

October 14, 2016

Interest Rate Targets and Operating Regimes¹

1. Executive Summary

This memo reviews two key components of most monetary policy implementation frameworks—the interest rate(s) (IR) that the Federal Reserve may wish to use as a **policy rate** and the **operating regime** (OR) it chooses to promote money market rate conditions consistent with the target policy rate.² Policymakers can achieve the long-run framework objectives through many alternative IRs and ORs. However, policymakers’ choices with regard to these two key framework features have important implications. In particular, these choices determine the need for and use of particular tools that constitute a monetary policy implementation framework.³

We start the discussion by reviewing how various frameworks operate in normal times. We examine the necessity and effectiveness of various tools, including ceilings, floors, reserve requirements, and discretionary open market operations (OMOs). We provide three illustrative frameworks, each consisting of a policy interest rate and an operating regime, to explain how different combinations could work together and how these frameworks stack up against the long-run framework objectives. Two of the frameworks focus on the market for reserves, with an unsecured market interest rate or the interest on excess reserves (IOER) rate as a policy rate. The key difference between these two frameworks is whether the Federal Reserve would be operating on a flat or steep portion of the reserves demand curve. The third framework focuses on supply and demand in the repo market and various repo policy rates.

We also consider how a framework could generally incorporate liquidity backstop tools. The decision regarding how best to manage such tools—that is, whether to fully integrate such tools

¹ The authors include FRB Atlanta: Paula Tkac; Board: Jane Ihrig, Kurt Lewis, Laura Lipscomb; FRB Kansas City: Susan Zubradt; FRBNY: Patrick Dwyer, James Egelhof, Antoine Martin; FRB Minneapolis: Ron Feldman. We thank Sophia Allison, Courtney Demartini, Brian Madigan, Julie Remache, Gretchen Weinbach and Heather Wiggins for valuable comments.

² For the purposes of this memo, the term ‘policy rate’ will be defined as the rate through which the Committee sets the stance of monetary policy.

³ These choices could also have implications for the Federal Reserve’s balance sheet. Those are considered in the “Balance Sheet considerations for the Federal Reserve’s Long-Run Framework” memo.

into the normal operating framework, announce instead that they will be made available under certain conditions, or leave such tools inactive—influences the design of the framework and its robustness to changing conditions.

Broad lessons we draw about long-run frameworks and how they stand up to the long-run framework (LRF) objectives, include:

- In normal times, the FOMC can exert **interest rate control** across a wide range of potential policy rates through an appropriate choice of OR tools, and these rates will likely also effectively transmit the stance of policy to the real economy.
- The ability to expand the balance sheet to **mitigate liquidity strains** and operate at the **effective lower bound** with a large volume of excess reserves creates some distinctions between frameworks. One potential issue is how different regimes would deal with the surfeit of reserves, and possible consequences for achieving the policy rate, that could be created by asset purchases in periods of financial stress.
 - Regimes that operate on the flat portion of the reserve demand curve would not likely need to be adapted much, as the floor tools (such as IOER and the overnight reverse repurchase (ON RRP) facility) would hold up market rates.
 - Regimes that operate on the steep portion of the reserve demand curve could be maintained by using reserve sterilization tools. Alternatively, such a regime could transition over a period of time to operating on the flat part of the demand curve using IOER, and perhaps an ON RRP facility, to guide market rates toward the level desired by policymakers. If it is believed that an ON RRP facility would be important to a smooth transition, maintaining an expanded set of RRP counterparties may be necessary, as adding new counterparties would take time.
 - A repo regime could lean on the standing ON RRP facility to support the policy rate, or associated money market rates and absorb any excess liquidity, if necessary. The IOER rate would likely need to be maintained at a constant spread to the ON RRP offering rate to keep incentives across money markets unchanged.

- Promoting **payment system efficiency** and reducing **burdens associated with reserve requirements** are achieved in different ways across the operating regimes.
 - Frameworks operating on the flat portion of the reserve demand curve, whether targeting an unsecured rate or in a repo regime, would have ample reserves, supporting early settlement and low intraday credit extensions. With a sufficiently large quantity of reserves in the banking system, the Federal Reserve could choose to set reserve requirements to zero as they are not needed for interest rate control.
 - In a framework with an unsecured policy rate that operates on the steep portion of the reserve demand curve, current Payment System Risk (PSR) policies and the possibility of using voluntary reserve targets would help support the same objectives.
- All regimes will have **active money markets**, though interbank trading is dampened in systems that involve levels of reserves that are in excess of those necessary to meet regulatory requirements and clearing needs.

We also highlight the following two key points in the memo.

- There are tradeoffs related to the **breadth of counterparties** the Federal Reserve chooses to interact with in traditional OMOs and through liquidity facilities. In normal times, interacting with a narrow set of OMO counterparties may be appealing because it reduces the Federal Reserve's direct impact on markets, although it could be viewed as conferring a special status to a small subset of firms and official institutions. In times of stress it might be advantageous to have broader direct reach in markets, both through OMOs and liquidity facilities to help with interest rate control and policy transmission. The choice of counterparties must balance a range of issues such as operational readiness at times of crisis—transitioning from a relatively small to a relatively large set of counterparties in times of stress may be difficult—versus issues of potential moral hazard and possible adverse incentives in providing a liquidity backstop. The appropriate set of counterparties could be different for each of the three illustrative frameworks we discuss.
- The Federal Reserve has used the **discount window** for three purposes: to achieve interest rate control, to provide liquidity to individual firms facing idiosyncratic liquidity shocks, and to provide liquidity to the market as a whole. Combining firm-specific lending, which suffers from stigma and scrutiny that comes from borrowing, with the other two liquidity

functions may have limited the ability of the discount window to effectively serve all three of these roles.⁴ Using separate liquidity tools to achieve separate goals may allow liquidity tools to work more effectively, but this outcome is not assured. The “Standing Lending Facilities” memo discusses this issue in more detail.⁵

In what follows, section 2 provides a quick overview of the key features of any monetary policy implementation (MPI) framework. We discuss choices for the policy rate and the policy implementation tools that comprise an operating regime. Section 3 presents three illustrative frameworks that allow us to discuss specific issues and tradeoffs and review how the frameworks stand up to the LRF objectives and compare with each other. In this discussion we focus on situations in which the policy rate exceeds the effective lower bound (ELB) and financial markets are not particularly stressed. Section 4 focuses on framework operations at the ELB, while section 5 briefly reviews operational issues that become most salient during periods of stress.

2. Background on choosing a policy rate and operating regime

Here we discuss the role of the policy rate and operating regime tools, which together form a MPI framework, and the general choices available for each.⁶ Based on this discussion, the next section will review three illustrative alternative MPI frameworks.

2.1 Policy rates

The policy rate performs two critical and interrelated functions in a monetary policy framework. The first function is setting and communicating the stance of policy: Typically, the Committee conveys the stance of monetary policy to the public mainly by describing its setting of the policy rate. The second function is policy transmission: In altering the policy rate, policymakers guide a constellation of money market rates and broader financial conditions to affect the real economy.

⁴ Stigma is defined as a reluctance to access the central bank standing lending facility out of concerns that, if detected, depositors, creditors, or analysts could interpret such borrowing as a sign of financial weakness.

⁵ The “Standing Lending Facilities” memo was distributed on October 14, 2016.

⁶ The “Foreign Experience with Monetary Policy Implementation” memo, distributed to the Committee on July 13, 2016, described the frameworks that some advanced foreign economy central banks use to implement policy, some of which have changed since the financial crisis.

Here we consider a range of overnight interest rates that might serve as a policy rate. Policy rates may be grouped into a few main categories according to whether the rate is market-determined, such as a rate for secured or unsecured overnight funding, or is set by the central bank, referred to as an “administered” rate. The distinctions between market and administered policy rates are, however, small in practice, because central banks that choose an administered policy rate almost always also refer, either explicitly or implicitly, to a market rate.

