

Global Money Notes # 1

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The Money Market Under Government Control

The Fed's new Reverse Repo (RRP) facility could get big – very big – as interest rates start to rise, despite what Fed officials have been saying. The facility has been trending around \$150bn, roughly 1/20th of the level of bank reserves.

A much larger RRP facility – think north of a trillion – would represent the endpoint of an evolution that began before the crisis, when large dealer repo books stood between institutional cash pools and leveraged carry trade investors to...

after the crisis, when bank balance sheets were expanded by both reserve assets and deposit liabilities created by QE to...

the future, when government-only money funds grow to hold large volumes of RRPs as assets and issue fixed-NAV shares (money) to institutional cash pools.

What are institutional cash pools? Think corporate treasuries and the cash desks of asset managers and FX reserve managers. Their demand for short-term, money-like assets has had a strong secular growth for several decades.

New regulations have constrained some investors in terms of what they can buy, and many institutions, in terms of what they can (profitably) issue.

History shows that when financial innovation occurs or rules change, the least constrained players grow.

In contrast to banks and dealers that face various charges on capital and balance sheet, and prime funds whose shares have lost "moneyness" due to regulation, government funds are relatively unconstrained.

They will likely grow, fed by an RRP facility that may grow much larger and become a permanent fixture of the financial system. In our view, this would herald the arrival of an era of financial "RRPression" in the US money market where the sovereign dominates and dealers play a supporting role – the inverse of the pre-crisis state of affairs.

While this shift would undoubtedly reap massive financial stability benefits, the main reason why the RRP facility might need to get much bigger is not financial stability related, but rather revolves around the Fed's potential inability to control short-term interest rates in an era where Basel III and banks satiated with excess reserves hinder monetary transmission.

Why pay attention to this plumbing stuff?

Because the infrastructure of markets determines which trades can profitably be done, and which institutions will grow in importance over time.

This piece marks a return to our prior focus on shadow banking and the global financial system (see references at the end).

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

Circumstances rule central banks. And the current circumstances include new regulations, banks satiated with reserves, and institutional cash pools that are still large and growing.

Institutional cash pools, the short-term debt portfolios of asset managers and corporate treasuries, have experienced strong secular growth in recent decades. Since 2000, they have grown from \$1tn to \$7tn. Their ascent has played a key role in shaping the global financial system. In particular, it drove the rise of wholesale funding markets on the one hand and carry trading on the other and the associated rise in the fragility of the system.¹

The 2008-2009 crisis marked a structural shift in how the money demand of cash pools is intermediated. Intermediation shifted from private balance sheets to the balance sheet of the sovereign. The untold story behind the changes in the money market since 2008 is policymakers' struggle to find a permanent home for the money demand of cash pools in a financially stable manner that is also consistent with control over short-term interest rates.

From Private Carry to Public Carry

Before 2008, broker-dealer balance sheets had virtually unlimited elasticity and were the main source of short-term debt supply, with \$4.5 trillion in repos outstanding at the peak.

Broker-dealers "manufactured" these short-term assets by financing (predominantly) "safe," long-term assets such as US Treasuries and agency RMBS for leveraged bond portfolios. They reused these securities through their matched repo books for their own funding. Cash pools held dealer repos directly or indirectly through money funds (see Exhibit 1).

Exhibit 1: Pre-Crisis System of "Private Carry" and "Private Money Dealing"

Cash pools' direct and indirect holdings of repo

"Carry Trading"		"Money Dealing"					
Bond Portfolios (private carry)		Broker-Dealers (matched books)		Money Funds (prime/government)		Cash Pools	
Bonds	Repo	Repo	Repo	Repo	\$1 NAV	\$1 NAV	Repo

Source: Credit Suisse

After the crisis, dealers' repo books shrank, and the Fed became the marginal source of supply of short-term assets through its \$2.8 trillion increase in bank reserves. The Fed "manufactured" short-term assets by purchasing US Treasuries and agency RMBS and paying for them with newly created reserves.

Operationally, quantitative easing (QE) involves four parties: the Fed, dealers, banks, and asset managers. The Fed purchases bonds from asset managers through dealers. Bond owners are credited with bank deposits. Bond owners' bank balance sheets increase on both sides: assets rise in the form of reserves; liabilities rise in the form of deposits.²

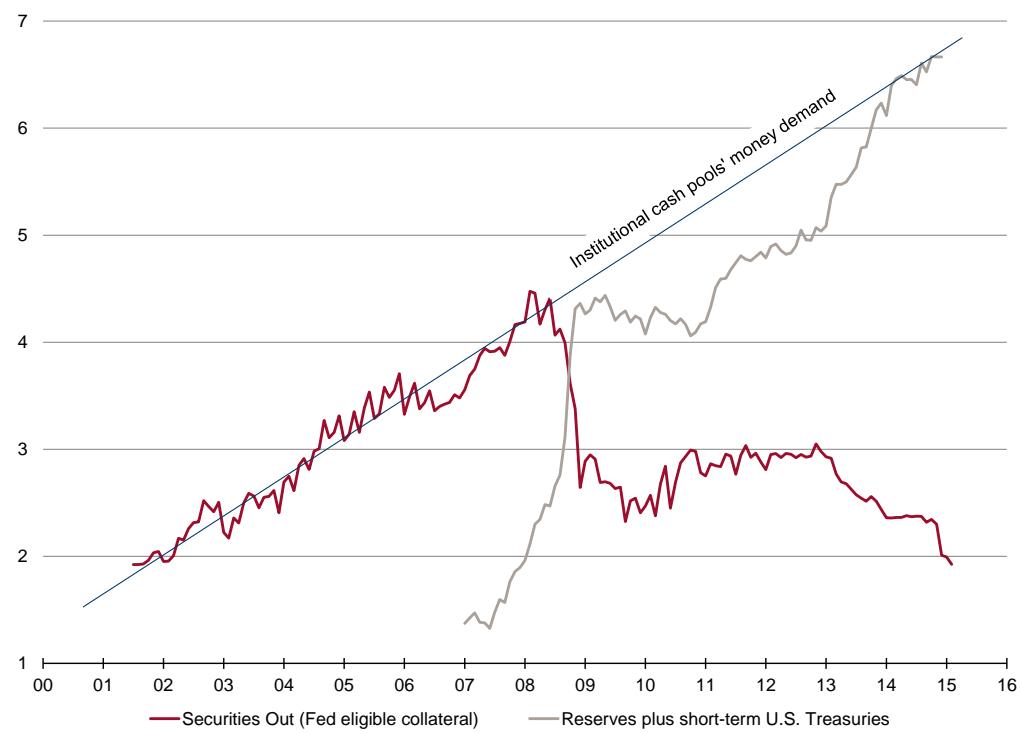
Meanwhile, the crisis brought about a massive decline in dealers' repo liabilities. This was initially due to crisis deleveraging, but was later enforced by regulation (Basel III).

¹ See "[Institutional Cash Pools and the Triffin Dilemma of the US Banking System](#)" by Zoltan Pozsar (IMF, 2011).

² If the Fed had bought bonds from banks directly, deposits (M1) would not have risen, because one form of bank assets (bonds) would simply offset another (reserves).

Exhibit 2: Tectonic Shifts in the US Money Market

Short-term sovereign claims substitute dealer repos to accommodate the secular trend growth of cash pools, \$ trillion



Source: Federal Reserve, U.S. Treasury, Haver Analytics®, Credit Suisse

As the level of dealer repos fell, the level of reserves rose. The increase in reserves drove an increase in deposits and other bank liabilities. The Fed's massive new carry trade was an offset to shrunken leveraged bond portfolios. As the "shadow banking system"³ shrank, the traditional banking system grew.⁴ Exhibit 2 shows the uninterrupted growth of institutional cash pools along their pre-crisis trend. The growth in reserve balances and Treasury bills (government money-like assets) took off when repo collapsed. Interestingly, government short-term debt appears to be riding the same trend as repo did pre-crisis.

Money dealing – the high volume, low margin business of borrowing and lending in short-term markets – is being done by various entities in Exhibits 1 and 3. But what is clear is the migration of the money-dealing function from dealer balance sheets to traditional banks and the migration of carry trading from bond portfolios to the Fed's balance sheet.

In these charts we see alternative systems of intermediated flows from savers to borrowers. Compared to the pre-crisis state of affairs, the role of borrower shifted from the private sector (bond portfolios earning profits from private carry trades) to the public sector (the Fed's "seigniorage" revenues/profits from its public carry trades).

Regulatory reform since the crisis enshrined these changes. Broker-dealers' footprint as money dealers permanently shrank, as costs became prohibitive.

But the new rules made money dealing costly for banks too.

³ We define shadow banking as "money market funding of capital market lending." See "Bagehot was a Shadow Banker" by Perry Mehrling, Zoltan Pozsar, James Sweeney and Daniel Neilson (INET, 2013)

⁴ NB: This is a one example of the many important offsetting phenomena which characterize the financial system.

Exhibit 3: Post-Crisis System of “Public Carry” and “Public Money Dealing”

Cash pools' indirect holdings of reserves

Federal Reserve (public carry)		Foreign Banks (matched books)		Money Funds (prime)		Cash Pools	
Bonds	Reserves	Reserves	Repo CD CP	Repo CD CP	\$1 NAV	\$1 NAV	
Federal Reserve (public carry)		U.S. Banks (matched books)				Cash Pools	
Bonds	Reserves	Reserves	Deposits			Deposits	

Source: Credit Suisse

However, because only banks can hold reserves, the banking system is stuck with the new regulatory costs of money dealing. Depressed net interest margins and returns on equity are the result – along with a banking system resolute to minimize these drags. This structural shock to the profitability of the banking system is a likely impetus to change.

As always, changes will involve arbitrage. Not an arbitrage of Basel III (which is near-impossible due to the new accord's scope and invasiveness), but of the spirit of the Federal Reserve Act, by allowing access to Fed liabilities to entities the Act does not permit to hold reserves.

This arbitrage will intertwine the balance sheets of the Fed and money funds. A rapidly growing and ultimately permanent RRP facility will be the link, in an awkward “marriage” of necessity intended to help the Fed maintain precise control of short-term interest rates.

Basel III Disrupts Arbitrage

Exhibit 4 shows several short-term interest rates: the Fed's interest on excess reserves (IOER), the federal funds rate, the overnight (Fed) reverse repo (RRP) rate, the overnight GC repo rate, and the overnight AA financial commercial paper rate.

Some market participants have no choice but to lend money to banks at rates less than the Fed pays in IOER. This shows that the Fed's interest rate on excess reserves (IOER) has not been an effective floor to short-term interest rates.

The reasons for that require some key institutional details.

