

April 19, 2013

Update on Alternative Frameworks for Monetary Policy Implementation¹

At its April 2008 meeting, the FOMC reviewed a memo (hereafter referred to as the “2008 memo”) investigating possible frameworks for monetary policy implementation, based partly on systems employed in other countries.² Broadly speaking, the frameworks were differentiated in design by a few key elements such as the extent to which they relied on a system of requirements to establish a stable demand for reserves, whether the system of requirements involved an element of “averaging” across a multi-day maintenance period, and the extent to which each system employed a “corridor” to limit the daily variation in the federal funds rate. This note summarizes the operating frameworks discussed in the 2008 memo and also discusses a number of factors that have changed since then that may have some bearing on the design of the operating regime that policymakers may wish to implement when the level of reserves has been returned to more normal levels.³

Summary of Operating Frameworks Reviewed in 2008

In the 2008 memo, the staff analyzed five different potential long-run operating frameworks. Two of the implementation frameworks discussed in the earlier work—a modified version of the existing system based on mandatory reserve requirements and a framework based on voluntary balance targets—involved a system of requirements coupled with a multiday maintenance period. In addition, these frameworks established a symmetric corridor for the federal funds rate, with the ceiling determined by the primary credit rate and the floor determined by the interest on excess reserves rate (IOER). The remaining three frameworks dispensed with any form of multiday reserve maintenance period and focused instead on “daily balance” systems in which the daily demand for and supply of reserves were the key factors influencing the level of the federal funds rate. A brief summary of each framework is provided below.

Multiday Systems

The staff discussed two possible multiday operating regimes. The first was a simplified version of the existing system of mandated reserve requirements applied against transaction accounts to establish a stable demand for reserves. This variation on the existing system also incorporated a

¹ Sophia Allison, Chris Burke, Seth Carpenter, Jim Clouse, Patrick Dwyer, Bill English, Jane Ihrig, Laura Lipscomb, Lorie Logan, Stephanie Martin, Jamie McAndrews, Steve Meyer, Bill Nelson, Julie Remache, Zeynep Senyuz, Jeff Stehm, Jeff Walker, Gretchen Weinbach, and Patricia Zobel.

² For more detail, see the staff memo for the April, 2008 FOMC meeting entitled, “Interest on Reserves: A Preliminary Analysis of Basic Options.”

³ See the companion memo by David Bowman, Michiel DePooter, and Mike Leahy entitled “Update on Foreign Central Bank Operating Procedures and the Foreign Experience with Using Interest on Reserves as a Monetary Policy Instrument” for a discussion of the evolution of foreign country experience with operating regimes and interest on reserves over recent years.

funds rate “corridor” to help limit day to day variation in the funds rate. As discussed in more detail below, this system also introduced some structural changes that simplified the existing system of reserve requirements in several important ways. The second type of system in this category was very similar to the first in many respects but replaced mandated reserve requirements with a system of voluntary balance targets.

- Simplified Version of Existing System of Reserve Requirements: Under the Federal Reserve’s existing framework for monetary policy implementation, reserve requirements establish a fairly stable demand for reserves and, in ordinary times, the Desk closely manages the daily supply of reserves in order to keep the federal funds rate close to the FOMC’s target federal funds rate. A key feature of this system is that requirements are satisfied by the average level of balances held by depository institutions (DIs) over the maintenance period. The “averaging” feature of the current system of reserve requirements helps to stabilize the federal funds rate by providing flexibility for DIs to adjust their holdings of reserves on particular days in response to market developments. Depositories generally hold reserves sufficient to satisfy their reserve requirements along with a modest buffer of “excess reserves” to guard against penalties for reserve requirement deficiencies or overnight overdrafts. In determining the level of excess reserves, DIs balance the risk of penalties for reserve shortfalls with the opportunity costs of holding excess reserves. Given estimates of the demand for reserves, the Desk conducts open market operations each day to supply an appropriate amount of aggregate reserves so as to keep the federal funds rate close to the FOMC’s target federal funds rate. If the aggregate supply of reserves falls short of demand at the target funds rate, the federal funds rate tends to rise and some institutions may turn to the discount window. In this sense, the discount window acts to buffer increases in the federal funds rate. Conversely, if the supply of reserves exceeds demand at the target funds rate, the level of the federal funds rate tends to fall.

