Tealbook baseline

Real Federal Funds Rate

Percent

Real 10–year Treasury Yield

Percent

Unemployment Rate

Percent

— Staff's estimate of the natural rate

PCE Inflation
Four–quarter average
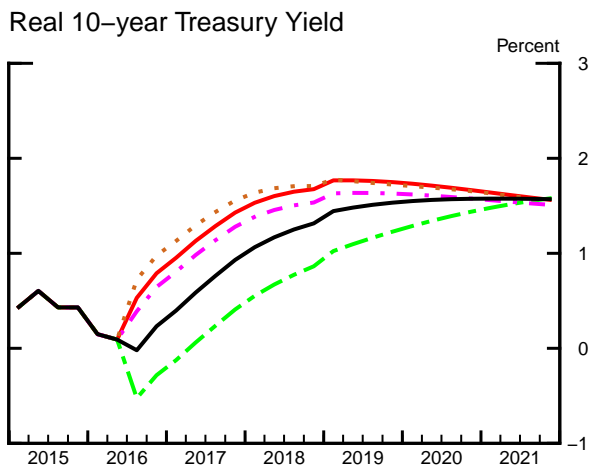
Percent

Note: Each set of lines corresponds to an optimal control policy under commitment in which policymakers minimize a discounted weighted sum of squared deviations of four–quarter headline PCE inflation from the Committee's 2 percent objective, of squared deviations of the unemployment rate from the staff's estimate of the natural rate, and of squared changes in the federal funds rate. The weights vary across simulations. See the box "Optimal Control and the Loss Function" for a motivation and the appendix for technical details.

The third exhibit, "Optimal Control Simulations under Commitment," displays optimal control simulations under different assumptions about policymakers' preferences, as captured by four specifications of the loss function. The companion box "Optimal Control and the Loss Function" offers motivations for these specifications; the appendix provides technical details. The concept of optimal control that is employed here corresponds to a commitment policy under which the plans that policymakers make today are assumed to constrain future policy choices in a way that improves overall economic outcomes. The exhibit also shows the current Tealbook baseline forecast.

The first simulation, labeled "equal weights," presents the familiar case in which policymakers are assumed to place the same weights on keeping headline PCE inflation close to the Committee's 2 percent goal, on keeping the unemployment rate close to the staff's estimate of the natural rate of unemployment, and on minimizing changes in the federal funds rate. In the resulting optimal strategy, the path for the federal funds rate is significantly higher than the Tealbook policy path. This is because, in the current baseline projection, unemployment falls well below the staff's estimate of the natural rate over the next several years. Under the preferences embedded in optimal control with equal weights, policymakers judge this undershooting of the natural rate to be costly, leading them to tighten policy appreciably more than in the Tealbook baseline. This tighter policy results in a path of the unemployment rate that runs substantially closer to the staff's estimate of the natural rate; headline PCE inflation is slightly lower than in the Tealbook baseline over the simulation period, consistent with lower levels of resource utilization.

The second simulation, labeled "asymmetric weight on *ugap*," uses a loss function that assigns no cost to unemployment rate outcomes below the natural rate but that is otherwise identical to the specification with equal weights. In the resulting optimal strategy, the path of the federal funds rate is considerably below both the corresponding path in the case of equal weights and the path in the Tealbook baseline. Policymakers choose this relatively low path for the policy rate because the desire to raise inflation to 2 percent is not tempered by any aversion to the undershooting of the natural rate of unemployment that helps achieve this outcome. In this simulation, the tighter labor market causes inflation to reach 2 percent more quickly than in the case of equal weights; inflation then edges above the Committee's longer-run objective for a few years.

Optimal Control and the Loss Function

Beginning with the current Tealbook, the exhibit "Optimal Control Simulations under Commitment" presents optimal control simulations of the FRB/US model derived using four loss functions, illustrating how policymakers' preferences concerning macroeconomic outcomes influence the choice of a policy path. Each optimal control policy is a path of the federal funds rate that minimizes a given loss function in the FRB/US model, conditional on the staff's extended Tealbook projection. The four loss functions differ with respect to the weights they assign to the discounted sum of squared inflation gaps (measured as the difference between the four-quarter change in headline PCE prices and the Committee's 2 percent objective), unemployment gaps (measured as the difference between the unemployment rate and the staff's estimate of the natural rate), and changes in the federal funds rate. The table below summarizes the weights assigned under the four loss functions.[1]

Weights on the components in the loss function

	Inflation gap	Unemployment gap		Changes in the federal funds rate
		$ugap<0$	$ugap≥0$	
Equal weights	1	1	1	1
Asymmetric weight on *ugap*	1	0	1	1
Large weight on inflation gap	5	1	1	1
Minimal weight on rate adjustment	1	1	1	0.01

The first loss function (labeled "equal weights") has been featured routinely in past Tealbooks; it assigns the same weight to each of the three sources of loss. With these penalties for inflation and unemployment gaps, this formulation recognizes the Committee's dual mandate to promote stable prices and maximum employment— taking what is arguably a balanced view of the relative importance of these gaps to policymakers. The loss function also penalizes changes in the federal funds rate, thus embodying a preference for policy gradualism. This feature of the loss function may reflect a variety of non-modeled concerns, such as caution associated with uncertainty about the structure and the state of the economy or policymakers' desire to reduce the risks to financial stability from volatility in interest rates.[2]

The second loss function (labeled "asymmetric weight on *ugap*") assigns no losses to unemployment outcomes below the natural rate but otherwise attaches equal weights to all arguments in the loss function. Policymakers with such preferences may subscribe to the view that the costs associated with output and employment

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[1] The appendix provides further details on the loss functions and the optimal control approach.

[2] For a discussion of policy gradualism, see Ben S. Bernanke (2004), "Gradualism," speech delivered at an economics luncheon co-sponsored by the Federal Reserve Bank of San Francisco (Seattle Branch) and the University of Washington, Seattle, Washington, May 20.

falling short of their potential levels by some amount are appreciably larger than the costs associated with output and employment exceeding their potential levels to the same extent. For example, a sustained period of high unemployment may result in the loss of job-specific skills and, more generally, in a deterioration of human capital; by contrast, there is no obvious cost when the unemployment rate is below the natural rate. Thus, policymakers who share these preferences may not view low unemployment as an undesirable outcome in itself.[3]

The third loss function (labeled "large weight on inflation gap") places a higher weight on inflation than the equal-weights specification while keeping the weights assigned to the unemployment gap and changes in the federal funds rate the same. Policymakers with these preferences may be more concerned about the distortionary effects of inflation than is an equal-weights policymaker. Moreover, they might note that, in response to aggregate demand shocks, policies that aim to close the inflation gap would also narrow the unemployment gap. Alternatively, placing a relatively high weight on inflation deviations can be interpreted as a pragmatic response to uncertainty about estimates of the natural rate of unemployment and the risk that responding to poorly estimated unemployment gaps could lead to policy mistakes.

In contrast to the first three loss functions, the fourth loss function (labeled "minimal weight on rate adjustments") describes the preferences of a policymaker who sees interest rate changes as entailing little, if any, cost. Such a policymaker may not feel burdened by the sort of "non-modeled concerns" noted above, or may feel that such concerns do not warrant a preference for gradualism. Accordingly, policymakers with these preferences would find it desirable to adjust policy rates more quickly and by larger amounts in response to shocks to the economy than policymakers who penalize changes in the federal funds rate.

All four loss functions aim to achieve the Committee's 2 percent inflation objective and a zero unemployment gap in the long run. However, the loss functions differ in terms of how they trade off deviations from the Committee's long-run objectives over the medium run. Accordingly, policymakers whose preferences are represented by different loss functions may have different views about which monetary policy strategies and associated macroeconomic outcomes are optimal.

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[3] In stochastic simulations of a canonical New Keynesian model in which policymakers act under discretion and minimize expected losses that are symmetric in the inflation and output gaps, the average inflation rate is below policymakers' objective if policy is occasionally constrained by the effective lower bound. By contrast, these policymakers may achieve, on average, an inflation rate closer to the central bank's objective when they attach zero weight on positive output gaps; see Christopher Gust, David López-Salido, and Steve Meyer (2016), "Asymmetric Policy Strategies and the Effective Lower Bound," unpublished paper, Board of Governors of the Federal Reserve System, Division of Monetary Affairs, June. Related work includes Timothy S. Hills, Taisuke Nakata, and Sebastian Schmidt (2016), "The Risky Steady State and the Interest Rate Lower Bound," Finance and Economics Discussion Series, Board of Governors of the Federal Reserve System, January, as well as Susanto Basu and Brent Bundick (2015), "Endogenous Volatility at the Zero Lower Bound: Implications for Stabilization Policy," The Federal Reserve Bank of Kansas City, Research Working Paper, January.

Strategies

The third simulation, labeled "large weight on inflation gap," posits a loss function that assigns a cost to above-target or below-target inflation that is five times larger than under the specification with equal weights. The resulting optimal strategy is only a little more accommodative than in the case with equal weights, even though the losses associated with undershooting the inflation objective in coming years are markedly larger. The reason is that, in the FRB/US model, policymakers face an unappealing tradeoff because inflation responds little to resource utilization. Hence, policymakers would need to engineer a substantial undershooting of the natural rate of unemployment, which they see as costly, in order to raise inflation in the near term by a modest amount.[5]

The fourth simulation, labeled "minimal weight on rate adjustments," uses a loss function that assigns a very small cost to changes in the federal funds rate but is otherwise identical to the loss function with equal weights. In the resulting optimal strategy, the federal funds rate rises faster than under the specification with equal weights over the next few years in an effort to contain the projected undershooting of the natural rate of unemployment. The paths for the real federal funds rate and the real 10-year Treasury yield are also higher than in the case of equal weights. While this policy affects the trajectory for inflation relatively little, it keeps the unemployment rate close to the staff's estimate of the natural rate.

The next four exhibits tabulate the simulation results for key variables under the policy rule and optimal control simulations described above.

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[5] If the "large weight on inflation gap" specification did not penalize the unemployment gap at all, then the adverse tradeoff would disappear and policy would be markedly more accommodative.

