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Class I FOMC – Restricted Controlled (FR)

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# Report to the FOMC on Economic Conditions and Monetary Policy



## Book B

### Monetary Policy: Strategies and Alternatives

July 21, 2016

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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

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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.<sup>1</sup> 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 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, whereas the first-difference rule calls for values that are a little below the Tealbook baseline. The Taylor (1993) and Taylor (1999) rules, which feature no interest rate smoothing term, prescribe substantially higher values of the federal funds rate in the near term than the inertial Taylor (1999) rule and the first-difference rule. The prescriptions of all four simple rules are a tad lower than in the June Tealbook because the staff now projects a slightly lower path for the output gap in the near term.

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 result in the output gap being closed in the final quarter of that period. The current estimate of  $r^*$ , at 0.96 percent, is a bit lower than the estimate for the corresponding period in the June Tealbook due to the slightly lower path of the output gap in coming years in the projection. The second line of the panel shows the average level of the real federal funds rate in the staff’s forecast for the same 12-quarter period used to compute  $r^*$ .<sup>2</sup> This average, at 0.05 percent, is almost 1 percentage point below  $r^*$ . The relatively accommodative stance of policy in the Tealbook baseline projection reflects policy

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<sup>1</sup> The appendix to this section provides details on each of the four rules.

<sup>2</sup> 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 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.

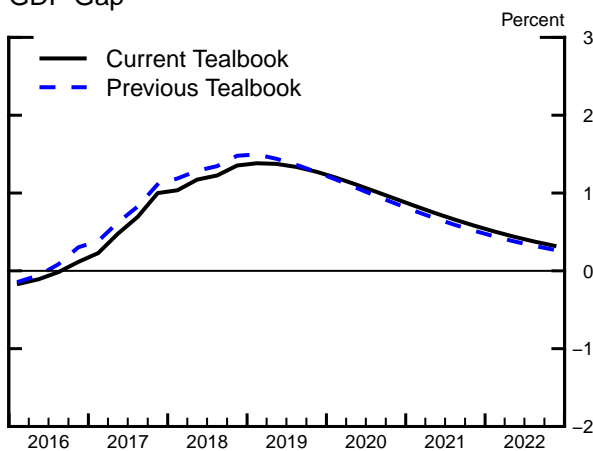
### Policy Rules and the Staff Projection

#### Near-Term Prescriptions of Selected Policy Rules<sup>1</sup>

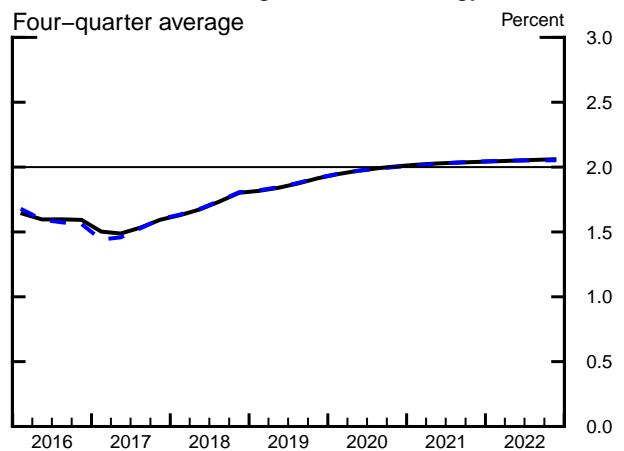
	(Percent)	
	2016:Q3	2016:Q4
Taylor (1993) rule	<b>2.40</b>	<b>2.46</b>
<i>Previous Tealbook</i>	2.43	2.51
Taylor (1999) rule	<b>2.40</b>	<b>2.52</b>
<i>Previous Tealbook</i>	2.47	2.66
Inertial Taylor (1999) rule	<b>0.68</b>	<b>0.96</b>
<i>Previous Tealbook projection</i>	0.69	0.99
First-difference rule	<b>0.41</b>	<b>0.53</b>
<i>Previous Tealbook projection</i>	0.44	0.58
<i>Addendum:</i>		
Tealbook baseline	<b>0.52</b>	<b>0.70</b>

#### Key Elements of the Staff Projection

GDP Gap



PCE Prices Excluding Food and Energy  
Four-quarter average



#### Real Federal Funds Rate Estimates<sup>2</sup>

	(Percent)		
	Current Tealbook	Current-Quarter Estimate as of Previous Tealbook	Previous Tealbook
Tealbook-consistent FRB/US $r^*$	0.96	1.12	0.96
Average projected real federal funds rate	0.05	0.15	-0.05

1. For rules that have a lagged policy rate as a right-hand-side variable, the lines denoted "Previous Tealbook projection" report prescriptions based on the previous Tealbook's staff outlook for inflation and the output gap, but 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-consistent FRB/US  $r^*$ .

considerations other than closing the output gap that are embedded in the policy reaction function assumed by the staff.<sup>3</sup>

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.<sup>4</sup> The constant intercept terms of the Taylor-type 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.

As in the June Tealbook, the baseline policy path in the staff forecast is derived under a modified version of the inertial Taylor (1999) rule with a temporary downward adjustment to the intercept.<sup>5</sup> The implications in the model of this adjustment can be seen by comparing the outcomes under the Tealbook baseline policy to the outcomes under the inertial Taylor (1999) rule for which the intercept is constant. In the Tealbook baseline, the nominal federal funds rate increases by an average of  $\frac{1}{4}$  percentage point per quarter through the middle of 2019, when it reaches 3 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

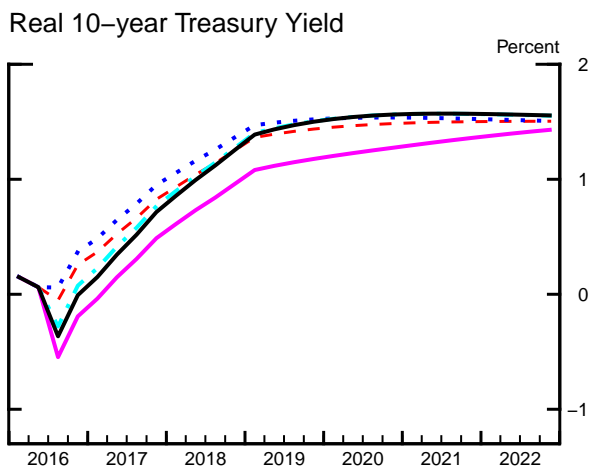
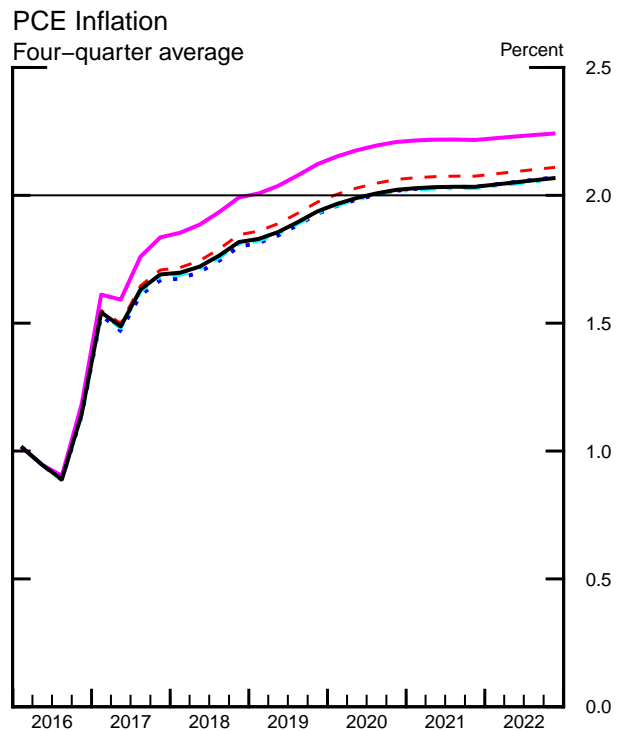
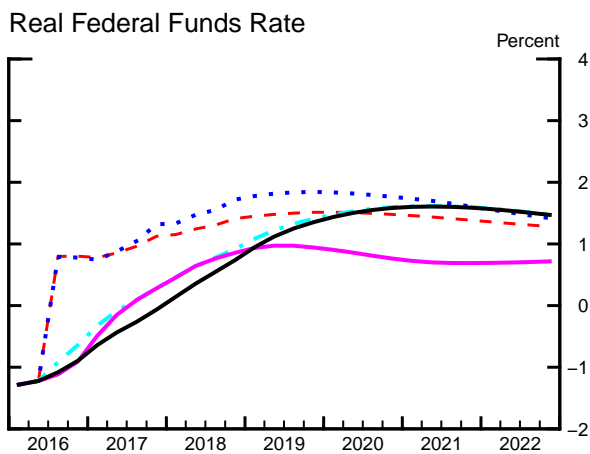
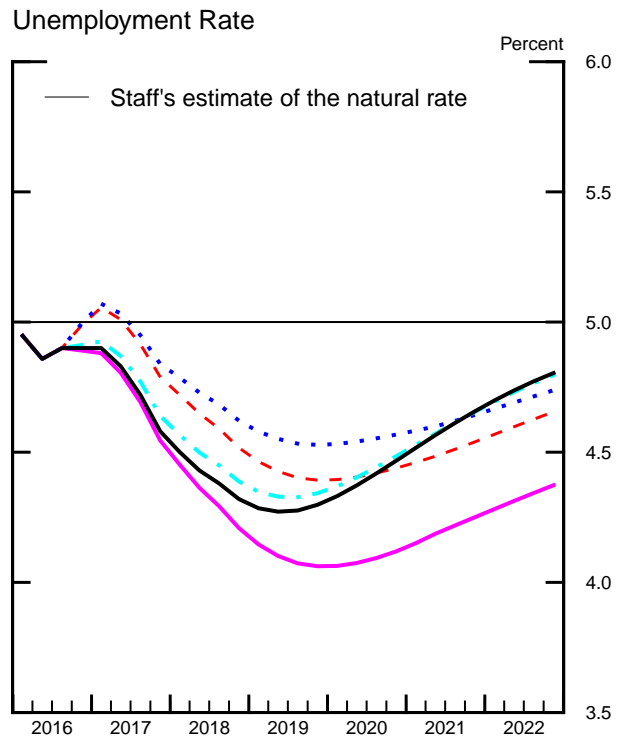
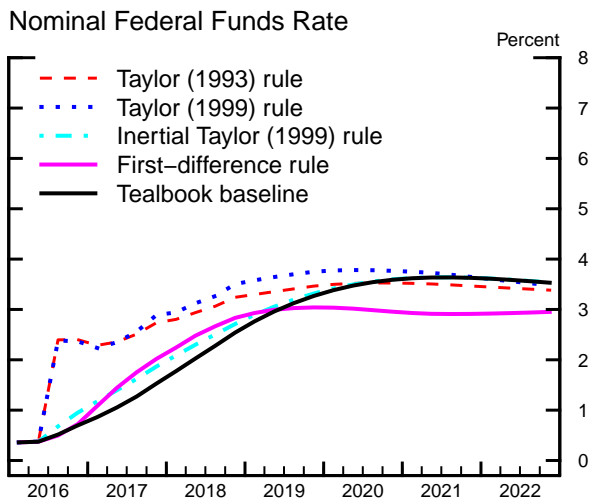
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<sup>3</sup> In particular, the baseline policy reaction function embeds an endogenous response to deviations of inflation from the Committee’s 2 percent objective. Furthermore, it features inertia regarding adjustments to the path of the nominal federal funds rate and a judgmental downward adjustment to the stance of policy that gradually diminishes over the next few years; all else equal, inclusion of these two features in the baseline policy rule makes the output gap at the end of the 12-quarter period more positive than otherwise, which tends to increase the difference between the  $r^*$  needed to close the output gap and the corresponding average projected real federal funds rate.