Banks were force-fed the excess reserve balances created by QE. They did not demand those reserves, and so are satiated with them. The actual holding of reserves is highly uneven across banks, with the largest US banks (and in particular the two clearing banks) holding a disproportionate share, and foreign banks holding the rest (see Exhibit 5).

Regulations make it costly for banks to hold reserves, limiting their appetite to pay up for funding. Reserves count against banks' leverage caps, and the largest US banks have to hold 6% capital against them – that's 6% capital against riskless arbitrage trades earning slivers of basis points in spread and involving what is considered the safest possible counterparty. For US banks there is a further FDIC fee increasing costs even further.

The interaction between reserves satiation and regulation means the Fed's control over short-term interest rates may be less than it used to be. Because reserves are the marginal supply of short-term assets post-crisis and because cash pools can hold these reserves only indirectly through the balance sheet of banks, banks maintain absolute control over what share of IOER flows through to cash pools and – by extension – the extent to which higher IOER rates (once the Fed begins to hike) will flow through to financial conditions more broadly.

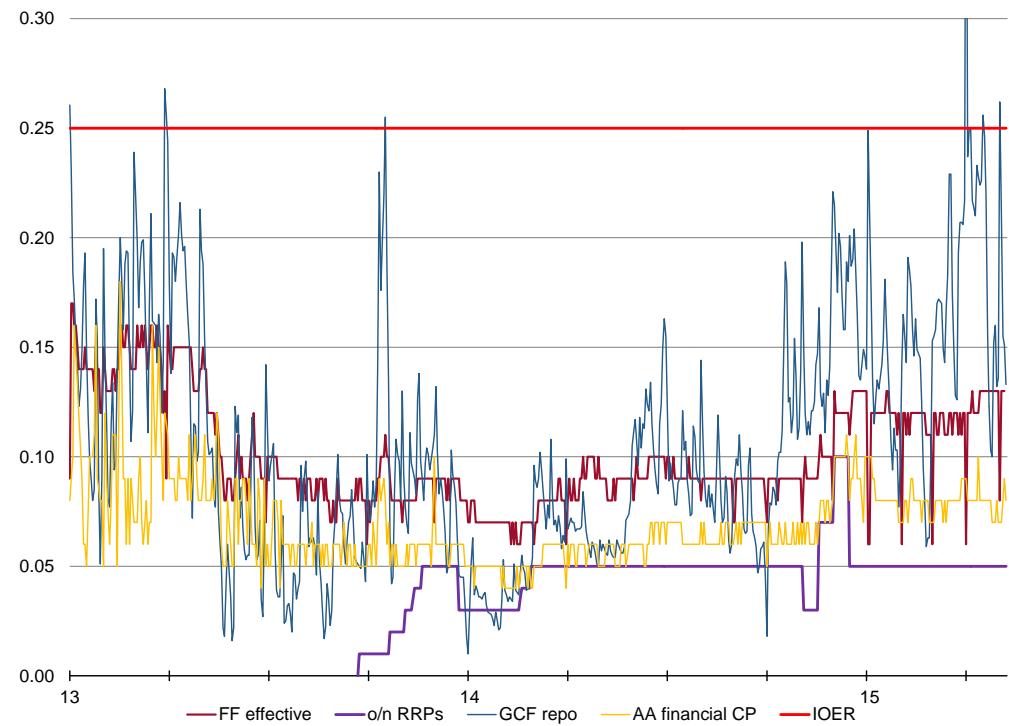
The Fed new reverse repo (RRP) facility regains control over short-term interest rates by allowing money funds to bypass banks and invest cash with the Fed directly (see Exhibit 6). Think of it as a buffer in case banks intent on minimizing the post-crisis costs of money dealing fail to pass on higher rates to their funding providers.

It can also be thought of as direct access to the Fed's balance sheet for "shadow banks." This is the arbitrage of the spirit of the Federal Reserve Act we mentioned above.

An arbitrage because the Act allows reserve accounts to be held only by traditional banks. But as banks became bottlenecks in the monetary transmission process a broader access to the Fed's balance sheet became necessary. This was possible only through arbitrage – the creation of quasi reserve accounts for shadow banks in the form of RRP.

Exhibit 4: Basel III Disrupts Arbitrage, Clogs Monetary Transmission

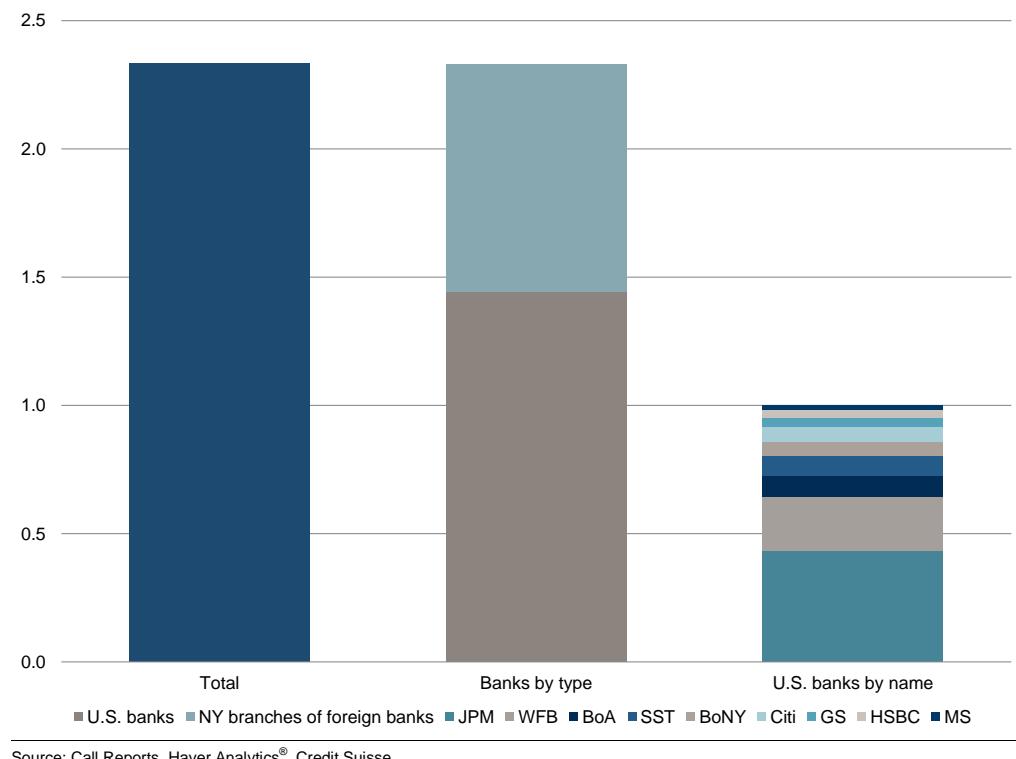
% per annum



Source: Haver Analytics®, Credit Suisse

Exhibit 5: Excess Reserves Burden Predominantly G-SIBs

Excess reserves, \$ trillion



Source: Call Reports, Haver Analytics®, Credit Suisse

Exhibit 6: Enter the RRP Facility – Unclogging Monetary Transmission

Streamlining the money dealing process and getting around the depressed funding rates offered by banks.

"Carry Trading"	"Money Dealing"			
Federal Reserve (public carry)		Banks (matched books)	Money Funds (prime)	Cash Pools
Bonds	Reserves	Reserves	Repo CD CP	Repo CD CP

Federal Reserve (public carry)		Money Funds (matched books)		Cash Pools
Bonds	RRPs	RRPs	\$1 NAV	\$1 NAV

Source: Credit Suisse

The Money Dealing Hot Potato

The RRP facility is policymakers' latest attempt to create a redoubtable money market. So far, the overnight RRP facility has helped firm up short-term interest successfully.

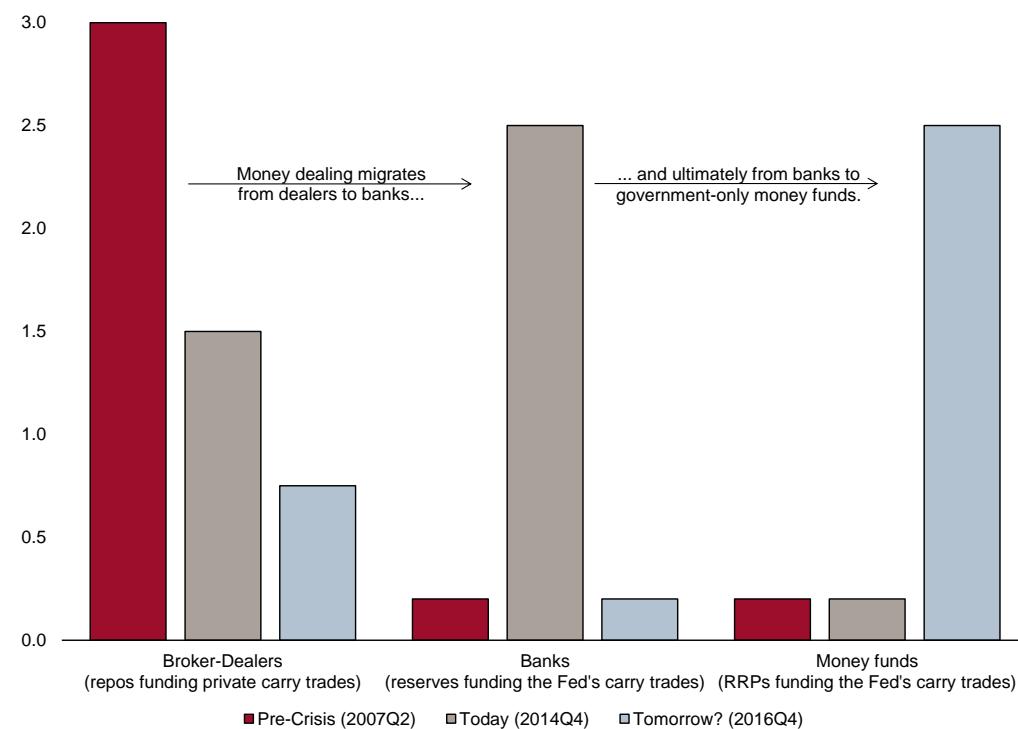
But maintaining control over short-term interest rates as policy is tightening will be challenging if the RRP facility does not grow significantly. As discussed above, banks might not pass on higher interest rates to their funding providers. If they don't, cash pools will attempt to leave banks and look for higher-yielding RRPs. Getting the size of RRP issuance right is tricky: as we have emphasized, whenever one component of short-term markets grows or shrinks, something will have to offset it.

