April 19, 2019

Transitioning to the Long-Run Composition of the SOMA Portfolio: A Preliminary Analysis[1]

Executive summary

At its March meeting, the FOMC adopted an interim plan for the reinvestment of principal payments from securities in the System Open Market Account (SOMA) portfolio after balance sheet runoff ends in September, and indicated that it would revisit that plan in connection with deliberations on the portfolio's longer-run composition. While there is no apparent need to choose a longer-run portfolio composition now, the tradeoffs that choice entails are complex. This memo provides a preliminary analysis of some of the key issues to lay the groundwork for an initial discussion.

The memo considers two illustrative targets for the long-run composition of the portfolio—one similar to the universe of outstanding Treasury securities and one focused on shorter-term securities. It also considers two illustrative approaches, one gradual and one accelerated, for transitioning to the target composition. A key macroeconomic tradeoff we highlight is this: A portfolio with shorter average duration would provide the Committee with greater opportunity to provide economic stimulus through a maturity extension program (MEP) that would exchange shorter-term securities for longer-term ones, without increasing the size of the balance sheet. However, a shorter-duration portfolio could also increase term premiums; if so, the path of the federal funds rate target required to achieve any given macroeconomic outcome would be lower. Thus, in light of the effective lower bound (ELB), creating more space for an MEP may reduce the capacity to provide stimulus through a lower federal funds rate. However, there is a great deal of uncertainty about the quantitative magnitude of this tradeoff, and several factors could be expected to mitigate it in the longer run.

We begin by showing how the portfolio's weighted average maturity (WAM) and model-based estimates of effects on term premiums would evolve for different target compositions and transition approaches. Using macroeconomic simulations, we describe how the evolution of the portfolio might influence the amount of policy space available to the FOMC, including both MEP capacity and the capacity to reduce the federal funds rate target without encountering the ELB.[2] We discuss how the results depend on a range of

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[2] We focus on how SOMA holdings influence term premiums and the economy by changing the stock of duration held by private investors. On this dimension, MEPs and large-scale asset purchases (LSAPs) have comparable effects. Differences between LSAPs and MEPs on other dimensions, such as signaling, are

assumptions and the consequent uncertainty around the effects of policy choices. Finally, we discuss how markets might react to an announcement of changes in the portfolio. Other issues that may be relevant to the choice of portfolio composition, such as potential liquidity needs and risk to Federal Reserve income, are reserved for future analysis.

I. The basic framework and the facts

A. Two long-run target portfolios and two transition approaches

We describe two illustrative long-run SOMA portfolio compositions and two illustrative alternative paths to reach these target compositions.

- *Proportional Target Portfolio:* SOMA holdings are proportional in the long run to the maturity composition of the universe of Treasury securities outstanding today.[3]
- *Short Target Portfolio*: SOMA holdings are proportional in the long run to the maturity composition of Treasury securities outstanding today with residual maturity shorter than three years.

We consider two approaches, one faster than the other, for transitioning to either of these long-run portfolio compositions. Both approaches rely on changing the composition of the portfolio by adjusting the composition of securities purchased to reinvest principal payments received and to accommodate growth in Federal Reserve liabilities; neither entails sales of securities. The details of each transition approach depend on the long-run target portfolio because, along the transition path, purchases and reinvestments would be directed only to securities in the long-run target portfolio.

For both approaches, we assume that the proceeds from maturing Treasury securities are reinvested at auction into newly issued securities with weights on maturities that depend on the target portfolio.[4] The two transition approaches differ in the structure of open-market purchases for reinvestment of principal payments received from holdings of agency debt and agency mortgage-backed securities (MBS) and for accommodating growth in Federal Reserve liabilities.

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beyond the scope of this memo, as capacity to conduct LSAPs generally does not depend on portfolio composition.

[3] We use the composition of the current universe of Treasury securities to approximate the future composition because the composition of Treasury securities changes slowly.

[4] Specifically, proceeds from maturing Treasury securities are reinvested at auction into newly issued securities that are in the target portfolio. To the extent possible given the Treasury auction calendar, the weights on different securities purchased at auction are chosen so that, over time, the WAM of the cumulative stock of securities acquired at auction is the same as the WAM of the long-run target portfolio. For the short target portfolio, the WAM of the target portfolio can be matched only approximately because of the auction calendar: Treasury securities maturing at mid-month could be reinvested only in 3-year notes and Treasury securities maturing at month-end could be reinvested only in 2-year notes; given the current mix of maturity dates in the SOMA, this procedure would produce a stock of securities whose WAM over time would average 1.3 years, compared with 1.13 years for the short target portfolio.

- *Gradual Approach:* Open-market purchases are directed to Treasury securities that are in the long-run target portfolio, in proportions that are similar to the target portfolio.
- *Accelerated Approach:* Open-market purchases are directed only to Treasury bills until the WAM of the SOMA Treasury portfolio becomes equal to the WAM of the long-run target portfolio. Once the WAM of the target portfolio is reached, open market purchases are designed to hold the WAM of the SOMA Treasury portfolio constant while the overall composition continues to move closer to that of the target portfolio.

Purely for illustrative purposes, we assume that the transition begins in January 2020, although this date has no particular importance. For both transition approaches, we assume that the MBS portfolio unwinds passively as principal payments are received.[5] This assumption could be relaxed in future analysis, in light of the Committee's earlier communication that limited MBS sales might be warranted in the longer run.