<sup>4</sup> Because of these endogenous responses, the near-term prescriptions from the dynamic simulations can differ from those shown in the top panel of the first exhibit.

<sup>5</sup> For a discussion of 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



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 a tendency for current and near-term core inflation rates to outperform headline inflation rates as predictors of the medium-term behavior of headline inflation.

Tealbook baseline because, until late 2018, its intercept is higher than in the modified version of the rule used to construct the baseline. However, the difference in policy rates is small and dissipates too rapidly 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 those in 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.<sup>6</sup> 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  $\frac{1}{2}$  percentage point below the Committee's objective, and an intercept term of 1 percent, the Taylor (1993) and Taylor (1999) rules prescribe nominal rates that, in the near term, are just 0.6 percentage point below their longer-run level of 3 percent. 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 several years. As a consequence, the Taylor (1999) rule generates a higher trajectory of the unemployment rate and a slightly lower trajectory of inflation than does 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.<sup>7</sup> 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

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<sup>6</sup> An immediate 2-percentage-point increase in the federal funds rate like the one prescribed by these rules would constitute a sharp departure from the policy strategy that the Committee has followed over the past several years—a period during which the Committee has emphasized that it is not following a rule and that it intends to adjust policy gradually. In the simulations, private-sector agents are assumed to fully understand the central bank's new rule and the implications for the economy as well as to believe the central bank's commitment to following the rule; accordingly, the switch to following the Taylor (1993) or the Taylor (1999) rule and the resulting jump in the federal funds rate do not create confusion about the Committee's reaction function or call into question the Committee's credibility.

<sup>7</sup> For the current and next quarters, the policy response of the first-difference rule in the "Policy Rule Simulations exhibit" is similar to the baseline, in contrast with the modestly more accommodative stance shown earlier in the "Near-Term Prescriptions of Selected Policy Rules" exhibit. This difference arises because of endogenous feedback from expected future inflation and output growth in the current exhibit, whereas these variables were kept at their baseline values in the previous exhibit.



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 from mid-2019 onward 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.

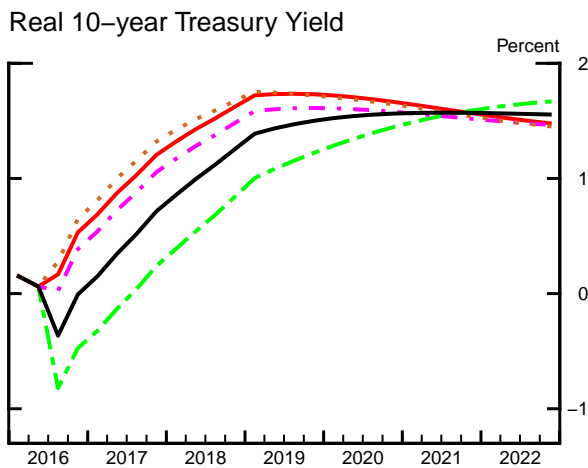
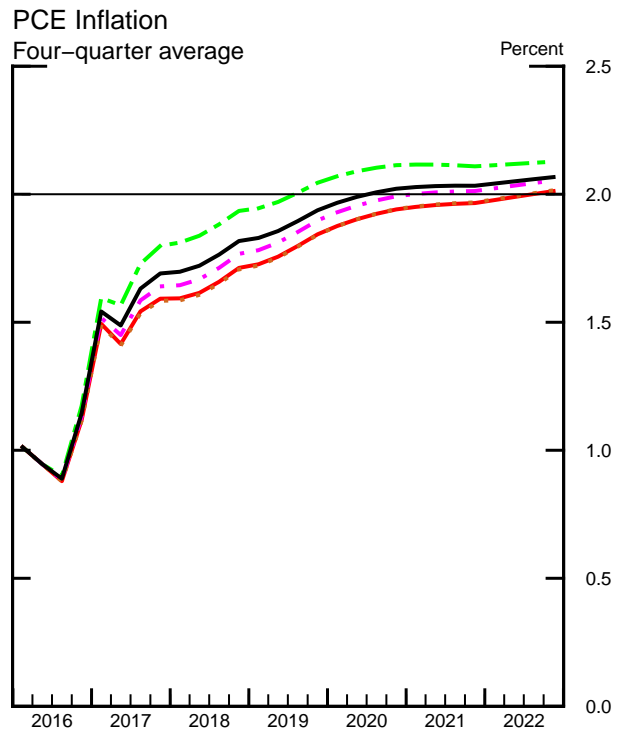
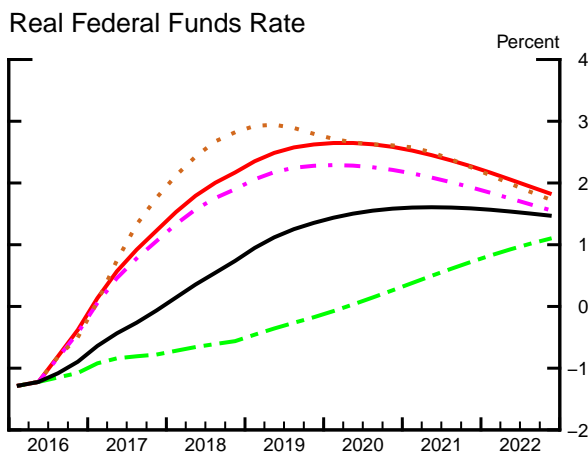
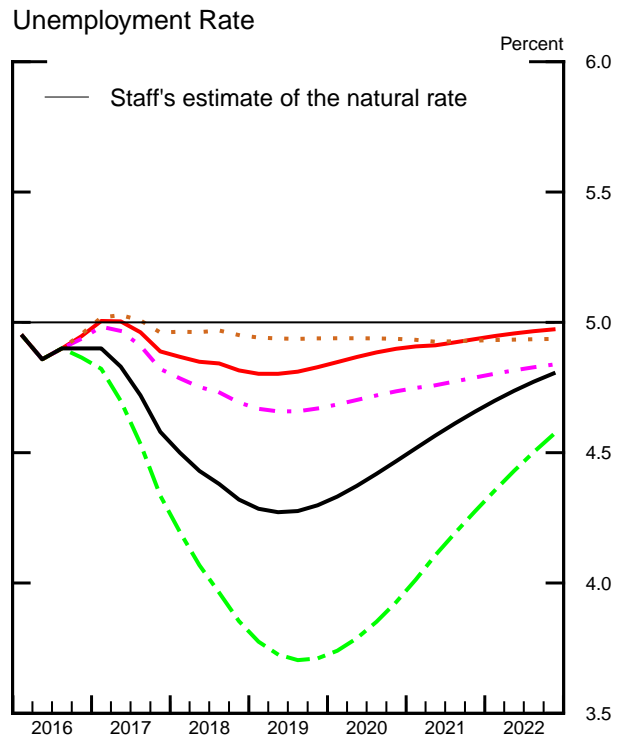
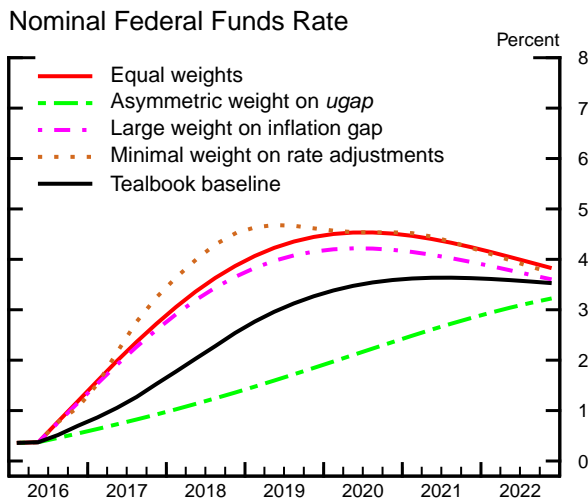
The third exhibit, "Optimal Control Simulations under Commitment," displays optimal control simulations under various assumptions about policymakers' preferences, as captured by four specifications of the loss function.<sup>8</sup> The concept of optimal control that is employed here corresponds to a 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 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 higher path arises 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

