

July 13, 2020

Financial and Macroeconomic Impacts and Effectiveness of Yield Caps or Targets¹

Introduction and summary

With the target range for the federal funds rate at its effective lower bound, forward guidance (FG) about the future federal funds rate can help align private-sector expectations with the Committee’s intentions, enhancing policy effectiveness. However, circumstances could arise in which the FOMC’s guidance about the policy rate does not affect private expectations as anticipated. Possible scenarios in which this could take place include if private agents did not fully understand the implications of the guidance, doubted the Committee’s commitment to that guidance, or had different expectations regarding the timing of some outcome upon which forward guidance were based.

One way the Committee could ensure that FG achieves its intended effects even in scenarios like the ones described above would be by committing to purchase Treasury securities to control interest rates over the FG horizon through a program of front-end yield caps or targets (YCT).² We see little evidence that such a YCT program would, in the current circumstance, have a material impact on the level of the yield curve. However, a YCT program may still bring insurance benefits relative to FG by preventing short- to medium-term yields from rising as much in certain scenarios. The onward transmission to broader financial conditions and the macroeconomy would likely be similar in these scenarios to the intended effects of FG.

We are viewing YCT as a tool to maintain a highly accommodative stance, and therefore it carries the risks that may accompany such a stance. But YCT could also bring some unique challenges beyond those associated with keeping rates low for a long period of time. For example, because YCT involves a commitment to reinforce FG with asset purchases over targeted maturities that are related to the Committee’s expected departure date from the effective lower bound (ELB), there are situations in which the market pressure on capped rates could become significant if the public expects an earlier

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² The companion memo on “Design and Implementation of Yield Caps or Targets to Reinforce Forward Guidance” discusses considerations for the design of a YCT program. Of note, neither memo addresses the possibility of a YCT program at longer maturities, as Committee members have expressed limited support for the consideration of such a program.

date for the policy rate's departure from the ELB. If the economy does, in fact, improve faster than the Committee expects and the caps are not adjusted or removed quickly enough, YCT could result in a need for large purchases in order to maintain the targeted caps and could lead to undesirably high inflation or other imbalances relative to outcome-based FG alone. Prompt adjustment of the targeted maturities, or an increase in the yield caps at those maturities, would likely alleviate these risks.

The remainder of this memo consists of three sections. In section A, we discuss the effects of providing additional FG and implementing a YCT program on the Treasury yield curve and the potential insurance benefits of YCT for preventing an undesirable increase in policy rate expectations. In section B, we discuss the potential transmission of YCT to financial conditions, and highlight a few potential financial stability risks associated with a YCT program. Finally, in section C, we discuss the potential benefits and challenges of YCT for the macroeconomy. Of note, throughout the memo, we do not detail the differential impacts of the specific features of FG or YCT discussed in the companion memo on design and implementation. Instead, our focus is on discussing more broadly the effects of FG and YCT.

A. Effect of YCT on the Yield Curve

Forward interest rates based on OIS quotes (the blue squares in figure 1) and nominal Treasury yields (not shown) are currently below 0.25 percent at short- to medium-term maturities. However, recent survey evidence suggests that expectations for the federal funds rate lie modestly above these market rates. While the median response to the June Desk surveys placed the highest odds on the federal funds rate remaining in the current target range through at least the end of 2022, the probabilities associated with higher policy rates, as assigned by the average respondent, increase noticeably over that horizon (as shown by the yellow circles in figure 1).³ The probability-weighted expected path (the yellow crosses) therefore lies a little above the current target range.⁴ Moreover, at longer horizons, the modal path also starts to rise above the current target range; for example, the June long-run Blue Chip survey (not shown) points to the federal funds rate reaching 1 percent in 2023.

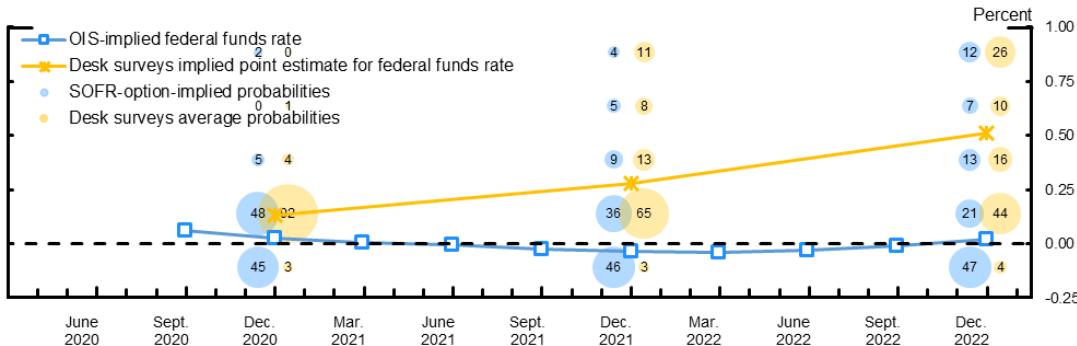
If the Committee judges that the probability assigned to increases to the federal funds rate target range is inappropriately high, more explicit FG may be a natural response, possibly in the form of calendar- or outcome-based thresholds. More explicit FG may also be warranted if the Committee judges that the perceived probability of increases to the federal funds rate is currently appropriate but has a concern that this could change in undesirable ways. In either case, adding a YCT program would be an

³ An update on monetary policy expectations including results from the July Desk surveys will be provided in Tealbook Book B.