Most critically, the potential policy rates that we discuss are likely to support the transmission of monetary policy to the real economy equally well. This conclusion is based on the presumption that overnight money markets are likely to remain well connected to each other and to other financial markets through arbitrage activity, so that expectations about the path of the policy rate would continue to influence longer-term interest rates. For example, the “Money Markets” memo found that money market rates—those for brokered federal funds, brokered Eurodollars, U.S. Treasury repo, and AA-rated financial commercial paper—move closely together outside of a few periods of severe market turmoil.⁷ The degree of connectedness among these rates has decreased somewhat following the financial crisis but remains high and would be expected to continue to transmit the stance of monetary policy to broader markets. In addition, the “The Foreign Experience with Monetary Policy Implementation” memo (the “Foreign Experience” memo hereafter) concluded that most central banks, regardless of their choice of policy rate, have reasonable control over short-term rates and changes in the stance of policy are generally transmitted effectively to longer-term interest rates and overall financial conditions, allowing monetary policy to influence activity in the real economy.⁸

As a result, policymakers can choose from a range of policy rates and meet key objectives of a MPI framework. Of course, achieving interest rate control relies on using appropriate operating regime tools which may differ in normal times and periods of stress. In particular, the choice of policy rate affects the selection of operating tools and the breadth of counterparties the Federal Reserve may want to interact with. In addition, an administered policy rate may allow for more discretion in responding to movements in market rates than a regime in which a market rate is chosen as a policy rate. Indeed, in using an administered policy rate, policymakers may not feel

⁷ The “Money Markets” memo was distributed on July 13, 2016.

⁸ The “Foreign Experience” memo was distributed on July 13, 2016.

they need to respond to volatility in the associated money market rate, as might be the case with a market policy rate even if a target range is used. If so, policymakers may not see a need to lean on operating tools to mitigate rate volatility as much as in some other regimes. Of course, this discretion could come with communications challenges. The memo “Alternative Policy Rates” discussed the similarities and distinctions among policy rate options in more detail.⁹

We consider six alternative policy rates—four market-based rates and two Federal Reserve administered rates. Two of the market rates are unsecured rates that directly relate to banks’ overnight funding costs—the federal funds rate (FFR) and the somewhat broader overnight bank funding rate (OBFR)—and a third is an overnight repo rate, which directly relates to the secured funding costs of broker dealers. For administered rates, we consider the IOER rate and ON RRP offering rate. Finally, as described in the “Alternative Policy Rates” memo, the Committee could also use as a policy rate something broader, such as the “general level of short-term interest rates,” in order to capture a measure of the central tendency of overnight interest rates across more than one money market. Depending on how such a measure was defined, tools that operate in both unsecured and secured markets might be needed.

2.2 Operating regimes

Policymakers also choose a set of tools that make up an operating regime that is used to control the policy rate and, indirectly, influence broader financial conditions. The tools discussed in this memo are:

- Tools that aim to cap market interest rates: Ceiling facilities that typically take the form of a standing lending facility, with a loan rate set above the target level of short-term market rates.
- Tools that aim to bound market interest rates from below: Floor facilities or other tools that aim to prevent the policy rate and other market interest rates from falling below a particular level. These tools typically take the form of a deposit facility or the payment of interest on reserves.

⁹ The “Alternative Policy Rates” memo was distributed on October 7, 2016.

- Discretionary open market operations: Actions that move the supply curve in the designated (unsecured or secured) market so that it intersects the demand curve at the targeted level of the policy rate.¹⁰
- The level of reserves and the possible use of voluntary or mandatory reserve targets that shape the demand for reserves in regimes where the supply of reserves intersects the steep part of the demand curve. See “Considerations for the Design of Reserves Operating Regimes” memo (the “Reserve Regimes” memo hereafter) for a detailed discussion of these types of regimes.¹¹

Lending facilities can also play the role of liquidity backstop tools aiming to support the transmission of monetary policy during times of stress. These lending facilities may be the same or distinct from ceiling tools. As the memo “Standing Lending Facilities” notes, stigma and reluctance to borrow is a particularly challenging problem to consider when constructing central bank standing lending facilities. Stigma seems most difficult to avoid when providing backstop liquidity for idiosyncratic shocks to individual institutions. Combining that role with the role of supporting interest rate control, or the provision of liquidity more broadly within a single standing lending facility, runs the risk that all forms of liquidity provision, regardless of objective, suffer from stigma.

With this in mind, we discuss the discount window as a ceiling tool in section 3.2, where we review sample MPI frameworks and note possible structural changes in liquidity provision that may establish a more effective ceiling role. We discuss liquidity backstop tools, including the issues of discount window stigma, and the extent to which these tools are integrated in the framework in section 5.

We abstract from policymaker preferences for balance sheet size related to macroeconomic and financial stability objectives that could also influence the choice of operating tools and regime.

¹⁰ OMOs can be standing or discretionary. In this memo standing OMOs are considered ceiling or floor tools, depending on the way they are used in an operating regime, unless noted otherwise. Discretionary OMOs are primarily either repurchase or reverse repurchase operations that are conducted by the Desk in size and frequency to carry out the Committee’s domestic policy directive as authorized by the FOMC. Outright purchases (or, in principle, sales) may also be carried out on a discretionary basis to meet other goals, such as accommodating trend growth in currency.

¹¹ The “Reserve Regimes” memo was distributed on September 30, 2016.

These issues are addressed in the “Balance Sheet Considerations for the Federal Reserve’s Long-Run Framework” memo (the “Balance Sheet” memo hereafter).

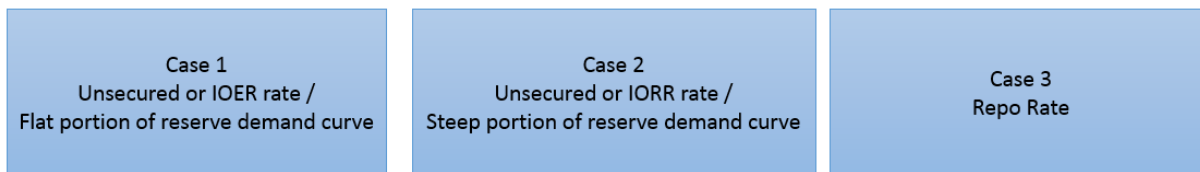
3. Illustrative frameworks

We now describe three stylized frameworks that combine a choice of policy rate with the tools of an operating regime in different ways. The purpose of this discussion is to illustrate how the tools work together and to contrast the ability of the frameworks to achieve the various LRF objectives developed for this project. These three cases are meant to illustrate alternative choices among commonly used features, and we provide some discussion about choices policymakers can make in each case. However, other combinations of tools would also be possible and the three frameworks illustrated here are not meant to capture all possible choices for the Federal Reserve’s long-run operating framework.

Figure 1 summarizes these cases. Two of the frameworks focus on a policy rate that is an unsecured market rate or a related administered deposit rate (such as the IOER rate or interest on required reserves (IORR) rate). The key difference between the two regimes is whether the amount of reserves supplied by the central bank intersects the demand curve for those reserves where the curve is flat or steep.¹² In the first framework, reserves are relatively abundant, so that the reserve supply curve intersects the flat part of the demand curve, consistent with the framework currently used by the Federal Reserve. In the second framework, in contrast, the supply of reserves intersects the steep part of the demand curve for reserves, as was the case pre-crisis. The third framework we consider uses a secured market rate, specifically the repo rate, as the policy rate.

¹² Since the demand curve is expected to be continuous, it would be possible to also consider the case where the supply intersects the demand for reserves near the inflection point between where the curve is steep and flat. The Federal Reserve does not have any experience implementing monetary policy in that manner and we are not aware of any foreign central bank having tried it. It would be possible for the Federal Reserve to gain some experience with such a framework by gradually reducing the supply of reserves. We do not discuss such an intermediate framework further in this memo.