Outcomes of Policy Rule Simulations
(Percent change, annual rate, from end of preceding period except as noted)

Measure and policy	2016	2017	2018	2019	2020
Nominal federal funds rate[1]					
Taylor (1993)	2.4	2.8	3.3	3.5	3.5
Taylor (1999)	2.5	3.0	3.6	3.8	3.7
Inertial Taylor (1999)	1.0	1.9	2.8	3.4	3.6
First-difference	0.8	2.1	2.9	3.0	2.9
Extended Tealbook baseline	0.8	1.6	2.6	3.3	3.6
Real GDP					
Taylor (1993)	1.8	2.2	2.1	1.8	1.7
Taylor (1999)	1.8	2.1	2.0	1.8	1.7
Inertial Taylor (1999)	1.9	2.3	2.1	1.7	1.5
First-difference	1.9	2.6	2.3	1.9	1.7
Extended Tealbook baseline	1.9	2.4	2.1	1.6	1.5
Unemployment Rate[1]					
Taylor (1993)	4.9	4.7	4.4	4.4	4.5
Taylor (1999)	4.9	4.8	4.6	4.5	4.6
Inertial Taylor (1999)	4.8	4.6	4.3	4.3	4.5
First-difference	4.8	4.5	4.1	4.0	4.1
Extended Tealbook baseline	4.8	4.5	4.3	4.3	4.5
Total PCE prices					
Taylor (1993)	1.3	1.7	1.8	2.0	2.0
Taylor (1999)	1.3	1.6	1.8	1.9	2.0
Inertial Taylor (1999)	1.3	1.6	1.8	1.9	2.0
First-difference	1.3	1.8	2.0	2.1	2.2
Extended Tealbook baseline	1.3	1.7	1.8	1.9	2.0
Core PCE prices					
Taylor (1993)	1.6	1.6	1.8	2.0	2.0
Taylor (1999)	1.6	1.6	1.8	1.9	2.0
Inertial Taylor (1999)	1.6	1.6	1.8	1.9	2.0
First-difference	1.6	1.8	2.0	2.1	2.2
Extended Tealbook baseline	1.6	1.6	1.8	1.9	2.0

1. Percent, average for the final quarter of the period.

Strategies

Strategies

Outcomes of Policy Rule Simulations, Quarterly
(Four-quarter percent change, except as noted)

Measure and policy	2016				2017			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Nominal federal funds rate[1]								
Taylor (1993)	0.4	0.4	2.4	2.4	2.3	2.4	2.6	2.8
Taylor (1999)	0.4	0.4	2.4	2.5	2.3	2.4	2.7	3.0
Inertial Taylor (1999)	0.4	0.4	0.7	1.0	1.2	1.5	1.7	1.9
First-difference	0.4	0.4	0.6	0.8	1.2	1.5	1.9	2.1
Extended Tealbook baseline	0.4	0.4	0.6	0.8	0.9	1.1	1.4	1.6
Real GDP								
Taylor (1993)	2.1	1.6	1.7	1.8	1.9	2.0	2.0	2.2
Taylor (1999)	2.1	1.6	1.7	1.8	1.8	1.9	1.9	2.1
Inertial Taylor (1999)	2.1	1.6	1.7	1.9	2.1	2.2	2.3	2.3
First-difference	2.1	1.6	1.6	1.9	2.2	2.4	2.5	2.6
Extended Tealbook baseline	2.1	1.6	1.7	1.9	2.1	2.3	2.3	2.4
Unemployment Rate[1]								
Taylor (1993)	4.9	4.8	4.8	4.9	5.0	4.9	4.8	4.7
Taylor (1999)	4.9	4.8	4.8	4.9	5.0	4.9	4.9	4.8
Inertial Taylor (1999)	4.9	4.8	4.8	4.8	4.9	4.8	4.7	4.6
First-difference	4.9	4.8	4.8	4.8	4.8	4.7	4.6	4.5
Extended Tealbook baseline	4.9	4.8	4.8	4.8	4.8	4.7	4.6	4.5
Total PCE prices								
Taylor (1993)	1.0	1.0	1.0	1.3	1.6	1.6	1.6	1.7
Taylor (1999)	1.0	1.0	1.0	1.3	1.6	1.5	1.6	1.6
Inertial Taylor (1999)	1.0	1.0	1.0	1.3	1.6	1.5	1.6	1.6
First-difference	1.0	1.0	1.0	1.3	1.7	1.7	1.7	1.8
Extended Tealbook baseline	1.0	1.0	1.0	1.3	1.6	1.5	1.6	1.7
Core PCE prices								
Taylor (1993)	1.7	1.6	1.6	1.6	1.4	1.5	1.5	1.6
Taylor (1999)	1.7	1.6	1.6	1.6	1.4	1.4	1.5	1.6
Inertial Taylor (1999)	1.7	1.6	1.6	1.6	1.4	1.5	1.5	1.6
First-difference	1.7	1.6	1.6	1.6	1.5	1.6	1.7	1.8
Extended Tealbook baseline	1.7	1.6	1.6	1.6	1.4	1.5	1.5	1.6

1. Percent, average for the quarter.

Outcomes of Optimal Control Simulations under Commitment

(Percent change, annual rate, from end of preceding period except as noted)

Measure and policy	2016	2017	2018	2019	2020
Nominal federal funds rate¹					
Equal weights	1.3	3.0	4.1	4.5	4.5
Aymmetric weight on *ugap*	0.6	0.9	1.4	1.8	2.3
Large weight on inflation gap	1.3	2.8	3.9	4.2	4.2
Minimal weight on rate adjustments	1.8	3.8	4.8	4.5	4.4
Extended Tealbook baseline	0.8	1.6	2.6	3.3	3.6
Real GDP					
Equal weights	1.8	1.9	1.8	1.6	1.7
Aymmetric weight on *ugap*	2.0	2.9	2.5	1.9	1.4
Large weight on inflation gap	1.8	2.0	1.9	1.7	1.7
Minimal weight on rate adjustments	1.8	1.7	1.7	1.7	1.8
Extended Tealbook baseline	1.9	2.4	2.1	1.6	1.5
Unemployment rate¹					
Equal weights	4.9	4.8	4.8	4.8	4.9
Aymmetric weight on *ugap*	4.8	4.2	3.7	3.6	3.9
Large weight on inflation gap	4.9	4.8	4.7	4.7	4.8
Minimal weight on rate adjustments	4.9	5.0	4.9	4.9	4.9
Extended Tealbook baseline	4.8	4.5	4.3	4.3	4.5
Total PCE prices					
Equal weights	1.2	1.6	1.7	1.8	1.9
Aymmetric weight on *ugap*	1.3	1.8	1.9	2.0	2.1
Large weight on inflation gap	1.3	1.6	1.8	1.9	2.0
Minimal weight on rate adjustments	1.2	1.6	1.7	1.8	1.9
Extended Tealbook baseline	1.3	1.7	1.8	1.9	2.0
Core PCE prices					
Equal weights	1.5	1.5	1.7	1.8	1.9
Aymmetric weight on *ugap*	1.6	1.7	1.9	2.0	2.1
Large weight on inflation gap	1.5	1.6	1.8	1.9	2.0
Minimal weight on rate adjustments	1.5	1.5	1.7	1.8	1.9
Extended Tealbook baseline	1.6	1.6	1.8	1.9	2.0

1. Percent, average for the final quarter of the period.

Outcomes of Optimal Control Simulations under Commitment, Quarterly
(Four-quarter percent change, except as noted)

Measure and policy	2016				2017			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Nominal federal funds rate[1]								
Equal weights	0.4	0.4	0.9	1.3	1.8	2.2	2.6	3.0
Asymmetric weight on *ugap*	0.4	0.4	0.5	0.6	0.7	0.7	0.8	0.9
Large weight on inflation gap	0.4	0.4	0.8	1.3	1.7	2.1	2.5	2.8
Minimal weight on rate adjustments	0.4	0.4	1.2	1.8	2.3	2.9	3.4	3.8
Extended Tealbook baseline	0.4	0.4	0.6	0.8	0.9	1.1	1.4	1.6
Real GDP								
Equal weights	2.1	1.6	1.7	1.8	1.9	1.9	1.8	1.9
Asymmetric weight on *ugap*	2.1	1.6	1.6	2.0	2.3	2.6	2.8	2.9
Large weight on inflation gap	2.1	1.6	1.7	1.8	1.9	2.0	1.9	2.0
Minimal weight on rate adjustments	2.1	1.6	1.7	1.8	1.8	1.7	1.6	1.7
Extended Tealbook baseline	2.1	1.6	1.7	1.9	2.1	2.3	2.3	2.4
Unemployment rate[1]								
Equal weights	4.9	4.8	4.8	4.9	5.0	4.9	4.9	4.8
Asymmetric weight on *ugap*	4.9	4.8	4.8	4.8	4.8	4.6	4.4	4.2
Large weight on inflation gap	4.9	4.8	4.8	4.9	4.9	4.9	4.8	4.8
Minimal weight on rate adjustments	4.9	4.8	4.8	4.9	5.0	5.0	5.0	5.0
Extended Tealbook baseline	4.9	4.8	4.8	4.8	4.8	4.7	4.6	4.5
Total PCE prices								
Equal weights	1.0	1.0	1.0	1.2	1.6	1.5	1.5	1.6
Asymmetric weight on *ugap*	1.0	1.0	1.0	1.3	1.7	1.6	1.7	1.8
Large weight on inflation gap	1.0	1.0	1.0	1.3	1.6	1.5	1.5	1.6
Minimal weight on rate adjustments	1.0	1.0	1.0	1.2	1.6	1.5	1.5	1.6
Extended Tealbook baseline	1.0	1.0	1.0	1.3	1.6	1.5	1.6	1.7
Core PCE prices								
Equal weights	1.7	1.6	1.6	1.5	1.4	1.4	1.4	1.5
Asymmetric weight on *ugap*	1.7	1.6	1.6	1.6	1.5	1.5	1.6	1.7
Large weight on inflation gap	1.7	1.6	1.6	1.5	1.4	1.4	1.5	1.6
Minimal weight on rate adjustments	1.7	1.6	1.6	1.5	1.4	1.4	1.4	1.5
Extended Tealbook baseline	1.7	1.6	1.6	1.6	1.4	1.5	1.5	1.6

1. Percent, average for the quarter.

Appendix

POLICY RULES USED IN "MONETARY POLICY STRATEGIES"

The table below gives the expressions for the four simple policy rules reported in "Monetary Policy Strategies." R_t denotes the nominal federal funds rate for quarter t, and the right-hand-side variables include the staff's projection of trailing four-quarter core PCE inflation for the current quarter and three quarters ahead (π_t and $\pi_{t+3|t}$), the output gap estimate for the current period ($ygap_t$), and the forecast of the three-quarter-ahead annual change in the output gap ($\Delta^4 ygap_{t+3|t}$). The value of policymakers' longer-run inflation objective, denoted π^{LR}, is 2 percent.

Taylor (1993) rule	$R_t = r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 0.5 ygap_t$
Taylor (1999) rule	$R_t = r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + ygap_t$
Inertial Taylor (1999) rule	$R_t = 0.85 R_{t-1} + 0.15(r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + ygap_t)$
First-difference rule	$R_t = R_{t-1} + 0.5(\pi_{t+3|t} - \pi^{LR}) + 0.5\Delta^4 ygap_{t+3|t}$

The first two of the selected rules were studied by Taylor (1993, 1999), while the inertial version of the Taylor (1999) rule has been featured prominently in analysis by Board staff.[1] The intercepts of these rules, denoted r^{LR}, are constant and chosen so that they are consistent with a 2 percent longer-run inflation objective and a longer-run real federal funds rate of 1 percent, a value used in the FRB/US model.[2] The prescriptions of the first-difference rule do not depend on the level of the output gap or the longer-run real interest rate; see Orphanides (2003).

Near-term prescriptions from the four policy rules are calculated taking as given the Tealbook projections for inflation and the output gap. When the Tealbook is published early in a quarter, the prescriptions are shown for the current and next quarters. When the Tealbook is published late in a quarter, the prescriptions are shown for the next two quarters. Rules that include a lagged policy rate as a right-hand-side variable are conditioned on the lagged federal funds rate in the Tealbook projection for the first quarter shown, and then conditioned on their simulated lagged federal funds rate for the second quarter shown. The lines labeled "Previous Tealbook, adjusted" report prescriptions conditional on the previous Tealbook projections for inflation and the output gap but taking into account the current estimate of r^{LR}; for rules that

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[1] See, for example, Erceg and others (2012).

[2] All nominal and real federal funds rates reported in the Monetary Policy Strategies section are expressed on the same 360-day basis as the published federal funds rate. Consistent with the methodology in the FRB/US model, the simple rules are first implemented on a fully-compounded, 365-day basis and then converted to a 360-day basis.

include a lagged policy rate, the prescriptions for the first quarter shown use the lagged policy rate in the current Tealbook projection.