⁴ The average (mean) expected path lying above the modal path is an expected consequence of proximity of the modal path to the lower bound.

additional option to help align private-sector expectations with the Committee's intentions. In this section, we first discuss the potential immediate impact of more explicit FG on the yield curve in the current circumstances, before turning to the potential marginal effects of a YCT program. We then discuss ways in which a YCT program could reinforce the insurance benefits of more explicit FG.

Figure 1: Market- and Survey-Implied U.S. Policy Rate Expectations



Note: Desk surveys refer to the June 2020 surveys. Market measures are based on closing data from July 10, 2020.

Source: Bloomberg L.P.; CME Group, Inc., FRBNY

The Immediate Impact of More Explicit FG on the Yield Curve

If the perceived probability of higher federal funds rate outcomes fell as a result of more explicit FG, the expected path for the federal funds rate would fall, all else equal. However, it is unclear whether that would result in a lower overall yield curve, because the impact on the term premium component of yields is ambiguous. The term premium compensates investors for interest rate and liquidity risk. While the liquidity risk component is likely small at present, the fact that survey expectations are above forward rates suggests that the interest rate risk premium over the next few years is substantially negative. A negative interest rate risk premium is consistent with bonds providing investors with a hedge against bad outcomes (that is, if yields tend to fall and bond prices rise, in relatively bad times). So the impact of more explicit FG will likely depend on how it affects the hedging properties of bonds—which is ambiguous.

On the one hand, if the probability of increases in interest rates in response to stronger-than-expected economic developments fell as a result of more explicit FG, all else being equal that would increase the hedging value of bonds by eliminating at least some of the scenarios in which the bond price would fall. Thus, interest rate risk premiums could fall further into negative territory. On the other hand, because the expectations component of yields would also fall closer to the lower bound, there would be less scope for yields to fall further (and bond prices to rise) in response to weaker-than-expected economic developments. All else equal, that would reduce the hedging value of bonds and could push interest rate risk premiums higher. It is not clear which of these effects would dominate.

That said, it seems unlikely that the interest rate risk premium would switch signs into positive territory, so market rates would likely remain below the expected policy rate path. There would likely remain some room for bond yields to fall further if economic developments turn out weaker than expected, particularly if investors continue to place some odds on rates somewhat below zero. Nominal bond yields are likely subject to the same (or almost the same) lower bound as the federal funds rate.⁵ And recent surveys and options prices imply a non-zero probability on negative outcomes for money market rates (the lowest yellow and blue circles in figure 1, respectively).⁶ Although the option-implied probabilities of negative outcomes are likely substantially higher than the true probabilities because of risk premiums, the fact that the option-implied probabilities are non-zero implies that there must be some perceived possibility of negative outcomes. Moreover, several respondents to the June Desk surveys continued to report a belief that the effective lower bound is below zero.

Looking further along the yield curve, even if short- to medium-term yields did fall somewhat as a result of more explicit FG, longer-term yields (such as the 10-year yield) are unlikely to fall materially in the current circumstances. Because long-term yields are equal to the weighted average of short-term yields and forward rates covering the remaining maturity, lower short-term yields would pass through mechanically to yields on longer-term bonds, but that effect would diminish mechanically with the maturity of the bond.

The Marginal Impact of YCT on the Yield Curve in Current Circumstances

To the extent that a YCT program were to further lower the perceived probability of higher federal funds rate outcomes relative to more explicit FG alone, the effects on the current yield curve would likely be qualitatively similar to those discussed above. The differences relative to FG alone in the current circumstances are likely to be minor: A cap on yields at the level of the current policy rate would additionally rule out the small possibility of a materially positive term premium. And a yield target (as opposed to just a cap) would also eliminate the possibility of further falls in rates, ruling out the possibility of a negative term premium (because the hedging value of bonds at the targeted maturities would be eliminated).

We next consider whether previous calendar- and outcome-based FG episodes suggest that YCT might have had a material marginal impact on expected federal funds rate outcomes at the point the FG was introduced. When the Committee introduced

⁵ For further discussion of this point, see Gagnon and Jeanne (2020).