Exhibit 7 shows the money dealing function being passed around like a hot potato. Before the financial crisis, broker-dealers practiced money dealing through a matched book repo. However, dealers eventually facilitated so much risk transformation that it exposed the system to fire sale and run risks. Later, banks became the dominant money dealers, funding massive volumes of maturity transformation on the balance sheet of the Fed. While this change reduced risks of private maturity transformation, reforms made it so costly for banks that the Fed's ability to control short-term interest rates came into question.

Eventually, we expect a massive and permanent overnight RRP facility, with government-only money funds emerging as the ultimate home of money dealing. Money market funds in many ways are anathema to central bankers. But to regain control over short-term interest rates they deal with them directly: the "marriage" of necessity will occur.

Exhibit 7: In Search of a Home

The total volume of money dealing conducted by various intermediaries over time, \$ trillion



Source: Federal Reserve, Haver, Credit Suisse

Of course, this is not the Fed's stated policy script. According to the [latest minutes](#), the FOMC intends the RRP facility to be a temporary feature and "expects that it will be appropriate to reduce the capacity of the facility soon after it commences policy firming."

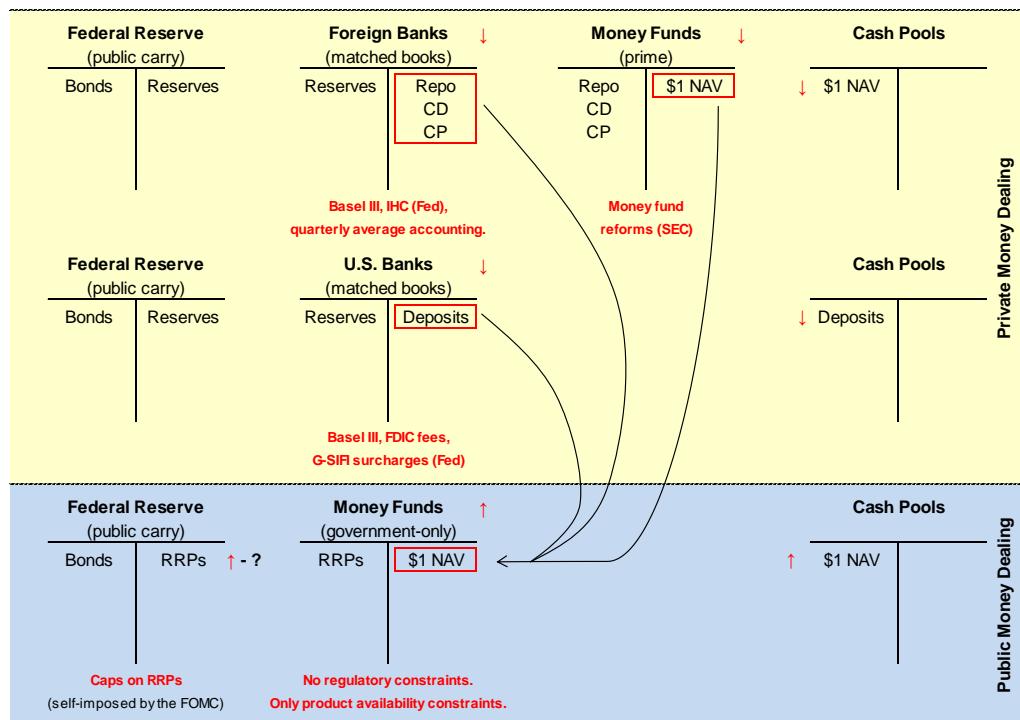
We disagree. The facility has already evolved in ways that are inconsistent with the FOMC's initial goals. Its size is now limited, but the latest FOMC minutes suggest a potential suspension of the cap during lift-off (albeit on a temporary basis).

Exhibit 8 illustrates the migration of money dealing to government-only money funds in this possible future state of the world. New rules force banks, dealers, and prime funds to shrink their short-term issuance. Government-only funds, in contrast, are relatively unconstrained; we think they will grow and become the key "money dealers" in the system.

A much larger or full allotment RRP facility could make this happen.

Exhibit 8: Will the Fed Respond to Bulging Demand?

Regulatory constraints all point toward a dramatic supply response from the Fed.



Source: Credit Suisse

US banks, the New York branches of foreign banks, and prime funds have good reasons to pare their money-dealing activities.

Capital timetables for both US and non-US banks are ramping up with the phase-in of the Basel III accord's capital conservation buffers and countercyclical capital buffers, as well as Fed's G-SIB⁵ surcharges starting to get phased in 2016 and ramping up through 2019.

A major US bank recently announced plans to shed \$100 billion in non-operating deposits (and an equivalent amount of reserves) - just weeks after it emerged that it was the only US bank with a capital shortfall (\$20 billion short once G-SIB surcharges are factored in).

Since raising more capital without shedding low margin money dealing would dilute the bank's RoE, it opted to reduce its money-dealing activities by trying to shed non-operating deposits by imposing fees on them or by engaging in a dialogue with clients to move them.

⁵ G-SIB = Global Systemically Important Bank

A bank can only reduce its reserve holdings by shifting them – and their dilutive burden – to another bank. Only the Fed can extinguish reserves and non-operating deposits, either by shrinking its balance sheet or by increasing the RRP facility.

Unless this happens, incentives will increase for banks to chase excess reserves off their balance sheets via imposing fees on deposits and/or offering depressed rates on their liabilities just as the Fed is hiking rates. The New York branches of foreign banks – which collectively hold just over \$800 billion in reserves – will soon join US banks in trying to shrink their money dealing activities as the Fed will require them to establish separately capitalized intermediate holding companies and face more stringent leverage reporting requirements. Both will raise the burden of money dealing for foreign banks.

These are major factors which could complicate the Fed's attempt to raise interest rates.

Furthermore, the SEC's money market reforms mandate that institutional class prime funds float their net asset value (NAV) by October 2016. Government-only money funds may retain a stable NAV. This will incentivize cash pools to reallocate from prime to government-only funds. New rules end prime funds as we know them: going forward, prime funds will be viewed as a short-term yield product, not a short-term liquidity product.

Cash pools' reallocation from institutional-class prime to government-only funds has already begun. It is getting an early tailwind from the voluntary conversion of prime money funds into government-only money funds by several large asset managers.

Exhibit 8 shows cash pools crowding into government-only money funds – the only balance sheets in the financial ecosystem not subject to new regulatory constraints.

A very large supply of RRPs will be needed to accommodate the demand for government fund liabilities from cash pools. Potential alternatives, such as Treasury bills and dealer repo, are unlikely to grow meaningfully unless the US Treasury makes dramatic changes to its debt management strategy or the bite of Basel III is reduced, which is unlikely.

In the extreme, the RRP facility could facilitate shifting the funding of the entire Fed portfolio onto the balance sheet of government-only money funds. This would help reduce reserve balances back to pre-crisis levels sooner than the market thinks, and enable the Fed to achieve its aim to get back to its old operating regime of targeting the level of the fed funds rate (as opposed to targeting a target range for the fed funds rate at present).

In this sense, if IOER is a magnet, the RRP facility is a dam, keeping excess reserves outside of the banking system and on the balance sheet of money funds. This could help interbank markets return to normalcy and provide a safer way to absorb the money demand of institutional cash pools compared with the pre-crisis shadow banking system.

Swapping excess reserves for RRPs on a large scale is unlikely to do anything dramatic to the flow of long-term credit in the economy. If RRPs are uncapped and demand for them soars, all that will happen (as a matter of double-entry bookkeeping) is that bank balance sheets will shrink and government money fund balance sheets will grow in equal amounts. As reserves are swapped for RRPs, cash pools' holdings switch from bank liabilities to government-only money fund liabilities. About the only major change in this configuration is that more of the profits from money dealing will flow to money funds and less to banks.

The only link to the real economy in these chains is through the SOMA portfolio's Treasury and RMBS holdings, the funding of which is unaffected by swapping reserves for RRPs. If anything, it would only get cheaper as RRPs pay only a fraction of the 25 bps offered on excess reserves, boosting the Fed's remittances (seigniorage revenues) to the Treasury.

Between Monetary Control and a Small Balance Sheet

Once again, we emphasize the nature of the financial ecosystem, where any new growth or reduction prompts an offset elsewhere – “for every action there is a reaction.”

Fed RRP^s, Treasury bills, and dealer repos are close substitutes and forms of money. The crisis showed that their relative supplies matter.

Perhaps markets will not be permitted to determine that again in our lifetimes.

If this is the case, we will have to adapt to a sovereign that’s going to be a larger and more active (or rather, more *activist*) participant in the wholesale money market than before.

This implies that the sovereign may choose to accommodate some share of the growing money demand of cash pools on its balance sheet if it deems the volume of private or shadow money creation to be excessive and posing a risk to financial stability.

Accommodating some share of cash pools’ money demand through a rising and permanent stock of RRP^s would be similar to a central bank increasing the supply of currency to accommodate the growing money demand of households as the economy grows – a basic feature of all monetary systems.

We make little fuss about accommodating currency demand along a trend, perhaps because we are more familiar with the image of central banks accommodating the money demand of households than with the image of central banks accommodating the money demand of institutional cash pools by issuing RRP^s. Economically they are the same.

If the Fed’s balance sheet never shrinks much, cash pools will have migrated from funding broker-dealers (pre-crisis) to funding the sovereign (post-crisis). The composition of the money fund complex will have shifted from mostly prime (pre-crisis) to mostly government-only money funds (post-crisis). And the supply of short-term assets will have shifted from mostly shadow – or private – money (pre-crisis) to mostly public money (post-crisis).

And as the sovereign replaces banks and shadow banks as the dominant borrower in the wholesale money markets, risks to financial stability will decrease (as more money will be public and less will be private). And the Fed will have delivered on its financial stability mandate not by vigilance over systemic risks, but by increasing the supply of public money through its balance sheet. This echoes the 1940s experience, which left US banks with large holdings of Treasury bills, and without any major crises for several decades.

The size of bank holding companies, and hence their profits and RoEs, are checked by global capital, liquidity, funding and leverage rules, which have reduced balance sheet elasticity. As intermediaries are less flexible in their ability to furnish elastic currency, someone else will have to do it instead – and that won’t be Bitcoin but the sovereign.

The secular rise of cash pools coincided with the three-decade trend toward lower interest rates. Although many investors target certain yield and return levels because of institutional arrangements, low yields did not eventually lead to sufficient issuance in long-term debt to steepen yield curves and attract savings out of cash pools (which were targeting short-term paper) and into intermediate and long-term debt. Perhaps the elasticity of dealer balance sheet before the crisis served to supply the leverage (via repo) to target higher returns in a low yield world (as an alternative to higher long-term issuance).

One long-term development, then, that could come from restrained balance sheets would be increased long-term issuance, increased long-term all-in yields for credit products, and a migration of savings toward longer-term securities. There are some signs of this already happening. And regulation may encourage this too. For example, new rules are forcing many banks to term out their debt issuance, increasing the supply of long-term credit.