REAL FEDERAL FUNDS RATE ESTIMATES

The bottom panel of the exhibit titled "Policy Rules and the Staff Projection" provides an estimate of one notion of the equilibrium real federal funds rate, *r**. This measure is an estimate of the real federal funds rate that, if maintained over a 12-quarter period (beginning in the current quarter), makes the output gap equal to zero in the final quarter of that period using the output projection from FRB/US, the staff's large-scale econometric model of the U.S. economy. This "Tealbook-consistent FRB/US *r**" depends on a broad array of economic factors, some of which take the form of projected values of the model's exogenous variables. It is generated after the paths of exogenous variables in the FRB/US model are adjusted so that they match those in the extended Tealbook forecast. Model simulations then determine the value of the real federal funds rate that closes the output gap conditional on the exogenous variables in the extended baseline forecast.

The "average projected real federal funds rate" reported in the panel is the average of the real federal funds rate under the Tealbook baseline projection calculated over the same 12−quarter period as the Tealbook-consistent FRB/US *r**. The average projected real federal funds rate and *r** need not be associated with the same macroeconomic outcomes even when their values are identical. The reason is that, in the *r** simulations, the real federal funds rate is held constant over the entire 12-quarter period to close the output gap at the end of this timeframe whereas, in the Tealbook baseline, the real federal funds rate can vary over time. Distinct paths of real short-term rates can, in turn, generate different paths for inflation and economic activity.

FRB/US MODEL SIMULATIONS

The exhibits of "Monetary Policy Strategies" that report results from simulations of alternative policies are derived from dynamic simulations of the FRB/US model. Each simulated policy rule is assumed to be in force over the whole period covered by the simulation; this period extends several decades beyond the time horizon shown in the exhibits. The simulations are conducted under the assumption that market participants as well as price and wage setters have perfect foresight, and are predicated on the staff's extended Tealbook projection, which includes the macroeconomic effects of the Committee's large-scale asset purchase programs. When the Tealbook is published early in a quarter, all of the simulations begin in that quarter; when the Tealbook is published late in a quarter, all of the simulations begin in the subsequent quarter.

COMPUTATION OF THE OPTIMAL CONTROL POLICY UNDER COMMITMENT

The optimal control simulations posit that policymakers minimize a discounted weighted sum of squared inflation gaps (measured as the difference between four-quarter headline PCE inflation, π_t^{PCE}, and the Committee's 2 percent objective), squared unemployment gaps ($ugap_t$, measured as the difference between the unemployment rate and the staff's estimate of the natural

rate), and squared changes in the federal funds rate. The resulting loss function, shown below, embeds the assumption that policymakers discount the future using a quarterly discount factor $\beta = 0.9963$:

$$L_t = \sum_{\tau=0}^{T} \beta^{\tau} \left\{ \lambda_{\pi} \left(\pi_t^{PCE} - \pi^{LR} \right)^2 + \lambda_{u,t+\tau} (ugap_{t+\tau})^2 + \lambda_R (R_{t+\tau} - R_{t+\tau-1})^2 \right\}.$$

The exhibit "Optimal Control Simulations under Commitment" considers four specifications of the weights on the inflation gap, the unemployment gap, and the rate change components of the loss function. The accompanying box "Optimal Control and the Loss Function" provides motivations for the four specifications of the weights.

The first specification, titled "equal weights," assigns equal weights to all three components at all times. The second specification, titled "asymmetric weight on *ugap*," uses the same weights as the equal-weights specification whenever the unemployment rate is above the staff's estimate of the natural rate but it assigns no penalty to the unemployment rate falling below the natural rate. The third specification, titled "large weight on inflation gap," attaches a relatively large weight to inflation gaps. The fourth specification, titled "minimal weight on rate adjustments," places almost no weight on changes in the federal funds rate.[3] The table below shows the weights used in the four specifications. The optimal control policy and associated outcomes depend on the relative (rather than the absolute) values of the weights.

	λ_{π}	$\lambda_{u,t+\tau}$		λ_R
		$ugap_{t+\tau} < 0$	$ugap_{t+\tau} \geq 0$	
Equal weights	1	1	1	1
Asymmetric weight on *ugap*	1	0	1	1
Large weight on inflation gap	5	1	1	1
Minimal weight on rate adjustment	1	1	1	0.01

For each of these four specifications of the loss function, the optimal control policy is the path for the federal funds rate that minimizes the loss function in the FRB/US model, subject to the effective lower bound constraint on nominal interest rates, under the assumption of perfect foresight, and conditional on the staff's extended Tealbook projection. Policy tools other than the federal funds rate are taken as given and subsumed within the Tealbook baseline. The path chosen by policymakers today is assumed to be credible, meaning that decision makers in the model see this path as being a binding commitment on future Committee decisions; the optimal

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[3] The inclusion of a minimal but strictly positive weight on changes in the federal funds rate helps ensure a well-behaved numerical solution.

Strategies

control policy takes as given the initial lagged value of the federal funds rate but is otherwise unconstrained by policy decisions made prior to the simulation period. The discounted losses are calculated over a period that ends sufficiently far in the future that extending that period farther would not affect the policy prescriptions shown in the exhibits.

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Monetary Policy Alternatives

- A key question for this meeting is whether the Committee sees the recent data as consistent with economic growth picking up in the second quarter, labor market conditions continuing to strengthen, and inflation making progress toward the Committee's 2 percent objective. In light of the crosscurrents in the available data, the alternatives offer somewhat different answers to this key question as well as different characterizations of risks to the economic outlook; accordingly, the statements offer different messages about the current and future stance of policy.

- Regarding the characterization of recent incoming economic data, each alternative says that "growth in economic activity appears to have picked up" and that "the pace of improvement in the labor market has slowed," but the sentence construction in Alternative A is intended to signal that the Committee places more weight on the weaker payroll data than on the stronger spending data.

  - With respect to specific labor market indicators, Alternative B notes that "although the unemployment rate has declined, job gains have diminished."

  - Alternative A highlights the deceleration in growth of payroll employment by stating that "job gains have slowed noticeably."

  - Alternative C, in contrast, emphasizes the noticeable decline in the unemployment rate over the slowdown in job gains.

- The three alternatives convey different views on the likelihood of inflation continuing to run below 2 percent.

  - Alternative C states that low inflation "largely" reflects earlier declines in energy prices and in prices of non-energy imports. Continued low inflation "partly" reflects those factors, according to Alternative B, and "only partly" in Alternative A.

  - Alternatives B and C describe indicators of inflation compensation as remaining "low," and survey measures of longer-run inflation expectations as "little changed." Alternative A instead notes that indicators of inflation compensation and longer-term inflation expectations "have declined."

Alternatives

- In summarizing the economic outlook and its implications for monetary policy, Alternatives B repeats language from the April statement, noting the Committee's expectation that "with gradual adjustments in the stance of monetary policy, economic activity will expand at a moderate pace." Alternative C indicates that with gradual adjustments in the stance of monetary policy "economic activity and employment will expand at moderate rates." Alternative A signals that policy adjustments are not likely to occur soon by dropping the reference to "gradual adjustments" and instead expressing an expectation that economic activity will expand at a moderate pace "with appropriate monetary policy accommodation."

  o All three statements reaffirm the Committee's expectation that inflation will "remain low in the near term," in part because of earlier declines in energy prices and in prices of non-energy imports, but that inflation will rise to 2 percent over the medium term as the transitory effects of those earlier declines dissipate and the labor market strengthens further. And each Alternative notes that the Committee will closely monitor inflation.

- Alternative B and Alternative C do not contain an explicit assessment of the balance of risks; they maintain the language from the April statement that the Committee "continues to closely monitor global economic and financial developments" along with inflation indicators. Alternative A cautions that the Committee "sees the risks to the economic outlook as tilted somewhat to the downside."

- With respect to the policy decision, Alternative A, Alternative B, and one version of Alternative C maintain the current target range; another version of Alternative C raises the target range. More specifically:

  o Alternative B keeps the target range and repeats paragraphs 3 and 4 of the April statement. By doing so, Alternative B indicates that the Committee still expects to increase the federal funds rate target range but steps away from signaling the likely timing of that action.

  o Alternative A communicates a judgment that the economic outlook and associated risks warrant deferring increases in the target range "until the risks to the economic outlook are more closely balanced and inflation moves closer to 2 percent on a sustained basis." If the staff's forecast proves correct, the inflation condition is unlikely to be met in short order.

- By the time the inflation and risk conditions specified in Alternative A are met, the labor market might have strengthened substantially further, which would then call for relatively rapid increases in the target range. Accordingly, Alternative A drops the indication that future adjustments to the stance of policy will be "only gradual."

o Alternative C with the first version of paragraph 3 maintains the current target range but strongly suggests that an increase in the federal funds rate is likely in coming months if labor market indicators and other incoming information suggest that the economy is growing at a moderate pace, consistent with sustaining maximum employment and a return to 2 percent inflation.

- Under this version of Alternative C, policymakers would wait for additional information to increase their confidence that the economic outlook is progressing in line with the Committee's objectives before increasing the target range, but also would signal that they expect the uncertainty to be resolved in favor of raising rates at an upcoming meeting.

o Alternative C with the second version of paragraph 3 raises the target range by 25 basis points and maintains the existing guidance about future monetary policy actions, consistent with a view that the economy will likely evolve in a way that will warrant further gradual increases in the federal funds rate target range.

Alternatives

APRIL 2016 FOMC Statement

1. Information received since the Federal Open Market Committee met in March indicates that labor market conditions have improved further even as growth in economic activity appears to have slowed. Growth in household spending has moderated, although households' real income has risen at a solid rate and consumer sentiment remains high. Since the beginning of the year, the housing sector has improved further but business fixed investment and net exports have been soft. A range of recent indicators, including strong job gains, points to additional strengthening of the labor market. Inflation has continued to run below the Committee's 2 percent longer-run objective, partly reflecting earlier declines in energy prices and falling prices of non-energy imports. Market-based measures of inflation compensation remain low; survey-based measures of longer-term inflation expectations are little changed, on balance, in recent months.

2. Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee currently expects that, with gradual adjustments in the stance of monetary policy, economic activity will expand at a moderate pace and labor market indicators will continue to strengthen. Inflation is expected to remain low in the near term, in part because of earlier declines in energy prices, but to rise to 2 percent over the medium term as the transitory effects of declines in energy and import prices dissipate and the labor market strengthens further. The Committee continues to closely monitor inflation indicators and global economic and financial developments.

3. Against this backdrop, the Committee decided to maintain the target range for the federal funds rate at ¼ to ½ percent. The stance of monetary policy remains accommodative, thereby supporting further improvement in labor market conditions and a return to 2 percent inflation.

4. In determining the timing and size of future adjustments to the target range for the federal funds rate, the Committee will assess realized and expected economic conditions relative to its objectives of maximum employment and 2 percent inflation. This assessment will take into account a wide range of information, including measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial and international developments. In light of the current shortfall of inflation from 2 percent, the Committee will carefully monitor actual and expected progress toward its inflation goal. The Committee expects that economic conditions will evolve in a manner that will warrant only gradual increases in the federal funds rate; the federal funds rate is likely to remain, for some time, below levels that are expected to prevail in the longer run. However, the actual path of the federal funds rate will depend on the economic outlook as informed by incoming data.

5. The Committee is maintaining its existing policy of reinvesting principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities and of rolling over maturing Treasury securities at auction, and it anticipates doing so until normalization of the level of the federal funds rate is well under way. This policy, by keeping the Committee's holdings of longer-term securities at sizable levels, should help maintain accommodative financial conditions.