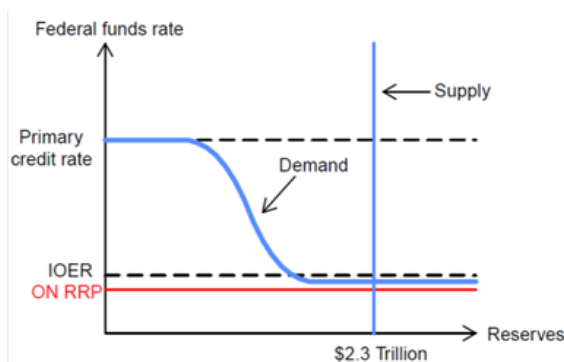
Figure 1: Three Illustrative Frameworks



3.1 Case 1: Unsecured or related administered rate with operations on the flat portion of the demand curve for reserves

This framework is similar to the one currently in use by the Federal Reserve. The key operational features of this type of framework are (a) the intersection of the supply of reserves with the flat portion of the reserve demand curve and (b) the use of floor tools to maintain the relevant market rate in the target range. The latter explains the reference to this type of framework as a “floor system.” As shown by the stylistic supply and demand curves in figure 2, the Federal Reserve currently employs two floor tools to achieve policy rate control.¹³ First, the Federal Reserve pays interest on excess reserves which helps to maintain a floor on money market rates through arbitrage. Second, the ON RRP facility sets a floor on repo rates and improves control over money market rates more generally.¹⁴

Figure 2: Current Regime: Operating on the Flat Portion of the Reserve Demand Curve



¹³ A fuller discussion of this supply and demand diagram is found in [Ihrig, Meade, and Weinbach \(2015\)](#).

¹⁴ A small share of triparty repo trades are transacted at rates below the ON RRP offering rate. These trades include institutions that do not have access to the ON RRP facility. See Alyssa Anderson, “Monetary Policy Transmission and the ON RRP,” Board memo, April 6, 2016, for an empirical discussion of this issue.

While the level of reserves where the demand curve becomes steep is not known with precision, the current floor system could undoubtedly operate at a level of reserves lower than at present. The current superabundant level of reserves has led to earlier settlement of payments, with lower intraday extensions of credit by the Federal Reserve than pre-crisis, as noted in the memo titled “Monetary Policy Implementation Frameworks and the Payment System” (hereafter the “Payment System” memo).¹⁵ Lowering the level of reserves somewhat from the current level would likely have minimal impact on payment system issues. Even with a substantial reduction in reserves, tools other than high reserve balances such as the provision of collateralized daylight credit could promote efficient payments settlement as well as other aspects of a safe and efficient payment system.

Perhaps the other most salient part of the framework is the policy rate. The FOMC determined that the federal funds rate should remain the policy rate during the normalization period but may want to consider alternatives in the longer run, particularly if it chooses to operate in a floor system with ample reserves similar to the current framework.

Other tools exist in the current framework but, currently appear to have little role in the effective implementation of monetary policy. In particular, the Federal Reserve maintains a system of reserve requirements, has the ability to carry out discretionary OMOs, and continues to operate the discount window, which could be considered a ceiling tool.¹⁶ But operating in a floor system, at the flat portion of the reserve demand curve, reduces or in some cases eliminates the need for tools of these types if market rates remain close to the floor rates in the system.¹⁷

There are a few questions that policymakers could address as they consider this benchmark case relative to an evaluation of long-run MPI frameworks, perhaps leading to outcomes that better achieve the objectives for a MPI framework.

¹⁵ The “Payment System” memo was distributed on September 30, 2016.

¹⁶ Because of stigma associated with the discount window, primary credit (PC) is generally viewed as an ineffective ceiling tool. However, in an environment like today with a large volume of reserves where there is no shortage of liquidity in the banking system, there appears to be less of a need for the PC to serve this role.

¹⁷ Some may still see value in a ceiling tool to help maintain interconnections among money market rates.

Should the Committee revisit the policy target?

Given the Federal Reserve's long reliance on the federal funds rate, policymakers may be comfortable with the current policy rate. An advantage of targeting the federal funds rate is that it is familiar, both to the Federal Reserve and market participants. But, as noted in the "Alternative Policy Rates" and "Money Markets" memos, with a high level of reserves, the federal funds market largely reflects arbitrage trading that depends crucially on the business model of Federal Home Loan Banks (FHLBs), one that involves lending in the federal funds market to banks (typically U.S. branches and agencies of foreign banks). The incentives for this trading depend on the gap between the rate that banks earn on balances at the Federal Reserve (the IOER rate) and the rate than FHLBs earn on Fed balances (zero). Significant further reductions in this market activity, such as if the FHLBs or the U.S. branches and agencies of foreign banks were to change their current business practices, might precipitate a situation in which the FFR becomes less connected with other overnight market rates.

If this robustness issue was a serious concern, policymakers could consider adopting the OBFR as the policy rate. Since the OBFR includes Eurodollar transactions, which are similar unsecured market transactions but involve a wider set of counterparties, this change would likely have little impact on MP implementation. Of course there could be some concerns with the OBFR rate as well. One potential disadvantage is that the public could have the misperception that "Eurodollar" means that the Federal Reserve is targeting a rate that is largely related to the activities of foreign banks. Also, as discussed in the "Alternative Policy Rates" memo, Eurodollar volumes have recently declined noticeably in part because banks have shifted some balances on shore, and the rates at which those deposits are booked are not captured in the OBFR in its current formulation. However, the staff is exploring the possibility of expanding the OBFR to include onshore wholesale deposits.

Alternatively, policymakers could choose to communicate the stance of policy using an administered rate, such as the IOER rate, and still use the same OR as discussed here. One consideration to keep in mind is that interest on reserves is set by the Board and not the FOMC. Alternatively, policymakers could choose to target the general level of short-term interest rates. The robustness of either an administered or general level rate would be tied to the market rate(s)

with which it is explicitly or implicitly associated. Finally, policymakers could consider targeting the repo rate. Such a policy rate could be adopted in the regime that is discussed here, and this possibility is discussed in detail in section 3.3.

How should the level of reserves be chosen?

While operating on the flat portion of the demand curve, control of money market interest rates can be achieved by a wide range of different levels for the supply of reserves. This raises the question of what level of reserves would be most desirable in this type of floor system.

Policymakers would need to evaluate tradeoffs between relatively large and small balance sheets. They may see more reserves as helping to achieve payment system risk objectives. And, they might also have a preference for maintain a large balance sheet to foster financial stability or macroeconomic objectives. On the other hand, policymakers may believe that the PSR policies in place will achieve payment system objectives and not see financial stability as a direct objective of the Federal Reserve nor think a large balance sheet is necessary for macroeconomic objectives. They may hope that a smaller supply of reserves would help reduce some potential political economy risks such as the perception that the Fed is subsidizing banks when market rates are below IOER. Indeed, reducing the supply of reserves would be expected to gradually bring market rates closer to IOER, as reserves become scarcer and if balance sheet costs decrease at the margin.¹⁸ In addition, a smaller supply of reserves would reduce the Federal Reserve's interest expense and, perhaps, political interest in Federal Reserve interest payments to banks and remittances to the Treasury.¹⁹ But, it may be the case that this political risk cannot be totally avoided in a floor regime. The "Balance Sheet" memo discusses these considerations in more detail.

One option would be to let reserves decline gradually and observe the effects of this reduction on money markets and broader financial markets over time. This option may be attractive to

¹⁸ A number of other factors influence how close market rates are to IOER, including the intensity of competition among banks and balance sheet costs.

¹⁹ A smaller supply of reserves would be associated with lower and less volatile net income, on average. Of course, the level and variability of the Federal Reserve's net interest income also depends on the composition of its assets. Indeed, the Federal Reserve could reduce the variability of its remittances to a negligible amount by substantially shortening the maturity of its liabilities.

policymakers who would like to reduce the supply of reserves from its current level but who are uncertain about how much they can reduce reserves and remain in a floor system. Such an option would likely require careful communication with the public regarding policymakers' intentions and the conditions that could lead them to stop reducing the supply of reserves.