⁶ Note that here we use probabilities derived from SOFR future options, rather than derived from federal funds futures options, which we normally show in Tealbook. Using SOFR futures options allows us to consider implied probability distributions at longer horizons. For comparison, the distribution based on federal funds futures options for end-2020 also implies a positive probability of negative outcomes, although the probability is considerably smaller than that implied by SOFR options.

calendar-based FG in August 2011, stating that it would likely keep the federal funds rate at exceptionally low levels “at least through mid-2013,” the expected federal funds rate based on financial market quotes (without adjusting for term premiums) for mid-2013 fell about 15 basis points to 0.3 percent. Similarly, in the Desk’s September 2011 Survey of Primary Dealers, the median respondent’s modal expectation for the federal funds rate for mid-2013 fell from 1 percent in the August survey to about 0.1 percent. Private expectations appeared to remain broadly consistent with the Committee’s calendar-based FG while that was in force until December 2012.

In December 2012, the Committee introduced the outcome-based guidance that the effective funds rate would remain at the lower bound “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.” While it is not straightforward to assess whether private expectations were consistent with that outcome-based guidance, Engen, Laubach, and Reifschneider (2015) find some evidence that expectations for the level of unemployment at the time of lift-off did subsequently move closer to 6½ percent and the level of inflation closer to 2 percent. These moves happened fairly gradually—and were perhaps not complete until late 2013. That gradual response of private expectations suggests there may have been some scope to reinforce the Committee’s FG with a YCT program. However, private expectations did not ever appear to be substantially inconsistent with the Committee’s FG; had the Committee judged that private expectations were inappropriate at the time, it seems likely that it would have provided additional guidance to address that.

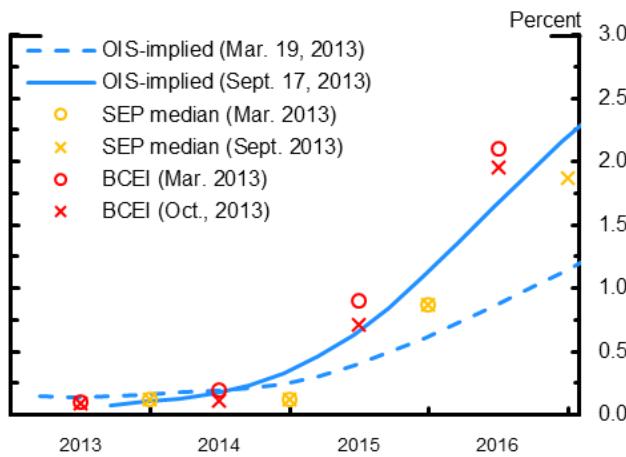
The Marginal Insurance Benefits of YCT

Even if a YCT program would only have a minor marginal impact on the yield curve relative to more explicit FG alone in the current environment, there are scenarios in which the marginal effect could turn out to be larger, potentially strengthening the insurance benefits of more explicit FG. One such scenario could arise if the Committee’s intentions and private-sector expectations under outcome-based FG became misaligned—for example, if investors were to misunderstand the Committee’s FG or hold an overly optimistic view of the economic outlook. A YCT program could be one way to avoid such misalignments or to hold down yields at targeted maturities relative to FG alone.

The 2013 taper tantrum provides an example of such a scenario, albeit an imperfect one. Ahead of this episode, market expectations appeared to be well aligned with the Committee’s intentions for the federal funds rate: the average respondent to the Desk’s May 2013 Survey of Primary Dealers expected the federal funds rate to remain at 0 to 0.25 percent until mid-2015, close to the median assessment of appropriate policy in

the March 2013 SEP (the yellow circles in figure 2).⁷ However, between May 2013 and September 2013, the forward curve (the blue lines) rose 50 basis points at the end of 2015 and 100 basis points at the end of 2016, even though the FOMC's FG and the median SEP projection (the yellow crosses) did not change. Moreover, measures of policy expectations increased particularly sharply following the June 2013 FOMC communications, although that move retraced fairly quickly following a series of further communications. An appropriately designed YCT policy may have reinforced FG on the federal funds rate so that Federal Reserve communications would not have been misinterpreted. That said, the taper tantrum is not a perfect example: forward rates increased most significantly at longer horizons that would likely not have been covered by a YCT program, likely as a result of an increase in term premiums. And federal funds rate expectations measured by Blue Chip Economic Indicators surveys (the red markers) were already pointing to increases in 2016, so the example may not be entirely relevant for understanding the insurance benefits of FG at the lower bound.

Figure 2: Short Rate Projections Around Taper Tantrum



Note: OIS-implied federal funds rate path is not adjusted for term premiums. BCEE refers to the consensus forecast from Blue Chip Economic Indicators for the 3-month Treasury bill rate.

Source: Blue Chip, Federal Reserve Board.