Alternatives

JUNE 2016 Alternative A

1. Information received since the Federal Open Market Committee met in ~~March~~ **April** indicates that**,** ~~labor market conditions have improved further even as~~ **although** growth in economic activity appears to have ~~slowed~~ **picked up, the pace of improvement in the labor market has slowed**. Growth in household spending has ~~moderated,~~ **strengthened.** ~~although households' real income has risen at a solid rate and consumer sentiment remains high.~~ Since the beginning of the year, the housing sector has ~~improved further~~ **continued to improve and the drag from net exports appears to have diminished,** but business fixed investment ~~and net exports have~~ **has** been soft. ~~A range of recent indicators, including strong job gains, points to additional strengthening of the labor market.~~ **Although the unemployment rate has declined, job gains have slowed noticeably.** Inflation has continued to run below the Committee's 2 percent longer-run objective, **only** partly ~~reflecting~~ **because of** earlier declines in energy prices and ~~falling~~ **in** prices of non-energy imports. **Moreover,** market-based measures of inflation compensation ~~remain low;~~ **and** survey-based measures of longer-term inflation expectations ~~are little changed, on balance, in recent months~~ **have declined**.

2. Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee currently expects that, with ~~gradual adjustments in the stance of~~ **appropriate** monetary policy **accommodation**, economic activity will expand at a moderate pace and labor market indicators will ~~continue to~~ strengthen. Inflation is expected to remain low in the near term, in part because of earlier declines in energy prices, but to rise to 2 percent over the medium term as the transitory effects of **past** declines in energy and import prices dissipate and the labor market strengthens further. The Committee ~~continues to closely monitor inflation indicators and global economic and financial developments~~ **sees the risks to the economic outlook as tilted somewhat to the downside**.

3. Against this backdrop, the Committee decided to maintain the target range for the federal funds rate at ¼ to ½ percent. The stance of monetary policy remains accommodative, thereby supporting further improvement in labor market conditions and a return to 2 percent inflation. **The Committee judges that an increase in the target range will not be warranted until the risks to the outlook are more closely balanced and inflation moves closer to 2 percent on a sustained basis.**

4. ~~In determining the~~ **When adjustments to the target range become appropriate, their** timing and size ~~of future adjustments to the target range for the federal funds rate, the Committee will assess~~ **will depend on the Committee's assessment of** realized and expected economic conditions relative to its objectives of maximum employment and 2 percent inflation. This assessment will take into account a wide range of information, including measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial and international developments. ~~In light of the current shortfall of inflation from 2~~

<div style="writing-mode: vertical">Alternatives</div>

percent, the Committee will carefully monitor actual and expected progress toward its inflation goal. The Committee expects that economic conditions will evolve in a manner that will warrant only gradual increases in the federal funds rate; the federal funds rate is likely to remain **remaining**, for some time, below levels that are expected to prevail in the longer run. However, the actual path of the federal funds rate will depend on the economic outlook as informed by incoming data.

5. The Committee is maintaining its existing policy of reinvesting principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities and of rolling over maturing Treasury securities at auction, and it anticipates doing so until normalization of the level of the federal funds rate is well under way. This policy, by keeping the Committee's holdings of longer-term securities at sizable levels, should help maintain accommodative financial conditions.

Alternatives

JUNE 2016 Alternative B

Alternatives

1. Information received since the Federal Open Market Committee met in ~~March~~ **April** indicates that **the pace of improvement in the** labor market ~~conditions have improved further~~ **has slowed** ~~even as~~ **while** growth in economic activity appears to have ~~slowed~~ **picked up**. **Although the unemployment rate has declined, job gains have diminished.** Growth in household spending has ~~moderated,~~ **strengthened.** ~~although households' real income has risen at a solid rate and consumer sentiment remains high.~~ Since the beginning of the year, the housing sector has ~~improved further~~ **continued to improve and the drag from net exports appears to have lessened,** but business fixed investment ~~and net exports have~~ **has** been soft. ~~A range of recent indicators, including strong job gains, points to additional strengthening of the labor market.~~ Inflation has continued to run below the Committee's 2 percent longer-run objective, partly reflecting earlier declines in energy prices and ~~falling~~ **in** prices of non-energy imports. Market-based measures of inflation compensation remain low; survey-based measures of longer-term inflation expectations are little changed, on balance, in recent months.

2. Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee currently expects that, with gradual adjustments in the stance of monetary policy, economic activity will expand at a moderate pace and labor market indicators will ~~continue to~~ strengthen. Inflation is expected to remain low in the near term, in part because of earlier declines in energy prices, but to rise to 2 percent over the medium term as the transitory effects of **past** declines in energy and import prices dissipate and the labor market strengthens further. The Committee continues to closely monitor inflation indicators and global economic and financial developments.

3. Against this backdrop, the Committee decided to maintain the target range for the federal funds rate at ¼ to ½ percent. The stance of monetary policy remains accommodative, thereby supporting further improvement in labor market conditions and a return to 2 percent inflation.

4. In determining the timing and size of future adjustments to the target range for the federal funds rate, the Committee will assess realized and expected economic conditions relative to its objectives of maximum employment and 2 percent inflation. This assessment will take into account a wide range of information, including measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial and international developments. In light of the current shortfall of inflation from 2 percent, the Committee will carefully monitor actual and expected progress toward its inflation goal. The Committee expects that economic conditions will evolve in a manner that will warrant only gradual increases in the federal funds rate; the federal funds rate is likely to remain, for some time, below levels that are expected to prevail in the longer run. However, the actual path

of the federal funds rate will depend on the economic outlook as informed by incoming data.

5. The Committee is maintaining its existing policy of reinvesting principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities and of rolling over maturing Treasury securities at auction, and it anticipates doing so until normalization of the level of the federal funds rate is well under way. This policy, by keeping the Committee's holdings of longer-term securities at sizable levels, should help maintain accommodative financial conditions.

Alternatives

JUNE 2016 ALTERNATIVE C

1. Information received since the Federal Open Market Committee met in ~~March~~ **April** indicates that **the pace of improvement in the** labor market ~~conditions have improved further~~ **has slowed** ~~even as~~ **while** growth in economic activity appears to have ~~slowed~~ **picked up**. Growth in household spending has ~~moderated,~~ **strengthened.** ~~although households' real income has risen at a solid rate and consumer sentiment remains high.~~ Since the beginning of the year, the housing sector has ~~improved further~~ **continued to improve and the drag from net exports appears to have diminished,** but business fixed investment ~~and net exports have~~ **has** been soft. ~~A range of recent indicators, including strong job gains, points to additional strengthening of the labor market.~~ **Although job gains slowed, the unemployment rate has declined noticeably.** Inflation has **risen somewhat, but it has** continued to run below the Committee's 2 percent longer-run objective~~, partly reflecting~~ **largely because of** earlier declines in energy prices and ~~falling~~ **in** prices of non-energy imports. Market-based measures of inflation compensation remain low; survey-based measures of longer-term inflation expectations are little changed, on balance, in recent months.

2. Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee currently expects that, with gradual adjustments in the stance of monetary policy, economic activity **and employment** will expand at a moderate ~~pace~~ **rates.** ~~and labor market indicators will continue to strengthen.~~ Inflation is expected to remain low in the near term, in part because of earlier declines in energy prices, but to rise to 2 percent over the medium term as the transitory effects of **past** declines in energy and import prices dissipate and the labor market strengthens further. The Committee continues to closely monitor inflation indicators and global economic and financial developments.

3. ~~Against this backdrop,~~ The Committee decided **today** to maintain the target range for the federal funds rate at ¼ to ½ percent **but agreed that a modest increase in the federal funds rate will likely be appropriate in coming months if incoming information confirms the Committee's expectations for economic activity, the labor market, and inflation**. The stance of monetary policy remains accommodative, thereby supporting further ~~improvement~~ **strengthening** in labor market conditions and a return to 2 percent inflation.

OR

3.′ **In light of recent and expected progress toward its statutory goals**, the Committee decided to ~~maintain~~ **increase** the target range for the federal funds rate ~~at ¼~~ to ½ **to ¾** percent. The stance of monetary policy remains accommodative**, even after this increase,** thereby supporting further ~~improvement~~ **strengthening** in labor market conditions and a return to 2 percent inflation.

4. In determining the timing and size of future adjustments to the target range for the
    federal funds rate, the Committee will assess realized and expected economic
    conditions relative to its objectives of maximum employment and 2 percent inflation.
    This assessment will take into account a wide range of information, including
    measures of labor market conditions, indicators of inflation pressures and inflation
    expectations, and readings on financial and international developments. In light of
    the current shortfall of inflation from 2 percent, the Committee will carefully monitor
    actual and expected progress toward its inflation goal. The Committee expects that
    economic conditions will evolve in a manner that will warrant only gradual increases
    in the federal funds rate; the federal funds rate is likely to remain, for some time,
    below levels that are expected to prevail in the longer run. However, the actual path
    of the federal funds rate will depend on the economic outlook as informed by
    incoming data.

5. The Committee is maintaining its existing policy of reinvesting principal payments
    from its holdings of agency debt and agency mortgage-backed securities in agency
    mortgage-backed securities and of rolling over maturing Treasury securities at
    auction, and it anticipates doing so until normalization of the level of the federal
    funds rate is well under way. This policy, by keeping the Committee's holdings of
    longer-term securities at sizable levels, should help maintain accommodative
    financial conditions.

Alternatives

THE CASE FOR ALTERNATIVE B

Economic Outlook

- The somewhat conflicting information received over the intermeeting period may have left policymakers more uncertain whether the data point to an economy that is evolving in line with their modal forecasts of moderate growth.

    o Stronger-than-expected readings on some components of final demand, particularly household spending, led the staff to raise its projection of real GDP growth in the first half of the year to an annual rate of 1.5 percent, but left the projection for the year as a whole, now at 1.9 percent, essentially unchanged.

    o While the unemployment rate has declined since the April FOMC meeting, this decline largely reflects a step-down in the labor force participation rate; meanwhile, nonfarm payroll employment decelerated significantly since March.

    o Policymakers may think that the sluggish employment growth is likely to prove transitory, and that a pickup in job gains is likely to follow the current quarter's acceleration in economic activity. But policymakers may nonetheless see a risk that recent weakness in employment gains together with the ongoing contraction in business fixed investment point to a persistent slowdown in aggregate demand.

- Twelve-month core and headline inflation appear to have been trending up since the fall of last year. However, inflation has continued to run below the Committee's 2 percent target. Moreover, inflation compensation is low and survey measures of longer-run inflation expectations are little changed.

    o Policymakers may continue to judge that the low readings of inflation compensation likely reflect risk and liquidity premiums, to a large extent.

    o Policymakers may continue to anticipate that PCE inflation will move up to 2 percent over the medium term, now that energy prices are no longer falling.

Policy Strategy

- Given the crosscurrents in recent data on the real economy, and with inflation continuing to run below the Committee's 2 percent target, policymakers may judge it prudent to wait for evidence that domestic demand will continue to grow at a moderate pace and that the labor market will strengthen further before taking the next step in normalizing the stance of monetary policy.

- In addition, policymakers may judge that downside risks from global economic and financial developments remain material. For example, they might see a U.K. vote to leave the EU as posing risks to the U.S. domestic outlook and note that this uncertainty might well be resolved by the time of their July meeting.

- Policymakers may conclude that the optimal response to such uncertainty and risks is to leave the federal funds rate unchanged at this meeting, pending their assessment of future evidence on the economic outlook, and to avoid signaling the timing of the next policy move. They might note that the proximity of nominal rates to the effective lower bound provides additional support to this wait-and-see posture.

