

Exiting Well

Peter Stella¹

This Version September 15, 2015

Abstract

The expansion of central bank balance sheets since the Great Recession has had an important unintended consequence—an extraordinary expansion of bank reserves in global financial markets. The problem with large excess reserves is not that they may eventually become fuel for an inflationary fire—for they have no such potential. The issue is precisely the opposite. Large excess reserves, in combination with post-crisis regulatory changes, are inadvertently taxing bank intermediation and have the potential to stifle loan growth. These problems may be remedied either through tweaking post-crisis regulations or shrinking central bank balance sheets. However, both US regulators and the Basle Committee have rejected the notion of exempting bank reserves from regulations pertaining to leverage and short term financing and the central bank closest to exiting zero interest policies—the Fed—shows no sign of imminently shrinking its balance sheet. In this paper I discuss the negative ramifications of large US bank excess reserves and argue that central banks should endeavor to substitute treasury bills for bank reserves. As the US prepares to raise interest rates, an orchestrated swap of US Treasury bills for bonds in the Fed portfolio would allow the Fed to exit well.

¹ I thank participants in seminars at the International Monetary Fund, Bank of Japan, United States Treasury, Norges Bank, and World Bank Treasury; Simon Gray, Tadashi Endo, Alessandro Scipioni, Arto Kovanen, Larry Wall, Ib Hansen, and Serkan Arslanalp for comments on earlier versions.
Author contact information: pstellaconsult@gmail.com.

I. Introduction

Advanced country central banks first responded to the Great Recession with conventional collateralized lending operations and interest rate cuts, but when confronted with the zero lower bound (ZLB) on short term policy rates, they expanded the size and changed the composition of their balance sheets. The US Federal Reserve (Fed), Bank of England, Bank of Japan and lastly the ECB engaged in LSAPs financed by the creation of an equivalent amount of central bank liabilities, almost exclusively bank reserves—overnight interest-bearing demand deposits held by banks at the central bank.

Having exhausted their ability to lower policy rates, central banks employed balance sheet policies (BSP) hoping to reduce both credit risk and term premia components of yields on government/treasury securities, corporate bonds, mortgage backed securities (MBS), and even equities. BSP were hypothesized to work through several mechanisms—reducing secondary market yields on the assets directly purchased; reducing yields on other risk assets that were to experience an increase in demand resulting from the private sector’s desire to restructure its securities portfolio to reacquire the risk sold to the central bank; and by adding credibility to central banks’ proclamations that policy rates would be held lower for “longer” than had been the case in previous policy cycles. This third effect was anticipated to result from the market’s belief that the larger the balance sheet, the more difficult would be a quick BSP reversal.

Communication of the central bank’s ability to raise short term rates without a reversal of BSP has been complicated in the US owing to idiosyncratic features of US markets and the pre-crisis monetary operations regime, but the Fed has been attempting to explain the separation of interest rate policy and BSP since at least 2009. In recent statements, the FOMC has made it quite clear that interest rates will be raised well in advance of serious contemplation of changing BSP, i.e. any decision to reduce or alter the duration of the Fed’s security portfolio is a long way away. Thus the size of the Fed’s securities holdings will be “large” for longer, perhaps “much longer”.

In light of the LSAP risk extraction objective, several empirical studies have examined the change in interest rate risk (duration) they have occasioned in private sector portfolios. Using different measures of duration, these studies have concluded that LSAPs have taken risk out of the market by swapping bank reserves (zero duration assets) for longer term securities. In measuring the net impact on market duration, the assumption that reserves have zero duration is completely correct. Yet those studies make a second, seemingly innocuous assumption, that bank reserves are as fungible as treasury securities and MBS. In fact, they are not. Bank reserves can only be traded among banks (entities legally enabled to hold deposits at the central bank) while treasury securities, MBS, and corporate bonds may be traded freely among banks and nonbanks.

The key implication of the limited fungibility of bank reserves is that until and unless central banks reduce excess bank reserves they will remain on the aggregate banking system balance sheet. They can neither be passed on to nonbanks nor made to “evaporate” in materially significant amounts.

Large excess reserves, simply as a consequence of balance sheet arithmetic, compel a significant adjustment in the remainder of the banking system consolidated balance sheet. The entirety of the sum

of excess reserves created as a consequence of LSAPs must be offset by an increase in bank liabilities to fund those additional assets and/or a reduction in other bank assets (credit to nonbanks). Note that the latter effect is exactly the opposite of what is anticipated by many proponents of “quantitative easing”. Rather than *expanding* lending to the economy, QE might result in a *contraction* in bank lending.

I discuss in this paper the deleterious financial consequences of excess reserves in the context of US monetary and regulatory policies and propose that the Fed remedy the current situation by exchanging treasury bills for excess reserves in significant amounts while quietly abandoning its experimentation with heavy reliance on its new instruments—interest on reserves, time deposits and reverse repos. In order to implement this remedy, the Fed and US Treasury must agree a cooperative swap of treasury bills for the longer-term notes and bonds currently held by the Federal Reserve Bank of New York in the System Open Market (SOMA) portfolio.

While much has been written about the evolution of the size and composition of the *assets* acquired by central banks during the crisis, comparatively little analysis has been undertaken of the *liabilities* issued to finance those assets and their consequences for financial markets.

Moreover, most analysis to date of the growth of central bank liabilities has had a traditional monetarist tint—focused on the impact of policy on the monetary base, money velocity, the money multiplier and current and future monetary aggregates—all concepts that play little to no role within the modern macroeconomic paradigm². During the crisis, the Fed *never* explicitly aimed to influence the economy through changes in bank reserves.

The remaining analysis of central bank liabilities issued during the crisis has been cursory—frequently expressed in no more than a footnote to the literature. That literature has correctly focused on the role central bank asset purchases (LSAPs) have played in reducing the duration of fixed income securities available to the market. It essentially ignores the duration of the liabilities central banks have issued to the market since they have largely been of zero duration³. That is, since overnight interest earning deposits at the Fed are “equivalent” to one day Treasury bills, the impact of asset purchases on the overall duration of sovereign debt held by the market can be measured by looking at the duration of the securities withdrawn from the market only—since the duration of the liabilities issued to fund the acquired securities is zero.

Although the assumption that bank reserves are equivalent to treasury bills when viewed across the duration dimension is valid, bank reserves differ in a material way from short term treasury securities in that interest-bearing reserves can only be held by banks and must be funded by banks. This difference, combined with crisis-related regulations designed to reduce US bank leverage and dissuade short term financing, has introduced material wedges among US money market rates that heretofore had been insignificant. With US banks now holding reserves close to \$ 3 trillion—compared with pre-crisis daily

² See McLeay, Radia and Thomas (2014), Sims (2013), Carpenter and Demiralp (2012), Kydland and Prescott (1990), and Fama (1980), for various perspectives on the demise of the traditional monetarist paradigm.

³ See Gagnon, Raskin, Remache, and Sack (2010) and Greenwood, Hanson, Rudolph, and Summers (2014). By “held in the market” I mean US marketable debt less US intergovernmental holdings and debt held by FRBs.

average levels of about \$ 20 billion—and with prospects that the Fed will retain the size of its balance sheet for an extended period, the economic significance of market fragmentation has escalated.

Should the Fed not shrink its balance sheet, it will join the large number of central banks who have been confronted with the challenge of managing a large stock of interest-bearing liabilities for an extended period of time. Those countries who have most successfully met this challenge—Brazil, Israel, Singapore and Mexico—have all adopted solutions that replaced central bank crisis-introduced debt with government debt. That is, they have all harmonized the sovereign domestic debt market by replacing central bank debt with treasury debt in the hands of the market⁴.

This paper has five sections following this introduction. The first will review the first three phases of the transformation of the Federal Reserve balance sheet and the associated impact on the monetary operations framework. The second will discuss central bank liability management during the exit and its efficacy. The third will explain why a prolonged period of Fed reliance on its new instruments will impose deleterious unintended consequences on the US financial system. The fourth discusses how the US Treasury and Fed could reach a superior cooperative solution during the exit from unconventional balance sheet policies. The fifth concludes.

II. Transformation of the Balance Sheet

Both the composition and size of the consolidated balance sheet of the Federal Reserve Banks (FRBs) have undergone dramatic changes since 2006⁵. This transformation has witnessed three main phases.

Between end-2006 and prior to the Lehman Brothers insolvency, the Fed provided a significant amount of credit against dodgy collateral. These new lending programs were added without expanding the size of the balance sheet owing to compensating sales of US Treasury securities held by the FRBs. The euphemism in the market for this period was “treasuries for trash”.

The second phase began the third week of September 2008. At that time the Fed provided even more credit against dodgy collateral but ceased sales of Treasuries. Consequently, the liability side of the Fed balance sheet—in the form of bank reserves—was allowed to rise in line with the increased credit provided. The new market euphemism was “cash for trash”.

As financial markets slowly stabilized, Fed lending programs shrank, as they were designed to do, and their place on the balance sheet was taken during the third phase by a more than compensating increase in securities held as a consequence of Large Scale Asset Purchase (LSAP) programs—comprising Fed purchases of US Treasury and Government Sponsored Entity (GSE) guaranteed mortgage backed securities (MBS) and GSE and Agency debt⁶. LSAPs ended in October 2014.

⁴ Nyawata (2012) contains a general discussion of the merits of t-bills vs. central bank bills.

⁵ This balance sheet will be denoted the “Fed” balance sheet elsewhere.

⁶ For ease of exposition I will refer to these securities simply as “MBS”. MBS constitute the vast bulk of the total.

A fourth phase has recently been initiated. It differs from the previous three in that the *liability* side of the balance sheet will be transformed and restructured while the *asset* side remains largely unchanged. This paper focuses on the fourth phase of the transformation—the liability management phase.

The Pre-Crisis Balance Sheet

The pre-crisis Fed balance sheet is shown in Table 1. US Treasuries and banknotes outstanding constituted about 90 percent of total assets and liabilities respectively. Overnight bank deposits at the Fed, also known as bank reserves, comprised a very small portion of the balance sheet—less than two percent. Bank reserves, compared with total US bank assets at end 2007, were miniscule—0.15 percent⁷ and actually less, in nominal terms, than at end 1951. The liability “reverse repos” reflect transactions that were conducted almost exclusively with foreign central banks and multilaterals⁸. These daily operations allowed the Fed to effectively pay interest on foreign official deposits. Treasury deposits, at \$5 billion, reflected a long-standing agreement whereby the US Treasury committed to hold close to that amount in its Treasury General Account, so as to minimize disruptions its cash management activities might otherwise have had on the supply of bank reserves.

Table 1: Consolidated Balance Sheet of the Federal Reserve Banks
December 5, 2007
(in US\$ billions)

Assets		Liabilities	
US Treasuries	780	FR Notes Outstanding	782
Liquidity Providing Repos	47	Bank Deposits (Overnight)	16
Net Other Assets	50	Reverse Repos	37
		US Treasury Deposits	5
		Equity	37
Total Assets	876	Total Liabilities	876

Source: Federal Reserve Board Release H.4.1 and Author's calculations

Prior to the crisis, the only actively used policy instruments were short term liquidity supplying repos⁹. The Fed, like its advanced country peers, kept the market “short” reserves and influenced the overnight rate via lending operations. In the aggregate, banks were compelled to rely on small amounts of credit

⁷ Total US bank assets at end-2007 were \$10.888 trillion. (FRB Release H.8).