In principle, a further consequence of YCT relative to FG alone is that any purchases made would act like a form of quantitative easing (QE), in that they would remove duration risk from the market and should therefore lower interest rate risk premiums across the curve, similar to quantity-based LSAPs. However, any purchases conducted to support YCT would be at significantly shorter maturities than for quantity-based LSAPs, so a given amount of purchases would remove relatively little duration

⁷ In May 2013, the Committee's then-outcome-based FG continued to indicate that a federal funds target range of 0 to 0.25 percent would remain appropriate at least as long as the unemployment rate remained above 6.5 percent, subject to inflation remaining at or below 2.5 percent.

risk. Moreover, the overall size of the purchases could be small if there is little need to enforce the Committee’s stated caps or targets for yields. Hence, the impact of a YCT program through this duration channel seems unlikely to be material.

A YCT program would also act like a form of QE if there were upward pressure on term premiums at the targeted maturities. As discussed above, it seems unlikely that interest rate risk premiums at targeted horizons would become materially positive in the current circumstances, although it is a possibility. Moreover, changes in the liquidity premium component of term premiums—perhaps related to high Treasury issuance and / or renewed illiquidity in the Treasury market—could plausibly push up on yields. A YCT program would cap any resulting upward movement in targeted yields. However, it would not address any upward pressure on term premiums in longer-term yields, which may require other policies, such as quantity-based LSAPs, to address.

A YCT program may also bring some additional challenges compared with FG alone. First, sizeable purchases could cause market functioning problems, particularly if the Federal Reserve ended up owning a very high proportion of segments of the market. Second, if the Committee needed to change its policy stance unexpectedly in response to economic developments, perhaps by abandoning the YCT program entirely, the resulting impact on the yield curve could be substantial.⁸ Third, as discussed further in section C, if large purchases were perceived as simply offsetting increased issuance of Treasuries, this could raise concerns about the Federal Reserve’s independence.

B. Transmission of YCT to the Financial Sector

There is limited historical precedent on YCT as a monetary policy tool and so scant evidence is available regarding the effectiveness of such policy in lowering the level of yields and in transmitting to financial conditions. While YCT has been implemented by two foreign central banks in recent years—the Bank of Japan (BOJ) and the Reserve Bank of Australia (RBA)—discerning the marginal effects of these programs on financial conditions is somewhat difficult because they were accompanied by other nonstandard policy measures, such as FG and balance sheet policies. In addition, the effects of YCT on financial conditions in the United States could differ from that in other countries, given institutional differences across credit markets, financial systems, and policymakers’ objectives. For example, in the case of the BOJ, a key goal of the YCT

⁸ This would be consistent with previous evidence that market participants tend to adjust their portfolio allocations more in response to policy surprises when uncertainty about monetary policy is relatively low (De Pooter et al., 2020).

program was not to drive rates lower but to support market functioning in the Japanese Government Bond market.⁹

Nevertheless, it is reasonable to believe that in current circumstances, a YCT program is unlikely to have a significant marginal effect on broader financial conditions, relative to FG alone. However, a program that caps or targets short-term rates may contribute to easing financial conditions by strengthening the Committee's FG under the two scenarios discussed in the previous section: when the Committee's intentions and private-sector expectations became misaligned, and if there were upward pressure on yields due to changes in premiums on Treasuries. As noted earlier, under these two scenarios, a credible YCT on short-term yields that reinforces the transmission and the signaling effect of FG would help keep market expectations of future policy rates low through the horizon of targeted maturities. The lower expected policy path would likely pass through to asset prices and private borrowing costs, easing financial conditions.¹⁰

In this section, we assess the likely effects on financial conditions, given the current composition and maturity structure of private business and household debt, and highlight a few potential financial stability risks associated with implementing a YCT program.

Transmission of shorter-term YCT to financial conditions

The historical evidence broadly indicates that FG at the ELB can ease financial conditions. However, the effectiveness of FG in the United States has depended upon the language of the policy guidance provided.¹¹ In instances where YCT could forestall an increase in rates, a program of caps or targets on short-term yields will contribute to ease financial conditions more than FG alone by boosting asset prices and weakening the value of the dollar. The influence of this program on private funding costs, however, is likely to depend on the nature and the maturity structure of household and business debt.

⁹ For a review of the available international and historical evidence on YCT, see memo “Lessons on Yield Caps or Targets from International and U.S. Experience” that was provided to the Committee for the June 9-10, 2020 FOMC meeting.

¹⁰ Consistent with this interpretation, the recent introduction of the 3-year YCT program by the Reserve Bank of Australia (RBA) to reinforce forward guidance for their policy rate was associated with a decline in investment grade corporate bond yields at maturities beyond the horizon of the RBA's target program. The RBA also purchased government bonds across the yield curve to address market dysfunctions occurring around the time of the announcement.

