

Global Money Notes #3

Research Analysts

Zoltan Pozsar
212 538 3779
zoltan.pozsar@credit-suisse.com

James Sweeney
212 538 4648
james.sweeney@credit-suisse.com

Flying Blind

For the first time in nearly a decade, the FOMC has raised interest rates.

Now comes the hard part: interpreting the sequence of events that will follow.

Darkening clouds in credit markets and a sub-50 ISM aside, the financial system has completely changed since the last hiking cycle. It's not just the exit tools and excess liquidity; rules and incentives are different too.

Money funds are getting ready to bid away hundreds of billions in non-operating deposits from banks and invest those funds in reverse repos at the Fed. The more generous these funds are in passing on the first hike, the more deposits they will lure away from banks and the greater the usage of the RRP facility.

Banks on the other side of these flows are about to learn the validity of their assumptions regarding deposit betas (how deposits will respond to higher rates) and the liquidity profile of the HQLA portfolios built based on these assumptions.

A modest 25 basis points hike could trigger lots of flows because many financial institutions hold huge non-operating deposits. These [institutional cash pools](#) include the central liquidity desks of asset managers and the balances of hedge funds and private equity funds. Seemingly trivial moves in interest rates and basis points will matter for those who manage the largest of cash pools.

As cash moves, banks will have to adjust their balance sheets in accordance with the new liquidity rules. Banks have been adding bonds to their HQLA portfolios in recent quarters, but the coming months are likely to prompt some rebalancing in some of these portfolios. Outright (net) sales are also possible.

Meanwhile, non-bank fixed income portfolio managers (PMs), who are mostly unacquainted with the large banks' new liquidity rules, must learn the details, in order to avoid being caught on the wrong side of likely flows.

Like quarterly snapshots of total return funds, HQLA portfolios require attention. Some HQLA portfolios are bigger than the largest total return funds were at their peak. And unlike total return funds, which are subject to the idiosyncratic whims of a portfolio manager, HQLA portfolios are subject to more or less programmatic trading rules that get triggered when certain position limits are hit.

The details of large banks' HQLA and deposit portfolios are not public. Below, we estimate them from individual banks' call reports, in order to get a sense of how large banks were positioned for outflows at the eve of the first hike.

We found more questions than answers. Our piece is intended as a roadmap to help investors think through some of the moving parts they did not have to think about when the Fed embarked on its previous hiking cycle over a decade ago.

DISCLOSURE APPENDIX AT THE BACK OF THIS REPORT CONTAINS IMPORTANT DISCLOSURES AND ANALYST CERTIFICATIONS.

"Throughout the flight, pilots are required to monitor many functions, the state of aircraft systems, aircraft configuration, flight path and the actions of the other pilot in the cockpit. Thus, the number of opportunities for error is enormous — especially on challenging flights, and many of those opportunities are associated with two safeguards themselves designed to guard against error: checklists and monitoring. [...] Maintaining the safety of any highly ordered system — an aircraft or the entire air transport system — is like balancing on a ball; constant effort is required to counter the many forces that would disorder the system."

NASA Technical Memorandum

The average trader has not been in markets long enough to have seen a hiking cycle. Therefore, the common wisdom is that trading the exit will be a challenge for many.

But even if one has several hiking cycles under his or her belt, star trader or not, no one has ever traded a hiking cycle against a backdrop of a banking system with so many noninterest-bearing deposits. Institutional noninterest-bearing deposits – a byproduct of many years of QE – will soon have the potential to earn yield. But not from banks: the largest of U.S. banks are subject to hard-coded asset-liability management rules (due to Basel III) that make these deposits unattractive. Thus, the system is about to be stress-tested to see what happens when large-scale flows occur from banks to money funds.

Understanding the implications of this is essential for anticipating flows and interest rates and spread behavior as rates rise. The Fed's transparency on the timing and path of rate hikes may be insufficient to avoid surprises and [turbulence](#) in a system awash with so much excess liquidity and subject to so many new rules.

We are confident that the new tools will work and that the effective fed funds rate and other important short-term interest rates will rise into the Fed's new target range (see the previous issue of Global Money Notes [here](#)).

But obsessive focus on the very short-end of the yield curve might miss the bigger picture.

The present focus on short-end mechanics are equivalent to a pilot checking if the plane is fueled and its wings are positioned correctly for takeoff. But nothing more. Take-off may go fine but volatile weather systems at 30,000 feet are another matter. Does the average portfolio manager know what it is like up there, or will he or she be trading blind?

Any portfolio manager's pre-takeoff "weather" checklist should include:

1. Incentives: how did the incentives of banks and asset managers change since the last hiking cycle in terms of their appetite for retail versus wholesale funding?
2. Rules: how did banks' asset-liability management rules change since the last hiking cycle? How about the depth and elasticity of dealer balance sheets?
3. Positioning: how are banks positioned for outflows within the parameters set by the new rules? Will the bond portion of HQLA portfolios come into play?

The rest of our piece discusses each of these items in detail.

The section on incentives is intended for money fund businesses. Its message: be bold, and be generous, and focus on market share, not fees. Scale will matter. Don't be hindered by counterparty caps. If the flows are large enough, caps will be washed away...

The section on rules and HQLA positioning is intended for fixed income portfolio managers and bank treasurers. Its message: we are about to find out whether assumptions about deposit betas and the liquidity profile of HQLA portfolios based on them were correct.

Using call report data, we reverse-engineered the outflow assumptions G-SIBs¹ appear to have attached to their non-operating deposits. In some cases we find a mismatch between these and the liquidity profile of HQLA portfolios.

It is difficult to say whether some banks will sell HQLA to finance deposit outflows or need to rebalance between Level 1 and Level 2 HQLA. Similarly, if some banks end up with surplus HQLA, what they will do with those assets is also hard to say. But we think that steady bank demand for HQLA in recent years may turn into a period of sales, as flows from banks to money funds run their course in the coming weeks and months.

Fixed income investors don't want to be caught on the wrong side of these flows.

Our piece is intended as a roadmap to help them think through some moving parts they did not have to think about before. An aid to keep them from flying blind through the night...

Incentives

Basel III and the SEC's money fund reforms have fundamentally re-shaped banks' and asset managers' preferences to intermediate retail versus wholesale deposits.

Basel III increased banks' demand for retail deposits (vis-à-vis other banks and vis-à-vis retail money funds) and reduced their demand for wholesale deposits.

The SEC's money fund reform did the exact opposite. It increased asset managers' incentives to court wholesale cash balances, and raised the appeal of government-only money funds over prime money funds as vehicles to do so. This is because reforms require institutional-class prime funds (but not government-only funds) to float their NAVs, and also subject prime funds (but not government-only funds) to liquidity gates and fees.

Exhibit 1 shows how funds are presently distributed in the U.S. money market.

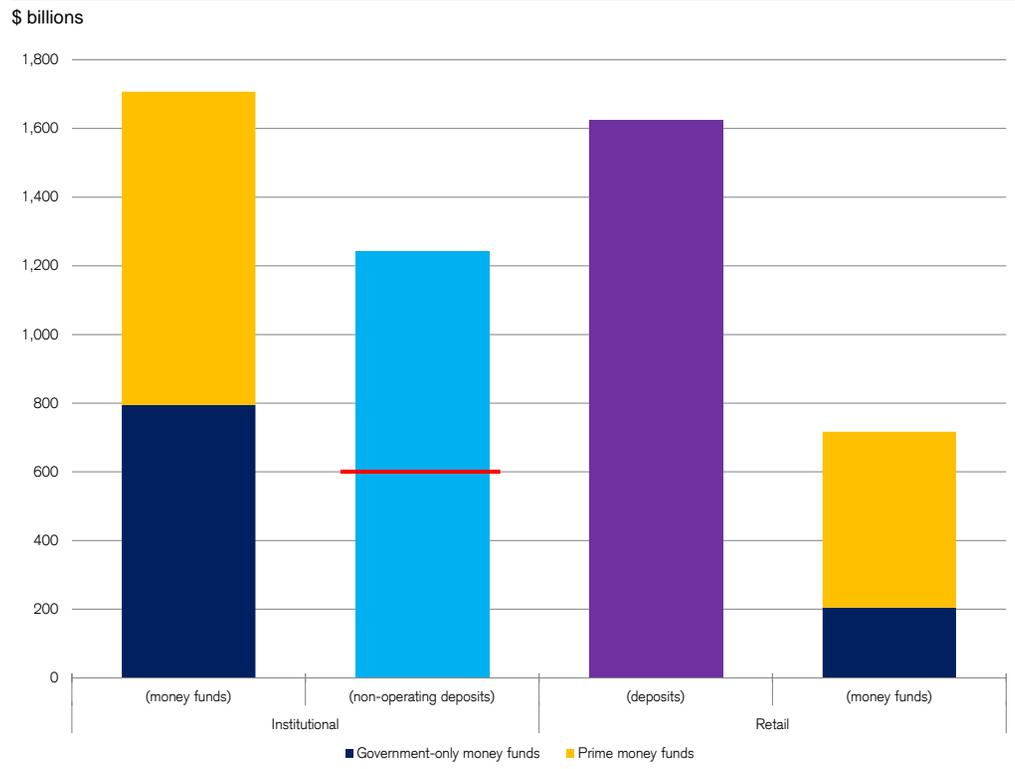
The first column shows assets under management at institutional-class money funds at \$1.7 trillion, split between \$800 billion in government-only and \$900 billion in prime funds.

The second (light blue) column shows the aggregate volume of so-called institutional non-operating deposits at the six U.S. G-SIBs at \$1.2 trillion. We will discuss the concept of non-operating deposits in detail below; for now, non-operating deposits are deposits that are in excess of an institutional depositor's immediate payment needs and typical payment patterns. The red line at \$600 billion is our estimate of the amount of non-operating deposits that belong to financial institutions (as opposed to non-financial corporations; henceforth, buyside non-operating deposits). These deposits have the worst of all RoEs.

The third (purple) column shows the total amount of retail deposits at \$1.6 trillion at the same banks. These deposits have the best of all RoEs.

¹ Global, systemically important banks

Exhibit 1: U.S. G-SIBs versus Asset Managers Today



Source: ICI, Call Reports (FDIC), Credit Suisse

RoEs on retail versus wholesale deposits are so different because Basel III requires banks to invest only 5 cents of every dollar of retail deposits into high-quality (but relatively low-yielding) liquid assets (HQLA), whereas a bank may have to invest as much as 100 cents of every dollar of certain kinds of wholesale deposits. In other words, funding with retail deposits gives a bank near-total control of its lending and investment portfolios, and much less or even zero control when funding with wholesale deposits. Basel III has turned the size of one’s retail deposit base into a make-or-break driver of bank profitability.

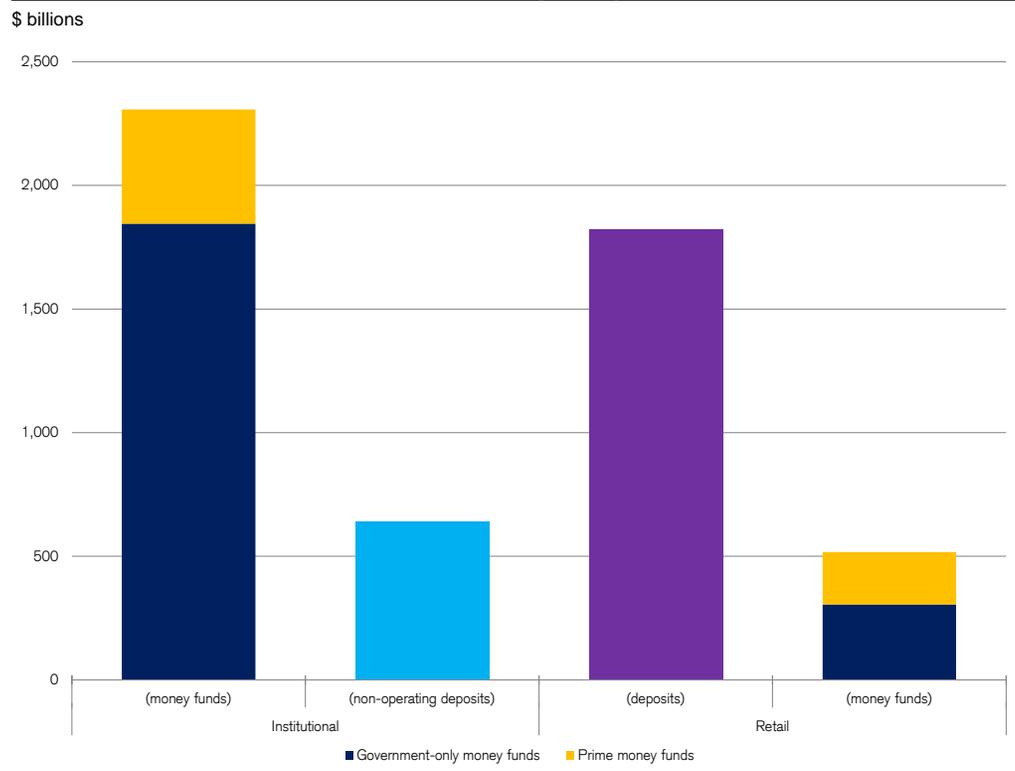
The fourth column shows the total amount of retail-class money funds at around \$700 billion, split between \$200 billion in government-only funds and \$500 billion in prime funds.

One year from now, the size of these columns will likely be very different and the likely direction of change will be as follows (see Exhibit 2).

Institutional non-operating deposits will likely have shrunk by at least \$600 billion and migrated to institutional-class government-only funds.

On the other hand, retail deposits will likely have increased as banks lure depositors away from retail money funds. The big U.S. banks will have all the incentives to bid up for retail deposits as they have low HQLA requirements and also count toward compliance with the net stable funding ratio (NSFR). From the perspective of households, deposits will also become more appealing, not only because banks will be incentivized to pass on a greater share of higher interest rates faster than before, but also because deposit insurance limits are higher than during the past hiking cycle (\$250,000 versus \$100,000). Furthermore, unlike prime funds, deposits won’t be subject to liquidity gates and fees.

Exhibit 2: U.S. G-SIBs versus Asset Managers by Year-End 2016



Source: ICI, Call Reports (FDIC), Credit Suisse

Some asset managers’ voluntary conversions of retail prime money funds to government-only funds may tame some of the flows from retail money funds to banks. But for the retail money fund complex as a whole the prognosis looks bleak: high-margin prime funds are set to lose market share to big banks or if not, their conversion to lower-margin government-only funds point to structurally lower margins going forward.

The outlook is not much better on the institutional-side of the business, in our view.

Asset managers are bracing for outflows from institutional-class prime funds, as floating NAVs will prompt end-investors to switch to lower-margin government-only funds.

