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# SPECIAL REPORT

## TD Economics



October 8, 2014

# THE FED'S (GRA)DUAL NORMALIZATION: NAVIGATING OUT OF UNCHARTED WATERS

### Highlights

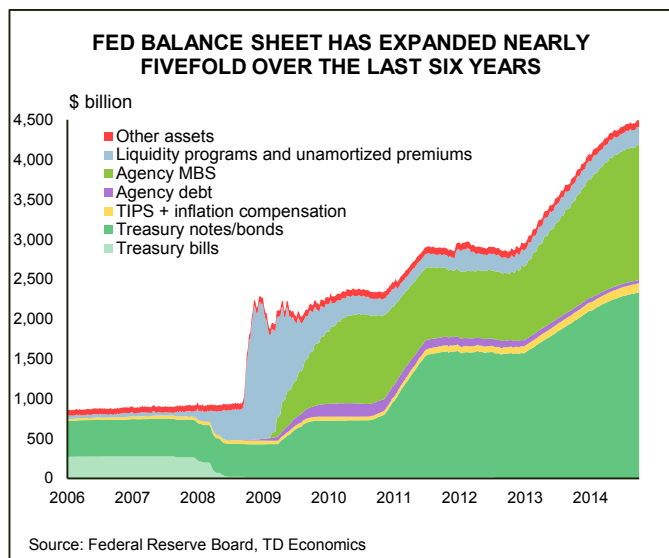
- The Federal Reserve's balance sheet should stabilize with QE expected to wind down later this month, but bond buying will continue at least until late-2015 as proceeds from maturing Treasuries and agency-debt and principal payments from agency-MBS are reinvested.
- The Fed is unlikely to start raising rates until at least mid-2015. When rates do lift-off, the Fed will target a range for the FFR with rate hikes accomplished through the IOER rate with support from the ON RRP facility. The tightening cycle will be gradual with a neutral stance achieved by 2018.
- Balance sheet normalization will be accomplished through passive run-off as the Fed stops reinvesting. It too will be gradual, with the balance sheet unlikely to approach normal level until late-2020.
- End of reinvestments will increase the supply of these securities in the private market and extinguish base money. It will also manifest in a headwind for broad money growth, which may not be fully offset by the expected pick-up in bank lending activity.
- To the extent that broad money growth slows, the headwinds could extend to other assets such as bonds and equities, above and beyond what is already reflected in prices. At the same time, inflation should remain under control, while the dollar may find strength during the normalization period.
- The Fed remains in uncharted waters, faced with the dual task of raising rates amid plentiful reserves and reducing its balance sheet. Risks remain, with the Fed likely to proceed gradually so as to not stifle the recovery. The journey will be long, but we remain confident the Fed will be successful in navigating to more familiar territory despite the precise destination still shrouded in mist.

It has been nearly seven years since the financial crisis plunged the U.S. economy into the Great Recession. Its 'greatness' can be attributed both to its depth as well as to long-lasting legacies. Scars of the downturn remain painfully obvious in the number of foreclosed homes and people out of work. But, while both the housing and labor markets have seen some degree of normalization, two legacies of the Great Recession remain as apparent as ever – the enlarged size of the Federal Reserve's balance sheet and its zero interest rate policy. Through several liquidity programs and three rounds of asset purchases the Fed's balance sheet expanded almost fivefold over the last six years, with the federal funds rate (FFR) target at the zero lower bound for nearly as long.

Now with the economic recovery appearing increasingly resilient, the Federal Reserve has signaled that the end of its large scale asset purchase (LSAP) program is near, with rate hikes more clearly on the horizon. Being prudent central bankers, the Fed has long contemplated how, when the time comes, it will normalize rates amid plentiful reserves and reduce its balance sheet to more normal levels. Broad contours of the exit strategy have been communicated for years, evolving alongside its portfolio holdings and economic conditions. The Fed's latest plan was outlined last month, but the details remain necessarily vague and the course itself subject to revision – with not even the Fed able to fully anticipate future developments. As it stands, the Fed remains deep in uncharted waters. The journey to more familiar territory will be gradual, with a number of potential risks requiring skillful navigation to limit any unintended financial market repercussions that may have negative consequences for the economy.

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The journey will begin later this month with the Fed expected to announce the end of its quantitative easing<sup>1</sup> (QE) program in three weeks' time. The focus will then turn to implementing reserve-draining tools to take control of short-term rates, currently in trial runs. Several months after asset purchases end, the Fed will likely resort to using its trusted, albeit somewhat rusted, interest rate lever and begin what is expected to be a gradual tightening cycle. Sometime after rates lift-off, the Fed will cease reinvesting proceeds from its holdings of maturing U.S. Treasuries (UST) and Government Sponsored Enterprise (GSE, or agency) debt, and principal payments from GSE mortgage-backed securities (MBS) – effectively increasing the supply of those assets in the private market. The end of reinvestments will bring about a headwind to broad money (deposit) growth, which may not be fully offset by an expected rise in bank lending. To the extent that broad money growth slows, it could create a headwind for asset markets, such as equities and corporate bonds. Lastly, the normalization process should not heighten inflationary risks in the U.S., while the dollar may find strength during this period.

In so far as markets adjust quickly to new information, the expected path to normalization, which has been thoroughly communicated, should already be reflected in asset prices. However, given the lack of historical precedent, the unconventional nature of the tools, their sheer magnitude, and the uncertainty as to the exact feedback mechanism and potential spillovers, it is unlikely that markets have fully determined all consequences of the unwinding, with more adjustment likely as the journey gets underway. Moreover, there remains potential uncertainty around the pace of and

exact path to normalization, as well as its ultimate destination, with deviations from expectations requiring additional realignment. What is somewhat more certain is that volatility during this process is likely to rise, with the Fed expected to proceed gradually so as to not overly roil markets or derail the recovery.