B. Evolution of the portfolio's WAM

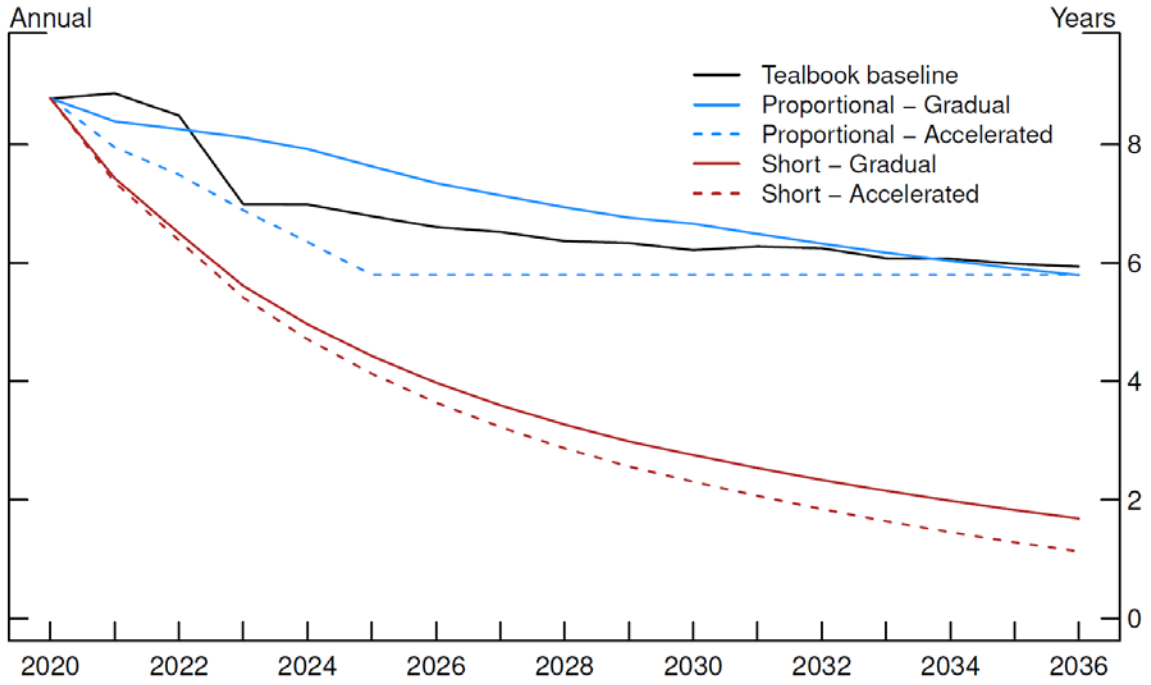
Figure 1 shows the evolution of the WAM of the SOMA Treasury portfolio for the Tealbook baseline and four scenarios based on the two long-run target portfolios and the two transition approaches. The pace at which the WAM falls depends on both the transition approach and the long-run target portfolio.

With a proportional target and a gradual transition approach, the WAM of the Treasury portfolio declines at a steady pace from more than 8½ years at the start of the projection period to the long-run target portfolio's WAM of just under 6 years by 2036, implying a transition period for the WAM of about a decade and a half. With the same target but an accelerated transition approach, the WAM falls to match that of the target portfolio in about 5 years, as open-market purchases of Treasury bills rapidly bring down the portfolio's average maturity. However, with the accelerated transition approach, the composition of the portfolio would differ from the long-run target composition even after the WAM matches the target portfolio's WAM, as Treasury bills would initially be overrepresented in the portfolio.

For the short target portfolio composition, the WAM declines rapidly regardless of the transition approach. Of course, because the target WAM is much lower than the portfolio's current WAM, it takes longer to reach the target WAM for the short portfolio than for the proportional portfolio given the same transition approach. Even with an accelerated transition, the WAM does not reach the long-run target portfolio's WAM of 1.13 years until the end of 2035. Again, even after the WAM matches that of the long-run target, it takes more time for the overall composition to reach the long-run target.

[5] In all scenarios, we assume that the pace of MBS runoff is the same as in the Tealbook baseline. The amount of MBS in the total SOMA portfolio is projected to decline from about $1.43 trillion at the end of 2019 to about $303 billion by the end of 2035.

Figure 1: SOMA Treasury Portfolio WAM



Source: Board staff estimates.

