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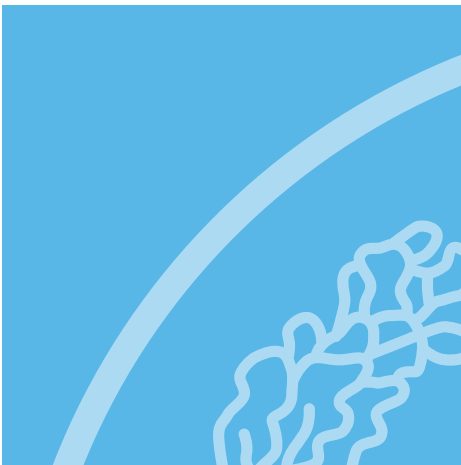
Liquidity and Leverage  
Regulation, Money Market  
Structure, and the Federal  
Reserve's Monetary Policy  
Framework in the Longer Run

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# Liquidity and leverage regulation, money market structure, and the Federal Reserve's monetary policy framework in the longer run

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This note demonstrates that recent changes in bank regulation will have foreseeable and material consequences for the structure of, and pricing in, money markets once the Federal Open Market Committee's ("FOMC's") balance sheet normalizes and something closer to normal levels of trading return to money markets. We also show that new bank regulations will constrain the FOMC's choices for its longer-run monetary policy framework.

Specifically, we show that money market term spreads will follow a simple formula that is shaped by liquidity requirements and depends on banks' leverage ratio requirements, their cost of equity financing, and the money premium (i.e., the discount in yield that investors are willing to accept on money-like assets).<sup>1</sup> An implication of that formula is that term spreads in money markets will be wider than before the 2007-09 financial crisis as banks demand more term funding in order to reduce their required holdings of low-yielding liquid assets, and that banks bound most closely by leverage ratio requirements will tend to borrow term from banks bound most closely by risk-based capital requirements.

Regarding the FOMC's monetary policy framework in the longer run, if the Federal Reserve were to require banks to hold their liquid assets in part as excess reserve balances, then it would be very difficult for the FOMC to return to a monetary policy framework similar to the one it used pre-crisis because money-market term spreads would be unsustainably high. On the other hand, if the FOMC were to adopt a framework that resulted in money market rates that were close to the interest rate the Fed pays on excess reserves, banks would likely demand very high levels of excess reserves. To accommodate that demand, the FOMC's portfolio of government securities would need to be much larger than it was before the crisis, even after adjusting for trend growth in currency. The combination of large holdings of government securities and large interest payments to U.S. and foreign banks could bring political scrutiny. If so, the only monetary policy framework option that is both feasible and politically palatable may be for the Fed to keep market rates well above the interest rate it pays on excess reserves and allow banks to meet their liquidity requirements almost entirely with assets other than excess reserve balances.

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<sup>1</sup> A "term spread" is the spread between interest rates on money market instruments with maturities greater than overnight and the overnight money market rate.

# Money market pricing and composition

## BACKGROUND

### *Federal funds market*

The federal funds market is the market where U.S. banks, U.S. branches of foreign banking organizations (FBOs), and government sponsored enterprises (GSEs) such as Fannie Mae, Freddie Mae, and the Federal Home Loan Banks (essentially, all the institutions that have accounts at Federal Reserve Banks) lend to each other on an unsecured basis, primarily overnight. Historically, banks and GSEs used the market, in part, to lend or borrow excess funds in the late afternoon so that their accounts at the Fed ended the day with a positive but small balance because prior to the crisis excess reserves did not earn interest. However, apart from some idiosyncratic trading between GSEs and the U.S. branches of FBOs, the federal funds market is currently largely shut down because of the high level of reserves. But as the level of excess reserves gradually shrinks over the coming years (as currency outstanding grows and perhaps at some point as the Federal Reserve allows its securities to mature without replacement), trading in the federal funds market will likely revive.<sup>2</sup> The interest rate that the FOMC targets to conduct monetary policy is the effective federal funds rate, the transaction-weighted average of interest rates charged on overnight loans in the federal funds market.