The modifications to the existing system of reserve requirements under this option involved establishing a symmetric corridor for the federal funds rate with the upper bound determined by the primary credit rate and the lower bound determined by the interest rate on excess reserves. For example, the primary credit rate might be set at 50 basis points above the FOMC’s target rate and the interest rate on excess reserves could be set 50 basis points below the FOMC’s target rate. In addition, the 2008 memo discussed the possibility of implementing a number of structural changes to the current system of administering reserve requirements including the elimination of the required clearing balance program, moving to a common maintenance period across all DIs, and the elimination of both as-of adjustments and the reserve carryover provision. As noted below, many of these simplifications have been or will soon be implemented and will substantially simplify the system of reserve requirements for both DIs and the Federal Reserve relative to the system in place prior to the crisis. However, even with these

simplifications, the current system of reserve requirements will continue to impose significant administrative burdens on both the Federal Reserve and DIs.

Voluntary Balance Targets: An alternative system based on a voluntary balance target could incorporate many of the key features of the simplified reserve requirement system described above, but with fewer administrative costs for the Federal Reserve and DIs. Under this type of system, depositories would again hold reserves on average over a multiday maintenance period to meet a pre-determined average target level of balances. However, the target level of balances would not be determined by mandatory reserve ratios applied against transaction deposits but rather would be voluntary targets that banks would establish for themselves. The rate of remuneration on voluntary target balances under this regime would be higher than the rate on excess reserve balances (which, under this regime, would be balances held in excess of the voluntary target balance), thus providing an incentive for banks to establish a voluntary balance target. In part, a voluntary balance target could also help DIs avoid penalties for overnight overdrafts or other costs associated with unexpected changes in their end-of-day reserve position. This type of system was employed by the Bank of England prior to the crisis.

Daily Balance Frameworks

Multiday systems like those discussed above have some attractive features, but can be quite complicated to administer, both for the Federal Reserve and for DIs. In the 2008 memo, the staff explored three possibilities for an operating regime based on simple designs focused on the daily demand and supply of reserves. Under one option, DIs would establish a daily voluntary target balance; DIs would then need to hold reserve balances each day sufficient to meet the target but with a “target balance band” to provide some flexibility. Two other options—the simple corridor regime and the floor system—do away with any form of reserve requirement or target balance.

- Voluntary Daily Target Balances with Band: Under this system, DIs could choose to establish in advance a voluntary target balance that would need to be met each day. For example, a DI could establish a daily target balance of \$1 million. Each day, the DI would then need to maintain \$1 million in balances to meet this target. DIs would be allowed to adjust their daily target balance periodically, perhaps monthly or quarterly. To provide some flexibility for DIs in meeting the daily target balance, this option incorporated a “penalty free band” around the daily target balance. For example, the band associated with a \$1 million target balance might run from \$0.95 million to \$1.05 million. If a depository institution’s end-of-day reserve position fell anywhere within this band, it would be deemed to have met the daily reserve target balance and the entire balance maintained would be remunerated at the rate on target reserve balances. Any balances held in excess of the upper bound of the band would be remunerated at a lower interest rate. If balances fell short of the lower bound of the band, the DI would be

charged a penalty on the shortfall.

- **Simple Corridor System:** Under the “simple corridor” system, reserve requirements would be set to zero and DIIs could hold any quantity of balances they wished in their accounts at the Federal Reserve. Presumably, the demand for balances in that case would be determined by factors such as the precautionary need to avoid overnight overdrafts and other demands for reserve balances such as clearing and payments activity. Even prior to the crisis, many DIIs already managed their account in this way because they were not “bound” by reserve requirements; that is, they could satisfy their reserve requirement entirely with vault cash and so maintained balances in their account at the Federal Reserve for other purposes. Under this system, the Desk likely would need to estimate the banking system’s aggregate demand for reserves each day and supply that quantity through open market operations.⁴ The demand for reserves under this system could be volatile and might also be relatively inelastic. As a result, the funds rate could be volatile. To help limit the day-to-day variability in the funds rate, the simple corridor system would establish a narrow corridor for the federal funds rate with the ceiling determined by the primary credit rate and the floor determined by the interest on excess reserves rate.
- **Floor System:** The 2008 memo also discussed a “floor system” in which the Federal Reserve would again eliminate reserve requirements and DIIs could hold any quantity of reserve balances they wished. The Federal Reserve would remunerate balances at a rate just slightly below the FOMC’s target federal funds rate.⁵ In theory, the rate of remuneration on reserves should set a floor on the level of the federal funds rate (when DIIs are the predominant sellers in the funds market). Under this system, the Desk would provide an ample supply of reserves so as to drive the federal funds rate down to the FOMC’s target rate. In this framework, the Desk could provide a large quantity of reserves and make only infrequent adjustments. The high daily level of reserve balances could have some ancillary effects in reducing the quantity of daylight overdrafts.

