## Prefatory Note

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

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

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# Report to the FOMC on Economic Conditions and Monetary Policy


## Book B

Monetary Policy:
Strategies and Alternatives

March 14, 2013

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

# Monetary Policy Strategies

The top panel of the first exhibit, "Policy Rules and the Staff Projection," provides near-term prescriptions for the federal funds rate from six policy rules: the Taylor (1993) rule, the Taylor (1999) rule, the inertial Taylor (1999) rule, the outcome-based rule, the first-difference rule, and the nominal income targeting rule. These prescriptions take as given the staff's baseline projections for real activity and inflation in 2013. (Medium-term prescriptions derived from dynamic simulations of the rules are discussed below.) As shown in the left-hand columns, four out of the six rules keep the federal funds rate at the effective lower bound in both the second and third quarters of 2013. The Taylor (1993) rule, which puts relatively little weight on the output gap, prescribes an average federal funds rate of about 100 basis points next quarter followed by a further increase in the third quarter. The first-difference rule, which responds to the expected change in the output gap, prescribes an average federal funds rate of just under 25 basis points in the second quarter, followed by nearly 50 basis points in the subsequent quarter.

The right-hand columns display the policy rule prescriptions that arise in the absence of the lower-bound constraint on the federal funds rate. The inertial Taylor (1999) rule and the outcome-based rule prescribe federal funds rates that are near zero for the next two quarters, while the Taylor (1999) rule and the nominal income targeting rule prescribe negative values for the federal funds rate. The more-accommodative prescriptions arising from the latter two rules reflect their stronger immediate response to the staff's estimate of the output gap, which remains appreciably negative.[1]

The Tealbook baseline projections for the output gap and inflation are shown in the bottom half of the exhibit, titled "Key Elements of the Staff Projection." As described in Book A of the Tealbook, the staff's outlook for economic activity is essentially unchanged from the January Tealbook, with the effects of slightly better incoming data offsetting those of somewhat tighter near-term fiscal policy assumptions. With the outlook for economic activity and inflation largely unchanged, the near-term

[1] Although the rule prescriptions are not constrained to be at or above the lower bound, the inertial Taylor (1999) rule, the outcome-based rule, the nominal income targeting rule, and the first-difference rule all include and place substantial weight on the lagged actual federal funds rate, which is subject to the lower-bound constraint.

# Policy Rules and the Staff Projection

## Near-Term Prescriptions of Selected Policy Rules

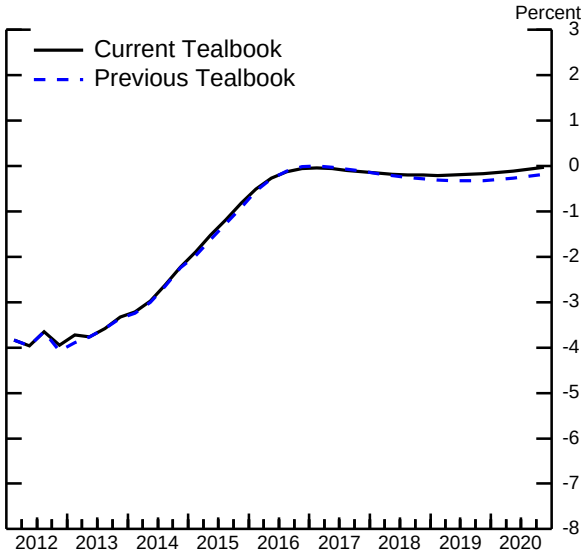
| | Constrained Policy | | Unconstrained Policy | |
|---|---|---|---|---|
| | 2013Q2 | 2013Q3 | 2013Q2 | 2013Q3 |
| Taylor (1993) rule | **1.03** | **1.35** | **1.03** | **1.35** |
| *Previous Tealbook* | *1.12* | *1.43* | *1.12* | *1.43* |
| Taylor (1999) rule | **0.13** | **0.13** | **–0.82** | **–0.41** |
| *Previous Tealbook* | *0.13* | *0.13* | *–0.73* | *–0.33* |
| Inertial Taylor (1999) rule | **0.13** | **0.13** | **0.00** | **–0.07** |
| *Previous Tealbook outlook* | *0.13* | *0.13* | *0.01* | *–0.04* |
| Outcome-based rule | **0.13** | **0.13** | **–0.06** | **–0.10** |
| *Previous Tealbook outlook* | *0.13* | *0.13* | *0.04* | *0.04* |
| First-difference rule | **0.22** | **0.46** | **0.22** | **0.46** |
| *Previous Tealbook outlook* | *0.29* | *0.49* | *0.29* | *0.49* |
| Nominal income targeting rule | **0.13** | **0.13** | **–0.55** | **–1.01** |
| *Previous Tealbook outlook* | *0.13* | *0.13* | *–0.52* | *–0.97* |

### Memo: Equilibrium and Actual Real Federal Funds Rate

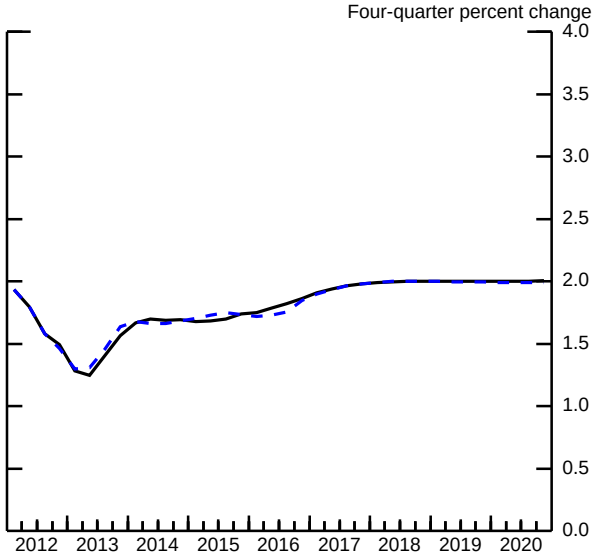
| | Current Tealbook | *Previous Tealbook* |
|---|---|---|
| Tealbook-consistent FRB/US *r** estimate | –1.76 | *–1.83* |
| Actual real federal funds rate | –1.36 | *–1.33* |

## Key Elements of the Staff Projection

GDP Gap




PCE Prices ex. Food and Energy




Note: For rules that have the lagged policy rate as a right-hand-side variable, the lines denoted "Previous Tealbook outlook" report rule prescriptions based on the previous Tealbook's staff outlook, but jumping off from the average value for the policy rate thus far in the quarter.

federal funds rate prescriptions from the unconstrained rules are similarly close to those in the January Tealbook.

The top panel of the first exhibit also reports the Tealbook-consistent estimate of short-run *r**, which is generated by the FRB/US model when conditioned on the staff's outlook for the economy. The short-run *r** estimate corresponds to the real federal funds rate that, if maintained, would return output to potential in twelve quarters. Consistent with the staff's marginally revised projection of the output gap in 2015, the *r** estimate for the current quarter is only about 5 basis points higher than in the January Tealbook. As in previous rounds, the estimate of *r**—currently about −1¾ percent—remains below the estimated actual real federal funds rate of about −1.4 percent.

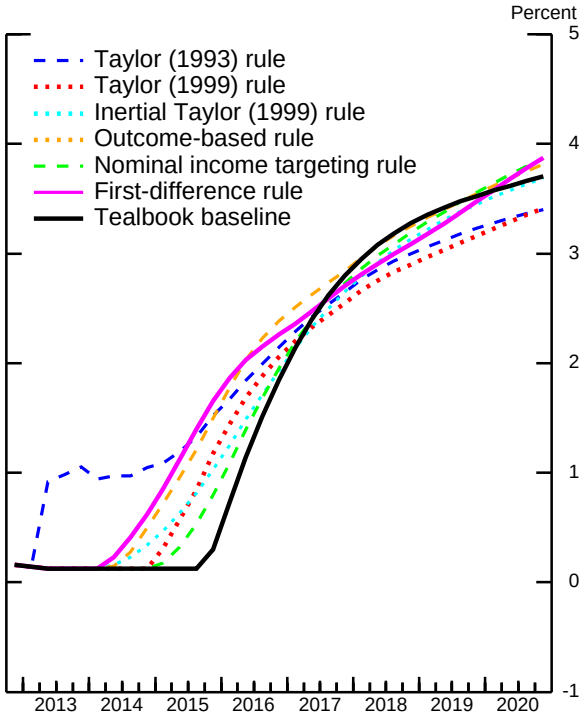
The second exhibit, "Policy Rule Simulations without Thresholds," reports dynamic simulations (using the FRB/US model) that incorporate the endogenous responses of inflation and the output gap to the paths of the federal funds rate prescribed by the different policy rules under the assumption that the funds rate is constrained by the effective lower bound. The model is adjusted to match the staff's baseline outlook for the economy and then simulated using the different policy rules.[2] Each rule is implemented from the second quarter of 2013 onward, under the assumption that financial markets as well as price- and wage-setters fully understand and anticipate the implications for future real activity, inflation, and interest rates of following that rule instead of the baseline policy. The exhibit also displays the implications of the Tealbook baseline policy, which keeps the federal funds rate at its effective lower bound of 12.5 basis points as long as the unemployment rate is above 6.5 percent and projected inflation between one and two years ahead is less than 2.5 percent; once either of these thresholds is crossed, the federal funds rate in the baseline projection follows the prescription of the inertial Taylor (1999) rule. (Alternative policy rule simulations augmented with thresholds are discussed below.)

[2] The staff's baseline forecast incorporates the effects of the large-scale asset purchase programs that the FOMC has undertaken in recent years. The staff baseline also assumes that the FOMC will purchase a total of $500 billion in longer-term Treasury securities and agency MBS during 2013, and it incorporates some "disappointment" on the part of financial market participants as they gradually come to recognize that, contrary to what they currently appear to expect, purchases will not rise above that level. Based on these assumptions, all of the policy rule simulations discussed here and on later pages incorporate the projected effects of these balance sheet policies; the rules themselves are not directly adjusted for the effects of balance sheet policies.

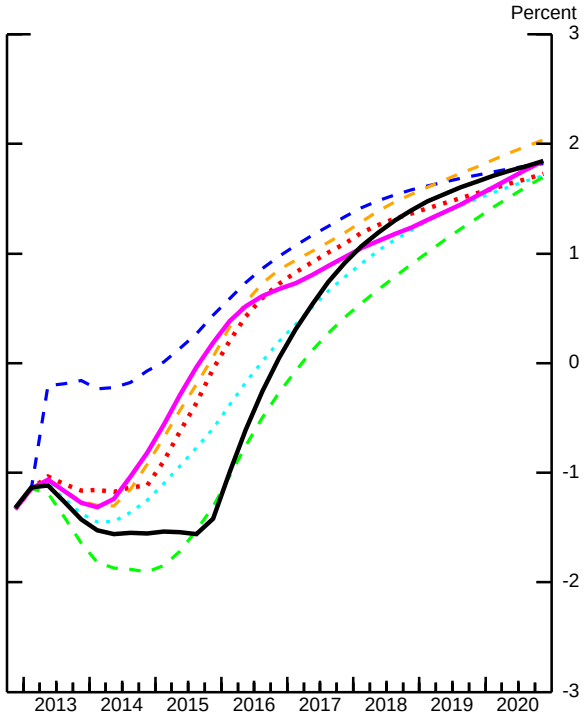
Strategies

# Policy Rule Simulations without Thresholds

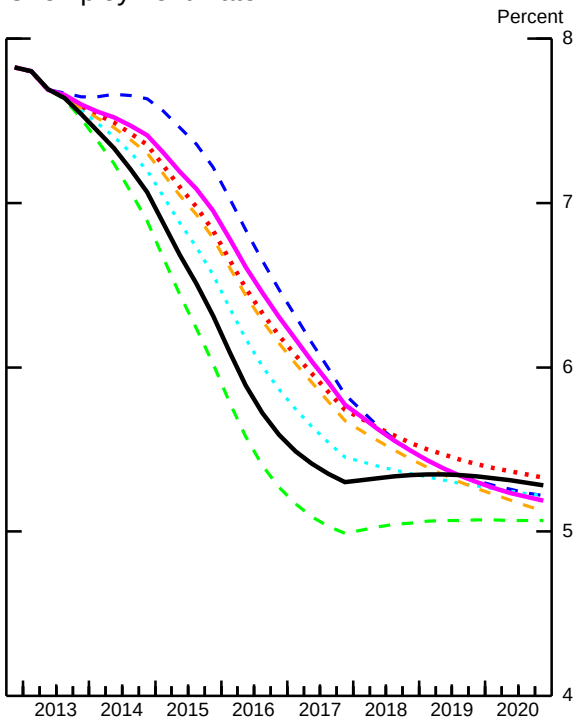
## Nominal Federal Funds Rate




## Real Federal Funds Rate

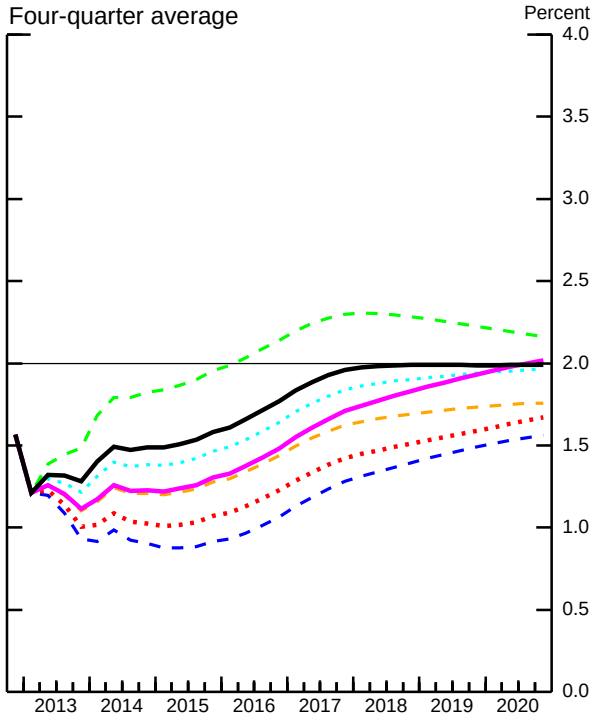



## Unemployment Rate




## PCE Inflation

Four-quarter average




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

In the Tealbook baseline, the federal funds rate departs from the effective lower bound in the fourth quarter of 2015, as in the January Tealbook. Subsequently, the federal funds rate increases to 3 percent by the beginning of 2018 and reaches 3¾ percent by the end of 2020. The unemployment rate declines below its threshold value of 6.5 percent in the fourth quarter of 2015 and is expected to converge to the staff's estimate of the natural rate of unemployment by 2017.[3] Headline inflation is projected to rise gradually over time and then to level off at 2 percent by 2018.

In the absence of thresholds, the various policy rules all call for tightening to commence appreciably earlier than in the Tealbook baseline. As a result, most of the rules imply a *real* federal funds rate path that is persistently above that in the baseline forecast, leading to higher unemployment and lower inflation through most of the decade. An exception is the nominal income targeting rule. Under this rule, policymakers credibly promise to keep the real federal funds rate persistently below baseline later in the decade, thereby generating stronger future real activity and higher inflation. These future developments in turn stimulate real activity and inflation in the near term, because forward-looking financial market participants price them into asset prices today, thereby lowering real bond yields, boosting equity prices, and putting downward pressure on the real exchange rate. Moreover, this mechanism is amplified by the increase in near-term inflation that results from higher expectations for future inflation, which in turn lowers the real federal funds rate over the next few years and so increases the downward pressure on real long-term interest rates today.[4] All told, the persistently more-accommodative stance of monetary policy that results from this strategy stimulates real activity and generates a distinctly more rapid decline in unemployment than in the Tealbook baseline. As with the other policy rules, the simulations of the nominal income targeting rule embed the assumption that financial markets and price- and wage-setters recognize that policymakers will adhere to the rule in the future. This assumption is particularly important for the nominal income targeting rule because that rule implies inflation in excess of the 2 percent goal even after the output gap is closed.

[3] The staff's estimate of the effective natural rate of unemployment declines from about 6 percent in the fourth quarter of 2013 to 5¼ percent by the end of 2017. It is assumed to remain at this level thereafter.

[4] As described in the Appendix included at the end of this section, the nominal income targeting rule responds to the nominal income gap defined as the difference between nominal GDP and target nominal GDP. For the rule simulated here, target nominal GDP in 2007:Q4 is set equal to potential real GDP in 2007:Q4 times the GDP deflator in that quarter; subsequently, target nominal GDP grows at a rate that is 2 percentage points above that of potential real GDP.