2 The Federal Reserve Bank of New York projects reserve balances to reach steady state levels in the second quarter of 2022. "Domestic open market operations during 2015," Markets Group of the Federal Reserve Bank of New York, April 2016, p. 31, <https://www.newyorkfed.org/medialibrary/media/markets/omo/omo2015-pdf.pdf>

### *The liquidity coverage ratio*

The keystone of post-crisis liquidity regulation is the liquidity coverage ratio (LCR) requirement. The LCR is designed to measure the ability of a bank to weather a 30-day period of severe idiosyncratic and market stress, without defaulting on its obligations.<sup>3</sup> The measure is defined as the ratio of a bank's high quality liquid assets (HQLA) to its projected stress net cash outflow:

$$LCR = \frac{HQLA}{30 \text{ day cash outflow} - 30 \text{ day cash inflow}} \quad (1)$$

HQLA must consist of at least 60 percent excess reserves and Treasury securities (referred to as level 1 HQLA). In the United States, the other 40 percent is primarily agency securities and agency mortgage backed securities (level 2 HQLA), which are subject to a 15 percent haircut.<sup>4</sup> While all Treasury securities qualify as level 1 HQLA, for simplicity, we assume banks only hold HQLA in the form of excess reserves and Treasury bills ("Tbills").

3 In addition to the liquidity coverage ratio requirement, the U.S. banking agencies have put out for comment a proposal to hold banks to a second liquidity requirement—the net stable funding ratio requirement. (NSFR). While this note focusses exclusively on the LCR, the NSFR will likely intensify the pressures discussed here. See the TCH research notes "The Net Stable Funding Ratio: Neither Necessary nor Harmless," July 2016, <https://www.theclearinghouse.org/issues/articles/2016/07/20160705-tch-publishes-research-note-on-nsfr>, and "Liquidity Regulations, the Neutral Real Federal Funds Rate, and the Money Premium," August 2016, <https://www.theclearinghouse.org/issues/articles/2016/08/20160824-tch-research-note-on-liquidity-and-money-premium>.

4 There are a number of additional complexities about the LCR that we are ignoring for simplicity but that can have material effects. For one, inflows cannot exceed 75 percent of outflows. For another, in the U.S., the HQLA need is calibrated to the deepest hole the bank reaches over 30 days, which is often on day one or two, not the liquidity need at 30 days. (See CGFS Papers No. 54, "Regulatory change and monetary policy," Committee on the Global Financial System and the Markets Committee, May 2015. p. 23.)



### Leverage ratio requirements

A second set of post-crisis reforms that will be important for money market dynamics includes the supplementary leverage ratio (SLR) requirement, the enhanced supplementary leverage ratio (eSLR) requirement, and the post-stress minimum leverage ratio in the Fed's annual bank stress tests. The SLR rule requires U.S. banks to maintain capital equal to 3 percent of assets plus certain off balance sheet items ("leverage exposure"). The eSLR rule requires the eight U.S. globally systemically important bank holding companies (GSIBs) to maintain capital equal to 5 percent of leverage exposure on a consolidated basis and 6 percent at their commercial bank subsidiaries.<sup>5</sup> The leverage ratio requirement incorporated into the stress tests requires that banks be able to pass a leverage ratio requirement of 4 percent (but on the older basis that depends only on average assets and doesn't include any off balance sheet items) after weathering the stress test. These leverage requirements differ importantly from risk-based capital requirements in that they require banks to hold capital against the riskless assets included in level 1 HQLA whereas risk-based requirements do not. A recent TCH research note indicated that about half of large U.S. banks are more closely bound by the leverage ratio requirement in the stress tests than by a risk-based requirement.<sup>6</sup>

## TERM SPREADS IN MONEY MARKETS

As is clear in equation 1, a bank can increase its LCR in one of three ways: (i) it can increase its holdings of HQLA; (ii) it can decrease its

projected 30-day cash outflow; or (iii) it can increase its projected 30-day cash inflow. More importantly, if a bank borrows unsecured in the interbank market for a term greater than 30 days, then the repayment of the loan does not show up as a cash outflow, whereas if the bank borrows overnight, it does.