⁸ The four one day reverse repos conducted with the market in 2007 were the first such draining operations since 2004. FRBNY (2008), page 20.

⁹ The Fed announced its Term Auction Facility and ECB and SNB swap lines only on December 12, 2007.

from the central bank to obtain their desired reserve balances. This facilitated the attainment of central bank interest rate targets even with small operations.

As of December 5, 2007, the Fed was providing \$47 billion in 7-day and 14-day repos to enable the market to meet its demand for \$16 billion in overnight deposits. The then current FOMC target for the fed funds rate was 450 bps and the daily effective fed funds rate on December 6, 2007 was 449 bps.

Within this operating system, which allows the *market* to determine both the quantity of currency in circulation and bank reserves (the monetary base), increases in the target interest rate are not achieved—as is often misleadingly stated in textbooks—necessarily by a reduction in liquidity providing repos nor by “open market sales of securities”¹⁰. More simply, the interest rate on repos is raised and this guides the market overnight interest rate.

It is also worth noting that this monetary operations framework can function with a very small balance sheet. If we subtract from the Fed balance sheet “currency in circulation” and the US Treasuries “backing” the note issue, neither of which play any material role in the monetary framework, the Fed balance sheet pre-crisis was less than one percent of US GDP. A very similar picture is obtained in the UK by considering separately the Bank of England “Issue Department” and “Banking Department” balance sheets. The former is a currency board, the latter the locus of monetary operations¹¹.

The ability of monetary operations to function in normal times with small operations is a reflection of the efficiency with which modern real time gross settlement systems economize on low yielding reserves. In the US, pre-crisis, the daily average level of reserves held overnight was about \$ 20 billion compared with average daily gross payments over Fedwire of \$ 2.5 trillion and assets under custody at the three largest US custodians—Bank of New York, State Street, and JP Morgan of \$ 71.8 trillion¹².

The Crisis Balance Sheet: Post-LSAPs

The Fed balance sheet toward the end of the LSAP program is shown in Table 2 below.

¹⁰ “The outright sale of U.S. Treasury securities that commenced on March 7 [2008] were the first sales in nearly two decades”. FRBNY (2009), page 13, footnote 12. Bindseil (2004) explains the theory behind modern monetary operations while Potter (2013) discusses specifically the US operational framework.

¹¹ An in-depth consideration of the requisite size of central bank balance sheets is found in Stella (2011).

¹² Source for data on assets under custody—Institutional Investor’s 2014, *Ranking of Custodians*.

Table 2: Consolidated Balance Sheet of the Federal Reserve Banks

October 15, 2014

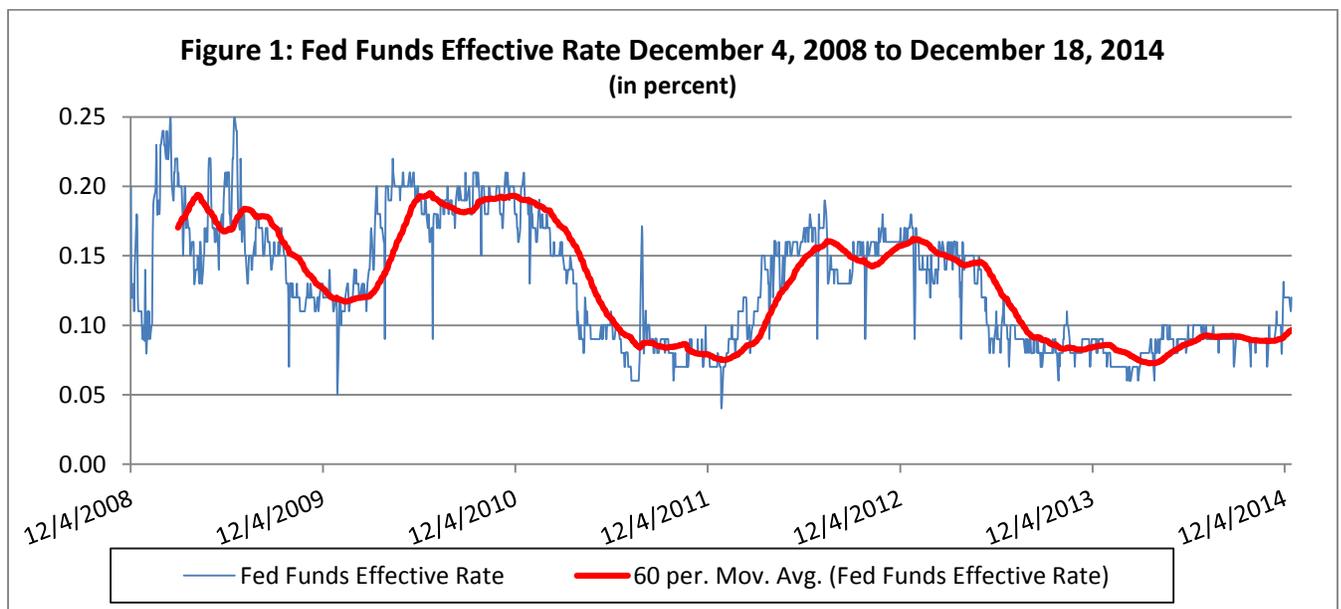
(in US\$ billions)

Assets		Liabilities	
US Treasuries	2567	FR Notes Outstanding	1252
MBS and Agencies	1832	Bank Deposits (Overnight)	2821
Net Other Assets	53	Bank Deposits (Term)	0
		Reverse Repos	221
		US Treasury Deposits	101
		Equity	56
Total Assets	4452	Total Liabilities	4452

Source: Federal Reserve Board Release H.4.1 and Author's calculations

Compared with the pre-crisis balance sheet (December 2007), the Fed's holdings of US Treasuries and MBS were higher by \$1787 billion and \$1832 billion respectively at the end of the LSAPs. Bank reserves rose by \$2805 billion over the same period. The residual, \$814 billion, is largely explained by increases in banknotes outstanding (\$470 billion), reverse repos (\$184 billion), and Treasury deposits (\$96 billion).

Owing to the enormous level of excess reserves, it is no surprise that fed funds have been trading at close to zero for more than 6 years—over 1,500 consecutive trading days. See Figure 1.



Source: FRBNY Website and author's calculations.

LSAPs were introduced as a supplement to conventional monetary operations which were constrained by the ZLB. The intent and effect of LSAPs “...was to put downward pressure on yields of a wide variety of *longer-term* securities, support mortgage markets, and promote a stronger economic recovery.”¹³[Emphasis added].

Both the “large scale” and “long duration” aspects of LSAPs were essential to achieving the Fed’s objective. Repeated media attention only to the “large scale” or “quantitative” element of Fed policy, and its mislabeling as “QE” missed the essential role that LSAPs played in altering the *duration* of securities held in the market—the replacement of long-term Treasuries and MBS with overnight bank reserves. Had LSAPs only involved the purchase of, say, 7 to 28 day t-bills, they would have had little to no impact on long-term yields irrespective of the LSAP magnitudes. Similarly, despite many claims to the contrary, the “money printing” aspect of LSAPs was not essential to their efficacy. Had the Fed used t-bill sales, rather than bank reserves, to finance its long term debt purchases, the duration transformation would have been almost identical¹⁴.

Gagnon, Raskin, Remache and Sack (2010) argue that the primary objective of the LSAPs was to lower long term interest rates through the “portfolio balance” channel. Interest rate risk, also known as the term premium, was reduced by removing long duration securities from the market. In addition to directly raising the prices of the assets purchased and lowering yields among assets remaining in the same category in the market, investors were expected to subsequently rebalance their portfolios leading other asset prices to rise and their yields to fall. There was no expectation that the addition to bank reserves would be a material factor—consistent with the role—or lack thereof—of the bank reserve channel in modern macroeconomics alluded to earlier, as well as contemporary research being published at the same time originating from the NY Fed¹⁵.

A secondary impact of LSAPs was to support the Fed’s “lower for longer” interest rate guidance. By taking such a significant portion of certain long term securities out of the market, the Fed set up a situation where it would be very disruptive to sell those securities any time soon. Consequently, the Fed was signaling that once it did decide to raise rates, the intended impact would be on the short end of the curve primarily—the reduction in the term premium achieved by the LSAPs would be the “last” element of any future tightening, not the first.

Both motivations for the LSAPs define the contours of the “Exit” strategy.

III. Fed Liability Management During the Exit: Strategy and Operational Challenges

The FRBNY lost control of its operational target—the fed funds effective rate¹⁶ in the context of the massive market disruption associated with the application of Lehman Brothers for bankruptcy

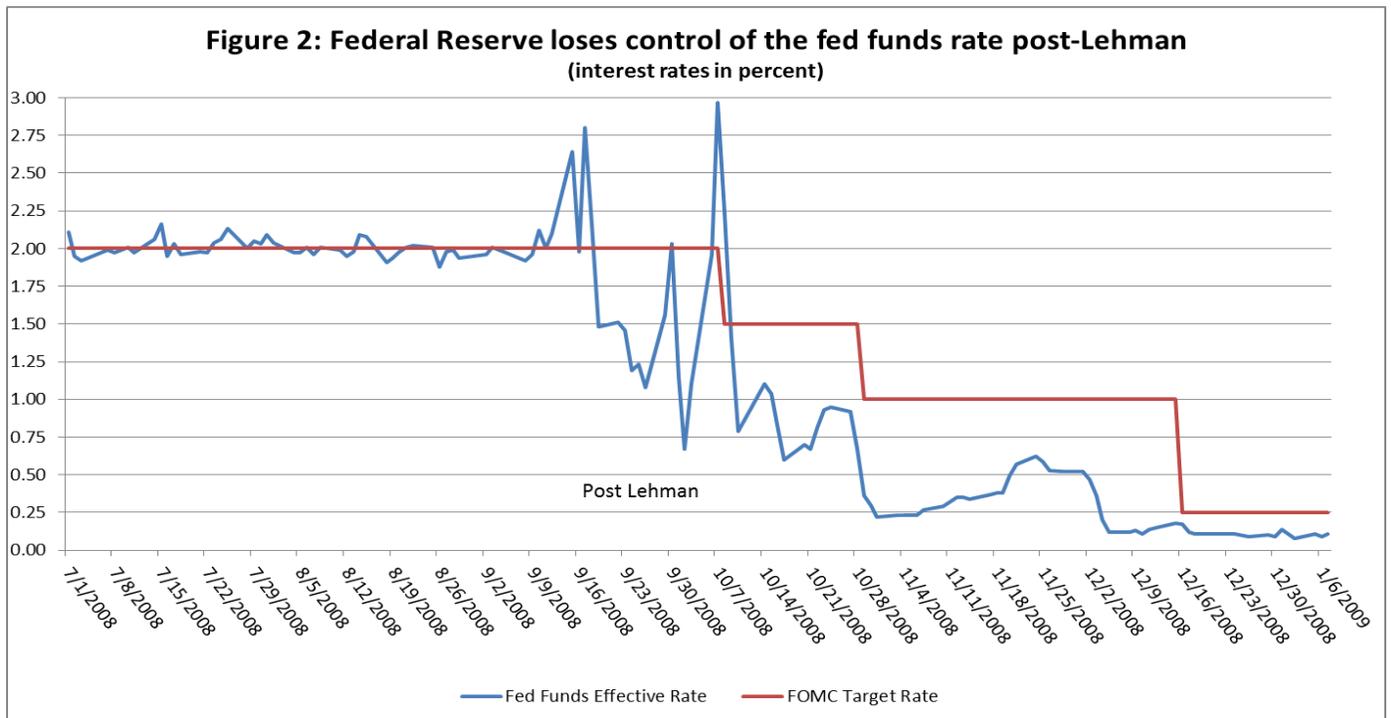
¹³ Website of the Federal Reserve Board, FAQ, *What are the Federal Reserve’s large-scale asset purchases?*

¹⁴ Of course the Fed did not have sufficient t-bills in its portfolio to finance the LSAPs. I return to this later.