### QE worked as intended

The Fed's balance sheet, which in normal times grows at the rate of currency in circulation it ultimately supports, has increased from just over \$900 billion to \$4.5 trillion over the last six years – to an equivalent of one-quarter of annual economic output. Early expansion of the balance sheet was related to liquidity programs (see chart), which then gave way to three rounds of QE whereby \$3.7 trillion<sup>2</sup> in assets were purchased outright and held in the System Open Market Account (SOMA). The Fed embarked on the first of these in late-2008 as it lowered the federal funds rate target to near zero, leaving little scope for further conventional accommodation. As such, instead of targeting the price of reserves (the FFR), the Fed began to target their quantity.

Asset purchases were done on the secondary market<sup>3</sup> through the Fed's primary dealer network. The Fed's intention was to reduce the supply of longer-term securities in the private market, hoping to lower longer-term interest rates and improve functioning of mortgage markets.<sup>4</sup> Moreover, the purchases were meant to kick-start a chain reaction of portfolio rebalancing.<sup>5</sup> The Fed purchased Treasuries, agency debt, and agency MBS with newly created money, leaving sellers of these securities with more cash (and less assets) than they likely wanted. Since cash is low-yielding, these counterparties used the newly created money to purchase higher-yielding assets (such as corporate bonds and equities) from others, who passed it on again leading to a 'hot potato' effect. The transactions related to this portfolio rebalancing in the search for yield bid up prices and reduced yields of underlying assets. Falling yields on dollar-denominated assets motivated the quest for yield further out into global markets. To the extent that the new money was used to purchase foreign currency assets, the dollar depreciated while foreign asset prices rose.<sup>6</sup> This was especially apparent vis-à-vis currencies of central banks that did not resort to QE. Analogous to a tide that lifts all boats, the money tide effectively raised prices of all assets.

The increase in asset prices enriched households and firms through the wealth effect. Alongside lower borrowing costs, this boosted nationwide spending by households

and businesses, and supported domestic prices – potentially helping avoid a deflationary spiral. Additionally, a lower dollar benefited U.S. exports, while providing further support to the domestic price level. As such, a virtuous cycle developed, with QE leading to better economic outcomes.

Looking at QE through a monetarist lens,<sup>7</sup> by unilaterally increasing the amount of money in the economy through the purchase of assets from the non-bank private sector, the Fed intentionally distorted the money supply-demand equilibrium, with several ways it could be achieved again. On the one hand, the demand for money could increase. This is something the Fed was precisely hoping for and could come about through a rise in nominal spending, a rise in asset prices, or an increase in the relative rate of return on money (vis-à-vis other assets). On the other hand, as suggested by opponents of QE,<sup>8</sup> the adjustment could come about through a decline in the supply of money, resulting from deleveraging by the non-bank sector or the issuance or sale of commercial bank assets to the non-bank sector. In all likelihood, achieving equilibrium was likely a combination of changes in both supply and demand for money.

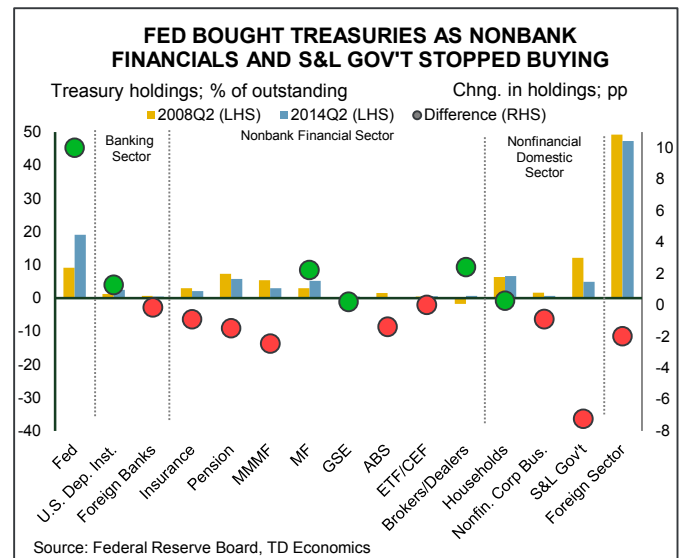
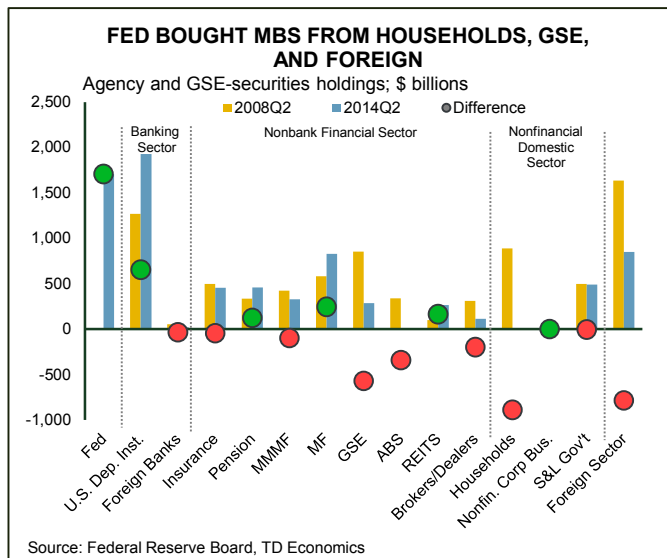
**Fed put money directly into non-bank sector**

By concentrating on bond buying – unlike the ECB or BOJ which focused on loans to banks<sup>9</sup> – the Federal Reserve placed money directly into the private domestic non-bank sector consisting of non-bank financial firms (incl. GSEs), households<sup>10</sup> (incl. hedge funds, private equity), nonfinancial business, etc. with some securities also purchased from the foreign sector. But, U.S. banks did not, on net, sell securities to the Fed, with their holdings of UST and MBS actually

higher in relative terms (see charts). Still, since most of the Fed’s counterparties lack deposit accounts at the Fed (with the exception of the GSEs), purchases of securities had to instead be credited to the account of the sellers’ clearing bank – creating reserves. At the same time, the banks credited an equivalent amount in the sellers’ checking accounts.