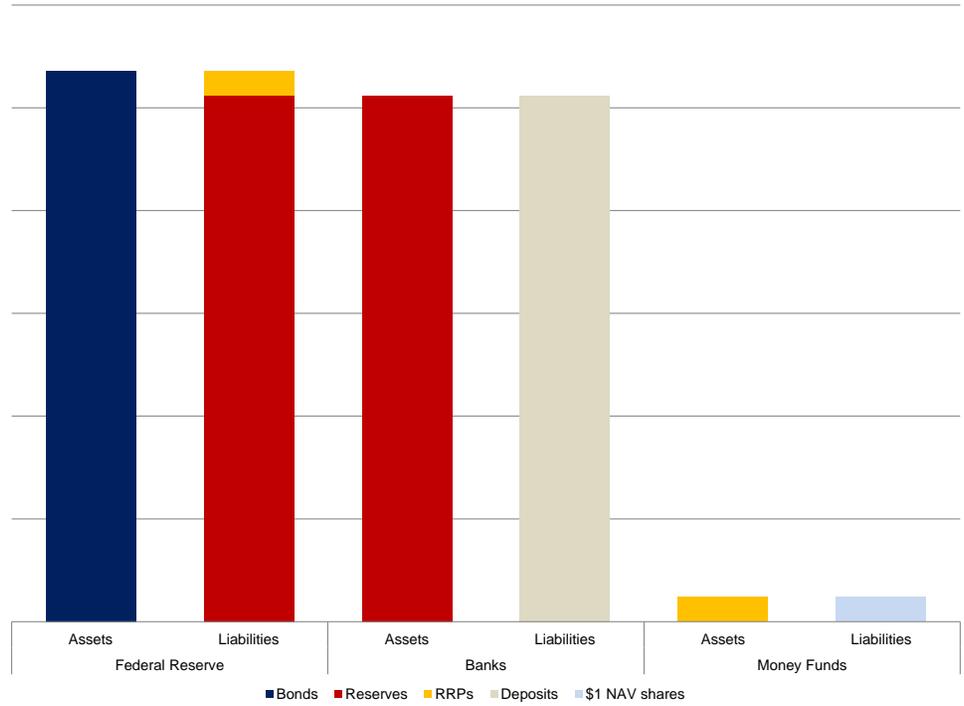
As AuMs from existing investors are set to shrink, and a bigger share of a shrinking pie will likely go to lower-margin government-only money funds, it will be imperative for money funds to grow their business by trying to attract new sources of cash by going after wholesale deposits in the banking system. This is where the Fed’s RRP facility comes in.

As we have discussed before (see [here](#)) every penny of wholesale deposits that money funds will manage to lure away from banks will result in a 1:1 decline in reserves and increase in RRP. As banks lose deposits (to money funds) they will also lose assets (reserves), and as money funds gain AuM (by absorbing deposit outflows from banks) they will buy new assets (RRPs). These flows are axiomatic and hard to argue with.

As these flows work their way through the system, the size of the Fed’s balance sheet need not change, but its liability mix will change. And as these liability swaps run their course, bank balance sheets will shrink and money funds’ AuM will increase (see Exhibits 3 and 4). It is important to appreciate that throughout this process, the Fed won’t be an active, but rather a passive participant: banks will bid for reserves and money funds for RRP, and the Fed will passively accommodate the order flow for one instrument versus the other, **swapping** (a more accurate term than draining) reserves for RRP.

Exhibit 3: The Financial System with a Small RRP Facility

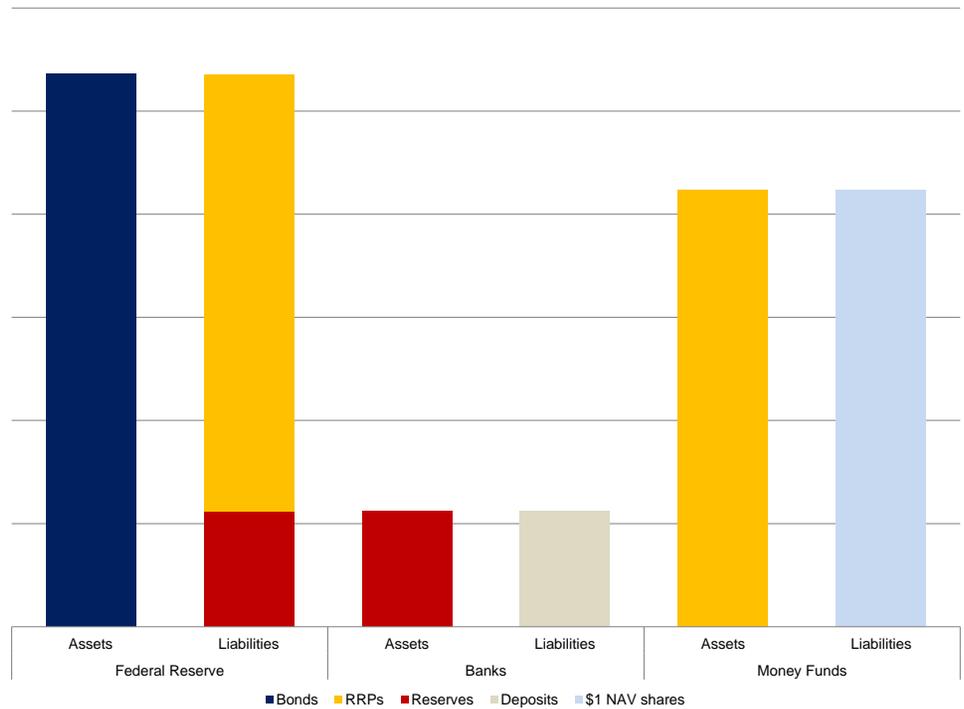
The financial system at present; no scales, chart for illustrative purposes only.



Source: Credit Suisse

Exhibit 4: The Financial System with a Large RRP Facility

The financial system 12 months from now; no scales, chart for illustrative purposes only.



Source: Credit Suisse

Now that the Fed chose to uncap the RRP facility, the single most important factor that will determine the uptake will be how aggressive money funds will be in passing on the first rate hike. Counterparty caps are a pain, but large flows should wash them away...

If money funds are stingy (i.e., they hold on to the first hike through higher fees) money does not move. If banks don't pass on higher rates to wholesale depositors, and neither do money funds, money has no incentive to move. However, if money funds are generous and pass on the bulk of the first hike, money will have an incentive to move (Appendix 1 details the economics of what it would take for cash to move from banks to money funds).

How will money funds behave?

The consensus assumption is that money funds, after seven years at the zero bound can't wait to get their margins back up to their historical average. As such, the thinking goes money funds will use the first hike to increase their fees, passing on little to end investors.

We disagree for two reasons.

First, if money funds chose to go down this path with their retail funds, they will only make it easier for banks to attract business away (for the reasons discussed above).

Second, it also makes little sense for money funds to behave like this with their institutional funds. If one thinks of the Fed's RRP facility as an all you can eat buffet of 'safe assets' that would help money funds get a large volume of new assets at a fixed price for every new dollar of AuM they manage to bring in as they lure non-operating deposits away from banks, it would make no sense to show up with a full stomach (i.e. raising returns on existing AuM by raising fees) and a lot more sense to show up hungry (i.e. raising returns primarily by increasing one's AuM and less by raising fees).

This should be the mindset with which money funds are likely to approach the operational aspects of the exit.

However, some fund complexes keep raising the concern that RRP's with the Fed may crowd out relationships with existing repo customers – namely the primary dealers.

These concerns are misplaced, in our view.

Bidding aggressively for RRP's at the Fed won't cannibalize existing portfolios, but will be net additive. What's at stake is going after a \$600 billion slice from the balance sheet of the largest U.S. banks, by luring away that much of wholesale deposits from them (none of these deposits are held by prime money funds; money funds fund foreign, not U.S. banks).

Banks want to offload these deposits – the push. Money funds should court them – the pull.

These flows from banks to money funds will be entirely parallel to (and to emphasize, additive to) existing funding relationships between dealers and money funds (in the case of bank holding companies, bidding for RRP's will likely attract money away from the bank operating subsidiary, not the dealer subsidiary on which money funds rely on for repos).

In terms of the dynamics that will likely play out between various fund complexes, it is helpful to think about the sector a little bit like the oil market.

The largest fund complexes (those that belong to large, diversified asset managers) will likely behave like the Saudis at the moment – they will pump and go for market share regardless of the price (i.e., fees) they get today. This approach we view as “hook ‘em” first, charge later.

On the other hand, the smaller fund complexes will likely go for higher prices (i.e. fees) from the get-go. Competition will likely keep margins compressed going forward.

Recent announcements by large asset managers are confirming the above mindset and that the money fund business is presently morphing into a lower(er) margin business.

Some have stated that they won't raise their fees back to pre-crisis levels; some have announced new funds to lure wholesale deposits away from large banks; and one has announced buying the money fund business of a bank in the largest such transaction ever.

These changes are the final stage of what we have [previously](#) labeled the migration of the matched-book money dealing function first from the balance sheet of dealers (overnight borrowing in repo and overnight lending in repo) to the balance sheet of banks (overnight borrowing via deposits and overnight lending to the Fed at IOER) and ultimately from the balance sheet of banks to the balance sheet of money funds (overnight borrowing via stable value shares and overnight lending to the Fed through what will ultimately become a large RRP facility; see Exhibit 5). Just as these activities were high-volume, low margin when they resided on dealers' balance sheets and now on banks' balance sheets, they will likely remain high-volume, low margin when they migrate to money market funds.

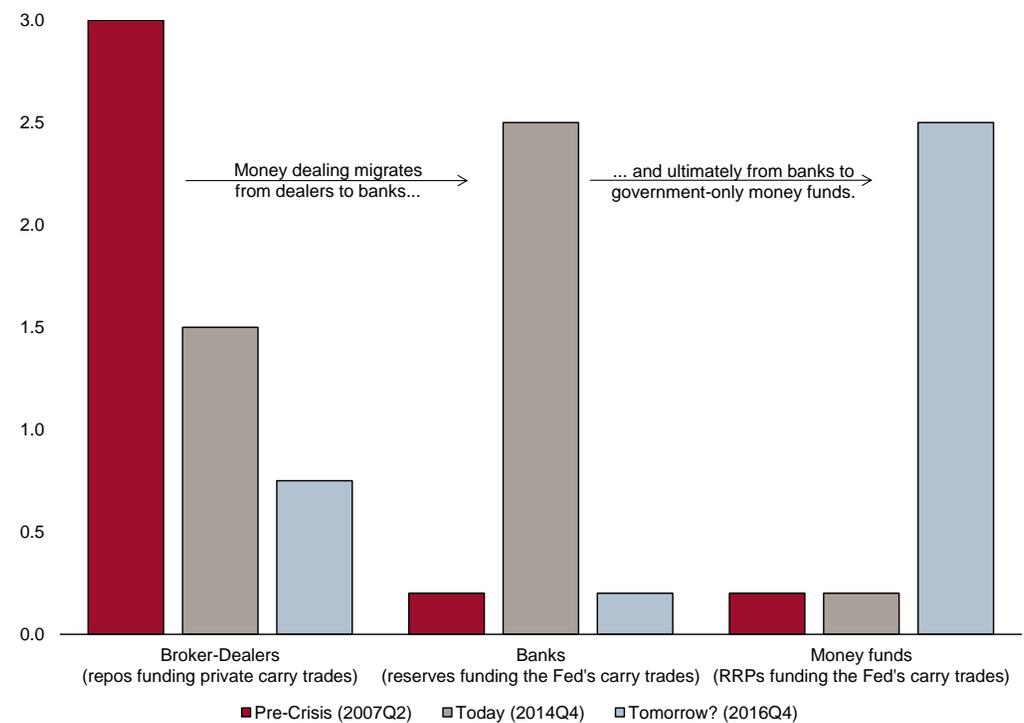
Finally, another reason why we believe money funds' fees will need to remain structurally lower going forward is that if a large RRP facility will remain a permanent feature of the financial ecosystem and RRP's will become the core asset of money funds' portfolios, it will be difficult for money funds to differentiate themselves and attract incremental flows.

For money funds, RRP's are a uniform asset about nothing more than taking cash in overnight and putting it at the Fed overnight. That does not involve a lot of value-added unlike having a view on the Fed and using that view to sift and pick through a pile of Treasury bills, coupons and FRNs or watching the credit risk and collateral embedded in repos with primary dealers. It will be hard to charge for that. And that is precisely why going forward the emphasis is likely to be on volumes, not margins.

How an asset manager approaches the opportunity a large RRP facility represents, will determine its position in the money fund business over the medium term.

Exhibit 5: In Search of a New Home

The migration of the money-dealing function since the financial crisis.



Source: Credit Suisse

Rules

The Liquidity Coverage Ratio (LCR) is the most important piece of regulation that will shape **second-order flows** that may get triggered by deposits-to-money funds flows, in our view.

Non-bank fixed income portfolio managers (PMs) are typically unfamiliar with the details of the LCR. But they should be.

If PMs spend time analyzing in detail the latest asset allocation snapshots of the largest total return bond funds, they should also start analyzing the asset allocation snapshots of the HQLA portfolios that banks have built in recent quarters to get compliant with the LCR.

In many cases, these HQLA portfolios are bigger than the largest total return funds have been at their peak – at present, the size of the bond portion of the largest HQLA portfolios (mostly duration bets) can range anywhere from \$100 billion to \$400 billion, which is larger than the biggest total return fund at its peak. And unlike total return funds, which are subject to the idiosyncratic whims of a portfolio manager, HQLA portfolios are subject to more or less programmatic trading rules that get triggered once certain thresholds are hit.

Therefore, familiarity with the rules and how individual banks are positioned within the bounds set by the rules are of first order importance.

How do the rules work?

The LCR was designed to insure banks against outflows over a 30-day stress period.

These outflows may occur due to deposit flows, debt maturities, an inability to roll repos or margin calls triggered by shocks (big standard deviation events). The trigger of outflows may be credit risk, systemic risk or something as simple as better yields offered by money funds – in its design, the LCR is agnostic as to why outflows occur. Outflows are outflows.

For our present discussion the relevant risk scenario is one where large U.S. banks lose deposits to money funds as the latter offer better yields in the days and weeks after liftoff.

Determining a bank's LCR compliance is a two-step process.

First, banks are required to take stock of their deposits and assign each into one of four categories, each with a different outflow assumption.

Retail deposits are assigned a 5% outflow assumption (hardly a surprise as retail deposits are insured and fairly insensitive to movements in short-term interest rates).

Corporate operating deposits are assigned a 25% outflow assumption. These refer to deposits that corporations (both non-financial and financial) keep at a bank to meet their upcoming payment needs: paying workers, suppliers, rents and taxes.