That said, as indicated in footnote 4, in the U.S., banks are required to hold sufficient HQLA to address their deepest liquidity need rather than their need at 30 days. Although, in this note we will generally refer to the "30 day horizon", because banks' peak projected liquidity needs often occur after only 1 or 2 business days, the term rates relevant for the analysis could include any borrowing or lending that is longer than overnight.

Over time, banks will presumably seek to satisfy the LCR in the least costly manner possible.<sup>7</sup> Consequently, after the financial system has completely adjusted to the new regulations, there should be no transactions available to a bank that increases its profits and leaves it compliant. For example, a bank that is bound by a leverage ratio requirement and LCR should not find it profitable to lengthen the maturity of its money market borrowing from overnight to term, even though that shift will allow it to reduce the HQLA it needs to comply with the LCR and the capital it needs to comply with the leverage requirement. Such a transaction can be described

5 The SLR and eSLR calculates capital relative to a bank's "total leverage exposure," which equals total assets plus a measure of the exposure from certain off balance sheet items.

6 "Shortcomings of Leverage Ratio Requirements, August 2016, <https://www.theclearinghouse.org/issues/articles/2016/08/20160809-tch-research-note-on-shortcoming-of-the-leverage-ratio>

7 By "least costly", we mean that banks will satisfy their LCR in a manner that maximizes their profits given external market forces or imperfections that will factor into financial asset prices such as the equity premium or the money premium. We simply assume, for instance, that investors pay a premium for money-like assets (see Greenwood, Robin, Samuel G. Hanson, and Jeremy C. Stein, 2015, "A Comparative-Advantage Approach to Government Debt Maturity," *Journal of Finance* LXX (4): 1683-1722.) Moreover, in our examples, we assume that Modigliani-Miller is violated, equity is expensive, and that a bank's equity premium is essentially invariant to marginal changes in its portfolio.

with the following two steps, which should be thought of as occurring simultaneously:

### Step 1

The bank allows \$1 in the overnight market to mature and replaces it with \$1 in the term market.<sup>8</sup>

### Step 2

The bank sells \$1 in HQLA and buys back \$λ of equity and repays \$(1-λ) in the term market.

### Compliance

The bank remains compliant with the LCR because it has reduced its cash outflow (the outflow that occurs when the overnight loan is scheduled to be repaid) by \$1 and holds \$1 less in HQLA. It remains compliant with the leverage ratio requirement because its assets have declined by \$1 and its capital has declined by \$λ.

### Asset prices that leave the bank indifferent about the transaction

In sum, the bank has reduced its HQLA and overnight borrowing by \$1, reduced its equity by \$λ, and increased its term borrowing by \$λ. If the overnight federal funds rate is  $r^{ff}$ , the term money market rate is  $r^t$ , the rate on HQLA is  $r^h$ , and the required return on equity is  $r^e$ , then equating the change in borrowing cost with the change in interest earnings yields:

$$-r^{ff} + \lambda r^t - \lambda r^e = -r^h \quad (2)$$

Rearranging term (and adding  $r^t$  to both sides of the equation) yields:

<sup>8</sup> As noted above, in the United States, banks have to hold HQLA to satisfy their peak liquidity need, which often occurs on day 2 or 3. Consequently, the term borrowing under consideration could mature in just a few days rather than after 30 days and leave the bank LCR compliant.