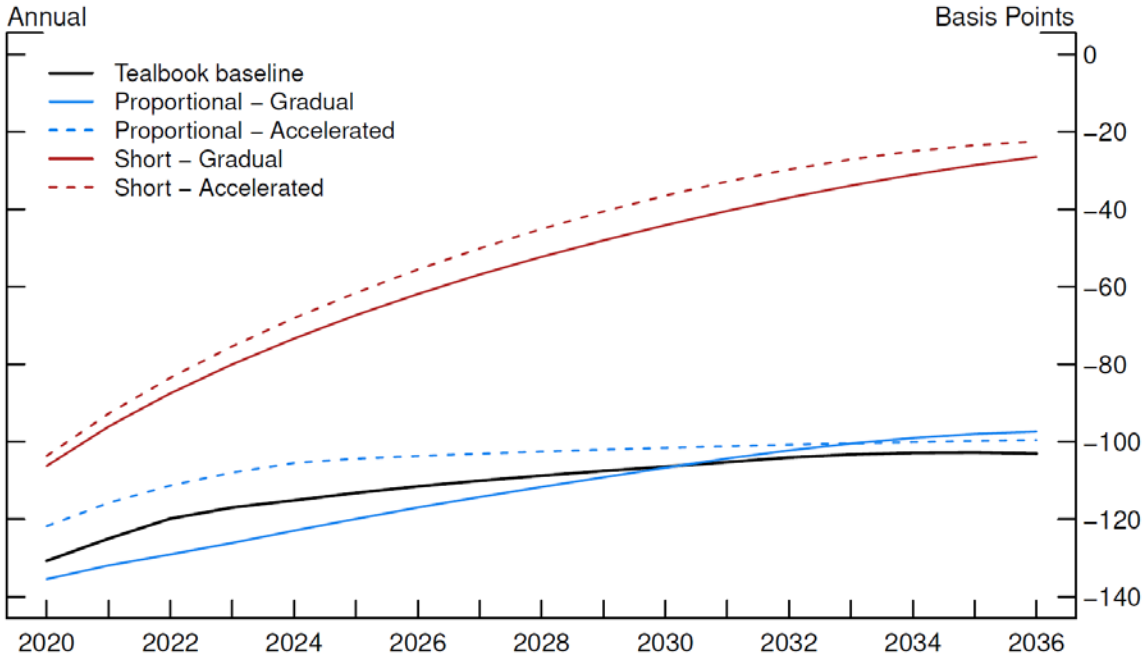
C. Term premium effects

All else equal, a shorter-duration SOMA Treasury portfolio would leave more duration risk in private investors' portfolios, putting upward pressure on the term premiums embedded in longer-term interest rates. Figure 2 illustrates the paths for the model-implied total term premium effects (TTPE) induced by the four scenarios. For reference, the figure also shows the TTPE path consistent with the Tealbook baseline projection, which assumes that, in the long run, bills are one third of the portfolio and the remaining securities are spread across the maturity spectrum.[6]

Targeting a shorter portfolio would, in the Board staff's model, prompt an immediate jump in the 10-year term premium of about 25 basis points relative to the Tealbook baseline, even though the actual portfolio would evolve gradually over time. This jump occurs because asset prices would change immediately in response to investors' expectation that they would have to hold more duration risk in the future. The 10-year term premium with a short target then continues to rise rapidly as the duration risk held in the SOMA portfolio falls, ending up by 2035 at a level about 80 basis points higher than in the Tealbook baseline. With a proportional target, the model-implied path of term premiums is relatively similar to the Tealbook baseline path—term premiums are initially a bit higher for an accelerated transition, and a bit lower for a gradual transition.

[6] The TTPE is defined as the effect on the 10-year term premium of the SOMA portfolio relative to a counterfactual in which the SOMA portfolio has the same size but zero duration. See the Balance Sheet and Income Projections in the March 2019 Tealbook B.

Figure 2: Total Term Premium Effect (TTPE)



Source: Board staff estimates.

The projected effects on term premiums are subject to many sources of uncertainty. First, the estimated parameters in the term-structure model on which the TTPE estimates are based have large variances. Second, alternative term-structure models could imply different TTPE estimates.[7] Third, the size of the TTPE could depend on whether the composition of the portfolio affects investors' expectations about the likelihood of a future MEP.[8] These expectations are difficult to assess, and the estimates reported here assume no such effects. Finally, and perhaps most importantly, the projected effects depend on whether and how the Treasury and private market participants change their debt issuance patterns in reaction to the Federal Reserve's decisions about the long-run portfolio composition and the transition approach. The projections shown in Figure 2 assume no such changes, but as we discuss in the next

[7] Related, the term premium effect of SOMA portfolio holdings could depend on interest rate volatility and could be lower if a given portfolio configuration reduces interest rate volatility, for example by bringing rates closer to the effective lower bound. See Thomas B. King, 2018, "Expectation and Duration at the Effective Lower Bound," Federal Reserve Bank of Chicago Working Paper 2016-21.
[8] For example, if a transition to a shorter-duration portfolio leads investors to think a future MEP is more likely, then the effect of the shorter-duration portfolio on term premiums would be mitigated because investors would put a greater probability on the Federal Reserve removing duration from the market in the future.

section, term premium differences between the scenarios may be considerably smaller—especially in the long run—depending on the Treasury's debt management choices.[9]

II. Policy space

By "policy space," we mean the ability to provide monetary policy accommodation to stimulate the real economy. If in the future the ELB were to constrain the FOMC's ability to lower short-term rates, other tools, such as large-scale asset purchases (LSAPs) and maturity extension programs (MEPs), could provide the Committee with additional policy space.

Everything else equal, a portfolio with a shorter maturity distribution would be expected to provide more policy space: The ability to increase the size of the Federal Reserve's balance sheet through LSAPs should be essentially the same regardless of the maturity distribution of the portfolio. However, a portfolio with shorter maturity would allow for more accommodation through an MEP, in which shorter-duration assets are exchanged for longer-duration ones in order to put downward pressure on longer-term interest rates.[10]

While a portfolio with a shorter maturity distribution provides more room in relative terms for conducting an MEP, even a proportional portfolio would, in absolute terms, have sizable holdings of Treasury bills and other short-duration securities that could be used for an MEP. Figure 3 shows how MEP capacity—measured as SOMA Treasury holdings with less than three years remaining to maturity as a share of nominal GDP—would evolve for each of the two target portfolio compositions and two transition approaches and for the Tealbook baseline. By comparison, the amount of securities exchanged under the MEP conducted in 2011-12 was approximately 4 percent of GDP.