¹⁵ See, for example, Keister and McAndrews (2009) and Martin, McAndrews, and Skeie (2011).

¹⁶ The “fed funds effective rate” is the daily transaction-value weighted average interest rate on brokered trades for unsecured overnight fed funds—overnight deposits at one of the 12 Federal Reserve Banks. A “trade” is an agreement between two parties wherein the lender transfers FRB balances it holds through FEDWIRE to the

protection in September 2008. The behavior of the fed funds effective rate was a significant source of concern between September 16, 2008 and December 16, 2008 (See Figure 2). During that time the Fed was still attempting to target a nonzero policy rate. However, once the decision was taken to adopt a target band including the zero lower bound (0 – 25 bps), the Fed’s inability to control the operational rate became immaterial. But with exit—raising the fed funds rate—now on the horizon, the Fed knows that it will need to regain control over its operational target. In other words, the operational arm of the Fed, the FRBNY, is preparing to receive the eventual call from the FOMC in Washington to raise rates.



Laying the ground for the exit essentially involves action to bring the overnight money market back into equilibrium. The situation in which the Fed finds itself is somewhat akin to a driver who realizes her brakes no longer work just prior to beginning a difficult drive uphill for an extended period of time. While the objective is to climb the hill, the condition of the brakes is largely irrelevant—but before the *descent* begins, something must be done to ensure that the brakes will function smoothly.

Strategy

The FOMC has outlined its exit strategy. The first steps have been taken, to curtail (taper) and then terminate the LSAP program which had been the source of continued bank reserve augmentation.

During the second step of the balance sheet normalization process, overnight bank deposits at the Federal Reserve, “fed funds”, are to be *reduced* in overall magnitude by:

borrower in expectation that the later will reverse the transaction next day plus interest. The FRB is neither a lender nor borrower in a trade. It merely collects data from brokers, calculates and publishes the effective rate.

- increasing term deposits
- increasing reverse repurchase agreements or “reverse repos”
- ceasing to roll over securities maturing in the Fed’s portfolio

The first two operations would convert bank overnight deposits (fed funds) into longer term deposits and collateralized loans to the Federal Reserve, respectively. Neither would shrink the balance sheet.

Ceasing to reinvest the proceeds of maturing Treasury, GSE, or Agency debt would shrink the balance sheet and drain reserves. The Treasury, GSE or Agency would need to issue more debt to the market than otherwise would be the case and use the proceeds obtained to redeem their debt held by the Fed. Ceasing to reinvest the proceeds of maturing MBS would have an identical impact on bank reserves.

Once the Fed has reestablished control over the fed funds rate, it will begin to exit by raising rates on all of its instruments including, primarily, the IOR rate.

Sequencing

The FOMC has indicated clearly its intention to raise the fed funds target before ceasing to roll over its securities holdings, i.e. shrinking the balance sheet. This implies a greater reliance on its new interest-bearing instruments than otherwise would be the case. The consequences of this sequencing strategy for US money market segmentation and fragmentation is discussed in the next section.

Experimenting with the new tools—tapping the brakes

As shown in Table 3, the Fed will have approximately \$3 trillion in interest-bearing liabilities to manage with a combination of three instruments: overnight deposits, term deposits, and reverse repos. It is important to note that only banks (depository institutions) may hold interest-earning deposits at the Fed. That is, the fed funds market comprises the trading of deposits at FRBs among entities allowed to hold deposits at the Fed—the GSEs, Federal Home Loan Banks, Foreign and Multilateral institutions, and banks. Only depository institutions are eligible to receive interest on overnight and term deposits.

Reverse repos, in contrast, are available also to nonbanks, the primary class being money market funds. In order to participate in a reverse repo, the money market fund issues instructions to its clearing bank to transfer funds it holds at the clearing bank to the FRB. The clearing bank executes the instruction, debiting the MMF account with it and remitting the equivalent amount in reserves to the FRB via FEDWIRE. Thus, even though a *nonbank* has participated in the trade with the Fed, the decline in bank reserves is the same as it would be had a bank participated directly.

In December 2008, it was believed that introducing “interest on reserves” (IOR) would enable the Fed to re-establish control of the fed funds rate relatively easily. Although it was understood, even at that time, that certain non-depository holders of reserves were not eligible under the legislation to receive IOR, it was believed that competitive arbitrage would raise the fed funds rate close to the IOR rate or that a

relatively small quantity of reverse repos directed toward the ineligible institutions at the IOR rate would take them out of the fed funds market and establish equilibrium at a rate close to IOR¹⁷.

Several important developments were unforeseen at the time IOR was introduced, including the rise of excess reserves from about \$200 billion to \$2.7 trillion and the impact of certain provisions of legislative efforts to reduce financial market leverage and enhance financial system stability. Of particular relevance is the application of FDIC insurance fees to all non-equity liabilities of insured banks; higher charges for systemic institutions; for short term financing; and a tighter capital leverage ratio¹⁸.

Since the Fed will raise its operational target for the fed funds rate before it begins to reduce the size of the balance sheet, the exit process has begun with increases in the amount of TDs and RRP— with offsetting declines in overnight balances—that will be followed by increases in the rates paid on those two instruments and on reserves. Owing to the fact that the TD rate is available only to banks able to obtain the IOR rate, the TD rate should trade above the IOR rate and the fed funds rate, in turn, should trade above the RRP rate. Hence the Fed will exit by containing the fed funds rate within a corridor—the ceiling being the TD rate and the floor the RRP rate. Of the three main interest rates, only the IOR is strictly comparable to the fed funds rate—an unsecured overnight rate. The TD offers a “term” rate and the RRP a “secured” rate in that it is collateralized. The IOR rate is also the only rate set directly by the Fed—not through an auction process, so one would expect the FOMC to focus communicating its decisions on changing the IOR rate and fed funds target rate.

Thus the FOMC has adopted a rather unconventional, novel and complex operational framework¹⁹. A “maglev” system, using increases in the IOR rate as a “magnet” to draw upward the fed funds rate²⁰.

The FOMC authorized testing small-scale reverse repo operations in November 2009 and the Federal Reserve Board authorized TD on April 30, 2010. Experimentation with TD and RRP began in large amounts during the second half of 2014 and has continued into the third quarter of 2015²¹.

There remains considerable debate within the FOMC concerning the optimal size of RRP. Unlike the Fed’s other instruments, RRP are available directly to nonbanks such as money market funds. Some FOMC members apparently believe this raises financial stability concerns. For instance, a loss in confidence in banks might lead nonbanks to withdraw commercial bank financing in exchange for “lending to the Fed” in the reverse repo format. While intuitively appealing, this argument does not stand up to scrutiny. Nonbanks can only withdraw funding from banks to the extent they have claims on banks. Since banks currently hold approximately \$ 3 trillion in reserves at the Fed, nonbank withdrawals would need to reach staggering proportions to impact the banking system’s ability to meet them. Indeed, at the moment, banks are actively trying to lose customer accounts²² precisely because the costs

¹⁷ See Bech and Klee (2011).

¹⁸ The leverage ratio is calculated as regulatory capital divided by total assets. It therefore includes in the denominator deposits at the central bank.

¹⁹ In contrast, the Bank of England, uses “bank rate”, the equivalent to IOR, as its operational target.

²⁰ The IOR magnet analogy was first used in Potter (2014). I describe the *mechanism* as “maglev”.

²¹ A detailed examination of the Fed’s experimentation with exit tools may be found in Stella (2015).

²² JP Morgan announced on February 24 2015 plans to shed \$ 100 billion in deposits during 2015.

associated with them exceed the interest they obtain on excess reserves²³. Raising the limit on reverse repo outstanding to \$ 1 trillion would seemingly pose no problem and would allow the Fed to provide a tighter and firmer floor to the fed funds rate.

Latest Fed Balance Sheet

The July 29, 2015 (latest as of this version) Fed Balance Sheet is shown in Table 3.

Table 3: Consolidated Balance Sheet of the Federal Reserve Banks

July 29, 2015

(in US\$ billions)

Assets		Liabilities	
US Treasuries	2566	FR Notes Outstanding	1328
MBS and Federal Agencies	1845	Bank Deposits (Overnight)	2633
Net Other Assets	54	Bank Deposits (Term)	0
		Reverse Repos	243
		US Treasury Deposits	203
		Equity	58
Total Assets	4465	Total Liabilities	4465

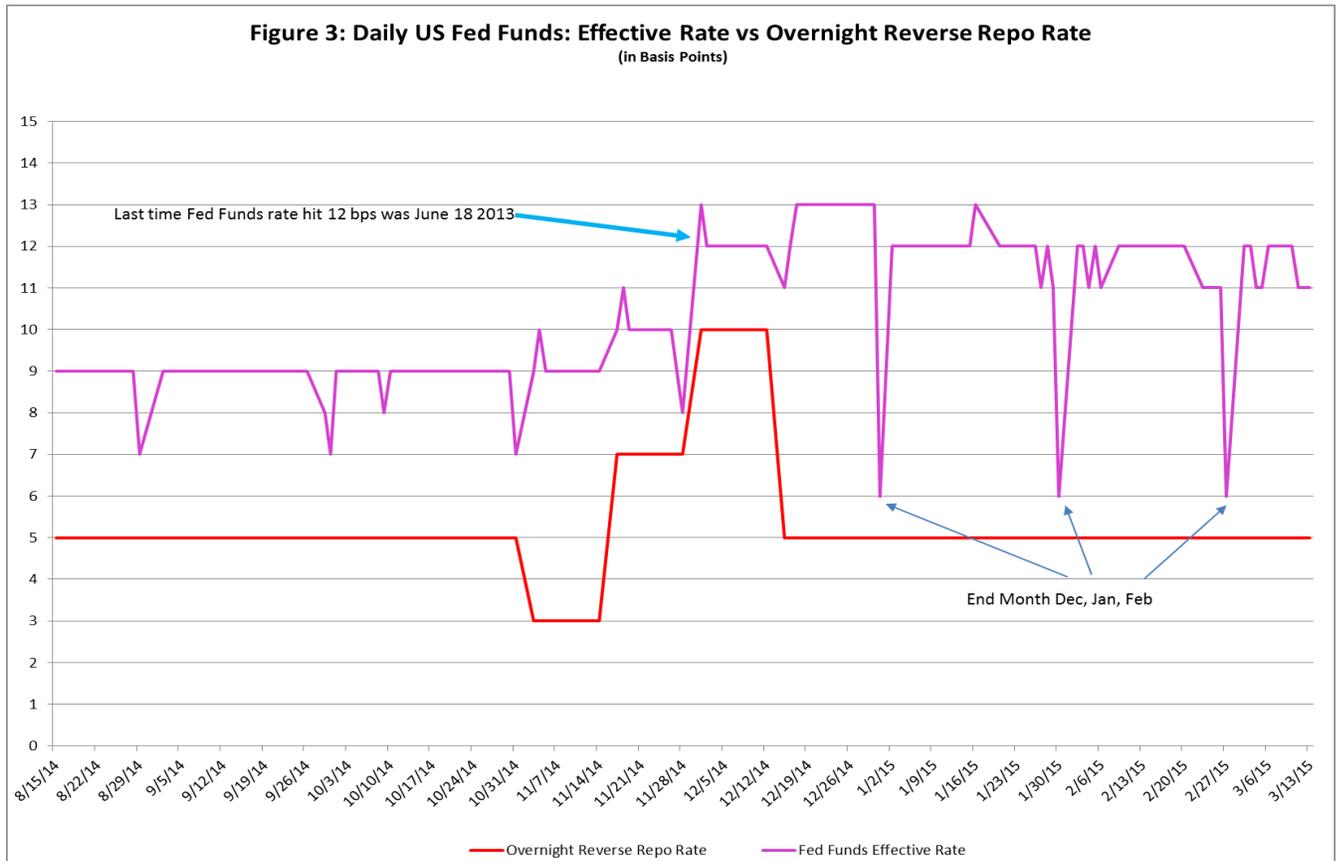
Source: Federal Reserve Board Release H.4.1 and Author's calculations