$$(r^t - r^{ff}) = \lambda (r^e - r^t) + (r^t - r^h). \quad (3)$$

When equation 3 holds, a bank bound by a leverage ratio requirement and the LCR that terms out its borrowing would find that the added expense of the term borrowing equaled the reduction in cost associated with the smaller holdings of low-yielding HQLA and of the associated required equity. The left hand side of equation 3 is the money market term spread. At its peak, during the crisis, the 30 day Eurodollar/overnight fed funds spread exceeded 100 basis points, but historically it has averaged about 10 basis points.<sup>9</sup> The first term on the right hand side,  $\lambda (r^e - r^t)$ , is the bank's leverage requirement times its equity premium (the amount by which its cost of equity exceeds the term money market rate).<sup>10</sup> The second term on the right hand side,  $(r^t - r^h)$ , is the amount by which the yield on the assets in HQLA is below the term money market rate. Because most of the assets that qualify as HQLA are valuable as money substitutes (low-risk investments that mature soon or can be sold quickly without moving the market), the amount by which average yields on HQLA are below the term money market rate is one measure of what is often referred to as the "money premium."<sup>11</sup> For instance, over the 10 years before the crisis, the 30-day Tbill rate averaged about 30 basis points below the 30-day Eurodollar rate.

Equation 3 ties together three key financial money market risk premiums: the money

<sup>9</sup> The examples provided in the note are subject to the Lucas critique as well as evolving market structures and are simply meant to be illustrative.

<sup>10</sup> The term money market rate is an appropriate discount factor for the required return on equity because it is a short-term rate that is not distorted by the demand created by the LCR.

<sup>11</sup> For a further discussion of the money premium, see Greenwood et al (2015).



market term spread, the bank's equity premium, and the money premium. Specifically, the term spread will equal the leverage requirement times the bank's equity premium plus the money premium. For example, if the bank's equity premium is 7 percent, the leverage requirement is 5 percent, and the money premium is 30 basis points, the money market term spread would be 65 basis points, well above its historical average.

Equation 3 only applies if the bank is bound by the leverage ratio requirement, not a risk-based capital requirement. Banks bound most tightly by a risk-based requirement do not need to hold equity against reserve balances or T-bills (the types of HQLA we are considering) at the margin, so for those banks, the equation determining the term spread would be:

$$(r^t - r^{ff}) = (r^t - r^h) \quad (4)$$

In this case, the term spread would equal the money premium, or about 30 basis points — closer to the historically average term spread of 10 basis points.<sup>12</sup>

Equation 3, which assumes the bank is bound by a leverage ratio requirement, indicates that the term spread will be about 65 basis points

and equation 4, which assumes the bank is bound by a risk-based capital requirement, says the spread will be 30 basis points. Both equations can't hold, and it is unclear what the actual term spread will be. But there are two clear implications. First, the term spread will lie somewhere between the amount specified by equations 3 and 4. And second, it will be profitable for banks that are not bound by the leverage requirement to lend term funds to banks that are bound by the leverage requirement. When the term spread is between the amounts given by equations 3 and 4, such trades would be profitable for both types of banks.

A common measure of the term spread in money markets is the 90-day Libor-OIS spread, as the OIS swap rate settles to the average overnight federal funds rate.<sup>13</sup> Indeed, that spread has widened sharply in recent months, from about 20 basis points to about 40 basis points. The widening is reportedly the result of the massive shift out of prime money funds and into Treasury-only funds, and the corresponding reduction in the supply of term funding for banks.<sup>14</sup> The analysis presented in this note suggests the wider spreads could persist as banks bid aggressively for term funds that allow them to reduce their holdings of low yielding HQLA along with the associated capital charge under the leverage ratio requirements.

12 The lower term spread in equation (4) would hold for all banks if (i) leverage requirements were calibrated as backstops to risk-based requirements rather than binding requirements (see the TCH research note on the leverage ratio cited in footnote 6), or (ii) reserve balances and Treasury securities were excluded from the definition of assets used to calculate leverage ratios on the view that banks should not be required to hold capital against riskless assets. The Bank of England, for example, recently decided to exclude reserves from the calculation of the leverage ratio in the United Kingdom, see <http://www.bankofengland.co.uk/pr/ Documents/publications/reports/prstatement0816.pdf>.

13 While both measures should include the same traditional term premium to compensate for the associated interest rate risk, the demand for cash inflows created by the LCR should push down the overnight federal funds rate but not the 90 day Libor.