The third exhibit, "Policy Rule Simulations with Thresholds," displays dynamic simulations in which policy rules are subject to the thresholds that the Committee adopted in December 2012. For each of the rules, the thresholds are imposed by keeping the federal funds rate at its effective lower bound of 12.5 basis points as long as the unemployment rate is above 6.5 percent and projected inflation between one and two years ahead is less than 2.5 percent. In each of the simulations discussed below, crossing the unemployment threshold is the catalyst for switching to the specified rule. Financial markets and price- and wage-setters are assumed to understand that policy will switch to the specified rule when one of the threshold conditions is crossed and to view this switch as permanent and fully credible.

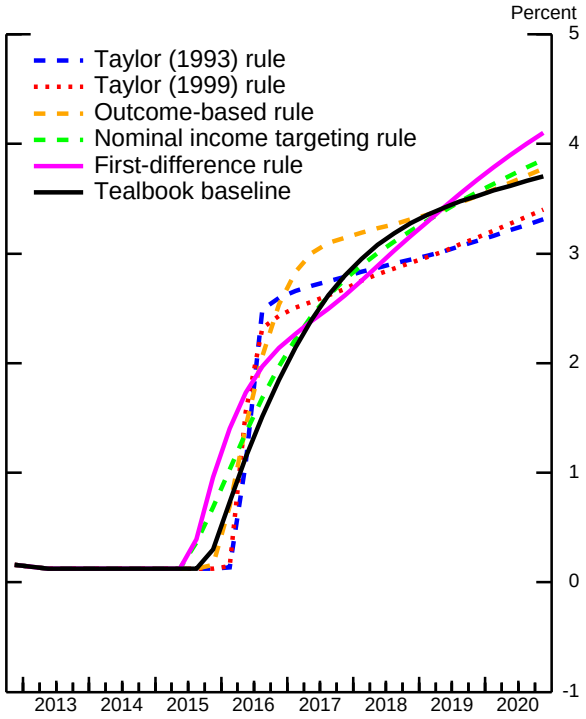
The simulations with thresholds bring out several important properties of the rules. First, because all of the policy rules without thresholds shown in the previous exhibit imply a departure of the federal funds rate from the effective lower bound before either threshold is crossed, imposing thresholds uniformly leads to a more-accomodative policy. The imposition of thresholds alters economic outcomes least for the nominal income targeting rule because this rule prescribes the latest departure from the effective lower bound when no thresholds are imposed. Second, the conduct of policy after the threshold is crossed exerts a major influence on the effective stimulus provided by the threshold strategy. In particular, post-crossing policy rules that entail a more gradual increase in the federal funds rate, such as the nominal income targeting rule and the first-difference rule, imply a more rapid decline in unemployment before the threshold is crossed. As a result, these rules lead to an *earlier* crossing of the threshold and an *earlier* departure of the federal funds rate from the effective lower bound. Third, the effectiveness of threshold-augmented rules rests heavily on the ability of policymakers to credibly commit to a particular rule after a threshold is crossed, and on the assumption of model-consistent expectations.

The fourth exhibit, "Constrained vs. Unconstrained Optimal Control Policy," compares optimal control simulations derived for this Tealbook with those shown in January.[5] In these simulations, policymakers are assumed to place equal weights on keeping headline PCE inflation close to the Committee's 2 percent goal, on keeping the

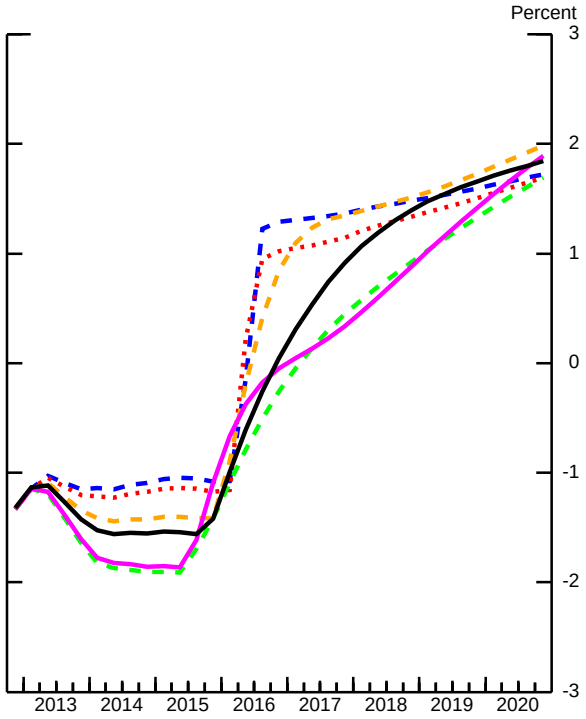
[5] The optimal policy simulations incorporate the assumptions about underlying economic conditions used in the staff's baseline forecast, as well as the assumptions about balance sheet policies described above.

# Policy Rule Simulations with Thresholds

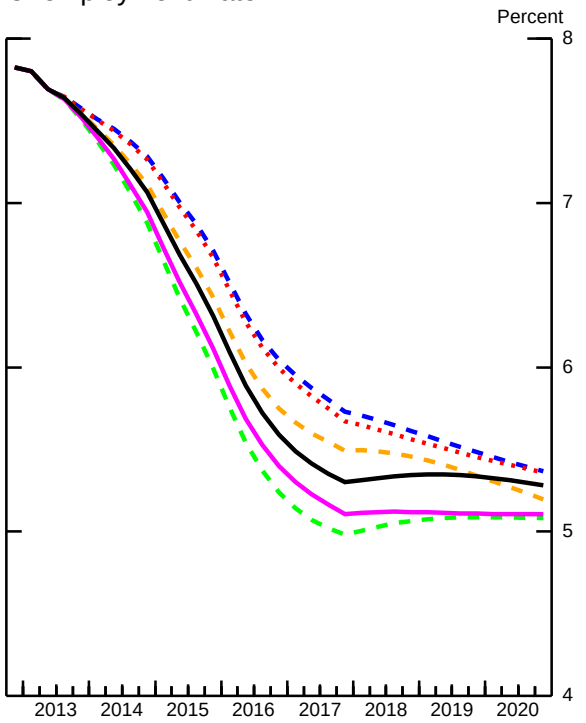
## Nominal Federal Funds Rate




## Real Federal Funds Rate

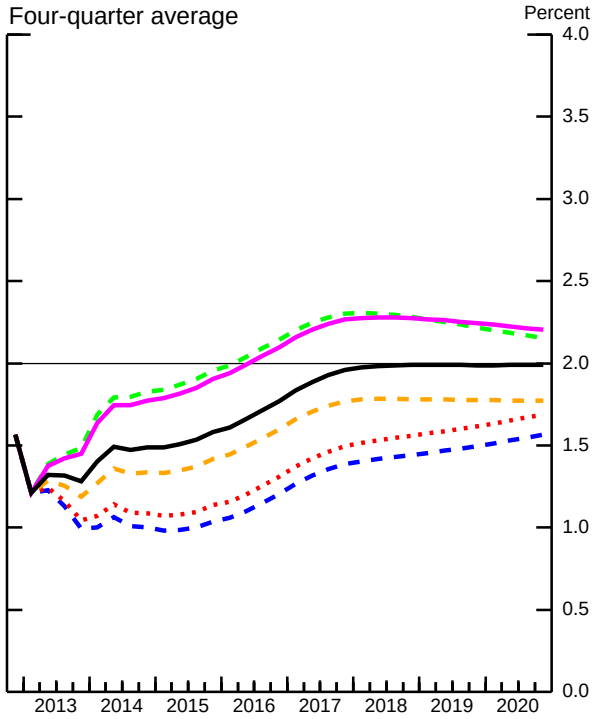



## Unemployment Rate




## PCE Inflation

Four-quarter average

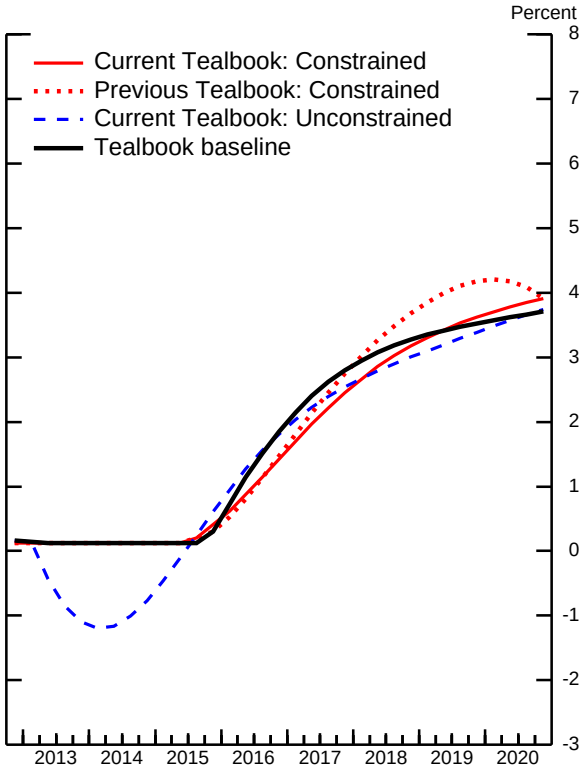



Note: The policy rule simulations in this exhibit are based on rules that respond to core inflation. This choice of rule specification was made in light of the tendency for current and near-term core inflation rates to outperform headline inflation rates as predictors of the medium-term behavior of headline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

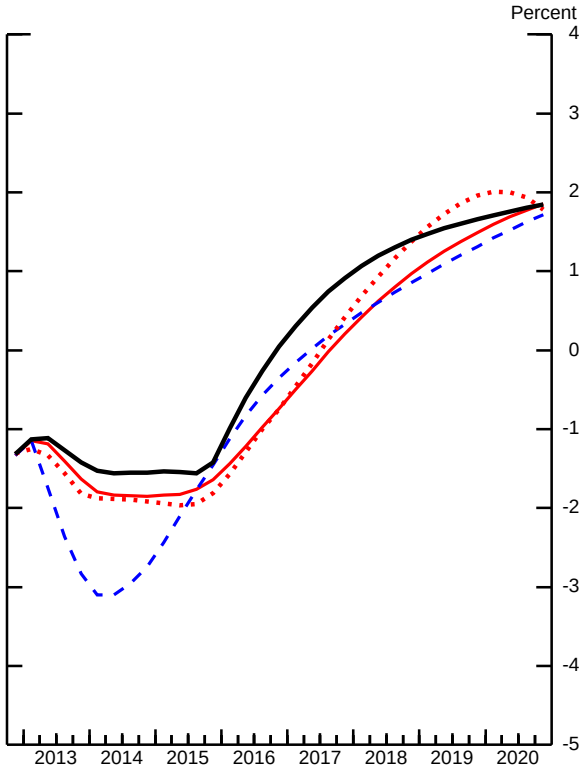
Strategies

# Constrained vs. Unconstrained Optimal Control Policy

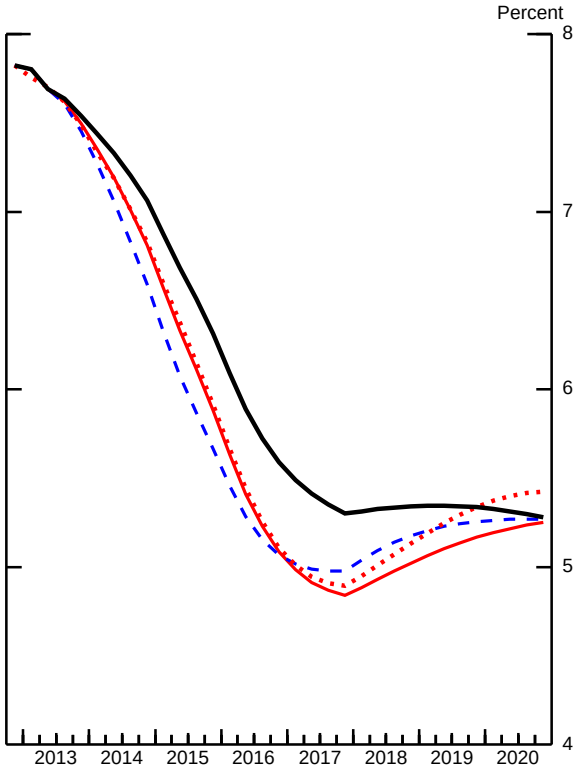
## Nominal Federal Funds Rate




## Real Federal Funds Rate

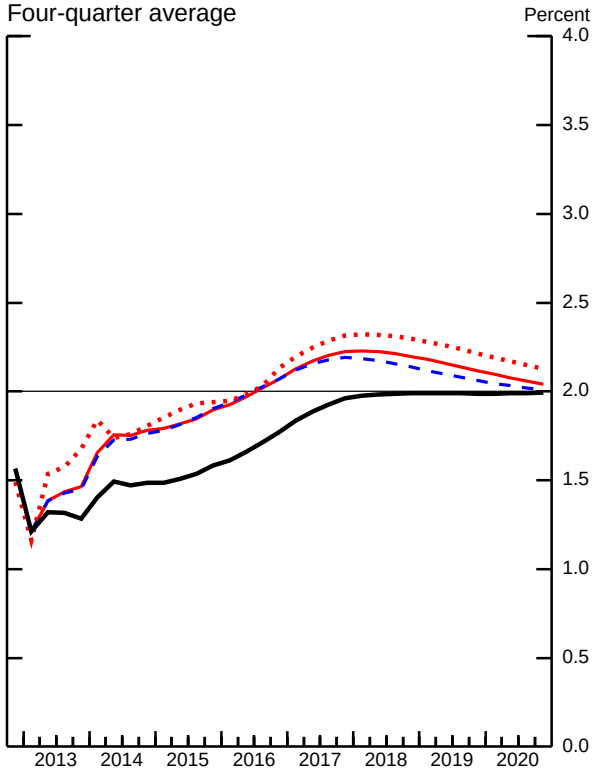



## Unemployment Rate




## PCE Inflation

Four-quarter average



unemployment rate close to the staff's estimate of the effective natural rate of unemployment, and on minimizing changes in the federal funds rate.

The simulations indicate that, with the federal funds rate constrained to remain positive, the optimal control path does not rise above the effective lower bound until the fourth quarter of 2015, the same as in the staff's current baseline forecast and also in the optimal control exercise shown in the January Tealbook. Subsequently, the optimal control path for the federal funds rate rises to 3 percent by the middle of 2018 and to just below 4 percent by the end of the 2020.[6]

By generating a lower path for the real federal funds rate than in the staff's baseline outlook, the constrained optimal control policy promotes a stronger economic recovery while allowing inflation to rise no more than ½ percentage point above the Committee's 2 percent goal. As a result, the unemployment rate drops below 6.5 percent in the second quarter of 2015 and falls to 6 percent by the time the federal funds rate leaves the effective lower bound at the end of 2015; thereafter, the unemployment rate declines to 4¾ percent by the end of 2017, temporarily undershooting the staff's estimate of the long-term natural rate of unemployment. Inflation increases more rapidly than in the Tealbook baseline and reaches the Committee's 2 percent objective by the second half of 2016. Thereafter, inflation overshoots the 2 percent target by about ¼ percentage point before gradually moving back toward 2 percent. The earlier achievement of the Committee's assumed objectives occurs because policymakers respond to the lower bound constraint by committing for an extended period of time to a response to inflation that is less forceful than under the baseline path, thereby boosting inflation expectations and reducing real interest rates in the short and medium run.

In the absence of the lower-bound constraint, the optimal control path for the federal funds rate would gradually decline to about −1¼ percent by the beginning of 2014 and return to positive territory by mid-2015. Under this unconstrained policy, the unemployment rate would decline more rapidly than under the optimal constrained policy. Inflation would increase to 2 percent by the second half of 2016, a pattern much

[6] Although the loss function uses headline inflation instead of core inflation, the real federal funds rate shown in the upper right panel of the exhibit, as in the other simulations reported in this section, is calculated as the difference between the nominal federal funds rate and a four-quarter moving average of core PCE inflation. Core PCE inflation is used to compute the real rate for this illustrative purpose because it provides a less volatile measure of inflation expectations than does a four-quarter moving average of headline inflation.

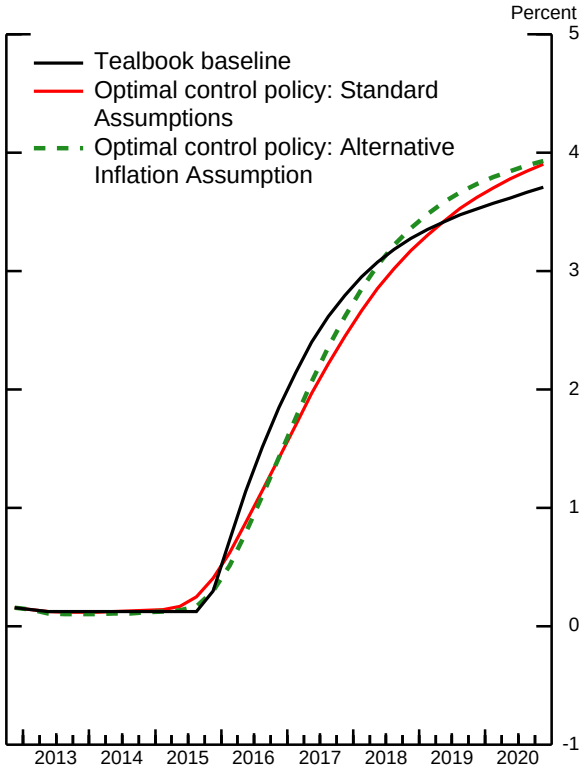
like that in the constrained simulation. In subsequent years, inflation would slightly exceed the 2 percent objective, but by somewhat less than in the constrained case.

