

August 28, 2012

### **The effect of an additional \$1 trillion LSAP on the exit strategy<sup>1</sup>**

As the Committee considers whether to provide additional accommodation through a new large-scale asset purchase (LSAP) program, one issue it will need to consider is the implications of such a program for exit from the current highly accommodative stance of policy.<sup>2</sup> This memo addresses two issues related to the exit that could be complicated by a new LSAP program. In particular, it considers the implications for the Federal Reserve's ability to raise short-term interest rates when the time comes and for its ability to normalize its balance sheet within the bounds of the exit strategy principles published with the minutes of the June 2011 FOMC meeting.<sup>3</sup> The basic conclusion of this memo is that following a new \$1 trillion LSAP program, the challenges posed by exit would remain manageable. To summarize:

- The staff believes that, with the available tools and following the exit strategy principles as articulated in the June 2011 minutes, the Committee will be able to raise the federal funds rate at the appropriate time despite the higher level of reserve balances.
- With an additional \$1 trillion LSAP, the level of reserve balances in the system will be roughly \$2.3 trillion at the time of the anticipated first increase in the federal funds rate, or about \$1 trillion higher than if the new LSAP program is not implemented. As a result, the temporary reserve draining tools will presumably need to be relied upon to a greater extent than previously envisioned. Specific plans for how this exit would be executed will depend in part on how markets evolve over the intervening period and in part on lessons learned about the new tools as exit nears.
- Previous staff projections have assumed that asset sales would take five years, the long end of the three- to five-year range noted in the Committee's exit strategy principles, in order to minimize possible disruptions to market functioning. An additional \$1 trillion LSAP program would likely require sales to be completed in less than five years in order to conform to the Committee stated expectation that the size of the portfolio will be normalized within two to three years of the initiation of asset sales.<sup>4</sup> The staff currently judges that the more rapid pace of sales could be implemented without significant adverse effects on market functioning.
- If the Committee adopts a flow-based LSAP program, the ultimate size of purchases will not be known for some time. As a result, a periodic reassessment of the exit principles will be useful. Such a program could result in substantially larger purchases, and an additional \$2 trillion in securities would likely not be consistent with the current exit strategy principles, and some adjustments would probably need to be made.

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<sup>2</sup> The Committee is receiving two additional memos that deal with possible additional LSAP programs, "Options for an additional LSAP program" and "Flow-Based Balance Sheet Policies: Communication Issues and Macroeconomic Effects," August 28, 2012.

<sup>3</sup> The exit strategy principles are presented in the appendix.

<sup>4</sup> Asset sales are assumed to begin six months after the initial increase in the target federal funds rate.

### **The level of reserve balances at liftoff**

The first exit-related consideration raised by a new LSAP program is the issue of a substantially greater quantity of reserve balances at liftoff than previously assumed. When the exit strategy principles were first articulated, the projections for the balance sheet were quite different from current projections, as summarized in table 1.<sup>5</sup> In June 2011, the reserve balances at liftoff were projected to be slightly less than \$1.3 trillion; the current projection, including an additional \$1 trillion LSAP, is about \$2.3 trillion.<sup>6</sup>

The FOMC has stated that it sees the interest on excess reserves (IOER) rate as the primary tool for increasing the federal funds rate and that it intends to use temporary reserve draining tools – specifically, large-scale reverse repurchase agreements (RRPs) and the term deposit facility (TDF) – to support the effectiveness of the IOER rate by tightening the relationship between market rates and the IOER rate. Since 2008, it has been clear that with a substantial quantity of reserve balances in the banking system, the IOER rate has not provided a floor for the federal funds rate. It is possible, however, that even with an elevated level of reserve balances, an increase in the IOER rate would result in a nearly equal increase in the federal funds rate because banks have an incentive to arbitrage by borrowing at the federal funds rate and holding reserves earning the IOER rate. Factors limiting that arbitrage, such as the FDIC assessment fee and the shadow cost of banks' balance sheets, could simply result in a fairly stable spread between the IOER rate and the federal funds rate as the IOER rate is increased. Nevertheless, some research suggests that, with an extraordinarily high quantity of excess reserves, the federal funds rate might rise by notably less than one-to-one with the IOER rate, partly because most of the current selling in the federal funds market is done by entities that do not earn interest on excess reserves and banks may have an increasing cost of arbitraging with higher levels of reserve balances.<sup>7</sup> Regardless, it seems implausible that a substantial deviation of bank funding rates from the IOER rate could persist for long. Banks are currently engaging in the arbitrage activity mentioned above, and as the economy recovers and appetite for risk returns to more normal levels, the willingness to arbitrage would likely increase.