Through this process, the Fed created additional \$3.7 trillion in both base money (reserves + currency) and broad money (deposits + currency). Potential offsetting factors for broad money creation could have resulted from QE motivating banks, due to higher asset prices and rising charge-offs, to repair their balance sheets through debt or equity issuance. But, banks were largely passive intermediaries in the QE mechanism, as their balance sheets expanded with reserves on the asset side matched by increased liabilities made up of customer deposits. Quantitative easing placed the newly created money directly into the non-bank sector, circumventing the more typical broad money creation process of loan extension by commercial banks.

While the main purpose of QE in the United States was not to boost bank lending, the program may have indirectly motivated banks to lend more by lowering their funding costs and fostering better economic outcomes. However, QE also had offsetting impacts on bank lending. Lower corporate bond yields and higher equity prices likely motivated an increase in non-bank debt and equity issuance, sometimes used to pay off bank loans. The headwind to lending was further compounded by household deleveraging in the form of loan repayments and charge-offs, with the former potentially boosted by QE. Taken together, net



bank lending remained muted during the crisis, being to some extent crowded out by both QE and non-QE factors.<sup>11</sup>

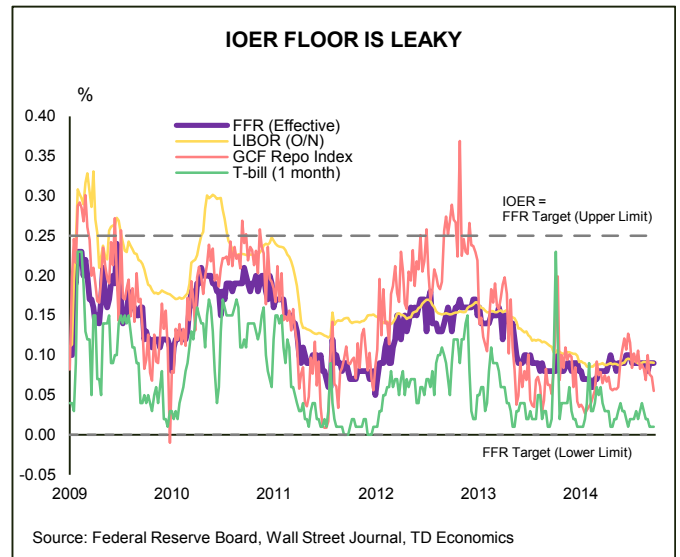
Still, a common misnomer is that banks ‘sat’ on large amounts of QE reserves, instead of lending them out. But, while banks can and do pass on their reserves to other banks by making loans, as the proceeds are used to purchase goods, services, or assets, they cannot, in aggregate, alter the level of reserves without the Fed’s cooperation. And since the Fed’s intentions under QE are precisely to target an increasingly higher level of reserves, banks have little choice in the matter. Having said that, the windfall of additional reserves that banks ended up with due to QE didn’t directly impact lending activity. Bank lending decisions are based on regulatory requirements and profitability considerations. Ultimately, alongside the expected return on loans related to the economic environment (interest rates, charge-offs), it is the price of reserves (current and expected) and not their quantity that affects lending decisions. In fact, when reserves are scarce, any interest rate targeting central bank, such as the Federal Reserve, provides as much in the way of reserves as are needed by the banks on demand.

### From scarcity to abundance

So with the substantial liquidity provided by the Fed widely dispersed within the economy, the natural question to ask is: how does the Federal Reserve remove these excess funds in the future in a manner that is the least disruptive to financial markets and the economy? To answer this, it’s first important to understand the mechanics of how the central bank influences short-term funding in normal times.

Typically, the Fed sets policy by way of the Federal Open Market Committee (FOMC) establishing a monetary stance, designated as the target for the federal funds rate – the rate at which depository institutions trade reserves with each other overnight. The FOMC then directs the Federal Reserve Bank of New York Open Market Desk to adjust the amount of reserves in the system so as to be consistent with overnight trading taking place near the Fed’s target. This is done by way of temporary and permanent open market operations<sup>12</sup> which supply and drain reserves as needed. As such, the setting of monetary policy is contingent on the scarcity of reserves referred to as “structural deficiency.”

When reserves cease being scarce, as is currently the case, this mechanism breaks down. In fact, the substantial increase in reserves has effectively made them worthless, pressuring the effective FFR<sup>13</sup> down to a natural lower bound



of zero and decreasing the precision with which the Fed can control interest rates.

### Leaky floor

Typically, a central bank can target either the level of reserves or their price. But, in order to conduct monetary policy and adjust interest rates amid plentiful reserves, the Fed needed to break the link between the quantity of reserves and their price. This unhinging was done through the introduction of a tool in 2008 whereby the Fed can pay interest on excess reserves (IOER).<sup>14</sup> The IOER gave the Fed “greater scope to use its lending programs to address conditions in credit markets, while also maintaining the federal funds rate close to the target.”<sup>15</sup> by setting a floor under short term rates. No depository institution with access to the IOER would want to lend funds below this rate in the interbank market – given the Fed is the ultimate ‘risk-free’ counterparty.

But, despite implementing the IOER, the effective FFR (along with other short-term rates) has consistently traded below the IOER rate (see chart). This is due to the fact that not all of the institutions that trade in the fed funds market are eligible for IOER. Notably, GSEs (Fannie Mae, Freddie Mac, and the Federal Home Loan Banks) are active in this market and hold reserves at the Fed, but are not eligible to receive interest on excess reserves. Moreover, other financial institutions – primarily money market funds (MMFs) – which don’t have accounts at the Fed tend to be active lenders into the fed funds market, by way of repurchase agreements. As such, both GSEs and MMFs have an incentive to lend into the fed funds market at any rate that is above



the alternatives (GC Repo, T-bills, etc.). Meanwhile, banks (particularly foreign ones, since they don't pay FDIC insurance on reserves) have an incentive to borrow below the IOER rate and collect the arbitrage. As such, the fed funds rate does not reflect the price of interbank lending anymore, and effectively has become little more than the outcome of the bargaining process between banks and non-banks.