¹¹ For additional discussion on the language in FG and how it matters at the ELB, see the memo titled “Issues Regarding the Use of the Policy Rate Tool,” provided to the Committee for the October 29-30, 2019 FOMC meeting. This memo discusses variants of FG language described as being either *qualitative* (e.g. planning to keep the federal funds rate low for a “considerable period”), *date-based* (e.g. that conditions would warrant “exceptionally low levels for the federal funds rate at least through mid-2013”), or *outcome-based* (e.g. that low rates would be appropriate “at least as long as the unemployment rate remains above 6-1/2 percent”).

Table 1 suggests that, for the most part, a YCT program would reinforce the influence of FG on borrowing costs of bank loans to businesses, commercial paper, and many types of consumer debt, as these debts typically have a remaining maturity of 1 to 5 years.

In contrast, borrowing costs for most commercial real estate loans, speculative grade corporate bonds and a small share of auto loans, with maturities at origination concentrated in the 5- to 7-year range, are likely to be influenced less from a program that targets short-term yields. Investment grade bonds, residential mortgages, and student loans all display even longer maturities and are thus likely to be the category of debt that would be least affected by a front-end YCT program.

However, longer-term debt is often refinanced, giving the private sector the opportunity to take advantage of lower rates, or to shorten the debt maturity structure if the yield curve steepens. In the residential and non-residential real estate sector refinancing is common, and the vast majority of corporate bonds are callable.

Table 1: Debt Structure of the U.S. Business and Household Sectors

Panel A: Nonfinancial Corporate Sector

Loan Category	Outstanding Amount (\$ bn)	Fixed-rate Share	Remaining Maturity		
			≤ 2 years	2 y. < mat. ≤ 5 y.	> 5 years
Non-Residential Mortgages	4,515	53%	21%	33%	46%
Commercial Paper	244	100%	100%	0%	0%
Corporate Bonds	5,385	100%	13%	25%	62%
Investment Grade	4,073	98%	14%	22%	64%
Speculative-Grade	1,035	100%	9%	34%	57%
Unrated/Private	277	97%	14%	44%	43%
Bank Loans	2,308	13%	40%	41%	19%

Panel B: Household Sector

Loan Category	Outstanding Amount (\$ bn)	Fixed-rate Share	Remaining Maturity		
			≤ 2 years	2 y. < mat. ≤ 5 y.	> 5 years
Residential Mortgages	11,154	92%	0%	1%	99%
Student Loans	1,683	95%	2%	9%	89%
Motor Vehicle Loans	1,195	100%	20%	50%	30%
Credit Card Loans	1,066	2%	Revolving	Revolving	Revolving
Other Consumer Loans	400	Vast majority	40%	60.00%	0.00%

Source: Mergent FISD, Financial Accounts of the United States - Z.1, FR Y-14, Experian/AutoCount, Department of Education, Mintel/Comperemedia, and staff estimations.

The additional support of YCT to a FG is also likely to transmit the most to floating rate instruments, whose rates move in lockstep with a variety of short-term reference rates. This transmission, however, may be somewhat hindered by restrictions

placed on some loans that limit the reference rate to be above a specific floor. The majority of businesses and household debt, however, has a fixed interest rate.

Potential implications for financial stability

While YCT may be a desirable tool to reinforce the credibility of FG and improve financial conditions, it may exacerbate financial stability risks—typically associated with policies such as FG or large-scale asset purchases (LSAPs)—by keeping rates low for an extended period of time and compressing interest rate volatility.

Such risks include rollover risks, stemming from the incentives of households and businesses to shorten the maturity structure of debt, and excessive maturity transformation by banks and other financial institutions that rely on short-term borrowing to lend long-term. In addition, if the insurance provision to hold rates down on the front end of the curve spills over to longer-term rates, YCT could foster additional reach-for-yield behavior by financial intermediaries whose profit margins are negatively affected by a flat yield curve. Since many businesses and households borrow long term, a reduction in rates beyond the intended horizon of YCT may also have the unintended consequences of encouraging excessive nonfinancial leverage. In addition, reduced interest rate uncertainty may contribute to the build-up of excessive leverage and risky positions by investors and financial intermediaries through value-at-risk considerations or complacency. These risk-taking and leverage concerns should be evaluated in light of how much the level and the volatility of yields will be lower under YCT than under FG alone.

A distinct channel through which YCT may create new financial stability risks is through the preferred-habitat motive of investors to hold Treasury securities with short-to medium-term maturities. The implementation of a YCT program may entail large and unpredictable purchases of short-term Treasury securities. Risks may emerge if such unpredictable purchases crowd out the demand of private investors, forcing them to substitute riskier assets of similar maturities to Treasuries, overly compressing credit spreads.

More generally, YCT may have unintended consequences for financial stability if investors are slow to understand how this new monetary policy tool works. For example, investors may position themselves in ways that make them vulnerable to unexpected policy changes if they fail to understand how YCT responds to changing economic conditions, and how new information will shift the expected date of liftoff. If realized, these risks could harm the economy and call into question the overall desirability of targeting or capping yields.