Corporate non-operating deposits are assigned a 45% outflow assumption. By and large, these refer to those balances of non-financial corporations that are in excess of a firm's upcoming payment needs or typical payment patterns. Because these balances are not in the bank for payment purposes, but rather as "excess cash" in search for a yield (a money market rate of return), they have a higher outflow assumption than operating balances.

Finally, buy-side² non-operating deposits are assigned a 100% outflow assumption. Because these balances represent the strategy cash of investors – where search for yield and beating the benchmark are the key goals – the sensitivity of these deposits to yield are the highest and their tendency to ebb and flow violently are the greatest of all deposits.

Second, the outflow assumption assigned to each deposit type, determines how much of high-quality liquid assets (HQLA) a bank has to hold on the asset side of its balance sheet.

² Buy-side refers to financial institutions other than banks.

For 5% outflow assumption retail deposits, the requirement is 5% HQLA.

For 25% outflow assumption operating deposits the requirement is 25%.

For 45% outflow assumption corporate non-operating deposits the requirement is 45%.

For 100% outflow assumption buy-side non-operating deposits the requirement is 100%.

HQLA fall into two categories: Level 1 and Level 2.

Level 1 HQLA include reserves at the Fed, U.S. Treasuries (of any maturity) and MBS guaranteed by Ginnie Mae. Level 1 HQLA may be held in any amount at no haircut.

Level 2 HQLA include MBS guaranteed by Fannie Mae and Freddie Mac. Level 2 HQLA is capped at a maximum of 40% of an HQLA portfolio at a 15% haircut.

The ratio of a bank's total amount of HQLA, divided by expected net outflows (determined mostly, but not exclusively, by a bank's deposits) is the LCR, which has to be min 100%.

Exhibit 6 demonstrates how the LCR actually works in action.

The key point to absorb from the Exhibit is that from an LCR perspective, the only type of deposit a bank can lose without suffering an HQLA shortfall are buy-side non-operating deposits (i.e. deposits with a 100% HQLA requirement).

This is because when deposits with a 100% outflow assumption leave, HQLA falls by an amount equivalent to the deposit outflow (an identity as using up HQLA is what generates the liquidity that is needed to facilitate the outflow) and so both the numerator and the denominator fall by the same amount, leaving the ratio unchanged and the bank in compliance with LCR (see Example 1 – "Buy-side non-operating deposits leave").

However, if corporate non-operating, operating or retail deposits were to leave, their outflow would cause an HQLA shortfall for the bank (see Examples 2, 3 and 4 in Exhibit 6), meaning an LCR below the minimum requirement of 100%.

To see how, consider the scenario where \$100 in corporate non-operating deposits leave (Example 2). The outflow will decrease the bank's HQLA portfolio by the same amount. The bank is now left with \$70 in HQLA (\$40 + \$25 + \$5) but on the liability side they are left with deposits with 100%, 25% and 5% outflow assumptions of \$100 each, against which the bank is required to hold HQLA in the amount of \$100, \$25 and \$5 for a total of \$130 versus only \$70 at hand. This would yield an LCR well below the minimum of 100%.

Importantly, since July 1st of this year, the six U.S. G-SIBs have to comply with the LCR at both the holding company and the bank subsidiary level every business day. Episodes of non-compliance are followed by a three-day window to take prompt corrective action.

Dealing with an HQLA shortfall is difficult as it would require either of three choices:

1. Re-jig the bank's asset side by swapping illiquid loans for HQLA. However, this is impossible during a three-day window.
2. Issue debt and use the proceeds to buy more HQLA. This is not impossible in three days but perhaps not the most efficient way of dealing with the problem.
3. Pay up for deposits so they don't leave. Here, NIMs suffer still but less than above.

Thus, the least painful (but far from painless) way to avoid an HQLA shortfall is by paying up for the types of deposits that could cause a shortfall were they to attempt to leave.

This means that during the hiking cycle, large U.S. banks are likely to fight for all types of deposits save for buy-side non-operating deposits, and try to avoid an HQLA shortfall like the plague – a dynamic that flies against expectations for wider net interest margins as the hiking cycle gets underway and reinforces expectations for Libor-OIS to widen.

At present all the large U.S. banks are compliant with the LCR. What's more, the Fed has been quietly guiding them to be about **125% compliant**. Over-compliance is important to appreciate – if the target were only 100% on the LCR, there would be no margin of safety.

Exhibit 6: The Liquidity Coverage Ratio in Action

Rules		[1] Buyside nonoperating deposits leave		[2] Corporate nonoperating deposits leave		[3] Corporate/buyside operating deposits leave		[4] Retail deposits leave		
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	
100 (HQLA)	100 (non-op, FI)	X	X	X	100 (non-op, FI)	X	100 (non-op, FI)	X	100 (non-op, FI)	Buy-side Deposits <i>OK to lose, liquidity matters</i>
60 (Credit)	100 (non-op)	60 (Credit)	100 (non-op)	60 (Credit)	X	60 (Credit)	100 (non-op)	60 (Credit)	100 (non-op)	Corporate Deposits <i>Fight, can't lose</i>
40 (HQLA)		40 (HQLA)		40 (HQLA)		40 (HQLA)		40 (HQLA)		
75 (Credit)	100 (op)	75 (Credit)	100 (op)	75 (Credit)	100 (op)	75 (Credit)	X	75 (Credit)	100 (op)	
25 (HQLA)		25 (HQLA)		25 (HQLA)		25 (HQLA)		25 (HQLA)		
95 (Credit)	100 (retail)	95 (Credit)	100 (retail)	95 (Credit)	100 (retail)	95 (Credit)	100 (retail)	90 (Credit)	X	Retail Deposits
5		5		5		5		5		
$\frac{170}{170} = 1.0$		$\frac{70}{70} = 1.0$		$\frac{70}{130} < 1.0$		$\frac{70}{145} < 1.0$		$\frac{70}{165} < 1.0$		100% compliance
$\frac{210}{170} = 1.25$		$\frac{110}{70} = 1.6$		$\frac{110}{130} = 0.8$		$\frac{110}{145} = 0.8$		$\frac{110}{165} = 0.7$		125% compliance

Source: BCBS, Credit Suisse

Over-compliance changes the above calculus, but only marginally. As the examples at the bottom of Exhibit 6 show (all starting from a 125% compliance level) retail and corporate operating deposits are still not possible to lose without suffering an HQLA shortfall.

However, the loss of buyside non-operating deposits would now leave the bank with an HQLA surplus (see number in red circle) giving the bank a welcome degree of balance sheet flexibility it lacks at present: whether to sell HQLA and buy credit or alternatively push down rates on some corporate-nonoperating deposits to force them to leave (losing some of the excess HQLA in the process) is up to bank CIOs and treasurers to decide.

Thus, money markets are not the only segment of fixed income markets that will be impacted by flows between banks and money funds. Broader segments of the market could also be affected if the bond portion of HQLA portfolios come into play either because banks chose to sell surplus HQLA or – as we discuss below – banks have to sell/repo HQLA to finance outflows or rebalance HQLA portfolios to remain compliant with the LCR.

Positioning

Getting a sense of U.S. G-SIBs' deposit mix, the outflow assumptions attached to various deposits as well as the composition of HQLA portfolios is not an easy task.

Banks do not disclose all of this information to investors and without them it is hard to get a sense of how the duration of HQLA portfolios and institutional deposits line up. And without this knowledge we believe it is impossible to have an informed view on how fixed income markets are likely to trade post liftoff.

Anyone with a strong conviction should think twice, in our view.

Now that the Fed uncapped the RRP facility and deposits are now visibly on the move from banks to money funds, these will likely be the relevant next questions:

1. What is the total volume of buy-side non-operating deposits at the system level? How much has flowed from banks to money funds? How much is still left to flow?
2. Do individual banks have enough cash at the Fed to finance deposit outflows or will they soon choose to repo or sell Treasuries and MBS to do so?
3. As deposits leave, depleting the stock of Level 1 HQLA, do banks have a sufficient margin of safety before their Level 2 HQLA breaches the 40% limit?
4. If a bank breaches its Level 2 limit and has to take prompt corrective action will it sell MBS and buy Treasuries, or will it issue debt and buy more Treasuries?
5. If this bank is a large producer of Ginnies for the rest of the Street, will it start self-originating Ginnies to top up its Level 1 HQLA and restrict supply for others? If it simultaneously sells Level 2 MBS, what will that do to spreads?
6. If HQLA portfolios come into play (either because banks choose to sell bonds to finance deposit outflows or they have to rebalance their portfolios) and dealers take these flows on their balance sheet, will swap spreads trade similar to the way they have traded when SAFE was selling Treasuries earlier this year?
7. If banks realize that non-operating deposits are leaving faster than they assumed (i.e. banks' assumption of deposit betas are off the mark), will they put on swap overlays to hedge for higher deposit rates? What will that do to swap spreads?
8. If all the flows are done and the landscape is more tranquil, how much excess HQLA is there in the system and what will banks choose to do with them?

In the remainder of this piece, we'll attempt to figure out the net effect of the moving parts.

But first, a note on the data.

Compliance with the LCR (and other Basel III targets) are typically reported (by banks) and looked at (by investors and equity analysts) at the holding company level. But for our present purposes, which is to see if HQLA portfolios will come into play in the weeks after liftoff, the relevant unit of analysis should be the bank operating subsidiary, not the holdco.

This is an important distinction. Here is why:

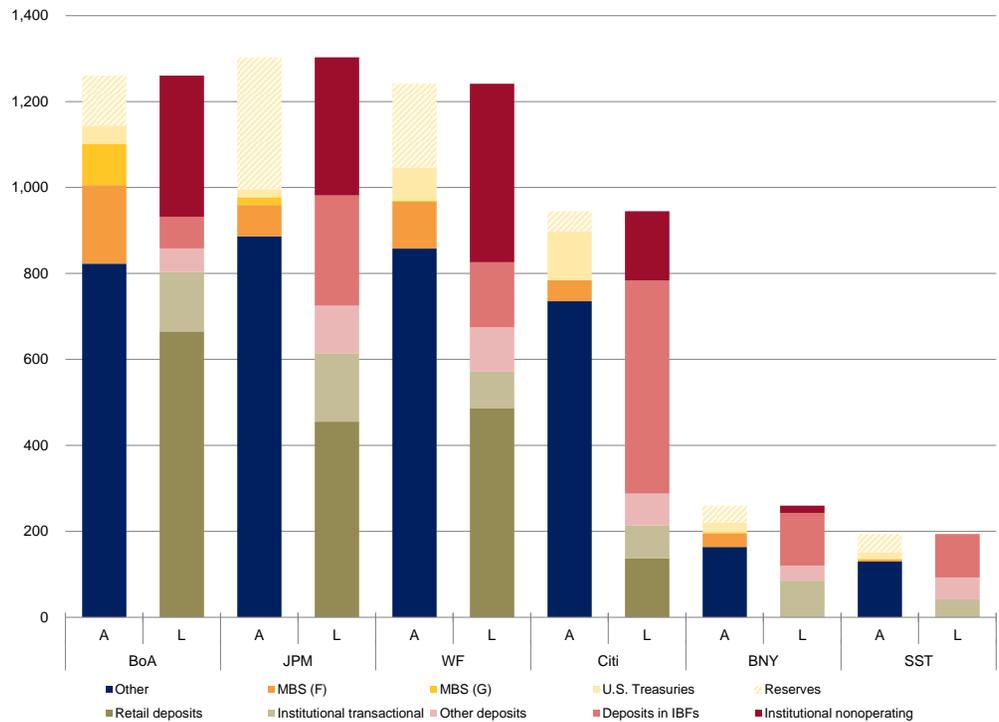
1. Our focus is outflows from deposits into money funds and the swapping of reserves into RRP. In a large bank holding company every penny of reserves and every penny of deposits are booked in the holdco's bank operating subsidiary. The broker-dealer subsidiary and the holding company have none of these.
2. The LCR applies both at the holdco and the bank operating subsidiary level.
3. As deposits flow and the quantum and mix of HQLA portfolios are shaped by these outflows, it's compliance with the LCR at the bank subsidiary that will matter.

4. Tracking how deposit flows are shaping HQLA portfolios at the holding company level would dilute the precision of the exercise. But precision matters...
5. ...because the biggest banks have to comply with the LCR on a daily basis, and non-compliance triggers prompt corrective action. In turn, non-compliance triggers forced (near-programmatic) trades. The relevant unit of analysis for a bank equity investor is not precise enough for the purposes of a fixed income investor.

Digging deep into the call reports of the bank operating subsidiaries of U.S. G-SIBs the following pictures emerge. Exhibit 7 shows how various assets and core liabilities (deposits) line up. The data is as of 2015Q3 (from the latest call reports) and is the very last snapshot we will have of how the biggest U.S. banks were positioned before takeover.

Exhibit 7: U.S. G-SIB's HQLA and Deposit Portfolios

2015Q3, \$ billions



Source: Call Reports (FDIC), Credit Suisse

On the asset side, various shades of orange denote various types of HQLA. Blue denotes the volume of loans and bonds other than HQLA.

On the liability side, various shades of red denote various types of institutional deposits – the darkest shade corresponds to institutional non-operating deposits, followed by deposits booked offshore (whether these are operating or non-operating deposits we do not know; the call reports are silent on these details), followed by other deposits which include the deposits of other banks, central banks, multilateral organizations and sub-sovereigns. Shades of brown denote corporate operating deposits and retail deposits.

Unfortunately the call reports do not provide a breakdown as to what share of institutional non-operating deposits are those of corporations versus the buy-side. As such, we do not know how fickle they are and whether they can be lost without an HQLA shortfall.

That said, we tried to reverse-engineer from the call reports the outflow assumption banks appear to have attached to their non-operating deposits on average (see Exhibit 8).

According to our methodology (details available upon request), JP Morgan had \$215 billion in buyside non-operating deposits as of 2015Q1 – in line with the numbers disclosed by CFO Marianne Lake (page 32 [here](#)). In further support of our methodology, JP Morgan’s numbers come out at \$65 billion for 2015Q3 – a decline of \$150 billion from 2015Q1, in line with what the bank reported it has managed to push off its balance sheet.

Wells Fargo’s numbers are also in line with the bank’s focus on middle-market corporate banking – an average outflow assumption on non-operating deposits of just over 40% suggests that more of their deposits are those of middle-market firms than the buyside.

Citibank’s sizeable offshore deposit base makes it hard to come up with an informed view of the profile of its non-operating deposits, other than to say that the bank appears to over-reserve itself for deposit outflows.

Bank of America appears to have sizeable buyside non-operating deposits and in volumes greater than its reserve balances at the Fed, which makes them unique among the G-SIBs.