Should the Federal Reserve develop a more robust ceiling tool?

The role of ceiling tools in this regime is perhaps less important than in systems that operate on the steep part of the demand curve, because abundant reserves generally push money market interest rates down to the floor. Nevertheless, having an effective ceiling tool may still be desirable to limit occasional spikes in the policy rate, particularly during times of market stress, but perhaps also in normal time as well. And, an effective ceiling could also, in principle, be created to target particular money market rates that are not necessarily the policy rate but meaningful for monetary policy transmission, such as adding an ON RP facility to the current framework to moderate repo volatility. We discuss options that may help to address discount window stigma, which is one factor that hinders the effectiveness of the discount window in operating as a ceiling, in section 3.2, as ceiling tools play a more important role in ORs operating on the steep portion of the demand curve.

What should the Federal Reserve do with reserve requirements?

Reserve requirements have been simplified somewhat in recent years but their basic structure has remained essentially the same. As discussed in the memo titled "Reserve Regimes," reserve requirements were used to establish a stable, downward sloping demand for reserves in the pre-crisis framework. In the current system, with the level of reserves far exceeding required reserves, the role of reserve requirements in shaping the demand curve is not an important feature for interest rate control. At the same time, even with interest on required reserves, these requirements have deadweight loss and administrative costs associated with them; see the "Reserve Regimes" memo for more details. Setting reserve requirements to zero could reduce many of the costs of reserve requirements, and these costs could be further reduced depending on

choices made regarding the level of reporting needed to continue to compile the monetary aggregates.^{20, 21} There could also be transition costs.

As an aside, setting reserve requirements to zero, perhaps temporarily, could be considered in the near term to reduce the aforementioned costs. Such a setting would reduce costs to banks and increase the supply of high-quality liquid assets (HQLA), but would not be expected to have any effect on interest rate control in an environment of continued large reserve supply. Of course, policymakers would need to evaluate any costs to communicating this change, both in terms of the perception that this change could affect the stance of policy and the signal about the longer-run choice of monetary policy implementation framework.²²

Should the Federal Reserve modify some of the settings of the ON RRP facility?

Given that this regime is operating on the flat portion of the reserve demand curve and the structure of U.S. money markets in which non-bank institutions represent a significant source of wholesale funding, it may be desirable to think about the parameter settings of the ON RRP facility that would best support its role as a supplementary tool to help control interest rates. For example, following the implementation of money market mutual fund reform, the Federal Reserve could perhaps study whether to provide reduced availability of the facility to prime funds relative to government funds. To mitigate some of the political economy concerns associated with money market rates trading below IOER, the spread between the ON RRP offering rate and IOER rate could possibly be narrowed. Finally, some consideration could be given to re-imposing some form of an aggregate cap on the facility, including setting it to zero.

²⁰ Required reserve balances will continue to be costly to banks because they are not considered high-quality liquid assets in the liquidity coverage ratio. Data collected to administer reserve requirements is also used to publish the monetary aggregates on a weekly basis, and alternative approaches to constructing the monetary aggregates could be considered to reduce administrative costs.

²¹ Section 19 of the FRA provides that each depository institution “shall maintain reserves against its transaction accounts as the Board may prescribe by regulation solely for the purpose of implementing monetary policy” in a ratio between 0 percent and 3 percent for transaction accounts subject to the low reserve tranche, and in a ratio between 0 percent and 14 percent for transaction accounts over the low reserve tranche. 12 U.S.C. 461(b)(2). The statute also provides for the imposition of reserve requirements on nonpersonal time deposits and net eurocurrency liabilities; the reserve ratios for these liabilities have been set at zero since the early 1990s.

²² For a discussion of communications about and preparations for changes in reserve requirements see the October 7, 2016 memo “Preparing the Public for a New Monetary Policy Framework.”

A cap may be seen as desirable to mitigate potential issues associated with a destabilizing run that would result in large inflows to the facility.²³

Evaluation with respect to LRF objectives

Overall, the Federal Reserve's experience with this type of system over the last few years suggests it achieves some of the objectives set forth by the FOMC for the LRF project.²⁴

Specifically, this framework

- achieves sufficient rate control for the policy rates considered, though continuing to target the federal funds rate would require considering whether this policy rate is robust enough to changes in the investment behavior of a small number of financial intermediaries.
- makes providing liquidity to markets in times of stress particularly easy because such injections do not need to be drained to maintain interest rate control.
- does not need reserve requirements and, therefore, can eliminate the deadweight losses associated with those requirements.
- supports active money markets, including the federal funds market where there is bank to nonbank arbitrage trading, so long as the ON RRP rate is below the IOER offering rate. There is a small amount of interbank activity in this framework.
- supports early payment settlement and reduces the amount of intraday credit.

3.2 Case 2: Unsecured or related administered rate with operations on the steep part of the demand curve for reserves

An alternative type of framework would operate on the steep portion of the demand curve for reserves. This framework would have many similarities to the pre-crisis regime. However, given changes to money markets reflecting regulatory reforms, new business practices at banks, and new operating tools such as IOER, it may look and operate somewhat differently than it did at the time.

²³ Some cap options are discussed in "Overnight RRP Operations as a Monetary Policy Tool: Some Design Considerations" by Frost, Logan, Martin, McCabe, Natalucci, and Remache. FEDS 2015 – 010.

²⁴ See the September 14, 2015, memo "Revised Long Run Framework Scope and Objectives."

There are two key tools in this alternative type of framework: reserve requirements and discretionary OMOs. Mandatory reserve requirements are set by law as a share of depository institutions' reservable liabilities, and are currently calculated based on deposit data from depository institutions every two weeks. Together with factors such as reserve demand for clearing purposes or for satisfying HQLA needs, reserve requirements establish a stable, downward sloping reserve demand curve and help with rate control.²⁵ In particular, reserve averaging over the maintenance period helps make demand for reserve balances fairly predictable, and mitigates rate volatility within a reserve maintenance period in such a regime.²⁶

As an alternative to mandatory reserve requirements, voluntary reserve targets could be used to shape the steep part of the demand for reserves. In such a system, depository institutions choose their reserve targets at some predetermined frequency, providing information to the central bank about banks' demand for reserves.

The type of framework considered in this section uses discretionary OMOs to offset changes in autonomous factors affecting the supply of reserves (such as fluctuations in the Treasury General Account) and the demand for reserves so that the supply of reserves intersects the demand curve as close as possible to the target. The "Reserve Regimes" memo provides a detailed discussion of the various approaches to reserve requirements and some factors that may affect supply and demand going forward.

The Federal Reserve traditionally focused on the level of the federal funds rate as the policy rate in this regime because it most directly reflected conditions in the reserve market. That said, as in the case of frameworks operating on the flat portion of the reserve demand curve, policymakers

²⁵ The Federal Reserve has some limited experience with operating a form of voluntary targets. From the early 1980s to mid-2012, the Federal Reserve operated a contractual clearing balance program that provided banks with the ability to set voluntary targets in amounts above their mandatory requirements and receive earnings credits on those amounts. Because the Federal Reserve did not have explicit authority at that time to remunerate balances at Reserve Banks, the use of those earnings credits to offset the costs of Federal Reserve priced services served as an implicit interest payment. In the pre-crisis framework, contractual clearing balances were helpful in providing banks with a cost effective way of maintaining balances at levels sufficient to cover fluctuations in reserve demands associated with daily clearing needs.

²⁶ See Ennis and Keister "Understanding Monetary Policy Implementation," Summer 2008, Federal Reserve Bank of Richmond Economic Quarterly—Volume 94, Number 3, Pages 235–263, for an analytical treatment.

could choose other rates such as the OBFR or an administered rate, such as IORR, to serve as the policy rate.