14 See, for example, Abate, Joseph, "Money Markets Monthly Update," Barclays Interest Rate Research, August 2016.

# FOMC longer-run monetary policy framework

The minutes to the July 2015 FOMC meeting state that the Fed was beginning a major project to evaluate different potential monetary policy frameworks that the FOMC could adopt in the longer run after interest rates and its balance sheet normalized.<sup>15</sup> In the July 2016 FOMC meeting (as recorded in the minutes), the Committee received an extensive briefing on, and then discussed, staff work on a potential longer-run framework. In the discussion, the FOMC participants observed:

*Importantly, the policy implementation framework would need to be consistent with recent changes in regulation designed to enhance the stability of the financial system.<sup>16</sup>*

Analysis similar to that in the previous section suggests that some plausible choices for the FOMC's monetary policy framework will be inconsistent with some conceivable supervisory objectives for commercial bank liquidity.

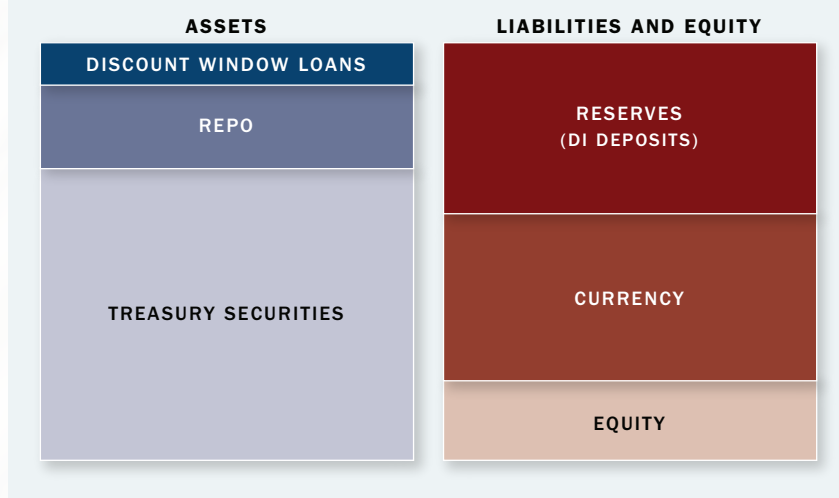
A monetary policy framework consists of the interest rate to be targeted, the tools used to hit that target, and choices concerning the composition of the central bank's balance sheet. One key distinction between frameworks is whether policy is conducted using a corridor system or a floor system, which we describe next.

## BACKGROUND

### *Federal Reserve Balance Sheet*

Any discussion involving monetary policy has to begin with the central bank's balance sheet. In the case of the Fed, the balance sheet is relatively simple. As depicted in Exhibit 1, before the financial crisis, assets consisted primarily of Treasury securities owned outright, repurchase agreements of Treasury securities,<sup>17</sup> and discount window loans, while liabilities consisted of currency and deposits of banks (either required reserves or excess reserves). The Fed generally kept the amount of Treasury securities owned outright about equal to the amount of currency and discount window loans were on most days close to zero. Because currency and equity were essentially fixed, the FOMC could determine exactly the amount of reserves balance by adjusting the amount of securities it owned,

### EXHIBIT 1: SIMPLIFIED FEDERAL RESERVE BALANCE SHEET



15 "Minutes of the Federal Open Market Committee, July 28-29, 2015," <https://www.federalreserve.gov/monetarypolicy/files/fomcminutes20150729.pdf>

16 "Minutes of the Federal Open Market Committee July 26-27, 2016," p. 3. <https://www.federalreserve.gov/monetarypolicy/files/fomcminutes20160727.pdf>

17 Confusingly, the Fed refers to reverse transactions from the perspective of the counterparty. So they refer to reverse repos, which are an asset, as repos.



with those adjustments typically occurring in the repo portfolio. Since banks earned no interest on excess reserves, they usually sought to keep excess reserves as low as possible.