This leakage is not a problem for the Fed currently, since it benefits from the lower limit for the target aligning with a natural floor for nominal rates at zero. This will, however, become a problem when the Fed attempts to lift interest rates off the floor. As it stands, the Fed is unable to ensure that when it begins to hike rates by way of its new policy tool, the IOER rate, the effective fed funds rate (and other short rates) will follow in the same magnitude. The leakage could become a significant issue, and has prompted the Fed to introduce additional tools enabling it more control over short term rates, which we will discuss shortly.

### The five step program

So, where to from here? Substantial progress within the U.S. economy has steadily weakened the case for the continuation of ultra-accommodative policies. At the same time, given some remaining slack in the economy, long-lasting legacies of the recession, and the duality of the normalization process, the Fed is likely to take a very gradual approach to its exit from unconventional policy, so as to foster conditions for continued recovery.

Uncertainty regarding the timing, the exact path, and the destination of the interest rate and balance sheet normalization remains, with details likely to evolve over time, but the general contours point to a long journey made up of five parts. First, the Fed will cease adding to its balance sheet, but continue to fully reinvest the proceeds of its maturing and prepaying assets. Second, the Fed will fully implement additional reserve-draining tools, such as the overnight reverse repo (ON RRP) and term deposit facility (TDF), enabling more control over short-term interest rates. Third, the Fed will begin to raise interest rates, by using a the IOER rate with the ON RRP facility playing an important supporting role. Fourth, the Fed will eventually stop reinvestments, either as a hard stop or gradually by way of tapering the share being reinvested, setting forth a process of passive run-off of the assets in its portfolio. Fifth, towards the end of the journey the Fed will clean house, with any temporary facilities likely wound down and a potential sale of some

residual MBS holdings.

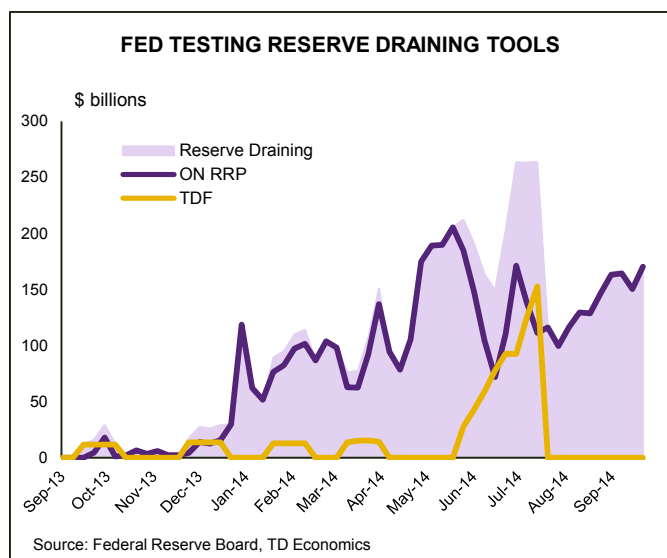
Gradual execution of these five steps should enable the Fed to complete the tightening cycle by 2018 and, by 2020, reduce its balance sheet to be more in line with its conventional size, or “hold no more securities than necessary to implement monetary policy efficiently and effectively.”<sup>16</sup> However, it is not certain that the Fed will go back to the “structural deficiency” conditions that preceded the recession. Moreover, even at the start of the next decade the composition of the balance sheet will still not be normal in its historical sense, with the Fed holding substantial MBS holdings which are a legacy of the housing downturn. A more traditional balance sheet could be achieved over subsequent years through passive run-off or outright sale of MBS with proceeds reinvested in short- and long-term Treasuries. Next, we delve into the details of the five-step process and follow with potential market implications.

### 1) QE to taper out, but bond buying will continue

Although the quantitative easing program looks to officially end later this month and the balance sheet will cease to expand as QE ends, purchases of Treasuries and MBS will continue. Principal payments on Fed holdings of agency MBS, as well as proceeds from any maturing Treasury and agency debt, will continue to be reinvested into new MBSs and USTs for some time still. While reinvestment policy may become data-dependent, we expect that the Fed will reinvest until at least the end of 2015, but could continue into early-2016 should progress of the housing recovery disappoint. During 2015, reinvestment will be skewed towards MBS, and will likely require the purchase of about \$200 billion of MBS. Treasury reinvestment over 2015 will be minimal with an approximate \$4.8 billion maturing. But, the maturing Treasury pipeline rises sharply in 2016 to \$216 billion, which alongside the near \$200 billion of potential MBS purchases is not an insignificant amount. Until they cease, reinvestments will keep the size of the Fed's SOMA portfolio (and its balance sheet) elevated at its ultimate peak. However, the balance sheet will be shrinking in relative terms, as the economy grows.

### 2) Taking control of short term rates

As we noted above, through the expansion of its balance sheet, the Fed has made its core duty of adjusting interest rates a whole lot harder. With the IOER floor being leaky, the Fed has been testing two additional tools for draining reserves from the system, enabling it to support short term



rates. These tools include: the fixed-rate overnight reverse repurchase agreements (ON RRP) with an extended set of counterparties, as well as the term deposit facility (TDF).

The more mainstream of the two is the TDF. The facility was first introduced in mid-2010,<sup>17</sup> with the sole purpose of draining reserves from the system. Funds placed in the TDF are removed from the accounts of the participating institution over the duration of the term. They are returned once the term expires along with interest. Compensation would likely be a small premium over the IOER rate. The Fed tested this facility earlier this year with spreads of one to five basis points above IOER attracting as much as \$150 billion in participation (see chart). More testing will be taking place over the coming weeks. Reserve draining through the TDF puts upward pressure on rates primarily through the “scarcity channel.” As such, its effectiveness in managing rates will likely be limited early in the normalization process, but will increase as reserve balances decline over time.