Although increasing the IOER rate almost certainly will raise short-term market rates by itself, using the reserve draining tools may be needed to assure tighter control over the federal funds rate. With the additional reserve balances associated with a new \$1 trillion LSAP, the use of the tools would likely need to be greater. Estimating the amount of draining that will be necessary to assure control over the federal funds rate is difficult. One might assume that reducing the level of reserve balances to the point that the federal funds rate is roughly equal to the IOER rate will result in a one-for-one relationship between changes in the IOER rate and the federal funds rate. Based on historical data, staff econometric studies suggest that reserve balances would have to

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<sup>5</sup> The June 2011 projection is based on the June 2011 Tealbook Book B Alternative B balance sheet assumptions.

<sup>6</sup> The analysis in this memo is based on an assumed distribution of purchases of 60 percent Treasury securities and 40 percent MBS. Allowing somewhat different distributions will not change the results materially.

<sup>7</sup> Refer to Bech and Klee, "The Mechanics of a Graceful Exit: Interest on Reserves and Segmentation in the Federal Funds Market," *Journal of Monetary Economics* (2011) and Marquez, Morse, and Schlusche (2012), "The Federal Reserve's Balance Sheet and Overnight Interest Rates," forthcoming Finance and Economics Discussion Series paper.

fall to between \$500 billion and \$700 billion to achieve this result.<sup>8</sup> Such estimates imply that with an additional \$1 trillion LSAP as much as roughly \$1.5 trillion in reserve balances might need to be drained during exit, about \$1 trillion more than projected in June 2011.

### **Changes to the demand for reserve balances**

The uncertainty about the quantity of reserve balances that will need to be drained is increased because the demand for reserve balances may evolve over time. The empirical estimates of the relationship between the federal funds rate and the level of reserve balances discussed above were based on historical relationships, but for a variety of reasons those relationships may have already changed or may change between now and the first increase in the federal funds rate. One illustrative example is the liquidity coverage ratio (LCR) requirement, which is scheduled to become effective in 2015, and could boost banks' demand for central bank reserve balances relative to prior norms. Under the LCR, large banks must hold a pool of highly liquid assets that can include cash, central bank reserves, and government securities, as well as a limited amount of other high-quality securities. The most recent estimate of the total LCR requirements for 13 of the largest U.S. banking organizations revealed an aggregate shortfall of liquid assets of slightly more than \$500 billion even with the current elevated holdings of reserve balances.<sup>9</sup> Furthermore, the LCR is just one feature of a new regulatory and market environment in which financial institutions may demand greater amounts of liquid assets. Although there is considerable uncertainty about how conditions will develop over the longer run, it seems plausible that banks could have a substantially higher demand for reserve balances than has been the case historically, especially for as long as the IOER rate remains near the return on liquid, short-term money market assets. If the demand for reserves proves greater than we have estimated, the amount of reserve draining that will be required would be smaller.<sup>10</sup>

### **Reverse repurchase agreements (RRPs)**

Staff has conducted a number of tests of the RRP facility involving small-value operations with the expanded set of counterparties.<sup>11</sup> The current, preliminary staff estimate is that the Federal Reserve should be able to use RRPs to reduce reserve balances by about \$500 billion without resulting in material disruptions to money market functioning, assuming that the program builds over several months. Any estimate of the potential capacity is subject to substantial uncertainty, and in principle an extremely large capacity might be feasible but could strain money market functioning and require paying rates on RRPs that exceed market rates. An RRP program, especially if it is expanded at a rapid pace, would likely also have a direct effect on repo rates over and above the effect from the reduction in the level of reserve balances as the RRPs

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<sup>8</sup> Refer to Bech, Klee, and Stebunovs (2012), "Arbitrage, liquidity and exit: The repo and federal funds markets before, during, and emerging from the financial crisis," Finance and Economics Discussion Series paper 2012-21 and Marquez, Morse, and Schlusche (2012).

<sup>9</sup> The estimates are based on data for December 31, 2011, submitted by 13 large banking organizations for the most recent Quantitative Impact Study (QIS) conducted by the federal bank regulatory agencies.