In the policy rule and optimal control simulations discussed above, it is assumed that the FOMC can influence actual inflation today by altering private agents' expectations for future monetary policy and thus their expectations for future real activity and inflation. However, our understanding of wage and price dynamics is imperfect, and there may be limits on the FOMC's ability to push up near-term inflation by promising to be more accommodative later in the decade. To illustrate this possibility, we consider a setting of the FRB/US model in which inflation moves up only as real economic improvement occurs, so wage and price inflation initially rise less than in the simulations discussed on the previous page. The fifth exhibit, "Constrained Optimal Control Policy under Alternative Inflation Processes," compares the constrained optimal control policy under this assumption for wage-price dynamics with the corresponding policy that obtains when we maintain our usual assumption that expectations of future policy actions and their economic effects do directly affect inflation today. By assumption in both cases, financial market participants have model-consistent expectations and the real interest rates relevant for household and business spending decisions accurately reflect the future course of inflation.

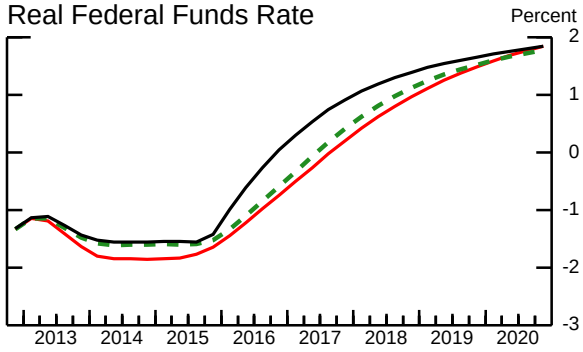
Compared with the simulation under our standard assumption for wage and price dynamics, inflation under the more inertial assumption is lower over the medium term. As a result, optimal control policy results in an average level of the real funds rate through the end of the decade that is somewhat above that obtained when policymakers can influence near-term inflation through expectational effects. Nevertheless, given that policymakers continue to enjoy perfect credibility, an optimal control strategy under these conditions is able to put downward pressure on real long-term interest rates today by keeping the path of the real funds rate noticeably below baseline beyond 2015. Moreover, optimal control policy partially compensates for the more inertial nature of inflation by keeping the real funds rate beyond 2020 lower than it otherwise would be (not shown). As a result, optimal policy is still able to boost real activity to almost the same extent as when inflation responds directly to guidance about future monetary policy.

# Constrained Optimal Control Policy under Alternative Inflation Processes

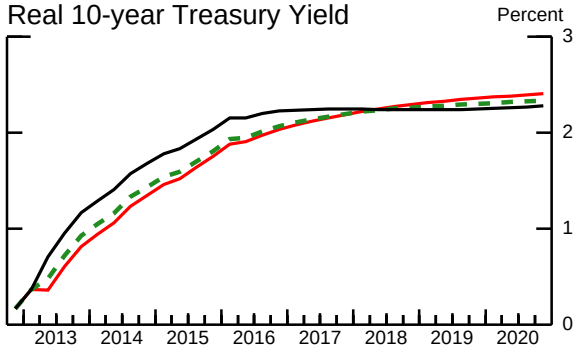
## Nominal Federal Funds Rate



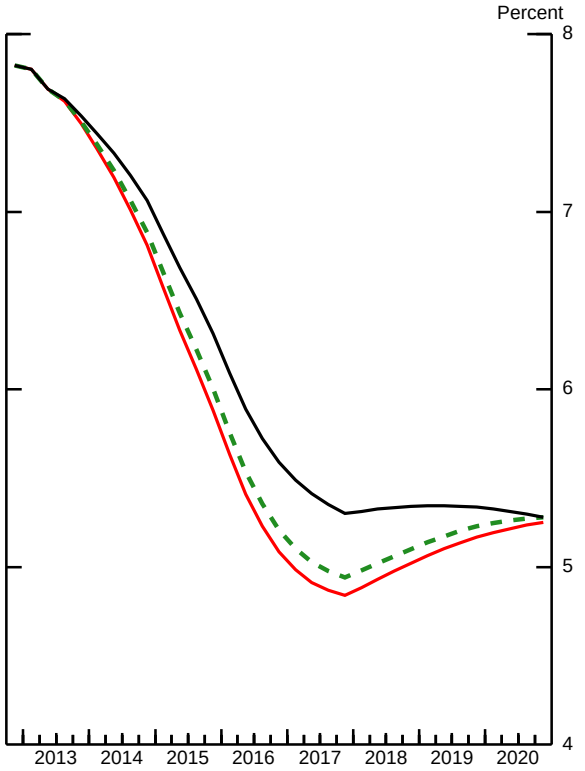

## Real Federal Funds Rate




## Real 10-year Treasury Yield

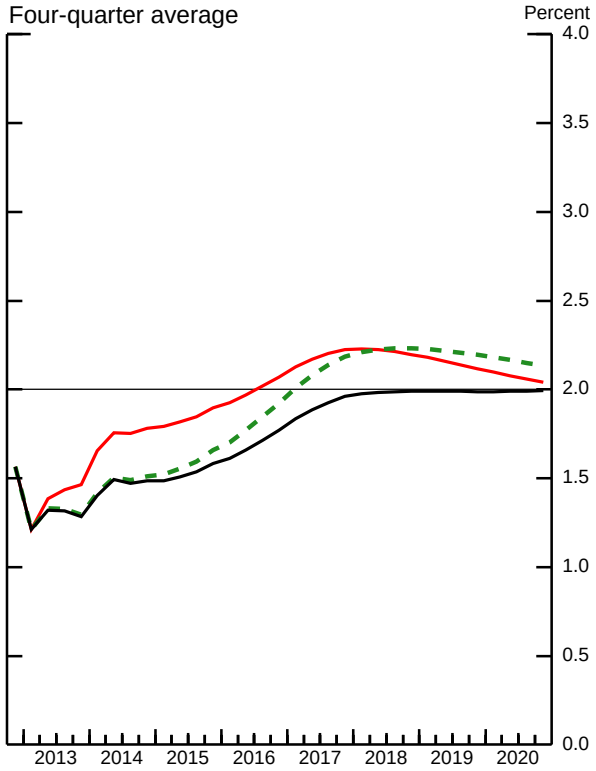



## Unemployment Rate




## PCE Inflation

Four-quarter average



The final two exhibits, “Outcomes under Alternative Policies without Thresholds” and “Outcomes under Alternative Policies with Thresholds,” tabulate the simulation results for key variables under each policy rule discussed above, with and without thresholds.

## Outcomes under Alternative Policies without Thresholds

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

| Measure and scenario | 2012 H2 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| *Real GDP* | | | | | | |
| Extended Tealbook baseline[1] | 1.8 | 2.5 | 3.2 | 3.6 | 3.0 | 2.1 |
| Taylor (1993) | 1.8 | 2.1 | 2.2 | 3.0 | 3.1 | 2.7 |
| Taylor (1999) | 1.8 | 2.3 | 2.7 | 3.1 | 2.9 | 2.4 |
| Inertial Taylor (1999) | 1.8 | 2.5 | 2.9 | 3.3 | 3.0 | 2.3 |
| Outcome based | 1.8 | 2.4 | 2.7 | 3.1 | 2.9 | 2.5 |
| First difference | 1.8 | 2.3 | 2.6 | 3.0 | 2.9 | 2.6 |
| Nominal income targeting | 1.8 | 2.7 | 3.5 | 3.7 | 3.0 | 2.1 |
| Constrained optimal control | 1.8 | 2.7 | 3.6 | 3.9 | 3.1 | 2.0 |
| *Unemployment rate*[2] | | | | | | |
| Extended Tealbook baseline[1] | 7.8 | 7.5 | 7.1 | 6.3 | 5.6 | 5.3 |
| Taylor (1993) | 7.8 | 7.6 | 7.6 | 7.2 | 6.5 | 5.8 |
| Taylor (1999) | 7.8 | 7.6 | 7.4 | 6.8 | 6.2 | 5.7 |
| Inertial Taylor (1999) | 7.8 | 7.6 | 7.2 | 6.6 | 5.9 | 5.5 |
| Outcome based | 7.8 | 7.6 | 7.3 | 6.8 | 6.1 | 5.7 |
| First difference | 7.8 | 7.6 | 7.4 | 7.0 | 6.3 | 5.8 |
| Nominal income targeting | 7.8 | 7.5 | 6.9 | 6.0 | 5.3 | 5.0 |
| Constrained optimal control | 7.8 | 7.5 | 6.8 | 5.9 | 5.1 | 4.8 |
| *Total PCE prices* | | | | | | |
| Extended Tealbook baseline[1] | 1.5 | 1.3 | 1.5 | 1.6 | 1.8 | 2.0 |
| Taylor (1993) | 1.5 | 0.9 | 0.9 | 0.9 | 1.1 | 1.3 |
| Taylor (1999) | 1.5 | 1.0 | 1.0 | 1.1 | 1.2 | 1.4 |
| Inertial Taylor (1999) | 1.5 | 1.2 | 1.4 | 1.5 | 1.6 | 1.8 |
| Outcome based | 1.5 | 1.1 | 1.2 | 1.3 | 1.4 | 1.6 |
| First difference | 1.5 | 1.1 | 1.2 | 1.3 | 1.5 | 1.7 |
| Nominal income targeting | 1.5 | 1.5 | 1.8 | 2.0 | 2.1 | 2.3 |
| Constrained optimal control | 1.5 | 1.5 | 1.8 | 1.9 | 2.1 | 2.2 |
| *Core PCE prices* | | | | | | |
| Extended Tealbook baseline[1] | 1.0 | 1.6 | 1.7 | 1.7 | 1.9 | 2.0 |
| Taylor (1993) | 1.0 | 1.2 | 1.1 | 1.1 | 1.2 | 1.3 |
| Taylor (1999) | 1.0 | 1.3 | 1.2 | 1.2 | 1.3 | 1.4 |
| Inertial Taylor (1999) | 1.0 | 1.5 | 1.6 | 1.6 | 1.7 | 1.9 |
| Outcome based | 1.0 | 1.4 | 1.4 | 1.4 | 1.5 | 1.6 |
| First difference | 1.0 | 1.4 | 1.4 | 1.5 | 1.6 | 1.7 |
| Nominal income targeting | 1.0 | 1.8 | 2.0 | 2.1 | 2.2 | 2.3 |
| Constrained optimal control | 1.0 | 1.8 | 2.0 | 2.1 | 2.2 | 2.2 |
| *Federal funds rate*[2] | | | | | | |
| Extended Tealbook baseline[1] | 0.2 | 0.1 | 0.1 | 0.3 | 1.8 | 2.8 |
| Taylor (1993) | 0.2 | 1.1 | 1.0 | 1.5 | 2.1 | 2.7 |
| Taylor (1999) | 0.2 | 0.1 | 0.1 | 1.2 | 2.1 | 2.5 |
| Inertial Taylor (1999) | 0.2 | 0.1 | 0.3 | 1.0 | 1.9 | 2.7 |
| Outcome based | 0.2 | 0.1 | 0.5 | 1.5 | 2.4 | 2.8 |
| First difference | 0.2 | 0.1 | 0.6 | 1.7 | 2.3 | 2.7 |
| Nominal income targeting | 0.2 | 0.1 | 0.1 | 0.8 | 2.0 | 2.7 |
| Constrained optimal control | 0.2 | 0.1 | 0.1 | 0.4 | 1.4 | 2.5 |

1. Policy in the Tealbook baseline keeps the federal funds rate at its effective lower bound of 12.5 basis points as long as the unemployment rate is above 6.5 percent and projected one-year-ahead inflation is less than 2.5 percent. Once either threshold is crossed, the federal funds rate follows the prescription of the inertial Taylor (1999) rule.

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

## Outcomes under Alternative Policies with Thresholds[1]

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

| Measure and scenario | 2012 H2 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| *Real GDP* | | | | | | |
| Extended Tealbook baseline[1] | 1.8 | 2.5 | 3.2 | 3.6 | 3.0 | 2.1 |
| Taylor (1993) | 1.8 | 2.4 | 2.8 | 3.2 | 2.8 | 2.2 |
| Taylor (1999) | 1.8 | 2.4 | 2.8 | 3.3 | 2.8 | 2.2 |
| Outcome based | 1.8 | 2.5 | 3.1 | 3.4 | 2.8 | 2.1 |
| First difference | 1.8 | 2.6 | 3.4 | 3.7 | 3.0 | 2.2 |
| Nominal income targeting | 1.8 | 2.7 | 3.5 | 3.8 | 3.0 | 2.1 |
| Constrained optimal control | 1.8 | 2.7 | 3.6 | 3.9 | 3.1 | 2.0 |
| *Unemployment rate*[2] | | | | | | |
| Extended Tealbook baseline[1] | 7.8 | 7.5 | 7.1 | 6.3 | 5.6 | 5.3 |
| Taylor (1993) | 7.8 | 7.6 | 7.3 | 6.7 | 6.0 | 5.7 |
| Taylor (1999) | 7.8 | 7.6 | 7.3 | 6.7 | 6.0 | 5.7 |
| Outcome based | 7.8 | 7.5 | 7.1 | 6.4 | 5.8 | 5.5 |
| First difference | 7.8 | 7.5 | 6.9 | 6.1 | 5.4 | 5.1 |
| Nominal income targeting | 7.8 | 7.5 | 6.9 | 6.0 | 5.2 | 5.0 |
| Constrained optimal control | 7.8 | 7.5 | 6.8 | 5.9 | 5.1 | 4.8 |
| *Total PCE prices* | | | | | | |
| Extended Tealbook baseline[1] | 1.5 | 1.3 | 1.5 | 1.6 | 1.8 | 2.0 |
| Taylor (1993) | 1.5 | 1.0 | 1.0 | 1.0 | 1.2 | 1.4 |
| Taylor (1999) | 1.5 | 1.0 | 1.1 | 1.1 | 1.3 | 1.5 |
| Outcome based | 1.5 | 1.2 | 1.3 | 1.4 | 1.6 | 1.8 |
| First difference | 1.5 | 1.4 | 1.8 | 1.9 | 2.1 | 2.3 |
| Nominal income targeting | 1.5 | 1.5 | 1.8 | 2.0 | 2.1 | 2.3 |
| Constrained optimal control | 1.5 | 1.5 | 1.8 | 1.9 | 2.1 | 2.2 |
| *Core PCE prices* | | | | | | |
| Extended Tealbook baseline[1] | 1.0 | 1.6 | 1.7 | 1.7 | 1.9 | 2.0 |
| Taylor (1993) | 1.0 | 1.3 | 1.2 | 1.2 | 1.3 | 1.4 |
| Taylor (1999) | 1.0 | 1.3 | 1.3 | 1.3 | 1.4 | 1.5 |
| Outcome based | 1.0 | 1.5 | 1.5 | 1.6 | 1.7 | 1.8 |
| First difference | 1.0 | 1.7 | 2.0 | 2.1 | 2.2 | 2.3 |
| Nominal income targeting | 1.0 | 1.8 | 2.0 | 2.1 | 2.2 | 2.3 |
| Constrained optimal control | 1.0 | 1.8 | 2.0 | 2.1 | 2.2 | 2.2 |
| *Federal funds rate*[2] | | | | | | |
| Extended Tealbook baseline[1] | 0.2 | 0.1 | 0.1 | 0.3 | 1.8 | 2.8 |
| Taylor (1993) | 0.2 | 0.1 | 0.1 | 0.1 | 2.6 | 2.8 |
| Taylor (1999) | 0.2 | 0.1 | 0.1 | 0.1 | 2.4 | 2.7 |
| Outcome based | 0.2 | 0.1 | 0.1 | 0.2 | 2.5 | 3.1 |
| First difference | 0.2 | 0.1 | 0.1 | 1.0 | 2.1 | 2.6 |
| Nominal income targeting | 0.2 | 0.1 | 0.1 | 0.7 | 2.0 | 2.8 |
| Constrained optimal control | 0.2 | 0.1 | 0.1 | 0.4 | 1.4 | 2.5 |

1. With the exception of constrained optimal control, monetary policy is specified to keep the federal funds rate at its effective lower bound of 12.5 basis points as long as the unemployment rate is above 6.5 percent and projected one-year-ahead inflation is less than 2.5 percent. Once either of these thresholds is crossed, the federal funds rate follows the prescriptions of the specified rule. Policy in the Tealbook baseline also uses these threshold conditions and switches to the inertial Taylor (1999) rule once either of these thresholds is crossed.