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<sup>8</sup> The box "Optimal Control and the Loss Function" in the Monetary Policy Strategies section of the June 2016 Tealbook B offers motivations for these specifications; the appendix provides technical details on the optimal control simulations.

Optimal Control Simulations under Commitment



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 appendix for technical details and the box "Optimal Control and the Loss Function" in the June 2016 Tealbook B for a motivation.

than in the Tealbook baseline over the simulation period, consistent with a limited response of inflation in the model to 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 identical to the specification with equal weights when the unemployment rate is above the natural rate. Under this strategy, the path of the federal funds rate is considerably below both the path for the case of equal weights and the Tealbook baseline path; policymakers choose this relatively accommodative path for the policy rate because the desire to raise inflation to 2 percent is not tempered by an aversion to the undershooting of the natural rate of unemployment that helps achieve this outcome.<sup>9</sup> 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.

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.<sup>10</sup>

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 and assigns relatively larger but equal weights on the unemployment gap and the inflation gap. 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

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<sup>9</sup> That said, this desire is tempered a bit by a modest overshooting of the natural rate of unemployment beyond the period shown, which occurs as policymakers keep the federal funds rate above its longer-run level for a time to prevent the high degree of accommodation early in the simulation from raising inflation much above 2 percent.

<sup>10</sup> 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.

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.

**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
<i>Nominal federal funds rate<sup>1</sup></i>					
Taylor (1993)	2.4	2.7	3.2	3.5	3.5
Taylor (1999)	2.4	2.9	3.5	3.7	3.8
Inertial Taylor (1999)	1.0	1.9	2.7	3.3	3.6
First-difference	0.7	2.0	2.8	3.0	3.0
Extended Tealbook baseline	0.7	1.5	2.5	3.3	3.6
<i>Real GDP</i>					
Taylor (1993)	1.6	2.2	2.1	1.9	1.8
Taylor (1999)	1.6	2.1	2.0	1.9	1.8
Inertial Taylor (1999)	1.7	2.4	2.1	1.8	1.6
First-difference	1.7	2.6	2.3	2.0	1.8
Extended Tealbook baseline	1.7	2.5	2.1	1.8	1.6
<i>Unemployment rate<sup>1</sup></i>					
Taylor (1993)	5.0	4.8	4.5	4.4	4.4
Taylor (1999)	5.0	4.8	4.6	4.5	4.6
Inertial Taylor (1999)	4.9	4.6	4.4	4.3	4.5
First-difference	4.9	4.5	4.2	4.1	4.1
Extended Tealbook baseline	4.9	4.6	4.3	4.3	4.5
<i>Total PCE prices</i>					
Taylor (1993)	1.1	1.7	1.8	2.0	2.1
Taylor (1999)	1.1	1.7	1.8	1.9	2.0
Inertial Taylor (1999)	1.1	1.7	1.8	1.9	2.0
First-difference	1.2	1.8	2.0	2.1	2.2
Extended Tealbook baseline	1.1	1.7	1.8	1.9	2.0
<i>Core PCE prices</i>					
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	1.7	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.

**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
<i>Nominal federal funds rate<sup>1</sup></i>								
Taylor (1993)	0.4	0.4	2.4	2.4	2.3	2.4	2.5	2.7
Taylor (1999)	0.4	0.4	2.4	2.4	2.2	2.3	2.6	2.9
Inertial Taylor (1999)	0.4	0.4	0.7	1.0	1.2	1.4	1.6	1.9
First-difference	0.4	0.4	0.5	0.7	1.1	1.4	1.8	2.0
Extended Tealbook baseline	0.4	0.4	0.5	0.7	0.9	1.1	1.3	1.5
<i>Real GDP</i>								
Taylor (1993)	2.1	1.6	1.5	1.6	1.8	1.9	2.0	2.2
Taylor (1999)	2.1	1.6	1.5	1.6	1.7	1.8	1.9	2.1
Inertial Taylor (1999)	2.1	1.6	1.5	1.7	1.9	2.1	2.2	2.4
First-difference	2.1	1.6	1.5	1.7	2.0	2.2	2.4	2.6
Extended Tealbook baseline	2.1	1.6	1.5	1.7	2.0	2.2	2.3	2.5
<i>Unemployment rate<sup>1</sup></i>								
Taylor (1993)	4.9	4.9	4.9	5.0	5.1	5.0	4.9	4.8
Taylor (1999)	4.9	4.9	4.9	5.0	5.1	5.0	4.9	4.8
Inertial Taylor (1999)	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.6
First-difference	4.9	4.9	4.9	4.9	4.9	4.8	4.7	4.5
Extended Tealbook baseline	4.9	4.9	4.9	4.9	4.9	4.8	4.7	4.6
<i>Total PCE prices</i>								
Taylor (1993)	1.0	0.9	0.9	1.1	1.5	1.5	1.6	1.7
Taylor (1999)	1.0	0.9	0.9	1.1	1.5	1.5	1.6	1.7
Inertial Taylor (1999)	1.0	0.9	0.9	1.1	1.5	1.5	1.6	1.7
First-difference	1.0	0.9	0.9	1.2	1.6	1.6	1.8	1.8
Extended Tealbook baseline	1.0	0.9	0.9	1.1	1.5	1.5	1.6	1.7
<i>Core PCE prices</i>								
Taylor (1993)	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.6
Taylor (1999)	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.6
Inertial Taylor (1999)	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.6
First-difference	1.6	1.6	1.6	1.6	1.6	1.6	1.7	1.7
Extended Tealbook baseline	1.6	1.6	1.6	1.6	1.5	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
<i>Nominal federal funds rate<sup>1</sup></i>					
Equal weights	1.2	2.7	3.9	4.4	4.5
Aymmetric weight on <i>ugap</i>	0.5	0.9	1.4	1.8	2.4
Large weight on inflation gap	1.2	2.6	3.7	4.2	4.2
Minimal weight on rate adjustments	1.1	3.2	4.5	4.6	4.5
Extended Tealbook baseline	0.7	1.5	2.5	3.3	3.6
<i>Real GDP</i>					
Equal weights	1.6	2.0	1.7	1.7	1.7
Aymmetric weight on <i>ugap</i>	1.8	3.0	2.5	2.0	1.5
Large weight on inflation gap	1.6	2.1	1.9	1.8	1.7
Minimal weight on rate adjustments	1.6	1.9	1.6	1.7	1.8
Extended Tealbook baseline	1.7	2.5	2.1	1.8	1.6
<i>Unemployment rate<sup>1</sup></i>					
Equal weights	4.9	4.9	4.8	4.8	4.9
Aymmetric weight on <i>ugap</i>	4.9	4.3	3.9	3.7	3.9
Large weight on inflation gap	4.9	4.8	4.7	4.7	4.7
Minimal weight on rate adjustments	5.0	5.0	5.0	4.9	4.9
Extended Tealbook baseline	4.9	4.6	4.3	4.3	4.5
<i>Total PCE prices</i>					
Equal weights	1.1	1.6	1.7	1.8	1.9
Aymmetric weight on <i>ugap</i>	1.2	1.8	1.9	2.0	2.1
Large weight on inflation gap	1.1	1.6	1.8	1.9	2.0
Minimal weight on rate adjustments	1.1	1.6	1.7	1.8	1.9
Extended Tealbook baseline	1.1	1.7	1.8	1.9	2.0
<i>Core PCE prices</i>					
Equal weights	1.6	1.5	1.7	1.8	1.9
Aymmetric weight on <i>ugap</i>	1.6	1.7	1.9	2.0	2.1
Large weight on inflation gap	1.6	1.5	1.8	1.9	2.0
Minimal weight on rate adjustments	1.6	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
<i>Nominal federal funds rate<sup>1</sup></i>								
Equal weights	0.4	0.4	0.8	1.2	1.6	2.0	2.4	2.7
Asymmetric weight on <i>ugap</i>	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.9
Large weight on inflation gap	0.4	0.4	0.8	1.2	1.5	1.9	2.3	2.6
Minimal weight on rate adjustments	0.4	0.4	0.8	1.1	1.5	2.2	2.8	3.2
Extended Tealbook baseline	0.4	0.4	0.5	0.7	0.9	1.1	1.3	1.5
<i>Real GDP</i>								
Equal weights	2.1	1.6	1.5	1.6	1.7	1.8	1.8	2.0
Asymmetric weight on <i>ugap</i>	2.1	1.6	1.5	1.8	2.2	2.5	2.7	3.0
Large weight on inflation gap	2.1	1.6	1.5	1.6	1.8	1.9	1.9	2.1
Minimal weight on rate adjustments	2.1	1.6	1.5	1.6	1.7	1.7	1.7	1.9
Extended Tealbook baseline	2.1	1.6	1.5	1.7	2.0	2.2	2.3	2.5
<i>Unemployment rate<sup>1</sup></i>								
Equal weights	4.9	4.9	4.9	4.9	5.0	5.0	5.0	4.9
Asymmetric weight on <i>ugap</i>	4.9	4.9	4.9	4.9	4.8	4.7	4.5	4.3
Large weight on inflation gap	4.9	4.9	4.9	4.9	5.0	5.0	4.9	4.8
Minimal weight on rate adjustments	4.9	4.9	4.9	5.0	5.0	5.0	5.0	5.0
Extended Tealbook baseline	4.9	4.9	4.9	4.9	4.9	4.8	4.7	4.6
<i>Total PCE prices</i>								
Equal weights	1.0	0.9	0.9	1.1	1.5	1.4	1.5	1.6
Asymmetric weight on <i>ugap</i>	1.0	0.9	0.9	1.2	1.6	1.6	1.7	1.8
Large weight on inflation gap	1.0	0.9	0.9	1.1	1.5	1.4	1.6	1.6
Minimal weight on rate adjustments	1.0	0.9	0.9	1.1	1.5	1.4	1.5	1.6
Extended Tealbook baseline	1.0	0.9	0.9	1.1	1.5	1.5	1.6	1.7
<i>Core PCE prices</i>								
Equal weights	1.6	1.6	1.6	1.6	1.5	1.4	1.4	1.5
Asymmetric weight on <i>ugap</i>	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.7
Large weight on inflation gap	1.6	1.6	1.6	1.6	1.5	1.4	1.5	1.5
Minimal weight on rate adjustments	1.6	1.6	1.6	1.6	1.4	1.4	1.4	1.5
Extended Tealbook baseline	1.6	1.6	1.6	1.6	1.5	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 ( $\pi_t$  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  $\pi^{LR}$ , is 2 percent.