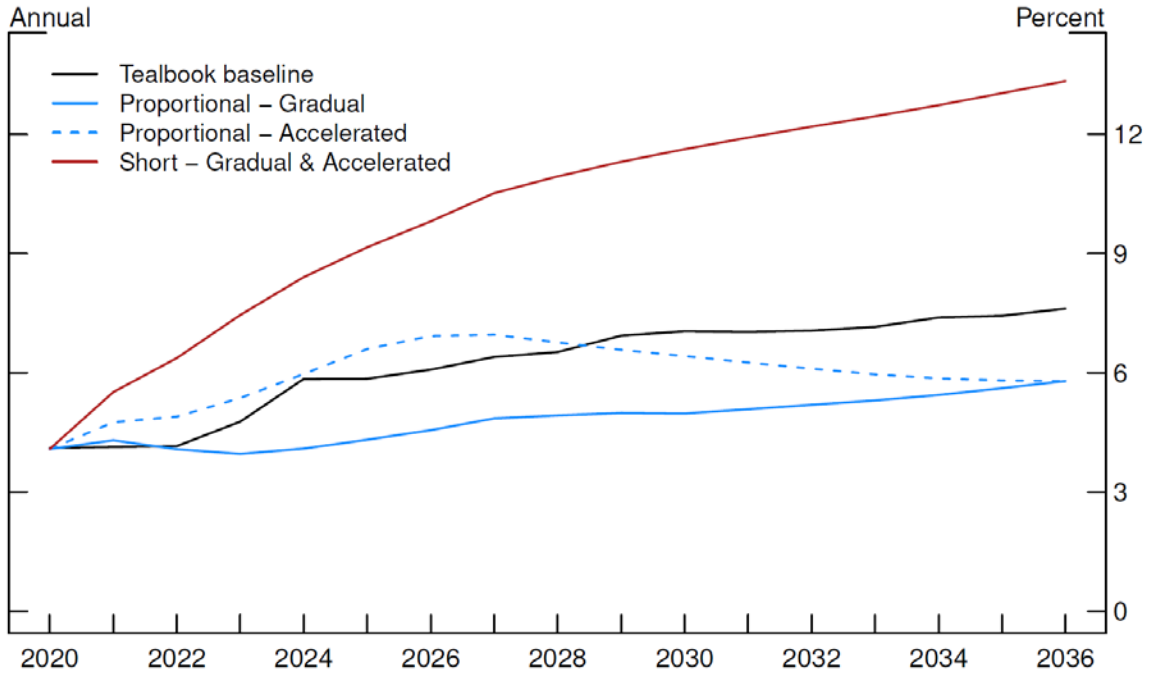
For a short target composition, MEP capacity does not depend on the transition approach, as both transition approaches would purchase only securities with less than three years to maturity. For a proportional target composition, the transition approach

[9] The composition of the SOMA Treasury portfolio will also affect the Federal Reserve's earnings and remittances to the Treasury. In the long run, a shorter-maturity portfolio would typically entail lower remittances because shorter-term securities generate lower interest income as long as the yield curve is upward sloping; this effect might be partially, but not entirely, offset by lower interest expense on reserves and some other liabilities. Previous analysis has also found that shorter-duration SOMA portfolios may lead to less variable remittances due to the closer match between interest income earned on short-term securities and interest expense paid on short-term liabilities such as reserves. However, these patterns may differ along the transition due to the timing of effects on portfolio composition and the policy rate path, and estimated effects on remittances are subject to even more uncertainty than effects on term premiums. For quantitative analyses of the uncertainty around remittances for a given composition of the portfolio, see Michele Cavallo and Benjamin A. Malin, "Implications of the Size and Composition of the Balance Sheet for Remittances: Results from Model Simulations," Long-Run Framework Memo, October 2016, and Erin E. Syron Ferris, Soo Jeong Kim, and Bernd Schlusche, "Confidence Interval Projections of the Federal Reserve Balance Sheet and Income," *FEDS Notes*, January 13, 2017.

[10] For example, in 2011 and 2012, the Federal Reserve sold or redeemed $667 billion of Treasury securities with less than three remaining years to maturity and used the proceeds to purchase longer-term securities.

would significantly affect MEP capacity at first, as many more Treasury bills would be acquired during the early years of an accelerated transition. The gap in MEP capacity between the transition approaches eventually closes as the portfolio's composition approaches that of the long-run target regardless of the transition approach. In the long run, the proportional target portfolio would provide less MEP capacity than the Tealbook baseline because the Tealbook baseline overweights Treasury bills relative to the current universe of outstanding securities.[11]

Figure 3: MEP Space in SOMA Treasury Portfolio as a Share of GDP



Source: Board staff estimates.

However, MEP capacity is not the only dimension on which changes in portfolio composition affect the space available to the FOMC for providing monetary accommodation. Because SOMA portfolio composition can affect term premiums, it can change the longer-term interest rates that are associated with a given setting of the federal funds rate, and thus change the federal funds rate setting that is consistent with a given level of economic activity. In particular, because a shorter-maturity portfolio composition will tend to increase term premiums and thereby tighten financial conditions, it may also require a lower setting of short-term interest rates to achieve any given configuration of macroeconomic outcomes.[12] We examine how the composition of the SOMA portfolio

[11] The Tealbook baseline also somewhat overweights very long-term securities, so that the WAM in the Tealbook baseline is similar to that of the proportional target.
[12] Many key economic variables such as productivity and demographics that affect the long-run level of the equilibrium federal funds rate are held constant in this analysis. The evolution of these variables would also affect the appropriate setting of the policy rate over the projection horizon.

affects the policy space available to the Committee, first under the assumptions in the Board staff's model in which the portfolio composition strongly influences term premiums in the long run, and then under alternative assumptions where term premium effects are less persistent or less pronounced.