In the meantime, however, we think government issuance is more likely to satisfy the demand of cash pools, not a large increase in long-term credit that drives up the yields and attractiveness of longer-term securities (traditionally “bonds”) relative to short-term securities (traditionally “money”).

For the Fed to get back to targeting a level for the fed funds rate, it will have to come to terms with the institutional realities of the modern financial ecosystem. Specifically:

- Wholesale money demand is a structural feature of the system, not an aberration that can be eliminated by forcing banks to term out their funding.
- Institutional cash pools, not households, are the dominant sources of funding in the US money markets.
- The shadow banking system exists parallel to the banking system.
- The economy’s critical funding channel is hybrid: deposits yes, but also secured repos issued either by broker-dealers or – if not – by the Fed through RRP.

To paraphrase Herodotus “circumstances rule central banks; central banks do not rule circumstances.” The Fed must seek the correct monetary policy stance, including the right size and composition of its balance sheet, in world of great change and complexity.

The reduced elasticity of bank and broker-dealer balance sheets amid the still-growing money demand of institutional cash pools represent the defining challenge to the system.

Interest rates matter, and quantities do too.

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Global Money Notes #2

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A Turbulent Exit

The Federal Reserve's historic liftoff from the zero lower bound is nearing.

Liftoff will be historic not only because the Fed has never tried to raise interest rates from such low levels before but also for at least three other reasons.

First, the Fed will raise interest rates using new tools.

Second, the money flows that liftoff will generate, both on and offshore, will dwarf those involved in past hiking cycles.

Third, liftoff will occur in a financial system completely redesigned through Basel III: bank balance sheets are now subject to liquidity and funding rules that have never been stress-tested in a hiking cycle before.

No matter how transparent the Fed has been about the start and pace of liftoff, the combination of new tools and a redesigned financial system **may** cause turbulence in money, FX and Treasury markets on purely "mechanical" grounds. This turbulence won't have anything to do with – but will be exacerbated by – the much discussed decline in market liquidity due to post-crisis re-regulation.

Forewarned is forearmed.

This second issue of Global Money Notes is a reference guide for trading the Fed's exit. We address the following questions: where will fed funds effective trade the day after liftoff? Will liftoff be a Libor-OIS widener? A curve flattener? Are rates the cleanest possible way to trade the Fed's historic exit? Or perhaps bank equities? How about the Euro/U.S. dollar exchange rate? In our view:

1. The Fed will opt for a full allotment o/n RRP facility on the day of liftoff.
2. Fed funds effective will print around 35 bps with risks to the upside.
3. 3-mo Libor will print around 55 bps with risks strongly to the upside.
4. Liftoff will benefit some banks but hurt others. A rising tide – rising interest rates – will not lift all boats as is typical during hiking cycles.
5. Volatility may spike in the 3-5 year segment of the U.S. Treasury curve as deposit flows force banks to calibrate their HQLA portfolios.
6. A full allotment RRP facility could accelerate FX reserve managers' shift out of euros for U.S. dollars.

For the Fed to control short-term interest rates effectively, it must live with the turbulence a full allotment RRP facility may unleash, despite all its communication efforts to ensure the opposite. Get ready for a turbulent exit...

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

Getting rid of excess reserves quickly is simple in principle.

The Fed could swap excess reserves for central bank bills (Fed bills), which banks could sell to anyone outside the banking system. This is something banks cannot do with reserves, which can only be held by banks. The sale of Fed bills would yield balance sheet relief for banks and increase the amount of short-term instruments ("collateral") held by investors that are confined to holding bank deposits at present. The size of the Fed's balance sheet would not change, but what were excess reserves before would now be Fed bills, and most reserves would once again be of the required kind. The Fed could go back to its pre-crisis operating regime of targeting a **level** for the federal funds rate, as opposed to a target **range** as at present – a goal the Fed has emphasized in the past.

There is only one problem with this simple and elegant roadmap to get "back to the future": the Federal Reserve Act does not allow for Fed bills. This is a problem that other central banks – the Bank of England for instance – do not have. And short of Fed bills, the Fed's exit strategy is being sketched out around the use of a reverse repo (RRP) facility instead.

A Monetary Hoover Dam

RRPs are not a new tool *per se*.

The Fed has been using them for decades, but will use them differently this time around: RRP will be fixed rate, not fixed size; they will be done with money funds (mostly), not dealers; and they will involve swapping reserves for RRPs, not reserves for bonds.

The mechanics of liftoff will be as simple as the New York Fed posting two numbers on its website – 0.50% for IOER and 0.25% for o/n RRPs – and standing ready to **passively** swap reserves for RRPs to accommodate the order flow for one instrument versus another.

It is helpful to think about RRPs as a dam – a monetary Hoover Dam.

Exhibit 1 shows the Colorado River in the Black Canyon, before construction of the Hoover Dam began. As an analogy, think about the banking system awash with excess reserves.

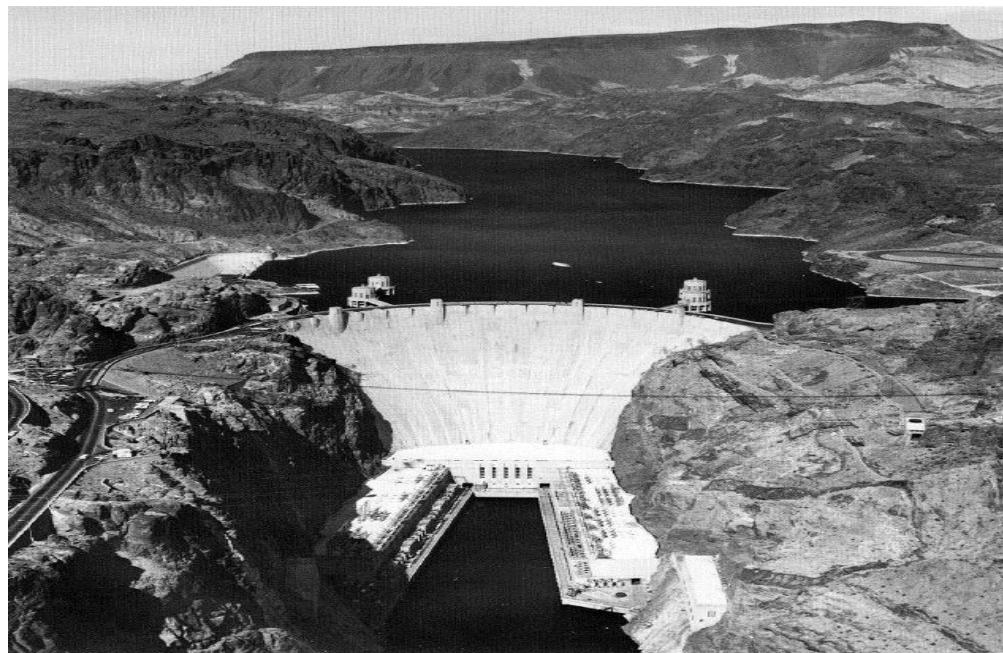
Exhibit 1: The Colorado River in 1930 – Think Excess Reserves



Source: http://waterandpower.org/Construction_of_Hoover_Dam.html

Exhibit 2 shows the Colorado River with the Hoover Dam in the middle. As an analogy, think about excess reserves cordoned off on one side of the dam as a large pool of RRP held by money market funds, and a small pond of reserves held by banks on the other. The river is still there (as is a large Fed balance sheet), but liquidity (central bank liabilities) has been redistributed: away from banks to money funds and from reserves to o/n RRP.

Exhibit 2: The Hoover Dam – Think RRPs as a Monetary Hoover Dam



Source: http://waterandpower.org/Construction_of_Hoover_Dam.html

As long as the Fed's balance sheet remains large (and as the Fed has stated very clearly in its exit principles, it won't shrink it until well into the hiking cycle), a large RRP facility is the only way to drain reserves from the banking system, i.e., to reduce those liabilities on the Fed's balance sheet that are relevant for controlling conditions in the fed funds market.

Exhibit 3 shows the way the Fed's liabilities (those relevant for our discussion) are distributed in the financial system at present: about \$2.5 trillion in reserves are held by banks which in turn fund reserves with deposits and other wholesale liabilities, and about \$100 billion in RRPs are held by money funds which fund RRPs with stable NAV shares.

This is what the financial system looks like with a **small** RRP facility.

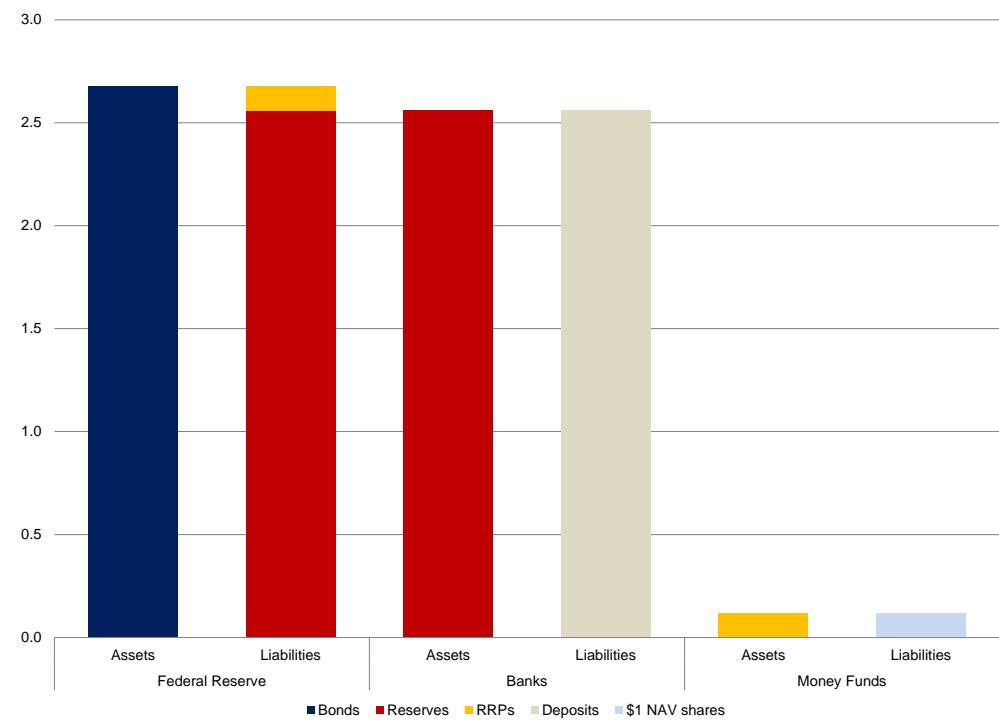
Exhibit 4 shows what the financial system looks like with a **large** RRP facility – the way the system could potentially look about six months to one year after liftoff.