Exhibit 8: Reverse-Engineering Outflow Assumptions

In USD billions
2015Q1

	HQLA (by type)				Institutional Nonoperating Deposits			Credit (bonds)	
	Reserves	U.S. Treasuries	MBS (G)	MBS (F) ¹	Nonint.-bearing ²	Deposit profiles... ³			...of the buyside ³
		Level 1	Level 2	...at 100% LCR		...at 125% LCR			
BoA	106.8	64.1	88.3	168.1	279.9	87%	65%	183.0	39.9
JPM	447.4	19.4	13.7	88.0	250.1	81%	60%	215.2	178.8
WF	244.4	71.7	2.0	90.5	243.1	61%	46%	84.6	155.4
Citi	49.4	111.4	0.6	39.3	58.2	22%	12%	-	157.1
BNY	50.1	27.4	2.9	31.2	95.2	182%	95%	31.7	54.8
SST	55.6	12.4	1.9	4.4	20.9	-	-	-	-
Total	953.7				947.3			514.5	586.0

2015Q3

	HQLA (by type)				Institutional Nonoperating Deposits			Credit (bonds)	
	Reserves	U.S. Treasuries	MBS (G)	MBS (F) ¹	Nonint.-bearing ²	Deposit profiles... ³			...of the buyside ³
		Level 1	Level 2	...at 100% LCR		...at 125% LCR			
BoA	116.6	42.3	96.1	182.8	294.9	86%	64%	185.1	39.1
JPM	306.7	18.8	17.8	72.9	238.2	62%	44%	65.6	190.3
WF	195.2	77.2	1.9	109.5	248.2	55%	41%	39.4	130.9
Citi	47.4	112.4	0.8	48.7	64.3	23%	14%	-	146.5
BNY	39.2	22.3	2.7	31.6	94.0	107%	50%	18.5	59.7
SST	42.6	15.7	1.6	3.9	16.4	-	-	-	-
Total	747.8				956.0			308.5	566.5

¹Reported at fair value, without a 15% haircut. ²Noninterest-bearing deposits in domestic offices. ³Nonoperating deposits in domestic and offshore offices (IBFs).

Source: Call Reports (FDIC), Credit Suisse

Based on these numbers, the total amount of buyside non-operating deposits at the six U.S. G-SIBs discussed above is just north of \$300 billion at the moment. Across the rest of the U.S. banking system (which we define as the universe of midcap banks and large-cap banks other than the six G-SIBs above and ex the New York branches of foreign banks) we put the total volume of buyside non-operating deposits at \$600 billion. This is the slice of the banking system’s balance sheet that money funds will compete for in coming weeks.

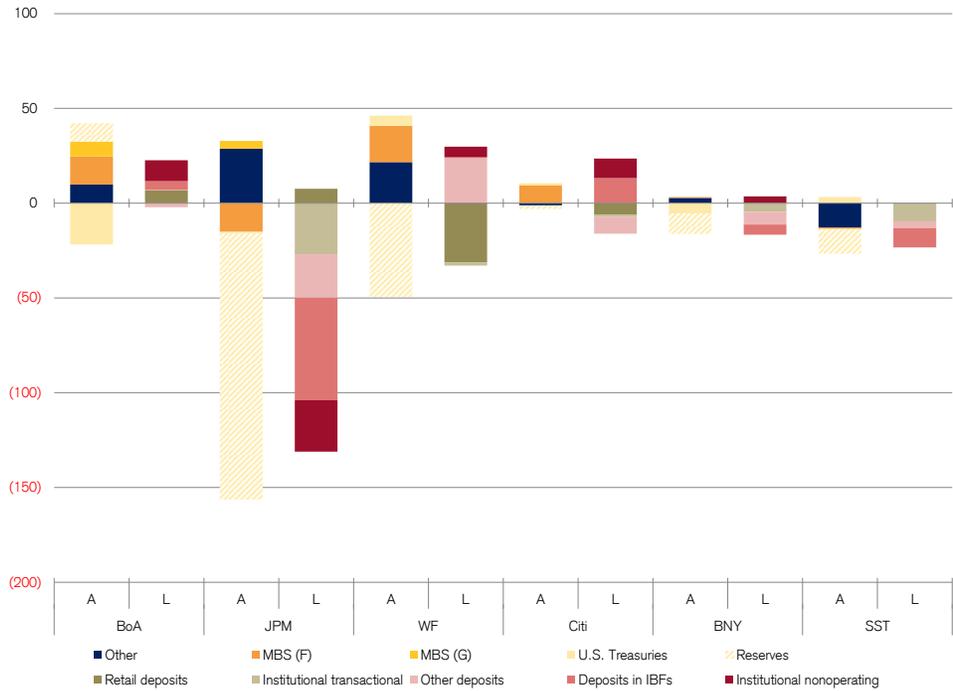
JP Morgan stands out in Exhibits 7 and 8 as a bank that is particularly conservative in its HQLA profile (which, as shown in the last column of Exhibit 8, is also paired up with a large credit portfolio). Were all its institutional non-operating deposits to leave, it would have sufficient cash at the Fed to finance these outflows. These flows would have little impact on fixed income markets. This is because the only trade they would trigger would be a “silent” liability swap on the Fed’s balance sheet – as deposits leave and reserves go down at one bank, deposits and reserve balances would go up at other banks; alternatively, money funds’ assets under management and RRP balances would go up.

Other banks seem to be aligned less conservatively. Were these banks to see more non-operating deposits leave than their reserves at the Fed, the bond portion of HQLA portfolios could come into play. Were deposit outflows to grow sufficiently large, banks would have to either sell bonds to finance outflows or rebalance their HQLA portfolios.

Exhibit 9 shows how the balance sheet of the same banks evolved since the beginning of 2015. It shows how JP Morgan managed to reduce its balance sheet by \$150 billion by pushing out a significant amount of non-operating deposits but also some operating balances with them. It is hard to reduce non-operating deposits only.

Exhibit 9: Changes in U.S. G-SIB's HQLA and Deposit Portfolios

2015Q1 - 2015Q3, \$ billions



Source: Call Reports (FDIC), Credit Suisse

But we have not felt any signs of these flows in the fixed income markets and that's because they involved the sale of reserves, not bonds (or more precisely, the shifting of reserves from one bank's reserve account at the Fed to another's).

Exhibit 9 also shows that some of the deposits that JP Morgan pushed out, other banks took in. In a game of hot potato, buy-side non-operating deposits are still sloshing around in the banking system (had these outflows left the banking system we would have seen a corresponding increase in money funds' AuM and in the usage of the Fed's RRP facility, but we have not). Suggestions that some banks have pushed the deposits of FX reserve managers into the foreign repo pool of the Fed are not visible in the data (see Exhibit 10).

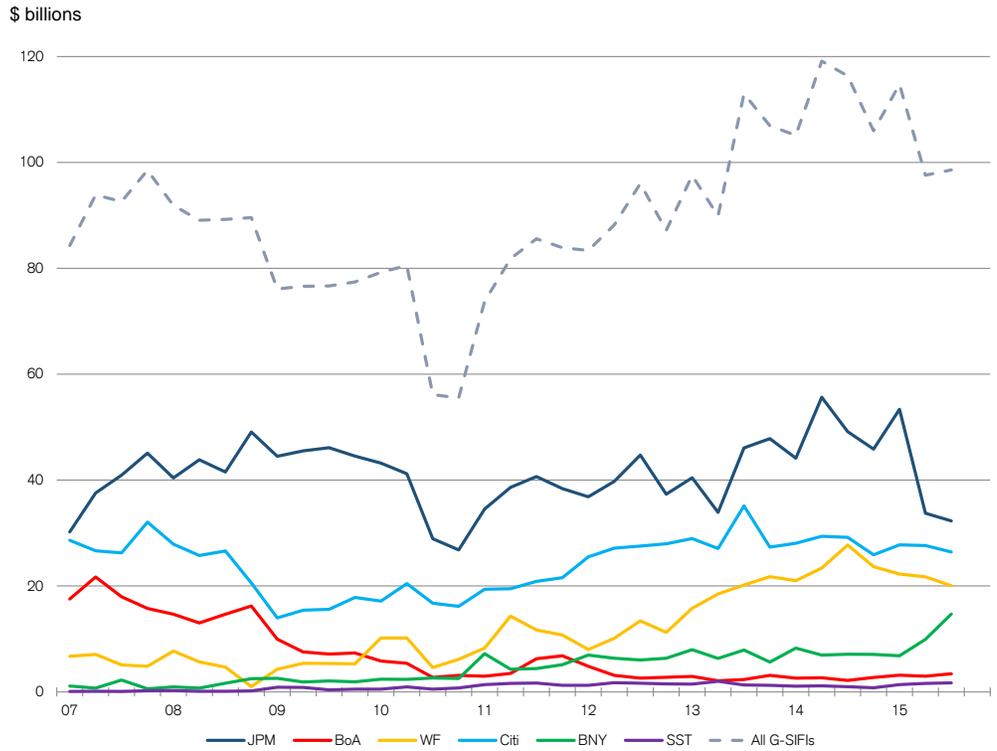
Exhibit 11 shows the balance between reserves at the central bank (the orange lines), the total volume of institutional non-operating deposits (the blue lines) and the volume of non-operating deposits that are noninterest-bearing (i.e. potentially very fickle; the red lines).

JP Morgan appears systematically over-reserved relative to Bank of America.

At all other banks reserves and non-operating deposits seem to be more or less in line. But there are uncertainties around these numbers. Exhibit 11 shows the balance between reserves and non-operating deposits booked in domestic offices only.

Exhibit 12 incorporates deposits booked offshore as well, but here a breakdown between operating and non-operating deposits are not available. A less balanced picture emerges.

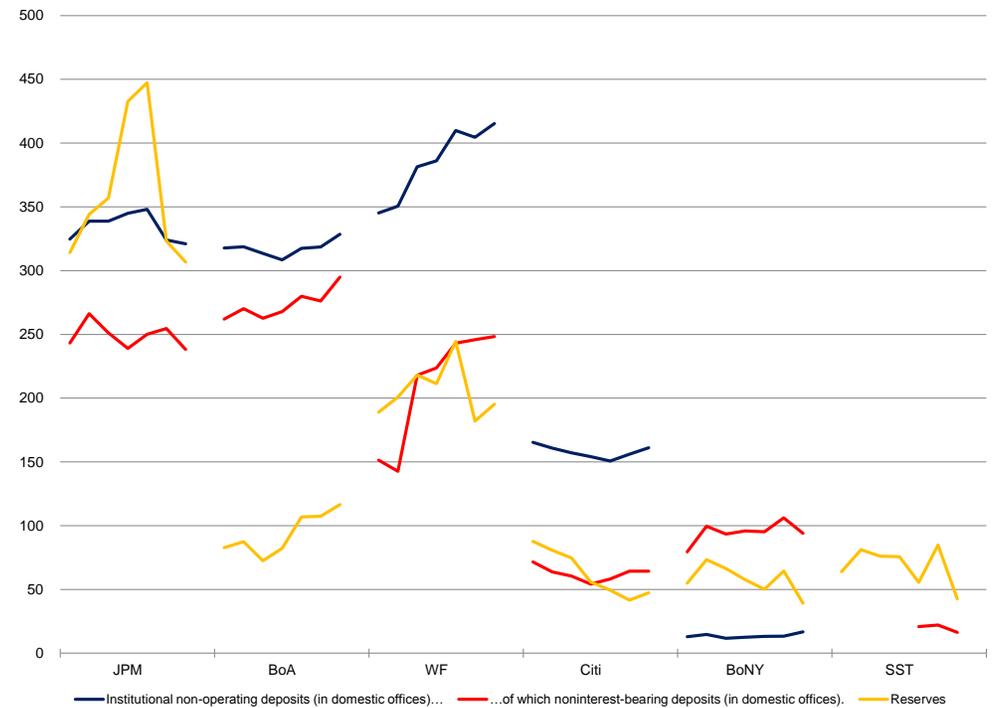
Exhibit 10: FX Reserve Managers' Deposits at U.S. G-SIBs



Source: Call Reports (FDIC), Credit Suisse

Exhibit 11: Cash Balances Relative to Fickle Deposits (Domestic Only)

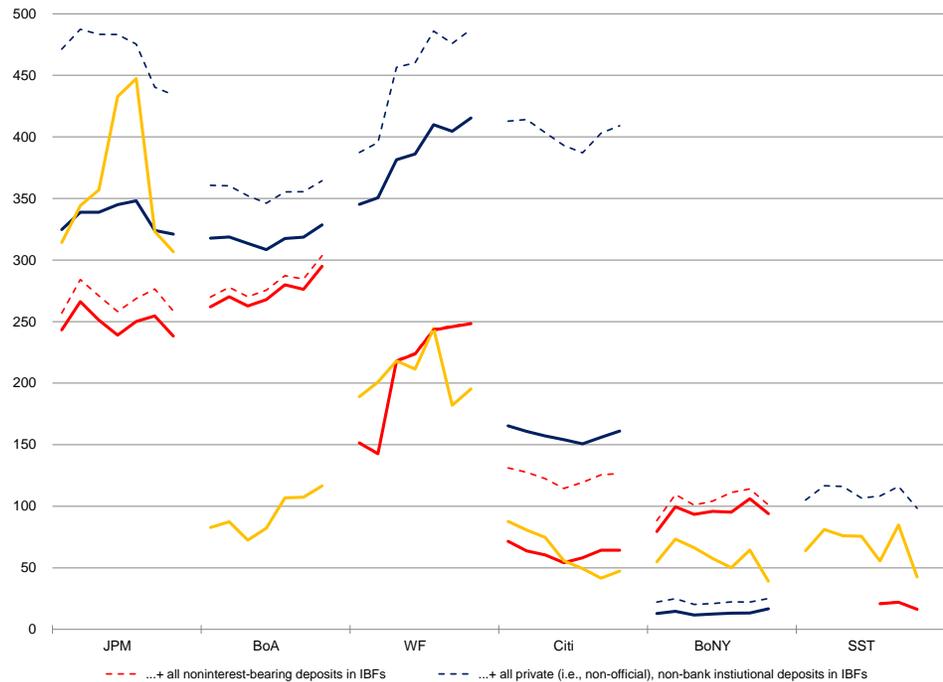
2014Q1 to 2015Q3, domestic offices, \$ billions



Source: Call Reports (FDIC), Credit Suisse

Exhibit 12: Cash Balances Relative to Fickle Deposits (Global)

2014Q1 to 2015Q3, in domestic offices and IBFs, \$ billions



Source: Call Reports (FDIC), Credit Suisse

An imbalance balance between reserves and deposit outflows is not the only reason why the bond portion of HQLA portfolios can come into play.

Exhibit 13 shows each bank’s allocation to various instruments in its HQLA portfolio. Importantly Level 2 assets may not exceed 40% of one’s HQLA portfolio. Even if one has enough reserves to finance deposit outflows, how these outflows will affect the share of Level 2 assets in an HQLA portfolio could trigger re-balancing trades (that said, how the Fed would treat Level 2 allocation branches in over-compliant portfolios we do not know).