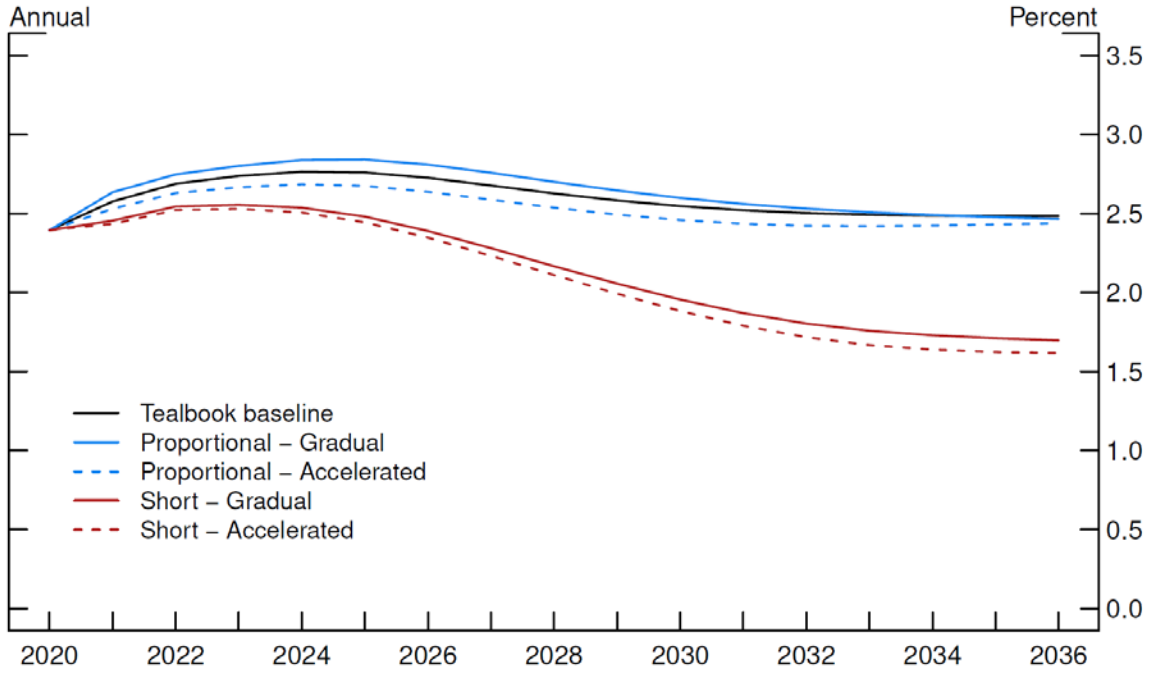
A. Policy space in the Board staff's model

The effects of SOMA composition depend on how the Treasury and private debt issuers respond to a long-run change in the SOMA portfolio. We begin by assuming, as in the Board staff's model, that the composition of the total debt issuance of private market participants and the Treasury is held constant when the SOMA portfolio changes. Under this assumption, portfolio changes can strongly affect term premiums—and, thus, the federal funds rate path required to achieve given macroeconomic outcomes—because reductions in the amount of duration in the SOMA portfolio correspond one-for-one with increases in the amount of duration held by private investors.[13] This modeling approach is consistent with the staff's usual assumption that Treasury does not react to either accentuate or attenuate effects of the FOMC's portfolio composition choices. During the LSAP programs of the last decade, the Treasury stated an intention not to change its issuance plans in response to the Federal Reserve's purchases, and the same might be true for decisions now about the long-run SOMA portfolio composition.[14]

For each of the illustrative target portfolios and transition paths, Figure 4 illustrates the path of the federal funds rate target that would be required to achieve approximately the same macroeconomic outcomes as in the Tealbook baseline, according to the FRB/US model.[15] Over the first few years of the transition, a short target portfolio composition would require setting the federal funds rate about 25 basis points lower than in the Tealbook baseline to achieve the same inflation and unemployment rates. This difference rises over time. In the long run, the policy rate is about 85 basis points lower with a short portfolio composition than in the Tealbook baseline. The funds rate path with a proportional target portfolio is relatively similar to the Tealbook baseline path.

[13] To hold the composition of total debt issuance constant when the Federal Reserve changes its holdings, the Treasury would need to significantly change the composition of the debt it issues to private investors.
[14] The Treasury's plans during the LSAP programs involved a gradual increase in the maturity of debt issuance. That increase nominally put more duration risk in private investors' hands at the same time as the Federal Reserve was removing duration from the market. However, the Treasury's plans were fixed in advance, rather than a response to the LSAPs, and the staff gauged the likely effects of LSAPs relative to those unchanged plans.
[15] The funds rate paths are constructed by adjusting the intercept of the inertial Taylor rule date by date in each scenario so that the inflation and unemployment rates match those in the Tealbook baseline, assuming perfect foresight on the part of agents in the model. In effect, in this approach the Committee reduces the average level of the federal funds rate to offset increases in term premiums. As an alternative, the intercept could be left unchanged and the coefficients on the inflation and output gaps could be changed, so that the Committee would have a stronger endogenous reaction to the effect of higher term premiums on inflation and unemployment, but such an approach would less clearly indicate how a change in portfolio composition affects the policy space available for the interest rate tool.