- A decision to maintain the current target range for the federal funds rate would be in line with the expectations of financial market participants.

  o According to the Desk's latest Survey of Primary Dealers and Survey of Market Participants, respondents perceive there to be only a negligible probability that the Committee will alter the target range at this meeting.

  o The Desk's surveys suggest that market participants will not be surprised by the changes in paragraph 1 of Alternative B, particularly the recognition of stronger spending data but weaker job gains.

  o Alternative B may not lead market participants to significantly change the odds they currently place on a target range increase in July or at subsequent meetings. Rather, Alternative B may lead market participants to adjust those odds over time depending on whether the data received after the June meeting prove to be largely consistent with the Committee's expectation for sustained growth of spending and for further labor market strengthening. Expectations will also be shaped by the new SEP and by the Chair's press conference.

Alternatives

o   Respondents do not anticipate any changes to the Committee's forward
    guidance or reinvestment policy (that is, to paragraphs 4 or 5 of the
    statement), both of which Alternative B maintains.

THE CASE FOR ALTERNATIVE C

Economic Outlook

- Policymakers might view the combination of a sizable drop in the unemployment rate
  and slowing job gains (taking into account that some of the slowing can be explained
  by clearly transitory factors) as consistent with the view that the economy has reached
  maximum sustainable employment and that growth of labor supply is becoming a
  binding constraint on hiring.

  o   Policymakers might also see the results of the Job Openings and Labor
      Turnover Survey for April as consistent with that view: job openings and
      separations were stable while hires edged down over the month.

  o   And policymakers might view the pickup in some measures of wage growth
      as consistent with this view, especially in light of the evidence, discussed in
      Tealbook A, indicating that real wages are rising faster than labor
      productivity.

- Household balance sheets have improved, gains in disposable income have been
  healthy, and the unemployment rate has declined noticeably. Moreover, the drag
  from net exports appears to have diminished. Policymakers may see conditions as
  favorable for solid consumption growth and further improvement in the housing
  sector and perhaps even in net exports, and so may project that aggregate demand will
  grow at a rate no slower than the economy's potential growth rate even with gradual
  increases in the target range for the federal funds rate.

  o   Accordingly, policymakers might anticipate further tightening of labor market
      conditions with increasing upward pressure on wages and, subsequently, on
      expected and actual inflation.

- Measures of the trend in inflation have moved closer to 2 percent. Policymakers may
  conclude that the effect of transitory factors is already subsiding, given the recent
  firming in oil prices.

Alternatives

- For all of these reasons, policymakers may be increasingly confident that headline inflation will be close to the 2 percent objective once the effects of earlier declines in energy and import prices fade, while increased labor market tightness will suffice to return headline inflation to the Committee's longer-run objective.

  o Policymakers may attribute the low levels of market-based measures of longer-term inflation compensation to movements in liquidity and inflation risk premiums that are unrelated to longer-run inflation outcomes, and the decline in some survey-based measures to previous declines in energy and import prices.

- Policymakers may see the risks to the economic outlook as approximately balanced, and the downside risks from global economic and financial developments as having diminished compared with earlier this year.

  o Indeed, policymakers might see alternative scenarios such as the "Weaker Productivity" scenario in the "Risks and Uncertainty" section of Tealbook A as increasingly likely.

Policy Strategy

- Policymakers may judge that current conditions and the outlook warrant a rate hike at the June meeting or in the near future.

  o They may be concerned that leaving policy rates unchanged in the face of an unemployment rate that is at or below its longer-run normal level would likely foster expectations of a prolonged shallow path for the federal funds rate that would be insufficiently responsive to economic conditions. Such expectations might well create excess demand and risk an upward drift in longer-term inflation expectations. In addition, such an expected path could induce further "reach for yield" or excessive risk-taking behavior in financial markets.

  o Policymakers may also be concerned that the public might misinterpret a statement like Alternative B as an indication that the FOMC is placing too much weight on transitory financial and economic developments and too little weight on a solid modal outlook for the economy, labor markets, and inflation.

Alternatives

- **Policymakers might favor the first version of paragraph 3** if they judged it prudent not to raise the target range in June but to signal a modest increase in coming months.

  o These policymakers might prefer to wait for further evidence that limited slack in the economy can account for the recent slowdown in payroll employment growth, and that the growth of GDP will continue to strengthen with inflation increasing toward the Committee's 2 percent target in the rest of the year.

  o Alternatively, policymakers might want to wait to see whether the weak employment report was an aberration or a sign of further softness ahead.

  o These policymakers may prefer to see the uncertainty over the outcome of the upcoming U.K. referendum on EU membership resolved before the next increase in the target range.

  o They may thus prefer to signal a likely rate increase in July to lean against the risk that the public might start to expect indefinite delays in policy normalization.

- **Policymakers might favor the second version of paragraph 3** if they judged that it is appropriate to announce a 25 basis point increase in the target range for the federal funds rate to ½ to ¾ percent.

  o These policymakers may note that, even after this increase, the real federal funds rate would still lie well below the prescriptions from most simple policy rules and optimal control exercises shown in the "Monetary Policy Strategies" section of Tealbook B.

- Respondents to the Desk's latest surveys perceive there to be no material odds that the Committee will change the target range at this meeting, and so a decision to increase the target range would be very surprising.

  o If market participants infer that the Committee intends to pursue a less accommodative stance of policy going forward than they had expected, for any given outlook, then medium- and longer-term real interest rates would rise, equity prices and inflation compensation would likely decline, and the dollar would appreciate.

o Nonetheless, if investors see a statement like Alternative C as primarily reflecting an upbeat assessment of the strength of the U.S. expansion, then equity prices and inflation compensation might fall less than otherwise, or even rise.

THE CASE FOR ALTERNATIVE A

Economic Outlook

- While economic activity appears to have picked up in recent months, policymakers might view the weakness in spending indicators for the first quarter, paired with recent softness of labor market indicators, as suggesting that the Committee's previously stated expectation of moderate growth for the rest of the year is overly optimistic. In particular, solid increases in consumer spending are unlikely to be sustained if employment continues to grow sluggishly.

  o The unexpected weakness in payroll employment growth recently cannot be fully explained by identifiable transitory factors.

  o Revised data now show that payroll gains have been on a declining trend since last fall.

  o The still-high rate of involuntary part-time employment, the low level of the employment-to-population ratio for prime-age workers, and the limited extent to which aggregate data have indicated upward pressure on wage growth may all suggest some remaining slack in labor markets.

- Moreover, both headline and core inflation continue to run noticeably below the Committee's 2 percent objective and market-based measures of inflation compensation are not only low but may be sliding, and survey-based measures remain at or near recent lows.

  o Market-based measures of inflation compensation have been at low levels for a long time. The Michigan survey measure of longer-term inflation expectations declined to a very low level in April whereas the New York Fed's measure of three-year-ahead expected inflation remains at the low end of its historical range.

Alternatives

Policy Strategy

- Some policymakers might judge that the recent uptick in core inflation will prove transitory.

    o Policymakers might worry that the failure of inflation to rise to the 2 percent target over the past several years has become ingrained in longer-term inflation expectations and that the persistent weakness in inflation compensation measures suggests that the inflation expectations relevant for wage and price setting have declined.

    o These policymakers might argue that the chronic failure of policy to return inflation toward 2 percent risks eroding the credibility of the FOMC's commitment to achieving that objective, including the statement that deviations from this objective are considered on a symmetric basis.

- Policymakers may believe that the natural rate of unemployment may be lower than current measures suggest, as described in the "Risk and Uncertainty" section of Tealbook A. Alternatively, they may see virtues in allowing the labor market to firm more over the medium term as a way of repairing the damage to the labor market that resulted from a prolonged period of weak labor demand.

- Policymakers may believe that risk management considerations call for signaling that any further removal of policy accommodation is some time off.

    o Policymakers might observe that, given the proximity to the effective lower bound, the scope for conventional policy measures to support the economy would be quickly exhausted in the event that adverse shocks were to hit the economy.

    o Policymakers might judge that the neutral rate of interest is low, relative to its historical norm, and likely to remain so for quite some time, thus exacerbating the risk that conventional policy could be constrained going forward. Moreover, unconventional monetary policies provide imperfect substitutes for conventional policy.

    o In addition, policymakers might argue that a U.K. vote to leave the EU could pose material risks for the domestic outlook; they also may see the factors that led to the sharp deterioration in financial conditions earlier this year as still

Alternatives

largely unaddressed. Policymakers might also see new risks emerging in the domestic outlook, such as those discussed in the "Recession" scenario in the "Risks and Uncertainty" section of Tealbook A.

- For all these reasons, policymakers might prefer a statement along the lines of Alternative A, to assert that the Committee judges that an increase in the target range "will not be warranted until the risks to the outlook are more closely balanced and inflation moves closer to 2 percent on a sustained basis."

- Most respondents in the Desk's latest surveys expect the Committee continue to emphasize the gradual nature of its normalization approach and to convey that it still expects to raise rates this year. The issuance of a postmeeting statement like Alternative A would therefore surprise financial market participants.

  o Investors would likely push further into the future the expected date of the next rate increase, the expected path for the federal funds rate would likely flatten further, and longer-term yields would decline.

  o If the statement is primarily seen as more accommodative, equity prices and inflation compensation would likely rise, and the dollar would depreciate.

  o Nonetheless, if investors interpret the statement as reflecting an unexpectedly downbeat assessment of global economic conditions and greater-than-anticipated concerns over the downside risks to the outlook, equity prices and inflation compensation could fall.

IMPLEMENTATION NOTE

If the Committee decides to maintain the current target range for the federal funds rate, an implementation note that indicates no change in the Federal Reserve's administered rates—the interest rates on required and excess reserves, the offering rate on overnight reverse repurchase agreements, and the discount rate—would be issued. If the Committee instead decides to raise the target range for the federal funds rate, an implementation note that communicates the changes the Federal Reserve decided to make to these three policy tools would be issued.

On the following pages, struck-out text indicates language deleted from the April directive and implementation note, bold red underlined text indicates added language, and blue underlined text indicates text that links to websites.

Implementation Note if the Committee maintains the current target range

Release Date: ~~April 27~~ June 15, 2016

Decisions Regarding Monetary Policy Implementation

The Federal Reserve has made the following decisions to implement the monetary policy stance announced by the Federal Open Market Committee in its statement on ~~April 27~~ **June 15**, 2016:

- The Board of Governors of the Federal Reserve System left unchanged the interest rate paid on required and excess reserve balances at 0.50 percent.

- As part of its policy decision, the Federal Open Market Committee voted to authorize and direct the Open Market Desk at the Federal Reserve Bank of New York, until instructed otherwise, to execute transactions in the System Open Market Account in accordance with the following domestic policy directive:

  > "Effective ~~April 28~~ **June 16**, 2016, the Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of ¼ to ½ percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 0.25 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of $30 billion per day.

  > The Committee directs the Desk to continue rolling over maturing Treasury securities at auction and to continue reinvesting principal payments on all agency debt and agency mortgage-backed securities in agency mortgage-backed securities. The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions."

  More information regarding open market operations may be found on the Federal Reserve Bank of New York's website.

- The Board of Governors of the Federal Reserve System took no action to change the discount rate (the primary credit rate), which remains at 1.00 percent.

This information will be updated as appropriate to reflect decisions of the Federal Open Market Committee or the Board of Governors regarding details of the Federal Reserve's operational tools and approach used to implement monetary policy.

Alternatives

Implementation Note if the Committee raises the target range to ½ to ¾ percent

*Release Date: ~~April 27~~ **June 15**, 2016*

Decisions Regarding Monetary Policy Implementation

The Federal Reserve has made the following decisions to implement the monetary policy stance announced by the Federal Open Market Committee in its statement on ~~April 27~~ **June 15**, 2016:

- The Board of Governors of the Federal Reserve System ~~left unchanged the interest rate paid on required and excess reserve balances at 0.50 percent~~ **voted [unanimously] to raise the interest rate paid on required and excess reserve balances to 0.75 percent, effective June 16, 2016**.