<sup>10</sup> An additional consideration is that the use of the IOER rate could change. In coming months, System staff will deploy technology that will allow the Federal Reserve to use the authority to pay interest on reserves very flexibly. Instead of simply paying a single rate on excess reserves, a graduated and increasing remuneration scheme could be put in place that, in principle, would make the IOER rate even more powerful. Other schemes are also feasible, and so further analysis will be warranted.

<sup>11</sup> There are currently 128 reverse repo counterparties, including the 21 Primary Dealers. The list of counterparties comprises 89 money market funds from 26 fund families, 2 government-sponsored enterprises, and 16 banks.

decreased cash available to short-term markets and increased the amount of collateral in the market. Higher repo rates would put additional upward pressure on the federal funds rate and other money market rates, as market participants actively arbitrage across funding markets. In crafting a specific plan for raising the funds rate, staff will consider how this direct effect might need to work in conjunction with the effect of draining reserves as well as increases in the IOER rate.

### **Term deposit facility (TDF)**

Estimating the capacity of the TDF to drain reserves is also difficult, in part because the TDF is a new instrument, and many details remain to be finalized about how TDF operations would be conducted. For example, the terms of TDF operations would determine their treatment under the Basel III liquidity regulations, such as the LCR. Given the preliminary staff estimates of the capacity of RRP, it may be necessary for the TDF to absorb as much as \$1 trillion. In practice, the terms of TDF operations would need to be attractive to depository institutions to allow the TDF to absorb a substantial amount of reserve balances. Doing so should be feasible, however, because in essence, TDF operations shift one riskless asset item on banks' balance sheets (reserve balances) to another riskless asset item (TDF deposits), albeit one with a longer maturity and that cannot be used to make payments or satisfy reserve requirements.<sup>12,13</sup> The automation that supports the TDF now allows for floating-rate deposits, essentially unlimited maturities for the deposits, the possibility of early withdrawal, and other parameters that could be adjusted to make term deposits attractive.

### **Supplementary Financing Account (SFA)**

In 2008, the Federal Reserve and the Treasury established a program under which the Treasury issued special cash management bills and deposited the proceeds in a segregated account at the Federal Reserve. The effect of the SFA was to drain reserve balances from the banking system. At its peak, the SFA contained almost \$560 billion, suggesting that it was able to absorb a substantial amount of reserve balances. There are some issues to consider with this tool, for example, on a couple of occasions as the debt ceiling approached, the Treasury drew down the account, so the use of the SFA would not be fully under the control of the Federal Reserve. Nevertheless, it remains a potential tool that could be used during exit.

### **Normalizing under current exit strategy principles**

An additional LSAP could also raise issues related to the pace of MBS sales and the timing of the normalization of the Federal Reserve balance sheet. The exit strategy principles currently envision selling all agency securities at a gradual and steady pace over a three- to five-year window, with the anticipated result that the size of the balance sheet is normalized within two to three years. The Committee has stated that it does not intend to sell Treasury securities, so purchases of longer-maturity Treasury securities tend to delay the normalization date by pushing redemptions of Treasury securities farther into the future. The MEP has had such an effect, and additional LSAPs involving purchases of longer-maturity Treasuries would make it more

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<sup>12</sup> Currently, there are nearly 600 depository institutions that are able to bid on TDF operations and these institutions collectively hold over \$1 trillion of reserve balances.

<sup>13</sup> The treatment of TDF deposits under the LCR requirements could depend importantly on the specific terms of those deposits, and that determination would potentially significantly affect the willingness of banks to participate.

pronounced. In the \$1 trillion LSAP scenarios considered, MBS are sold over a five-year period, and the size of the portfolio normalizes at roughly three years and five months—somewhat longer than the timeframe anticipated in the exit strategy principles.