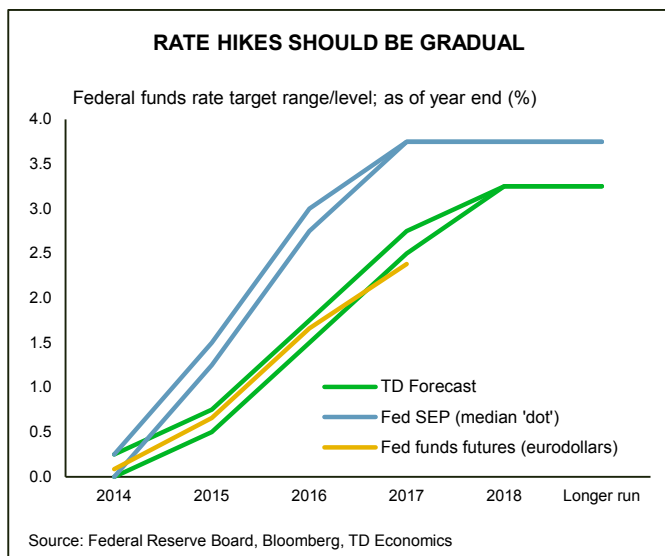
The far more controversial tool that the Fed has introduced is the ON RRP. The controversy stems not from the tool – it is not unconventional in and of itself – but rather the expansion of its scope from twenty-two primary dealers to several large banks, six GSEs (Fannie Mae, Freddie Mac, four of the twelve Federal Home Loan Banks: Boston, Chicago, Cincinnati, and Des Moines) and some 94 MMFs. The facility enables the Fed to sell a security, such as UST or MBS, to an investor for repurchase the next day. As such, it effectively acts as a collateralized loan whereby the Fed borrows funds from the markets. To pay for the security provided by the Fed, the institution would see their reserve balances (in the case of a bank or GSE), or deposits at a

bank (in the case of institutions without accounts at the Fed) debited by the value of the security. This would extinguish reserves, and in the case of non-bank counterparties, also deposits, during the overnight period. Continually rolling over these contracts enables the overnight RRP facility to sustain a drain of reserves/deposits.

Given the extensive range of counterparties, this facility has the capacity to put a definitive floor under short-term rates. The Fed, being the ultimate risk-free counterparty, should benefit from the lowest borrowing rates in the market. Once the Fed sets the RRP rate at a particular level, no one with access to it would lend below it, since they could lend to the Fed at the RRP rate. This would alleviate the leakage from IOER-ineligible lenders participating in the fed funds market, providing the Fed with more control of short-term rates by way of adjusting the RRP rate. As such, the RRP could be a very useful tool for the Fed, especially as it begins to raise rates.

However, the RRP also comes with substantial baggage, especially if used extensively. For one, the Fed risks displacing private sector institutions that are in the business of collateral lending. Already, with the facility in its trial period, the Fed is the largest lender in the tri-party repo market, lending between \$100 and \$200 billion in collateral overnight (see chart), crowding out other institutions. Moreover, the facility could potentially magnify funding stresses during a crisis, with money market lenders likely to seek the safety of the Fed’s facility instead of lending to private institutions. Lastly, since it would be transacting with non-banks, the Fed could be seen as promoting ‘shadow banking’ activity – or financial intermediation that is largely beyond its regulatory scrutiny.

To address these concerns, the Fed has been discussing implementing features to temper such risks. The FOMC has suggested that the facility will only be “as large as needed for effective monetary policy implementation,”<sup>18</sup> and be “phased out when no longer needed,” and has recently capped the aggregate daily limit to \$300 billion and \$30 billion per institution.<sup>19</sup> A more subtle way for limiting market uptake is through the rate itself. The Fed has indicated that the spread between the RRP rate and the IOER will be on the order of 20 to 25 basis points<sup>20</sup> – or much wider than was previously expected. As it stands now, the Fed continues to test the facility and solicit feedback from market participants with full implementation expected in the coming months.



### 3) Rate liftoff should materialize into shallow glide path

As a result of opting for a wide IOER-RRP spread and more limited RRP usage, the Fed has effectively come to terms with not being able to tightly control short-term rates. This is because a limited facility with a wide spread to the IOER will leave more of the fed funds lending in the sphere of arbitrage-type trades by which nonbanks negotiate with banks in an attempt to access the IOER. As such, as the tightening cycle begins, the FOMC will likely target a range of 25 basis points for the federal funds rate – as it does now at the effective lower bound – instead of the precise level that it typically targets when reserves are scarce.

So, while the federal funds rate will remain the key policy target, rate hikes themselves will be accomplished by way of the IOER. At the same time, the RRP will play a limited supporting role. When the time comes for liftoff, which we believe to be something on the order of six to twelve months after QE ends, the FOMC will direct the New York Fed Desk to fix the ON RRP rate at 25 basis points while the Board of Governors will direct the Reserve Banks to begin remunerating reserves (both required and in excess) at 50 basis points. As a result, the effective FFR would likely move up to somewhere under the midpoint of the range – to around 35–40 basis points following the first hike.<sup>21</sup> The effective FFR should progressively approach the IOER over the remainder of the tightening cycle as more and more reserves are extinguished after reinvestments cease.

The rate lift-off will mark the beginning of accommodation removal using the Fed’s primary tool of monetary policy, setting forth a tightening cycle that Chair Yellen

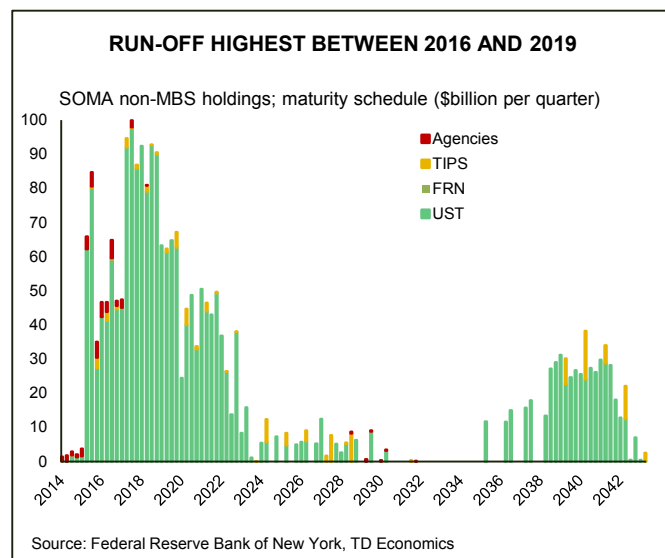
termed a “shallow glide path.”<sup>22</sup> We expect the Fed to hike by an average of 100 basis points per year or so (see chart), with the policy rate normalizing to its neutral stance of about 3.25% in the first half of 2018.