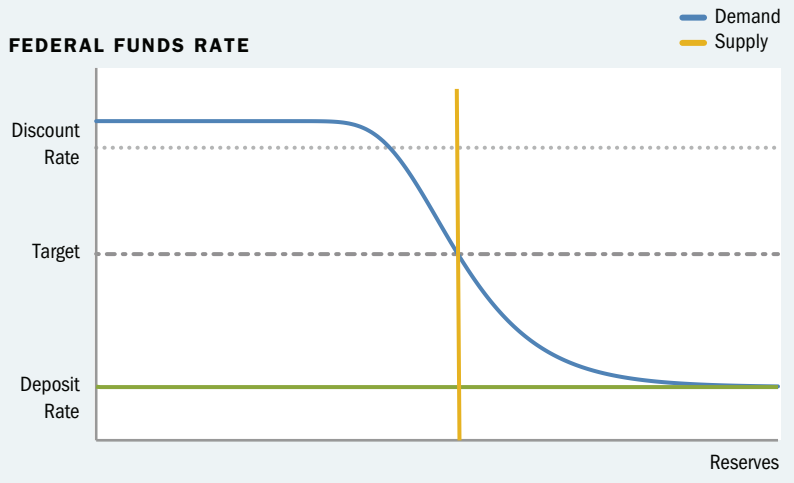
Monetary policy consists of adjusting central bank assets so that the right quantity of reserves is created to meet bank demand at the targeted interest rate. Generally, banks will not borrow reserves in the marketplace for much more than they can borrow them at the discount window, and they will not lend reserves in the marketplace for less than they can earn on deposit at the Fed.<sup>18</sup> As a result, the demand for reserves, as depicted by the blue line in Exhibits 2 and 3, below, has a ceiling at the discount rate and a floor at the deposit rate.

Prior to the crisis, the FOMC conducted monetary policy using a *corridor system*. The FOMC established a target for the overnight federal funds rate, and the Fed set the discount rate 100 basis points above that target. Prior to October 2008, the Fed did not have the authority to pay interest on reserve balances, so the floor for its corridor was zero. However, the ECB, which was also conducting policy using a corridor system and also set its discount rate 100 basis points above its target for overnight rates, paid interest on excess reserves equal to 100 basis points below its target. Consequently, it is reasonable to think of a normal pre-crisis monetary policy corridor as 200 basis points wide.

With the Interest on Excess Reserves (IOER) rate 100 basis points below market rates, banks

18 The Federal Reserve's standing loan facility for banks and other depository institutions is referred to as "the discount window" and the interest rate charged on those loans is called the "discount rate." Depository institutions can borrow overnight from the Federal Reserve on a no-questions-asked basis against a broad range of collateral, but because of stigma associated with the discount window, banks are reluctant to borrow. Consequently, the demand curve for reserves rises above the discount rate.

## EXHIBIT 2: CORRIDOR SYSTEM

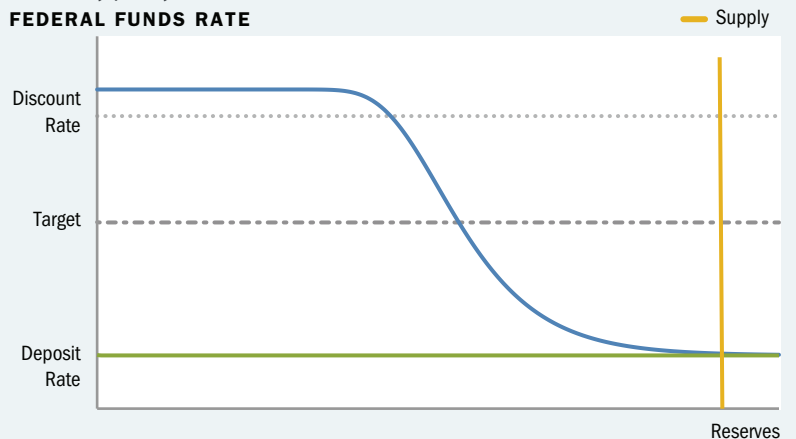


would only wish to hold a small amount of excess reserves, likely something on the order of \$1-2 billion, the amount of excess reserves banks held, on average, prior to the crisis. The FOMC would keep the federal funds rate near its target by adjusting the size of its balance sheet so that it was supplying only that small quantity of reserves, as depicted in Exhibit 2.