There has been virtually no change on the asset side of the Fed balance sheet since LSAPs ended in October 2014. On the liability side, Federal Reserve Notes outstanding and Treasury deposits increased by \$ 178 billion combined while bank reserves declined by an almost equivalent amount, \$ 188 billion. With the suspension of the Federal debt ceiling in February 2014, the Treasury was able to build up deposits at the Fed by issuing debt in excess of what was needed to finance the fiscal deficit. Balances in the Treasury General Account at the NY Fed reached a peak of \$ 223.5 billion on December 31, 2014. This increase in Treasury account balances resulted in a corresponding decrease in bank excess reserves, thereby reducing Fed interest costs and the costs to the US consolidated sovereign since the Treasury was able to issue 28 day bills in December 2014 at rates between 1 – 4 bps, substantially less than the 25 bps paid by the Fed on excess reserves.

Nevertheless, in anticipation of the expiration of the suspension of the debt ceiling on March 15, 2015, the Treasury had to rapidly reduce its balances at the Fed since the (February 2014) legislation did not allow it to take advantage of the temporary suspension of the debt limit to increase its deposit balances.

²³ See Stella (2015), *Exiting Well*, for more on this topic. <http://stellarconsultllc.com/blog/>

The Fed experiments appear to have been broadly successful. The fed funds rate has traded close to the middle of the FOMC target corridor since December 1, 2014²⁴. (Figure 3 below). It had not been consistently that high since June 2013. Exploiting its new instruments, the Fed has managed to raise the fed funds rate to its highest level in 18 months and kept it there despite the cut in the overnight RRP rate on December 15, 2014 and the maturing of \$225.6 billion in term repo on January 5, 2015.



Source: FRB NY website.

The demonstrated ability of the Fed to influence the fed funds rate using TD and RRP, combined with the expressed willingness of the FOMC to accept higher fed funds rate volatility will likely place shrinking the balance sheet on the back burner. Consequently the Fed may manage a large balance sheet using TD, IOR, and RRP for a long time. That issue will occupy the remainder of this paper.

IV. Inefficiencies associated with large excess bank reserves

In terms of the sheer size of reserves, comparisons with the pre-crisis numbers are astonishing. Prior to the crisis, reserve balances held at FRBs averaged about \$20 billion and the critical level below which FEDWIRE was deemed fragile, \$10 billion. Reserves are now about 150 times larger.

²⁴ With the exception of end-month trading days owing to “customary” end-month window dressing.

JP Morgan Chase (JPM), the largest US bank, held \$2.2 billion in deposits at FRBs at end-2006 compared with total assets of \$1,352 billion²⁵. Wells Fargo, the third largest US bank, held \$1.7 billion in deposits at FRBs at end-2006 compared with total assets of \$482 billion²⁶. In other words, JPM and Wells Fargo held 0.16 percent and 0.35 percent of their assets, respectively, at the Fed in 2006—not too dissimilar from the average US bank (0.12 percent). As of end-March 2015, JPM held reserves equal to \$447 billion compared with total assets of \$2,096 billion, or 21.4 percent, while Wells Fargo held \$244 billion at FRBs compared with total assets of \$1,571 billion, or 15.6 percent. The displacement of bank balance sheets engendered by the Fed has been monumental. More than half of the growth in JPM’s assets since 2006 can be explained by the increase in deposits held at the Fed, i.e. an increase in JPM’s loans to FRBs.

The impact on bank holding companies devoted primarily to wholesale clearing and asset custody services is likely to have been even greater. State Street, the second largest global asset custodian as of 2014 (Institutional Investor’s ranking), held deposits averaging \$ 103 million at FRBs during 2006. As of end-March 2015, those deposits had risen to \$ 56 billion, an astonishing increase of 43,000 percent. Figures for Bank of New York, the world’s largest global asset custodian, were similar to State Street before the crisis. Following BONY’s merger with Mellon Financial (2007), the combined entity held \$ 50 billion in reserves at Federal Reserve Banks as of end-March 2015.

		(in \$ Billions & percent)		
Date	Bank	Reserves	Total Assets	Reserves/Total Assets
Average 2006	JP Morgan Chase	2.2	1352	0.16
Average 2006	Wells Fargo + Wachovia	2.1	597	0.35
Average 2006	Bank of NY + Mellon	0.3	145	0.22
Average 2006	State Street	0.1	107	0.10
3/31/2015	JP Morgan Chase	447	2096	21.35
3/31/2015	Wells Fargo	244	1571	15.56
3/31/2015	Bank of NY Mellon	50	317	15.80
3/31/2015	State Street	56	275	20.22
3/31/2015	Bank of America	107	1600	6.68
3/31/2015	Citibank	49	1336	3.70
3/31/2015	PNC	31	340	9.06
3/31/2015	U.S. Bank	8	405	1.90
3/31/2015	Total (8 banks above)	992	7940	12.50

Sources: Various Quarterly and Annual Reports.

Why are banks holding such large reserves now at Federal Reserve Banks? Reading the popular financial press and the musings of certain seasoned central bankers one might think it is to fund future lending—that somehow “reserves” become transformed into loans. Nothing could be further from the truth.

²⁵ JPMorgan Chase and Company (2007), Note to the Accounts #25, page 129.

²⁶ Wells Fargo and Company (2007), Note to the Accounts #3, page 78.

Reserves are bank assets. As a matter of simple balance sheet arithmetic, an addition to reserves requires some combination of a *decrease* in other assets (lending) and an *increase* in liabilities (funding).

Banks are not choosing to hold this large amount of reserves, they are essentially being compelled to hold them on the balance sheet as an unintended consequence of central bank asset purchases.

Viewed from the global financial sector perspective, Fed LSAPs have withdrawn approximately \$3 trillion of US Treasury, Agency, and MBS from the market in exchange for \$3 trillion of US bank reserves. Since, by law and definition, only banks may hold reserves at the Fed, banks have wound up with the reserves regardless of whether they sold the securities—and research suggests that nonbanks were overwhelmingly the source of the sales to the Fed²⁷.

Therefore it would not be surprising that banks specializing in custodial, clearing and settlement services are likely to have borne the brunt of the impact of LSAPs²⁸. Their customers sold assets out of custody to FRBNY, directing FRBNY to credit their account at their designated custodian/settlement bank. The settlement banks did so and received—in return—an equivalent credit to their account at the FRB NY. The ultimate investor, say “A”—in line with the intent of the LSAPs—presumably then purchased other securities with their new deposits. Whoever sold those securities to A, say “B”—equities, corporate bonds, or even MBS or Treasuries—received payment from A at their (B’s) settlement/custodian bank. If the custodian banks are the same for A and B, no transfer of reserves takes place, the custodian bank simply transfers the ownership of the securities in custody and makes a corresponding adjustment in its depository (or other) liabilities. At some point, certainly, reserves will be transferred from custodial/settlement banks to retail and other banks, but the essential point is that for the banking system as a whole, if reserves rise, then either other assets fall or liabilities increase.

The impact of LSAPs on the aggregate US banking system is shown in Tables 5 and 6.

Table 5 shows the change in selected balance sheet items for the aggregate US banking system between December 5, 2007 and August 26, 2015. Table 6 rearranges Table 5 to make it clearer that the \$ 2.7 trillion in deposits at the Fed that banks have acquired through LSAPs has been financed by an equivalent increase in depository liabilities. In other words, 57 percent of the growth of US bank assets since the crisis consists of increased deposits at FRBs and 57 percent of the growth of US bank liabilities during the same period consists of deposits necessary to finance the growth in reserves at the Fed.

²⁷ I am excluding the nonbanks mentioned above who may hold deposits at the Fed. See Carpenter, et. al. (2013).

²⁸ For simplicity I assume the investor uses the same bank holding company for clearing, settlement and custody.

Table 5: Change in Simplified Aggregate Balance Sheet of US Commercial Banks
From 12/5/2007 to 8/26/2015

(in US\$ billions)

Assets		Liabilities	
Loans and Leases	+1584	Nonbank Deposits	+4088
Treasury and Agency Securities	+993	Borrowings	-227
Other Securities	-75	Other Liabilities	+245
Deposits at FRBs	+2666	Total Liabilities	+4106
Other Assets	-508	Equity and Residual	+554
Total Assets	+4660	Total Liabilities and Equity	+4660

Source: Federal Reserve Board Release H.8, H.4.1 and Author's calculations

Table 6: Reclassified Change in Simplified Aggregate Balance Sheet of US Commercial Banks
From 12/5/2007 to 8/26/2015

(in US\$ billions)

Assets		Liabilities	
Deposits at FRBs	+2666	Nonbank Deposits to Finance Reserves	+2666
Loans and Leases	+1584	Other Nonbank Deposits	+1422
Treasury and Agency securities	+993	Equity and Residual	+ 554
Net Other Assets	-601		
Total Assets	+4642	Total Liabilities and Equity	+4642

Source: Federal Reserve Board Release H.8, H.4.1 and Author's calculations

Table 6 is nothing other than simple balance sheet arithmetic. If deposits at FRBs rise by \$ 3 trillion, the combination of increased liabilities and decreased other assets must sum to \$ 3 trillion. In the US case, depository liabilities and equity have risen by more than enough to finance the increase in deposits at the FRBs, allowing some growth in non-reserve assets, mainly “loans and leases”.

Considering a slightly more disaggregated view of US banks, we would find that the growth in reserve holdings of US branches and agencies of *foreign* banks has been even greater than that of US chartered-banks reflecting the differential impact of changes in the US regulatory framework (Table 7)²⁹.