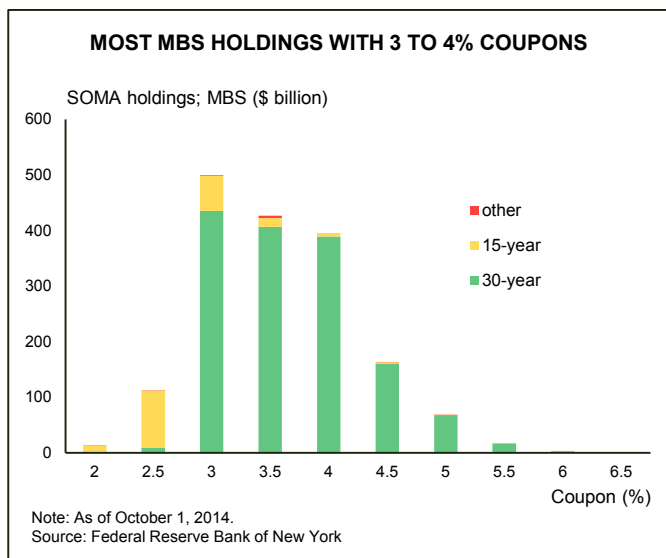
### 4) Balance sheet to shrink as reinvestments stop

One of the reasons for keeping rate hikes gradual is that the Fed will also begin to remove accommodation through the other tool of monetary policy – its balance sheet. Balance sheet normalization will be accomplished by and large through passive run-off of securities, with the FOMC sentiment moving away from outright MBS sales – except potentially in select cases of eliminating residual holdings. This second layer of tightening will begin when the Fed stops reinvesting maturing UST and agency debt, and principal payments from MBS, thus allowing its balance sheet to shrink. The process was first expected to begin several months prior to liftoff, but FOMC sentiment has gradually shifted with reinvestments set to continue until sometime after the first increase in the policy rate.

Stopping reinvestments could be done in one fell swoop, or gradually by reducing the share reinvested at subsequent meetings. This tapering of reinvestments could take several months with some level of reinvestments continuing through the end of 2015 and potentially into early-2016. Any purchases the Fed will be making during 2015 will almost exclusively consist of MBS, as there is very little in the way of Fed holdings of Treasuries that will mature before 2016 (see chart).

But, the trickle of maturing USTs over 2015 will become a river by early 2016 – in part due to Operation Twist which





extended the duration of the Fed’s UST holdings. Over 2016 and 2017, an average of \$50 billion of Treasuries are set to mature per quarter. The pace of run-off will peak in 2018, with \$365 billion worth of USTs maturing. Run-off in 2019/20 will bring the cumulative total to nearly \$1.3 trillion, with Fed holdings of Treasuries more than halved to about \$1.1 trillion by the end 2020. Of the remaining holdings, one third is set to mature between 2021 and 2023, with the rest made up of long-term bonds slated to mature beyond the mid-2030s.

While Treasury securities mature at a specific date, MBS pass-through securities pay down gradually due to normal mortgage payment, as well as refinancing activity. As such, the run-off resulting from prepayment of MBS is not as straightforward to anticipate. The key source of uncertainty will be the prevailing mortgage rates, relative to the rates in the Fed portfolio. This, alongside the age of the mortgage, and its vintage, are the main determinants of refinancing activity. Refi activity typically falls with age, and higher prevailing mortgage rates. The current Fed portfolio has prepaid faster than comparable market holdings,<sup>23</sup> but it is made up of relatively new mortgages, concentrated in 30-year securities with rates in the 3%-4% range (see chart). The portfolio prepaid between \$300 to 400 billion in 2012/13, during the period of sharply falling mortgage rates, but has been averaging closer to \$200 billion per year recently. As such, unless rates fall materially below 4%, we expect pay down activity in 2016 and beyond to be bounded by about \$200 billion per year. Prepayments should track lower as the portfolio declines, with total runoff between 2016 and 2020 estimated to be some \$800 billion.

## 5) Cleaning house

Between 2016 and 2018, about \$1.4 billion of securities will run-off the Fed balance sheet extinguishing reserves and deposits. Coupled with an increase in currency in circulation of about \$300 to 400 million,<sup>24</sup> whereby reserves are swapped for banknotes, this will result in a corresponding decline in excess reserves to under \$1 trillion by the end of 2018 – or about one-third of the current level. A substantial decline in excess reserves will cause the usefulness of the ON RRP to wane. But, risks related to the facility will remain. As such, the Fed may choose to wind it down and utilize more the term deposit facility, whose effectiveness in soaking up reserves will rise as these become scarcer.<sup>25</sup>

By the end of 2020, the \$2.1 trillion shrinkage of the SOMA portfolio will see its size halved. Coupled with currency issuance, this will reduce excess reserves substantially, with the balance sheet near the “smallest level consistent with efficient implementation of monetary policy.” While we believe that the Fed may return to an environment of “structural scarcity,” whereby it uses open market operations to adjust the federal funds rate, the IOER tool will allow it set rates by fiat, regardless of the level of reserves, which it could keep somewhat elevated should the need arise.

Whatever the future normal size of the balance sheet will be early into the next decade, the composition of the balance sheet will still be atypical with the Fed likely holding nearly \$1 trillion in mortgage-backed securities. The Fed would likely prefer its balance sheet to consist primarily of Treasury securities so as to “minimize the effect of the SOMA portfolio on the allocation of credit across sectors of the economy.”<sup>26</sup> To that end, the Fed may undertake a gradual rebalancing whereby the proceeds of its prepaying MBS holdings are reinvested in T-bills and longer-term Treasuries. Depending on market conditions, this process could be sped up by selling MBS outright and using funds to purchase USTs. At the same time, the Fed will also begin to grow its balance sheet in the more traditional sense, with its ultimate size determined by the demand for currency as well as demand for reserves enabling banks to satisfy reserve requirements and trade on the interbank market. We expect the Fed balance sheet to bottom out at just over \$2 trillion at the end of 2020, and then grow by about \$100 to \$150 billion per year thereafter.