- As part of its policy decision, the Federal Open Market Committee voted to authorize and direct the Open Market Desk at the Federal Reserve Bank of New York, until instructed otherwise, to execute transactions in the System Open Market Account in accordance with the following domestic policy directive:

  > "Effective ~~April 28~~ **June 16**, 2016, the Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of ~~¼ to~~ ½ **to ¾** percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of ~~0.25~~ **0.50** percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of $30 billion per day.

  > The Committee directs the Desk to continue rolling over maturing Treasury securities at auction and to continue reinvesting principal payments on all agency debt and agency mortgage-backed securities in agency mortgage-backed securities. The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions."

  More information regarding open market operations may be found on the Federal Reserve Bank of New York's website.

- **In a related action,** the Board of Governors of the Federal Reserve System ~~took no action to change the discount rate (the primary credit rate), which remains at 1.00~~ **voted [unanimously] to approve a ¼ percentage point increase in the discount rate (the primary credit rate) to 1.25** percent**, effective June 16, 2016**. **In taking this action, the Board approved requests submitted by the Boards of Directors of the Federal Reserve Banks of …**

This information will be updated as appropriate to reflect decisions of the Federal Open Market Committee or the Board of Governors regarding details of the Federal Reserve's operational tools and approach used to implement monetary policy.

Alternatives

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Alternatives

Projections

BALANCE SHEET AND INCOME

The staff has prepared a projection of the Federal Reserve's balance sheet and key elements of the associated income statement that is consistent with the monetary policy assumptions incorporated in the staff's forecast presented in Tealbook A.

For the purposes of our projections, we assume that the FOMC will cease reinvestments of maturing Treasury securities and agency debt as well as principal received on agency MBS when the federal funds rate reaches a range between 1¼ and 1½ percent. This assumption reflects the staff's interpretation of the Committee's statement that it anticipates continuing reinvestments until normalization of the level of the federal funds rate is "well under way." As a result of the more gradual rise in the federal funds rate in the staff's current projection, the implied timing for the cessation of reinvestments has moved to the third quarter of 2017, about three quarters later than posited in the April Tealbook. Once reinvestments cease, the SOMA portfolio shrinks through redemptions of maturing Treasury and agency debt securities as well as paydowns of principal on agency MBS.

Regarding the Federal Reserve's use of policy normalization tools, we assume that the level of overnight reverse repurchase agreements (ON RRPs) runs at $100 billion through the end of 2018 before declining to zero by the end of 2019, and that term deposits and term RRPs are not used.[1]

Some key features of the projection are highlighted below.

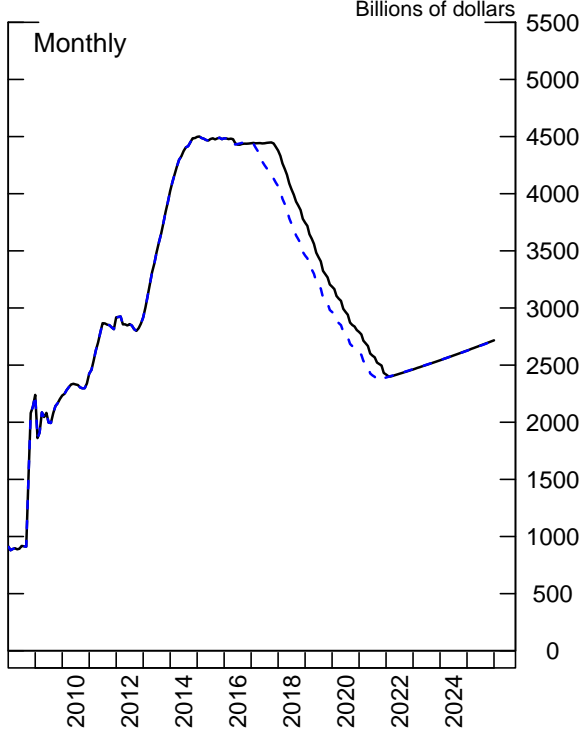- *Balance sheet.* The size of the portfolio is normalized in the first quarter of 2022, two quarters later than in the April Tealbook, reflecting the change in the timing for the cessation of reinvestments (see the solid black lines in the exhibit titled

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[1] Use of term RRPs or term deposits would result in a shift in the composition of Federal Reserve liabilities—a decline in reserve balances and an equal increase in term RRPs or term deposits—but would not produce a change in the overall size of the balance sheet. We also assume that RRPs associated with foreign official and international accounts remain near their April 30, 2016, level of $243 billion throughout the projection period.
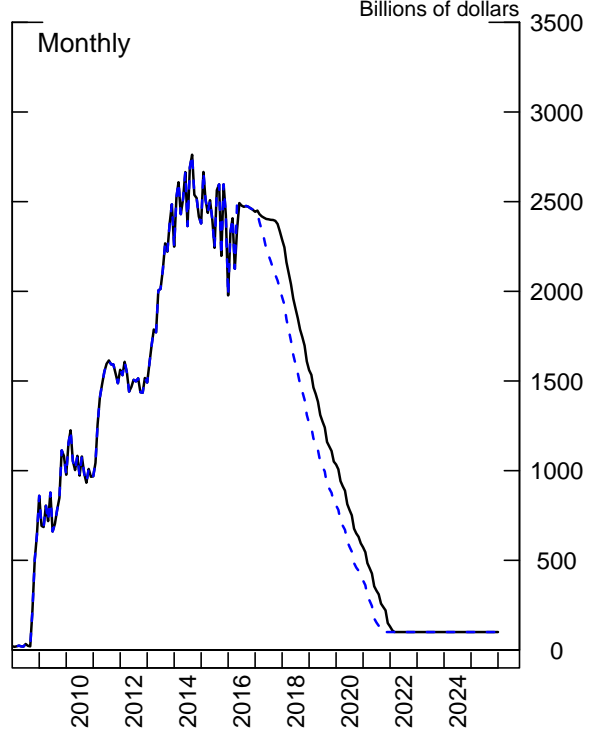
Total Assets and Selected Balance Sheet Items
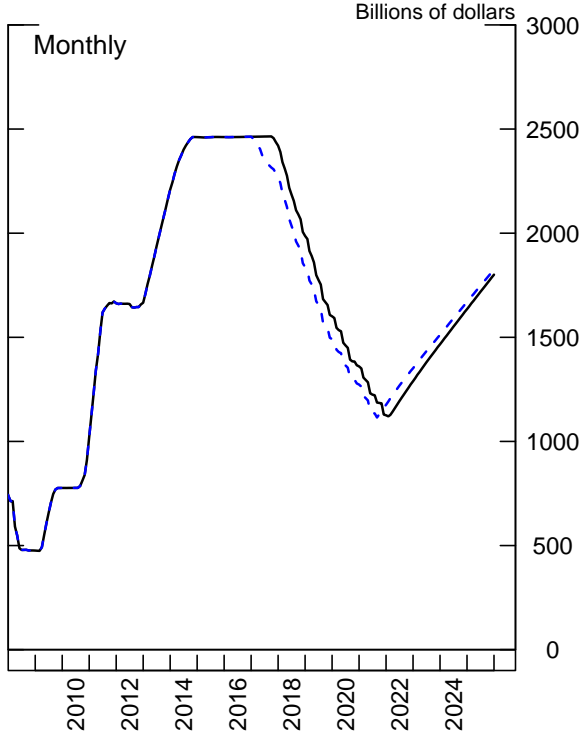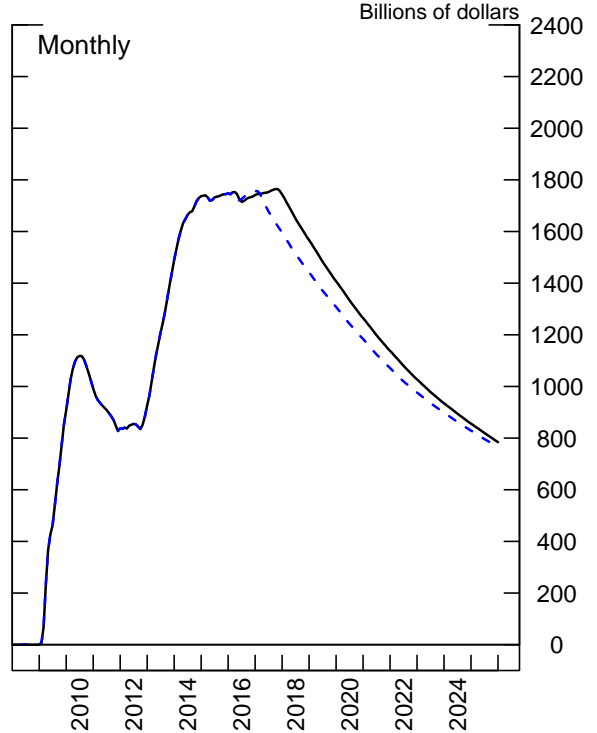
—— June Tealbook   – – April Tealbook

Total Assets

Billions of dollars

Monthly

Reserve Balances

Billions of dollars

Monthly

SOMA Treasury Holdings

Billions of dollars

Monthly

SOMA Agency MBS Holdings

Billions of dollars

Monthly

Projections

"Total Assets and Selected Balance Sheet Items" and the table that follows).[2] At that time, total assets are projected to stand at \$2.4 trillion, with about \$2.2 trillion in total SOMA securities holdings. Total assets and SOMA Treasury holdings rise thereafter, keeping pace with the increases in both Federal Reserve notes in circulation and Federal Reserve Bank capital. See the box entitled "Implications of Different Reinvestment Strategies" for a discussion of the implications of alternative reinvestment strategies for the balance sheet and for effects on Treasury term premiums.

- *Federal Reserve earnings remittances.* After record remittances to the Treasury in 2015 (excluding remittances associated with the transfer of Federal Reserve surplus under the FAST Act) of nearly \$100 billion, remittances are projected to decline to about \$84 billion this year (see the solid black lines in the "Income Projections" exhibit). The step-down in 2016 primarily reflects increased interest expense on reserves associated with the projected firming in the stance of policy. Annual remittances continue to decline in subsequent years, reaching a low of roughly \$34 billion in 2019, with no deferred asset being recorded.[3] Relative to the April Tealbook, the projected path of remittances is slightly higher in the medium term, as reinvestments are now assumed to continue through the third quarter of 2017, resulting in a larger SOMA portfolio and thus more interest income. The Federal Reserve's cumulative remittances from 2009 through 2025 total about \$1.1 trillion.

- *Unrealized gains or losses.* The staff estimates that the SOMA portfolio was in a net unrealized gain position of about \$201 billion at the end of May.[4]

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[2] The size of the balance sheet is assumed to be normalized when the securities portfolio reverts to the level consistent with its longer-run trend; this trend is determined largely by currency in circulation and a projected steady-state level of reserve balances. The projected timing of the normalization of the size of the balance sheet depends importantly on the level of reserve balances deemed necessary to conduct monetary policy; currently, we assume that level of reserve balances to be \$100 billion. However, ongoing regulatory and structural changes could result in a higher underlying demand for reserve balances. In turn, a higher steady-state level for reserve balances would, all else equal, imply an earlier normalization of the size of the balance sheet. For instance, with a \$500 billion steady-state level of reserve balances, the balance sheet would likely normalize at the beginning of 2021.

[3] In the event that a Federal Reserve Bank's earnings fall short of the amount necessary to cover its operating costs and pay dividends, a deferred asset for earnings remittances due to the U.S. Treasury would be recorded.