C. YCT and the Macroeconomy

This section discusses the potential benefits and costs of YCT for the macroeconomy. As discussed above, in current circumstances, a YCT program is unlikely to have a significant marginal impact on the yield curve and broader financial conditions, relative to FG alone. Accordingly, the initial macroeconomic effects of YCT, relative to FG alone, are similarly likely to be small. The additional macroeconomic benefits and challenges of using YCT to reinforce FG will depend on how the evolution of economic conditions interacts with the alignment of public and policymaker expectations regarding the future path of monetary policy.¹²

Private sector expectations about the reaction of monetary policy to economic conditions play an important role in the transmission of monetary policy. If there are states of the world in which YCT serves to communicate this “reaction function” more clearly to the public than FG alone, using YCT to augment FG may help ease broader financial conditions and provide more support to the macroeconomy.¹³ Below, we highlight these insurance benefits of YCT relative to outcome-based FG alone by discussing a scenario in which YCT can help avoid a premature withdrawal of support to aggregate demand caused by such a misunderstanding by the public.¹⁴ The additional support beyond outcome-based FG alone stems from the requirement that YCT selects dates for targeted or capped maturities, which conveys guidance about the duration that the Committee expects the policy rate to remain at the ELB, and stands behind that guidance with asset purchases.

These same features that differentiate YCT from outcome-based FG can also present challenges for YCT. By conveying guidance about the liftoff date that the Committee anticipates and capping rates over that horizon, YCT creates the possibility that pressure on capped rates could become significant if the public disagrees and expects an earlier date for the policy rate’s departure from the ELB. The large amount of current uncertainty about the economic outlook raises the probability that policymaker and public expectations could diverge in this way. Such a disagreement could result in a large amount of purchases in order to maintain the targeted caps and obtain the macroeconomic

¹² The companion memo on design and implementation includes a discussion of specific ways date- and outcome-based FG may be aligned with YCT.

¹³ However, if the announcement of a YCT program instead caused the public to revise down their expectations for the economic outlook, this downward revision could potentially lower Treasury yields as well as household and business spending. For a discussion of this information effect in the context of FG, see the discussion in the memo titled “Issues Regarding the Use of the Policy Rate Tool” provided to the Committee for the October 29-30, 2019 FOMC meeting, and the references given therein.

¹⁴ Another possible benefit of a YCT program could be a “confidence” effect of backing up FG with observable actions (asset purchases), contributing to a perception that the Fed is willing to do “whatever it takes” to support an economic recovery. On the other hand, if a YCT program is seen as unwilling to cap maturities “far enough” along the yield curve, there could be disappointment effects.

benefits of the YCT program. Moreover, if the economy does, in fact, improve faster than the Committee expects and the caps on rates are not removed or adjusted to reflect the improved economic conditions, YCT might heighten the risk of an undesirable increase in inflation or exacerbate risks to financial stability relative to outcome-based FG alone.

Aligning Policy Rate Expectations with YCT and FG

In this section we emphasize the potential insurance benefits of YCT. To illustrate this point, we consider an example in which public and FOMC expectations diverge as the recovery gathers strength. In particular, suppose that the policy rate is at the ELB, and that policymakers are using outcome-based FG without conducting YCT to reinforce it. In such a situation, changes in economic conditions could cause the public to misunderstand policymakers' intentions or doubt policymakers' commitment to follow through on their FG, causing the public to revise their view regarding the expected path for the policy rate more than policymakers deem appropriate. Such a divergence over the path of the short-term rate could spill over into the yields of longer-term securities and into the prices of private assets, as discussed above, and put upward pressure on the exchange rate, prematurely tightening financial conditions and thereby slowing the economic recovery.

Further communications alone could be used to augment FG when the Committee judges that public expectations have diverged from their own. Speeches or statement changes indicating policymaker expectations about how much longer the policy rate is likely to remain at the ELB, for example, could be used to attempt to close any gaps in the public's understanding of the Committee's policy intentions. If YCT were in place, it could help convey the Committee's expectation for the likely timing of liftoff, and would reinforce that expectation with asset purchases as needed. Because these potential asset purchases would avoid a tightening of financial conditions, YCT could support aggregate demand. Finally, YCT could help support inflation and longer-term inflation expectations by removing some of the downside risks to inflation if the YCT program is seen as a strong step toward reinforcing policymakers' interest rate intentions, and thus toward protecting against any premature tightening in financial conditions. While additional communications that clarify policymakers' FG may provide some or even all of the benefits described above, YCT stands behind FG communications with explicit actions that help enforce alignment of Treasury yields with the Committee's intentions for the path of the policy rate.