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

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.<sup>1</sup> 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.<sup>2</sup> 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. To isolate the effects of changes in the macroeconomic projections on the prescriptions of these inertial rules, the lines labeled “Previous Tealbook projection” report prescriptions conditional on the previous Tealbook

<sup>1</sup> See, for example, Erceg and others (2012).

<sup>2</sup> 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.

projections for inflation and the output gap but using the value of the lagged federal funds rate in the current Tealbook for the first quarter shown.

## 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,  $\pi_t^{PCE}$ , 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  $\beta = 0.9963$ :

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

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 box “Optimal Control and the Loss Function” in the Monetary Policy Strategies section of the June 2016 Tealbook B provides motivations for the four specifications of the loss function.

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.<sup>3</sup> 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.

	$\lambda_\pi$	$\lambda_{u,t+\tau}$		$\lambda_R$
		$ugap_{t+\tau} < 0$	$ugap_{t+\tau} \geq 0$	
<b>Equal weights</b>	1	1	1	1
<b>Asymmetric weight on <i>ugap</i></b>	1	0	1	1
<b>Large weight on inflation gap</b>	5	1	1	1
<b>Minimal weight on rate adjustment</b>	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

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

model see this path as being a binding commitment on future Committee decisions; the optimal 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.

## REFERENCES

- Erceg, Christopher, Jon Faust, Michael Kiley, Jean-Philippe Laforte, David López-Salido, Stephen Meyer, Edward Nelson, David Reifschneider, and Robert Tetlow (2012). “An Overview of Simple Policy Rules and Their Use in Policymaking in Normal Times and Under Current Conditions,” 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, July 18.
- Orphanides, Athanasios (2003). “Historical Monetary Policy Analysis and the Taylor Rule,” *Journal of Monetary Economics*, Vol. 50 (July), pp. 983–1022.
- Taylor, John B. (1993). “Discretion versus Policy Rules in Practice,” *Carnegie-Rochester Conference Series on Public Policy*, Vol. 39 (December), pp. 195–214.
- Taylor, John B. (1999). “A Historical Analysis of Monetary Policy Rules,” in John B. Taylor, ed., *Monetary Policy Rules*. University of Chicago Press, pp. 319–341.

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## Monetary Policy Alternatives

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Indicators received since the Committee's last meeting show a rebound in payroll gains in June along with continued moderate GDP growth, while readings on 12-month inflation are little changed, consistent with the staff outlook. And although the United Kingdom's vote to leave the European Union initially roiled financial markets and highlighted continued economic and political risks in Europe, the likely implications of Brexit for the U.S. economic outlook now appear mild. The key question for policymakers is whether these positive developments warrant a change in the stance of policy at this meeting (or a strong signal to that effect), or whether current policy and communications remain appropriate to achieve the Committee's outlook for continued moderate growth, labor market strengthening, and a return of inflation to 2 percent. The alternative statements offer somewhat different assessments of the implications of recent developments for the economic outlook and the associated risks surrounding the outlook; accordingly, they differ in either their setting of the current policy rate or the signal they provide about the likely stance of policy going forward.

- In characterizing incoming economic data, all three alternatives describe the recent rate of expansion in economic activity as “moderate,” and all acknowledge strength in household spending and recent weakness in residential investment. While all three alternatives state that the labor market has “strengthened,” the statements differ somewhat in their assessments of overall labor utilization.
  - Alternative B notes that “on balance, payrolls and other labor market indicators point to some increase in labor utilization,” while Alternative C expresses a slightly more optimistic view by replacing “some” with “an.” Alternative A takes a less optimistic view, noting that “the unemployment rate has held steady, on net, since the beginning of the year.”
- The three alternatives offer different interpretations of the incoming price data.
  - Alternatives A and B retain the language used in recent statements acknowledging that inflation “has continued to run below” the Committee's 2 percent longer-run objective, and note that this situation either “partly” reflects (in the case of Alternative B) or “only partly” reflects (in the case of Alternative A) earlier declines in energy prices and in prices of non-energy imports. By contrast, Alternative C states that inflation “has risen

this year, moving closer to” the Committee’s objective, and does not cite a contribution from energy prices and non-energy import prices.

- Alternatives B and C note that measures of inflation compensation “remain low” and that survey measures of longer-term inflation expectations are “little changed.” Alternative A instead says that inflation compensation and measures of longer-term inflation expectations “remain near their lows.”
- Turning to the outlook for economic activity and inflation and its implications for monetary policy:
  - Alternative B retains the June statement language affirming the Committee’s expectation that, “with gradual adjustments in the stance of monetary policy, economic activity will expand at a moderate pace and labor market indicators will strengthen.” Alternative C, while using the same gradual adjustment language for monetary policy, gives a different outlook for the labor market, stating that “employment growth will gradually slow to a rate in line with its longer-run trend;” these words signal that some slowing in employment growth would be seen as appropriate. By contrast, Alternative A signals that increases in the federal funds rate are unlikely in the near term (and indeed hints that the next adjustment in the stance of policy could be an easing) by expressing the Committee’s expectation that economic activity will expand at a moderate pace “with appropriate monetary policy accommodation” rather than “with gradual adjustments.”
  - Alternatives A and B 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—“gradually” in Alternative A—as the transitory effects of those earlier declines dissipate and the labor market strengthens further. Alternative C, in contrast, emphasizes the expected return of inflation to 2 percent by dropping the reference to low inflation in the near term, and, consistent with its labor market outlook, omits the reference to further labor market strengthening.
- Unlike the June statement, each of the alternatives offers some form of an assessment of the risks to the economic outlook:

- While Alternative B does not describe the current balance of risks explicitly, it does contain a statement on how risks have shifted since June. In light of the rebound in job gains in June and the minimal disruptions in global financial markets following the Brexit vote, Alternative B says that “near-term risks to the economic outlook appear to have diminished.”
- Reflecting a more optimistic assessment and foreshadowing its policy decision, Alternative C describes the near-term risks as “nearly balanced.”
- Alternative A, in contrast, describes the current balance of risks “as tilted somewhat to the downside.”
- With respect to the policy decision, Alternatives A and B maintain the current target range for the federal funds rate; Alternative C provides the option to either raise the target range or to signal that an increase will likely soon be warranted.
  - Alternative B leaves the target range unchanged and uses the same language in paragraphs 3 and 4 as the June statement. By doing so, Alternative B suggests that the Committee still expects to increase the federal funds rate target range but refrains from signaling the likely timing of that action.
  - The first version of paragraph 3 in Alternative C raises the target range by 25 basis points; it also notes that monetary policy remains accommodative and supportive of inflation returning to 2 percent, but omits a reference to the labor market.
  - The second version of Alternative C’s paragraph 3 maintains the current target range but states that the Committee “sees the case for an increase in the federal funds rate as having strengthened since its June meeting.” These words would signal that an increase in the target range is likely in coming months if incoming information continues to suggest that the economy is evolving as the Committee expects.
  - Alternative A communicates a judgment that the 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. Accordingly, Alternative A drops references to future adjustments in the stance of policy, and instead focuses on the policy rate remaining low in the near term.