In a *floor system*, depicted in Exhibit 3, the interest rate that the Fed would pay on reserves would be about equal to market rates. In that case, banks would be willing to hold substantially more excess reserves. The FOMC could choose to supply excess reserves that exceed what banks would demand in a corridor system by a relatively small amount or by a large amount. In either

## EXHIBIT 3: FLOOR SYSTEM (CURRENT SITUATION)

*Impact of LCR and leverage ratio requirement on the longer-run monetary policy framework*





case, interest rates would fall to the IOER rate and the FOMC would hit its target because the banks' demand curve for reserves is horizontal at the IOER rate (the deposit rate).<sup>19</sup> The most significant difference between the FOMC's balance sheet now and its balance sheet before the crisis is that, because of the FOMC's large-scale asset purchases, excess reserves are currently about \$2½ trillion. At that extraordinary level, market rates are close to, but a bit below, the IOER rate.<sup>20</sup>

If the FOMC chose to adopt a corridor system with a pre-crisis-normal width, then banks would likely satisfy their LCR by holding Tbills, not excess reserve balances, because excess reserve balances, with yields 100 basis points below market, would be very expensive. If the FOMC chose to adopt a floor system, banks would likely hold reserves, rather than Tbills, because, as noted above, Tbill rates tend to be below the federal funds rate.

But suppose, as Zoltan Pozsar did in a recent research note, that the Fed required banks to hold a certain quantity of HQLA as excess reserves.<sup>21</sup> In that case, if the fraction were material, it would be difficult or even impossible for the Fed to operate a corridor system because the resulting term spread would be too high.

19 The FOMC might wish to keep excess reserves high for a variety of reasons: If excess reserves are high then market rates would remain about unchanged if the demand for reserves varied, requiring fewer interventions on the part of the Fed to keep rates near its target. In addition, there may be financial stability benefits associated with the Fed providing a large amount of money-like assets, because the incentive for the shadow banking system to create such assets would be reduced (see, for example, "The Federal Reserve's Balance Sheet as a Financial-Stability Tool," a paper by Robin Greenwood, Samuel Hanson, and Jeremy Stein presented at the 2016 Jackson Hole Symposium).

20 Or quite a bit below: In "Passthrough Efficiency in the Fed's New Monetary Policy Setting," a paper presented at the 2016 Jackson Hole Symposium, Darrell Duffee and Arvind Krishnamurthy report that the federal funds rate could remain about 25 basis points below the IOER rate when reserves are plentiful because of term and credit effects.

21 Pozsar, Zoltan, "Global Money Notes # 5, What excess reserves?" Credit Suisse, 13 April 2016.

To see that, assume a bank, not bound by a leverage ratio, engages in the same transactions used to define equation 4 above, but now the dollar in HQLA sold equals  $\mu$  in excess reserves and  $(1-\mu)$  in Tbills. Define the rate on excess reserves to be  $r^x$  and the rate on Tbills to be  $r^b$ . The analogue to equation 3 is:

$$r^t - r^{ff} = \mu(r^t - r^x) + (1 - \mu)(r^t - r^b). \quad (5)$$

If IOER is  $\omega$  below the federal funds rate, then substituting and rearranging terms yields:

$$r^t - r^{ff} = \frac{\mu}{(1-\mu)} \omega + (r^t - r^b). \quad (6)$$

If the FOMC chose a monetary policy corridor that was 200 bp wide, as was normal historically, then  $\omega$  would equal 100 basis points. If the Fed required a third of HQLA to be excess reserves, then  $\frac{\mu}{(1-\mu)}$  would equal one half, so the term spread would equal 50 basis points plus the money premium. Using the historically average money premium of 30 basis points, equation 6 indicates the term spread would be 80 basis points in this case.