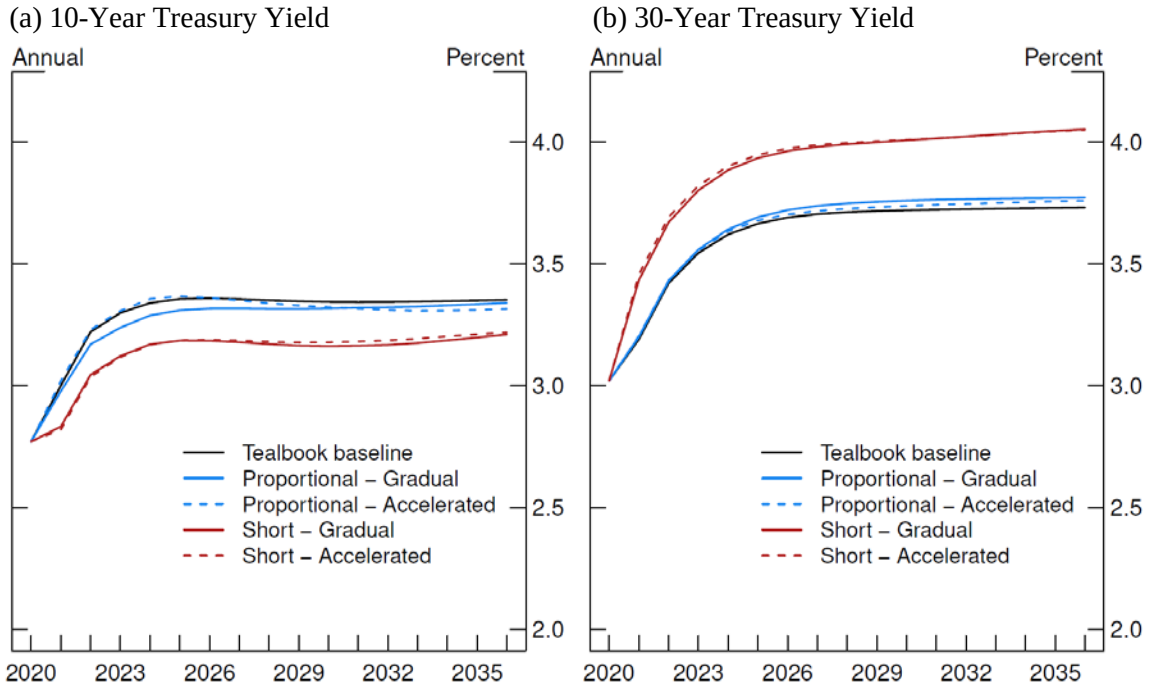
Figure 4: Federal Funds Rate Paths Consistent With Tealbook Baseline Macroeconomic Outcomes



Source: Board staff estimates.

With a short portfolio target, the model suggests that the federal funds rate would need to fall nearly half a percentage point below the inflation rate in the long run. This negative neutral real short-term rate arises because of the high term premium with a short portfolio target. As shown in Figure 5, assuming that the FOMC adjusts the federal funds rate to hold macroeconomic outcomes constant, 10-year and 30-year Treasury yields—which depend both on the path of short-term rates and on the term premium—are projected to remain well above the long-run 2 percent inflation rate regardless of the target portfolio composition or transition approach. Indeed, the paths of longer-term Treasury yields are relatively similar across the targets and transition approaches, reflecting the identical macroeconomic outcomes in each scenario and the predominant role of longer-term rates in affecting economic activity in the model. Notably, because the staff's model projects that a reduction in the duration of SOMA holdings would increase 30-year term premiums by more than 10-year term premiums, a shift to a short-duration portfolio is projected to permanently change the slope of the long end of the yield curve. As a result, in the short target scenarios, 10-year yields fall somewhat relative to baseline and 30-year yields rise somewhat relative to baseline, even as overall financial conditions and macroeconomic outcomes are roughly unchanged.

Figure 5: Long-Term Treasury Yields Consistent With Tealbook Baseline Macroeconomic Outcomes



Source: Board staff estimates.

The large differences in the paths of the federal funds rate suggest that, as the portfolio evolves, its impact on financial conditions will be an important background factor affecting the appropriate path of monetary policy. In addition, the potential need to lower the federal funds rate path to counteract financial tightening from a shorter-duration portfolio may partly offset the benefits of added MEP capacity. A lower funds rate target would leave the FOMC with less room to provide stimulus by reducing the funds rate before encountering the ELB. Thus, an increase in MEP capacity may also imply that the FOMC has to provide more stimulus with balance sheet tools and less with the interest rate tool in response to a significant economic downturn.

B. Policy space under alternative assumptions

The results presented above are subject to a substantial degree of uncertainty, as they rely on the assumptions in the Board staff's models about how the size and composition of the SOMA portfolio along with the federal funds rate target influence term premiums and the macroeconomy. In practice, the effect of SOMA portfolio composition on term premiums, financial conditions, and the federal funds rate path might differ from that assumed in the models. In particular, although it takes time for the Treasury or private debt issuers to adjust their behavior in response to changes in SOMA holdings, such as by issuing more securities with the durations that the Federal Reserve is targeting, these adjustments could offset changes in SOMA holdings in the long run. Thus, the effects of changes in SOMA holdings might differ in the short and long runs. In

the short run, the Federal Reserve may be able to provide macroeconomic stimulus by removing duration risk from private investors' hands. In the long run, however, the amount of duration risk held by the private sector, the resulting term premiums, and the federal funds rate path required to achieve given macroeconomic outcomes might be invariant to the Federal Reserve's asset holdings.[16] If so, a shorter-duration portfolio would eventually provide more MEP capacity without reducing the amount of policy space available for the interest rate tool in the long run.

The response of Treasury (and private-sector) debt issuance to Federal Reserve decisions thus has a crucial influence on how changes in portfolio composition affect term premiums and the appropriate path for the fed funds rate. Although it is difficult to anticipate how the Treasury might react to policy actions by the Federal Reserve, Treasury's typical behavior in past episodes may be a useful guide.