## Implications

Financial markets are expecting normalization. But, even

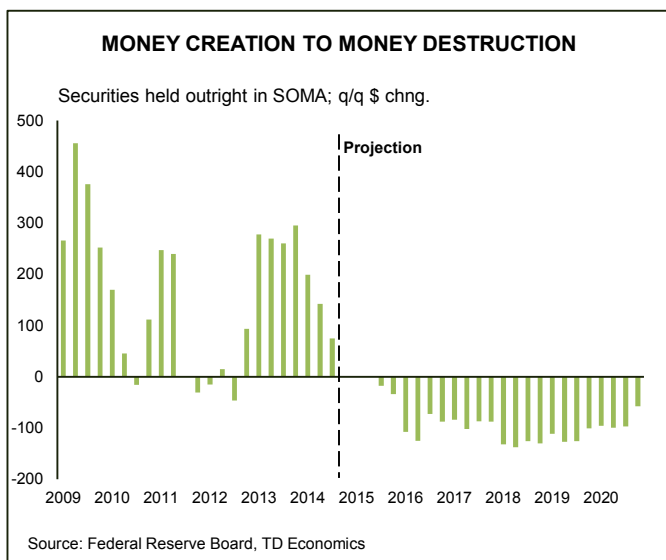


events that are expected by markets, such as the beginning of tapering of asset purchases last year, can result in price swings and lead to increased volatility. While we don't expect normalization will cause another sharp adjustment in asset prices, we also don't believe that all of its consequences are yet reflected in asset prices. As such, some gradual adjustment in an environment of higher volatility could ensue.

At this point, futures markets are pricing a gradual pick-up in short-term rates beginning in mid-2015. The profile is more muted than the Fed's Summary of Economic Projections of interest rates, but not overly so. And the Fed has been too optimistic in the past. Longer-term bond prices may see more adjustment over the normalization period. The term premia on longer-bonds have more than rebalanced from their QE-related lows during the course of the taper tantrums last year. But, they have since decreased and remain below their historical levels – perhaps reflecting lackluster growth prospects globally. When the Fed stops reinvesting, issuance of UST and MBS into private markets will have to rise to compensate. If this need is underestimated, the rising supply could pressure prices down and yields upward. At the same time, while much of the adjustment to bond prices happens in anticipation of future changes to UST/MBS supply, some adjustment could still take place at the time of supply changes.<sup>27</sup> Lastly, as liquidity that the Fed has injected is removed – although much more gradually than it was added (see chart) – the implications may extend to other asset classes.

#### a) Extinguishing reserves will destroy deposits

The unwinding of QE will, by definition, decrease the



monetary base by way of extinguishing reserves in the banking system. Any decline in base money will also directly cause a decrease in broad money/deposits of at least the same magnitude – by virtue of the fractional banking system that the Fed maintains. During the reinvestment phase, the Fed uses the money that is paid down on its MBS holdings, which destroys deposits, to purchase additional securities, recreating the deposit. However, when reinvestments stop, the Fed will no longer recreate the deposit, resulting in less money in the economy.

In the case of Treasury securities, these get rolled over at auction during reinvestment phase. However, when the Fed stops reinvesting USTs, the maturing Treasury security will cause a debit to the Treasury's deposit account at the Fed, which will need to be refilled by either by additional issuance or tax revenues – both of which will extinguish reserves/deposits when proceeds are moved to the Fed. Moreover, a short-term headwind to deposits could come from the expansion of the ON RRP facility, whereby the Fed borrows money from the private sector, leading to a drain in reserves of the same magnitude.

As such, deposit (and broad money) growth during the 2016-2020 period will face substantial headwinds, reversing the tailwind over 2009-2014. The headwind will be significant, with \$400 to \$600 billion (or 4% to 6% of deposits) destroyed every year. As money is drained from the economy, the supply-demand equilibrium will once again be distorted – this time towards excess demand for funds. To rebalance, supply will have to increase through additional commercial bank lending.

Bank credit growth will likely rise in the coming years. Improving economic growth will boost demand for credit. At the same time, falling charge-offs, rising interest rates, and healthier bank balance sheets should make banks more willing to lend. Bank loans should accelerate to a relatively robust 6 to 7% per year, with the associated deposit creation offsetting the gradual decline in broad money stemming from balance sheet normalization. However, while money balances are not likely to decline outright, their growth may remain fairly muted at 1 to 2% during the normalization period, falling short of the expected pace of nominal spending in the economy.

#### b) Headwinds may extend to other assets

To the extent that the supply of money fails to expand alongside the demand stemming from higher nominal

spending, some of equilibrium restoration between money demand and supply may be accomplished on the demand side. In particular, given the expected growth in nominal spending, remaining mechanisms for adjustment include asset prices and relative return of money (deposit rates relative to other yields).

Rising yields above and beyond the rise in deposit rates will likely correct for some of the distortion, but it may be the case that there is adjustment in other asset prices such as equities or corporate bonds. This may not result in outright declines in equities, which should reflect the discounted net present value of future earnings. But, to the extent that QE may have boosted prices above and beyond their fundamentals, the monetary headwind may result in more muted gains during the normalization period, with the equity risk premium rising. Risk premia may also rise in corporate and municipal bond markets as liquidity is removed by the Fed and volatility returns, leading to higher yields.

### **c) Inflationary risks remain subdued**

The higher asset yields alongside limited growth of money may result in further rebalancing away from foreign assets to domestic ones. This should be supportive of the dollar. Some of this appreciation has already taken place, with the broad dollar index rallying to its highest level of the recovery. But, it is unlikely that this process is complete, with rising dollar-denominated asset yields likely to attract more capital to flow back to the U.S. A further weakening of some international currencies vis-à-vis the dollar may put pressure on their inflation rates – a welcome development for countries facing disinflationary pressures.