Ceiling and floor tools are not strictly necessary for interest rate control in a framework that operates on the steep part of the reserve demand curve, as the pre-crisis experience illustrates.²⁷ Nevertheless, ceiling and floor tools can be useful to limit unanticipated volatility in the market rates. Because the demand curve for reserves is steep in this type of regime, small shifts of the demand curve can lead to volatility in money market rates. An effective ceiling, set at some spread to the policy rate, could prevent money market rates from increasing too much if banks' demand for reserves moved up. A floor tool, such as IOER, would prevent rates from dropping too much if a large amount of liquidity needed to be provided to the market. The IOER rate would be set below the policy rate, implying a cost to holding excess reserves, and could be supplemented with an ON RRP standing facility whose offering rate could be set equal to or below the IOER rate, if desired.

There are a few questions, similar to the ones noted in section 3.1, that policymakers could address as they consider this benchmark case. The choices of how to implement this framework would affect the evaluation of the regime relative to the long-run framework objectives.

Should the Committee revisit the policy target?

A move to operating on the steep part of the demand curve for reserves would result in an increase in interbank activity in the federal funds market. If the volume of interbank activity was large enough, concerns about the robustness of the FFR would be mitigated and policymakers could decide to keep that rate as the policy rate, thereby avoiding the costs associated with changing this part of the MPI framework. In fact, policymakers may find this rate the most natural choice since this regime is focused on making adjustments to the supply of reserves, which determines the effective federal funds rate.

Nevertheless, policymakers may want to explore the possibility of changing the policy rate. In particular, policymakers could be concerned about the robustness of that market in the future,

²⁷ The Federal Reserve did not have a floor tool and the discount window was ineffective as a ceiling because of stigma. In principle, it might be enough to rely only on discretionary OMOs to alleviate unwanted pressure on the target rate.

should large-scale asset purchases (LSAPs) be needed again to stimulate the economy at the effective lower bound. Changing the policy rate during a stable period may be seen as a form of insurance against the risk that the market could be impaired during a more stressed period, with the attendant communication challenges. While banks would still have an incentive to redistribute reserves among themselves, they may find interbank trading to be an expensive way to do that.²⁸ Instead of interbank trades, it is possible that a late day market for deposits would develop, which would allow the necessary redistribution of reserves to occur. If that were the case, the interbank market might be less vibrant than pre-crisis.

Should policymakers want to change the policy rate, but continue to target a market rate, they could consider the OBFR as in the case above. Another option would be to communicate the stance of policy using the interest rate on required reserves.²⁹ This is similar to the ECB's pre-crisis framework.

Should the Federal Reserve develop a more robust ceiling tool?

As noted above, because this regime operates on the steep part of the reserve demand curve, money market rates could be more volatile. In this case a ceiling tool can play a greater role in maintaining effective interest rate control than in Case 1. One approach in establishing an effective ceiling would be to try to address the underlying causes of stigma in the current discount window program that prevents the window from being an effective liquidity backstop and effective ceiling tool.

One possibility would be to consider other tools that may not suffer from stigma to the same extent as the discount window and could provide a more effective ceiling. A few such tools for consideration include the following.

²⁸ In the United States, the leverage ratio has been increased and the Federal Deposit Insurance Corporation has modified the base for the insurance fee it assesses on banks, effectively making it a function of the bank's liabilities or the size of its balance sheet in excess of capital. See Simon Potter, "[Discussion of 'Evaluating Monetary Policy Operational Frameworks' By Ulrich Bindseil](#)," August 26, 2016.

²⁹ In this type of system, IOER would be set at a spread below interest on required reserves.

- A “Depository Institution Repo Facility” (DIRF) could be established under section 14 authority to accept collateral limited to OMO-eligible securities.³⁰ A facility that only accepts high-quality collateral could suggest that the borrower is not under stress, as they would generally be able to readily liquefy such collateral in the market. If the DIRF rate is set sufficiently close to the policy rate, so that the facility is used regularly, in the normal course of business, it would be less likely to become stigmatized.
- A Financial Institution Repo Facility (FIRF) could be considered along the same lines as the DIRF and established under section 14 authority. The main difference between the two facilities is that the FIRF would be available to a broader set of counterparties. Although this regime is focused on reserves and depository institutions, broadening the set of counterparties with which the Federal Reserve interacts could provide some increase in interest rate control as these additional counterparties directly operate in a wider set of money markets.

A fuller discussion of the DIRF, including some key characteristics as well as advantages and challenges with using such a facility, is found in the appendix of the “Standing Lending Facility” memo.

What should the Federal Reserve do with reserve requirements?

As reviewed in the “Reserve Regimes” memo, the current reserve regime system imposes costs on depository institutions despite the payment of interest on reserves. As this framework relies on reserve requirements to help shape the demand curve, policymakers may want to consider an alternative to required reserves for this purpose.

In this context, voluntary reserve targets (VRTs) could be an attractive option that would reduce costs associated with requirements. In a system of VRTs, banks establish and communicate to the central bank individual reserve targets in line with their projected demand at the target rate. The central banks would supply an amount of reserves approximately equal to the sum of the banks’ targets. Balances held to meet the voluntary target would earn interest at the policy rate.

³⁰ The DIRF concept originated in the Discount Window Working Group.

Balances in excess of the voluntary target would earn a lower rate. And, banks that failed to meet their voluntary requirement could be assessed a penalty on the shortfall.

VRTs have a number of benefits compared to required reserves. First, in contrast to required reserves, reserves held under VRTs would likely be considered HQLA.³¹ Second, as noted in the “Reserve Regime” memo, there could be some uncertainty about where the steep portion of the demand curve lies. VRTs would allow banks to set the amount of reserves they would like to hold, and once VRT are set, banks would want hold a level of reserves balances that is close to their targets, because any deviations would be costly; this creates the steep portion of the demand curve. In addition, VRTs could provide more flexibility for banks to adjust to evolving clearing and liquidity needs. Finally, a VRT system could result in a larger supply of reserves than mandatory required reserves, as there would be little or no opportunity cost of holding reserves. Of course, the level would depend on a variety of factors, including the remuneration rate. A relatively large supply of reserves may foster earlier payment settlements.³²

The demand for reserves by banks could nevertheless be too low.³³ The BoE’s experience suggests that banks may not increase their targets, even in response to elevated market rates. This led the BoE to start paying the policy rate on all reserves and increase the supply of reserves more than was requested by banks during the crisis.

What should policymakers do with the ON RRP facility?

In a system where the supply of reserves intersects the steep part of the demand curve, take-up at the ON RRP facility may disappear if money market rates move above the IOER rate. Should this happen, or perhaps as take-up declines as the framework transitions to the steep portion of the reserve demand curve, policymakers could consider decommissioning the facility.³⁴ This action would allow the Fed to eliminate its extended counterparty program which includes

³¹ Under U.S. regulation, breakable TDF deposits qualify as central bank reserves and thus are included in Level 1 HQLA because they are explicitly and contractually repayable on notice. Using the same reasoning that supported the treatment of breakable TDF deposits as HQLA-eligible, VRTs would likely be eligible for inclusion in HQLA given banks’ ability to use such balances to meet immediate liquidity needs.

³² See the payment timing and reserve balances figure in the “Monetary Policy Implementation Frameworks and the Payment System” memo.

³³ Economic theory suggests that VRTs will be set where a bank’s private cost equals its private benefit. Banks would not be expected to take into account the payment system benefits associated with a larger supply of reserves, resulting banks setting their VRTs too low from the perspective of society.

³⁴ The Policy Normalization Principles and Plans from September 2014 state that the Committee will phase out the ON RRP facility when it is no longer needed to help control the federal funds rate.

money funds as counterparties and could be viewed as a way to simplify the operating regime. It could also be perceived as a reduction in the involvement of the Federal Reserve with money funds, although the Fed would presumably remain active in the repo market through the use of discretionary OMOs, which may be significantly larger than they were pre-crisis if the shifts in supply and demand for reserves are larger and more variable.