Some Considerations Regarding the Alternative Frameworks Noted in 2008

The 2008 memo evaluated the various options according to a range of criteria, including reducing burdens and deadweight losses associated with reserve requirements, preserving or

⁴ It might also be possible for the Desk to use standing repo and reverse repo facilities to passively supply or drain reserves in response to changes in market conditions.

⁵ The interest on excess reserves rate is a risk-free rate for DIIs while the overnight federal funds rate incorporates a risk premium. As a result, maintaining the federal funds rate close to the FOMC’s target rate would require the interest on excess reserves rate to be set just below the FOMC’s target rate by an amount reflecting the average risk premium on overnight federal funds transactions. As discussed in more detail below, the interest rate on excess reserves has not acted as a floor on the federal funds rate.

enhancing the Desk's ability to hit the FOMC's target for the federal funds rate, promoting the efficiency and resiliency of money markets and government securities markets, and promoting an efficient and resilient payments system.

Among the options considered, the simplified version of the existing system of reserve requirements would reduce the administrative burdens associated with the system that was in place prior to the crisis. Moreover, this system would almost certainly afford the Desk an adequate degree of control over the federal funds rate comparable to that associated with the system in place prior to the crisis. In addition, this system has, at least in the past, entailed a relatively modest level of excess reserve balances and would likely be associated with an active federal funds market. However, even under the "simplified" version of the current system of reserve requirements, the administrative burdens on both the Federal Reserve and DIs in terms of deposit reporting, and developing and maintaining automated systems would be substantial.

The voluntary multiday reserve target balance system could operate much like the current system as an effective framework for policy implementation. However, the 2008 memo noted some uncertainty about the magnitude of the target balances that banks would choose to establish. If DIs chose to establish only a modest level of voluntary target balances, the funds rate could be relatively volatile and the Desk would need to devote significant resources to actively managing the level of reserves on a day to day basis.⁶ Moreover, managing a system of voluntary target balances with a multiday maintenance period would still entail significant operational burdens for the Federal Reserve and DIs.

The simple corridor system scored high on the criteria of minimizing burdens and deadweight losses. However, the 2008 memo noted that it might result in somewhat more volatility in the federal funds rate and therefore might need to rely fairly heavily on an effective interest rate corridor to keep the funds rate within acceptable ranges. Depending on the width of the corridor, this system could require the Desk to fine tune the daily level of reserve balances.

The floor system also scored high on the criteria of minimizing burdens and allowing the Desk to achieve the target federal funds rate. In addition, the 2008 memo noted that a relatively high level of balances could be helpful in reducing the average level of daylight overdrafts provided by the Federal Reserve. Moreover, with a high level of balances well in excess of daily clearing needs, the 2008 memo noted that the Desk would not need to manage the daily level of reserves as actively as in many of the other systems discussed. However, by providing a relatively high level of reserve balances, the floor system would depress the level of activity in the federal funds market.

⁶ The level of voluntary balances that a DI would wish to establish presumably would be related partly to the rate of interest on balances held to meet the voluntary target and the interest rate on excess reserve balances.

The daily voluntary target balance system would entail some costs for the Federal Reserve in administering the system of target balances and the penalty free band across a large number of DIs. A relatively wide band around the daily target should afford a considerable degree of flexibility to banks and the Desk in managing daily levels of reserve balances. However, this type of daily system has not been implemented in any country so there may be questions about how effective it would be in allowing the Desk to keep the funds rate close to the FOMC's target rate, particularly if DIs chose to establish fairly minimal daily target balances.