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

# Appendix

## POLICY RULES USED IN "MONETARY POLICY STRATEGIES"

The table below gives the expressions for the selected policy rules used in "Monetary Policy Strategies." In the table, $R_t$ denotes the nominal federal funds rate for quarter *t*, while 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 as well as its one-quarter-ahead forecast ($gap_t$ and $gap_{t+1|t}$), and the forecast of the three-quarter-ahead annual change in the output gap ($\Delta^4 gap_{t+3|t}$). The value of policymakers' long-run inflation objective, denoted $\pi^*$, is 2 percent. The nominal income targeting rule responds to the nominal income gap, which is defined as the difference between nominal income $yn_t$ (100 times the log of the level of nominal GDP) and a target value $yn_t^*$ (100 times the log of target nominal GDP). Target nominal GDP in 2007:Q4 is set equal to the staff's estimate of potential real GDP in that quarter multiplied by the GDP deflator in that quarter; subsequently, target nominal GDP grows 2 percentage points per year faster than the staff's estimate of potential GDP.

| | |
|---|---|
| **Taylor (1993) rule** | $R_t = 2 + \pi_t + 0.5(\pi_t - \pi^*) + 0.5gap_t$ |
| **Taylor (1999) rule** | $R_t = 2 + \pi_t + 0.5(\pi_t - \pi^*) + gap_t$ |
| **Inertial Taylor (1999) rule** | $R_t = 0.85R_{t-1} + 0.15(2 + \pi_t + 0.5(\pi_t - \pi^*) + gap_t)$ |
| **Outcome-based rule** | $R_t = 1.2R_{t-1} - 0.39R_{t-2} + 0.19[0.54 + 1.73\pi_t + 3.66gap_t - 2.72gap_{t-1}]$ |
| **First-difference rule** | $R_t = R_{t-1} + 0.5(\pi_{t+3\|t} - \pi^*) + 0.5\Delta^4 gap_{t+3\|t}$ |
| **Nominal income targeting rule** | $R_t = 0.75R_{t-1} + 0.25(2 + \pi_t + yn_t - yn_t^*)$ |

The first two of the selected rules were studied by Taylor (1993, 1999), while the inertial Taylor (1999) rule has featured prominently in recent analysis by Board staff.[1] The outcome-based rule uses policy reactions estimated using real-time data over the sample 1988:Q1–2006:Q4. The intercept of the outcome-based rule was chosen so that it is consistent with a 2 percent long-run inflation objective and a long-run real interest rate of 2 percent, a value used in the FRB/US model.[2] The intercepts of the Taylor (1993, 1999) rules, and the long-run

[1] See Erceg and others (2012).

[2] For the January 2013 Tealbook, the staff revised the long-run value of the real interest rate from 2¼ percent to 2 percent. The FRB/US model as well as the intercepts of the different policy rules have been adjusted to reflect this change.

intercept of the inertial Taylor (1999) rule, are set at 2 percent for the same reason. The 2 percent real rate estimate also enters the long-run intercept of the nominal income targeting rule. The prescriptions of the first difference rule do not depend on the level of the output gap or the long-run, quarterly real interest rate; see Orphanides (2003).

Near-term prescriptions from these rules are calculated using Tealbook projections for inflation and the output gap. The inertial Taylor (1999) rule, the first-difference rule, the estimated outcome-based rule, and the nominal income targeting rule include the lagged policy rate as a right-hand-side variable. When the Tealbook is published early in the quarter, the lines denoted "Previous Tealbook" report rule prescriptions based on the previous Tealbook's staff outlook, jumping off from the actual value of the lagged funds rate in the previous quarter. When the Tealbook is published late in the quarter, the lines denoted "Previous Tealbook Outlook" report rule prescriptions based on the previous Tealbook's staff outlook, but jumping off from the average value for the policy rate thus far this quarter.

## 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." Memo sent to the Committee on July 18, 2012.

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McCallum, Bennett T., and Edward Nelson (1999). "Nominal Income Targeting in an Open-Economy Optimizing Model," *Journal of Monetary Economics*, Vol. 43 (June), pp. 553–578.

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.

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## ESTIMATES OF THE EQUILIBRIUM AND ACTUAL REAL RATES

An estimate of the equilibrium real rate appears as a memo item in the first exhibit, "Policy Rules and the Staff Projection." The concept of the short-run equilibrium real rate underlying the estimate corresponds to the level of the real federal funds rate that is consistent with output reaching potential in twelve quarters using the projection for the economy of FRB/US, the staff's large-scale econometric model of the U.S. economy. This estimate depends on a very broad array of economic factors, some of which take the form of projected values of the model's exogenous variables. The estimate reported is the "Tealbook-consistent" estimate of $r^*$, which 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 estimated actual real federal funds rate reported in the exhibit is constructed as the difference between the federal funds rate and the trailing four-quarter change in the core PCE price index. The federal funds rate is specified as the midpoint of the target range for the federal funds rate on the Tealbook Book B publication date.

## 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. The simulated policy rule is assumed to be in force over the whole period covered by the simulation. For the optimal control simulations, the dotted line labeled "Previous Tealbook" is derived from the optimal control simulations, when applied to the previous Tealbook projection.

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# Monetary Policy Alternatives

This Tealbook presents three policy alternatives—labeled A, B, and C—for the Committee's consideration. As always, the Committee could blend elements of the draft statements to construct its desired statement.

In summarizing recent economic developments, all of the alternatives note that growth in economic activity has increased following a pause late last year, but they differ in their readings of the indicators of economic activity and their assessments of labor market conditions. Alternative B indicates that incoming data suggest "a return to moderate economic growth" while Alternative A simply indicates that economic growth "has resumed." Alternative C offers a somewhat more positive characterization of the recent performance of the economy by stating that "the pace of economic growth has picked up." Alternatives B and C observe that the housing sector "has strengthened further;" Alternative A cites "further improvement," as in the January statement. Alternatives A and B acknowledge that "fiscal policy has become somewhat more restrictive," while Alternative C does not mention fiscal restraint. Regarding the recent news on the labor market, Alternative B states that "labor market conditions have shown signs of improvement in recent months." As in previous FOMC statements, Alternatives A and B reiterate that the unemployment rate "remains elevated;" in contrast, Alternative C states that unemployment, "though elevated, has declined," and emphasizes that employment has been expanding at a "solid" pace. All three alternatives indicate that inflation "has been running somewhat below the Committee's longer-run objective, apart from temporary variations that largely reflect fluctuations in energy prices" and that longer-term inflation expectations "have remained stable."

In characterizing the economic outlook, Alternative B continues to state that, with appropriate policy accommodation, the Committee expects economic growth to proceed at a moderate pace and the unemployment rate to decline gradually toward mandate-consistent levels. In light of its more positive reading of the recent economic data, Alternative C indicates that, with appropriate policy accommodation, economic growth will "pick up further over time." In contrast, Alternative A says that, "without further" policy accommodation, economic growth "might not be strong enough to generate sustained improvement in labor market conditions." With respect to inflation, Alternative B maintains the formulation used in January, stating that the Committee

"anticipates that inflation over the medium term likely will run at or below its 2 percent objective." Alternative A indicates that medium-term inflation likely will be "somewhat below" its 2 percent objective while Alternative C says that inflation is likely to run "close to" its 2 percent objective over the medium term.

The draft statements for Alternatives A and B continue to note downside risks to the economic outlook. While Alternative B does not mention specific risks, Alternative A points to strains in global financial markets and to "unresolved fiscal issues" as posing downside risks to the economic outlook. In a break from recent statements, Alternative C says that the Committee "sees the risks to both economic growth and inflation as roughly balanced."



Alternative B continues purchases of agency MBS and longer-term Treasury securities at the same monthly rates as those the Committee specified in January. In contrast, Alternative C would reduce the monthly flows of purchases of both agency MBS and longer-term Treasury securities to $30 billion per month. Alternative A would increase the combined pace of securities purchases to $100 billion per month. In explaining the Committee's balance sheet policy, Alternatives B and C clarify that its decisions about the pace of asset purchases are based on both its "outlook for the labor market and inflation" and its "current assessment of the likely efficacy and costs of additional asset purchases." In contrast, Alternative A states that the more rapid pace of asset purchases should "put additional downward pressure on longer-term interest rates" and is intended to support a stronger economic recovery.

Regarding the Committee's forward guidance about its purchase program, all of the alternatives state that the Committee will continue its securities purchases until "the outlook for the labor market has improved substantially in a context of price stability." The proposed statement for Alternative B frames the Committee's future decisions about the size, pace, and composition of its asset purchases in terms of the Committee's evaluation of their likely efficacy and costs, as in recent statements, but adds "as well as the extent of progress toward its economic objectives." Alternative C states, instead, that the Committee "is prepared to increase or reduce the pace of purchases if the outlook for the labor market or inflation changes, with the purpose of maintaining appropriate policy accommodation." Alternative A uses much the same language as the January statement.

All three alternatives would maintain the 0 to ¼ percent target range for the federal funds rate and retain quantitative threshold-based forward guidance for the funds rate. As in January, Alternatives B and C would keep the unemployment rate threshold at 6½ percent, while Alternative A would lower this threshold to 5½ percent. All of the alternatives would retain the 2½ percent threshold for projected inflation between one and two years ahead.

The following table summarizes key elements of the alternative statements. The summary table is followed by complete drafts of the three statements and then by arguments for each alternative.

Alternatives

## Table 1: Overview of Policy Alternatives for the March 20 FOMC Statement

| Selected Elements | January Statement | March Alternatives | | |
|---|---|---|---|---|
| | | A | B | C |
| ***Economic Outlook*** | | | | |
| *Outlook* | with appropriate policy accommodation, growth will proceed at a moderate pace and the unemployment rate will gradually decline | **without further** policy accommodation, growth might not be strong enough to generate sustained improvement in labor market conditions | unchanged | with appropriate policy accommodation, growth will pick up further over time and the unemployment rate will decline |
| | inflation likely will run **at or below** 2 percent | **somewhat below** 2 percent | unchanged | **close to** 2 percent |
| ***Balance Sheet Policies*** | | | | |
| *Agency MBS* | $40 billion per month | $45 billion per month | unchanged | $30 billion per month |
| *Longer-term Treasuries* | $45 billion per month | $55 billion per month | unchanged | $30 billion per month |
| *Rationale for Purchases* | to support a stronger recovery and ensure inflation consistent with dual mandate | unchanged | based on its outlook for labor market and inflation, and its current assessment of likely efficacy and costs; and, for B: to support a stronger recovery and ensure inflation consistent with dual mandate | |
| *Securities Reinvestment* | principal payments from agency securities into agency MBS | unchanged | | |
| | roll over maturing Treasuries | unchanged | | |
| *Guidance* | if outlook for labor market does not improve substantially, **will** continue purchases, and employ other policy tools as appropriate, until such improvement is achieved | **will** continue purchases, and employ other policy tools as appropriate, until outlook for labor market has improved substantially | | **intends** to continue purchases… |
| | will, **as always**, take appropriate account of likely efficacy and costs | will **continue to** take appropriate account of likely efficacy and costs | will **continue to** take appropriate account of likely efficacy and costs **as well as extent of progress toward economic objectives** | **prepared to increase or reduce pace of purchases if outlook for labor market or inflation changes, with purpose of maintaining appropriate policy accommodation**; will take appropriate account of likely efficacy and costs |
| ***Federal Funds Rate*** | | | | |
| *Target* | 0 to ¼ percent | unchanged | | |
| *Guidance* | for a considerable time after purchases end and recovery strengthens | unchanged | | |
| | at least as long as unemployment rate above 6½ percent, inflation one to two years ahead no more than 2½ percent, inflation expectations well anchored | at least as long as unemployment rate above 5½ percent… | unchanged | |
| | will consider other information; will take balanced approach to removing accommodation | unchanged | | |

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## JANUARY FOMC STATEMENT

1. Information received since the Federal Open Market Committee met in December suggests that growth in economic activity paused in recent months, in large part because of weather-related disruptions and other transitory factors. Employment has continued to expand at a moderate pace but the unemployment rate remains elevated. Household spending and business fixed investment advanced, and the housing sector has shown further improvement. Inflation has been running somewhat below the Committee's longer-run objective, apart from temporary variations that largely reflect fluctuations in energy prices. Longer-term inflation expectations have remained stable.

2. Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee expects that, with appropriate policy accommodation, economic growth will proceed at a moderate pace and the unemployment rate will gradually decline toward levels the Committee judges consistent with its dual mandate. Although strains in global financial markets have eased somewhat, the Committee continues to see downside risks to the economic outlook. The Committee also anticipates that inflation over the medium term likely will run at or below its 2 percent objective.

3. To support a stronger economic recovery and to help ensure that inflation, over time, is at the rate most consistent with its dual mandate, the Committee will continue purchasing additional agency mortgage-backed securities at a pace of $40 billion per month and longer-term Treasury securities at a pace of $45 billion per month. 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. Taken together, these actions should maintain downward pressure on longer-term interest rates, support mortgage markets, and help to make broader financial conditions more accommodative.

4. The Committee will closely monitor incoming information on economic and financial developments in coming months. If the outlook for the labor market does not improve substantially, the Committee will continue its purchases of Treasury and agency mortgage-backed securities, and employ its other policy tools as appropriate, until such improvement is achieved in a context of price stability. In determining the size, pace, and composition of its asset purchases, the Committee will, as always, take appropriate account of the likely efficacy and costs of such purchases.

5. To support continued progress toward maximum employment and price stability, the Committee expects that a highly accommodative stance of monetary policy will remain appropriate for a considerable time after the asset purchase program ends and the economic recovery strengthens. In particular, the Committee decided to keep the target range for the federal funds rate at 0 to ¼ percent and currently anticipates that this exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above 6½ percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations

continue to be well anchored. In determining how long to maintain a highly accommodative stance of monetary policy, the Committee will also consider other information, including additional measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial developments. When the Committee decides to begin to remove policy accommodation, it will take a balanced approach consistent with its longer-run goals of maximum employment and inflation of 2 percent.

## FOMC STATEMENT—MARCH 2013 ALTERNATIVE A

1. Information received since the Federal Open Market Committee met in ~~December~~ **January** suggests that growth in economic activity ~~paused in recent months, in large part because of weather-related disruptions and other transitory factors~~ **has resumed following a pause late last year**. **Although** employment has continued to expand at a moderate pace, ~~but~~ the unemployment rate remains elevated. Household spending and business fixed investment advanced, and the housing sector has shown further improvement**, but fiscal policy has become somewhat more restrictive**. Inflation has been running somewhat below the Committee's longer-run objective, apart from temporary variations that largely reflect fluctuations in energy prices. Longer-term inflation expectations have remained stable.

2. Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee ~~expects~~ **judges** that, ~~with appropriate~~ **without further** policy accommodation, economic growth ~~will proceed at a moderate pace and the unemployment rate will gradually decline toward levels the Committee judges consistent with its dual mandate~~ **might not be strong enough to generate sustained improvement in labor market conditions**. ~~Although~~ **Moreover,** strains in global financial markets ~~have eased somewhat, the Committee continues to see~~ **and unresolved fiscal issues pose** downside risks to the economic outlook. The Committee ~~also~~ anticipates that inflation over the medium term likely will run ~~at or~~ **somewhat** below its 2 percent objective.

3. To support a stronger economic recovery and to help ensure that inflation, over time, is at the rate most consistent with its dual mandate, the Committee will ~~continue purchasing additional~~ **increase the pace at which it purchases** agency mortgage-backed securities ~~at a pace of $40~~ **to $45** billion per month, and longer-term Treasury securities ~~at a pace of $45~~ **to $55** billion per month. 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. Taken together, these actions **will further increase the Committee's holdings of longer-term securities and** should ~~maintain~~ **put additional** downward pressure on longer-term interest rates, support mortgage markets, and help to make broader financial conditions more accommodative.

4. The Committee will closely monitor incoming information on economic and financial developments in coming months. ~~If the outlook for the labor market does not improve substantially,~~ The Committee will continue its purchases of Treasury and agency mortgage-backed securities, and employ its other policy tools as appropriate, until ~~such improvement is achieved~~ **the outlook for the labor market has improved substantially** in a context of price stability. In determining the size, pace, and composition of its asset purchases, the Committee will~~, as always,~~ **continue to** take appropriate account of the likely efficacy and costs of such purchases.

5. To support continued progress toward maximum employment and price stability, the Committee expects that a highly accommodative stance of monetary policy will remain appropriate for a considerable time after the asset purchase program ends and

the economic recovery strengthens. In particular, the Committee decided to keep the target range for the federal funds rate at 0 to ¼ percent and currently anticipates that this exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above ~~6½~~ **5½** percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored. In determining how long to maintain a highly accommodative stance of monetary policy, the Committee will also consider other information, including additional measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial developments. When the Committee decides to begin to remove policy accommodation, it will take a balanced approach consistent with its longer-run goals of maximum employment and inflation of 2 percent.