At any given time, unless it buys back outstanding debt, Treasury can readily control only the maturity distribution of new issuance.[17] Treasury historically has communicated its plans for issuance in terms of the maturity structure of total issuance, including both securities held by the Federal Reserve and securities held by the public. Thus, Treasury has not explicitly sought to hold issuance to the public constant as Federal Reserve holdings change. However, Treasury historically has responded to changes in SOMA holdings in at least two ways. First, when the Federal Reserve rolls over maturing Treasury securities at auction, Treasury treats these rollovers as add-ons to previously announced auction sizes and does not directly reduce issuance to the public of those securities or directly increase issuance to the public of other securities that the Federal Reserve is not acquiring. Second, Treasury has gradually adjusted the composition of issuance over time in response to changes in demand for different securities. An adjustment in Treasury issuance to accommodate changes in the Federal Reserve's desired holdings might be particularly reasonable to expect if the choice of a target SOMA portfolio composition were viewed as a one-time decision with long-lasting implications.

These considerations suggest that, in the long run, changes in Treasury issuance might offset the effect of changes in SOMA composition on assets held by the private sector and on term premiums. If so, in the long run, a shorter-maturity SOMA portfolio could provide more MEP space without reducing the amount of policy space available for

[16] However, if the SOMA composition influences investors' expectations about whether and how the Federal Reserve will use balance sheet tools, those expectations could themselves change risk premiums, asset prices, and macroeconomic outcomes – an effect whose magnitude is difficult to assess.
[17] Since the 1970s, Treasury's typical practice has been to let Treasury bill issuance fluctuate in response to changes in funding needs, while making regular and predictable adjustments to issuance sizes of coupon securities (those with initial maturities of two or more years). This practice means that when spending suddenly increases, Treasury issues more short-term debt that shortens the WAM of new issuance. After it determines that a financing shock will persist, Treasury typically increases its issuance of longer-term securities gradually.

the interest rate tool.[18] The timing of these effects, however, is highly uncertain. Also, if the Federal Reserve acquired more short-term Treasury debt and the Treasury did not respond by increasing issuance of such debt, there could be incentives for private-sector issuers to create more short-term safe assets, which might pose risks to financial stability.[19]

The manner in which the Federal Reserve would obtain Treasury securities could also influence the term premium. As noted above, in the staff's model, the term premium depends on the current and anticipated supply of longer-term Treasury securities held by the private sector. To gain some intuition, consider a hypothetical arrangement in which the Federal Reserve swaps the entire SOMA portfolio for Treasury bills in a bilateral exchange with the Treasury Department. Because such a swap would not change private-sector holdings, it should have no effect on term premiums, at least to the extent that it does not change expectations about the FOMC's policy reaction function. This reasoning suggests that changing the composition of the Federal Reserve's portfolio through rollovers that add on to existing auction sizes should have no effect on term premiums, because the distribution of Treasury securities in the hands of the private sector would be unaffected. In contrast, purchases in the open market would affect the distribution of Treasury securities in the hands of the private sector and, thus, would affect term premiums. However, going beyond the model, the results depend on how Treasury reacts to changes in rollovers and open-market purchases, as well as on how the operations affect public expectations about future use of the SOMA portfolio as a monetary policy tool. Perhaps the main takeaway from this example is that the uncertainty associated with the long-run effects of Federal Reserve balance sheet policies on term premiums is particularly high.

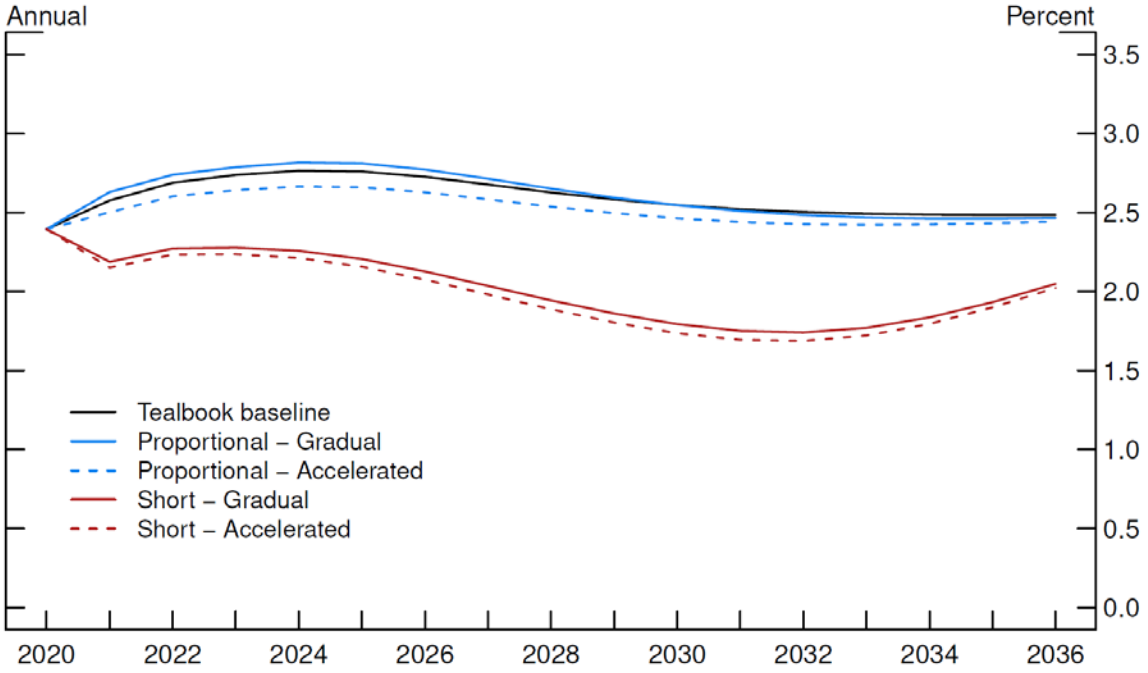
To illustrate how assumptions about the influence of SOMA composition on the term premium affect the appropriate path of policy, Figure 6 shows the federal funds rate paths that would be required to achieve Tealbook baseline macro outcomes, under the alternative assumption that the difference in term premiums between the illustrative scenarios and the Tealbook baseline fades to zero by 2036. In the near and medium terms, a plan to move to a short-duration portfolio still requires providing more accommodation through the federal funds rate to offset the tightening in financial