What would a bank do if a Level 2 allocation breach occurred?

Sell Level 2 MBS and buy Treasuries? Or rather Ginnie Maes?

Alternatively, rather than re-balancing the portfolio, should the bank issue debt and use the proceeds to top up its Level 1 assets, diluting the share of Level 2?

All banks' are presently over-compliant with the SLR meaning that they could issue additional debt and lever up a bit (banks' level of over-compliance is around 0.5% to 1%).

But we would attach a low probability to that for three reasons.

1. Typically, banks don't lever up in a hiking cycle.
2. Over-compliance with the SLR is treated as a buffer to be maintained at all times, not as dry powder.
3. Whatever one's present over-compliance with the SLR, that cushion may shrink during a hiking cycle. Exhibit 14 shows why.

Banks that have booked most of the bonds in their HQLA portfolio in the available for sale (AFS) book are exposed to mark-to-market declines (through the AOCI filter) eroding their regulatory capital as rates rise and the value of fixed income assets deplete.

This will likely reduce a bank’s room to issue debt to top up Level 1 assets.

As such the more likely (and least cumbersome) route is to sell Level 2 and buy Level 1 assets (for exhibits showing the historical evolution of the size and composition of banks' HQLA portfolios, and how the bonds in these portfolios are booked, see Appendix 2).

Exhibit 13: Not All HQLA Portfolios Are Created Equal

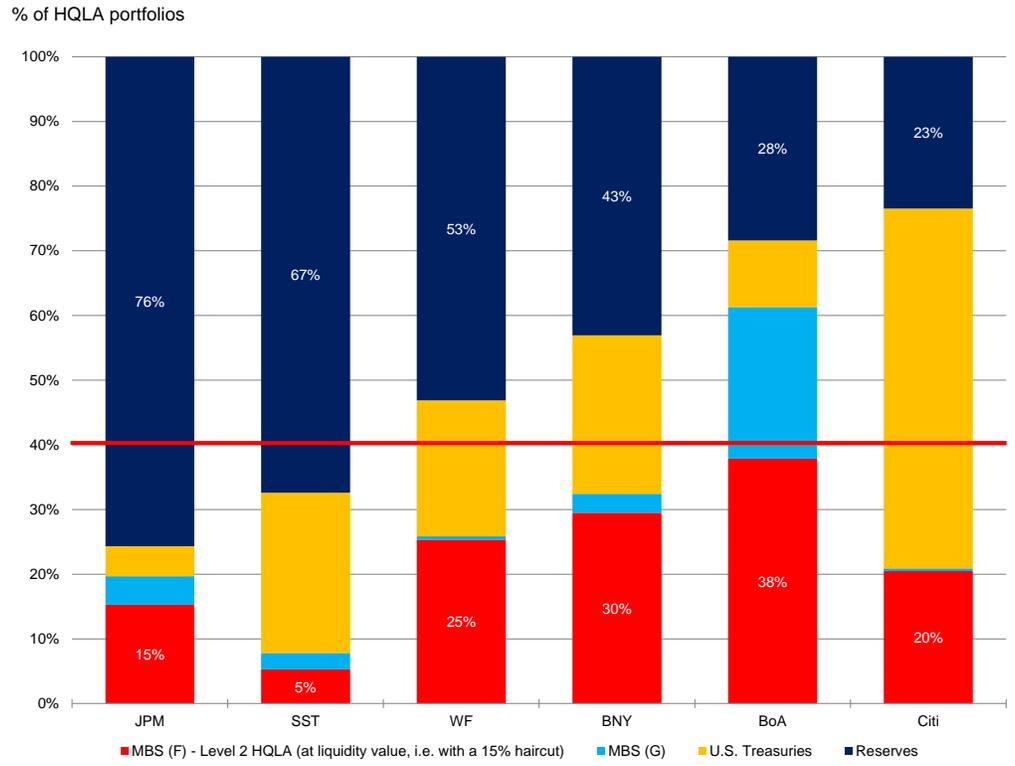
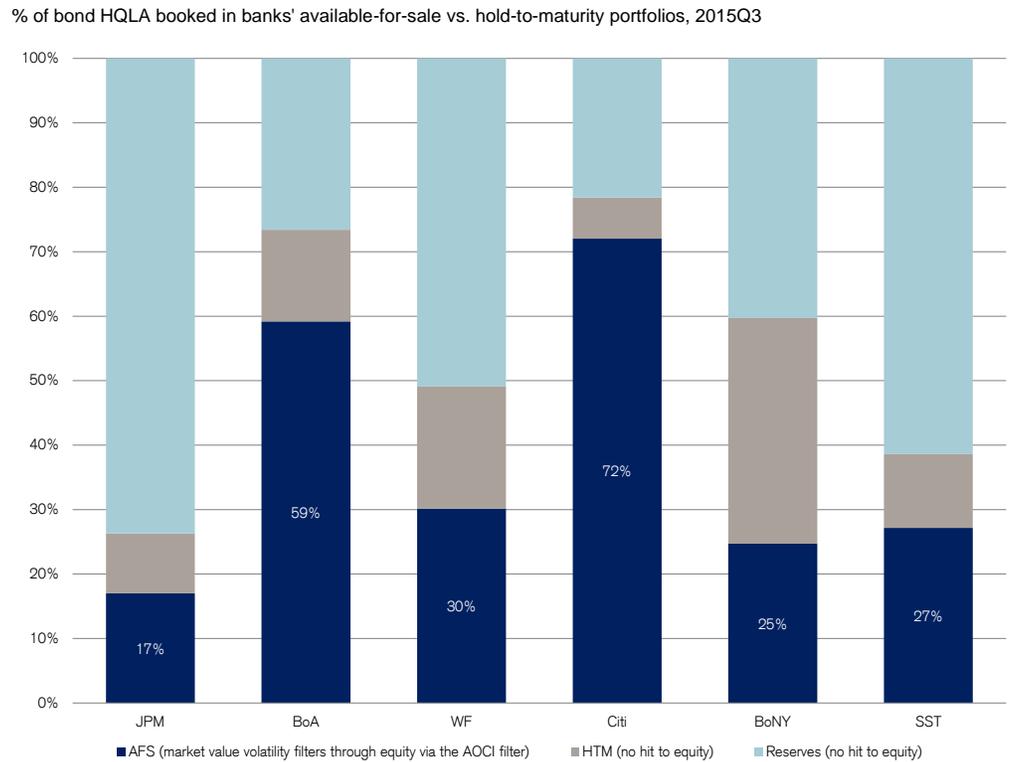


Exhibit 14: The Potential for (Some) Capital Decay is There



Conclusions

When these trades kick in we don't know.

They are certainly not a T+1 event to watch for. But cumulative outflows out of deposits and into RRP's will matter in the weeks and months that follow.

Tracking the uptake in the RRP facility (with the Federal Reserve's weekly [H.4.1](#) release) will be important. This will be the best indicator of how much money is on the move from banks to money funds. The size of these flows will give us a sense of how close some banks are getting to having to trade/sell or able to sell bonds from their HQLA portfolio.

Stay tuned....

Appendix 1 – What It Takes to Move Cash Around

Exhibit A1 shows what it would take for money funds to pull into their orbit buyside firms' non-operating cash balances that are presently parked in non-operating bank deposits.

Exhibit A1-1: The Economics of Buyside Non-Operating Deposits

	Today	Scenario 1 "Hardball"	Scenario 2 "Good Samaritan"	Scenario 3 "In-Between"
IOER (bank receives), <i>bps</i>	25	50	50	50
FDIC fee (bank pays), <i>bps</i>	5	5	5	5
Deposit rate (client receives), <i>bps</i>	0	0	25	20
NIM, <i>bps</i>	20	45	20	25
SLR (bank)	6.0%	6.0%	6.0%	6.0%
RoE (actual)	3.3%	7.5%	3.3%	4.2%
RoE (target)	15.0%	15.0%	15.0%	15.0%

Source: Credit Suisse

From the perspective of a large U.S. bank, the RoE associated with accepting such deposits is determined as follows: the bank pays zero interest on the deposit, invests all of it at the Fed at 25 bps and pays 5 bps in surcharges to the FDIC for a net interest margin (NIM) of 20 bps. Given that under the supplementary leverage ratio (SLR) a bank has to hold 6% equity against cash at the Fed, the RoE on this trade is an abysmal 3.3%, well below banks' 15% RoE target (or even a less ambitious 10%).

In reality, the RoE on these deposits may actually be lower considering that (1) the FDIC surcharge may be higher (no one knows what the precise surcharge is for individual banks, only that surcharges have been shrinking since they were first levied) and (2) the largest banks presently hold some amount of excess capital (0.5% to 1.0% in excess of 6%). Fees levied on depositors may improve RoEs, but increase the sensitivity of depositors to move once a large RRP facility enables flows from banks to money funds on scale.

Consider three scenarios post-liftoff: "Hardball", "Good Samaritan" and "In-Between".

Under the "Hardball" scenario, a bank plays tough and keeps the first hike to itself and continues to pay zero to the depositor. Its NIM improved to 45 from 20 bps and the RoE on the deposit to 7.5% from 3.3%. However, the depositor is unlikely to play along. It would leave for higher yields in a money fund. A money fund would not have to pay much to incent the money to move –5 bps could suffice. 5 bps are not much, but better than zero.

Under the "Good Samaritan" scenario, a bank gets generous (unlikely) and pays 25 bps to the depositor – the same rate that the Fed's RRP facility pays for money funds. In this case the deposit may stick around but the bank has not improved its RoE (it is still 3.3%) and that is a problem: the Fed hiked and the NIM on these deposits did not improve; the bank still has precious capital locked up against low RoE activities. Banking is not charity.

Under the "In-Between" scenario, a bank offers 20 bps to the depositor. NIM improves from 20 bps to 25 bps, RoE from 3.3% to 4.2% still not great, but progress. Even if we assume that the bank is ok with having equity locked up against activities that yield a low RoE of 4.2%, money funds would have a relatively easy time luring deposits away.

Consider that institutional-class government-only money funds at the moment have a net yield of 2 bps – not much, but better than 0%. As rates move higher, yields on Treasury bills, short-dated Treasury coupons and FRNs will all increase, as will the tri-party repo rate they earn on repos with dealers. As these yields increase, so will returns offered by money funds, and as these higher yields attract institutional money out of non-operating deposits, every dollar of inflows will be invested at 25 bps at the Fed. If 20 bps of the yield on these new inflows is passed on to the end-investor, money funds can improve (or the very least maintain) their advantage over deposits, while increasing their AuM and profits.

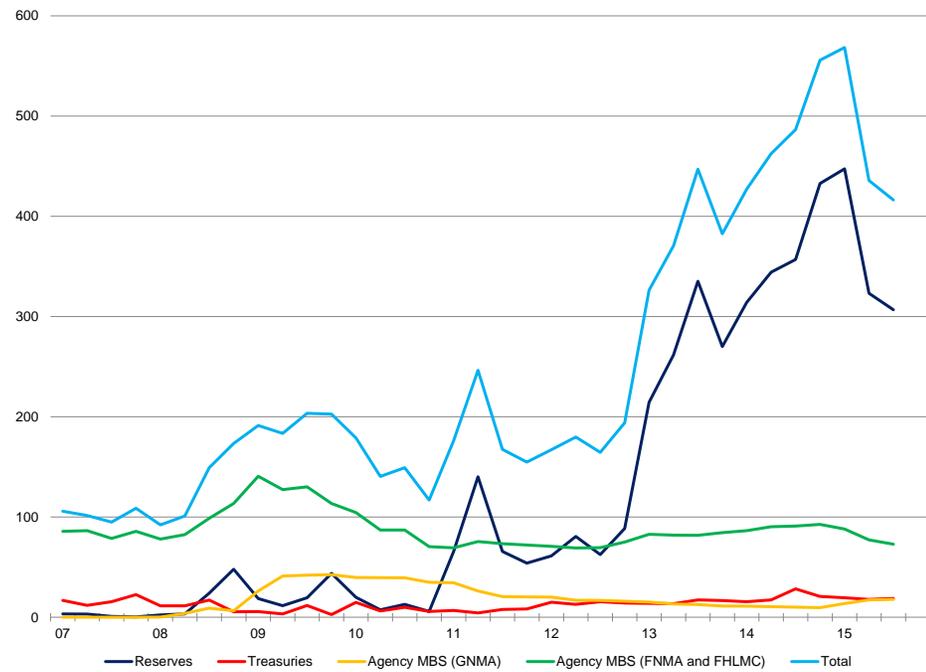
For the bank, offering 20 bps on these deposits (the "In-Between" scenario) is still a low RoE trade, so it will try to offer a lower rate or offset the 20 bps with fees.

However, such moves will only increase the appeal of money funds.