[4] The Federal Reserve reports the level in the quarter-end net unrealized gain/loss position of the SOMA portfolio to the public in the "Federal Reserve Banks Combined Quarterly Financial Reports,"

Federal Reserve Balance Sheet
End-of-Year Projections -- June Tealbook
(Billions of dollars)

	Apr 30, 2016	2017	2019	2021	2023	2025
Total assets	4,477	4,378	3,186	2,418	2,542	2,717
Selected assets						
Loans and other credit extensions*	3	0	0	0	0	0
Securities held outright	4,233	4,168	3,011	2,266	2,404	2,587
U.S. Treasury securities	2,461	2,420	1,601	1,126	1,466	1,801
Agency debt securities	27	4	2	2	2	2
Agency mortgage-backed securities	1,745	1,744	1,407	1,138	935	784
Unamortized premiums	184	161	125	99	84	74
Unamortized discounts	-16	-13	-10	-8	-7	-6
Total other assets	52	54	54	54	54	54
Total liabilities	4,437	4,335	3,140	2,368	2,487	2,657
Selected liabilities						
Federal Reserve notes in circulation	1,402	1,544	1,703	1,834	1,985	2,154
Reverse repurchase agreements	308	343	243	243	243	243
Deposits with Federal Reserve Banks	2,719	2,443	1,189	286	255	255
Reserve balances held by depository institutions	2,342	2,288	1,034	131	100	100
U.S. Treasury, General Account	339	150	150	150	150	150
Other deposits	38	5	5	5	5	5
Earnings remittances due to the U.S. Treasury	3	0	0	0	0	0
Total capital**	40	42	46	50	55	60

Projections (sidebar)

Source: Federal Reserve H.4.1 statistical releases and staff calculations.
Note: Components may not sum to totals due to rounding.
*Loans and other credit extensions includes primary, secondary, and seasonal credit; central bank liquidity swaps; and net portfolio holdings of Maiden Lane LLC.
**Total capital includes capital paid-in and capital surplus accounts.

Implications of Different Reinvestment Strategies

The Committee has indicated that it will cease reinvestments when the process for normalizing the level of the federal funds rate is "well under way." This box considers the differences in balance sheet and term premium effects that arise when the cessation of reinvestments is based on different levels of the federal funds rate. In particular, the scenarios labeled "FF 0.8", "FF 1.3", and "FF 2.0" consider the cases in which reinvestments end when the federal funds rate reaches 0.8 percent, 1.3 percent, and 2.0 percent, respectively.[1] The FF 1.3 scenario corresponds to the staff's current baseline assumption. All told, there are generally only small differences across strategies under the baseline economic outlook; however, the incremental policy accommodation provided by delaying the end of reinvestments may provide some insurance in the case of shocks that call for additional easing.

As shown in figure 1, these alternatives for the timing of the cessation of reinvestments largely result in "parallel" shifts of the trajectory for the Federal Reserve's balance sheet. As shown in figure 2, these different paths for the balance sheet would have corresponding effects on the paths of the term premium embedded in long-term interest rates. For example, the delay in the cessation of reinvestments under scenario FF 2.0 would result in a larger average level of the balance sheet over the next few years and a lower path for the term premium. All else equal, that would allow for somewhat faster normalization of the level of the federal funds rate. Conversely, the earlier cessation of reinvestments under scenario FF 0.8 would result in a somewhat higher path for the term premium and a somewhat slower pace of normalization for the level of the federal funds rate. Finally, under all scenarios, remittances to the Treasury (not shown) decline until 2019 before rebounding slowly, but differences across scenarios are minor.
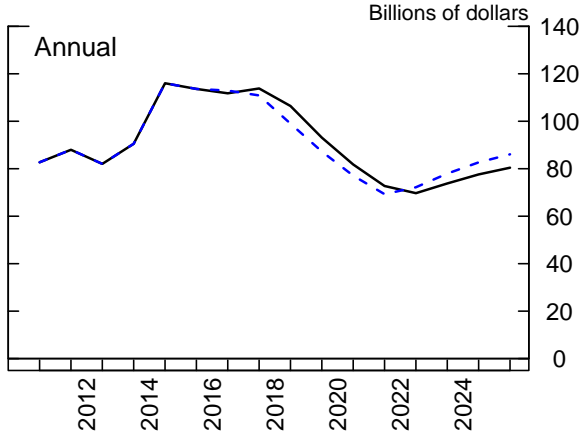

Figure 1: SOMA Holdings

Figure 2: Term Premium Effect

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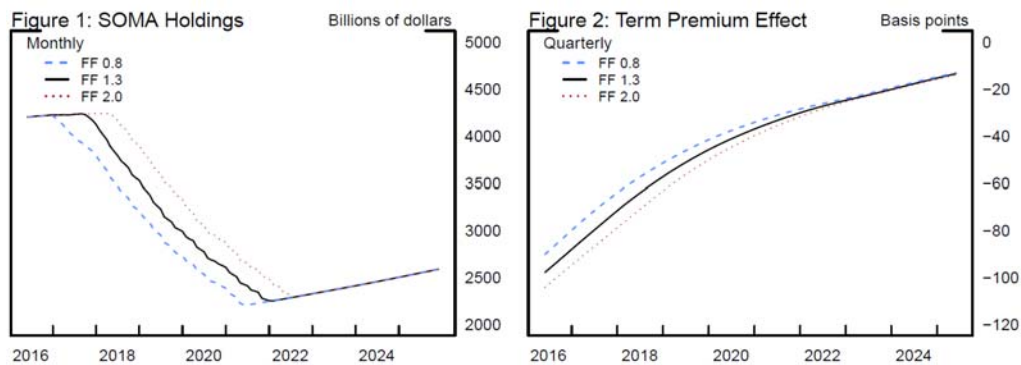
[1] The reinvestment end date under FF 0.8 coincides with that assumed in the April Tealbook baseline. The April Tealbook projected the federal funds rate to be 1.3 percent at this end date.
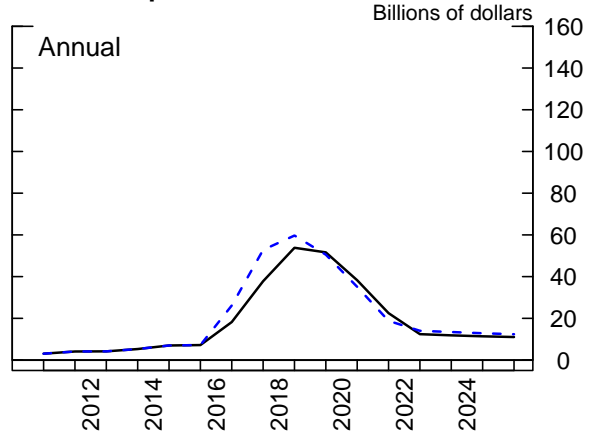
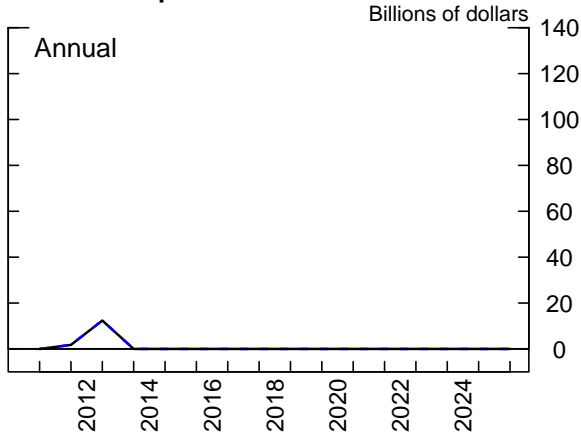# Income Projections

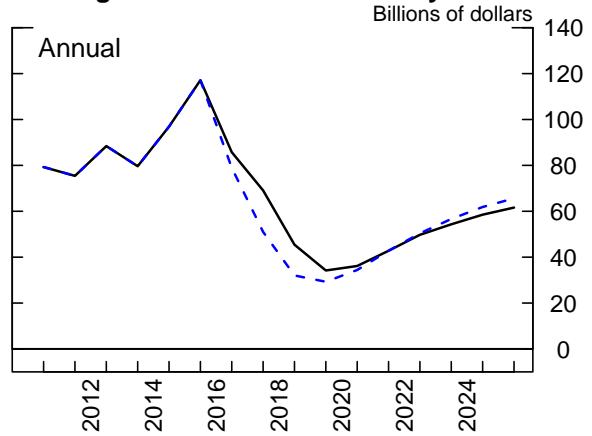—— June Tealbook   - - - April Tealbook

Interest Income

Annual

Billions of dollars

Interest Expense

Annual

Billions of dollars

Realized Capital Gains

Annual

Billions of dollars

Earnings Remittances to Treasury

Annual

Billions of dollars

Deferred Asset

End of year

Billions of dollars
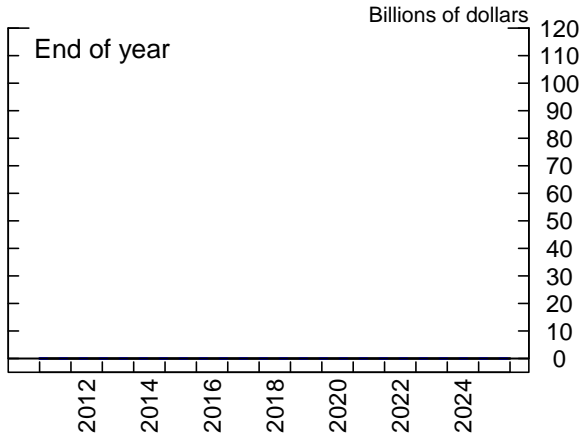
Memo: Unrealized Gains/Losses

End of year

Billions of dollars
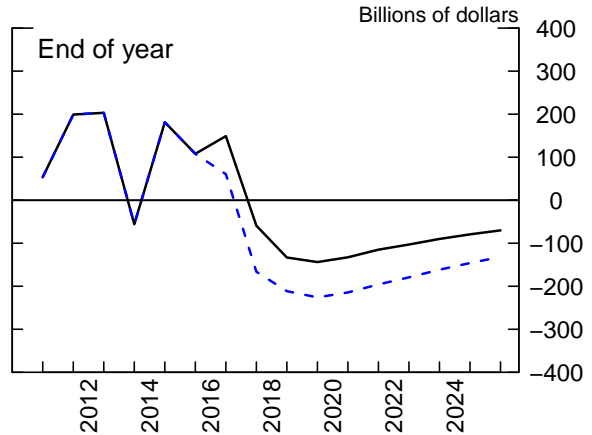
Projections

Going forward, the net unrealized gain or loss position of the portfolio will depend importantly on the path of longer-term interest rates. Because of the assumed rise in longer-term interest rates over the next several years, the portfolio is projected to shift to an unrealized loss position in mid-2017, about two quarters later than estimated in the April Tealbook. The delayed onset of a net unrealized loss position reflects a slightly lower path for long-term interest rates. The portfolio is then expected to record a peak unrealized loss of about $148 billion in 2019, about $92 billion less than what was projected in the April Tealbook. About $46 billion of that peak unrealized loss is attributable to losses on holdings of Treasury securities and $102 billion to losses on holdings of agency MBS. The unrealized loss position then contracts through 2025, as the value of securities previously acquired under the large-scale asset purchase programs return to par as they approach maturity and new securities are added to the portfolio at prevailing market yields.