**JUNE 2016 FOMC STATEMENT**

1. Information received since the Federal Open Market Committee met in April indicates that the pace of improvement in the labor market has slowed while growth in economic activity appears to have picked up. Although the unemployment rate has declined, job gains have diminished. Growth in household spending has strengthened. Since the beginning of the year, the housing sector has continued to improve and the drag from net exports appears to have lessened, but business fixed investment has been soft. Inflation has continued to run below the Committee's 2 percent longer-run objective, partly reflecting earlier declines in energy prices and in prices of non-energy imports. Market-based measures of inflation compensation declined; most 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 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  $\frac{1}{4}$  to  $\frac{1}{2}$  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.

**JULY 2016 ALTERNATIVE A**

1. Information received since the Federal Open Market Committee met in April ~~June~~ indicates that ~~the pace of improvement in the labor market has slowed while growth in~~ **strengthened and that** economic activity appears to have picked up **has been expanding at a moderate rate.** Although the unemployment rate has declined, job gains have diminished. **Job gains were strong in June following weak growth in May; on average, payrolls have risen at a moderate pace in recent months. Although some labor market indicators point to improvement in labor market conditions, the unemployment rate has held steady, on net, since the beginning of the year.** Growth in Household spending has **been growing strongly** ~~strengthened~~. Since the beginning of the year, the housing sector has continued to improve and the drag from net exports appears to have lessened, but business fixed investment **and residential investment** has **have** been soft. Inflation has continued to run below the Committee's 2 percent longer-run objective, **only** partly reflecting earlier declines in energy prices and in prices of non-energy imports. **Moreover,** market-based measures of inflation compensation ~~declined;~~ **and** most survey-based measures of longer-term inflation expectations are little changed, ~~on balance, in recent months~~ **remain near their lows.**
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 strengthen **further.** Inflation is expected to remain low in the near term, in part because of earlier declines in energy prices, but to rise **gradually** 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. **In light of global economic and financial developments, the Committee sees the risks to the U.S. 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 timing and size of future~~ **when** adjustments to the target range for the federal funds rate **might become appropriate,** the Committee will assess realized and expected economic conditions relative to its objectives of maximum employment and 2 percent inflation, **along with risks to the economic outlook.** 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 **ing**, 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.

**JULY 2016 ALTERNATIVE B**

1. Information received since the Federal Open Market Committee met in April ~~June~~ indicates that the pace of improvement in the labor market has slowed ~~strengthened~~ while growth in ~~and that~~ economic activity appears to have picked up ~~has been~~ **expanding at a moderate rate**. Although the unemployment rate has declined, job gains have diminished. **Job gains were strong in June following weak growth in May. On balance, payrolls and other labor market indicators point to some increase in labor utilization in recent months.** Growth in Household spending has ~~been growing strongly~~ strengthened. Since the beginning of the year, the housing sector has continued to improve and the drag from net exports appears to have lessened, but business fixed investment ~~and residential investment~~ has ~~have~~ been soft. Inflation has continued to run below the Committee's 2 percent longer-run objective, partly reflecting earlier declines in energy prices and in prices of non-energy imports. Market-based measures of inflation compensation ~~declined~~ **remain low**; most 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 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. **Near-term risks to the economic outlook appear to have diminished, but** 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  $\frac{1}{4}$  to  $\frac{1}{2}$  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.

## JULY 2016 ALTERNATIVE C

1. Information received since the Federal Open Market Committee met in April ~~June~~ indicates that the pace of improvement in the labor market has slowed ~~strengthened~~ while growth in ~~and that~~ economic activity appears to have picked up ~~has been~~ **expanding at a moderate rate**. Although the unemployment rate has declined, job gains have diminished. **Job gains were strong in June following weak growth in May. On balance, payrolls and other labor market indicators point to an increase in labor utilization in recent months.** Growth in Household spending has **been growing strongly** strengthened. Since the beginning of the year, the housing sector has continued to improve and the drag from net exports appears to have lessened, but business fixed investment **and residential investment** has **have** been soft. Inflation has continued to run below **risen this year, moving closer to** the Committee's 2 percent longer-run objective, partly reflecting earlier declines in energy prices and in prices of non-energy imports. Market-based measures of inflation compensation declined **remain low**; most 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 strengthen **employment growth will gradually slow to a rate in line with its longer-run trend.** 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 **continue to** dissipate and the labor market strengthens further. The Committee **sees the near-term risks to the U.S. economic outlook as nearly balanced but** continues to closely monitor inflation indicators and global economic and financial developments.
3. Against this backdrop ~~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  $\frac{1}{4}$  to  $\frac{1}{2}$  ~~to  $\frac{3}{4}$~~  percent. The stance of monetary policy remains accommodative, **even after this increase**, thereby supporting ~~further improvement in~~ labor market conditions and a return to 2 percent inflation.

OR

- 3.' Against this backdrop, the Committee decided to maintain the target range for the federal funds rate at  $\frac{1}{4}$  to  $\frac{1}{2}$  percent **but sees the case for an increase in the federal funds rate as having strengthened since its June meeting.** The stance of monetary policy remains accommodative, thereby supporting further improvement **firming** 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.



## THE CASE FOR ALTERNATIVE B

### Economic Outlook

- Policymakers may view the information they have received about the labor market and real activity as consistent, on balance, with their modal forecasts at the time of the June FOMC meeting.
  - Strong growth in payroll employment in June indicates that the sharp slowing of job gains in May was transitory. A range of labor market indicators point to increasing utilization; however, the unemployment rate, at 4.9 percent in June, is unchanged on net since the beginning of the year.
  - Strong consumption data was tempered by disappointing data on business and residential investment. In conjunction with weaker growth prospects abroad, these data led staff to mark down their outlook for 2016 real GDP growth slightly, to 1.7 percent.
- Twelve-month core and headline inflation have drifted up since the fall of last year. However, inflation continues to run below the Committee's 2 percent objective. Moreover, longer-term inflation compensation remains near its lows. Similarly, survey measures of longer-run inflation expectations are little changed and only slightly above their lows.
- Policymakers may judge that near-term risks to the economic outlook have diminished, in light of the rebound in payroll employment gains in June and minimal disruptions in global financial markets following the Brexit vote.

### Policy Strategy

- While near-term risks to the economy appear to have diminished, policymakers may still judge it prudent to wait for more evidence that domestic demand will continue to grow at a moderate pace and that the labor market will strengthen further before taking their next step in adjusting the stance of monetary policy, particularly with inflation continuing to run below the Committee's 2 percent objective. The rebound in job gains represents only one month of data. By the time of the September FOMC meeting, policymakers will have seen two more employment reports, and may have a better sense of the underlying trend in employment growth.

- Policymakers may conclude that, with inflation still clearly below 2 percent and inflation compensation quite low, the optimal response to uncertainty about the outlook is to leave the federal funds rate unchanged at this meeting, and to avoid signaling the timing of the next policy move. They might note that risk management considerations associated with the proximity of nominal rates to the effective lower bound provides additional support for the 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.
  - 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.
  - 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 the rebound in payroll employment growth.

## THE CASE FOR ALTERNATIVE C

### Economic Outlook

- Policymakers might view the rebound in job growth and solid retail sales in June as confirmation that both the slowdown in employment growth in May and the modest output growth in the first quarter reflected transitory factors.
- Gains in real disposable income have been healthy, reflecting both rising employment and the earlier period of very low headline inflation, and household balance sheets have improved further. Policymakers may see economic conditions as favorable for solid consumption growth going forward. Thus, they may project that aggregate demand will grow faster than the economy's potential output absent further increases in the target range for the federal funds rate in the near term, and they may view resource utilization as already tight.
  - In addition, policymakers might anticipate that further tightening of labor market conditions combined with mediocre productivity growth will put increasing upward pressure on wages and on prices of goods and services unless policymakers resume raising the target range for the federal funds rate at the July meeting or shortly thereafter.

- Some measures of the trend in inflation, such as trimmed means, are close to 2 percent. Policymakers may conclude that the effect of transitory factors on inflation is already subsiding.
- Policymakers might point to the absence of lasting disruptions of financial market conditions following the Brexit vote as supporting the outlook for continued moderate economic growth.