What has changed?

\$2 trillion of deposits (hypothetical, for the sake of exposition) have left the banking system for money funds. Banks facilitated these outflows by giving up reserves. The outflows led to a shrinkage of bank balance sheets on both sides. On the flipside, money fund balance sheets increased on both sides. Money funds absorbed the corresponding inflows by issuing stable NAV shares and investing the proceeds in RRPs with the Fed. Even as bank balance sheets shrank and money fund balance sheets grew, the size of the Fed's balance sheet remained the same. However, the composition of its liabilities changed: reserves fell from \$2.5 to \$0.5 trillion and RRPs grew from \$100 billion to \$2.1 trillion.

Exhibit 3: The Financial System with a Small RRP Facility

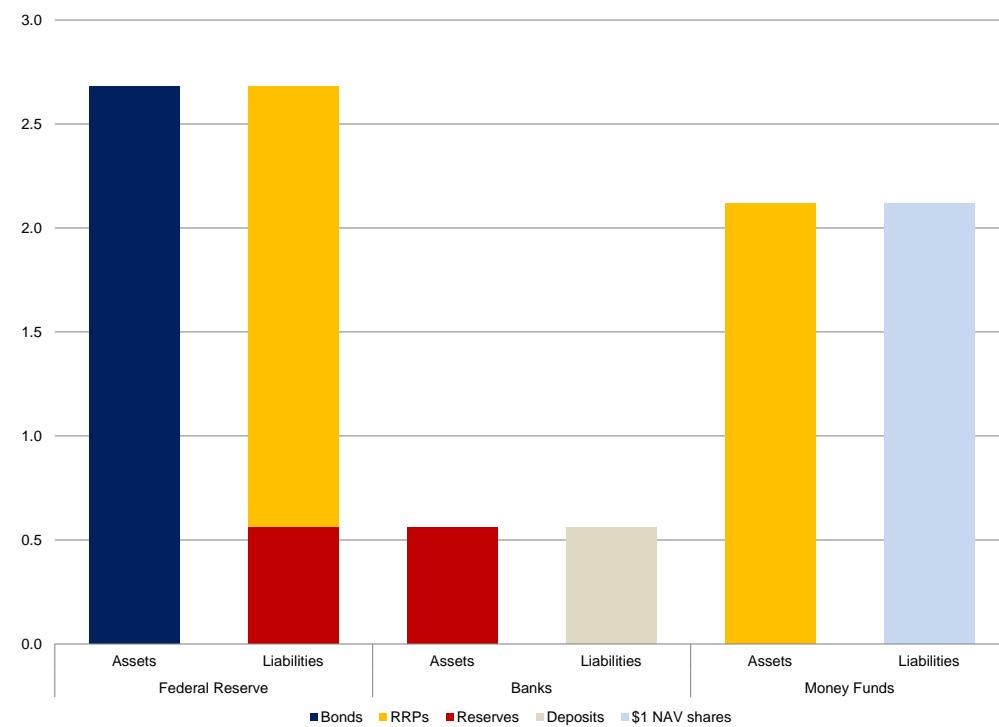
\$ trillions, 2015Q1 (T)



Source: Credit Suisse

Exhibit 4: The Financial System with a Large RRP Facility

\$ trillions, T + 12 months



Source: Credit Suisse

No one really knows the financial system's demand for reserves versus RRPs. Required reserves only amount to about \$100 billion at present but some banks may actually prefer to hold on to some of their excess reserves for HQLA purposes in which case some reserves should be thought of as "preferred" – a grey area between required and excess reserves. Pulling off the type of flows we sketch in Exhibits 3 and 4, while not being sure about how big they will ultimately get, points to the need for a full allotment RRP facility.

However, concerns emerged that a full allotment facility would (1) rely on money funds, (2) disintermediate banks and (3) increase the likelihood of runs. And this led to the dilution of the full allotment idea to a fixed rate, fixed allotment facility – an oxymoron, as one can either fix quantities and let prices adjust, or fix prices and let quantities adjust, but not both (for a discussion and critique of these concerns, see the Appendix at the end of this Note).

Full Allotment After All?

But the FOMC's initial concerns over a full allotment facility seem to have faded over time.

The March FOMC [minutes](#) signaled that the Fed is presently considering two alternatives: "**a temporarily elevated aggregate cap**" or "**a temporary suspension of the cap**" on the o/n RRP facility to ensure control over short-term interest rates at the time of liftoff.

The minutes make it abundantly clear that come October or December, or whenever liftoff will finally occur, the Fed will either put a very big number on the RRP facility (think \$1 trillion), or make it full allotment outright – just as a few on the FOMC originally intended.

We believe the FOMC will go for full allotment.

From a communication perspective, a full allotment facility is preferable to a facility with a large number attached to it, as a large number could easily have a sticker shock effect.

Just imagine the Fed moving IOER to 0.50% and the RRP rate to 0.25% and announcing that the RRP facility will be upsized from \$300 billion to \$1 trillion.

Markets may interpret this as a more hawkish move than intended:

"Gee, the Fed not only hikes, but also **drains** \$1 trillion in reserves. What if it over-drains? What will that do to the liquidity that's been pushing stocks higher all along? Sell!"

Of course, such concerns are misplaced – the amount of reserves in the system have nothing to do with where stocks trade. But markets being markets, it's never about how the world actually works, but how the markets think the world works. The Fed should care about the potential communication downsides involved in putting a large number on the RRP facility and make the facility full allotment, with no numbers attached.

A full allotment facility would be the exact opposite of what Chairman Volcker did in 1979 when he switched the Fed's operating regime from targeting the fed funds rate, to targeting the volume of reserves. When the Fed went monetarist, the fed funds rate quickly shot up to over 20%. When the Chairman had to appear in front of Congress to explain why interest rates got so high, he said something to the effect of "I did not hike rates; markets did." By slowing the pace of adding reserves to the system (a control of quantities), banks – given the pace at which they were lending and creating deposits at the time – suddenly faced a shortage of reserves and bid interest rates up accordingly.

In today's context, a full allotment RRP facility would leave it up to the market to determine the right mix of reserves versus RRPs and help the Fed set interest rates precisely where it wants them to be (a control of the price of money, that is, interest rates).

The Fed does intend to have control over short-term interest rates. Over the past five years, we have heard nothing but assurances to that end. The Fed's ability to control short-term interest rates has never been in doubt before. If the Fed does not seem to be in control after all, uncomfortable hearings in front of Congress would follow, and heat around the Fed's independence (already under heightened scrutiny) would intensify.

The Fed is keenly aware of these risks.

According to the March, 2015 FOMC [minutes](#), “a number of participants **emphasized** that maintaining control over short-term interest rates would be **paramount** in the initial stages of normalization” – (our emphases) unusually strong words for a central bank to use. The word “paramount” appears in FOMC minutes very rarely and participants at FOMC meetings rarely “emphasize” things – they typically note, recommend, agree, consider, judge, discuss, anticipate, repeat and sometimes underscore, but only rarely emphasize.

These are the key arguments against calibrating the size of the RRP facility with an incremental, trial by error approach at liftoff and going for a full allotment facility instead.

Vice Chairman Fischer noted last December that “very little works exactly as planned, and what are the alternatives if [o/n RRPs] do not work? I think about that a great deal.”

An o/n RRP facility should work absolutely fine – at least as far as establishing a floor under short-term interest rates is concerned (see below) – as long as it's full allotment.

Where Will Fed Effective Trade a Day After Liftoff?

Assuming we get a full allotment RRP facility, where will fed funds effective trade “T+1”?

Around 35 bps. Here is why.

At present, the size of the fed funds market is about \$50 billion, down sharply from \$250 billion before the crisis. The reason for the collapse is obvious: with so many excess reserves in the system, few banks have to borrow to meet reserve requirements.

Whatever is left of the fed funds market is mostly between Federal Home Loan Banks (FHLBs) on the lending side and U.S. and foreign banks on the borrowing side.

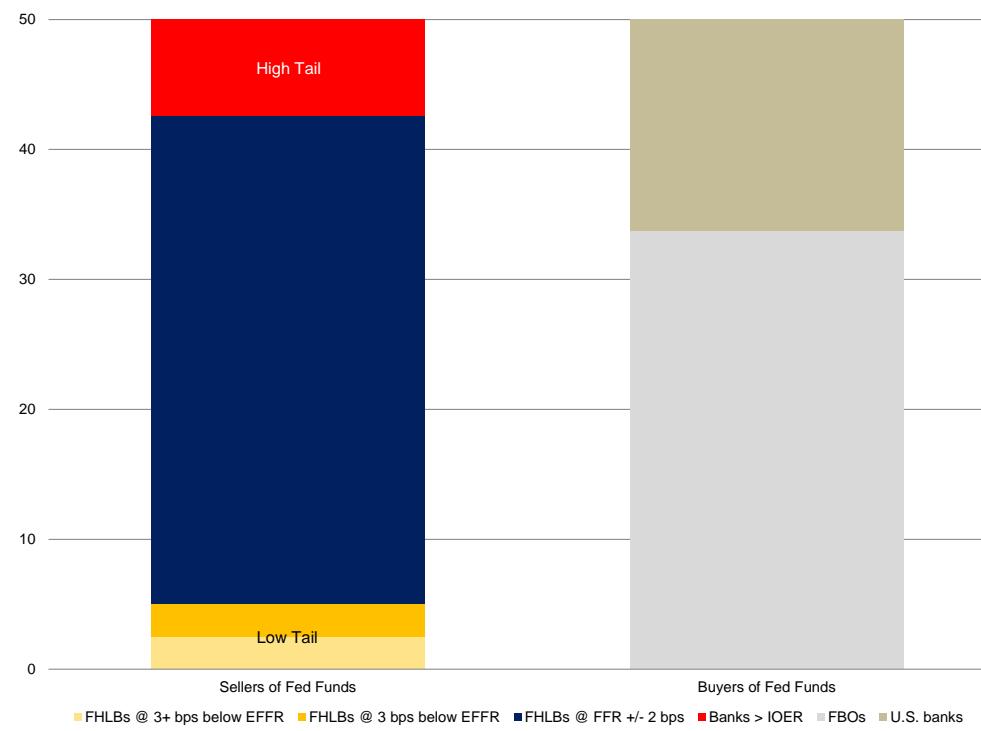
Exhibit 5 shows a snapshot of the market during the first quarter of 2015. On the lending side, we show three types of transactions: high tail, median and low tail transactions.