Of course, there are potential costs of decommissioning the ON RRP facility. In a stressed period with liquidity injections, without the use of RRP with extended counterparties, policymakers would need to be comfortable leaning on other draining tools (such as term deposits) to remain in a scarce regime or be willing to transition to a framework with higher levels of reserves relying only on IOER for interest rate control. If policymakers wanted to include the ON RRP facility or discretionary RRP in either of these instances it is important to know that it would take time to re-establish the relationship with the necessary counterparties.³⁵

Finally, if the ON RRP facility is maintained, policymakers would need to determine the appropriate parameter settings. The offering rate could be set equal to the IOER rate, which would be below the level of the policy rate. This could create a firmer floor than IOER would on its own and keep the facility in operation. The individual and aggregate caps could be set to low levels to discourage reliance on the Federal Reserve facility.

Evaluation with respect to LRF Objectives

The Federal Reserve's experience with operating on the steep portion of the reserve demand curve pre-crisis suggests it has some of the objectives desirable for a MPI framework. This framework:

- could achieve sufficient rate control, using discretionary OMOs to offset the effects of autonomous factors on the supply of reserves.³⁶

³⁵ Based on experience to date, it would likely take 6 months to a year to re-onboard the current types of extended counterparties (i.e. banks, money funds, and GSEs), provided that these counterparties had already been through the necessary credit and compliance reviews, which would not be the case if the facility has been decommissioned or if RRP with extended counterparties are not part of the ongoing framework. Adding new types of counterparties, which would require credit and compliance reviews, could take much longer. Further, the willingness of any counterparties to transact with the Federal Reserve might be lower as they face switching costs, which would be higher if the extended counterparty program had previously been discontinued.

³⁶ Autonomous factors may be more volatile than pre-crisis suggesting that such OMOs may need to be larger than they were, as noted in the "Reserve Regime" memo, which could require a broader set of counterparties.

- requires tools to sterilize the reserve injections associated with liquidity provision to markets to maintain control of the policy rate, or a transition to a system similar to those described in the previous section. With interest on reserves and lessons from the crisis, there is no indication this transition is not achievable. An ongoing ON RRP program with expanded counterparties could help facilitate a smooth transition and provide more confidence that interest rate control can be maintained.
- can reduce the burdens and deadweight losses associated with reserve requirements by implementing voluntary targets.
- would support active money markets. An interbank market would likely re-emerge.
- would promote an efficient and resilient payment system by either relying on PSR policies or solely from the level of the supply of reserves. For the latter, with regulatory reforms and changes in business practices as discussed in the “Money Markets” memo, the steep portion of the demand curve for reserves may have shifted, and VRTs would make it possible to operate on the steep part of the demand curve.

3.3 Case 3: Repo Rate Targeting Regime

The prior frameworks used an unsecured rate or a related administered rate as the policy rate. The Committee could instead choose a secured rate or a related administered rate as a policy rate, an option we discuss in this section.

The specific decisions that policymakers would face under this regime are similar to the prior cases, reflecting the fact that operating regimes have common features.

Which rate should be the policy target?

A natural focus of participants in secured funding markets is the Treasury repo rate; that is, the rate associated with an overnight repurchase agreement in which Treasury securities are provided as collateral against the loan, as such a rate is as free from credit risk as one could achieve. In practice, the Treasury repo market has multiple segments from which a repo rate could be calculated. These segments are generally divided in terms of the counterparties and settlement infrastructure associated with the transaction. Policymakers could choose one of these market rates. Another possibility would be to rely on the work under way by the Federal Reserve to

develop a repo benchmark rate(s) that is based on one or more repo market rate(s). An alternative to targeting a market repo rate would be to use the ON RRP offering rate as the policy rate. The “Alternative Policy Rates” memo discusses the different types of market repo rates and the tradeoffs between targeting a market rate and communicating policy through an administered rate.

Which operating tools should a repo target regime use?

The “Demand and Supply Considerations in Repo Rate Targeting Regimes” memo reviewed several mechanisms for targeting a repo rate.³⁷ One option would be to conduct discretionary OMOs without standing facilities, while the remaining options discussed a variety of ways for using standing overnight repurchase (ON RP) and ON RRP facilities.³⁸ In the latter cases, policy implementation would likely focus primarily on demand and supply conditions in the repo market, although, as discussed below, conditions in reserve markets would still be relevant for policy implementation as well. On the demand side of the repo market, the key players are dealers and other nonbank financial firms seeking to finance Treasury positions. On the supply side of the market, money market mutual funds and other private firms seeking to invest in short-term, low risk assets are the key players. To support a repo rate target, the Federal Reserve could participate alongside these firms either through standing or discretionary OMOs, or a combination of the two.

One could use the operating regime in place today and switch the target rate to the repo rate. The Committee may also want to consider some of the modifications noted in section 3.1.³⁹ The ON RRP facility, which would become permanent in such a framework, could be expected to provide a floor on market repo transactions as counterparties could always deposit their funds with the Fed instead of loaning them out in the market at a lower rate. The effectiveness of the ON RRP facility as a floor seems to hold even in the current environment of superabundant reserves, as

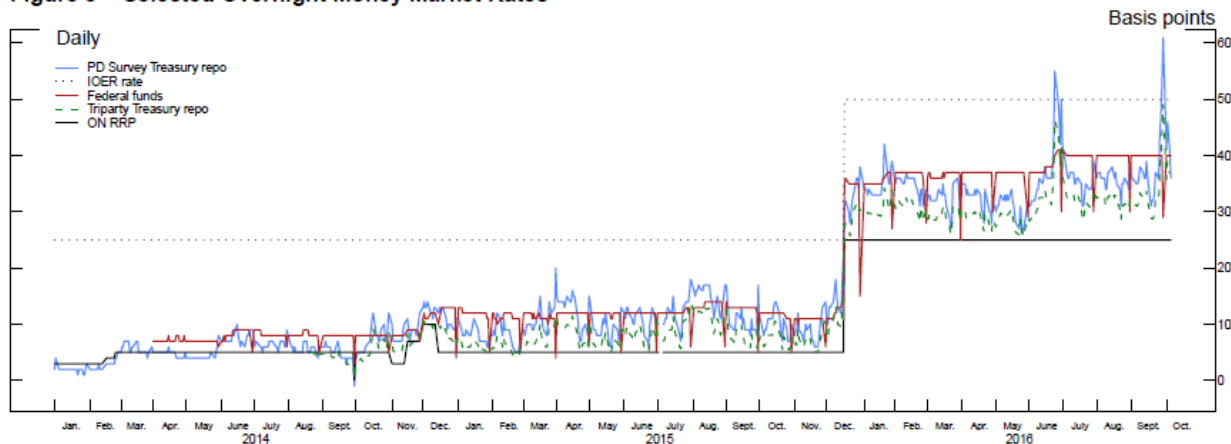
³⁷ The “Demand and Supply Considerations in Repo Rate Targeting Regimes” memo was distributed on September 30, 2016.

³⁸ An ON RP facility allows OMO counterparties to borrow at a fixed rate, set at a spread to the policy rate, against Treasury securities.

³⁹ The Committee could set a target range for the repo rate with the ON RP and ON RRP offering rates set at the endpoints of the range. Alternatively, the FOMC could set a target range for the repo rate but allow the Desk some discretion to move the offering rates within some range to respond to perceived changes in the supply and demand for repo investments.

this tool appears to provide an outside option for those money market lenders who are also counterparties. This floor is evident in the current regime, as shown in figure 3.

Figure 3 – Selected Overnight Money Market Rates



Source: Federal Reserve Bank of New York; Federal Reserve Board.

This figure shows that market repo rates have been somewhat more volatile than the effective federal funds rate (EFFR). Policymakers would need to decide on the acceptable level of volatility. They may want to introduce an ON RP lending facility in this regime to prevent undesired upward spikes in market repo rates. This facility, in combination with the ON RRP facility, would result in standing facilities that formed a corridor around the targeted repo rate. In some settings, as we will focus on here, these facilities could form the ceiling and floor for the operating regime.⁴⁰ Policymakers would most likely also want to include IOER as a floor tool for banks as well. Setting the IOER rate below the ON RRP offering rate would create incentives for banks to invest in the ON RRP and hold fewer reserves, which could put downward pressure on market repo rates relative to the target. This could lead to very large take-up at the ON RRP facility and scarcity of reserves, since every dollar invested in the ON RRP reduces the supply of reserves by the same amount. Thus, policymakers most likely would wish to set the IOER rate at or above the ON RRP offering rate.