## Policy Strategy

- Policymakers may judge that current conditions and the outlook warrant a rate hike now, or, at a minimum, a signal that such a hike is likely in the near future.
  - They may be concerned that leaving policy rates unchanged in the face of an unemployment rate that is at or below estimates of its longer-run normal level would foster expectations that monetary policy will 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 expectations could induce further “reach for yield” and other excessive risk-taking behavior in financial markets.
  - Policymakers may also be concerned that the public might misinterpret a statement like Alternative B as indicating that the FOMC is placing too much weight on transitory financial and economic developments and too little weight on the solid modal outlook for the economy, labor markets, and inflation. In particular, if the Committee indicates that incoming data since April has roughly been in line with its expectations for the labor market and inflation—and that the risks associated with Brexit have not materialized—the public may see the decision to further delay an increase in the policy rate as inconsistent with earlier FOMC communications.
- For these reasons, policymakers may want to increase the target range for the federal funds rate by 25 basis points or signal that they will likely do so in the near future.
  - Policymakers may note that, even if there is an increase, the stance of monetary policy remains accommodative. Consistent with such an assessment, 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. Respondents’ written comments suggest that they would also be surprised by the language in paragraph 3’ of Alternative C.
  - 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.
  - 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 has picked up in recent months from its low level in the first quarter, and job growth rebounded in June, policymakers may be concerned that the previously stated expectation of moderate growth for the rest of the year is overly optimistic.
  - Though payroll growth for June allayed some concerns raised by the disappointing numbers for May, a longer-term perspective indicates that the pace of payroll growth has stepped down markedly since the beginning of the year. In addition, the unemployment rate, the share of employees working part-time for economic reasons, and the long-term unemployment share have remained mostly unchanged over the past three quarters.
  - Continued weakness in business fixed investment suggests that firms may not expect aggregate demand to grow as much as policymakers have been projecting.
- 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 at or near historic lows.

- Policymakers may judge that the risks to the economic outlook are tilted to the downside. Although the Brexit vote has so far resulted in minimal disruptions to global financial markets, it could ultimately lead to renewed financial stress in Europe and beyond because of contentious Brexit negotiations, by encouraging other EU breakaway movements, or by increasing market scrutiny of the vulnerabilities in the European banking system. Policymakers might also point to downside risk associated with persistently low realized inflation and measures of longer-run inflation expectations. Indeed, policymakers may view alternative scenarios such as “Severe Financial Stress in Europe” or “Lower Inflation Expectations from Weaker Demand” in the “Risks and Uncertainty” section of Tealbook A as increasingly likely.

### Policy Strategy

- Some policymakers might judge that this year’s uptick in core inflation will prove transitory.
  - Policymakers might worry that the failure of inflation to rise to 2 percent 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.
  - These policymakers might argue that the chronic failure of policy to raise inflation back to 2 percent is eroding the credibility of the FOMC’s commitment to achieving that objective, including the statement that positive and negative deviations from this objective are treated symmetrically.
- Policymakers may believe that the natural rate of unemployment is lower than the current unemployment rate—and lower than they estimated previously, or 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 the prolonged period of weak labor demand following the financial crisis.
- Policymakers may believe that risk management considerations call for signaling that any further removal of policy accommodation is some time off.
  - Policymakers might observe that, given the proximity to the effective lower bound, the scope for conventional policy measures to support the economy

would be limited in the event that adverse shocks were to hit the economy. Moreover, unconventional monetary policies provide imperfect substitutes for conventional policy.

- Policymakers might judge that the neutral rate of interest is low, relative to its historical norm, due to lingering headwinds, which include restraint on U.S. economic activity from economic and financial developments abroad, subdued household formation, and meager productivity growth. The neutral rate is likely to remain low for quite some time, thus exacerbating the risk that conventional policy could be constrained going forward.
- Most respondents in the Desk's latest surveys expect the Committee to emphasize the gradual nature of its normalization approach, but about three quarters of respondents expect the FOMC to raise rates this year. A postmeeting statement like Alternative A would therefore be somewhat surprising to financial market participants.
  - Investors would likely push further into the future the expected date of the next rate increase, and the expected path for the federal funds rate would likely flatten further, and longer-term yields would decline.
  - If the statement is primarily seen as more accommodative, equity prices and inflation compensation would likely rise, and the dollar would depreciate.
  - 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 June 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: ~~June 15~~ **July 27**, 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 ~~June 15~~ **July 27**, 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 ~~June 16~~ **July 28**, 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  $\frac{1}{4}$  to  $\frac{1}{2}$  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.



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

Release Date: ~~June 15~~ July 27, 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 ~~June 15~~ July 27, 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 July 28, 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 ~~June 16~~ July 28, 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 July 28, 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.

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# Projections

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## BALANCE SHEET AND INCOME

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

For the purpose of our projection, 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 is between 1¼ and 1½ percent, which, in the staff forecast, occurs in the third quarter of 2017. 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." 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 (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 RRP are not used.<sup>1</sup>

Some key features of the projection are highlighted below.

- **Balance sheet.** The size of the portfolio is normalized in the fourth quarter of 2021, one quarter earlier than in the June Tealbook (see the solid black lines in the exhibit titled "Total Assets and Selected Balance Sheet Items" and the table that follows).<sup>2</sup> At that time, total assets are projected to stand at roughly \$2.4 trillion,

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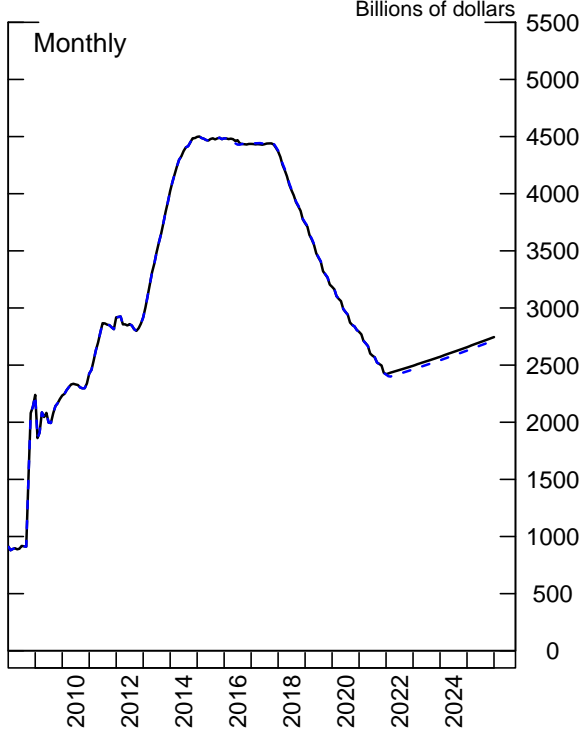
<sup>1</sup> Use of term RRP or term deposits would result in a shift in the composition of Federal Reserve liabilities—a decline in reserve balances and an equal increase in term RRP or term deposits—but would not produce a change in the overall size of the balance sheet. We also assume that RRP associated with foreign official and international accounts remain near their June 30, 2016, level of \$265 billion throughout the projection period.

<sup>2</sup> 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

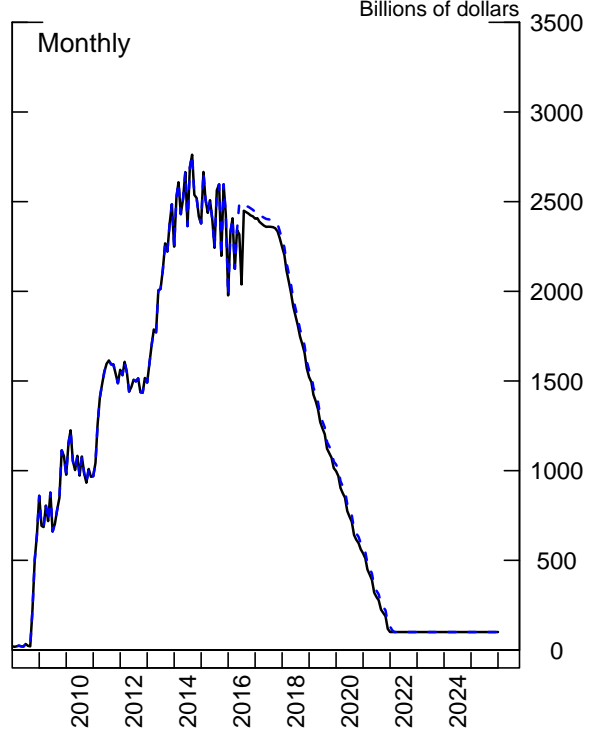
### Total Assets and Selected Balance Sheet Items