The “high tail” of fed funds trades (see the red portion of the left-hand column) involves **banks** with a surplus of reserves lending to **banks** with a shortage of reserves at rates above IOER. During the first quarter of 2015, the volume of such trades was about \$8 billion. We know that high tail trades occur only between banks, not between banks and the FHLBs. This is because the borrowing banks tend to be small, regional players which are not rated at all or are not rated creditworthy enough for the FHLBs to lend to them.

Based on our analysis of call report data, banks that borrow at a rate above IOER are clustered in states such as North Dakota, Texas and Utah. These states benefit from healthy demographics or are home to industrial loan companies that benefit from strong growth in auto loans (Utah); or benefit from the shale revolution (North Dakota and Texas). In each of these cases, what drives demand for reserves is strong loan growth.

Exhibit 5: The Fed Funds Market Today

\$ billions, 2015Q1



Source: FDIC, Federal Reserve Bank of New York (FR2420), Federal Home Loan Banks, Credit Suisse

The “median” of fed funds trades (see the blue portion of the left-hand column) involves trades between FHLBs and banks, and are executed at rates that are +/- 2 bps within the effective fed funds rate (EFFR). These account for the majority of fed funds trades at present. Their motivation is to arbitrage the difference between fed effective and interest on reserves (these trades exploit the feature of the U.S. money market whereby only banks can earn the IOER rate on their cash balances at the Fed, not the FHLBs; FHLBs earn zero). During the first quarter of 2015, the volume of such trades was \$37 billion.

The “low tail” of fed funds trades (see the orange portion of the left-hand column) involves trades where FHLBs lend to banks at least 3 bps below the EFFR and sometimes below the o/n RRP rate. These trades involve cash balances that the FHLBs receive late in the day, at a time when the RRP facility has already closed (the facility is open only for 30 minutes between 12:45 and 1:15 EST) and the alternative for FHLBs is to earn zero interest in their account at the Fed. During the first quarter of 2015, the volume of such trades was about \$5 billion (according to FR2420 data (see [here](#)), about \$2.5 billion printing 3 bps below EFFR and another \$2.5 billion printing more than 3 bps below EFFR).

Thus, in a nutshell, over 80% of lending in the fed funds market is done by the FHLBs, and on the borrowing side of the market, the split between U.S. and foreign banks is ~ 40:60.

In terms of the number of players involved, the market has a distinct “family atmosphere”.

Of the 11 FHLBs (their number fell from 12 when FHLB Seattle was merged into FHLB Des Moines on May 31st, 2015), only 10 are active lenders in the fed funds market. On the borrowing side, volumes are dominated by 10 foreign banks and 10 U.S. banks – so few because FHLBs can only lend in volume on an unsecured basis (the fed funds market is unsecured) to counterparties that are rated one of the top four investment grades. And as it turns out, there are not so many highly rated banks left to begin with globally.

Exhibit 6 provides the list of eligible candidates for FHLBs to lend to, and Exhibit 7 (note the overlap with the names in Exhibit 6) lists the top 10 foreign and U.S. borrowers in the fed funds market at present. The combined borrowing of these 20 banks absorbs about 70% of the lending done by the FHLBs. In essence then, at present, the bulk of trading in the fed funds market occurs between 10 FHLBs and 20 banks – small enough numbers to get a sense of the character of the market by talking to the main participants, which we did.

Exhibit 6: Who are the FHLBs Willing to Face?

Banks by ratings and FHLBs' corresponding maximum capital exposure limit (in percent)

Foreign banks

	Name	Fitch	Limit		Name	Moody's	Limit		Name	S&P	Limit
1	Royal Bank of Canada	AA	9		Toronto-Dominion Bank	Aa1	14		Svenska Handelsbanken AB	AA-	3
2	Svenska Handelsbanken AB	AA-	3		Svenska Handelsbanken AB	Aa2	9		Royal Bank of Canada	AA-	3
3	HSBC Holdings Plc	AA-	3		Bank of Nova Scotia	Aa2	9		Toronto-Dominion Bank	AA-	3
4	Toronto-Dominion Bank	AA-	3		National Australia Bank Limited	Aa2	9		Nordea Bank AB	AA-	3
5	Bank of Nova Scotia	AA-	3		Australia and New Zealand Banking Gro	Aa2	9		National Australia Bank Limiter	AA-	3
6	Nordea Bank AB	AA-	3		Westpac Banking Corporation	Aa2	9		Australia and New Zealand Ba	AA-	3
7	Bank of Montreal	AA-	3		Commonwealth Bank of Australia	Aa2	9		Westpac Banking Corporation	AA-	3
8	Canadian Imperial Bank of Com	AA-	3		Skandinaviska Enskilda Banken AB	Aa3	3		Commonwealth Bank of Austr	AA-	3
9	National Australia Bank Limited	AA-	3		Swedbank AB	Aa3	3		Skandinaviska Enskilda Banke	A+	3
10	Standard Chartered Plc	AA-	3		Royal Bank of Canada	Aa3	3		BNP Paribas SA	A+	3
11	Australia and New Zealand Bani	AA-	3		Nordea Bank AB	Aa3	3		Swedbank AB	A+	3
12	Westpac Banking Corporation	AA-	3		Bank of Montreal	Aa3	3		Bank of Nova Scotia	A+	1
13	Commonwealth Bank of Australi	AA-	3		Canadian Imperial Bank of Commerce	Aa3	3		Bank of Montreal	A+	1
14	Skandinaviska Enskilda Banken	A+	1		National Bank of Canada	Aa3	3				
15	BNP Paribas SA	A+	1		Standard Chartered Plc	Aa3	3				
16	Swedbank AB	A+	1		HSBC Holdings Plc	A1	1				
17	National Bank of Canada	A+	1		BNP Paribas SA	A1	1				

U.S. banks

	Name	Fitch	Limit		Name	Moody's	Limit		Name	S&P	Limit
1	1 Wells Fargo	AA+	14		Wells Fargo Bank	Aa1	14		1 Wells Fargo	AA-	3
2	2 U.S. Bank	AA	9		U.S. Bank	Aa1	14		1 U.S. Bank	AA-	3
3	2 JPMorgan Chase Bank	AA	9		BB&T Bank	Aa1	14		2 JPMorgan Chase Bank	A+	1
4	3 BB&T Bank	AA-	3		JPMorgan Chase Bank	Aa2	9		3 BB&T	A	1
5	3 PNC Bank	AA-	3		PNC Bank	Aa2	9		3 PNC Bank	A	1
6	3 Bank of America	AA-	3		Bank of America	A1	1		3 Bank of America	A	1
7	4 SunTrust Bank	A-	1		SunTrust Bank	A1	1		4 SunTrust Bank	A-	1

Source: SNL Financial, company reports, Credit Suisse

Talking to fed funds traders at FHLBs further reinforces the notion of a family atmosphere.

Traders refer to borrowers as the “usual names” – the “scandies,” the “ozzies,” the “Canadians,” and a few of the “bigger U.S. guys” – and indicate that most of their lending gets done early in the day Eastern Time (this applies regardless of which time zone an FHLB is based) and well before the window when the RRP facility is open.

Exhibit 7: Who Borrows in the Fed Funds Market?

\$ billions, 2015Q1

U.S. banks

1	Wells Fargo	6.2			Total	13.1	
2	Suntrust	1.3					
3	Deutsche	1.3					
4	JPMorgan	1.2					
5	BoNY	1.2					
6	USBC	0.9					
7	BB&T	0.7					
8	Citi	0.2					
9	BoA	0.1					
10	PNC	0.0					
	Total	13.1					
	Other U.S. banks...	12.6					
	...of which non-IOER arb ("high tail") trades	8.0					

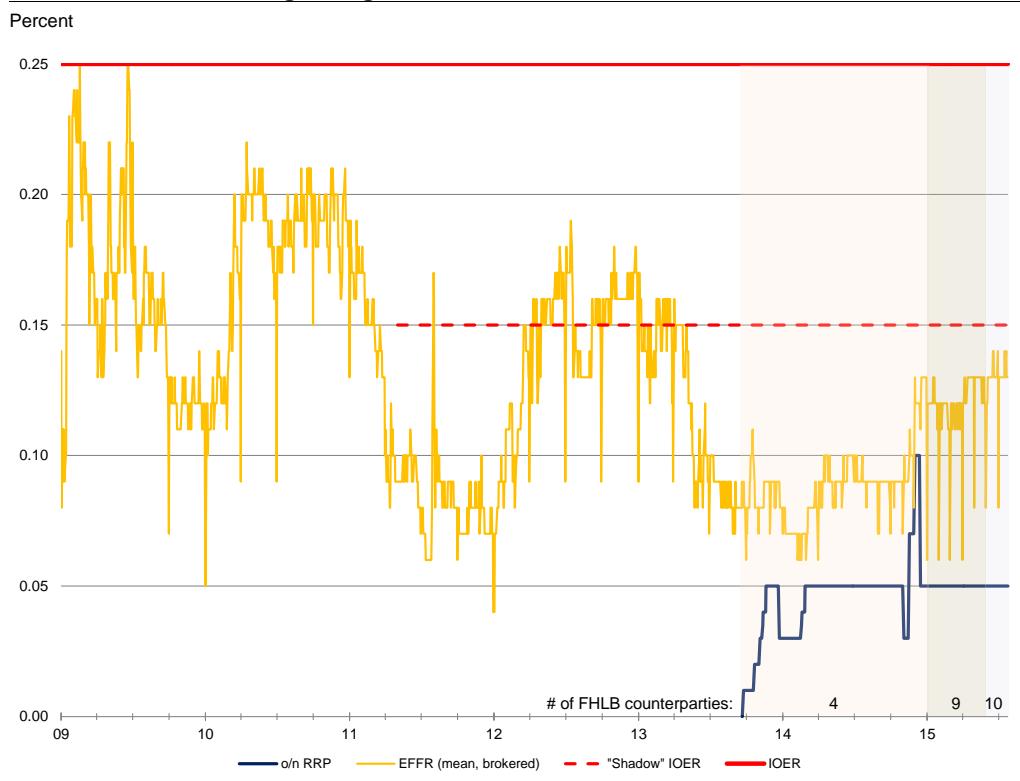
Foreign banks

1	Bank of Nova Scotia	5.7	
2	DnB NOR Bank ASA	3.5	
3	Mizuho Corporate Bank	2.6	
4	Swedbank AB	2.0	
5	BNP Paribas	1.1	
6	Skandinaviska Enskilda Banken	1.0	
7	Bank of Tokyo	0.5	
8	Sumitomo Mitsui Banking Co	0.2	
9	Standard Chartered Bank	0.1	
10	Svenska Handelsbanken	0.1	
	Total	16.9	
	Other foreign banks (residual)	7.4	

Source: FDIC, Call Reports (FFIEC031, FFIEC002), Credit Suisse

Most trades involve the rolling of existing trades with the “usual names.” Competition is tight. If bids from an existing borrower are not received promptly (or aren’t good enough), FHLBs will move their cash over to one of the 19 other banks quickly.