Developments Since 2008

A number of developments since 2008 could affect the FOMC's choice of regime for monetary policy implementation. Some of these developments might be classified as changes in "initial conditions"—that is, changes in the environment that may inform the desirability or feasibility of a possible future regime or affect the speed at which the System could move to a new regime. Other types of developments might be viewed as those having some bearing on the likely effectiveness of a ceiling and floor for the federal funds rate. Other changes over time have the potential to affect the level and variability of the demand for reserves. Finally, there have been some significant changes in the System's approach to the provision of intraday credit that could influence policymakers' views about the benefits of systems with relatively high levels of balances.

Changes in Initial Conditions

In 2006, the Congress authorized the Federal Reserve to begin paying interest on reserves in October of 2011. In April of 2008, when the FOMC last focused extensively on monetary policy operating regimes, the FOMC's target rate was 2 percent and the Federal Reserve implemented monetary policy through its traditional system of reserve requirements and fairly active management of the daily supply of reserves. The staff anticipated that a significant amount of time would be necessary to develop the automated systems necessary to support many of the alternative approaches. Moreover, the Federal Reserve had no prior experience with many of the key features of the alternative operating systems, and there was a considerable amount of uncertainty about how any of the proposed operating systems would work in practice.

Now, the situation is very different in some important respects. The Congress authorized the Federal Reserve to begin paying interest on reserve balances in October 2008, three years earlier than the original implementation date. In addition, although the infrastructure associated with the system of reserve requirements continues to operate, the Federal Reserve is effectively operating with a (very) high balance "modified floor system" where the floor on the federal funds rate is determined largely by the zero bound on nominal interest rates and the federal funds rate is determined primarily by the interaction of DIs, who receive payment of interest on reserves, and government sponsored enterprises (GSEs) who are not eligible to receive payment of interest on the balances they hold at Federal Reserve Banks. Moreover, throughout much of

the exit period, the Federal Reserve will very likely continue to operate with a system in which the rate of interest on excess reserves is its primary lever to influence the level of short-term interest rates. As a result, the normalization of the size of the Federal Reserve's balance sheet during the exit period will provide practical experience with a floor system that could well inform policymakers' judgments about the most desirable long-run operating regime.

In addition, recent or soon-to-be-implemented changes related to reserve requirements have simplified reserves administration considerably. In July of 2012, the Board approved the elimination of the required clearing balance program and the use of so-called "as-of" adjustments.⁷ In June 2013, the Federal Reserve will implement a new automated system for reserves administration that will provide the capability of implementing a wide range of potential monetary policy implementation regimes. As part of that effort, the Board approved further significant structural changes to the existing system of reserve requirements that should greatly simplify reserves administration. In particular, all DIs will meet reserve requirements over the same two-week maintenance period. In addition, the provisions for the carryover of reserve surpluses and deficiencies from one maintenance period to the next will be eliminated. Instead, DIs will have a penalty-free band around their requirement to provide a measure of flexibility in meeting required reserves and thereby help to reduce volatility in the funds rate. These changes will provide some practical experience with a system very close to the simplified version of the existing structure of reserve requirements discussed in the 2008 memo.

Questions About the Efficacy of Tools for Establishing a Ceiling and Floor for the Federal Funds Rate

All of the systems proposed in the 2008 memo relied to some degree on the primary credit facility and the interest rate on excess reserves to establish a ceiling and floor, respectively, for the federal funds rate. However, there are reasons to suspect that both the ceiling and the floor established in this way may not operate as effectively as envisioned in 2008.

Regarding the ceiling, the financial crisis likely reinforced the "stigma" of borrowing at the discount window. The reluctance of DIs to borrow at the discount window has long been a problem, and one that intensifies at times of financial distress. For example, DIs seemed very reluctant to borrow from the window following the failures of hundreds of DIs and the credit crunch in the late 1980s and early 1990s. In the years leading up to the crisis, banks seemed to

⁷ Under the required clearing balance program, banks maintained a contractual level of balances on average over a maintenance period. Such balances were remunerated in the form of earnings credits that could be applied against charges for Federal Reserve priced services. As-of adjustments were manual accounting adjustments to DIs' account balances that were often used to take account of deposit reporting errors and other technical factors. The required clearing balance program and as-of adjustments added a great deal of complexity to the administration of reserve requirements and both became obsolete with the advent of the payment of interest on reserves. The level of required clearing balances had implications for the Federal Reserve's priced services programs. With the elimination of the required clearing balance program, the Federal Reserve has made adjustments to the framework employed in the pricing of its services.