## FOMC STATEMENT—MARCH 2013 ALTERNATIVE B

1. Information received since the Federal Open Market Committee met in ~~December~~ **January** suggests ~~that~~ **a return to moderate economic** growth ~~in economic activity paused in recent months, in large part because of weather-related disruptions and other transitory factors~~ **following a pause late last year**. ~~Employment has continued to expand at a moderate pace~~ **Labor market conditions have shown signs of improvement in recent months** but the unemployment rate remains elevated. Household spending and business fixed investment advanced, and the housing sector has ~~shown~~ **strengthened** further ~~improvement~~**, but fiscal policy has become somewhat more restrictive**. Inflation has been running somewhat below the Committee's longer-run objective, apart from temporary variations that largely reflect fluctuations in energy prices. Longer-term inflation expectations have remained stable.

2. Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee expects that, with appropriate policy accommodation, economic growth will proceed at a moderate pace and the unemployment rate will gradually decline toward levels the Committee judges consistent with its dual mandate. ~~Although strains in global financial markets have eased somewhat,~~ The Committee continues to see downside risks to the economic outlook. The Committee also anticipates that inflation over the medium term likely will run at or below its 2 percent objective.

3. ~~To support a stronger economic recovery and to help ensure that inflation, over time, is at the rate most consistent with its dual mandate~~ **Based on its outlook for the labor market and inflation, and on its current assessment of the likely efficacy and costs of additional asset purchases**, the Committee ~~will~~ **decided to** continue purchasing additional agency mortgage-backed securities at a pace of $40 billion per month and longer-term Treasury securities at a pace of $45 billion per month. 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. Taken together, these actions should maintain downward pressure on longer-term interest rates, support mortgage markets, and help to make broader financial conditions more accommodative**, thereby supporting a stronger economic recovery and helping to ensure that inflation, over time, is at the rate most consistent with the Committee's dual mandate**.

4. The Committee will closely monitor incoming information on economic and financial developments in coming months. ~~If the outlook for the labor market does not improve substantially,~~ The Committee will continue its purchases of Treasury and agency mortgage-backed securities, and employ its other policy tools as appropriate, until ~~such improvement is achieved~~ **the outlook for the labor market has improved substantially** in a context of price stability. In determining the size, pace, and composition of its asset purchases, the Committee will~~, as always,~~ **continue to** take appropriate account of the likely efficacy and costs of such purchases **as well as the extent of progress toward its economic objectives**.

5. To support continued progress toward maximum employment and price stability, the Committee expects that a highly accommodative stance of monetary policy will remain appropriate for a considerable time after the asset purchase program ends and the economic recovery strengthens. In particular, the Committee decided to keep the target range for the federal funds rate at 0 to ¼ percent and currently anticipates that this exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above 6½ percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored. In determining how long to maintain a highly accommodative stance of monetary policy, the Committee will also consider other information, including additional measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial developments. When the Committee decides to begin to remove policy accommodation, it will take a balanced approach consistent with its longer-run goals of maximum employment and inflation of 2 percent.

## FOMC STATEMENT—MARCH 2013 ALTERNATIVE C

1. Information received since the Federal Open Market Committee met in ~~December~~ **January** suggests ~~that~~ **the pace of economic** growth ~~in economic activity paused~~ **has picked up** in recent months~~, in large part because of weather-related disruptions and other transitory factors~~ **following a pause late last year**. Employment has ~~continued to~~ expand**ed** at a ~~moderate~~ **solid** pace ~~but~~ **and** the unemployment rate ~~remains~~**, though** elevated**, has declined**. Household spending and business fixed investment advanced, and the housing sector has ~~shown~~ **strengthened** further ~~improvement~~. Inflation has been running somewhat below the Committee's longer-run objective, apart from temporary variations that largely reflect fluctuations in energy prices. Longer-term inflation expectations have remained stable.

2. Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee expects that, with appropriate policy accommodation, economic growth will ~~proceed at a moderate pace~~ **pick up further over time** and the unemployment rate will ~~gradually~~ decline toward levels the Committee judges consistent with its dual mandate. ~~Although strains in global financial markets have eased somewhat, the Committee continues to see downside risks to the economic outlook.~~ The Committee also anticipates that inflation over the medium term likely will run ~~at or below~~ **close to** its 2 percent objective. **The Committee sees the risks to both economic growth and inflation as roughly balanced.**

3. ~~To support a stronger economic recovery and to help ensure that inflation, over time, is at the rate most consistent with its dual mandate,~~ **Based on its outlook for the labor market and inflation, and on its current assessment of the likely efficacy and costs of additional asset purchases, the Committee decided today to reduce the pace of its purchases. In particular,** the Committee will ~~continue purchasing~~ **purchase** additional agency mortgage-backed securities at a pace of ~~$40~~ **$30** billion per month and longer-term Treasury securities at a pace of ~~$45~~ **$30** billion per month. 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. Taken together, these actions **will increase the Committee's holdings of longer-term securities by $60 billion per month and** should ~~maintain~~ **sustain** downward pressure on longer-term interest rates, support mortgage markets, and help to ~~make~~ **keep** broader financial conditions ~~more~~ accommodative.

4. The Committee will closely monitor incoming information on economic and financial developments in coming months. ~~If the outlook for the labor market does not improve substantially,~~ The Committee ~~will~~ **intends to** continue its purchases of Treasury and agency mortgage-backed securities, and employ its other policy tools as appropriate, until ~~such improvement is achieved~~ **the outlook for the labor market has improved substantially** in a context of price stability. **The Committee is prepared to increase or reduce the pace of purchases if the outlook for the labor market or inflation changes, with the purpose of maintaining appropriate policy accommodation.** In determining the size, pace, and composition of its asset

purchases, the Committee will~~, as always,~~ take appropriate account of the likely efficacy and costs of such purchases.

5. To support continued progress toward maximum employment and price stability, the Committee expects that a highly accommodative stance of monetary policy will remain appropriate for a considerable time after the asset purchase program ends and the economic recovery strengthens. In particular, the Committee decided to keep the target range for the federal funds rate at 0 to ¼ percent and currently anticipates that this exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above 6½ percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored. In determining how long to maintain a highly accommodative stance of monetary policy, the Committee will also consider other information, including additional measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial developments. When the Committee decides to begin to remove policy accommodation, it will take a balanced approach consistent with its longer-run goals of maximum employment and inflation of 2 percent.

## THE CASE FOR ALTERNATIVE B

Policymakers may continue to expect the pace of economic recovery to be moderate and inflation to be subdued for some time. In light of the recent favorable indicators of labor market conditions, participants might judge that the outlook has improved, but only modestly. And, based on current information, they may conclude that the potential benefits of continued purchases of longer-term securities outweigh the costs. If so, they might wish to continue acquiring longer-term securities at the same pace as in recent months, and choose to make an announcement along the lines of Alternative B.

FOMC participants may regard economic developments over the intermeeting period as broadly consistent with their assessments of the outlook at the time of the January meeting. They may also read the incoming data on inflation and inflation expectations as being consistent with their earlier views that inflation over the medium term likely will run at or below the Committee's longer-run objective. The recent data on payrolls and spending, in conjunction with the improvement in sentiment in domestic financial markets, may have given policymakers somewhat greater assurance that private demand will increase at a rate sufficient to generate a gradual decline in unemployment going forward. However, policymakers may see the effects of sequestration as likely to hold back growth of spending by both the public and private sectors over coming quarters. Moreover, with a number of fiscal matters yet to be resolved, participants may worry about the possibility of additional fiscal drag on economic activity. Policymakers may also see a continuing risk of an adverse financial shock originating in the euro area. In light of these concerns, the Committee may judge it appropriate to continue on the current policy trajectory in order to maintain support for the economic recovery and help ensure that inflation, over time, is at the rate most consistent with the Committee's dual mandate.

Some policymakers may have read the incoming information as confirming a return to moderate economic growth but nonetheless view the data as not yet indicating a substantial improvement in the outlook for the labor market, and thus may judge it premature to adjust the purchase program. Others may have been encouraged by recent economic news, but be skeptical that the available data clearly signal a sustained return to moderate economic growth, particularly in light of the uncertainty surrounding the near-term effects of sequestration. These participants may prefer to wait for more information on the recent and near-term performance of the economy before making any adjustment

to the stance of policy. Accordingly, participants might favor a statement that includes a reference to the signs of improvements in labor market conditions in recent months, balanced by recognition of their concerns that the unemployment rate remains elevated and that fiscal policy has become somewhat more restrictive, as in Alternative B.

In light of their review of the likely efficacy and costs of asset purchases, some participants may judge that the asset purchases are yielding the expected benefits in terms of supporting aggregate demand and should be continued in order to strengthen the moderate economic recovery.[1] Moreover, they may judge that the Committee can continue to purchase additional longer-term securities at the current pace for some time without disrupting market functioning.[2] Nonetheless, they may agree that the post-meeting statement should more clearly indicate that the Committee will be evaluating the efficacy and costs of its purchases on an ongoing basis, and want to leave open the possibility that as the Committee sees progress toward its economic objectives, purchases could be scaled back or even stopped in coming quarters if its future assessments were to indicate that the costs associated with the program exceed the benefits. If so, participants may favor language like that in paragraphs 3 and 4 of Alternative B.

Some policymakers might remain worried that inflation expectations could rise if asset purchases continue much longer at the current pace, especially if economic growth continues to strengthen, but they may see risk-management considerations as supporting the existing policy stance for the time being. In particular, they may worry that the effective lower bound on the funds rate could bind severely if a move toward tighter policy proved premature and led to a substantial deterioration in the economic outlook. In contrast, with considerable economic slack prevailing, and with inflation below levels deemed appropriate over the longer run, participants might be reasonably confident that they would be able to firm policy sufficiently quickly to avoid a significant run-up in inflation in the event of surprisingly strong economic growth or rising inflation expectations. Other policymakers who have been worried that the large size of the

[1] For a detailed analysis of the efficacy of asset purchases, see the memo by B. Durdu, T. Laubach, D. Lebow, J. Millar, and M. Palumbo, titled "Evaluating the Efficacy of the Federal Reserve's Large-Scale Asset Purchases," which was distributed to the Committee on March 8, 2013.

[2] For a detailed analysis see the memo titled "Assessment of the Effects of Asset Purchases on Market Functioning in the Treasury and Agency MBS Markets" (by J. Kandrac and E. Klee of the Federal Reserve Board, and J. Frost and N. Wuerffel of the Federal Reserve Bank of New York) that was sent to the Committee on March 8, 2013.

Federal Reserve's balance sheet would contribute to increased inflation expectations may see that risk as lower in light of the continued subdued readings on inflation.

The Desk's latest survey of primary dealers indicates that the median dealer expects the Committee to continue purchasing agency-backed MBS at a pace of $40 billion per month and longer-term Treasury securities at a pace of $45 billion per month until the end of this year—implying a $1 trillion increase in the Federal Reserve's securities holdings during 2013. The median dealer also expects the Committee to acquire another $60 billion of longer-term Treasury securities, but no additional MBS, during the first quarter of 2014. Measures of dealers' uncertainty and disagreement about the likely total amount of the Federal Reserve's asset holdings have declined somewhat since January. Meanwhile, the survey shows that the median dealer still sees the third quarter of 2015 as the most likely time of the first increase in the federal funds rate; it also shows no significant change in respondents' expected path of the federal funds rate following lift-off. Thus, the asset purchase and interest rate decisions of Alternative B would not surprise market participants and seem likely to generate little market reaction.



However, the size and nature of the market reaction to the new language in Alternative B is difficult to predict. For example, the updated assessment of labor market conditions in the first paragraph might lead some market participants to conclude that the Committee sees the recent data as being on a path to substantial improvement in the outlook for the labor market, resulting in a downward shift in market participants' expectations regarding the ultimate size of the purchase program. This effect could be reinforced by the changes in paragraph 3, which give greater prominence to the Committee's assessment of the likely efficacy and costs of additional asset purchases, and also by the changes in the final sentence in paragraph 4, which notes that the Committee will take account of the extent of progress toward its economic objectives as well as the likely efficacy and costs of its purchases when considering changes to its purchase program. The new reference to fiscal restraint in paragraph 1 might offset such effects to some extent, as might the more upbeat formulation in the second sentence of paragraph 4. Nonetheless, the result could still be a modest rise in longer-term interest rates, somewhat lower stock prices, and a firming of the dollar. Starting with this meeting, the time gap between the release of the post-meeting statement and the Chairman's quarterly press briefing has been reduced to 30 minutes, which could also influence the market response to the statement.

## THE CASE FOR ALTERNATIVE A

Some participants may see the incoming data over the intermeeting period as confirming that, although employment is expanding and economic growth has resumed after the fourth quarter lull, the rate of economic expansion and the pace of the decline in unemployment will continue to be unacceptably slow. Indeed, despite the pickup in hiring and the decline in the unemployment rate in February, policymakers may still view indicators of labor market conditions, including the low labor force participation rate and the high levels of long-duration unemployment and individuals working part time for economic reasons, as suggesting that only modest fundamental improvement is being made. And even with asset purchases continuing at their present monthly pace, some participants might judge that the deviation of employment from their assessment of its maximum level would remain sufficiently large to warrant more aggressive policy action at this time. In light of the continuing substantial slack in the labor market, some participants may also see a sizable risk that the skills and labor force attachment of long-term unemployed workers will erode, with an adverse effect on the economy's longer-run economic potential. In addition, some policymakers may judge that inflation is likely to run appreciably below the Committee's longer-run objective of 2 percent over the next several years. Accordingly, some policymakers might prefer Alternative A, which both increases the pace of purchases and lowers the forward guidance threshold for the unemployment rate to 5½ percent.

Some participants may conclude that the incoming information on domestic economic activity has become somewhat brighter, but continue to judge that risks to the outlook stemming from U.S. fiscal policy and the fiscal and banking strains in the euro area are substantial and skewed to the downside. Moreover, members may see the effects of a new adverse shock as likely to be significantly more costly and more difficult to mitigate than the consequences of economic performance or inflation surprising to the upside. If so, they may see the degree of uncertainty about the economic outlook and the asymmetry in risks and potential costs of a prolonged period of subpar economic performance as pointing to the need for further accommodation. Some participants may judge that an effective way of increasing accommodation would be to lower the threshold for the unemployment rate in the Committee's forward guidance for the federal funds rate, thereby indicating a determination to keep short-term interest rates near zero for longer.

In addition, policymakers may view recent economic developments and their assessment of the benefits of purchases of longer-term securities as arguing for an increase in asset purchases to help strengthen the recovery in the labor market. In particular, they may feel that boosting aggregate demand would generate ancillary benefits in the labor market such as raising labor force participation and reducing long-duration unemployment. Furthermore, some participants may see incoming data as confirming that the purchases made by the Committee since September are delivering somewhat greater benefits than they had anticipated, and without generating appreciable costs. They may therefore conclude that it is appropriate to step up the rate of purchases. Some policymakers may be concerned that additional asset purchases could lead to a reduction in remittances to zero and result in a deferred asset.[3] Nonetheless, they may see that risk as offset by the very high likelihood that the overall fiscal effect of additional asset purchases will be positive, because such purchases will help spur stronger macroeconomic outcomes.[4]

An announcement like Alternative A that raised purchases of agency mortgage-backed securities and longer-term Treasury securities to a combined pace of $100 billion per month would come as a considerable surprise to market participants. As a result, investors likely would mark up their expectations for the total amount of securities that the Federal Reserve will acquire under its flow-based program. Moreover, according to the latest survey, dealers do not expect the threshold language to be changed, so the 5½ percent unemployment threshold in Alternative A implies a longer period of very low short-term interest rates than dealers currently expect. Therefore, longer-term interest rates likely would decline, inflation compensation and equity prices might rise, and the

[3] The Committee may also consider a number of approaches that help forestall the possibility of zero remittances and a deferred asset; these include the implementation of changes in its remittances policy to smooth over time the level of remittances to the Treasury, as well as holding securities for a longer period than envisioned in the Committee's exit principles. For an analysis of possible remittance policies, see the memo titled "Alternatives for Federal Reserve Remittance Policy" (by S. Allison, S. Carpenter, J. Clouse, W. English, G. Evans, J. Faust, J. Huther, J. Ihrig, E. Klee, M. Leahy, and L. Mize of the Federal Reserve Board, and J. Remache of the Federal Reserve Bank of New York) that was sent to the Committee (corrected) on March 12, 2013. For an analysis of possible changes to the exit strategy, see the memo entitled "Exit Strategy Considerations" (by K. Femia and J. Remache of the Federal Reserve Bank of New York, and J Ihrig, J. Kandrac, E. Klee, and C. Miller of the Federal Reserve Board) that was sent to the Committee on March 5, 2013.