The number and type of counterparties as well as the cap settings of ON RP and ON RRP facilities would be key factors affecting interest rate control. A larger number as well as a more

⁴⁰ If there are tight caps on the standing facilities, then policymakers may want additional tools as a ceiling and floor. Given the focus on the repo market, there could be ON RP and RRP facilities with less attractive offering rates and larger caps put in place.

diverse set of counterparties would be expected to provide a more effective ceiling and floor. With respect to the counterparties, for example, one could continue with the current 159 institutions that have access to the ON RRP facility and the 23 primary dealers in RP transactions. Alternatively policymakers could consider increasing the number of institutions within the current types or broadening the availability to other institution types.

If policymakers wanted to target a specific value of the policy rate, or a narrow range, they may want to consider a relatively narrow spread between the ON RP and ON RRP offering rates and/or implementing discretionary OMOs alongside the standing facilities to affect repo supply. OMO operations would be somewhat similar to the pre-crisis operations where the Desk and Board staff would make daily assessments of supply and demand in the policy target market and estimate how much (if any) OMOs would be needed to hit the target.

The FOMC could face some tradeoffs between the volatility of the market repo rate and the frequency and size of Federal Reserve operations necessary to stabilize the rate. Very tight control of the repo rate in some cases could require very active use of “fine-tuning” OMOs. On the other hand, if policymakers are willing to accept some degree of daily variation of the repo rate, including expressing the target rate as a range, potentially supported by standing OMO facilities, then the need for the Desk to initiate frequent and potentially sizable OMOs would likely be reduced. This tradeoff between the desired precision of rate control and the frequency and size of operations required to achieve that precision is broadly similar to the one the FOMC could face with an unsecured rate target.

Implications of repo targeting regime for reserves

While a repo framework would not focus on the market for reserves to the same degree as the other options, it is important to consider the direct effects of repo transactions through the standing or discretionary OMOs on the supply of reserves in the banking system, which affects unsecured rates. Over most of this year, for example, non-month-end ON RRP take-up has ranged between \$20 billion and \$120 billion. If operating on the flat portion of the demand curve for reserves, as is the case today, these changes would be expected to have at most modest effects on the EFFR.

Policymakers could also consider targeting the repo rate in an environment where the supply of reserves is less plentiful, intersecting the demand for reserves on the steep part of the demand curve, as in section 3.2. Such a setting would likely lead to larger potential volatility in the repo rate and greater use of discretionary OMOs to control that volatility. In turn, these OMOs could have a meaningful impact on the EFFR. Consequently, the Committee would need to develop a view on the level of volatility it is willing to tolerate, both in terms of rates and volumes, in unsecured overnight markets and be prepared to adjust the size of the balance sheet, perhaps with facilities geared to depository institutions, to ensure acceptable levels of volatility.

To dampen federal funds volatility in a scarce reserve regime, policymakers could consider using reserve requirements with reserve averaging as a mechanism to dampen day-to-day fluctuations. Of course, another way to reduce unsecured rate volatility would be to operate with abundant reserves. As noted previously, a decision to operate with an ample supply of reserve would allow the Federal Reserve to reduce reserve requirements to zero, which would eliminate the burdens and deadweight losses associated with reserve targets.

Evaluation with respect to LRF Objectives

Given the similarity between the features of the tools in this regime to the other cases, we believe a repo targeting regime would achieve many objectives desirable for a MPI framework. Some objectives are easier to achieve if the supply of reserves is large. This framework:

- could target repo rates effectively using standard monetary policy tools, though the FOMC could face some tradeoffs between the volatility of the market repo rate and the frequency and size of Federal Reserve operations necessary to stabilize the rate.
- allows ample provision of liquidity to markets in times of stress while maintaining control of money market rates. The standing OMOs, in particular the ON RRP facility, would help support such control.
- does not need reserve requirements if operating with plentiful reserves and may not need them with scarce reserves. Therefore, likely can eliminate the deadweight losses associated with those requirements.

- supports active money markets in the current setting, though policymakers may want to account for direct effects of repo transactions on the supply of reserves in the banking system, which affects unsecured rates.
- supports an efficient and resilient payment system. The exact manner depends on the level of reserves in the system, as discussed in “Payment System” memo and the previous subsections.

3.4 Key differences between stylized frameworks

These cases highlight that policymakers have many options for how to implement a LRF. To help summarize how the three cases stand up to each other, we review them together against the LRF objectives.

- All could likely achieve sufficient rate control. Discretionary operations would be necessary in case 2, by construction, and perhaps in case 3, if the Committee desired to reduce the volatility of the repo rate or target a very tight range for a market rate. The federal funds market could become more active under case 2. In cases 1 and 3, when the supply of reserves is abundant, the federal funds market would remain vulnerable to changes in the investment strategies of government sponsored enterprises (GSEs) or U.S. branches and agencies of foreign banks.
- Providing liquidity to markets in times of stress would be particularly easy in case 1, because it is not sensitive to the level of reserves, and in case 3 if the supply of reserves is large. Case 2 would require sterilization, or shifting to an alternative framework, most likely one like case 1. Similar considerations would apply to case 3 if it was operating with scarce reserves. Transitioning to a framework with a large supply of reserves could be more difficult if RRP with expanded counterparties are discontinued.
- Reserve requirements could be set to zero and reporting requirements reduced in cases 1 and 3 in operating with abundant reserves, substantially reducing costs. In case 2, VRTs could most likely reduce burdens associated with mandatory reserve requirements.
- All cases support active money markets. Case 2 would likely have an active interbank market, as could case 3, if the supply of reserves is low.

- Efficiency and resiliency of the payment system depend more on the total supply of reserves than the particular framework. All frameworks could operate with a significant supply of reserves, which would support good payment system outcomes. PSR policies would mitigate costs if the supply of reserves is low.

Of course there are many other considerations that we touched upon, and policymakers may put weight on these factors as they evaluate different frameworks. Some issues worth flagging include the following.

- **Governance:** The choice of policy rate may depend on policymakers' preferences on internal Federal Reserve governance issues. In particular, the Board of Governors has the authority to set the IOER rate, while the FOMC has the authority to set the ON RRP rate.
- **Political considerations:** The choice of counterparties, how interest on reserves is used in the framework (and whether IOER is a below-market rate or not), how the choice of policy rate may be associated with a given set of counterparties, as well as the framework's implications for interest expense and remittances to the Treasury, all affect public perceptions of the Federal Reserve's role in financial markets.
- **Counterparties:** In normal times, interacting with a narrow set of counterparties is unlikely to constrain the transmission of monetary policy, as arbitrage relationships keep money markets and other financial markets well integrated. Interactions with a narrow set of counterparties may have been seen as a benefit, for example because it reduces the risk that implementation tools and operations distort market structure or incentives. That said, if frictions limit arbitrage opportunities between markets, interacting with a broad set of counterparties may be necessary to achieve the desired financial conditions. These frictions are likely to be particularly high in times of stress, as was observed during the 2007-2009 financial crisis; and money markets and other financial markets may become disconnected, which could limit the transmission of monetary policy. Unanticipated changes to business practices and new regulations could create some frictions even in normal times.⁴¹

⁴¹ See the "Money Markets" memo for more detail.

- **Interbank Market:** Operating on the steep part of the demand curve for reserves is the only operating regime in which a vibrant interbank federal funds market is likely to arise. This consideration could be important for policymakers who have a preference for retaining the funds rate as the policy rate.
- **Transitioning to the Effective Lower Bound:** It is important to think about how a framework would function in another period of very low interest rates. This issue is discussed in the next section, but included in this list of considerations to keep it in mind when choosing a LRF.