Importantly, since the beginning of 2015, the bargaining position of FHLBs has improved markedly, which explains the updrift of the EFFR over this period (see Exhibit 8).

Exhibit 8: FHLBs' Bargaining Power on the Rise

Source: Federal Reserve, Haver Analytics ®, Credit Suisse

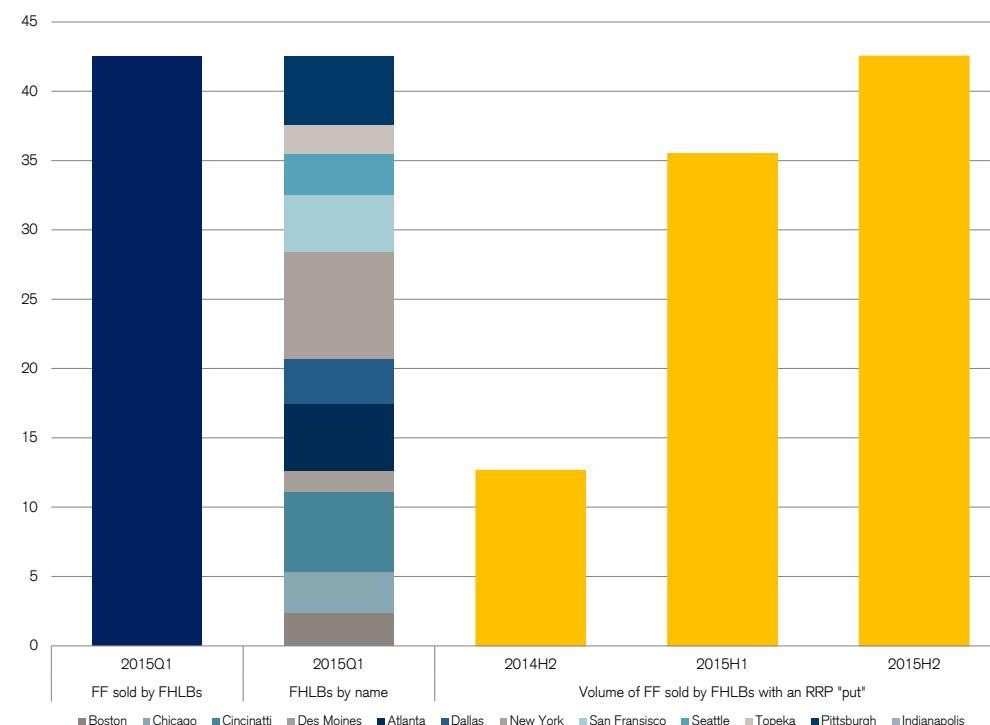
During most of 2014, the EFFR traded only about 2-3 bps above the o/n RRP rate, but since 2015, this spread widened to about 8 bps and recently to as much as 10 bps. What's behind this updrift is that the number of FHLBs with access to the RRP facility was only four during 2014, but expanded to nine on January 16th, 2015 and ten on August 3rd, 2015 (see [here](#), [here](#)). With more and more FHLBs having the option of investing at the o/n RRP rate, borrowers came under pressure to pay higher rates, pushing EFFR higher and higher.¹

In volume terms, Exhibit 9 shows the total volume of reserves lent by each of the FHLBs during the first quarter of 2015 and how the volume of reserves with a "put" to the RRP facility increased over time. At the moment, **all** FHLBs can invest at the o/n RRP rate except FHLB Indianapolis, which is not an active lender of federal funds presently (according to its financial reports, it has not lent a penny since the second quarter of 2014).

¹ This improvement in FHLBs' bargaining position could also explain why EFFR did not decline when the o/n RRP rate was first raised from 5 to 10 bps and then lowered back down to 5 bps in late 2014 – increasing the number of FHLBs as counterparties coincided with the testing of EFFR's responsiveness to the RRP rate.

Exhibit 9: FHLB Cash Balances with an RRP “Put”

\$ billions, 2015Q1



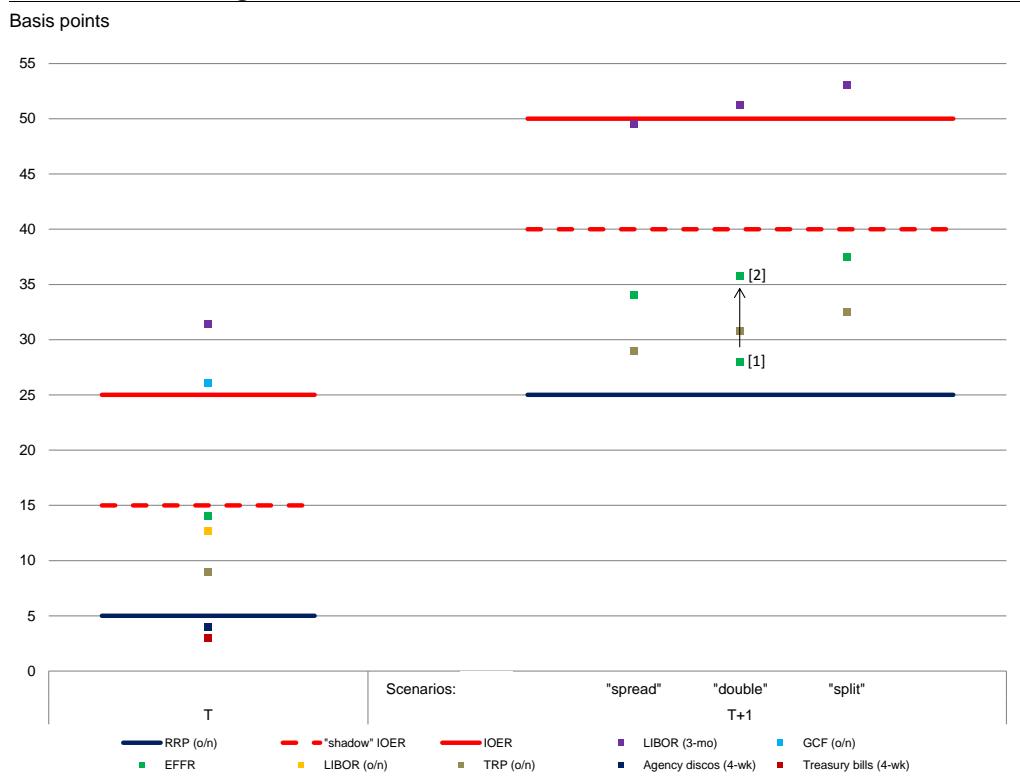
Source: Haver Analytics ®, the BLOOMBERG PROFESSIONAL™ service, Federal Reserve Bank of New York, Credit Suisse

This is the lay of the land. What does it imply for where EFFR will trade T+1?

Exhibit 10 shows how short-term interest rates stack up at present. The lines on the left-hand side show the key policy rates: the o/n RRP rate at 5 bps and IOER at 25 bps. The dashed line shows the “shadow” IOER, the effective rate U.S. banks subject to a 10 bps FDIC assessment fee earn on excess reserves (since it was introduced in April, 2011 the FDIC assessment fee has actually declined for all U.S. banks somewhat; what we know is that at present, these fees range from 7 to 15 bps. But figuring out how much U.S. banks pay on average is impossible as the assessment fees individual banks pay and the risk category they fall into for purposes of determining their assessment fee are both classified).

At the moment, 4-week U.S. Treasury bills and Agency discount notes both trade below the o/n RRP rate, at 3 and 4 bps, respectively. Overnight Treasury repos (tri-party) between primary dealers and money funds trade around 9 basis points. Overnight fed funds between FHLBs and banks trade around 15 bps. Overnight GCF repos between primary and non-primary dealers trade around 26 bps. 3-month LIBOR trades near 32 bps.

Exhibit 10: Plotting the Future



Source: Haver Analytics ®, Credit Suisse

The day after liftoff, the o/n RRP rate will be at 25 bps and the IOER and “shadow” IOER rates at 50 and 40 bps, respectively (see the lines on the right-hand side of Exhibit 8).

For where EFFR will print, consider three scenarios: spread, double and split.

Under the “spread” scenario, the tri-party repo rate trades at a similar spread over the o/n RRP rate as at present, and EFFR settles above tri-party repo also at a spread similar to where it is trading at present. This would put tri-party repo at 29 bps and EFFR around **34 bps** T+1. Assuming we get a full allotment RRP facility, there shouldn’t be a reason why tri-party repo rates should settle at a narrower spread over (let alone below) the o/n RRP rate. Should primary dealers offer to borrow at rates below the o/n RRP rate, money funds would quickly switch to funding the Fed’s balance sheet instead (see test results [here](#)).

Under the “double” scenario, imagine a trader at a bank (a borrower of fed funds) telling a trader at an FHLB (a lender of fed funds) the following: “At the moment you are earning 14 bps on fed funds. Why don’t I double that for you and pay 28 bps?” Were this trade to get done, the bank would also double the spread it makes arbitrage EFFR and IOER. At the moment, banks pay 14 bps and invest at 25 bps, for a profit of 11 bps. Were banks to pay 28 bps and invest at 50 bps, their profit would increase to 22 bps. Still, some FHLBs may not get particularly excited about where they are positioned within the o/n RRP – IOER band in terms of the rate that they earn. At 28 bps, FHLBs would earn close to the bottom of the range, compared to the middle of the range at present. The trader at the FHLB could ask for **35 bps** instead. Were this trade to get done, FHLBs would earn 2.5 times as much as at present and banks 50% more. Tri-party repo would drift higher accordingly.

Under the “split” scenario, imagine a trader at a bank telling a trader at an FHLB: “At the moment you and I are splitting the spread between RRP and IOER. Let’s just keep doing that.” Were this trade to get done, EFFR would print at around **37.5 bps**. Tri-party repo rates (Treasury collateral) would set marginally higher compared to the “double” scenario.

It is hard to imagine a scenario where FHLBs would ask for rates higher than 37.5 bps.

Doing so would be counterproductive. This is because above 37.5, trades would not be profitable for U.S. banks (they only earn the “shadow” IOER rate) and were U.S. banks stop borrowing, an already limited number of highly rated counterparties that FHLBs can trade with would halve and be limited to foreign banks only. Were this to happen, foreign banks would gain an upper hand and push rates offered back down. FHLBs would actually end up earning less on their fed funds trades, not more.

It is clear from these examples that when borrowers are few, it is hard to drive a tough bargain, and this also applies on the flipside with having the RRP facility to lend to.

Taking an average of these scenarios, EFFR should print somewhere around **35 bps T+1**.