Potential Challenges to Using YCT to Reinforce FG

The above example demonstrates how price-based programs such as YCT may be beneficial in forestalling a premature tightening in financial conditions should the public disagree with, or misinterpret, the implications of policymakers' FG. However, an

unexpected strengthening in aggregate demand poses challenges to augmenting outcome-based FG with YCT. YCT involves selecting dates for targeted or capped maturities that convey guidance about the duration that the Committee expects the policy rate to remain at the ELB. If these caps on rates are not removed or adjusted quickly enough in response to an unexpected strengthening in aggregate demand, then YCT could result in an overheating of the economy which may make it less effective in achieving the Committee's macroeconomic objectives than outcome-based FG alone. This issue of not adjusting policy promptly enough is also applicable to date-based FG.¹⁵ In contrast, it may not be applicable to outcome-based FG. FG language that is outcome based communicates information about the Committee's reaction function but does not necessarily provide information about its outlook. For example, outcome-based FG that uses a threshold does not need to indicate when that threshold will be reached, and the public could form their own expectations about that date using their own forecasts. However, by augmenting outcome-based FG with YCT, policymakers would be conveying information about their view regarding the likely departure date from the ELB and reinforcing that view with asset purchases.

LSAPs, YCT, and Aggregate Demand Shocks

At least since Poole (1970), it has been recognized that fixed-price and fixed-quantity based policy approaches perform differently in response to different shocks. Poole demonstrates that the use of fixed-quantity policies may be preferred to fixed-price policies in response to shocks to aggregate demand, because fixed-price policies amplify fluctuations in economic activity in that case.¹⁶ The challenges associated with adjusting caps on rates under a YCT program are analogous to that result in Poole. In particular, a price-based YCT program could lead to an overheating of the economy relative to a quantity-based LSAP program, if aggregate demand strengthens faster than expected.

We illustrate this point in an example in which the central bank is using YCT to support outcome-based FG. We contrast this YCT-policy regime with a fixed-quantity LSAP program in which that FG is coupled with asset purchases. We assume that, before the unanticipated demand shock occurs, the outcomes under the fixed-quantity LSAP program are the same as under the fixed-price YCT program. However, the unanticipated aggregate demand shock creates a subsequent divergence in outcomes.

¹⁵This issue is particularly applicable to the date-based FG discussed in the design and implementation memo in which the federal funds rate is held at the ELB until a specific date, independent of incoming information. However, it may be less applicable to FG language regarding the likely departure date of the federal funds rate from the ELB in previous FOMC statements. Those communications indicated that this date was conditional on the Committee's economic outlook.

¹⁶Poole (1970) focuses on the case in which the price- or quantity-based instrument is fixed and cannot respond to changes in the economic outlook. As we highlight in our example, allowing the instrument to respond to economic conditions blurs the distinction between a price- and quantity-based instrument.

Under the YCT regime, if the caps are not removed or adjusted quickly enough in response to stronger-than-expected aggregate demand, large open market operations would be needed to maintain the caps. The challenge that we emphasize here is that the additional stimulus from purchasing securities to enforce the caps could in principle lead to an overheating of the economy with a larger than desirable increase in inflation. Such overheating may also be associated with excessive risk-taking in financial markets. Under the alternative fixed-quantity LSAP program, there would be no additional stimulus coming from asset purchases so that yields on these securities can rise, mitigating the risks to inflation and financial stability. Importantly, the divergence in outcomes between quantity- and price-based tools is predicated on the interest rate caps not being removed or adjusted quickly enough. A YCT program in which the targeted maturities are promptly adjusted to reflect economic conditions helps prevent the economy from overheating.

If the source of the aggregate demand shock resulted at least in part from fiscal stimulus supported by greater debt issuance, a YCT program in which the caps were not removed or adjusted quickly enough could not only lead to overheating but also amplify concerns about central bank independence.¹⁷ While LSAPs would also raise similar concerns, in the context of this example, the additional purchases to hold down rates could contribute to overheating, but would also hold government financing costs lower than under a fixed-quantity LSAP program.¹⁸ However, here again, prompt adjustment of caps in response to changes in the economy would likely mitigate this concern as it would demonstrate a strong link between the YCT program and policymakers' macroeconomic objectives.

Outcome-Based FG, YCT, and Economic Uncertainty

As noted in the companion memo covering design and implementation issues, another challenge for a YCT program, raised by the currently high amount of uncertainty regarding the economic outlook, is selecting the tenor of targeted maturities. We emphasize here that this choice also has important implications for how YCT can support the achievement of the Committee's macroeconomic objectives. Given the current high level of uncertainty, both policymakers and the public know that the date of arrival for

¹⁷ Perceptions of weakened central bank independence could be even more likely to arise in a period in which coordinated fiscal-monetary action is already required to facilitate emergency lending programs.