Appendix 2 – U.S. G-SIBs’ HQLA Portfolios

Exhibit A2-1: JPMorgan Chase Bank, NA

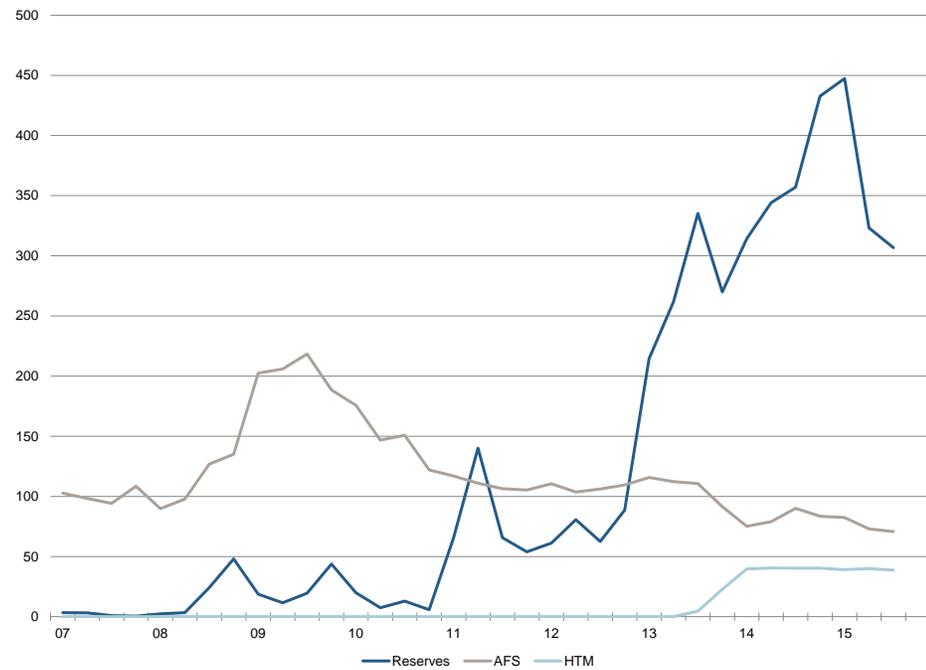
\$ billions



Source: FDIC (FFIEC031), Credit Suisse

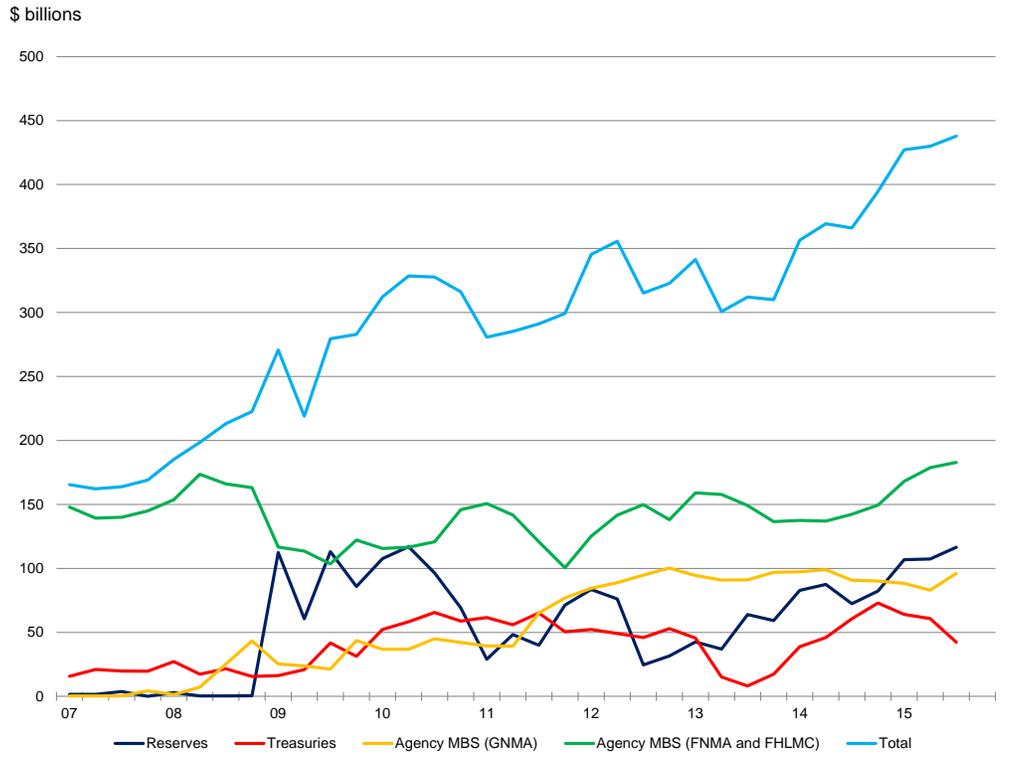
Exhibit A2-2: JPMorgan Chase Bank, NA

\$ billions



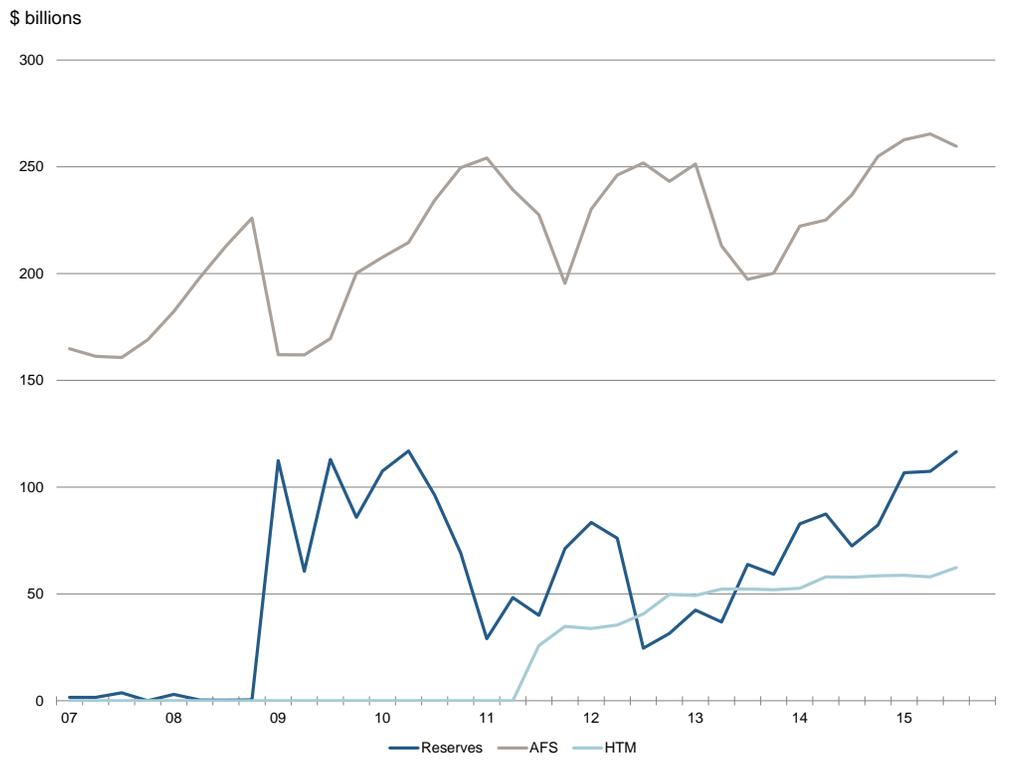
Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-3: Bank of America, NA



Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-4: Bank of America, NA



Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-5: Wells Fargo Bank, NA

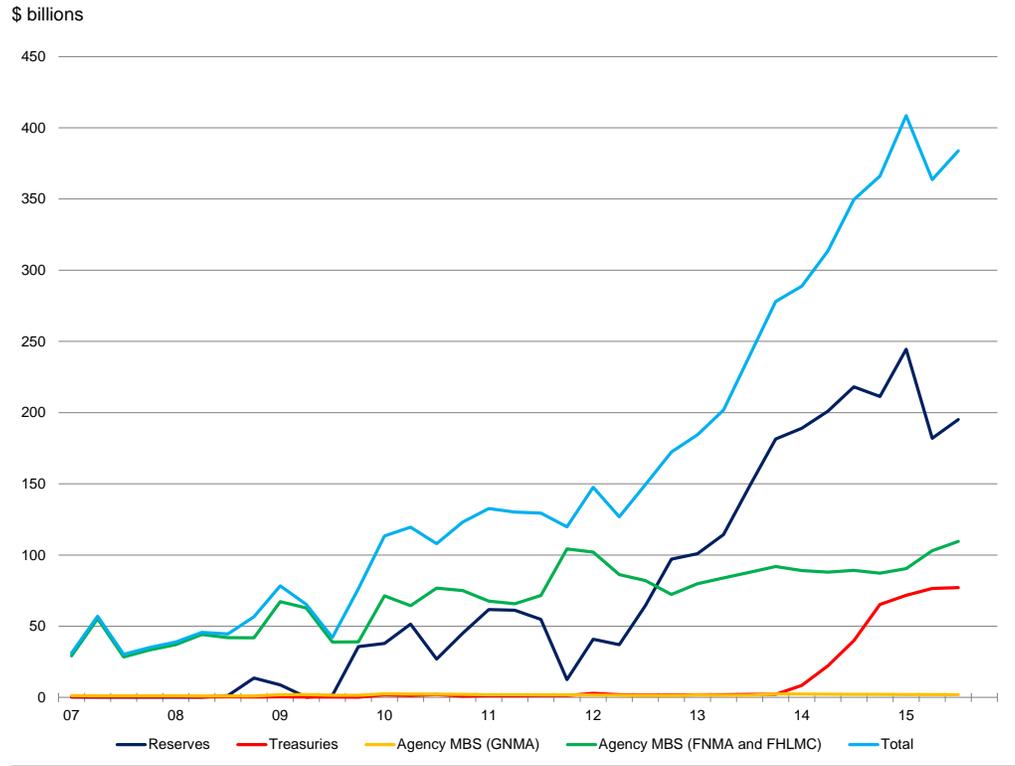


Exhibit A2-6: Wells Fargo Bank, NA

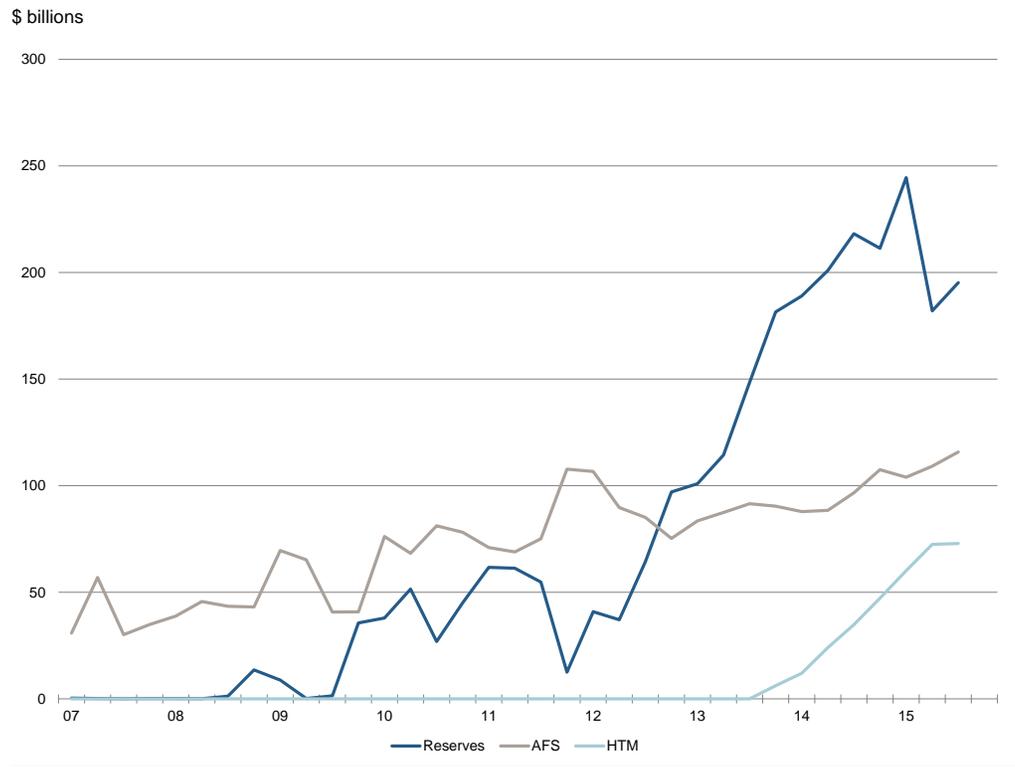
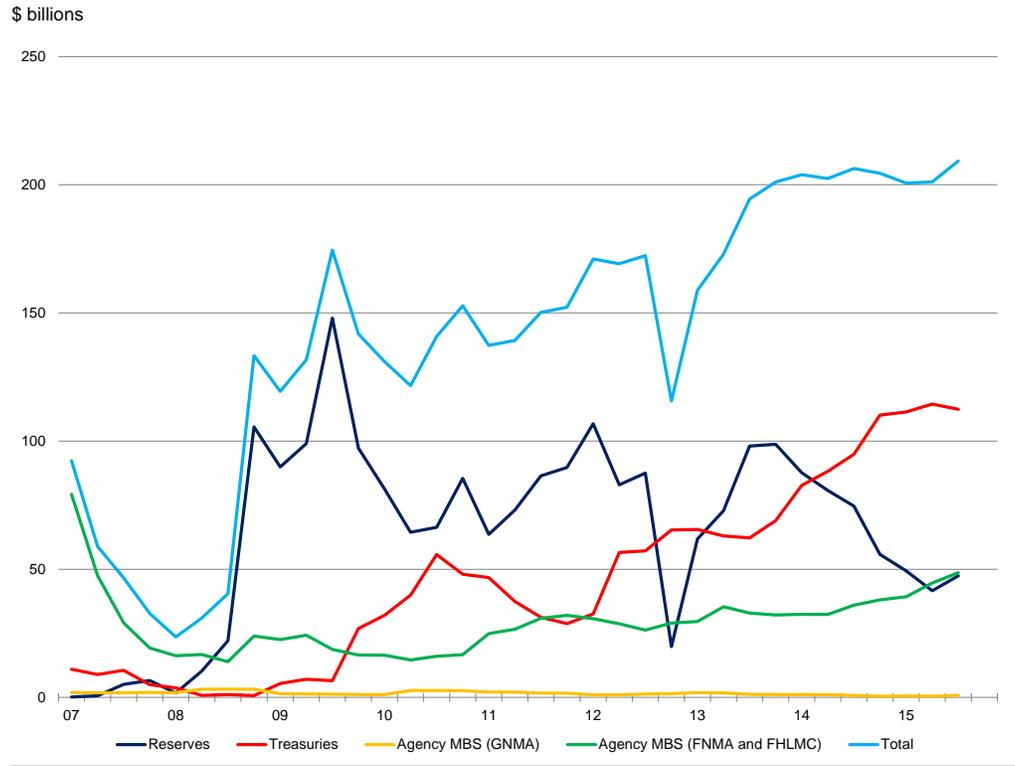
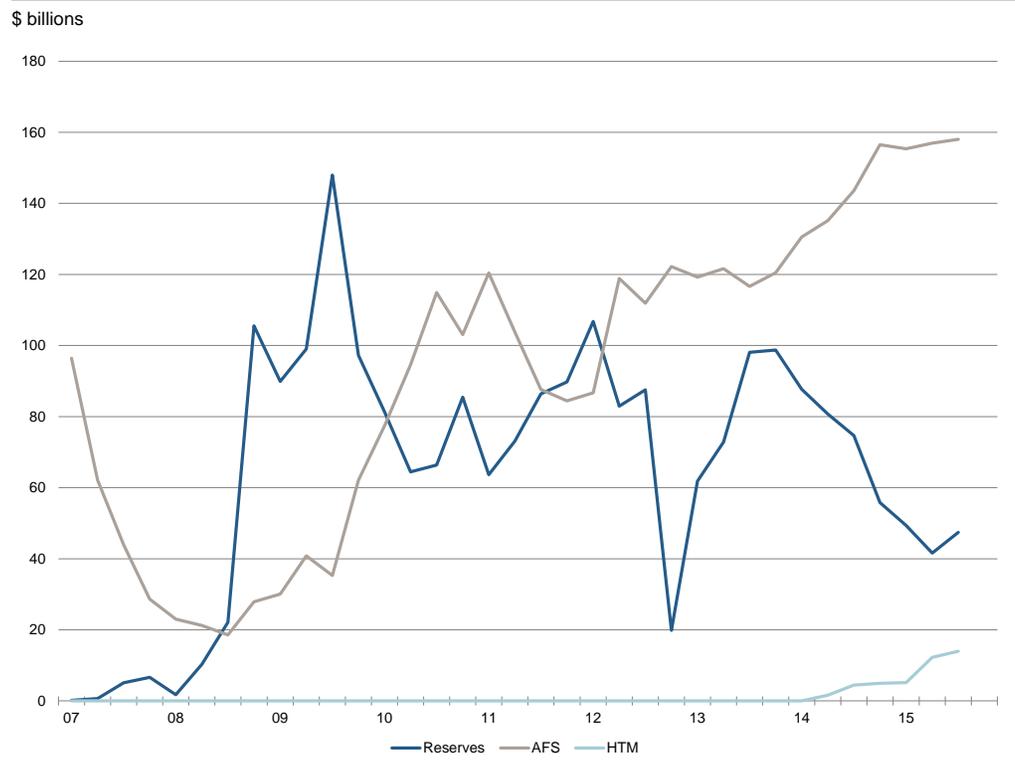