[18] Treasury's potential reaction to changes in the SOMA portfolio also affects the potential consequences of deploying MEPs as a policy tool. Conducting an MEP during a recession would entail selling short-dated Treasuries or allowing them to mature at the same time as the Treasury might be expected to increase its supply of bills, since the deficit typically rises in a recession. Recessions are often accompanied by an increase in private-sector demand for short-term U.S. government debt, but if such an increase did not occur, conducting an MEP at the same time as Treasury was issuing more bills could create pressures in short-term markets. On the other hand, if Treasury were to issue more longer-term securities in a recession, that issuance would partly undo the term premium effects of the MEP.

[19] See Mark Carlson, Burcu Duygan-Bump, Fabio Natalucci, Bill Nelson, Marcelo Ochoa, Jeremy Stein, and Skander Van den Heuvel, 2016, "The Demand for Short-Term, Safe Assets and Financial Stability: Some Evidence and Implications for Central Bank Policies," *International Journal of Central Banking* 12 (4), 307-333.

conditions from the change in SOMA holdings, regardless of the transition approach. However, over time, as the term premium effects of SOMA holdings fade, the differences in policy rate paths across scenarios become smaller. There is still some difference in policy rates between the short and proportional portfolio targets at the end of the projection period because the dynamics of the model are such that the appropriate policy rate takes time to converge after term premium effects have dissipated.

Figure 6: Federal Funds Rate Paths Consistent With Tealbook Baseline Macroeconomic Outcomes, if SOMA Holdings Do Not Affect Term Premiums in the Long Run



Source: Board staff estimates.

III. Announcement issues and market effects

In the absence of sales, the composition of the SOMA changes only gradually as existing holdings mature or are prepaid and are replaced with new securities. Nonetheless, as in the staff's model, the announcement of a plan to transition to a shorter-maturity portfolio is likely to have immediate effects on term premiums, bond yields, and more broadly on asset prices as investors anticipate the future changes in the SOMA portfolio.

Table 1 shows the predicted effects on the 10-year term premium of shifting to a different SOMA portfolio composition in the Board staff's model. The first row shows how the TTPE is predicted to change upon announcement of a transition to a different portfolio composition, and the second row shows how the TTPE is predicted to change in the long run. Moving toward a shorter-duration portfolio target would increase the 10-year term premium by about 25 basis points upon announcement, and by about 85 basis points in the long run. If the path of the federal funds rate were left unchanged, these term

premium increases would imply a sharp rise in long-term yields both upon announcement of the portfolio change and in the long run. However, if the FOMC were to simultaneously lower the path of the federal funds rate so as to keep macroeconomic outcomes unchanged, the net effect on long-term yields would likely be much smaller. Nonetheless, as illustrated in Figure 5, a change in the SOMA portfolio composition could have complex effects on the configuration of the yield curve.

Table 1: Projected change in 10-year TTPE from alternative portfolio plans

Target Transition	*Short Gradual*	*Short Accelerated*	*Proportional Gradual*	*Proportional Accelerated*
Initial effect	24.4	27.1	-4.7	8.9
Long-run effect	85.7	87.0	8.7	7.9

Difference in TTPE in basis points relative to Tealbook baseline. Initial effects are as of 2020, and long-run effects are as of 2040. Source: Board staff estimates.

The uncertainty surrounding estimated effects on financial variables is large, however. They depend on all of the assumed relationships in the model. In addition, investors sometimes react more strongly than expected to announcements about the SOMA portfolio. For example, the long-run effects could show through to markets more or less immediately, instead of gradually over time. If so, the immediate effects on term premiums might be similar to the long-run effects in the bottom row of the table, regardless of the transition approach. In addition, in the staff's model, the SOMA portfolio composition affects asset prices only through the stock of assets held by the private sector. However, there can also be temporary "flow" effects in which the Federal Reserve's actual purchase operations move market prices more than would be expected on the basis of stock effects alone.[20] If such effects occur in connection with the transition to a different portfolio composition, the initial changes in yields could be sharper.

The risk of an outsized market reaction to changes in portfolio composition might be mitigated by communicating the changes well in advance and by emphasizing that the FOMC intends, as in the past, to take a measured and predictable approach to adjusting SOMA asset holdings. Although such a communications strategy cannot guarantee a smooth market reaction, it would be less likely to generate sharp market movements than an abrupt announcement of a new plan or rapid changes in the actual composition of the portfolio. In addition, it may be helpful for the FOMC to communicate how its choices for the portfolio composition interact with its approach to setting the federal funds rate target, and in particular to emphasize that the policy rate target will take into account any tightening in financial conditions that results from changes in portfolio composition.

[20] See, for example, Stefania D'Amico and Thomas B. King, 2013, "Flow and stock effects of large-scale Treasury purchases: Evidence on the importance of local supply," *Journal of Financial Economics* 108(2), 425-448.

Finally, market reactions may depend on whether investors draw inferences from the choice of portfolio composition about which policy tools the FOMC is more likely to employ in future economic downturns. For example, if an announcement of a shift to a short-duration portfolio leads investors to believe that a future MEP is more likely, this belief could dampen the increase in term premiums—or could increase term premiums if investors also come to believe that a future LSAP is less likely. The risk of an unintended or unexpected market reaction could therefore be mitigated by communicating choices about portfolio composition in the context of the FOMC's overall policy strategy.