¹⁸ As discussed in the memo titled "Lessons on Yield Caps or Targets from International and U.S. Experience" that was provided to the Committee for the June 9-10, 2020 FOMC meeting, during the 1940s in the United States, a strong defense of interest rates caps by the Federal Reserve facilitated lower debt costs for the government during the second World War, but later led to issues of central bank independence that constrained the FOMC's ability to deal with rising inflation.

any outcome or threshold used is unknown, and they may assign significantly different probabilities to the range of possible outcomes. We illustrate this uncertainty by conducting stochastic simulations around the June Tealbook baseline forecast using the FRB/US model.¹⁹ In these simulations, monetary policy is assumed to hold the federal funds rate at the ELB until the unemployment rate falls below its assumed longer-run natural rate of 4.3 percent.²⁰

Figure 3 shows the distribution of the dates at which liftoff occurs after the unemployment threshold is reached. The mean of the distribution—the expected liftoff date given the shocks to the model—is 2023:Q4, or 13 quarters after the simulation begins. However, as can be seen in the figure, the distribution is both wide and skewed to the right, with significant probability on long-lasting spells at the ELB.²¹ The earliest date at which liftoff occurs under these simulation is 2022:Q1, about half as long as the expected ELB duration.

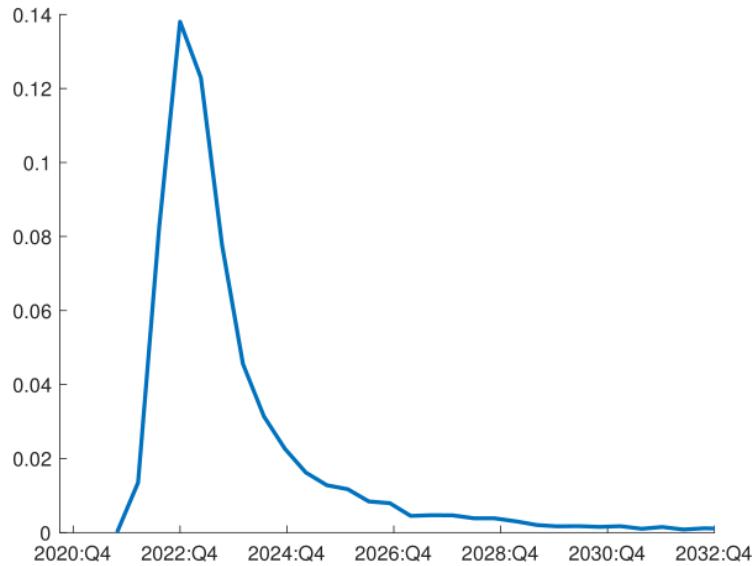
While the range of possible dates at which this unemployment threshold may be reached is significant, the width of the distribution in Figure 3 very likely understates the true uncertainty about this arrival time. Given the unprecedented nature of the current situation, it may not be appropriate to assume future shocks will be similar in size or correlated to the ones from the past used here. Additionally, FRB/US is only one model of the U.S. economy. The range of potential threshold dates in the figure does not account for the possibility that policymakers or the public may have views on the transmission of monetary policy that may differ from each other and from FRB/US.

¹⁹ Although the FRB/US simulations do not explicitly include a YCT program in which the targeted maturities are chosen to be consistent with the expected date at which the threshold is achieved, we assume that expectations within the FRB/US model are model consistent so that the outcome-based FG is perfectly credible. Thus, unless the model's term premiums on Treasury securities rise significantly over the course of a given simulation, a YCT program would not yield any additional benefits and the outcomes would remain unchanged if we had explicitly included a YCT program.

²⁰ When this threshold is reached, policy is assumed to follow the conditional attenuated rule used in the Tealbook. The threshold is not a liftoff trigger, *per se*, insofar as policy is not required to lift off after the unemployment threshold is reached. In practice, however, with the output gap closed at the point the threshold is reached, the inertial rule is unlikely to remain at the ELB.

²¹ The 95th percentile of liftoff dates under these simulations is just under 8 years into the future (2028:Q1).

Figure 3: Distribution of ELB Departure Dates from Simulations of the FRB/US Model



This macroeconomic uncertainty generates challenges for choosing a range of targeted maturities to support outcome-based FG. If the Committee chooses the maturity date based on their expectation for reaching the threshold, but the public expects an earlier date, then a large amount of purchases may have to be conducted to maintain the cap. Additionally, if the economy in fact improves faster than the Committee expected and the caps on rates are not removed or adjusted quickly enough, as discussed above, there is a risk that the economy could overheat. Also, as the design and implementation memo notes, if investors begin to anticipate a reduction in the tenor of the yield cap, they might sell large quantities of securities to the Federal Reserve until the FOMC reduced the tenor.

This issue can be mitigated to the extent the Committee uses a more conservative targeted range of maturities than implied by the date at which they expect liftoff to occur. However, using a shorter range of targeted maturities would reduce the macroeconomic benefits of YCT relative to FG alone. That is, targeting shorter maturities makes it more likely that the YCT program itself is operating on yields that are already significantly influenced by FG alone.

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