Table 7: US Bank Reserves and Assets (in \$billions and percent)	End June 2008			End March 2015		
	Reserves	Total Assets	R/TA	Reserves	Total Assets	R/TA
US Chartered Banks	12.8	9725	0.13	1783	12913	13.8
US Branches and Agencies of Foreign Banks	0.6	2081	0.03	884	2532	34.9

Source: FR Bulletin Table 4.3, FRB Releases H.8 & H.4.1, November 2008 & March 2015; and author's calculations.

Two particular revised regulations are worthy of mention.

In April 2011, the US changed the definition of the base on which the FDIC levies charges—from insured bank deposits to assets minus equity, i.e. all non-equity liabilities. This has increased the cost of non-deposit financing for US insured banks but not for foreign banks. Although the calculation is complicated, it is believed that the FDIC insurance fee alone “...added 2.5 to 45 basis points to the costs of large and complex US chartered banks’ short-term wholesale funding...the rate for the largest US bank was said to be 8 basis points.”³⁰ This has given branches of foreign banks a competitive advantage vis-à-vis US chartered banks in the market for arbitraging the gap in the fed funds rate and IOR rate.

The second relevant regulatory change (effective January 1, 2015) is the requirement that the largest US “advanced approaches banking organizations” meet the “enhanced supplementary leverage ratio” (eSLR) minimum threshold of 5 percent by January 1, 2018. The eSLR is the ratio of regulatory capital to all balance sheet assets plus certain off-balance sheet items including the effective notional principal amount of credit derivatives through which a banking organization provides credit protection. Were the eSLR binding for, say, JPM, the latter would need to hold additional capital equal to 5 percent of reserves held at the FRBs or \$17.85 billion at the current level. At an equity cost of capital of 12 percent, this would amount to \$2.14 billion, and add 35 bps to the cost of financing its reserves holdings.

Non-reserve assets of US branches and agencies of foreign banks have *decreased* by \$432 billion while their FRB deposits have *increased* by almost one trillion dollars. Consequently, 33 percent of the excess reserves at the Fed are being held by branches of foreign banks even though those banks hold only 13 percent of all US banks’ assets (excluding deposits at the Fed). Nonbank funding of banks has shifted toward foreign banks to avoid the newly enhanced regulatory restrictions and charges on US chartered banks’ short term funding³¹.

Returning to our discussion above of the custodial/settlement banks, those banks are actively trying to entice customers to move funding to other banks so as to avoid the enhanced FDIC and capital charges that make the intermediation of deposits at the Fed a low or even negative margin business. Bank of New York Mellon and JP Morgan have imposed fees and/or negative rates on certain depositor

²⁹ See the insightful discussion in McCauley and McGuire (2014).

³⁰ McCauley and McGuire (2014).

³¹ Obviously, banks will finance overnight assets at the Fed with *short term* liabilities.

accounts³². For example, JP Morgan announced on February 24 2015 plans to shed \$ 100 billion in depository liabilities during 2015. These funds will evidently find their way to US branches and agencies of foreign banks who have a clear competitive advantage in this business line currently.

The implication of this for monetary operations is clear. Even though the Fed might be able to take the non-depository institutions not eligible for IOR out of the market with reverse repos, regulatory arbitrage opportunities—among US chartered and foreign banks—may continue to drive a wedge between the fed funds and IOR rate absent other policy measures. As the current SOMA manager said in 2013 “...competitive conditions in the unsecured money markets haven’t proven strong enough to narrow the spread between the fed funds rate and the IOER rate to very small and stable levels...”³³

The implications for long run financial stability and risk also seem clear. Incentives are in place to move certain financial services and intermediation to nonbanks—the regulatory “shadow”.

A last problem with Fed instruments is that—owing to their illiquidity—they are expensive compared with Treasury instruments of equivalent, or even longer, duration. Table 8 illustrates this.

Auction/Issue Date	FRB Interest-Bearing Liabilities				US Treasury Instruments				
	IOR (o/n)	RRP (o/n)	Term RRP	7 Day TD	28 Day UST	90 Day UST	180 Day UST	7 Year	FRN
11/3/2014	25	3			3.5[36]	2[24]	6[30]		[15]
11/10/2014	25	3			4.5[40]	2.5[24]	6[28]		
11/13/2014	25	3		27[308]					
11/17/2014	25	7			3.5[40]	2.5[24]	7[28]		
11/20/2014	25	7		28[316]					
11/24/2014	25	7			6[40]	2[24]	7[28]		
11/26/2014	25	7		29[335]					[13]
12/1/2014	25	10			3[187/50]	2.5[112/24]	7.5[110/26]	196[76/29]	
12/4/2014	25	10		30[402]					
12/8/2014	25	10	8[102/50]		4[176/50]	2.5[108/24]	9[109/26]		
12/15/2014	25	5	7[75/50]		2[131/40]	3.5[96/24]	11[99/26]		
12/22/2014	25	5	10[50/100]		1	5.5	15.5		
12/29/2014	25	5	10[76/100]		1.5	4	13	212.5	[13]

Source: FRB NY website and US Treasury Monthly Statement of Treasury Debt

³² “JP Morgan to Start Charging Some Big Clients Deposit Fees” Wall Street Journal, February 23, 2015.

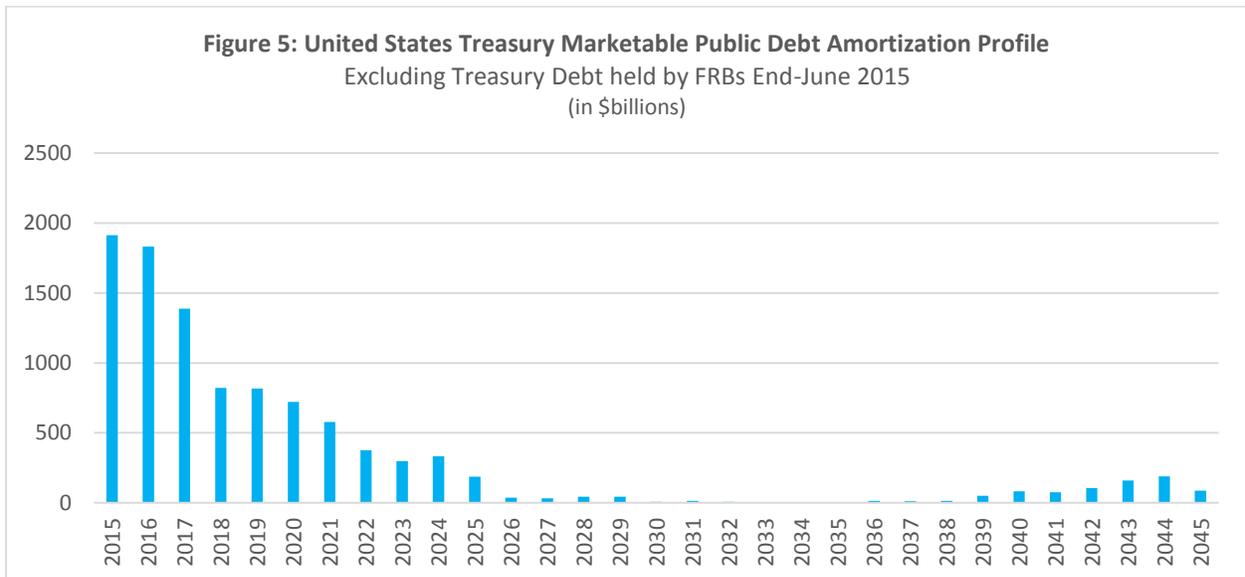
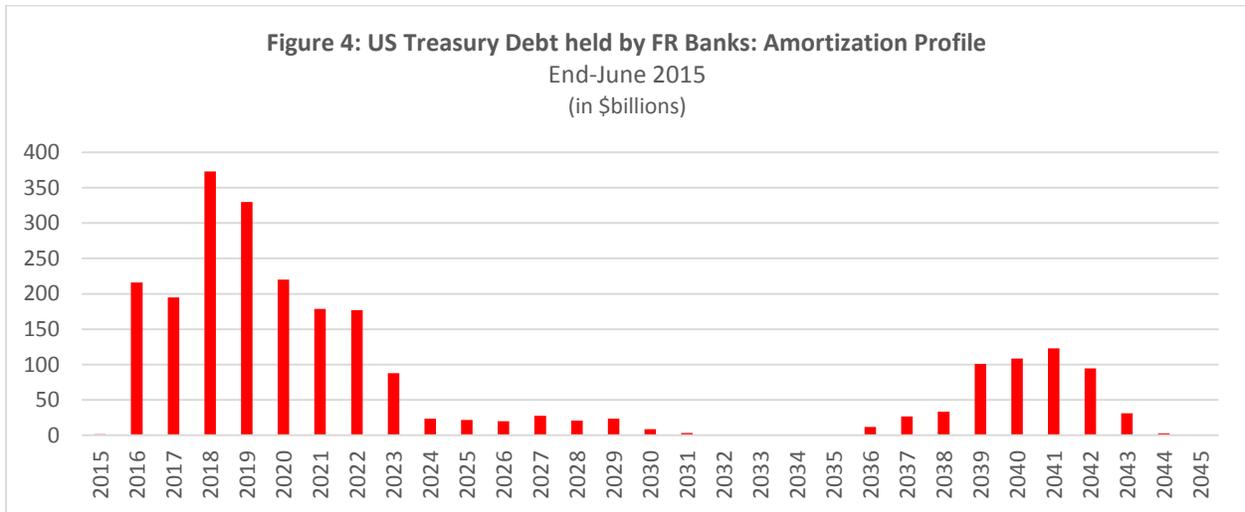
³³ Potter (2013), page 4.

For example, on December 1, 2014 the US Treasury issued 28, 90, and 180 day bills at yields of 3, 2.5 and 7.5 basis points respectively, while the Fed was paying 25 bps on reserves and 10 bps on overnight reverse repo agreements.

V. A Cooperative Sovereign Liability Management Strategy

Why, rather than introduce untested and novel policy instruments, does the FOMC simply not sell assets to reduce reserves? That is, exit operationally the same way it entered into LSAPs but in reverse?