— July Tealbook    - - June Tealbook

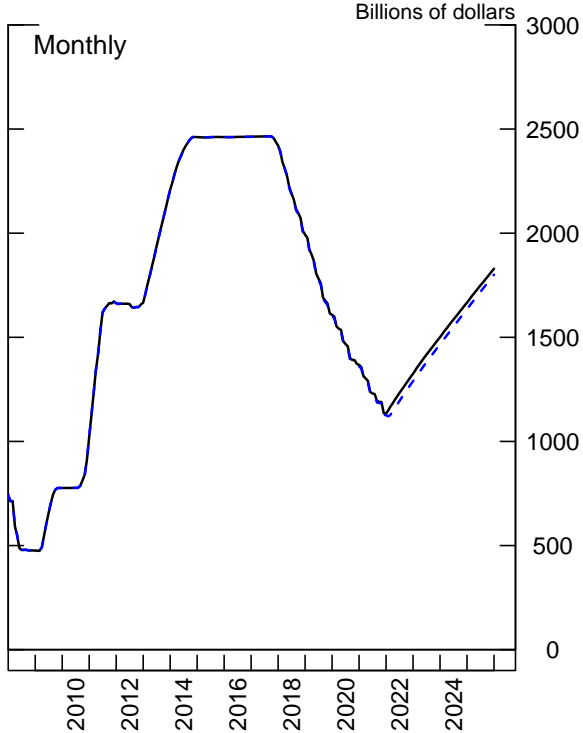
#### Total Assets



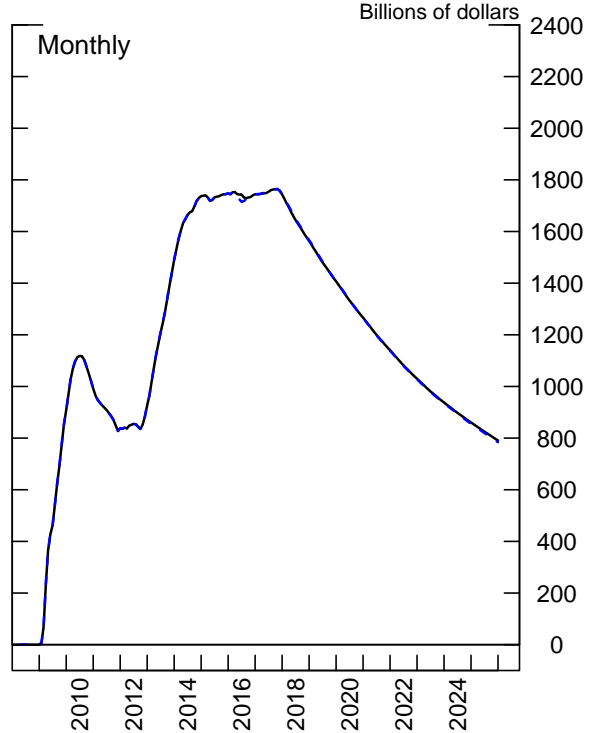
#### Reserve Balances



#### SOMA Treasury Holdings



#### SOMA Agency MBS Holdings



Projections

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

	Jun 30, 2016	2017	2019	2021	2023	2025
Total assets	4,468	4,370	3,185	2,420	2,573	2,745
Selected assets						
Loans and other credit extensions*	5	0	0	0	0	0
Securities held outright	4,231	4,169	3,017	2,276	2,441	2,622
U.S. Treasury securities	2,462	2,421	1,608	1,133	1,501	1,829
Agency debt securities	25	4	2	2	2	2
Agency mortgage-backed securities	1,744	1,744	1,407	1,140	938	791
Unamortized premiums	181	159	123	98	83	74
Unamortized discounts	-16	-14	-11	-8	-7	-6
Total other assets	47	48	48	48	48	48
Total liabilities	4,428	4,328	3,140	2,371	2,519	2,686
Selected liabilities						
Federal Reserve notes in circulation	1,418	1,554	1,716	1,845	1,992	2,160
Reverse repurchase agreements	544	365	265	265	265	265
Deposits with Federal Reserve Banks	2,459	2,402	1,153	255	255	255
Reserve balances held by depository institutions	2,038	2,247	998	100	100	100
U.S. Treasury, General Account	364	150	150	150	150	150
Other deposits	57	5	5	5	5	5
Earnings remittances due to the U.S. Treasury	2	0	0	0	0	0
Total capital**	40	42	46	50	54	59

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.

with about \$2.3 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.

- ***Federal Reserve earnings remittances.*** After record remittances to the Treasury of nearly \$100 billion in 2015 (excluding remittances associated with the transfer of Federal Reserve surplus under the FAST Act), remittances are projected to decline to about \$90 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 firming in the stance of policy. Annual remittances continue to decline in subsequent years, reaching a low of roughly \$36 billion in 2019, with no deferred asset being recorded.<sup>3</sup> Relative to the June Tealbook, the projected path of remittances is slightly higher in the medium term, primarily reflecting reduced interest expense associated with a lower path for short-term interest rates. 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 \$282 billion at the end of June.<sup>4</sup> 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 rise in longer-term interest rates assumed over the next several years, the portfolio is projected to shift to an unrealized loss position in the fourth quarter of 2017, one quarter later than estimated in the June Tealbook. The later onset of a net unrealized loss position reflects a slightly lower path for longer-term interest rates. The portfolio is expected to record a peak unrealized loss of approximately \$145 billion in 2019, nearly the same as projected in the June Tealbook. About \$44 billion of that peak

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.

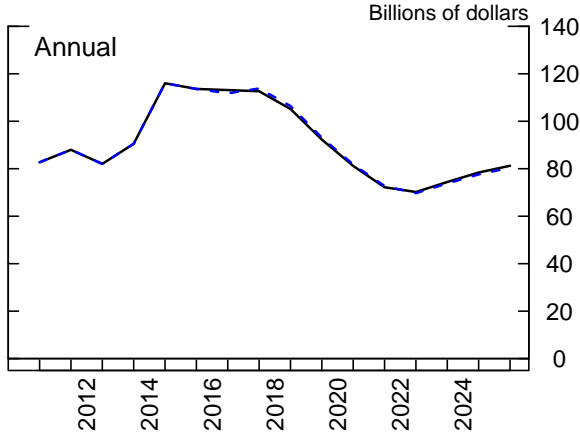
<sup>3</sup> In the event that a Federal Reserve Bank’s earnings fall short of the amount necessary to cover its operating costs and pay dividends, a deferred asset for earnings remittances due to the U.S. Treasury would be recorded.

<sup>4</sup> The Federal Reserve reports the quarter-end net unrealized gain/loss position of the SOMA portfolio to the public in the “Federal Reserve Banks Combined Quarterly Financial Reports,” available on the Board’s website at [http://www.federalreserve.gov/monetarypolicy/bst\\_fedfinancials.htm#quarterly](http://www.federalreserve.gov/monetarypolicy/bst_fedfinancials.htm#quarterly).