However, modest changes to staff assumptions would make the projection conform to the stated exit principles. First, the exit principles allow for sales to take place over a three- to five-year window, so sales could be completed over a shorter time horizon than assumed by the staff. With the projections of a \$1 trillion LSAP, MBS sales over five years imply a pace of sales of roughly \$17 billion per month, whereas sales over three years would imply a pace of sales of just under \$30 billion per month.<sup>14</sup> Any pace in this range would seem to be feasible without significant disruptions to the agency MBS market. However, there are uncertainties around this assessment because of the lack of experience with large-scale MBS sales.<sup>15</sup> A faster pace of MBS sales than assumed in the analysis of LSAP options would result in capital losses being slightly more concentrated in certain years, increasing the likelihood of remittances to the Treasury falling to zero and a deferred asset being created. In addition, if the Committee begins to reinvest maturing Treasury securities at auction (assuming it replaces the MEP with a new LSAP program), those reinvestments could be more focused on shorter-term securities instead of the current practice of reinvesting across all issuance. Doing so would accelerate the passive reduction of the size of the balance sheet through redemptions once reinvestments cease.<sup>16</sup> Alternatively, for any new LSAP, the FOMC could decide to purchase Treasury securities with a shorter average duration. Doing so would mean that Treasury securities would mature and roll off the balance sheet faster near the time of the liftoff of the federal funds rate, although at the cost of diminishing the term premium effect of the LSAP.

In contrast, for an LSAP that adds another \$2 trillion of securities to the Federal Reserve portfolio, as in option 4 in the accompanying staff memo, it would not be feasible to satisfy the exit principles. Even selling MBS holdings over a three-year window would not be sufficient to normalize the size of the balance sheet within three years. Moreover, in that scenario, sales over a three-year period would result in such a rapid pace of asset sales that the risk of market disruptions would be higher.

### **Revising the exit strategy principles**

While it appears that the Committee could adhere to the current exit strategy principles even with additional \$1 trillion LSAP program, it may nevertheless wish to periodically revisit the 2011

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<sup>14</sup> Under a \$1 trillion LSAP, MBS sales would need to be conducted in about three-and-a-half years in order for normalization to occur in three years, a pace of around \$25 billion per month.

<sup>15</sup> Other agency MBS portfolio sales provided limited information about the feasible pace of sales. The U.S. Treasury conducted agency MBS sales at a pace of about \$10 billion per month associated with its \$225 billion portfolio acquired under the Housing and Economic Recovery Act of 2008. However, sales were conducted during a period in which the MBS market had little net growth, and lasted only about a year. Fannie Mae and Freddie Mac (GSEs) are currently shrinking their portfolios at a rate of 15 percent per year under agreements with the U.S. Treasury. However, agency MBS represent only portion of these portfolio holdings and a substantial amount of the reduction is expected to occur through principal paydowns. Market participants estimate that sales of agency MBS in 2013, for example, may only amount to \$20 - 30 billion per month in total. Efforts surrounding GSE reform may also materially impact the ability to sell without significantly affecting market functioning if, for example, market activity or liquidity is substantially different than it is today.

<sup>16</sup> It is possible, however, that the Treasury might adjust its issuance pattern in response to this change in the Federal Reserve's strategy and thereby partially offset the effect on debt held by the public.

exit strategy principles, especially if policy changes could have a material impact on the evolution of the Federal Reserve's balance sheet. Moreover, if the Committee were not confident that interest on reserves and the draining tools discussed above will be effective, it could rely more heavily on asset sales to shrink the volume of reserve balances than currently envisioned. For example, at the time of liftoff the SOMA portfolio is projected to include over \$600 billion of Treasury securities with maturities of 3 years or less. Gradual sales of these securities prior to liftoff would reduce reserve balances with little effect on shorter-term interest rates. If needed, the Committee could also remove accommodation by using securities sales to reverse a portion of the effects of LSAPs. One possibility would be to accelerate the pace of sales of MBS. Alternatively, asset sales could begin before, instead of after, the first increase in the federal funds rate, or the Committee could consider selling longer-term Treasury securities in addition to MBS. Changes in the plans for sales, however, would require careful analysis to ensure that the overall stance of monetary policy implied by the combined effects of the Federal Reserve's security holdings and the expected trajectory for short-term interest rates was consistent with the Committee's policy objectives.

### **Conclusion**

In summary, although a periodic reassessment of exit strategy principles could well be useful, a \$1 trillion LSAP would not necessarily require a change in those principles. A \$2 trillion program, by contrast, likely would. If the Committee came to anticipate that an open-ended program could lead to such a large increase in securities holdings, then it might want to begin planning for changes in the exit principles that would be needed. An additional \$1 trillion LSAP could complicate the exit by increasing the quantity of reserve balances at the time that the federal funds rate is first increased, likely requiring greater use of the reserve draining tools. However, the staff believes that, with the available tools the Committee will be able to raise the federal funds rate at the appropriate time. That said, the specific mix of tools that will be used to tighten policy is uncertain at this stage. The Committee will learn more about the functioning of markets and the demand for reserve balances prior to exit.