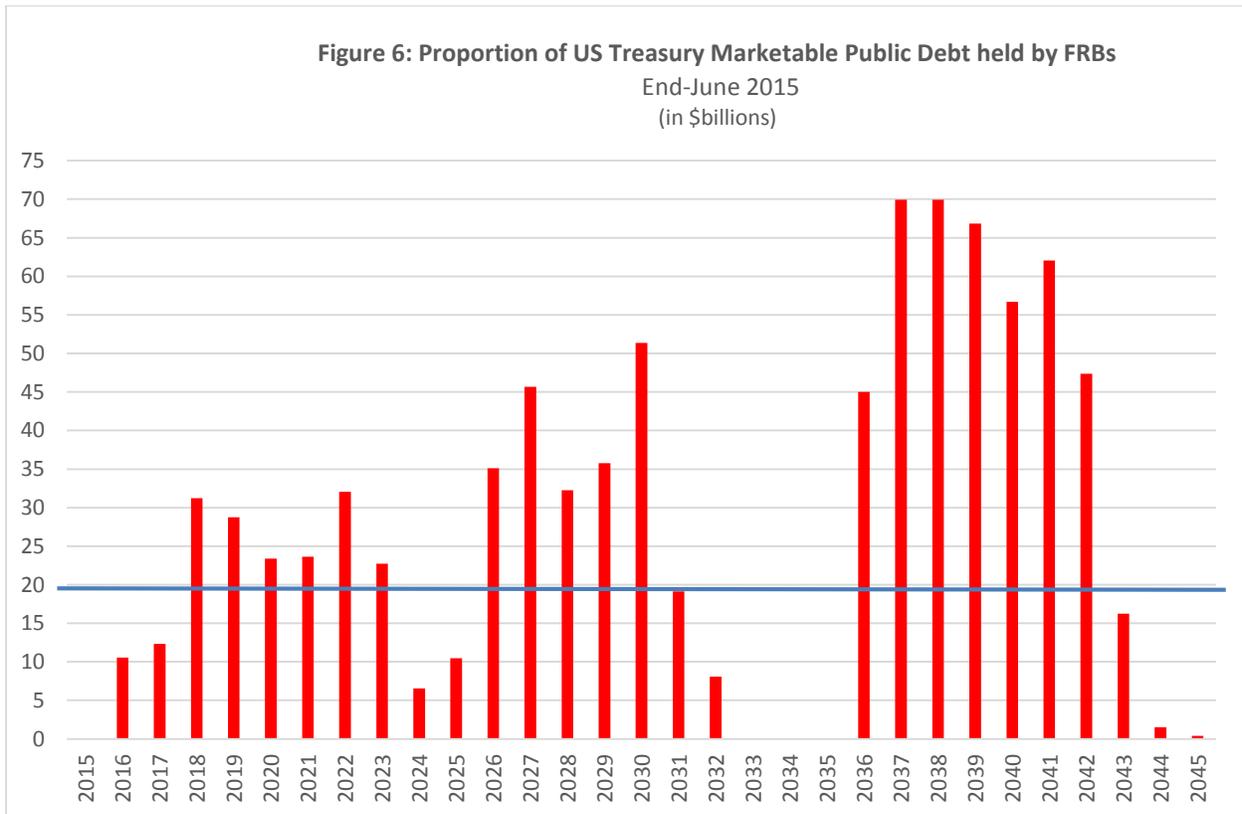
As noted at the end of section II, the Fed does not want to rapidly reverse the achievement it has made in altering the term structure of US sovereign debt held in the market and forfeit the associated decline in yields across a spectrum of longer-duration asset classes. Comparing the term structure of the FRBs' holdings of US Treasury debt with that of held by the market, the intent of the LSAPs is clear.



Sources: FRBNY, US Monthly Statement of the Public Debt, July 2015 and author's calculations.

The securities purchased by the Fed have a longer term-to-maturity than what remains in the market. For example, 36.7 percent of the Treasuries held by the market will mature by end-2016 compared with less than 9 percent of those held by FRBs. So it would be virtually impossible to sell securities from the Fed's portfolio without increasing the average duration in the market.

Furthermore, the Fed has a rather concentrated portfolio of Treasuries (Figure 6).



Source: US Monthly Statement of the Public Debt, July 2015 and author's calculations. Note that there are no US debt amortizations 2033-2035 owing to the hiatus in 30 year issuance circa 2001-2006 when the US was running budget surpluses.

Indeed, were the Fed to contemplate selling treasuries outright, as it did during phase two of the crisis, it would need to decide how the sales would be *distributed* over the yield curve. In 2008 that was not an issue as the distribution of the portfolio of securities held by the Fed was essentially similar to that held in the market. But that is no longer the case.

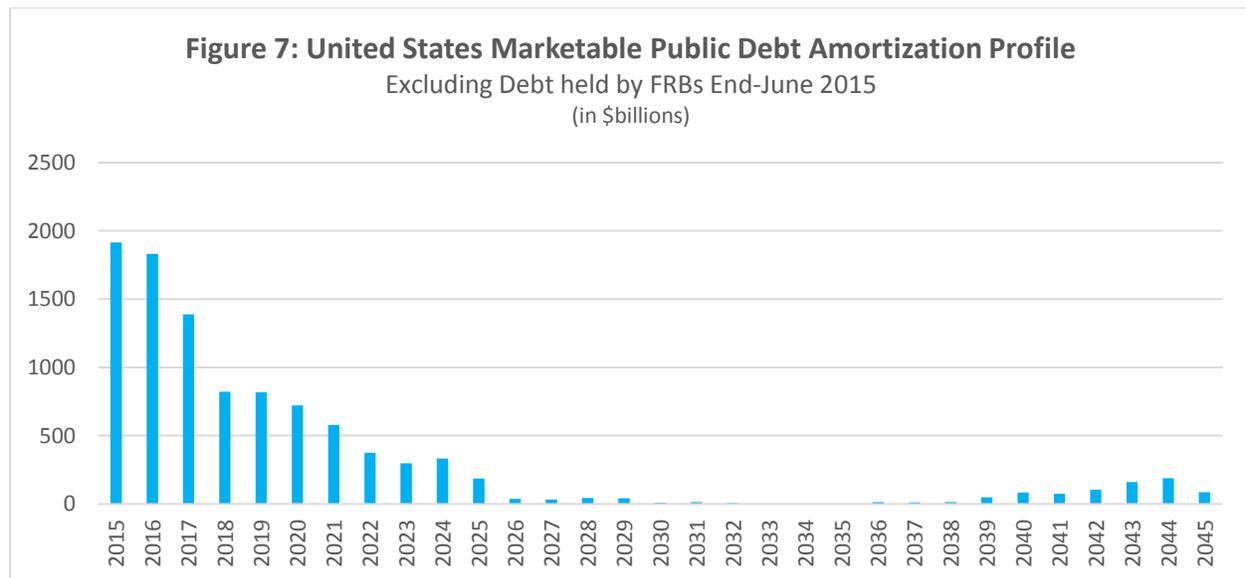
The decision by the Fed to concentrate its LSAPs made perfect sense. If you wish to move the market price of a security, one obtains the largest "bang-per-buck" by focusing demand on a particular security. The reverse is also true. Selling a large fraction of a given security would move prices (downward) and yields (upward) more abruptly than selling small proportions of several securities. Thus concentrated purchases reinforced the credibility of BSP "larger for longer".

In other words, even if the Fed were to sell off representative slices of its portfolio it would have an uneven impact on the market. Nor is it obvious that a proportional sale of each security class would be

optimal. For example, the FOMC might reasonably consider it less disruptive to the market to sell its \$23 billion in holdings due to mature in 2024 and none of its holdings due to mature in 2037. A sale of \$23 billion in the 2024 space would add only 8 percent to the amount of those maturities in the hands of the market while an identical sale in the 2037 space would more than triple those maturities outstanding. The FRBs currently hold 7.4 and 69.9 percent of total marketable Treasuries due to mature in 2024 and 2037 respectively. Looking across the full span of maturities, it is clear that the proportion of total marketable US Treasury securities held by the Fed is not uniformly distributed across time.

However, viewing this problem from the perspective of the US Treasury, one might come to a very different conclusion. Indeed, it is not impossible for the securities that the Treasury would like the Fed to sell first to be the ones the Fed would consider selling last.

Considering the stock of Treasury debt in the hands of the market (Figure 7), the US Treasury might very well wish to fill in the current void in the yield curve in the 2030-2038 space³⁴. In order to do this it might begin in 2015 to develop benchmark issues that mature in 2030 and 2035, with 15-year and 20-year bonds respectively. Those issues could very well meet with strong demand and yield attractive pricing—provided that the Treasury announces its intentions and strategy to fill in the curve. In general, one would wish the central bank to sell issues (shrink its balance sheet) in a way that contributes to market liquidity in that part of the yield curve the Treasury wishes to develop.



Source: US Monthly Statement of the Public Debt, July 2015 and author's calculations. Note that there are no US debt amortizations 2033-2035 owing to the hiatus in 30 year issuance circa 2001-2006 when the US was running budget surpluses.

There are two sorts of problems that arise for Fed cooperation with this sort of a strategy. The most fundamental is that the FRBs hold no Treasuries maturing in 2035. It is therefore impossible for it to add

³⁴ This gap is largely the result of the US Treasury's winding down and suspension of 30-year bond auctions in the first half of the 2000s. The future impact on the amortization curve was foreseen and discussed in Barclays (2001).

to market liquidity at this maturity. Contrast this with the situation for the 2025-2029 maturities—the Fed holds, on average, \$23 billion out of \$61 billion of the outstanding, or 38 percent.

Turning to the 2030 maturity, there is only one bond in this space, CUSIP 912810FM5, which was issued on February 15 and August 15, 2000 (i.e. it was originally a 30 year bond)³⁵. The FRBs currently own \$8.8 billion of this security, or 51.4 percent of the amount issued. If the Treasury wished to build up an issue size of \$60 billion—similar to the amount maturing on average during the previous 5 years—it could do so by issuing about \$43 billion in new securities—effectively a reopening of the 30-year bond—and have the Fed sell its holding of \$9 billion. This, added to the amount already in the market—\$8 billion—would result in achieving the \$60 billion target. In other words, the FOMC action would be easily absorbed by the market and assist in developing that part of the yield curve in a fashion consistent with Treasury’s objective. However, if the FOMC merely takes into account the impact of its action in a “vacuum”, i.e. ignoring the Treasury’s objective, it would be highly reluctant to rock the boat by selling its holdings of 912810FM5—as from their perspective it would be very difficult for the market to digest this volume without a spike in interest rates—Fed sales would add more than double the amount outstanding in the market. If it were to sell \$9 billion from its portfolio, it might decide, for reasons discussed above, to do so in the 2024 space—not an obvious point on the curve where the Treasury would choose to have more securities in the market, i.e. not a particular “gap” in the yield curve.

In light of these considerations, it is not surprising that the Fed is choosing to exit without shrinking the balance sheet. To do otherwise is both unnecessary to achieve an eventual increase in the fed funds rate and would bring with it significant operational and communications challenges as well as heightened and unnecessary market volatility. It is not necessary to reverse the LSAPs (and reverse the decline in term premia) in order to raise the fed funds rate and exit gradually from the zero lower bound.