Exhibit A2-7: Citibank, NA



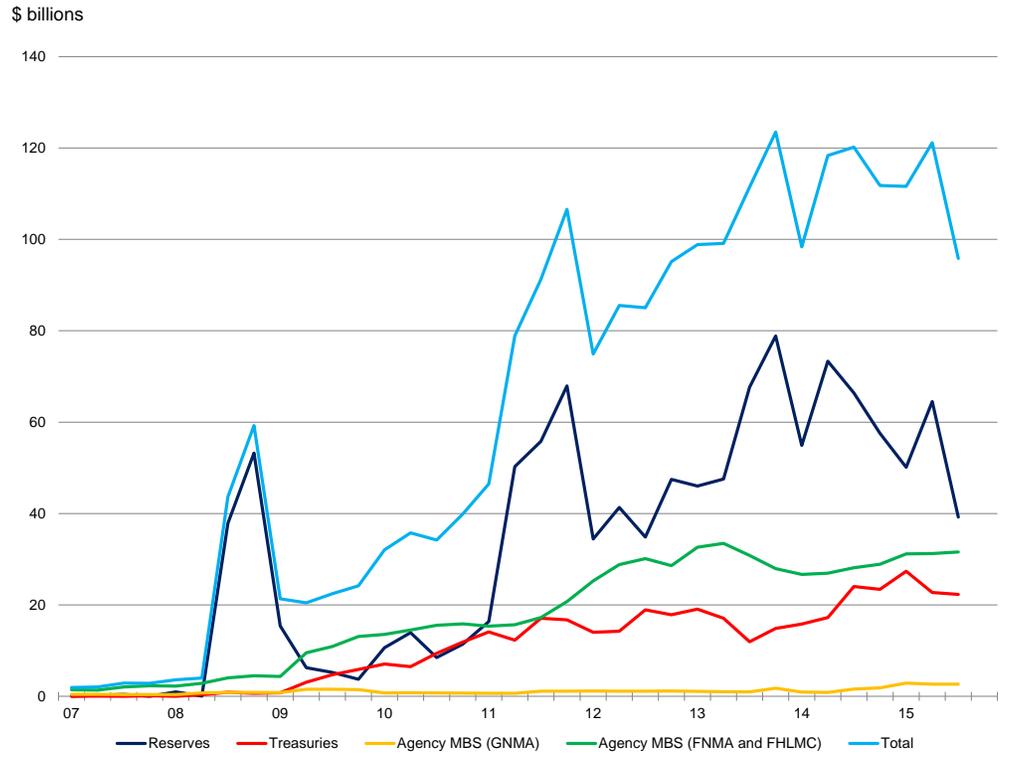
Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-8: Citibank, NA



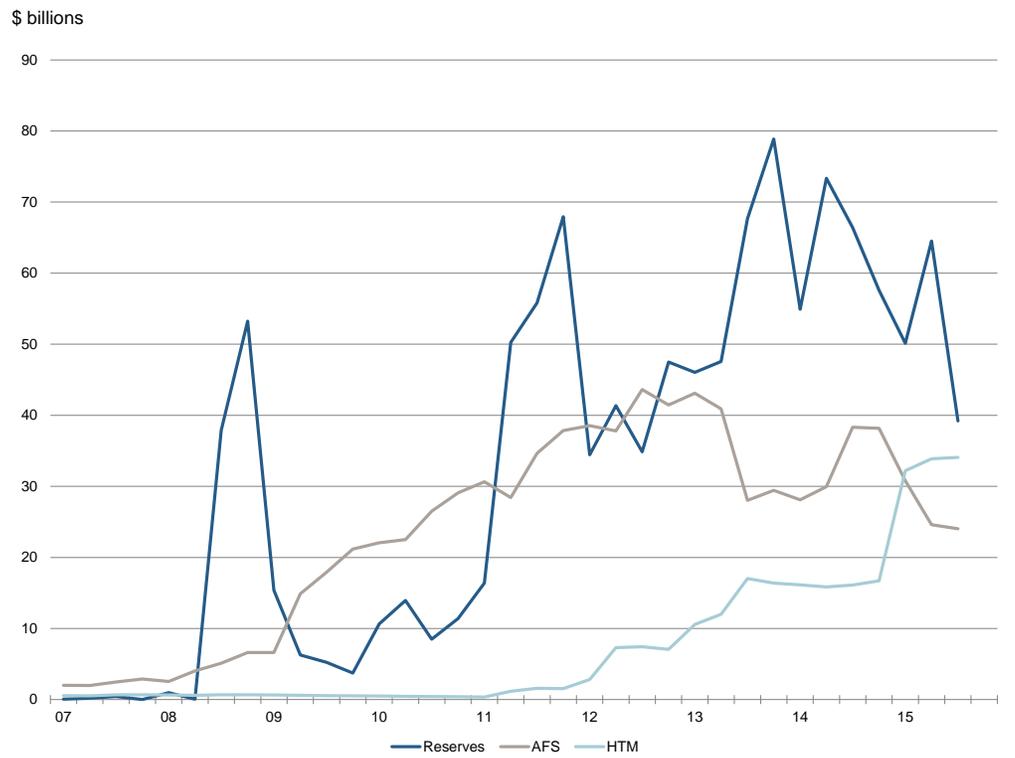
Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-9: The Bank of New York Mellon



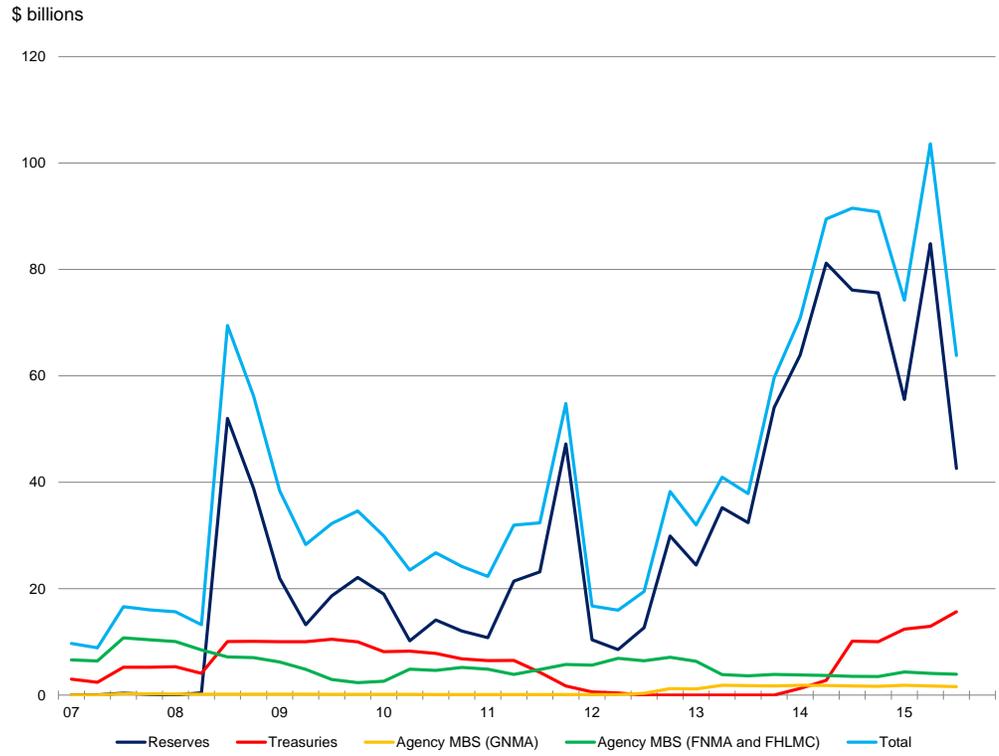
Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-10: The Bank of New York Mellon



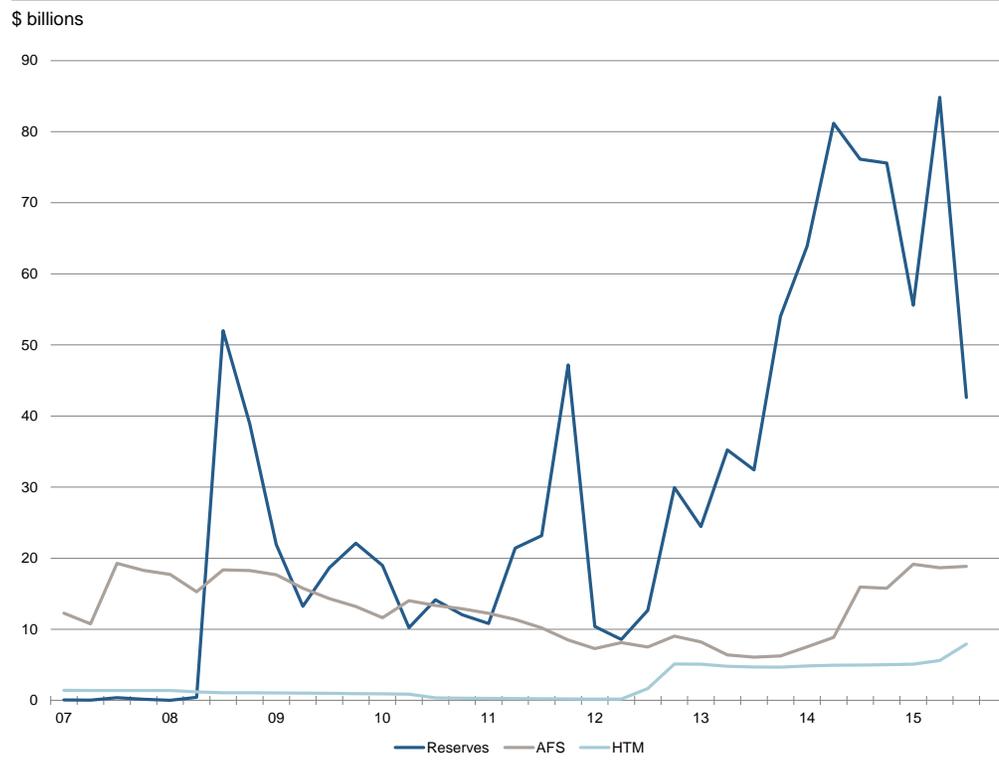
Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-11: State Street Bank and Trust Company



Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-12: State Street Bank and Trust Company



Source: FDIC (FFIEC031), Credit Suisse

References:

Pozsar, Zoltan, "[The Rise and Fall of the Shadow Banking System](#)," Moody's Economy.com (July, 2008)

Wilmot, Jonathan, Sweeney, James, Klein, Matthias and Lantz, Carl, "[Long Shadows](#)," Credit Suisse (May, 2009)

Pozsar, Zoltan, Adrian, Tobias, Ashcraft Adam and Boesky, Hayley, "[Shadow Banking](#)," FRBNY (July, 2010)

Pozsar, Zoltan "[Institutional Cash Pools and the Triffin Dilemma of the US Banking System](#)," IMF (August, 2011)

Sweeney, James and Wilmot, Jonathan, "[When Collateral Is King](#)," Credit Suisse (March, 2012)

Mehrling, Perry, Pozsar, Zoltan, Sweeney, James and Neilson, Dan "[Bagehot Was a Shadow Banker](#)," INET (November, 2013)

Sweeney, James, "[Liquidity Required: Reshaping the Financial System](#)," Credit Suisse (November, 2013)

Pozsar, Zoltan, "[Shadow Banking: The Money View](#)", US Treasury (July, 2014)

Pozsar, Zoltan, "[How the Financial System Works: An Atlas of Money Flows in the Global Financial Ecosystem](#)," US Treasury (July, 2014)

Pozsar, Zoltan, "[A Macro View of Shadow Banking](#)," INET Working Paper (January, 2015)

Di Iasio, Giovanni, and Pozsar, Zoltan, "[A Model of Shadow Banking: Crises, Central Banks and Regulation](#)" Banca d'Italia (May, 2015)

Pozsar, Zoltan and Sweeney, James, "[Global Money Notes #1: The Money Market Under Government Control](#)," Credit Suisse (May, 2015)

Pozsar, Zoltan and Sweeney, James, "[Global Money Notes #2: A Turbulent Exit](#)," Credit Suisse (August, 2015)

GLOBAL FIXED INCOME AND ECONOMIC RESEARCH

Ric Deverell
 Global Head of Fixed Income and Economic Research
 +1 212 538 8964
 ric.deverell@credit-suisse.com

GLOBAL ECONOMICS AND STRATEGY

James Sweeney, Chief Economist
 Co-Head of Global Economics and Strategy
 +1 212 538 4648
 james.sweeney@credit-suisse.com

Neville Hill
 Co-Head of Global Economics and Strategy
 +44 20 7888 1334
 neville.hill@credit-suisse.com

GLOBAL STRATEGY AND ECONOMICS

Axel Lang
 +1 212 538 4530
 axel.lang@credit-suisse.com

Jeremy Schwartz
 +1 212 538 6419
 jeremy.schwartz@credit-suisse.com

Sarah Smith
 +1 212 325-1022
 sarah.smith@credit-suisse.com

Wenzhe Zhao
 +1 212 325 1798
 wenzhe.zhao@credit-suisse.com

US ECONOMICS

James Sweeney
 Head of US Economics
 +1 212 538 4648
 james.sweeney@credit-suisse.com

Xiao Cui
 +1 212 538 2511
 xiao.cui@credit-suisse.com

Zoltan Pozsar
 +1 212 538 3779
 zoltan.pozsar@credit-suisse.com

Dana Saporta
 +1 212 538 3163
 dana.saporta@credit-suisse.com

LATIN AMERICA (LATAM) ECONOMICS

Alonso Cervera
 Head of Latam Economics
 +52 55 5283 3845
 alonso.cervera@credit-suisse.com
 Mexico, Chile

Casey Reckman
 +1 212 325 5570
 casey.reckman@credit-suisse.com
 Argentina, Venezuela