- **Term premium effects.** As shown in the table "Projections for the 10-Year Treasury Term Premium Effect," the Federal Reserve's elevated stock of longer-term securities is estimated to hold down the term premium embedded in the 10-year Treasury yield by 98 basis points in the current quarter.[5] Over the next couple of years, the estimated term premium effect diminishes at a pace of about 4 basis points per quarter, reflecting in part the gradual projected shrinking of the portfolio.

- **SOMA Characteristics.** Regarding the size of the portfolio, approximately $216 billion in SOMA Treasury holdings has already matured or will mature this year, and a total of $1.4 trillion will mature between 2016 and 2020 (see the top panel of the exhibit "Projections for the Characteristics of SOMA Holdings").[6]

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available on the Board's website at
http://www.federalreserve.gov/monetarypolicy/bst_fedfinancials.htm#quarterly.

[5] The projection for the contemporaneous term premium effect is about 5 basis points less negative than what was reported in the April Tealbook as a result of the staff's refinement of assumptions in the underlying estimated model.

[6] While following its current reinvestment policy, the Desk replaces maturing Treasury security holdings with newly issued debt at Treasury auctions. Consistent with longstanding practice, these rollovers are carried out at Treasury auctions by placing bids for the SOMA in a par amount equal to the value of holdings maturing on the issue date of a newly issued security. Moreover, across the various maturities, these bids are placed proportionately to the issue amounts of the new securities. The Desk's

Projections

Projections for the 10-Year Treasury Term Premium Effect
(Basis Points)

Date	June Tealbook	April Tealbook
Quarterly Averages		
2016:Q2	-98	-103
Q3	-94	-99
Q4	-89	-95
2017:Q4	-73	-78
2018:Q4	-58	-65
2019:Q4	-47	-55
2020:Q4	-38	-46
2021:Q4	-31	-39
2022:Q4	-25	-33
2023:Q4	-21	-27
2024:Q4	-16	-21
2025:Q4	-11	-15

Projections

The amounts of Treasury securities maturing each month vary considerably, while projected MBS paydowns are much less variable. However, realized MBS paydowns will reflect the evolution of interest rates and other factors and could thus be significantly more volatile than projected.

The weighted-average duration of the SOMA Treasury portfolio is currently about 6½ years (see the bottom panel of the exhibit). The weighted-average duration is projected to decline through 2017, reflecting the aging of the portfolio, and subsequently to rise until 2022, when the size of the balance sheet is normalized.[7] After reaching its peak, duration is projected to resume its decline as the Desk starts purchasing Treasury securities to keep pace with the increase in currency. In particular, the duration contour in this latter portion of the projection is based on the key assumption that the Federal Reserve will buy only Treasury bills until those holdings are equal to approximately 30 percent of the Treasury portfolio, similar to the pre-crisis composition of the portfolio (currently there are no Treasury bill holdings). Thereafter, purchases of Treasury securities are assumed to be spread across the maturity spectrum.[8]

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bids at Treasury auctions are placed as noncompetitive tenders and are treated as add-ons to announced auction sizes.

[7] The duration of the SOMA Treasury portfolio initially declines once reinvestments cease, as Treasury securities in the portfolio approach maturity. Once the pace of roll-offs accelerates starting in 2018 and longer tenor securities account for a larger share in the remaining portfolio, duration increases until the balance sheet is normalized.

[8] We assume zero purchases of agency MBS after reinvestments cease.
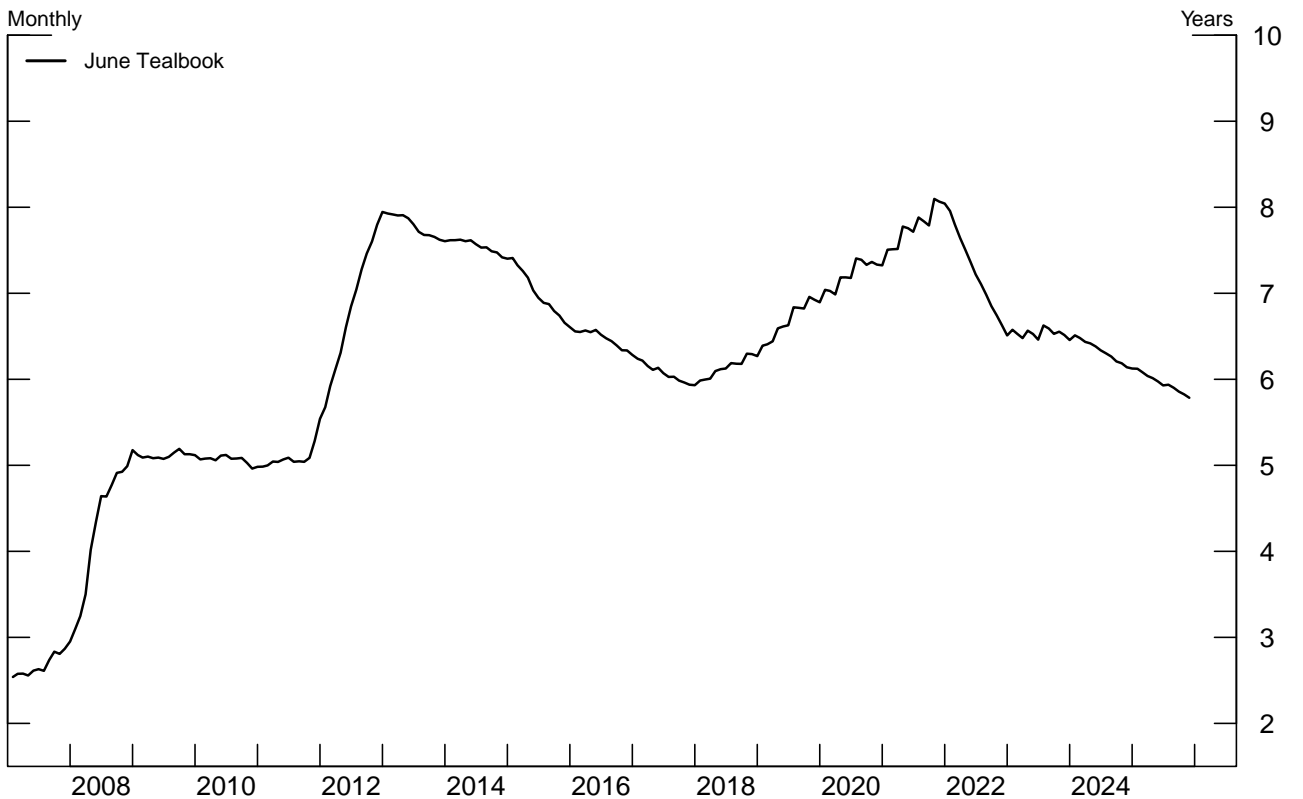
Projections for the Characteristics of SOMA Holdings

Projected Receipts of Principal on SOMA Securities

June Tealbook

Billions of Dollars

■ Projected MBS Paydowns
■ Treasury Maturities
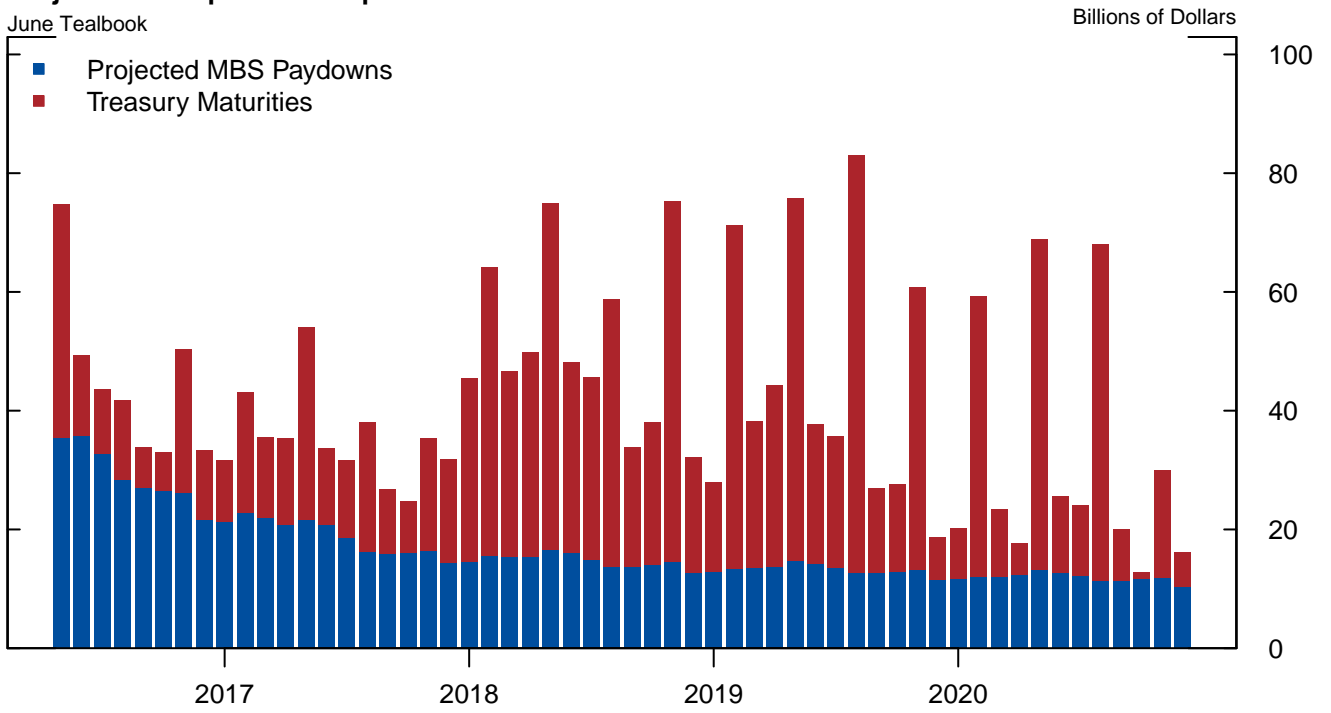
SOMA Weighted–Average Treasury Duration

Monthly

Years

—— June Tealbook

Projections

Abbreviations

ABS	asset-backed securities
BEA	Bureau of Economic Analysis, Department of Commerce
BHC	bank holding company
CDS	credit default swaps
CFTC	Commodity Futures Trading Commission
C&I	commercial and industrial
CLO	collateralized loan obligation
CMBS	commercial mortgage-backed securities
CPI	consumer price index
CRE	commercial real estate
Desk	Open Market Desk
DSGE	dynamic stochastic general equilibrium
ECB	European Central Bank
EDO	Estimated, dynamic, optimization-based model
ELB	effective lower bound
EME	emerging market economy
FDIC	Federal Deposit Insurance Corporation
FOMC	Federal Open Market Committee; also, the Committee
GCF	general collateral finance
GDI	gross domestic income
GDP	gross domestic product
GSIBs	globally systemically important banking organizations
HQLA	high-quality liquid assets
ISM	Institute for Supply Management
LIBOR	London interbank offered rate
MBS	mortgage-backed securities
MMFs	money market funds

NBER	National Bureau of Economic Research
NI	nominal income
NIPA	national income and product accounts
OIS	overnight index swap
ON RRP	overnight reverse repurchase agreement
PCE	personal consumption expenditures
repo	repurchase agreement
RMBS	residential mortgage-backed securities
RRP	reverse repurchase agreement
SCOOS	Senior Credit Officer Opinion Survey on Dealer Financing Terms
SEP	Summary of Economic Projections
SFA	Supplemental Financing Account
SLOOS	Senior Loan Officer Opinion Survey on Bank Lending Practices
SOMA	System Open Market Account
TBA	to be announced (for example, TBA market)
TGA	U.S. Treasury's General Account
TIPS	Treasury inflation-protected securities
TPE	Term premium effects