be somewhat more willing to borrow. But stigma intensified again during the crisis both because borrowing was again associated with financial weakness and because of the public perception that borrowing from the discount window was a form of government bailout. In addition, the disclosure requirements of the Dodd-Frank Act (DFA) are likely to further discourage borrowing.⁸ Against this backdrop, many large DIs have indicated that they would go to considerable lengths before turning to the discount window. Indeed, a number of DIs have told discount officers that they will not even conduct routine annual small-value tests of their ability to borrow at the discount window. As a result, the existing primary credit facility seems unlikely to create an effective upper bound on the federal funds rate for the foreseeable future. In principle, outreach efforts by the Federal Reserve with DIs might help to mitigate stigma to some degree. However, such efforts have met with only modest success in the past, and the outreach efforts would not be able to address the impact of the disclosure requirements in any case.

The effectiveness of the interest rate on excess reserves in creating a floor for the federal funds rate is also open to question. Most notably, the federal funds rate has traded consistently below the interest rate on excess reserves since late 2008. Two factors seem to have contributed to that phenomenon. First, some participants in the federal funds market—notably the Federal Home Loan Banks and the housing GSEs—are not eligible to earn interest on balances they maintain at the Federal Reserve. As a result, they have an incentive to lend at rates below the interest rate on excess reserves, and more so for counterparties they perceive as especially creditworthy. Second, DIs apparently have been unable or unwilling to completely compete away the spread between the interest rate on excess reserves and the rate at which DIs can borrow in the federal funds market. This lack of competition might reflect a number of factors including concerns by lenders about the creditworthiness of DIs that might post a higher bid in the federal funds market and about the implications for DIs of their leverage ratio and deposit insurance premiums.⁹ One might expect that were reserve balances to be reduced substantially, activity in the federal funds market would once again be dominated by transactions between DIs. In that case, the interest rate on excess reserves could establish a more effective lower bound on the federal fund rate. However, even in more normal times, DIs may not be willing to compete away the spread between IOER and the federal funds rate at times when the GSEs or Federal Home Loan Banks are left with a large surplus of funds to invest overnight.

⁸ Under the DFA, the Federal Reserve must now publicly release detailed transaction-level information for all discount window borrowing—including the names of the borrowers—with a two-year lag.

⁹ The leverage ratio is based on a DI's total assets (unweighted) relative to Tier 1 capital. In April 2011, the FDIC changed its deposit insurance assessment base to total assets less capital. As a result, a strategy in which an institution borrows in the funds market and holds more in reserves would, *ceteris paribus*, result in a reduction in an institution's leverage ratio and an increase in its deposit insurance premium assessment.

Possible Steps to Help Strengthen a Ceiling and Floor for the Federal Funds Rate

The question marks surrounding the effectiveness of the ceiling and floor for the federal funds rate as envisioned in the 2008 memo suggest that it may be useful to consider steps that may help to strengthen the ceiling and floor. Since 2008, the Federal Reserve has developed additional tools for draining reserves such as term deposits and term reverse repos (RPs). These tools could be employed to reinforce the floor for the federal funds rate. For example, the Desk could stand ready to conduct overnight reverse RPs at pre-established rates determined by the FOMC with an expanded set of counterparties.¹⁰ The ability to conduct reverse RPs has been improved with the expansion of the Desk's eligible RRP counterparties and operational capabilities leveraging the tri-party repo system. In such a facility, no counterparty in the operation would have an incentive to lend in any money market at a rate below that the Federal Reserve would pay, and these counterparties could arbitrage between other markets rates and the rate paid on RRP.

It may be possible to strengthen the ceiling for the federal funds rate as well. The Desk could also stand willing to conduct overnight RPs at a rate above the intended funds rate as a way of capping upward movement in short-term interest rates and providing additional reserves. There may also be some value in contemplating alternative structures for the discount window that might help to lessen stigma.