Daniel Chodos
 +1 212 325 7708
 daniel.chodos@credit-suisse.com
 Latam Strategy

Juan Lorenzo Maldonado
 +1 212 325 4245
 juanlorenzo.maldonado@credit-suisse.com
 Colombia, Ecuador, Peru

Alberto J. Rojas
 +52 55 5283 8975
 alberto.rojas@credit-suisse.com

BRAZIL ECONOMICS

Nilson Teixeira
 Head of Brazil Economics
 +55 11 3701 6288
 nilson.teixeira@credit-suisse.com

Daniel Lavarda
 +55 11 3701 6352
 daniel.lavarda@credit-suisse.com

Iana Ferrao
 +55 11 3701 6345
 iana.ferrao@credit-suisse.com

Leonardo Fonseca
 +55 11 3701 6348
 leonardo.fonseca@credit-suisse.com

Paulo Coutinho
 +55 11 3701-6353
 paulo.coutinho@credit-suisse.com

EUROPEAN ECONOMICS

Neville Hill
 Head of European Economics
 +44 20 7888 1334
 neville.hill@credit-suisse.com

Christel Aranda-Hassel
 +44 20 7888 1383
 christel.aranda-hassel@credit-suisse.com

Giovanni Zanni
 +44 20 7888 6827
 giovanni.zanni@credit-suisse.com

Sonali Punhani
 +44 20 7883 4297
 sonali.punhani@credit-suisse.com

Mirco Bulega
 +44 20 7883 9315
 mirco.bulega@credit-suisse.com

Peter Foley
 +44 20 7883 4349
 peter.foley@credit-suisse.com

EASTERN EUROPE, MIDDLE EAST AND AFRICA (EEMEA) ECONOMICS

Berna Bayazitoglu
 Head of EEMEA Economics
 +44 20 7883 3431
 berna.bayazitoglu@credit-suisse.com
 Turkey

Carlos Teixeira
 +27 11 012 8054
 carlos.teixeira@credit-suisse.com
 South Africa, Sub-Saharan Africa

Alexey Pogorelov
 +44 20 7883 0396
 alexey.pogorelov@credit-suisse.com
 Russia, Ukraine, Kazakhstan

Nimrod Mevorach
 +44 20 7888 1257
 nimrod.mevorach@credit-suisse.com
 EEMEA Strategy, Israel

Chernay Johnson
 +27 11 012 8068
 chernay.johnson@credit-suisse.com
 Nigeria, Sub-Saharan Africa

Mikhail Liluashvili
 +44 20 7888 7342
 mikhail.liluashvili@credit-suisse.com
 Poland, Hungary, Czech Republic

JAPAN ECONOMICS

Hiromichi Shirakawa
 Head of Japan Economics
 +81 3 4550 7117
 hiromichi.shirakawa@credit-suisse.com

Takashi Shiono
 +81 3 4550 7189
 takashi.shiono@credit-suisse.com

NON-JAPAN ASIA (NJA) ECONOMICS

Dong Tao
 Head of NJA Economics
 +852 2101 7469
 dong.tao@credit-suisse.com
 China

Deepali Bhargava
 +65 6212 5699
 deepali.bhargava@credit-suisse.com
 India

Dr. Santitarn Sathirathai
 +65 6212 5675
 santitam.sathirathai@credit-suisse.com
 Regional, India, Indonesia, Thailand

Michael Wan
 +65 6212 3418
 michael.wan@credit-suisse.com
 Singapore, Malaysia, Philippines

Christiaan Tuntono
 +852 2101 7409
 christiaan.tuntono@credit-suisse.com
 Hong Kong, Korea, Taiwan

Weishen Deng
 +852 2101 7162
 weishen.deng@credit-suisse.com
 China

Disclosure Appendix

Analyst Certification

The analysts identified in this report each certify, with respect to the companies or securities that the individual analyzes, that (1) the views expressed in this report accurately reflect his or her personal views about all of the subject companies and securities and (2) no part of his or her compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this report.

References in this report to Credit Suisse include all of the subsidiaries and affiliates of Credit Suisse operating under its investment banking division. For more information on our structure, please use the following link: <https://www.credit-suisse.com/who-we-are> This report may contain material that is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation or which would subject Credit Suisse AG or its affiliates ("CS") to any registration or licensing requirement within such jurisdiction. All material presented in this report, unless specifically indicated otherwise, is under copyright to CS. None of the material, nor its content, nor any copy of it, may be altered in any way, transmitted to, copied or distributed to any other party, without the prior express written permission of CS. All trademarks, service marks and logos used in this report are trademarks or service marks or registered trademarks or service marks of CS or its affiliates. The information, tools and material presented in this report are provided to you for information purposes only and are not to be used or considered as an offer or the solicitation of an offer to sell or to buy or subscribe for securities or other financial instruments. CS may not have taken any steps to ensure that the securities referred to in this report are suitable for any particular investor. CS will not treat recipients of this report as its customers by virtue of their receiving this report. The investments and services contained or referred to in this report may not be suitable for you and it is recommended that you consult an independent investment advisor if you are in doubt about such investments or investment services. Nothing in this report constitutes investment, legal, accounting or tax advice, or a representation that any investment or strategy is suitable or appropriate to your individual circumstances, or otherwise constitutes a personal recommendation to you. CS does not advise on the tax consequences of investments and you are advised to contact an independent tax adviser. Please note in particular that the bases and levels of taxation may change. Information and opinions presented in this report have been obtained or derived from sources believed by CS to be reliable, but CS makes no representation as to their accuracy or completeness. CS accepts no liability for loss arising from the use of the material presented in this report, except that this exclusion of liability does not apply to the extent that such liability arises under specific statutes or regulations applicable to CS. This report is not to be relied upon in substitution for the exercise of independent judgment. CS may have issued, and may in the future issue, other communications that are inconsistent with, and reach different conclusions from, the information presented in this report. Those communications reflect the different assumptions, views and analytical methods of the analysts who prepared them and CS is under no obligation to ensure that such other communications are brought to the attention of any recipient of this report. Some investments referred to in this report will be offered solely by a single entity and in the case of some investments solely by CS, or an associate of CS or CS may be the only market maker in such investments. Past performance should not be taken as an indication or guarantee of future performance, and no representation or warranty, express or implied, is made regarding future performance. Information, opinions and estimates contained in this report reflect a judgment at its original date of publication by CS and are subject to change without notice. The price, value of and income from any of the securities or financial instruments mentioned in this report can fall as well as rise. The value of securities and financial instruments is subject to exchange rate fluctuation that may have a positive or adverse effect on the price or income of such securities or financial instruments. Investors in securities such as ADRs, the values of which are influenced by currency volatility, effectively assume this risk. Structured securities are complex instruments, typically involve a high degree of risk and are intended for sale only to sophisticated investors who are capable of understanding and assuming the risks involved. The market value of any structured security may be affected by changes in economic, financial and political factors (including, but not limited to, spot and forward interest and exchange rates), time to maturity, market conditions and volatility, and the credit quality of any issuer or reference issuer. Any investor interested in purchasing a structured product should conduct their own investigation and analysis of the product and consult with their own professional advisers as to the risks involved in making such a purchase. Some investments discussed in this report may have a high level of volatility. High volatility investments may experience sudden and large falls in their value causing losses when that investment is realised. Those losses may equal your original investment. Indeed, in the case of some investments the potential losses may exceed the amount of initial investment and, in such circumstances, you may be required to pay more money to support those losses. Income yields from investments may fluctuate and, in consequence, initial capital paid to make the investment may be used as part of that income yield. Some investments may not be readily realisable and it may be difficult to sell or realise those investments, similarly it may prove difficult for you to obtain reliable information about the value, or risks, to which such an investment is exposed. This report may provide the addresses of, or contain hyperlinks to, websites. Except to the extent to which the report refers to website material of CS, CS has not reviewed any such site and takes no responsibility for the content contained therein. Such address or hyperlink (including addresses or hyperlinks to CS's own website material) is provided solely for your convenience and information and the content of any such website does not in any way form part of this document. Accessing such website or following such link through this report or CS's website shall be at your own risk. This report is issued and distributed in Europe (except Switzerland) by Credit Suisse Securities (Europe) Limited, One Cabot Square, London E14 4QJ, England, which is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority. This report is issued and distributed in Europe (except Switzerland) by Credit Suisse International, One Cabot Square, London E14 4QJ, England, which is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority. This report is being distributed in Germany by Credit Suisse Securities (Europe) Limited Niederlassung Frankfurt am Main regulated by the Bundesanstalt fuer Finanzdienstleistungsaufsicht ("BaFin"). This report is being distributed in the United States and Canada by Credit Suisse Securities (USA) LLC, in Switzerland by Credit Suisse AG; in Brazil by Banco de Investimentos Credit Suisse (Brasil) S.A or its affiliates; in Mexico by Banco Credit Suisse (Mexico), S.A. (transactions related to the securities mentioned in this report will only be effected in compliance with applicable regulation); in Japan by Credit Suisse Securities (Japan) Limited, Financial Instruments Firm, Director-General of Kanto Local Finance Bureau (*Kinsho*) No. 66, a member of Japan Securities Dealers Association, The Financial Futures Association of Japan, Japan Investment Advisers Association, Type II Financial Instruments Firms Association; elsewhere in Asia/ Pacific by whichever of the following is the appropriately authorised entity in the relevant jurisdiction: Credit Suisse (Hong Kong) Limited, Credit Suisse Equities (Australia) Limited, Credit Suisse Securities (Thailand) Limited, regulated by the Office of the Securities and Exchange Commission, Thailand, having registered address at 990 Abdulrahim Place, 27th Floor, Unit 2701, Rama IV Road, Sliom, Bangkok, Bangkok 10500, Thailand, Tel. +66 2614 6000, Credit Suisse Securities (Malaysia) Sdn Bhd, Credit Suisse AG, Singapore Branch, Credit Suisse Securities (India) Private Limited (CIN no. U67120MH1996PTC104392) regulated by the Securities and Exchange Board of India as Research Analyst (registration no. INH 000001030) and as Stock Broker (registration no. INB230970637; INF230970637; INB010970631; INF010970631), having registered address at 9th Floor, Ceejay House, Dr.A.B. Road, Worli, Mumbai - 18, India, T- +91-22 6777 3777, Credit Suisse Securities (Europe) Limited, Seoul Branch, Credit Suisse AG, Taipei Securities Branch, PT Credit Suisse Securities Indonesia, Credit Suisse Securities (Philippines) Inc., and elsewhere in the world by the relevant authorised affiliate of the above. Research on Taiwanese securities produced by Credit Suisse AG, Taipei Securities Branch has been prepared by a registered Senior Business Person. Research provided to residents of Malaysia is authorised by the Head of Research for Credit Suisse Securities (Malaysia) Sdn Bhd, to whom they should direct any queries on +603 2723 2020. This report has been prepared and issued for distribution in Singapore to institutional investors, accredited investors and expert investors (each as defined under the Financial Advisers Regulations) only, and is also distributed by Credit Suisse AG, Singapore branch to overseas investors (as defined under the Financial Advisers Regulations). By virtue of your status as an institutional investor, accredited investor, expert investor or overseas investor, Credit Suisse AG, Singapore branch is exempted from complying with certain compliance requirements under the Financial Advisers Act, Chapter 110 of Singapore (the "FAA"), the Financial Advisers Regulations and the relevant Notices and Guidelines issued thereunder, in respect of any financial advisory service which Credit Suisse AG, Singapore branch may provide to you. This information is being distributed by Credit Suisse AG (DIFC Branch), duly licensed and regulated by the Dubai Financial Services Authority ("DFSA"). Related financial services or products are only made available to Professional Clients or Market Counterparties, as defined by the DFSA, and are not intended for any other persons. Credit Suisse AG (DIFC Branch) is located on Level 9 East, The Gate Building, DIFC, Dubai, United Arab Emirates. This research may not conform to Canadian disclosure requirements. In jurisdictions where CS is not already registered or licensed to trade in securities, transactions will only be effected in accordance with applicable securities legislation, which will vary from jurisdiction to jurisdiction and may require that the trade be made in accordance with applicable exemptions from registration or licensing requirements. Non-U.S. customers wishing to effect a transaction should contact a CS entity in their local jurisdiction unless governing law permits otherwise. U.S. customers wishing to effect a transaction should do so only by contacting a representative at Credit Suisse Securities (USA) LLC in the U.S. Please note that this research was originally prepared and issued by CS for distribution to their market professional and institutional investor customers. Recipients who are not market professional or institutional investor customers of CS should seek the advice of their independent financial advisor prior to taking any investment decision based on this report or for any necessary explanation of its contents. This research may relate to investments or services of a person outside of the UK or to other matters which are not authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority or in respect of which the protections of the Prudential Regulation Authority and Financial Conduct Authority for private customers and/or the UK compensation scheme may not be available, and further details as to where this may be the case are available upon request in respect of this report. CS may provide various services to US municipal entities or obligated persons ("municipalities"), including suggesting individual transactions or trades and entering into such transactions. Any services CS provides to municipalities are not viewed as "advice" within the meaning of Section 975 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. CS is providing any such services and related information solely on an arm's length basis and not as an advisor or fiduciary to the municipality. In connection with the provision of the any such services, there is no agreement, direct or indirect, between any municipality (including the officials, management, employees or agents thereof) and CS for CS to provide advice to the municipality. Municipalities should consult with their financial, accounting and legal advisors regarding any such services provided by CS. In addition, CS is not acting for direct or indirect compensation to solicit the municipality on behalf of an unaffiliated broker, dealer, municipal securities dealer, municipal advisor, or investment adviser for the purpose of obtaining or retaining an engagement by the municipality for or in connection with Municipal Financial Products, the issuance of municipal securities, or of an investment adviser to provide investment advisory services to or on behalf of the municipality. If this report is being distributed by a financial institution other than Credit Suisse AG, or its affiliates, that financial institution is solely responsible for distribution. Clients of that institution should contact that institution to effect a transaction in the securities mentioned in this report or require further information. This report does not constitute investment advice by Credit Suisse to the clients of the distributing financial institution, and neither Credit Suisse AG, its affiliates, and their respective officers, directors and employees accept any liability whatsoever for any direct or consequential loss arising from their use of this report or its content. Principal is not guaranteed. Commission is the commission rate or the amount agreed with a customer when setting up an account or at any time after that.

Copyright © 2015 CREDIT SUISSE AG and/or its affiliates. All rights reserved.

Investment principal on bonds can be eroded depending on sale price or market price. In addition, there are bonds on which investment principal can be eroded due to changes in redemption amounts. Care is required when investing in such instruments.

When you purchase non-listed Japanese fixed income securities (Japanese government bonds, Japanese municipal bonds, Japanese government guaranteed bonds, Japanese corporate bonds) from CS as a seller, you will be requested to pay the purchase price only.