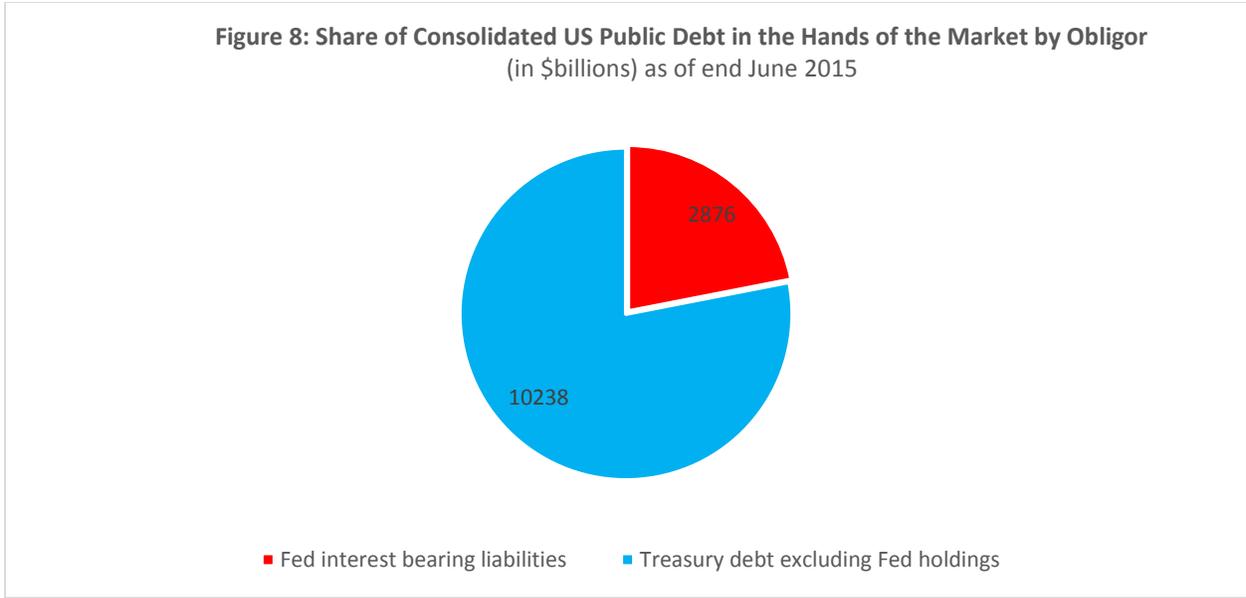
That said, the US need not rely on Fed instruments to manage its large balance sheet and suffer the deleterious consequences discussed in the preceding section. In order to consider how the US might improve its sovereign liability management during the era of the “large” Fed balance sheet, it is necessary to first obtain a consolidated view of the task at hand.

In consolidating Treasury and FRB balance sheet liabilities, all Treasury debt held by the Fed disappears as well as Treasury deposits held at the Fed³⁶. FRB interest-bearing liabilities to the public, plus Treasury debt in the hands of the market (excluding the Fed) appear as consolidated balance sheet liabilities.

Viewed from this perspective, interest-bearing liabilities of FRBs comprise about 22 percent of total US consolidated public debt in the hands of the market, i.e. US Treasury debt in the hands of the public minus the Treasuries held by the FRBs plus the interest bearing debt of FRBs. See Figure 8.

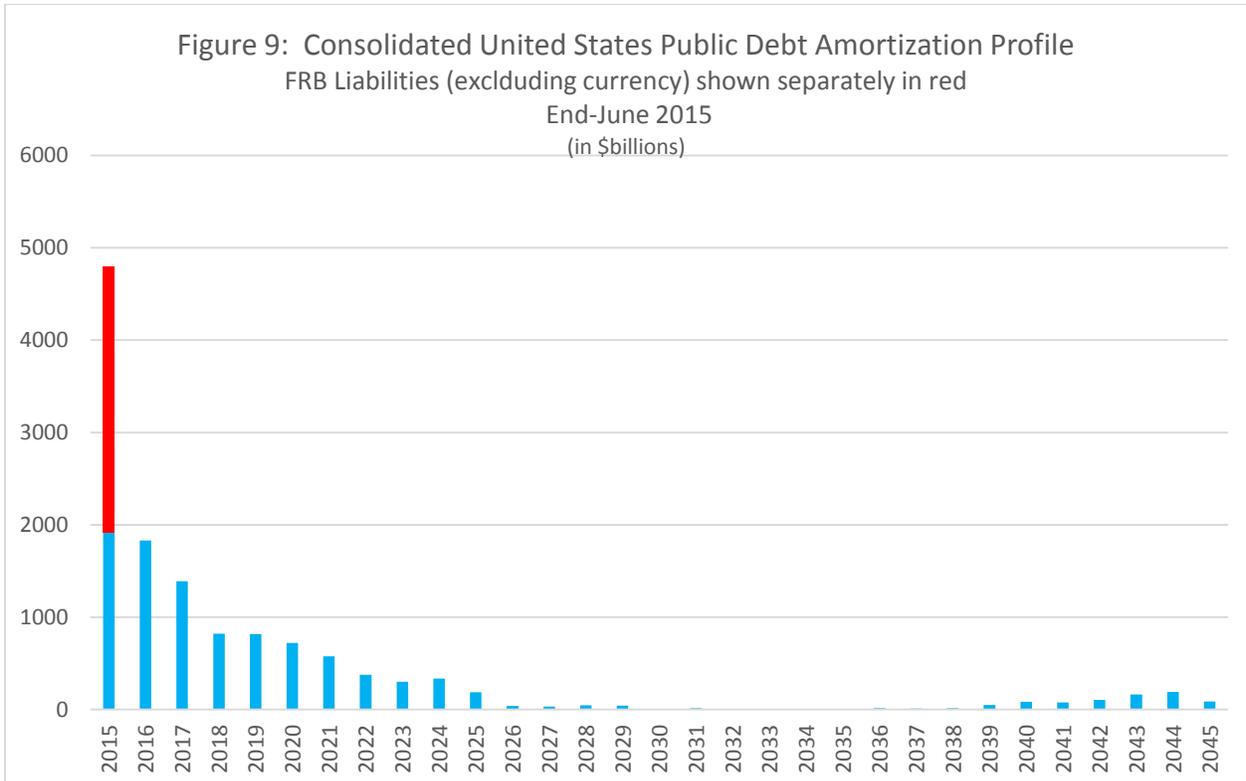
³⁵ This was the penultimate 30-year bond issued by the US Treasury before it announced the suspension of 30-year bond auctions on October 31, 2001.

³⁶ In most countries, central bank equity would also disappear since the Treasury is the legal owner. In the US, each FRB is owned by the commercial banks chartered in its geographical district.



As noted earlier, the *average duration* of the Fed’s holdings of Treasuries is longer than the market’s. Indeed, the entire point of LSAPs of Treasuries (TLSAP) was to shorten the duration of the market portfolio. So in order to have a more granular picture of the situation, it is necessary to consider the term structure of the debt, distinguishing between the two obligors—the Fed and the Treasury.

The consolidated US public debt amortization profile as of end-June 2015 is shown in Figure 9.



A key insight from the consolidated sovereign asset liability approach is that it makes plain that the *composition of the Fed's holdings of US Treasury securities is completely irrelevant provided they are held to maturity*.³⁷ The peculiarities of the particular securities the FRBs hold impact only intra-sovereign cash flows. Only debt *in the hands of the market* matters³⁸. Consequently, the impact of LSAPS on the economy must derive from their impact on the duration and nature of securities bought and sold by the Fed from the market—actions that are conventionally thought of as sovereign “debt management”.

That the Fed is engaged in debt management brings to the fore the relationship of its policies to those undertaken by the US Treasury. Indeed, the Treasury's GSE Purchase program was identical to Fed LSAPs with MBS, except that the former was financed with conventional Treasury securities and the latter with “central bank money”. The impact on the duration of US consolidated sovereign liabilities was therefore greater when the Fed purchased MBS than when the Treasury purchased MBS.

There is no doubt that LSAPs shortened the term structure of the consolidated debt in the hands of the market compared with the “no LSAPs” counterfactual. Nevertheless, Greenwood, Hanson, Rudolph and Summers (2014) point out that the duration of the consolidated public debt has decreased only from 4 to 2.9 years during the period between December 2007 and July 2014 despite the TLSAPs owing to the US Treasury's efforts to lengthen the maturity of the debt it has been issuing to finance large fiscal deficits in recent years. They conclude that the Treasury has offset part of the impact of Fed TLSAPs. Again, this points to the fact that the US currently has two different entities managing the term structure of the debt—a bifurcation with a potential for inconsistencies.

The \$3 trillion question is how to manage the pink bar in Figure 9. The FOMC appears to believe there are only two choices—to sell securities from its portfolio and reduce the pink bar and/or continue to refinance its liabilities for an extended period of time—years, using overnight and term deposits and short term reverse repos. Selling from its portfolio of long term securities—particularly during a period when policy rates are rising, risks a sharp surge in long term rates—a more violent repeat of the 2013 “taper tantrum”. Consequently, it appears the FOMC will be content to live with an extended balance sheet for a period of time that is dictated by the maturity of the securities that it has purchased (securities held in its “vaults” or in the “box”). It may also find this “new” tool—*balance sheet size* difficult to surrender. Regrettably this signifies an extended period of time during which the FOMC will manage a large fraction of US public sector debt with inefficient instruments.

The idea that the Fed can manage its balance sheet only with new instruments or with Treasury instruments *already on its balance sheet* is very peculiar if one takes the consolidated view.

As noted earlier, from the standpoint of consolidated US liabilities, the composition of debt held by the Fed is completely irrelevant. The US Treasury may issue whatever instruments it chooses to finance the debt. It certainly is under no restriction to “sell first” from the “box” of securities sitting in the figurative

³⁷ This is also true of the Fed's holdings of MBS if we consider the Treasury to be the beneficial owner of the GSEs.

³⁸ Compare Stein (1952).

vaults of the Federal Reserve. To think that a debt manager would first have to sell instruments it had bought back from the market some time ago (in the “box”) before issuing new instruments is absurd.

The FOMC decision to persist with an expanded balance sheet for an extended period of time therefore raises two problems that have been faced by many other central banks exiting a crisis—the bifurcation of sovereign balance sheet management between two actors unlikely to have the same objectives and perspectives—and the segmentation of the sovereign domestic debt market into multiple, usually inefficient instruments. The solution to the instrument problem is usually to rely on treasury instruments within a comprehensive strategy articulated by the treasury to deepen markets.

Consequently, cooperation with the Treasury to restructure the liabilities that are on the Fed “subaccount” of the sovereign balance sheet is highly desirable during the transitional return to a “minimal” Fed balance sheet. This can be effected in two ways. Both would require the Treasury to take an active and cooperative role during exit.

In one option, the Treasury would issue more debt than is needed to finance future budget deficits and deposit the proceeds in an account at the Fed. This is the same mechanism as employed by the Treasury in 2008 to assist the Fed at that time with managing the balance sheet consequences of the post-Lehman liquidity expansion. Treasury issuance to fund the account would transform bank reserves currently on the Fed balance sheet into Treasury deposits. The US sovereign would save the interest the Fed would have otherwise paid on its instruments, while incurring additional interest expenditure on the Treasury bills and notes issued. Since Fed instruments are demonstrably inferior to bills, the sovereign would witness a decrease in its overall interest cost. The risk in this scenario is that the Treasury and Fed would not agree on the optimal duration of the additional Treasury instruments. In other words, the Treasury might wish to issue long-term debt to finance the reduction in overnight bank reserves. This would increase sharply the average duration of sovereign liabilities in the market and risk a reversal of the decline in the risk premium engendered by the LSAPs. The other quite difficult problem with this solution—despite the fact that it has worked well in other countries—is that Congress would have to be convinced to allow the US debt ceiling to increase to accommodate the increased Treasury issuance. Even though this solution would not increase total sovereign gross debt in reality—since Fed interest-bearing debt *is* US public debt—and would *decrease* US sovereign interest payments, it is probably extremely unrealistic to expect leading political figures to take up its cause at this juncture in the US political cycle. Consequently, it is highly unlikely to be implemented.