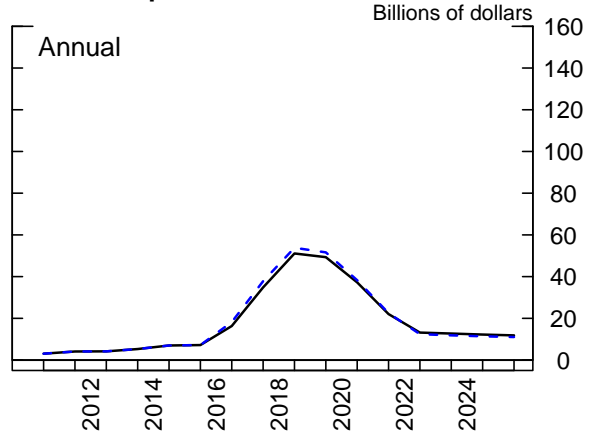
### Income Projections

— July Tealbook    - - June Tealbook

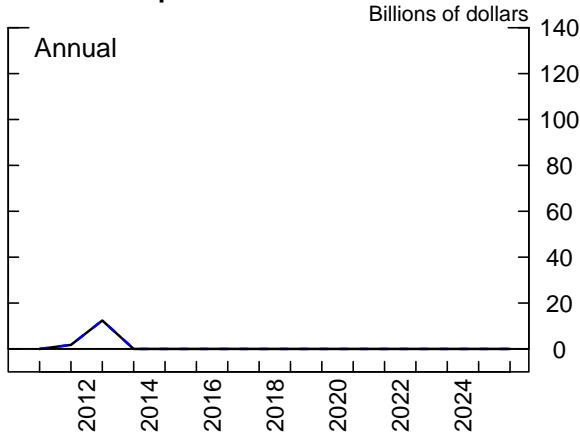
**Interest Income**



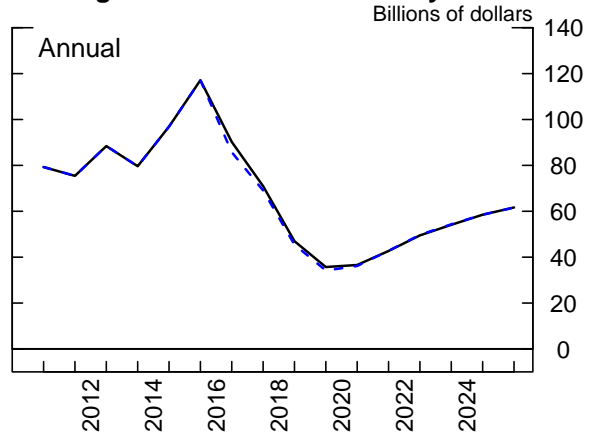
**Interest Expense**



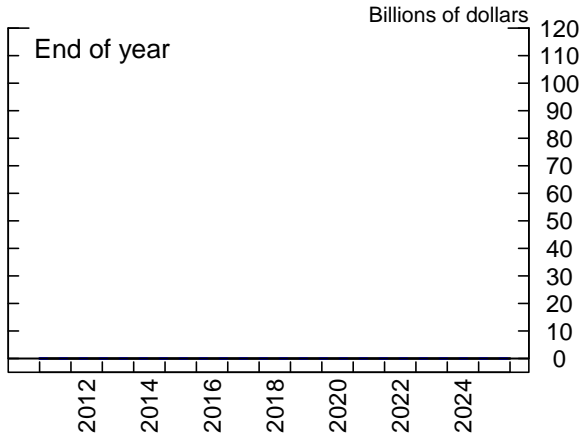
**Realized Capital Gains**



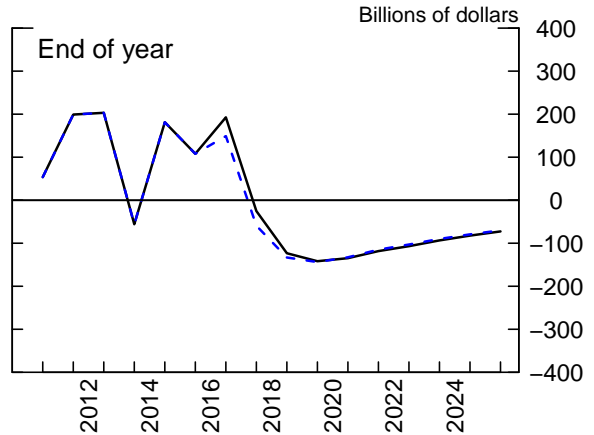
**Earnings Remittances to Treasury**



**Deferred Asset**



**Memo: Unrealized Gains/Losses**



Projections



unrealized loss is attributable to losses on holdings of Treasury securities and \$101 billion to losses on holdings of agency MBS. The unrealized loss position contracts from 2020 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 be holding down the term premium embedded in the 10-year Treasury yield by 94 basis points in the current quarter. 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 projected gradual shrinking of the portfolio.
- **SOMA characteristics.** Approximately \$216 billion in SOMA Treasury holdings has already matured or will mature this year, and a total of \$1.5 trillion will mature between 2016 and 2020 (see the top panel of the exhibit “Projections for the Characteristics of SOMA Holdings”).<sup>5</sup> 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 thus could be significantly more volatile than projected.<sup>6</sup>

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 late 2021 when the size of the balance sheet is

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<sup>5</sup> 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 newly issued securities. Moreover, across the various maturities, these bids are placed proportionately to the issue amounts of the new securities. The Desk’s bids at Treasury auctions are placed as noncompetitive tenders and are treated as add-ons to announced auction sizes.

<sup>6</sup> Over the intermeeting period, the Desk reinvested \$17 billion of maturing Treasury securities, purchased \$38 billion of 15- and 30-year agency MBS under the reinvestment program, and rolled \$1.2 billion in expected settlements.

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

Date	July Tealbook	June Tealbook
Quarterly Averages		
2016:Q3	-94	-94
Q4	-90	-89
2017:Q4	-73	-73
2018:Q4	-59	-58
2019:Q4	-47	-47
2020:Q4	-39	-38
2021:Q4	-32	-31
2022:Q4	-26	-25
2023:Q4	-21	-21
2024:Q4	-16	-16
2025:Q4	-12	-11

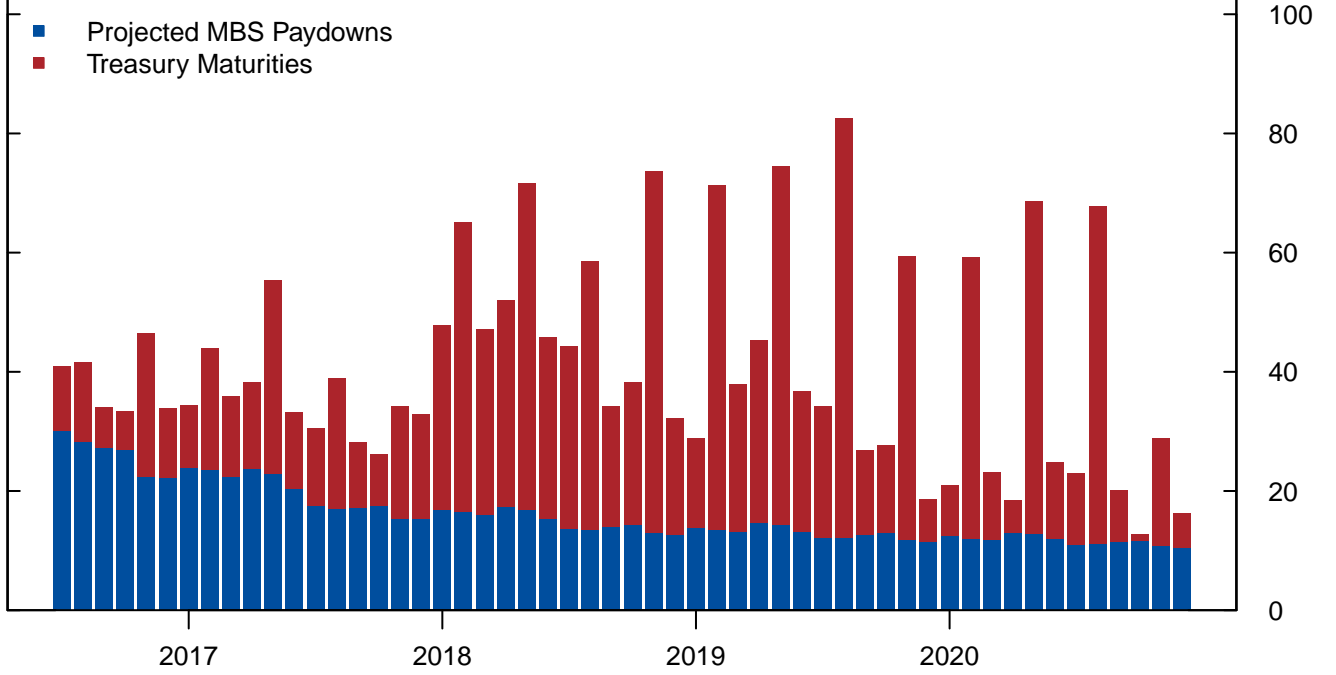


### Projections for the Characteristics of SOMA Holdings

#### Projected Receipts of Principal on SOMA Securities

July Tealbook

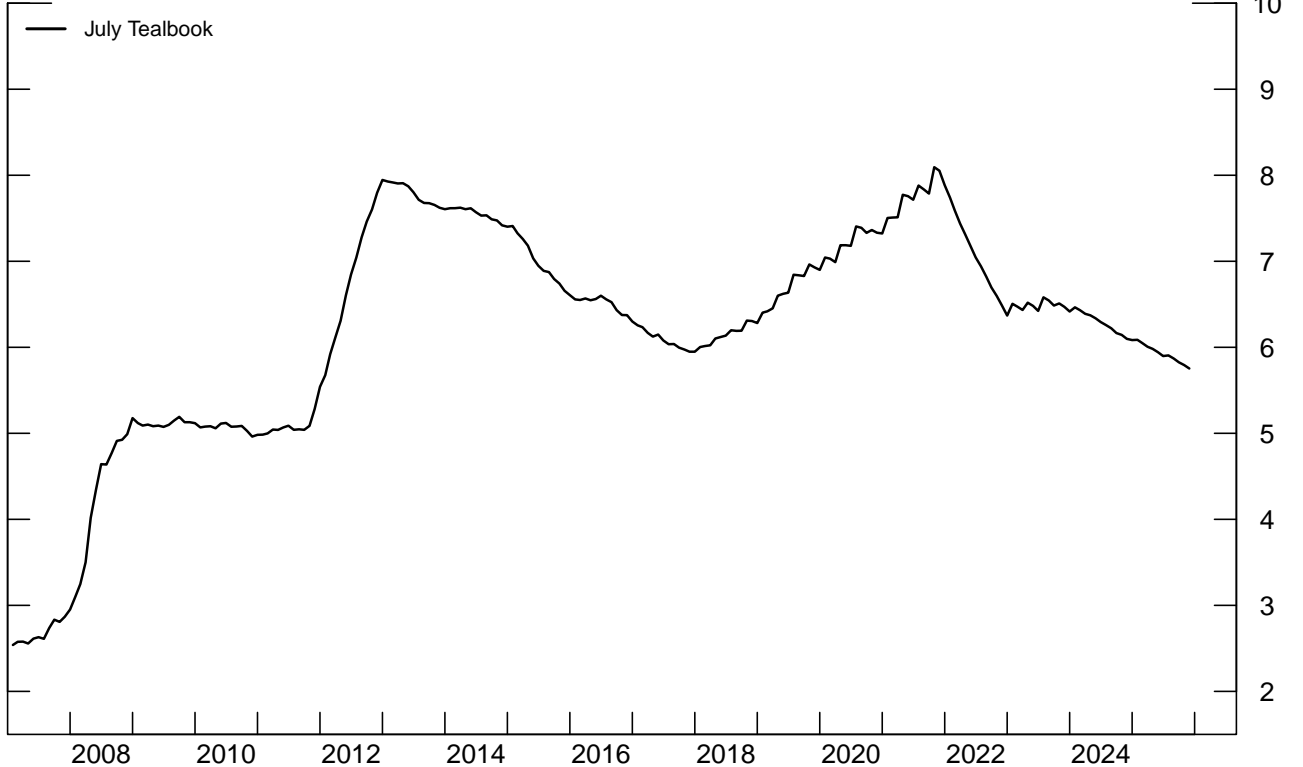
Billions of Dollars



#### SOMA Weighted-Average Treasury Duration

Monthly

Years



Projections

normalized.<sup>7</sup> After reaching its peak, duration is projected to decline as the Desk purchases Treasury securities to keep pace with the increase in currency. 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.<sup>8</sup>

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<sup>7</sup> The duration of the SOMA Treasury portfolio initially declines 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 of the remaining portfolio, the duration increases until the size of the balance sheet is normalized.

<sup>8</sup> We assume zero purchases of agency MBS after reinvestments cease.

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## Abbreviations

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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