It should be noted that the same precise control over the federal funds rate that was exercised before the crisis may not be feasible with the first increases in the target rate. There will no doubt be a learning process in removing policy accommodation through a combination of interest on reserves, reserve draining tools, and, perhaps, asset sales. On a daily basis, volatility in money market rates may be somewhat higher than in the years before the crisis. This comparison, however, may not be particularly troubling, because the control that the Federal Reserve exercised over market rates was among the most precise among major central banks. Moreover, somewhat greater day-to-day idiosyncratic variation in the funds rate around the target should not greatly affect monetary policy implementation or the transmission of the stance of monetary policy to overall financial conditions.

**Table 1**  
**Comparison of Balance Sheet Projections**

	June 2011 Alt B LSAP II Completion	\$1T LSAP \$600B Treasury/ \$400B MBS
<b>Exit Assumptions</b>		
Fed Funds Liftoff	Dec-12	Jun-15
Redemptions Start	Mar-12	Dec-14
Agency MBS Sales Start	Jun-13	Dec-15
Agency MBS Sales End	May-18	Nov-20
<b>Exit Strategy Considerations</b>		
Reserves at Liftoff (\$B)	1,256	2,296
SOMA Balance at Liftoff (\$B)	2,314	3,498
SOMA Balance Normalization Date	Nov-15	Apr-19
Months to Normalization After Sales Start	30	41
Within 36 Months Exit Window?	Y	N
Cumulative Treasury Redemptions 3 Years Post Liftoff (\$B)	547	654
Cumulative MBS Redemptions 3 Years Post Liftoff (\$B)	157	376
Total SOMA Size 2020 Year-End (\$B)	1,853	1,849

## Appendix: Federal Open Market Committee Exit Principles

### Exit Strategy Principles

The Committee discussed strategies for normalizing the stance and conduct of monetary policy, following up on its discussion of this topic at the April meeting. Participants stressed that the Committee's discussions of this topic were undertaken as part of prudent planning and did not imply that a move toward such normalization would necessarily begin sometime soon. For concreteness, the Committee considered a set of specific principles that would guide its strategy of normalizing the stance and conduct of monetary policy. Participants discussed several specific elements of the principles, including how they should characterize the monetary policy framework that the Committee would adopt after the conduct of policy returned to normal and whether the principles should encompass the possible timing between the normalization steps. At the conclusion of the discussion, all but one of the participants agreed on the following key elements of the strategy that they expect to follow when it becomes appropriate to begin normalizing the stance and conduct of monetary policy:

- The Committee will determine the timing and pace of policy normalization to promote its statutory mandate of maximum employment and price stability.
- To begin the process of policy normalization, the Committee will likely first cease reinvesting some or all payments of principal on the securities holdings in the SOMA.
- At the same time or sometime thereafter, the Committee will modify its forward guidance on the path of the federal funds rate and will initiate temporary reserve-draining operations aimed at supporting the implementation of increases in the federal funds rate when appropriate.
- When economic conditions warrant, the Committee's next step in the process of policy normalization will be to begin raising its target for the federal funds rate, and from that point on, changing the level or range of the federal funds rate target will be the primary means of adjusting the stance of monetary policy. During the normalization process, adjustments to the interest rate on excess reserves and to the level of reserves in the banking system will be used to bring the funds rate toward its target.
- Sales of agency securities from the SOMA will likely commence sometime after the first increase in the target for the federal funds rate. The timing and pace of sales will be communicated to the public in advance; that pace is anticipated to be relatively gradual and steady, but it could be adjusted up or down in response to material changes in the economic outlook or financial conditions.
- Once sales begin, the pace of sales is expected to be aimed at eliminating the SOMA's holdings of agency securities over a period of three to five years, thereby minimizing the extent to which the SOMA portfolio might affect the allocation of credit across sectors of the economy. Sales at this pace would be expected to normalize the size of the SOMA securities portfolio over a period of two to three years. In particular, the size of the securities portfolio and the associated quantity of bank reserves are expected to be reduced to the smallest levels that would be consistent with the efficient implementation of monetary policy.
- The Committee is prepared to make adjustments to its exit strategy if necessary in light of economic and financial developments.