4. Effective Lower Bound Considerations

How the different frameworks perform around the effective lower bound (ELB) is a new consideration that was not contemplated in the staff's 2008 LRF work. With most models and policymakers' projections suggesting the current level of the neutral real interest rate (r^*) is very low and will only gradually rise, the frequency and duration of future episodes in which monetary policy is confronted with short-term rates around zero will likely be higher than in the past. As a result, it is important to consider how the framework choices work at or below the zero lower bound.⁴² We consider potential implications for the operating regime resulting from LSAPs, large liquidity injections, and the introduction of negative rates. We find that frameworks 1 and 3, those with abundant reserves, will most likely need less special considerations at the ELB, while framework 2 will need to lean on tools to maintain a relatively low level of excess reserves or transition to a floor regime. All regimes have the same considerations with respect to negative rates.

LSAPs will most likely be an active tool at the effective lower bound, which would add reserves to the system. If there are liquidity strains in markets, then adding reserves through purchases and possibly credit and liquidity programs may be desired. In an OR similar to the current regime, such as case 1, this would imply moving out along the flat portion of the reserve demand curve. With the availability of tools like interest on reserves and the ON RRP, and as

⁴² Of course, there are potential policy responses to the chance that the ELB will be hit more frequently that go beyond the implementation framework. For examples, see John Williams, "Monetary Policy in a Low R-star World," Federal Reserve Bank of San Francisco Economic Letter, August 15, 2016.

demonstrated when rates were successfully lifted in December 2015, the stance of policy most likely can be implemented effectively even with extraordinarily high levels of reserve balances. If instead, as was effectively the situation in late 2008, a decision to initiate LSAPs or liquidity programs when operating on the steep part of the demand curve for reserves, such as case 2, would require a decision to remain in that regime or move to the flat portion of the demand curve.⁴³ If the former decision is made, policymakers would need to sterilize the impact of the additional reserves. They have several tools at their disposal for doing so, notably standing or discretionary ON RRP and term deposits.⁴⁴ With VRTs, since there is little opportunity cost of holding reserves because they earn the policy rate, it could be the case that banks would increase their targets for reserves, which would allow some increase in the supply of reserves. Alternatively, policymakers could consider using a Maturity Extension Program (instead of a LSAP) if feasible with the balance sheet maturity distribution, or bundling purchases with draining tools such as term deposits and RRP.⁴⁵ If instead policymakers decide to transition to the flat portion of the demand curve, they would utilize tools like IOER, and ON RRP, to aid interest rate control. The ON RRP facility could provide more confidence that interest rate control can be maintained during the transition. Finally, if operating in a repo regime, any excess liquidity would put downward pressure on market repo rates which would spur take-up at the standing ON RRP facility. So overall, all the regimes would likely accommodate LSAPs, but potentially with different tools and some transition costs.

Another consideration at the ELB is negative rates. The general aim would be to maintain the relationship between the policy rate and money market rates so that setting a negative level of the policy rate would result in a lower path of short-term interest rates. In order to maintain incentives for federal funds trading in a regime with a negative IOER rate and a large supply of reserves due to LSAPs, the Federal Reserve would likely need to adjust the terms and conditions for balances maintained at the Federal Reserve by GSEs since their account balances are

⁴³ This distinction is particularly relevant if the policy rate remains above zero. That said, even at the effective lower bound the Committee would face the choice of keeping the supply of reserves small or letting it expand.

⁴⁴ As noted above, maintaining the capacity to implement large scale ON RRP would likely require some regular transactions with an extended set of counterparties to assure operational readiness.

⁴⁵ So-called “Fed bills” would be an especially powerful draining tool. These would be unsecured liabilities that the Federal Reserve could issue to a wide class of investors. The Federal Reserve does not have the authority to issue Fed bills under current law but policymakers may want to consider ways to engage Congress if desired.

currently unremunerated.⁴⁶ Eurodollars and repos do not face these same complications, but all market rates are likely to face varying degrees of operational challenges.

5. Liquidity backstop tools

We have already discussed how liquidity provisioning tools, such as the ceiling tools, and discretionary OMOs can play a role in normal operations guiding market rates towards the policy target. In this section, we highlight the role of these facilities in providing a backstop source of liquidity, either for firms' idiosyncratic needs or, more broadly, in times of market stress, separate and apart from the discussion of such facilities serving to provide a ceiling within an operating regime. Below we discuss two basic issues—the degree of “integration” of such backstop tools in the monetary policy implementation framework and the appropriate range of collateral and counterparties for facilities.

The memo “Standing Lending Facilities” provides background on the rationale for these facilities, their current operations, and considers the level of integration backstop tools should have in a monetary policy implementation framework. It also discusses the issues of counterparties and collateral in the liquidity facility context.

5.1 Facility Integration

Motivated by the potential for financial stress to arise with little warning, policymakers might want to consider their preferred level of readiness of backstop tools as they develop their LRF. As discussed in the “Standing Lending Facility” memo, it is useful to consider three basic levels of readiness—full integration of a policy tool in the MPI, “conditional” tools that can be implemented relatively quickly under a predefined set of criteria, and “inactive” tools that can be implemented if necessary but are not regularly used or tested.

Policymakers may prefer liquidity backstop tools to be fully integrated into the MPI framework. The integrated approach would provide the most operational readiness. The more integrated option could have the potential to limit the extent of liquidity hoarding during periods of

⁴⁶ If the Committee wanted to set the policy rate negative with scarce reserves, interbank trading would likely be maintained. However, other GSE arbitrage options would need to be addressed, such as not allowing these institutions to issue agency debt at negative rates and then deposit these funds in their Federal Reserve account, if their reserve balances earn zero.

developing stress given that market participants recognize that firms could have access to central bank liquidity. These benefits, however, might come with relatively more moral hazard compared to other options, as well as have the greatest chance of altering how markets and firms would otherwise operate and organize themselves. In contrast, policymakers might prefer less integrated approaches—which we call conditional or inactive—given relatively lower potential for moral hazard and effects on firm operations but with the downside of more operational and communication challenges at the point of market stress.

The experience with swap lines highlights the potential benefits, and some costs, with moving a liquidity facility to more integrated status.⁴⁷ The Term Auction Facility (TAF) may be the only program where policymakers may view the level of integration decision as salient in the near term. The TAF may offer a tool to provide liquidity to the market with less stigma than the discount window. The shift of the TAF to a more integrated status may offer some advantages but these would come with costs that could offset benefits, discussed more fully in the “Standing Lending Facilities” memo.

5.2 Counterparties and collateral

The effectiveness with which a facility contributes to rate control or plays one of the liquidity backstop roles depends on its range of eligible counterparties and collateral, which for the Federal Reserve is determined under specific legal authority. For a facility aimed at addressing liquidity pressures, a broad range of counterparties would provide the central bank with an ability to address broad-based liquidity strains from the outset. However, a broader range of counterparties increases the potential for moral hazard and the likelihood that the facility will alter the operations and structure of firms. These tradeoffs may be one consideration in setting counterparties for a facility aimed solely at interest rate control whereas broad a set of counterparties may not be necessary to achieve its operational goal. That said, interacting with a narrow set of counterparties could be viewed as a distortion by conferring a special status to a small subset of firms.

The collateral accepted at a facility also plays a large role in its effectiveness. The less liquid is the collateral accepted at the facility, the more liquidity transformation occurs. Higher levels of

⁴⁷ For a discussion of swap lines see the memo “Addressing Global Dollar Liquidity Strains: The Role of the Federal Reserve’s Swap Arrangements” distributed on October 7, 2016.

liquidity transformation yield a more effective liquidity backstop by converting increasingly more illiquid collateral into a smaller quantity of highly liquid assets. There is a cost to providing more liquidity transformation, however. Such collateral may have more uncertain ongoing and liquidation value and thus potentially greater credit risk. Moreover, acceptance of collateral that no private agent would take might contribute to the stigma of using the facility.