The other main option would not require an increase in US public debt “in the hands of the public” as currently defined. This option would consist of a one-time debt swap between the Treasury and Fed. The Treasury would swap t-bills for the entire portfolio of Treasury debt held by the Fed.³⁹ Since the treasury bills would be in the possession of the Fed, the central bank, not the treasury, would be able to determine the pace at which bank reserves are replaced by t-bills. Although the Fed would not be able

³⁹ The Treasury could also swap t-bills for MBS but MBS are not considered US public debt under current law. Consequently, this acquisition of assets by the Treasury would necessitate an increase in US public debt in the hands of the public, even though the t-bills would reside at the Fed. Were the GSEs to be “nationalized” the accounting arrangements might be altered in such a way as to make the swap feasible.

to control the maturity of the debt the Treasury would eventually issue to rollover any bills the Fed sells into the market, it would control the timing and quantity of the reduction in the size of its balance sheet. It would also have the option to resume purchases of long-duration Treasuries should the Treasury move too quickly—in the Fed’s opinion—to lengthen the maturity structure of the debt.

In the “swap” variant, the Fed would continue to rollover t-bills in its portfolio with new t-bills until such time as it believed the Treasury was willing and able to refinance any t-bills it sells into the market with instruments of sufficiently short duration. Naturally, the most appropriate path to this solution would involve an ex-ante agreement between the two parties to agree a benchmark duration for Treasury securities in the hands of the market. An additional benefit of this solution is that it would ease the Fed’s communication problem about the size of the balance sheet (by shrinking it), perhaps making more palatable future adoption of LSAPs as central bank policy; and eliminate the (admittedly) small probability that the Fed would surprise the market with rapid sales of long duration securities from its portfolio—as it would no longer retain any long duration securities in its portfolio (apart from MBS).

Although it may not be practical at this time to similarly deal with the Fed’s large holdings of MBS, shrinking the balance sheet by an amount equivalent to the Fed’s holdings of Treasuries alone would be sufficient to allow it to dispense with its unconventional liabilities. That is, the MBS portfolio can be financed with Federal Reserve banknotes outstanding. A comprehensive and definitive resolution to the current ambiguity surrounding future government involvement in the US mortgage market could allow a straightforward swap of Treasury securities for the Fed’s MBS portfolio remaining at that time.

VI. Conclusion

The FOMC appears to have decided to keep the Fed balance sheet larger for longer than is necessary. This decision seems to be based on two erroneous related beliefs. The first is that the size of the Fed balance sheet, independent of the size of the consolidated sovereign US balance sheet, matters for monetary policy. This is akin to the belief that debt management operations have a different impact on interest rates whether the treasury notionally keeps the debt instruments that are purchased before maturity in a “box” until they mature (maintains them as gross liabilities on a ledger) or simply wipes them off the treasury accounting system as a current liability as is the practice in the majority of countries. The second mistaken belief is that the only scope for sovereign liability management is to sell instruments “in the box” or sell new instruments that fragment and segment the money market. Relying instead on the Treasury to execute a single financing strategy for the entirety of the US balance sheet would enable a more efficient and less costly exit from extraordinary balance sheet policies.

The probably that the current distribution of FRB holdings of securities exactly matches the securities that an unconstrained sovereign debt manager would issue to finance the consolidated balance sheet—and future deficits—is zero. In other words, the Fed, as “debt manager”, is restricted to issuing from a pre-defined “box” of securities that happen to be on its balance sheet at the present time. In practical terms, the Fed is constrained not to issue debt maturing in the years 2033-35, no more than \$1 billion maturing in 2032, \$3 billion maturing in 2031 and \$7 billion maturing in 2030, etc. The Treasury is subject to no such arbitrary constraints.

Faced with these constraints, the FOMC is likely to hold on to its assets for an extended period of time. This raises the second problem, the inefficiencies incorporated into the structure of its liabilities.

Segmentation of the money market is virtually guaranteed as only banks may hold two of the Fed instruments—reserves and term deposits. This has compelled the Fed to introduce an unorthodox “maglev” monetary operations system and to exit within a target band. It also means that the US banking system will be burdened for an extended period with a bloated balance sheet. Were overnight interest rates where they were in 2006 and the regulatory framework similarly unchanged, this would pose no problems. However, with interest rates low; and US chartered banks now required to pay FDIC insurance charges on all non-equity liabilities and to keep capital to back reserves according to eSLR, the inefficiencies associated with using Fed instruments to manage one quarter of US sovereign debt—rather than US Treasuries—will be material both to the sovereign and the markets.

Conceptually, there are several solutions to these problems.

One would simply be to resume the Treasury Supplementary Financing Program (SFP) combined with a deposit arrangement similar to that used with great success in Mexico and Israel. The advantage of this arrangement would be that Treasury would run no rollover risk even if it issued only short term instruments to substitute for Fed instruments in the same maturity bucket. The downside, from the political optics, would be that it would increase gross debt outstanding “in the hands of the public” (but, of course, not net debt). Consequently, the Treasury might wish to use some of the funds raised in a resumed SFP to buy back debt held by the Fed. This would shrink the Fed balance sheet and provide the Fed more space to resume LSAPs at a later date should that become necessary and, in addition, remove any market uncertainty that it might start selling outright from its long term debt portfolio. The Treasury could also use the funds raised to “clean up” the Fed balance sheet by purchasing the remaining equity in the Maiden Lane LLCs (effectively promised in 2009).

An alternative to resuming the SFP is to allow the FRB the option to swap, in agreement with the Treasury, any or all of its holdings for alternative Treasury securities⁴⁰. In other words, if the FOMC thought it best to shrink the balance sheet by issuing a basket of 1, 3 and 6 month t-bills, it could not currently do so as it has no securities of this maturity on its balance sheet. Under a free swap regime, the FRBs could agree to trade a current FRB holding, say \$100 billion of securities maturing in 2040-44 for an equal amount of t-bills. The Treasury would then refinance those bills in the market as they mature with the optimal set of instruments from a consolidated perspective. The Treasury could alternatively engage in a one-time swap of bills for all notes and bonds currently held by the Fed. This would provide the Fed the flexibility to decide when and by how much to shrink its balance sheet.

Whatever the particular mechanism agreed, the US should aim to curtail the period of time during which it has two sovereign debt managers and two different sets of debt instruments. This would enable the Fed to “Exit Well”.

⁴⁰ Naturally the swap would leave the amount of securities in the “hands of the public” as defined by US debt limit legislation unchanged.

References

- Barclays (2001), *So Long to 30-Year Treasuries: How Suspension of the Long Bond Could Impact Markets*, Barclays Global Investor Newsletter, (October).
- Bech, Morten L. and Elizabeth Klee (2011), *The Mechanics of a Graceful Exit: Interest on Reserves and Segmentation in the Federal Funds Market*, Journal of Monetary Economics, Elsevier, 58(5).
- Bindseil, Ulrich (2004), *Monetary Policy Implementation: Theory, Past and Present*, Oxford University Press, New York.
- Carpenter, Seth and Selva Demiralp (2012), *Money, Reserves and the Transmission of Monetary Policy: Does the Money Multiplier Exist?* Journal of Macroeconomics, Vol., 34, No. 1.
- Carpenter, Seth; Selva Demiralp, Jane Ihrig, and Elizabeth Klee (2013), *Analyzing Federal Reserve Asset Purchases: From whom does the Fed buy?*, Finance and Economics Discussion Series Divisions of Research and Statistics and Monetary Affairs, Federal Reserve Board, # 2013-32.
- Christensen, Jens H.E.; Jose A. Lopez and Glenn D. Rudebusch (2014), *A Probability-Based Stress Test of Federal Reserve Assets and Income*, available online (December 16 version).
- Fama, Eugene (1980), *Banking in the Theory of Finance*, Journal of Monetary Economics 6.
- FRBNY (2009), *Domestic Open Market Operations During 2008*, available online.
- Ibid (2008), *Domestic Open Market Operations During 2007*, available online.
- Gagnon, Joseph; Matthew Raskin; Julie Remache; and Brian Sack (2010), *Large-Scale Asset Purchases by the Federal Reserve: Did They Work?* Federal Reserve Bank of New York Staff Reports # 441, March.
- Goodfriend, Marvin (2014), *Monetary Policy as a Carry Trade*, Bank of Japan Institute for Monetary and Economic Studies Discussion Paper 2014-E-8.
- Greenwood, Robin; Samuel G. Hanson, Joshua S. Rudolph, Lawrence H. Summers (2014) *Government Debt Management at the Zero Lower Bound*, Hutchins Center on Fiscal and Monetary Policy at Brookings Working Paper #5.
- Hrung, Warren B. and Jason S. Seligman (2015), *Responses to the Financial Crisis: Treasury Debt, and the Impact on Short-Term Money Markets*, International Journal of Central Banking, January.
- JPMorgan Chase and Company (2007), *2006 Annual Report*, available online.
- Keister, Todd; and James McAndrews (2009), *Why are Banks Holding so Many Excess Reserves?* Federal Reserve Bank of New York Staff Report # 380, July.
- Kydland, Finn and Edward Prescott (1990), *Business Cycles: Real Facts and a Monetary Myth*, Federal Reserve Bank of Minneapolis Quarterly Review, Vol. 14, No. 2.

Martin, Antoine; James McAndrews and David Skeie (2011), *Bank Lending in Times of Large Bank Reserves*, Federal Reserve Bank of New York Staff Report # 497, May.

McCauley, Robert and Patrick McGuire (2014), *Non-US banks' claims on the Federal Reserve*, BIS Quarterly Review, March 2014.

McLeay, Michael; Amar Radia and Ryland Thomas (2014), *Money Creation in the Modern Economy*, Bank of England Quarterly Bulletin 2012, Q1.

Nyawata, Obert (2012), *Treasury Bills and/or Central Bank Bills for Absorbing Surplus Liquidity: The Main Considerations*, IMF Working Paper WP/12/40.

Potter, Simon (2014), *Interest Rate Control during Normalization*, Remarks at the SIFMA Conference on Securities Financing Transactions, New York City, October 7, 2014.

Ibid (2013), *Recent Developments in Monetary Policy Implementation*, Remarks before the Money Marketmakers of New York University, New York City, December 2.

Reinhart, Carmen M. and Kenneth S. Rogoff (2009), *This Time is Different*, Princeton University Press.

Shleifer, Andrei and Robert W. Vishny (1997), *The Limits to Arbitrage*, Journal of Finance, March.

Sims, Christopher (2013), *Paper Money*, American Economic Review, Vol. 103.

Stein, Herbert (1952), *Monetary Policy and the Management of the Public Debt*, American Economic Review, vol. 42, no. 5, December.

Stella, Peter (2015), *Fed Exit Monitor*, <http://stellarconsulting.com/research>.

Ibid (2011), *Minimising Monetary Policy*, BIS Working Paper #330.

Ibid (2009), *The Federal Reserve System Balance Sheet: What Happened and Why it Matters*, IMF Working Paper, WP/09/120.

US Treasury (2011), *Frequently Asked Questions on Treasury's Program to sell MBS*, available online.

US Treasury and FRB (2009), *The Role of the Federal Reserve in Preserving Financial and Monetary Stability*, Joint Statement by the Department of the Treasury and the Federal Reserve, March 23.