[4] Such a judgment would be in line with the staff analysis provided in the memo titled "Fiscal Implications of Additional Large-Scale Asset Purchases for the Federal Government and the Federal Reserve" (by J. Clouse, W. English, J. Faust, J. Ihrig, J. Huther, E. Klee, M. Leahy, and D. Reifschneider of the Federal Reserve Board, and J. Remache of the Federal Reserve Bank of New York) that was sent to the Committee on March 11, 2013.

dollar could depreciate. However, if investors read the statement of Alternative A as indicating that the FOMC has a relatively gloomy outlook for economic growth and employment, equity prices might not rise or could even decline. In addition, changing one of the numerical thresholds so soon after adopting it might create significant confusion among investors about the extent to which the Committee feels bound by its forward guidance, potentially increasing volatility in asset prices.

## THE CASE FOR ALTERNATIVE C

Policymakers may view the information received since the January meeting as indicating that the economic recovery has gained traction and that economic growth is likely to pick up over time. In particular, recent months have witnessed an improvement in employment growth and a substantial rebound in hours worked. In addition, policymakers may now judge the risks to economic growth to be roughly balanced, and that overall financial conditions in the United States—with higher equity prices and a decline in volatility in recent months—are very supportive of economic growth. As a result, they might judge it appropriate to provide less accommodation by reducing the pace of asset purchases and the total size of the purchase program.

Some participants may view such a reduction in the pace of purchases as an appropriate response to an improved economic outlook. Some others may view a reduction as an appropriate initial step toward stopping purchases. They may think it likely that the recent pace of labor market gains will continue and will result in a substantial improvement in the outlook relatively soon, and might see dialing back purchases as an effective way of communicating to the public that the purchase program is probably nearing its end. Still other participants may favor bringing the program to an end, but they might view an immediate cessation of the program as undesirable on the grounds that such an abrupt change could trigger significant though short-lived disruptions in financial markets.

Alternatively, some participants might be concerned that, while core inflation seems likely to decline somewhat in the first quarter of this year and inflation expectations remain well anchored, the recent increase in gasoline prices and the resulting boost to headline inflation, coming at a time when monetary policy is highly accommodative and the Federal Reserve's balance sheet remains exceptionally large, might raise inflation expectations. Moreover, in an environment in which economic activity is picking up, the risk that inflation will exceed the Committee's longer-run

objective now may appear higher than it did last year. Against this backdrop, policymakers may judge that a timely reduction in the pace of purchases is necessary to prevent an undesirable increase in future inflation that could undermine the public's confidence in the Committee's commitment to its longer-run inflation goal.

Some policymakers may be skeptical that the downward pressure on longer-term interest rates from the current program of Treasury and agency MBS purchases is having a significant effect on macroeconomic outcomes. Alternatively, they may have concluded that output and employment are close to their equilibrium levels, and so see little, if any, need for additional policy accommodation. Some participants may judge the prospective costs of further purchases to be significant. In particular, some members might see further asset purchases as raising the odds that the Federal Reserve will realize significant losses during exit and be worried about the communications and political issues that such losses could raise. Or they may worry that further purchases by the Federal Reserve of safe assets when longer-term interest rates are already quite low could lead to excessive risk-taking on the part of investors. Such behavior might undermine financial stability over time, thereby putting the achievement of the dual mandate at risk, particularly if supervisory tools are not sufficiently effective to avoid such an outcome.

In addition, policymakers may be concerned about the potential effects of further asset purchases on the functioning of particular financial markets. In light of these considerations, they might conclude that moving toward a less accommodative stance of policy sooner than indicated by the Committee's January statement would be appropriate. Moreover, they might want to make clear that they are prepared either to increase the pace of purchases or to reduce the pace further, as appropriate, if the outlook for the labor market or inflation changes. If so, the Committee might prefer a statement like Alternative C, including the new language in paragraph 4.

A statement like Alternative C would come as a considerable surprise to market participants and might well be interpreted as signaling not only smaller total asset purchases but also a significantly earlier removal of policy accommodation than investors had expected. The Desk's survey indicates that primary dealers still expect purchases of longer-term securities to continue at their present pace beyond mid-year. Accordingly, a statement along the lines of Alternative C would likely lead investors to mark down significantly their expectations of the Committee's cumulative asset purchases, and so would cause a sizable upward shift in market participant's expectations of the likely path

for longer-term yields. Moreover, the announcement of a balanced assessment of the risks to the outlook for both growth and inflation—as in paragraph 2—might cause an upward shift in market participants' expectations of the likely path for the federal funds rate, reinforcing the increase in intermediate- and longer-term interest rates. However, the upward movement in longer-term interest rates might be attenuated to some degree by the indication, in paragraph 4, that the Committee is prepared to increase the pace of its purchases if the outlook worsens. In addition, if market participants inferred from the statement that the key factor motivating the Committee to reduce the size of its asset purchase program was its assessment of the balance between the efficacy and costs of asset purchases, they might push out their expected timing of the first increase in the federal funds rate, which would also attenuate the effect on yields. That said, longer-term rates would rise, equity prices would probably fall, and the dollar might appreciate.

## DIRECTIVE

The directive that was issued in January appears on the next page, followed by drafts for a March directive that correspond to each of the policy alternatives. These drafts suggest a number of updates to make the language of the directive consistent with the Committee's post-meeting statements.

The draft directive for Alternative B instructs the Desk to continue purchasing additional agency MBS at a pace of about $40 billion per month and to continue purchasing longer-term Treasury securities at a pace of about $45 billion per month. The draft directive for Alternative A directs the Desk to purchase additional agency MBS at a pace of about $45 billion per month and to purchase longer-term Treasury securities at a pace of about $55 billion per month. The draft directive for Alternative C instructs the Desk to purchase agency MBS at a pace of about $30 billion per month and to purchase longer-term Treasury securities at a pace of about $30 billion per month. All three of the draft directives direct the Desk to maintain the current policy of reinvesting principal payments from its holdings of agency debt and agency MBS in agency MBS and of rolling over maturing Treasury securities at auction.

## January 2013 Directive

Consistent with its statutory mandate, the Federal Open Market Committee seeks monetary and financial conditions that will foster maximum employment and price stability. In particular, the Committee seeks conditions in reserve markets consistent with federal funds trading in a range from 0 to ¼ percent. The Committee directs the Desk to undertake open market operations as necessary to maintain such conditions. The Desk is directed to continue purchasing longer-term Treasury securities at a pace of about $45 billion per month and to continue purchasing agency mortgage-backed securities at a pace of about $40 billion per month. 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 MBS transactions. The Committee directs the Desk to maintain its policy of rolling over maturing Treasury securities into new issues and its policy of reinvesting principal payments on all agency debt and agency mortgage-backed securities in agency mortgage-backed securities. The System Open Market Account Manager and the Secretary will keep the Committee informed of ongoing developments regarding the System's balance sheet that could affect the attainment over time of the Committee's objectives of maximum employment and price stability.

Alternatives

## Directive for March 2013 Alternative A

Consistent with its statutory mandate, the Federal Open Market Committee seeks monetary and financial conditions that will foster maximum employment and price stability. In particular, the Committee seeks conditions in reserve markets consistent with federal funds trading in a range from 0 to ¼ percent. The Committee directs the Desk to undertake open market operations as necessary to maintain such conditions. **Beginning April 1,** the Desk is directed to ~~continue~~ **increase the pace of** purchase**s of** longer-term Treasury securities ~~at a pace of~~ **to** about ~~$45~~ **$55** billion per month and to ~~continue purchasing~~ **increase the pace of purchases of** agency mortgage-backed securities ~~at a pace of~~ **to** about ~~$40~~ **$45** billion per month. 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 ~~MBS~~ **mortgage-backed securities** transactions. The Committee directs the Desk to maintain its policy of rolling over maturing Treasury securities into new issues and its policy of reinvesting principal payments on all agency debt and agency mortgage-backed securities in agency mortgage-backed securities. The System Open Market Account Manager and the Secretary will keep the Committee informed of ongoing developments regarding the System's balance sheet that could affect the attainment over time of the Committee's objectives of maximum employment and price stability.

## Directive for March 2013 Alternative B

Consistent with its statutory mandate, the Federal Open Market Committee seeks monetary and financial conditions that will foster maximum employment and price stability. In particular, the Committee seeks conditions in reserve markets consistent with federal funds trading in a range from 0 to ¼ percent. The Committee directs the Desk to undertake open market operations as necessary to maintain such conditions. The Desk is directed to continue purchasing longer-term Treasury securities at a pace of about $45 billion per month and to continue purchasing agency mortgage-backed securities at a pace of about $40 billion per month. 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 ~~MBS~~ **mortgage-backed securities** transactions. The Committee directs the Desk to maintain its policy of rolling over maturing Treasury securities into new issues and its policy of reinvesting principal payments on all agency debt and agency mortgage-backed securities in agency mortgage-backed securities. The System Open Market Account Manager and the Secretary will keep the Committee informed of ongoing developments regarding the System's balance sheet that could affect the attainment over time of the Committee's objectives of maximum employment and price stability.

Alternatives

## Directive for March 2013 Alternative C

Consistent with its statutory mandate, the Federal Open Market Committee seeks monetary and financial conditions that will foster maximum employment and price stability. In particular, the Committee seeks conditions in reserve markets consistent with federal funds trading in a range from 0 to ¼ percent. The Committee directs the Desk to undertake open market operations as necessary to maintain such conditions. **Beginning April 1,** the Desk is directed to ~~continue purchasing~~ **reduce the pace of purchases of** longer-term Treasury securities ~~at a pace of~~ **to** about ~~$45~~ **$30** billion per month and to ~~continue purchasing~~ **reduce the pace of purchases of** agency mortgage-backed securities ~~at a pace of~~ **to** about ~~$40~~ **$30** billion per month. 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 ~~MBS~~ **mortgage-backed securities** transactions. The Committee directs the Desk to maintain its policy of rolling over maturing Treasury securities into new issues and its policy of reinvesting principal payments on all agency debt and agency mortgage-backed securities in agency mortgage-backed securities. The System Open Market Account Manager and the Secretary will keep the Committee informed of ongoing developments regarding the System's balance sheet that could affect the attainment over time of the Committee's objectives of maximum employment and price stability.

# Projections

## DEBT, BANK CREDIT, AND MONEY

Domestic nonfinancial sector debt expanded at an annual rate of 4¾ percent in 2012, reflecting continued strong growth in federal government debt and a solid rise in private nonfinancial debt. For the forecast period ending in 2015, we project that domestic nonfinancial debt will expand at a slower rate—about 3½ percent each year—with a slight acceleration in private debt offset by a slowing in the growth of federal debt as the deficit trends lower. We expect that growth of nonfinancial business debt will diminish over the projection period as corporate bond issuance steps down from the unusually strong pace seen in 2012. Following a moderate contraction in 2012, home mortgage debt is expected to increase slowly over the forecast period as tight lending standards ease somewhat and house prices rise further, leading to a gradual decline in the number of homeowners who are "underwater." We project consumer credit to rise at a strong pace over the forecast period, driven by continued robust demand for student and auto loans and growth in spending on consumer durables.

Commercial bank credit is anticipated to increase at a moderate pace over the forecast period, a bit above its 3¾ percent rate of expansion in 2012. Core loans—the sum of commercial and industrial (C&I), real estate, and consumer loans—are projected to rise at a gradually increasing pace, led by a pickup in real estate and consumer loans. In particular, after decreasing in each year since 2009, commercial real estate loans are projected to increase modestly this year and then to accelerate a bit through 2015 as current restraints—high vacancy rates and the poor credit quality of existing loans in this sector—ease somewhat. Similarly, the staff anticipates that the expansion of both residential real estate and consumer loans on banks' books will pick up from their currently weak pace, reflecting both higher loan demand as the condition of households' balance sheets continues to improve and a gradual easing of standards and terms on such loans. In contrast, the rapid growth in C&I loans observed in recent quarters is expected to moderate over the next three years and to be more in line with the rise in nominal business investment. Over the forecast period, the growth rate of banks' securities holdings is expected to diminish relative to 2012, as deposit growth ebbs and demand for bank loans strengthens.

On balance, M2 is projected to increase at a pace below that of nominal income over the forecast period. For the remainder of 2013 and through 2014, we expect growth of M2 and its largest component, liquid deposits, to moderate relative to the rapid expansion observed over recent years. We anticipate that a gradual improvement in global financial conditions will encourage investors to shift their portfolios away from the safe and liquid assets in M2 toward riskier financial assets. M2 growth is expected to slow further toward the end of 2015 in response to the projected increase in short-term market interest rates and the accompanying rise in the opportunity cost of holding money.

Growth Rates for M2

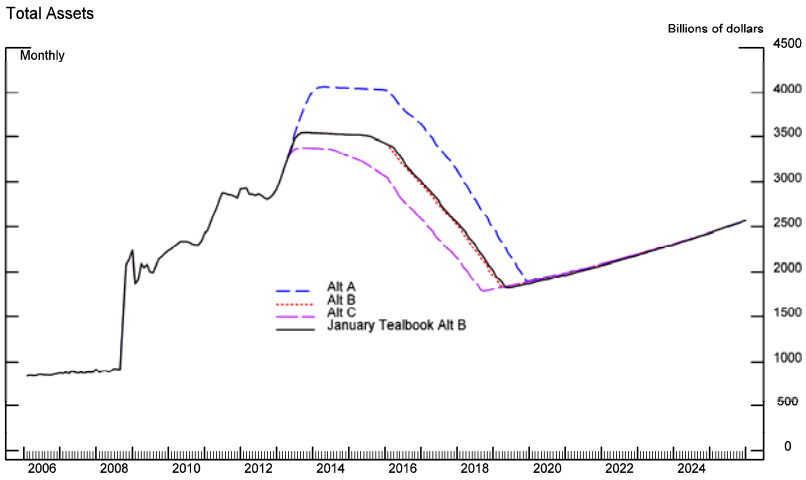
(Percent, seasonally adjusted annual rate)

| Monthly Growth Rates | Tealbook Forecast* |
|---|---|
| Jul-12 | 11.1 |
| Aug-12 | 8.7 |
| Sep-12 | 9.1 |
| Oct-12 | 9.9 |
| Nov-12 | 5.9 |
| Dec-12 | 12.7 |
| Jan-13 | 4.3 |
| Feb-13 | -3.1 |
| Mar-13 | -0.4 |
| Apr-13 | 5.0 |
| May-13 | 5.0 |
| Jun-13 | 5.2 |
| Quarterly Growth Rates | |
| 2012 Q3 | 8.6 |
| 2012 Q4 | 9.1 |
| 2013 Q1 | 4.2 |
| 2013 Q2 | 2.9 |
| 2013 Q3 | 1.9 |
| 2013 Q4 | 2.1 |
| 2014 Q1 | 2.0 |
| 2014 Q2 | 2.4 |
| 2014 Q3 | 2.8 |
| 2014 Q4 | 3.0 |
| Annual Growth Rates | |
| 2012 | 7.5 |
| 2013 | 2.8 |
| 2014 | 2.6 |
| 2015 | 1.7 |

*This forecast is consistent with nominal GDP and interest rates in the Tealbook forecast. Actual data through March 4, 2013; projections thereafter.

## BALANCE SHEET AND MONETARY BASE

The staff has prepared three scenarios for the Federal Reserve's balance sheet that correspond to Alternatives A, B, and C. All three policy alternatives include additional asset purchases.[1] Alternative B continues purchases of $45 billion per month of longer-term Treasury securities and $40 billion per month of agency MBS. Alternative A increases the pace of securities purchases, while Alternative C decreases the pace. All three alternatives maintain the 0 to ¼ percent target range for the federal funds rate and retain threshold-based forward guidance for the funds rate based on the unemployment rate and the outlook for inflation. Projections under each scenario are based on assumptions about the trajectory of various components of the balance sheet.[2] Details of these assumptions, as well as projections for each major component of the balance sheet, can be found in the Appendix that follows this section.[3]




[1] The Committee is assumed to maintain for now its existing policy of rolling over maturing Treasury securities at auction and of reinvesting principal payments from agency MBS and agency debt securities into agency MBS. The effect of assuming that maturing Treasury securities are rolled over at auction is very modest; as a result of the maturity extension program, there are currently less than $5 billion of Treasury securities in the SOMA portfolio that mature before January 2016.

[2] The projections assume that the Committee follows an exit strategy consistent with exit principles articulated in the minutes of the June 2011 FOMC meeting. For alternative assumptions about the exit of unconventional monetary policy and the implications for the evolution of the balance sheet, see the memo by K. Femia, J. Ihrig, J. Kandrac, E. Klee, C. Miller, and J. Remache, titled "Exit Strategy Considerations," which was distributed to the Committee on March 5, 2013.