If the bank were bound by the leverage ratio requirement, the term spread would be boosted further, by the same amount as in equation 3 (35 basis points), discussed above, and as shown in equation 7.

$$r^t - r^{ff} = \frac{\mu}{(1-\mu)} \omega \text{ bp} + (r^t - r^b) + \lambda (r^e - r^{ff}) \quad (7)$$

Specifically, the term spread would have to be about 115 basis points.

The spread implied by equations 6 or 7, or looked at another way, the cost of compliance with the LCR in this case, seems too high to be sustainable. Therefore, rather than banks engaging in liquidity and maturity transformation while holding a prudent amount of HQLA, liquidity transformation would likely shift into the unregulated sector.

### *Feasible options*

To avoid that outcome, the Fed would appear to have two options. *First*, it could adopt the requirement hypothesized by Pozsar (2016) that HQLA consist in material part of excess reserve balances and adopt a floor system for its monetary policy framework. In that case, the FOMC would provide banks the quantity of excess reserve balances needed to push overnight rates down to IOER and term rates down nearer overnight rates. In equation (6),  $\omega$  would equal zero, delivering a term spread that was substantially lower. However, even if the Fed adopted an excess reserve requirement that left excess reserves at less than half their current level, excess reserves could easily end up at \$1 trillion or more, implying the FOMC's holdings of government securities would be similarly higher.

The FOMC currently judges that the longer-run normal level of the federal funds rate is 3¼ percent. At that level, if the FOMC set IOER equal to its target for the funds rate and reserves were equal to \$1 trillion, annual interest payments by the Fed to commercial banks and U.S. branches of foreign banks would equal \$32.5 billion. Most of those payments would go to very large U.S. and foreign banks. Such large payments, as well as large holdings of government securities, could result in increased political scrutiny that the FOMC might prefer to avoid.

That said, even if the Fed did not require banks to hold HQLA in the form of excess reserves, if the Fed adopted a floor system, the outcome could be nearly the same. Banks would likely choose to hold excess reserves rather than Tbills, because the yield on Tbills is lower; to hit its target for the federal funds rate, the FOMC would need to meet that demand for reserves to prevent the federal funds rate from rising off the floor set by IOER. As a result, the FOMC could still end up with massive holdings of government securities and massive interest payments on excess reserves.

The *second* option would be for the Fed to continue with its current policy and not require that HQLA consist in material part of reserve balances, and for the FOMC to adopt a corridor system for its monetary policy framework. In that case, banks would hold only a small quantity of excess reserves, leaving the FOMC's holdings of government securities at historically normal levels and interest payments on excess reserves that were much lower.<sup>22</sup>

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22 Under these assumptions, the two approaches, corridor and floor frameworks, would result in approximately equal quantities of net profits for the FOMC and so similar remittances to the Treasury. As noted above, the Federal Reserve Bank of New York's projections for the FOMC's balance sheet assumes normalization in 2022. At that time, if currency grows at the rate of nominal GDP projected by the Survey of Professional Forecasters, currency will equal \$1.7 trillion. Under a corridor system, with the IOER rate equal to 2¼ percent, excess reserves equal to \$2 billion, and the Tbill rate equal to 3.05 percent (assuming all FOMC assets are Tbills), FOMC profits would equal about \$52 billion. Under a corridor system, with the IOER rate equal to 3.25 percent and excess reserves equal to \$1 trillion, FOMC profits would equal about \$50 billion. While the FOMC could choose to hold longer-term Treasury securities, the Fed's estimates indicate that term premiums on such securities are negative, indicating that such a strategy would be less, not more, profitable, on average, over time. See the current term premium estimates provided with D. Kim and J. Wright, "An Arbitrage-Free Three-Factor Term Structure Model and the Recent Behavior of Long-Term Yields and Distant-Horizon Forward Rates", FEDS working paper 2005-33. <https://www.federalreserve.gov/pubs/feds/2005/200533/200533abs.html>