Level and Variability of Reserve Demand

Heightened demands for precautionary balances and significant regulatory changes since 2008 could have important implications for the level and variability of the demand for reserve balances in the future. With the payment of interest on excess reserve balances, the banking system may now have a permanently higher demand for precautionary balances than was the case prior to the crisis. In addition, forthcoming changes in bank liquidity regulation associated with Basel III are reportedly already encouraging some DIs to hold larger fractions of their assets in the form of reserve balances than in the past. In particular, the liquidity coverage ratio (LCR) will require the largest banks to hold significant volumes of "high quality liquid assets" (HQLA). While the regulations associated with the LCR have not been fully developed yet, it appears certain that HQLA will include reserve balances. Some estimates suggest that the banking system overall may need to substantially boost holdings of HQLA over time relative to current levels.

Moreover, with the passage of the DFA, the Board may now authorize a Reserve Bank to open and maintain accounts for designated financial market utilities (DFMUs). The Board has the authority to pay interest on balances maintained by DFMUs in the same manner and to the same extent as they pay interest to DIs. Staff anticipates recommending that the Board pay interest on

¹⁰ This possibility is discussed in more detail in the memo entitled "Tools to Improve Control Over Short-Term Interest Rates," memorandum to the Committee, April, 2013.

these accounts at the IOER.¹¹ It is difficult to gauge the average level of balances that DFMUs will choose to maintain. One metric of the possible level of balances that DFMUs might wish to hold is the aggregate level of cash margins currently held by the five DFMUs that do not currently have Reserve Bank accounts; at present, the aggregate level of cash margins for these institutions ranges between \$25 to \$40 billion.¹² The size of a DFMU's cash margins varies over time depending on the portion of margin required to be held in cash, the volatility of the underlying margined positions, and the general growth of a DFMU's clearing business.

Taken together, these changes might be expected to contribute to higher “steady state” levels of demand for reserve balances, depending on market rates of interest. The demand for reserves could also be somewhat more volatile than in the past, in part because it might be less determined by relatively stable demands of DIs. Overall, these developments could lead policymakers to favor regimes that do not rely heavily on very tight daily control of the aggregate level of reserve balances.

Payment System Issues

In general, to the extent possible, the Federal Reserve seeks to minimize and be compensated for credit risk in operating its policy framework. The elevated level of balances in the banking system has dramatically reduced the average level of intraday credit, or daylight overdrafts, provided by the Federal Reserve. In early 2008, for example, peak daylight overdrafts exceeded \$180 billion and average daylight overdrafts exceeded \$70 billion.¹³ By contrast, in the fourth quarter of 2012, peak daylight overdrafts had dropped to about \$12 billion and average daylight overdrafts stood at about \$2 billion. Much of this decline occurred following the most intense phase of the financial crisis and the associated sharp increase in reserve balances. For example, average levels of reserve balances in the first quarter of 2009 had jumped to about \$650 billion, and the peak and average level of daylight overdrafts had dropped to \$65 billion and \$13 billion, respectively. While there are many factors during this period that could affect the level of intraday credit, these simple correlations would suggest that a level of balances under a floor system of perhaps \$300 billion to \$400 billion could be enough to substantially reduce the aggregate level of daylight overdrafts. It is worth noting that the Board implemented changes to its Payment System Risk policy in 2011 that allowed DIs to incur daylight overdrafts without penalty when such overdrafts are secured by collateral. It may well be the case that a level of

¹¹ The Financial Stability Oversight Council designated eight institutions—CLS Bank International (CLS), Depository Trust Company (DTC), Chicago Mercantile Exchange (CME), Clearing House Payments Company L.L.C. as operator of the Clearing House Interbank Payment System (CHIPS), Options Clearing Corporation (OCC), Fixed Income Clearing Corporation (FICC), National Securities Clearing Corporation (NSCC), and ICE Clear Credit—as designated financial market utilities. The Board is expected to finalize its rule governing Federal Reserve accounts and services for designated FMUs later this year.

¹² The other three DFMUs – CHIPS, CLS, and DTC – currently maintain accounts with FRBNY. CHIPS and CLS do not maintain overnight balances, while DTC maintains an overnight balance around \$2 billion. Because DTC is a state member bank, it already earns interest on its balances.

¹³ For more detail, see http://www.federalreserve.gov/paymentsystems/psr_dlod.htm.

reserve balances well below the \$300 to \$400 billion range could be sufficient to maintain a very low level of uncollateralized intraday credit. Moreover, the penalty for uncollateralized intraday credit could be raised, if necessary, to encourage banks to avoid uncollateralized daylight overdrafts.