[3] The entire expected path of the portfolio has implications for the evolution of interest rates, economic activity, and Federal Reserve income. To the extent that market participants have different expectations for the size, pace, and composition of purchases as well as the execution of the exit strategy than assumed in these scenarios, the resulting effects on interest rates, economic activity, and Federal Reserve income will differ from those presented here.

For the balance sheet scenario that corresponds to Alternative B, the Committee is assumed to continue agency MBS purchases at a pace of $40 billion per month and longer-term Treasury securities purchases of $45 billion per month through June 2013. The purchases total about $500 billion in 2013. This scenario might be viewed as consistent with the description of asset purchases in the statement language of Alternative B.[4] Overall, under this scenario, SOMA securities holdings are about $3.3 trillion at the end of December 2013.

In the Alternative B scenario, we assume that the first increase in the target federal funds rate is in December 2015, as in the staff forecast.[5] Given the exit principles adopted by the Committee in June 2011, the date of liftoff is a key determinant of the trajectory of the balance sheet. In June 2015, six months before the first increase in the target federal funds rate, all reinvestment is assumed to cease, and the SOMA portfolio begins to contract. In June 2016, six months after the initial increase in the target federal funds rate, the Committee begins to sell its holdings of agency securities at a pace that reduces the amount of these securities in the portfolio to zero over five years, that is, by May 2021. Through these redemptions and sales, the size of the portfolio is normalized by April 2019.[6, 7] The balance sheet then begins to expand, with increases in SOMA



[4] The statement indicates that the Committee intends to continue its asset purchases until the outlook for the labor market has improved substantially in a context of price stability. It also notes that the Committee will continue to "take appropriate account of the likely efficacy and costs of such purchases." In the staff economic outlook, by mid-2013, there will be accumulating evidence of a pickup in economic growth and an outlook for substantial improvement in the unemployment rate, which is projected to decline from near 7¾ percent in mid-2013 to 7¼ percent in mid-2014 and to 7 percent in late 2014. Alternatively, by mid-2013, the Committee could end the purchase program based on its assessment of the likely efficacy and costs of additional asset purchases.

[5] At the time of liftoff, the unemployment rate is projected to be just below 6.5 percent, and core PCE inflation is expected to be 1.7 percent. This liftoff date for the federal funds rate is the same as that assumed in the balance sheet projections for Alternative B in the January Tealbook.

[6] The tools to drain reserve balances (reverse repurchase agreements and term deposits) are not modeled in any of the scenarios presented. Use of these tools would result in a shift in the composition of Federal Reserve liabilities—a decline in reserve balances and a corresponding increase in reverse repurchase agreements or term deposits—but would not produce an overall change in the size of the balance sheet.

[7] The size of the balance sheet is assumed to be normalized when the securities portfolio reverts to its longer-run trend level, determined largely by currency in circulation plus Federal Reserve capital and a projected steady-state level of reserve balances. The projected timing of the normalization of the size of the balance sheet depends importantly on the level of reserve balances that is assumed to be necessary to conduct monetary policy; currently, we assume that level of reserve balances to be $25 billion. A higher steady-state level for reserve balances would, all else equal, lead to an earlier normalization of the size of the balance sheet.

holdings essentially matching the growth of Federal Reserve Bank capital and currency in circulation. Total assets are $2.6 trillion at the end of 2025.

The additional purchases of securities through the middle of 2013 increase the level of SOMA holdings and reserve balances through the medium term. Sales of agency MBS after the first increase in the federal funds rate are projected to result in realized capital losses.[8] These capital losses, in conjunction with the rise in interest expense on reserve balances, substantially reduce Federal Reserve net income; however, Federal Reserve remittances to the Treasury are projected to remain positive and no deferred asset is recorded.

In the scenario for Alternative A, the Committee is assumed to step-up the pace of purchases of longer-term Treasury securities to $55 billion per month and of agency MBS to $45 billion per month for the next two quarters. Around the end of the third quarter, the Committee is assumed to begin to taper purchases and in January 2014 it completes all purchases. These purchases total $1 trillion in 2013 and early 2014. This scenario might be viewed as consistent with the descriptions of asset purchases in the statement language of Alternative A.[9] The Committee continues reinvesting principal payments from agency MBS and agency debt securities into agency MBS and maintains its policy of rolling over maturing Treasury securities at auction. In this scenario, SOMA securities holdings increase to a peak of $3.8 trillion. In the Alternative A scenario, we assume that the first increase in the target federal funds rate is pushed out to July 2016, roughly consistent with the reduction in the threshold for the unemployment rate to 5½ percent and the added monetary stimulus from the increased asset purchases in this alternative. In January 2016, six months prior to the assumed first increase in the federal funds rate, all reinvestments are projected to cease and the SOMA portfolio begins to contract. Six months after the liftoff of the federal funds rate, sales of agency securities begin and continue for five years. The size of the portfolio is normalized by November 2019—a little less than three years after the start of sales and within the timeframe noted in the June 2011 exit strategy principles.



[8] Under Reserve Bank accounting, securities held in the domestic SOMA portfolio are recorded on an amortized cost basis. As a result, realized losses and gains on securities sold affect the Federal Reserve's reported net income; unrealized losses and gains are not reflected in net income.

[9] Under the staff's baseline forecast, by early 2014, the unemployment rate will have fallen to 7½ percent and real GDP will be expanding at about a 2¾ percent annual rate. Moreover, the unemployment rate is projected to decline to 7 percent by late 2014 and to 6¼ by late 2015. Alternative A provides more policy accommodation than assumed in the staff forecast, suggesting an even stronger outlook.

The additional purchases of securities in this scenario substantially boost the level of the SOMA portfolio and reserve balances. As the federal funds rate rises in 2016, 2017, and 2018, the interest expense on reserve balances increases substantially. The interest expense, combined with the losses realized on the sales of agency MBS, result in a very low level of remittances to the Treasury in 2018, but no deferred asset is recorded.

For the scenario that corresponds to Alternative C, the Committee decreases the pace of purchases of both longer-term Treasury securities and agency MBS to $30 billion per month for April. In May, the Committee is assumed to further reduce its purchase pace and to cease all purchases by the middle of June. The purchases total $350 billion in 2013.[10] In this scenario, the federal funds rate is assumed to lift off in December 2014, one year earlier than in Alternative B.[11] Corresponding to this earlier increase in the federal funds rate, reinvestment of principal from maturing or prepaying securities ends and redemptions begin in June 2014, and the portfolio begins to contract. Sales of agency securities commence in June 2015 and last for five years. SOMA securities holdings in this scenario peak at $3.1 trillion, and the size of the balance sheet is normalized in September 2018, seven months earlier than under Alternative B.

Across scenarios, the peak amount of reserve balances and the level of reserve balances outstanding at liftoff are directly related to the magnitude of assumed asset purchases. Under Alternative A, reserve balances peak at about $2.6 trillion, while under Alternative B, reserve balances peak at $2.2 trillion. Under Alternative C, reserve balances rise from their current level to $2.0 trillion. For the scenario corresponding to Alternative A, reserve balances are $2.2 trillion when the federal funds rate lifts off from its lower bound in July 2016. For the scenario corresponding to Alternative B, reserve balances are $1.9 trillion when the federal funds rate lifts off from its lower bound in December 2015. For the scenario corresponding to Alternative C, reserve balances are $1.8 trillion when the federal funds rate lifts off from its lower bound in December 2014.



[10] The scaling back of the asset purchase program may be seen as consistent with a stronger economic outlook than in the baseline.

[11] The scenario assumes that the Committee raises the federal funds rate before either the threshold for the unemployment rate or the threshold for projected inflation is crossed, perhaps because longer-term inflation expectations become unanchored or because the Committee concludes that a federal funds rate target at the zero lower bound was resulting in financial imbalances that were detrimental to future financial stability.

In the scenario corresponding to Alternative B, the monetary base increases significantly from 2012 to 2013 because of the purchase program and the accompanying increase in reserve balances. Once exit begins, the monetary base shrinks rapidly through the second quarter of 2019, primarily reflecting a decline in reserve balances as securities are redeemed or sold. Starting in the third quarter of 2019, after reserve balances are assumed to have stabilized at $25 billion, the monetary base begins to expand, in line with the growth of currency in circulation. Under Alternative A, the monetary base increases from 2012 to 2014 as the level of reserve balances climbs in concert with the expansion of the Federal Reserve's balance sheet. The base then contracts during the exit period until about one quarter after the size of the portfolio is normalized. Under Alternative C, the monetary base increases from 2012 to 2013 because of the purchase program and then contracts, on net, until about one quarter after the size of the portfolio is normalized.

Growth Rates for the Monetary Base

| Date | Alternative B | Alternative A | Alternative C | January Alternative B |
|---|---|---|---|---|
| | | Percent, annual rate | | |
| | | Monthly | | |
| Dec-12 | 13.7 | 13.7 | 13.7 | 14.7 |
| Jan-13 | 21.5 | 21.5 | 21.5 | 23.5 |
| Feb-13 | 37.3 | 37.3 | 37.3 | 63.4 |
| Mar-13 | 56.1 | 56.3 | 55.4 | 69.6 |
| Apr-13 | 30.3 | 33.3 | 27.5 | 19.0 |
| May-13 | 36.2 | 41.3 | 26.6 | 33.9 |
| Jun-13 | 51.5 | 56.3 | 32.3 | 50.1 |
| Jul-13 | 17.3 | 31.3 | -0.5 | 15.5 |
| Aug-13 | 17.5 | 43.1 | 7.9 | 17.5 |
| | | Quarterly | | |
| 2012 Q4 | -0.5 | -0.5 | -0.5 | -0.8 |
| 2013 Q1 | 26.7 | 26.8 | 26.6 | 35.3 |
| 2013 Q2 | 41.8 | 44.7 | 36.0 | 43.0 |
| 2013 Q3 | 25.8 | 42.3 | 11.7 | 24.8 |
| 2013 Q4 | -0.1 | 26.7 | -2.4 | 0.7 |
| 2014 Q1 | -1.7 | 12.1 | -1.9 | -2.3 |
| 2014 Q2 | 0.6 | 3.3 | 0.6 | 1.5 |
| 2014 Q3 | 0.8 | 0.8 | -0.8 | 0.3 |
| | | Annual - Q4 to Q4 | | |
| 2012 | 0.3 | 0.3 | 0.3 | 0.4 |
| 2013 | 25.4 | 39.9 | 18.9 | 28.2 |
| 2014 | -0.9 | 3.3 | -2.0 | -0.8 |
| 2015 | -2.0 | -0.8 | -5.1 | -2.0 |
| 2016 | -11.6 | -7.6 | -16.1 | -10.5 |
| 2017 | -16.7 | -14.6 | -18.5 | -16.3 |
| 2018 | -23.8 | -21.6 | -21.5 | -21.7 |
| 2019 | -9.6 | -27.9 | 4.2 | -12.5 |
| 2020 | 4.3 | 1.1 | 4.3 | 4.3 |
| 2021 | 4.5 | 4.3 | 4.5 | 4.5 |
| 2022 | 4.5 | 4.4 | 4.5 | 4.6 |
| 2023 | 4.5 | 4.4 | 4.5 | 4.6 |
| 2024 | 4.4 | 4.4 | 4.4 | 4.5 |
| 2025 | 4.4 | 4.4 | 4.4 | 4.5 |

Note: Not seasonally adjusted.

# Appendix

This appendix presents the assumptions underlying the projections provided in the section titled "Balance Sheet and Monetary Base," as well as projections for each major component of the balance sheet.

## GENERAL ASSUMPTIONS

The balance sheet projections are constructed at a monthly frequency from March 2013 to December 2025. The few balance sheet items that are not discussed below are assumed to be constant over the projection period at the level observed on February 28, 2013. The projections for all major asset and liability categories under each scenario are summarized in the tables that follow the bullet points.

The Tealbook projections for the scenario corresponding to Alternative B assume that the target federal funds rate begins to increase in December 2015. This date of liftoff is consistent with the current staff economic forecast and the thresholds described in the January 2013 FOMC statement, and it is the same as assumed in the balance sheet projections for Alternative B in the January Tealbook. The projections for the scenario corresponding to Alternative A assume the target federal funds rate lifts off in July 2016, roughly consistent with the thresholds and the added monetary stimulus from the increased asset purchases described in the proposed Alternative A statement language and seven months later than in Alternative B. The projections for the scenario corresponding to Alternative C assume the target federal funds rate lifts off in December 2014, a year earlier than in Alternative B. In each case, the balance sheet projections assume that no use of short-term draining tools is necessary to achieve the projected path for the target federal funds rate.[1]



[1] If term deposits or reverse repurchase agreements were used to drain reserves prior to raising the federal funds rate, the composition of liabilities would change: Increases in term deposits and reverse repurchase agreements would be matched by corresponding declines in reserve balances. Presumably, these draining tools would be wound down as the balance sheet returns to its steady state growth path, so that the projected paths for Treasury securities presented here remain valid.

## ASSETS

### Treasury Securities, Agency Mortgage-Backed Securities (MBS), and Agency Debt Securities

- The assumptions under Alternative B are:
  - The Committee is assumed to continue purchases of Treasury securities at a pace of $45 billion per month and purchases of agency MBS at a pace of $40 billion per month through June. The Treasury securities purchased are assumed to have an average duration of about nine years. The purchases in 2013 expand the SOMA portfolio's holdings of longer-term securities by about $500 billion.
  - The FOMC continues to reinvest the proceeds from principal payments on its agency securities holdings in agency MBS.
  - Starting in June 2015—six months prior to the assumed increase in the target federal funds rate—all securities are allowed to roll off the portfolio as they mature or prepay.
  - The Federal Reserve begins to sell agency MBS and agency debt securities in June 2016, six months after the assumed date of the first increase in the target federal funds rate. Holdings of agency securities are reduced over five years and reach zero by May 2021.
  - For agency MBS, the rate of prepayment is based on staff models using estimates of housing market factors from one of the Desk's analytical providers, long-run average prepayment speeds of MBS, and interest rate projections from the Tealbook.[2] The projected rate of prepayment is sensitive to these underlying assumptions.

- In the scenario corresponding to Alternative A, the Committee is assumed to increase the monthly pace of purchases to $55 billion of longer-term Treasury securities and $45 billion of agency MBS from April through August 2013. After August 2013, the pace of purchases slows, and purchases end in January 2014. The Treasury securities purchased are assumed to have an average duration of about nine years. These purchases expand the SOMA portfolio's holdings of longer-term securities by $1 trillion in 2013 and early 2014. In addition, the Committee is assumed to maintain its existing policy of reinvesting principal payments from its holdings of agency debt and agency MBS in agency MBS. Starting in January 2016, six months prior to the assumed increase in the target federal funds rate in July 2016, principal payments from all securities are allowed to roll off the portfolio. Sales of agency securities begin in January 2017 and continue for five years.

- In the scenario corresponding to Alternative C, the Committee is assumed to decrease the monthly pace of purchases to $30 billion of longer-term Treasury securities and $30 billion of agency MBS in April 2013. After April 2013, the pace of purchases slows

[2] Projected prepayments of agency MBS reflect interest rate projections as of March 11, 2013.

further, and purchases end in June 2013. The Treasury securities purchased are assumed to have an average duration of about nine years. These purchases expand the SOMA portfolio's holdings of longer-term securities by $350 billion in 2013. The FOMC continues to reinvest the proceeds from principal payments on its agency securities holdings in agency MBS until June 2014—six months prior to the assumed increase in the target federal funds rate under this alternative. Starting in June 2014, all securities are allowed to roll off the portfolio as they mature or prepay. The Federal Reserve begins to sell agency MBS and agency debt securities in June 2015. Holdings of agency securities are reduced over five years and reach zero by May 2020.

- Because current and expected interest rates in the near term are below the average coupon rate on outstanding Treasury securities, the market value at which the Federal Reserve purchases securities will generally exceed their face value, with a larger premium for longer-maturity securities. As a result, in Alternatives A, B, and C, premiums are boosted by roughly $25 billion, $12 billion, and $2 billion, respectively, by the time asset purchases end relative to a scenario without these Treasury securities purchases. The increase in premiums is reflected in higher total assets and in higher reserve balances.
- The current and near-term market values of new agency MBS purchases are assumed to be four percent above face value. As a result, for Alternatives A, B, and C, the $374 billion, $160 billion, and $88 billion of agency MBS purchases, respectively, will cause unamortized premiums on the Federal Reserve's balance sheet to rise by roughly $15 billion, $6 billion, and $4 billion, respectively, relative to a scenario without these MBS purchases. The increase in premiums is reflected in higher total assets and in higher reserve balances.
- The asset purchases under all three alternatives put downward pressure on market interest rates, in particular primary and secondary mortgage rates.
- The level of central bank liquidity swaps is assumed to decline, as draws under the recent foreign central bank swap auctions mature, and is assumed to return to zero in 2014.
- In all three scenarios, once reserve balances drop to $25 billion, the Desk begins to purchase Treasury bills to maintain this level of reserve balances going forward. Purchases of bills continue until such securities comprise one-third of the Federal Reserve's total Treasury securities holdings—about the average share prior to the crisis. Once this share is reached, the Federal Reserve buys coupon securities in addition to bills to maintain an approximate composition of the portfolio of one-third bills and two-thirds coupon securities.
- The level of foreign currency denominated assets held in the SOMA portfolio is assumed to stay constant at $24 billion.