However, implications from the normalization of monetary policy on inflation in the U.S. are likely to be limited. In particular, the downward pressure on money holdings resulting from the reduced balance sheet will likely be slightly deflationary, especially coupled with a higher dollar. This will be taking place alongside an improving economy and robust credit expansion which should offset. But, any inflationary worries can be promptly dealt with by the Federal Reserve through tighter monetary policy. This would likely take the form of more rapid interest rate hikes, provided that the Fed's toolkit for conducting monetary policy amid excess reserves works as expected. Alternatively, the Fed

could turn to outright asset sales to put pressure on longer term rates if necessary.

While a banking system with a substantial quantity of excess reserves may be able to “expand lending faster in response to changes in economic conditions,”<sup>28</sup> sparking worries that the Fed may find itself ‘behind the curve,’ this risk should be mitigated by the understanding that reserves will get extinguished, and subside further as normalization gets underway. The Fed will likely monitor these developments closely and has plenty of ammunition to deal with higher inflation, and may even feel comfortable to let it run hot temporarily, so as to make sure the economy is well on its way to sustained growth.

### **Bottom line**

The Fed balance sheet has expanded rapidly over the last six years, with interest rates near their effective lower bound for nearly that long. It will take just as long for the balance sheet to return close to its conventional size. Normalizing interest rates to their neutral stance will likely be accomplished sooner. But, given the complexity of doing so amid plentiful reserves and the vulnerability of the economic recovery, it too will be a gradual process.

Markets have already adjusted to the reality without QE. But, it would be a stretch to expect that this adjustment is complete and that markets have perfect foresight. More is likely on the way. Even if the recovery proceeds as expected, the complexity of the mechanism leaves us with a fair amount of caution regarding the unwinding of QE amid rising rates. Caution will likely be on the minds of the Fed policy makers, especially in light of potential repercussions for financial markets and the economy as a whole.

The beginning of normalization will mark a significant policy shift. Its dual nature will likely result in a gradual pace of tightening. The Fed will do its utmost to be predictable, so as to not roil markets and stifle the recovery. It will proceed one step at a time and make decisions based on its mandate of price-stability and full-employment, with considerations of financial stability. The Fed is in uncharted waters. Navigating out of them will require a skillful skipper and crew. The course has been charted, but may yet be altered as winds change or obstacles appear, with the ultimate destination not precisely known until we actually get there.

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**END NOTES**

1. The Federal Reserve's asset purchases were more of a "credit easing" than "quantitative easing" program. By intentionally purchasing long-term Treasuries and agency debt and MBS, the Fed intended to impact the yields in those particular credit markets with the emphasis on the asset side of the Bank's balance sheet rather than focusing on the liability side whereby it would only be concerned with injection of reserves into the system. For a more thorough explanation see Bernanke (2009).
2. Of the \$3.7 trillion in asset purchases, about \$300 billion were merely offsetting Treasury securities which were sold in early-2008 to sterilize various credit and liquidity programs initiated prior to QE.
3. The Fed is prohibited from purchasing Treasury securities in the primary market in amounts exceeding those of the maturing SOMA Treasuries.
4. Counting on the imperfect substitutability of assets related to preferred habitat and market segmentation, the Fed intended to reduce the supply of longer-term Treasuries, agency debt, and MBS, removing duration (and convexity, in the case of MBS) from the markets and raising their prices. This would effectively crowd out the marginal investor, reducing the term premium and thereby lowering yields, and push the investor further out the risk-frontier.
5. For early writing on the portfolio rebalancing channel see Tobin (1965, 1969), Modigliani and Sutch (1966), Brunner and Meltzer (1973).
6. See Neely (2010).
7. For a comprehensive monetarist perspective of the BoE's QE program see Bridges and Thomas (2012).
8. See, for example, Eggertsson and Woodford (2003).
9. See Fawley and Neely (2010).
10. In the FRB Flow of Funds accounts (Z.1) the household sector includes, in addition to the typical private households, entities such as non-profits, endowments, domestic hedge funds, private equity funds, and personal trusts.
11. See Bridges and Thomas (2012) and Bridges, Rossiter, and Thomas (2011) for analysis of spillovers from the BoE's QE program which they estimate to be approximately one-third.
12. Open market operations such as tri-party repos and securities purchases are the key tools that supply reserve balances to the banking system. Additionally, the Federal Reserve can drain reserve levels by redeeming maturing securities, selling securities outright or conducting reverse repos. Reinvesting the proceeds of maturing securities is reserve neutral as is placing them in a term deposit facility.
13. The effective federal funds rate is a volume-weighted average measure calculated by the Federal Reserve Bank of New York based on data on trades from major brokers in the interbank market.
14. The Fed was scheduled to begin paying interest on reserves (IOR) (both the required and excess balances) in October 2011, as part of the Financial Services Regulatory Relief Act of 2006. The implementation of this program was brought forward to October 1, 2008 by the Emergency Economic Stabilization Act of 2008. At this point, interest on excess balances is a much larger portion of the IOR facility, with reserves necessary to fulfill requirements currently making up just 3% of total reserves at Reserve Banks.
15. See Board of Governors of the Federal Reserve System (2008).
16. See Board of Governors of the Federal Reserve System (2014d).
17. An amendment to Regulation D authorized the twelve Reserve Banks to offer term deposits to depository institutions.
18. See Board of Governors of the Federal Reserve System (2014c).
19. See Federal Bank of New York (2014).
20. See Board of Governors of the Federal Reserve System (2014b).
21. Alternatively, if the Fed wants to keep the effective fed funds near its more typical 25 basis point increments, it could set a the IOER just above the desired 'target' and the RRP just below it. For instance, a first move could see the IOER go to 65bp, while the ON RRP would pay 40bps.
22. See Board of Governors of the Federal Reserve System (2014a).
23. See Kandrac and Schlusche (2014).
24. Assumes growth of currency in the 5-7% range that is consistent with history.
25. See Martin et al. (2013).
26. See Board of Governors of the Federal Reserve System (2014b).
27. D'Amico and King (2013) point to market imperfections which "might allow even pre-announced withdrawals of supply to have effect on prices when they occur." Hancock and Passmore (2012) discuss how information about policies is often "learned over time... and prices adjust slowly."
28. See, for example, Ennis and Woolman (2013).

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