## Liquidity Programs and Credit Facilities

- Credit through the Term Asset-Backed Securities Loan Facility (TALF) declines to zero by the end of 2015, reflecting loan maturities and prepayments.

- The assets held by TALF LLC decline from about $500 million currently to zero in 2015. Assets held by TALF LLC consist of investments of commitment fees collected by the LLC. On January 15, the Board of Governors approved the elimination of the U.S. Treasury's funding commitment and the repayment of the initial funding amount plus accrued interest. Additionally, the Board of Governors approved the disbursement of contingent interest payments from TALF LLC to Treasury and FRBNY that equal, approximately, the excess of the TALF LLC cash balance over the amount of outstanding TALF loans. The first payment occurred in February, and additional payments are expected to occur on a monthly basis. In this projection, the LLC is assumed not to purchase any asset-backed securities. (It would have to make such purchases if an asset-backed security were received by the Federal Reserve Bank of New York in connection with a decision of a borrower not to repay a TALF loan.)
- The assets held by Maiden Lane LLC decline to zero in 2016.

## LIABILITIES AND CAPITAL

- Federal Reserve notes in circulation grow in line with the staff forecast for money stock currency through 2015. Afterwards, Federal Reserve notes in circulation grow at the same rate as nominal GDP in the extended Tealbook projection.
- The level of reverse repurchase agreements (RRPs) is assumed to be around $100 billion, about the average level of RRPs associated with foreign official and international accounts observed over the past three years.
- Balances held in the U.S. Treasury's General Account (TGA) follow recent patterns until the assumed initial increase in the target federal funds rate in each alternative. At that point, the TGA drops back to its historical target level of $5 billion as it is assumed that the Treasury will implement a new cash management system and invest funds in excess of $5 billion. The TGA remains constant at $5 billion over the remainder of the forecast period.
- Federal Reserve capital grows 15 percent per year, in line with the average rate of the past ten years.[3]
- In general, increases in the level of Federal Reserve assets are matched by higher levels of reserve balances. All else equal, increases in the levels of liability items, such as Federal Reserve notes in circulation or other liabilities, or increases in the level of Reserve Bank capital, drain reserve balances. When increases in these liability or capital

[3] The annual growth rate of capital affects the date of normalization of the size of the balance sheet, the size of the SOMA portfolio, and the level of annual remittances to the Treasury. Growth in Reserve Bank capital has been modest over the past two years; if Federal Reserve capital were assumed to grow at 10 percent per year, the normalization date would be roughly unchanged, the size of SOMA would be a bit smaller after normalization, and annual remittances would, on net, be modestly larger.

items would otherwise cause reserve balances to fall below $25 billion, purchases of Treasury securities are assumed in order to maintain that level of reserve balances.

- In the event that a Federal Reserve Bank's earnings fall short of the amount necessary to cover operating costs, pay dividends, and equate surplus to capital paid-in, a deferred asset would be recorded. This deferred asset is reported on the liability side of the balance sheet as "Interest on Federal Reserve notes due to U.S. Treasury." This liability takes on a positive value when weekly cumulative earnings have not yet been distributed to the Treasury and takes on a negative value when earnings fall short of the expenses listed above. In this Tealbook, none of the alternatives result in a deferred asset.

## TERM PREMIUM EFFECTS[4]

- Under Alternative A, the term premium effect on the yield of the ten-year Treasury note is negative 117 basis points in the current quarter. The effect wanes over time as the length of time the securities will be held by the Federal Reserve shortens and as securities subsequently roll off the portfolio or are sold until the size of the portfolio is normalized.[5]
- Under Alternative B, the contemporaneous term premium effect is negative 107 basis points. This estimate is between the term premium effect associated with $1 trillion of purchases in 2013 and the term premium effect associated with $500 billion of purchases. Over the first half of this year, as market participants come to realize that the purchases will end in June, the term premium effect converges to one associated with $500 billion of purchases in 2013. Over the remainder of the projection period, the term premium effect declines slowly toward zero, reflecting the actual and anticipated normalization of the portfolio.
- Under Alternative C, the term premium effect is negative 81 basis points. The effect is less negative than in Alternative B because there are fewer securities purchases in 2013 and the liftoff date is earlier so asset sales begin sooner than under Alternatives B and A.



[4] Staff estimates include all current and projected asset purchases and use the model outlined in the appendix of the memo titled "Possible MBS Large-Scale Asset Purchase Program" written by staff at the Federal Reserve Bank of New York and the Board of Governors and sent to the Committee on January 18, 2012. More details of the model can be found in "Term Structure Modeling with Supply Factors and the Federal Reserve's Large Scale Asset Purchase Programs" by C. Li and M. Wei, FEDS working paper #37, 2012.

[5] The staff projection of the term premium effect assumes that the Committee follows an exit strategy consistent with the exit principles articulated in the minutes of the June 2011 FOMC meeting. If market participants anticipate a different exit strategy, the staff estimate of the term premium effect may not be the same as those priced in market rates. For example, if market participants believe MBS will not be sold, then the term premium effect implicit in market rates will be more negative than the staff's estimate.

| 10-Year Treasury Term Premium Effect | | | | |
|---|---|---|---|---|
| Date | Alternative B | Alternative A | Alternative C | January Alternative B |
| | Basis Points | | | |
| | Quarterly Averages | | | |
| 2013 Q1 | -107 | -117 | -81 | -109 |
| 2013 Q2 | -98 | -115 | -78 | -99 |
| 2013 Q3 | -87 | -111 | -74 | -88 |
| 2013 Q4 | -82 | -106 | -69 | -83 |
| 2014 Q1 | -77 | -100 | -64 | -78 |
| 2014 Q2 | -72 | -94 | -59 | -73 |
| 2014 Q3 | -68 | -89 | -55 | -68 |
| 2014 Q4 | -63 | -83 | -51 | -63 |
| 2015 Q1 | -58 | -78 | -46 | -59 |
| 2015 Q2 | -54 | -73 | -42 | -54 |
| 2015 Q3 | -50 | -68 | -39 | -50 |
| 2015 Q4 | -46 | -63 | -35 | -46 |
| 2016 Q4 | -32 | -45 | -24 | -32 |
| 2017 Q4 | -22 | -31 | -16 | -21 |
| 2018 Q4 | -16 | -22 | -12 | -15 |
| 2019 Q4 | -12 | -16 | -11 | -12 |
| 2020 Q4 | -11 | -13 | -10 | -10 |
| 2021 Q4 | -10 | -11 | -9 | -9 |
| 2022 Q4 | -8 | -9 | -8 | -8 |
| 2023 Q4 | -6 | -7 | -6 | -6 |
| 2024 Q4 | -5 | -6 | -5 | -5 |
| 2025 Q4 | -3 | -4 | -3 | -3 |

# Federal Reserve Balance Sheet
## End-of-Year Projections -- Alternative B

Billions of dollars

| | Feb 28, 2013 | 2013 | 2015 | 2017 | 2019 | 2021 | 2023 | 2025 |
|---|---|---|---|---|---|---|---|---|
| Total assets | 3,102 | 3,543 | 3,432 | 2,515 | 1,889 | 2,084 | 2,311 | 2,569 |
| Selected assets | | | | | | | | |
| Liquidity programs for financial firms | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| Primary, secondary, and seasonal credit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Central bank liquidity swaps | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| Term Asset-Backed Securities Loan Facility (TALF) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Net portfolio holdings of Maiden Lane LLC, Maiden Lane II LLC, and Maiden Lane III LLC | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Securities held outright | 2,844 | 3,274 | 3,209 | 2,337 | 1,749 | 1,969 | 2,205 | 2,471 |
| U.S. Treasury securities | 1,755 | 1,930 | 1,929 | 1,521 | 1,410 | 1,969 | 2,205 | 2,471 |
| Agency debt securities | 74 | 57 | 33 | 4 | 2 | 0 | 0 | 0 |
| Agency mortgage-backed securities | 1,016 | 1,287 | 1,247 | 812 | 337 | 0 | 0 | 0 |
| Net portfolio holdings of TALF LLC | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total other assets | 246 | 258 | 223 | 178 | 140 | 115 | 106 | 98 |
| Total liabilities | 3,047 | 3,480 | 3,349 | 2,405 | 1,743 | 1,892 | 2,056 | 2,233 |
| Selected liabilities | | | | | | | | |
| Federal Reserve notes in circulation | 1,129 | 1,187 | 1,337 | 1,467 | 1,594 | 1,743 | 1,908 | 2,084 |
| Reverse repurchase agreements | 97 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Deposits with Federal Reserve Banks | 1,809 | 2,182 | 1,901 | 827 | 39 | 39 | 39 | 39 |
| Reserve balances held by depository institutions | 1,696 | 2,081 | 1,887 | 814 | 25 | 25 | 25 | 25 |
| U.S. Treasury, General Account | 82 | 93 | 5 | 5 | 5 | 5 | 5 | 5 |
| Other Deposits | 31 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| Interest on Federal Reserve Notes due to U.S. Treasury | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total capital | 55 | 63 | 83 | 110 | 146 | 192 | 255 | 337 |

Source: Federal Reserve H.4.1 statistical releases and staff calculations.
Note: Components may not sum to totals due to rounding.

# Federal Reserve Balance Sheet
## End-of-Year Projections -- Alternative A

Billions of dollars

| | Feb 28, 2013 | 2013 | 2015 | 2017 | 2019 | 2021 | 2023 | 2025 |
|---|---|---|---|---|---|---|---|---|
| Total assets | 3,102 | 4,011 | 4,035 | 3,126 | 1,898 | 2,086 | 2,308 | 2,565 |
| Selected assets | | | | | | | | |
| Liquidity programs for financial firms | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| Primary, secondary, and seasonal credit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Central bank liquidity swaps | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| Term Asset-Backed Securities Loan Facility (TALF) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Net portfolio holdings of Maiden Lane LLC, Maiden Lane II LLC, and Maiden Lane III LLC | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Securities held outright | 2,844 | 3,721 | 3,788 | 2,927 | 1,743 | 1,964 | 2,196 | 2,462 |
| U.S. Treasury securities | 1,755 | 2,192 | 2,206 | 1,794 | 1,176 | 1,964 | 2,196 | 2,462 |
| Agency debt securities | 74 | 57 | 33 | 4 | 2 | 0 | 0 | 0 |
| Agency mortgage-backed securities | 1,016 | 1,471 | 1,549 | 1,129 | 564 | 0 | 0 | 0 |
| Net portfolio holdings of TALF LLC | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total other assets | 246 | 280 | 247 | 199 | 155 | 122 | 112 | 103 |
| Total liabilities | 3,047 | 3,948 | 3,952 | 3,016 | 1,753 | 1,894 | 2,054 | 2,228 |
| Selected liabilities | | | | | | | | |
| Federal Reserve notes in circulation | 1,129 | 1,187 | 1,337 | 1,479 | 1,603 | 1,744 | 1,905 | 2,079 |
| Reverse repurchase agreements | 97 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Deposits with Federal Reserve Banks | 1,809 | 2,649 | 2,502 | 1,425 | 39 | 39 | 39 | 39 |
| Reserve balances held by depository institutions | 1,696 | 2,548 | 2,400 | 1,412 | 25 | 25 | 25 | 25 |
| U.S. Treasury, General Account | 82 | 93 | 93 | 5 | 5 | 5 | 5 | 5 |
| Other Deposits | 31 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| Interest on Federal Reserve Notes due to U.S. Treasury | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total capital | 55 | 63 | 83 | 110 | 146 | 192 | 255 | 337 |

Source: Federal Reserve H.4.1 statistical releases and staff calculations.
Note: Components may not sum to totals due to rounding.

# Federal Reserve Balance Sheet
## End-of-Year Projections -- Alternative C

Billions of dollars

| | Feb 28, 2013 | 2013 | 2015 | 2017 | 2019 | 2021 | 2023 | 2025 |
|---|---|---|---|---|---|---|---|---|
| Total assets | 3,102 | 3,374 | 3,068 | 2,152 | 1,889 | 2,084 | 2,311 | 2,570 |
| Selected assets | | | | | | | | |
| Liquidity programs for financial firms | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| Primary, secondary, and seasonal credit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Central bank liquidity swaps | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| Term Asset-Backed Securities Loan Facility (TALF) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Net portfolio holdings of Maiden Lane LLC, Maiden Lane II LLC, and Maiden Lane III LLC | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Securities held outright | 2,844 | 3,118 | 2,863 | 1,989 | 1,761 | 1,973 | 2,209 | 2,474 |
| U.S. Treasury securities | 1,755 | 1,843 | 1,839 | 1,443 | 1,666 | 1,973 | 2,209 | 2,474 |
| Agency debt securities | 74 | 57 | 33 | 4 | 2 | 0 | 0 | 0 |
| Agency mortgage-backed securities | 1,016 | 1,218 | 991 | 542 | 93 | 0 | 0 | 0 |
| Net portfolio holdings of TALF LLC | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total other assets | 246 | 245 | 205 | 162 | 128 | 111 | 103 | 95 |
| Total liabilities | 3,047 | 3,311 | 2,985 | 2,041 | 1,744 | 1,892 | 2,057 | 2,233 |
| Selected liabilities | | | | | | | | |
| Federal Reserve notes in circulation | 1,129 | 1,187 | 1,337 | 1,467 | 1,594 | 1,743 | 1,908 | 2,084 |
| Reverse repurchase agreements | 97 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Deposits with Federal Reserve Banks | 1,809 | 2,012 | 1,536 | 463 | 39 | 39 | 39 | 39 |
| Reserve balances held by depository institutions | 1,696 | 1,910 | 1,522 | 450 | 25 | 25 | 25 | 25 |
| U.S. Treasury, General Account | 82 | 93 | 5 | 5 | 5 | 5 | 5 | 5 |
| Other Deposits | 31 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| Interest on Federal Reserve Notes due to U.S. Treasury | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total capital | 55 | 63 | 83 | 110 | 146 | 192 | 255 | 337 |

Source: Federal Reserve H.4.1 statistical releases and staff calculations.
Note: Components may not sum to totals due to rounding.

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# Abbreviations

| | |
|---|---|
| ABCP | asset-backed commercial paper |
| ABS | asset-backed securities |
| AFE | advanced foreign economy |
| APP | Asset Purchase Program |
| BEA | Bureau of Economic Analysis, Department of Commerce |
| BHC | bank holding company |
| BOE | Bank of England |
| BOJ | Bank of Japan |
| CDS | credit default swaps |
| C&I | commercial and industrial |
| CLO | collateralized loan obligation |
| CMBS | commercial mortgage-backed securities |
| CP | commercial paper |
| CPH | compensation per hour |
| CPI | consumer price index |
| CRE | commercial real estate |
| Desk | Open Market Desk |
| ECB | European Central Bank |
| EME | emerging market economy |
| ECI | employment cost index |
| E&S | equipment and software |
| ETF | exchange-traded fund |
| FDIC | Federal Deposit Insurance Corporation |
| FOMC | Federal Open Market Committee; also, the Committee |
| G-7 | Group of Seven (Canada, France, Germany, Italy, Japan, U.K., U.S.) |
| G-20 | Group of Twenty (Argentina, Australia, Brazil, Canada, China, European Union, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, U.K., U.S.) |

| | |
|---|---|
| GCF | general collateral finance |
| GDP | gross domestic product |
| HFR | Hedge Fund Research |
| IPO | initial public offering |
| ISM | Institute for Supply Management |
| LIBOR | London interbank offered rate |
| LSAP | large-scale asset purchase |
| MBS | mortgage-backed securities |
| Michigan Survey | Thomson Reuters/University of Michigan Surveys of Consumers |
| NIM | net interest margin |
| NIPA | national income and product accounts |
| OIS | overnight index swap |
| OTC | over-the-counter |
| PCE | personal consumption expenditures |
| PMI | purchasing managers index |
| REIT | real estate investment trust |
| REO | real estate owned |
| repo | repurchase agreement |
| RMBS | residential mortgage-backed securities |
| SCOOS | Senior Credit Officer Opinion Survey on Dealer Financing Term |
| SOMA | System Open Market Account |
| S&P | Standard & Poor’s |
| TBA | to be announced (for example, TBA market) |
| TIPS | Treasury inflation-protected securities |
| VIX | Chicago Board Options Exchange Market Volatility Index |