Seven questions are typically raised in response to this forecast:

First, could EFFR drift higher than forecast if smaller banks enter the market as borrowers of fed funds in order to arbitrage the difference between EFFR and IOER?

The answer is no. FHLBs would not lend to smaller banks because they are not rated highly enough, and banks would not lend fed funds to other banks below IOER.

Second, could EFFR drift higher than forecast if the FHLBs were to leave the fed funds market altogether (like Fannie and Freddie did) and lend their cash at higher rates elsewhere (for example, in GCF repos)? In such a scenario, all fed funds transactions would be “high tail” trades, which would pull EFFR higher, possibly above IOER.

The answer is no. By regulation, FHLBs need to maintain enough liquidity to meet the needs of their members under the following two scenarios: “inability to access debt markets for 5 days and all advances are renewed except those for very large, highly rated members” and “inability to access debt markets for 15 days and no advances are renewed.” These requirements will keep the size of the market at least where it is today.

Third, could EFFR shoot through IOER if the RRP is full allotment? How close EFFR trades to IOER is a function of how much the Fed drains, and a full allotment RRP facility means the Fed will drain a lot. EFFR would then surely trade close to or above IOER.

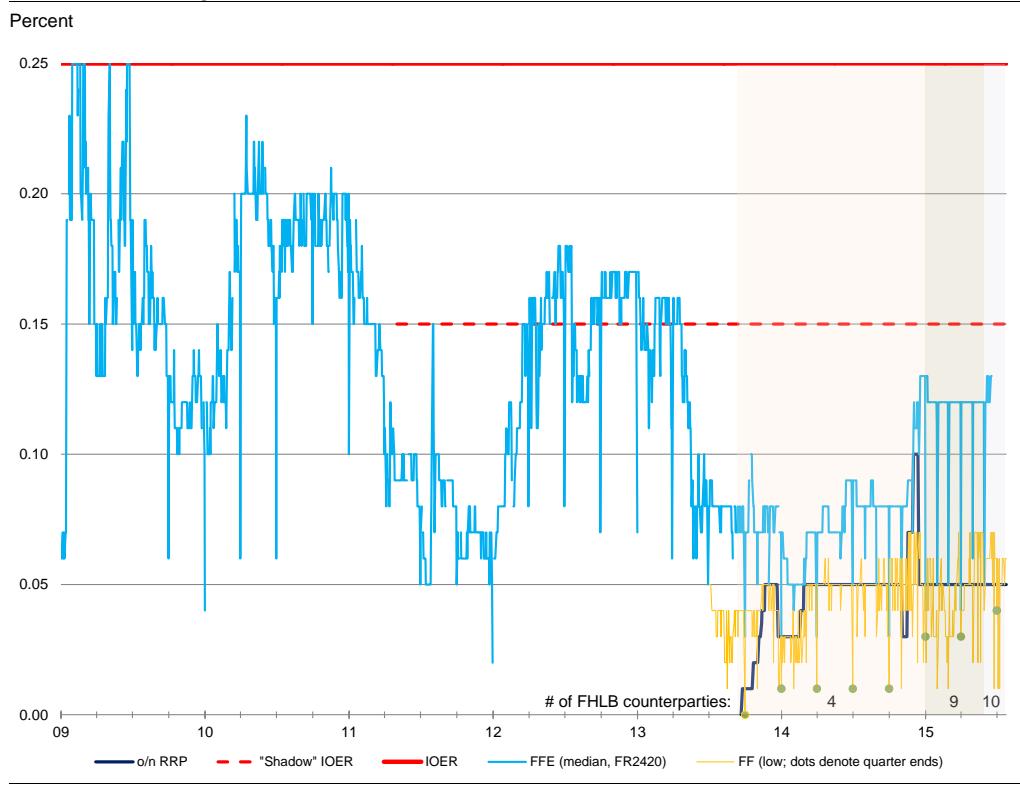
The answer is yes, but with qualifiers. The Fed can't just drain reserves on its own; the ecosystem has to cooperate. If RRPs are full allotment and if uptake is not large, the Fed can't drain a lot. While we think the RRP facility will get very big, this will play out over time and won't necessarily be a T+1 event (more on this in the section below).

Fourth, could EFFR drift *lower* than forecast if the banks were to stop borrowing in the fed funds market and opt for cheaper venues such as the tri-party repo market?

The answer is no. Banks do not borrow in the tri-party repo market; primary dealers do. In recent months, banks accounted for only about 5% of borrowing in the tri-party repo market against U.S. Treasury collateral. Because Basel III requires banks to hold HQLA on an unencumbered basis, repos (because they encumber HQLAs) are simply not an attractive source of funding for depository institutions in the ordinary course of business. Post Basel III, repos are no longer a primary, but rather next-to-last resort source of funding for banks. The idea behind holding more HQLA is to have enough safe assets on hand as collateral to raise liquidity in the repo market in case outflows accelerate unexpectedly, and not to encumber them because repo is a cheaper source of funding.

Fifth, could EFFR drift lower than forecast if late in the day trades get “low-balled” at 1 bp?

The answer is no. The “low tail” of fed funds trades is only about \$5 billion, a volume that is unlikely to move EFFR by much. In addition, the lowest rates on fed funds transactions typically print +/- 1 bp above the o/n RRP rate. They only drop deep below the o/n RRP rate on quarter-ends. The lowest fed funds trades will likely print around +/- 1 bps around the o/n RRP rate (see Exhibit 11). If below, FHLBs would opt for holding U.S. Treasury bills instead – 3 and 6-month bills auctioned at rates near 12 and 22 bps, respectively.

Exhibit 11: Deep Dives Limited to Quarter-Ends...

Source: Haver Analytics ®, Federal Reserve Bank of New York (FR2420), Credit Suisse

Sixth, could EFFR drift lower than forecast if FHLB Indianapolis (which is not an o/n RRP counterparty at present) started to lend in the fed funds market suddenly again?

The answer is no. During the quarters before Indianapolis stopped lending, it lent about \$1.5 billion on average, a volume unlikely to move EFFR by much if it came back online.

Seventh, could EFFR drift lower than forecast once the Fed switches its methodology to calculate EFFR?

Yes, but only about 1 bp and provided the Fed hikes this year, this will not be a T+1, but an early 2016 event – when the switch is scheduled to occur. The switch from reporting EFFR as a volume weighted mean to a volume weighted median will cause a slight downward drift. This is because the volume of trades that print well above EFFR is greater than the volume of trades that print well below EFFR (see [here](#)). The removal of these tails pulls the median EFFR slightly below the average (about 1 bp lower). The median has been trading closer to the o/n RRP rate than the average and on quarter-ends it **did** dip below it while the average has not. These preliminary findings (see [here](#)) are what may have prompted the Fed to start referring to the o/n RRP rate as a **soft floor** (versus a floor without qualifiers) in starting with the December 2014 FOMC meeting.

What does all this mean for 3-month LIBOR? The spread between 3-month LIBOR and EFFR has been stable around 15 bps since 2013, with a standard deviation of 2 bps.

Were this spread to hold at current levels, 3-month LIBOR would set around **49, 51 and 53 bps** under the spread, double and split scenarios, respectively, and at **52 bps** on average.

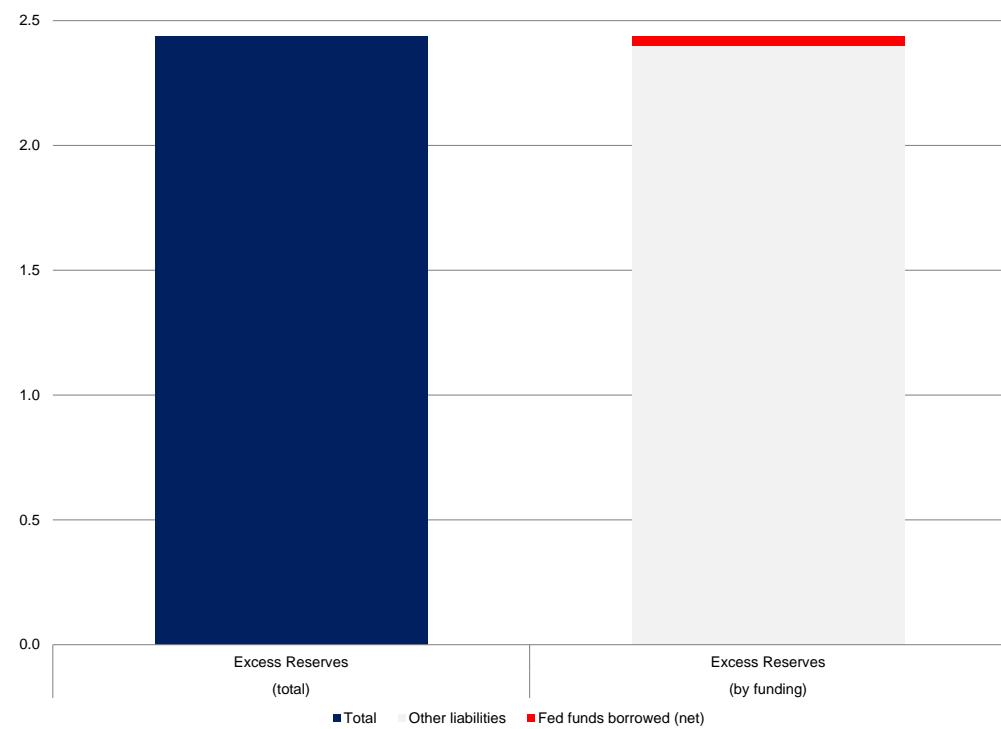
In practice, however, this spread will likely widen – not because bank credit risk will deteriorate, but because banks' demand for term funding **may** increase were cash pools to stampede out of bank deposits and crowd into money funds en masse (see below).

Liftoff and Bank Equities

No one seems to think about the fact that of the \$2.5 trillion of excess reserves in the banking system, only about \$50 billion are funded in the fed funds market though the EFFR - IOER arbitrage trade. That is less than 2% of excess reserves (see Exhibit 12).

Exhibit 12: The Tip of the Iceberg

\$ trillions, 2015Q1



Source: Federal Reserve (H.4.1), Federal Reserve Bank of New York (FR2420), Credit Suisse

What about the rest of the \$2.45 trillion of excess reserves in the system?

\$1.5 trillion of these are held by U.S. banks funded with institutional deposits. The rest are held by the New York branches of foreign banks and funded with yankee and Eurodollar CD and CP issued to prime money funds, as well as interoffice loans from headquarters also funded by Eurodollar deposits and Euro/U.S. dollar basis swaps (see Exhibit 13).

It is the pricing of these liabilities and the interest rate sensitivity of investors that hold them that will determine how large the RRP facility will get T+1 and in the following months.

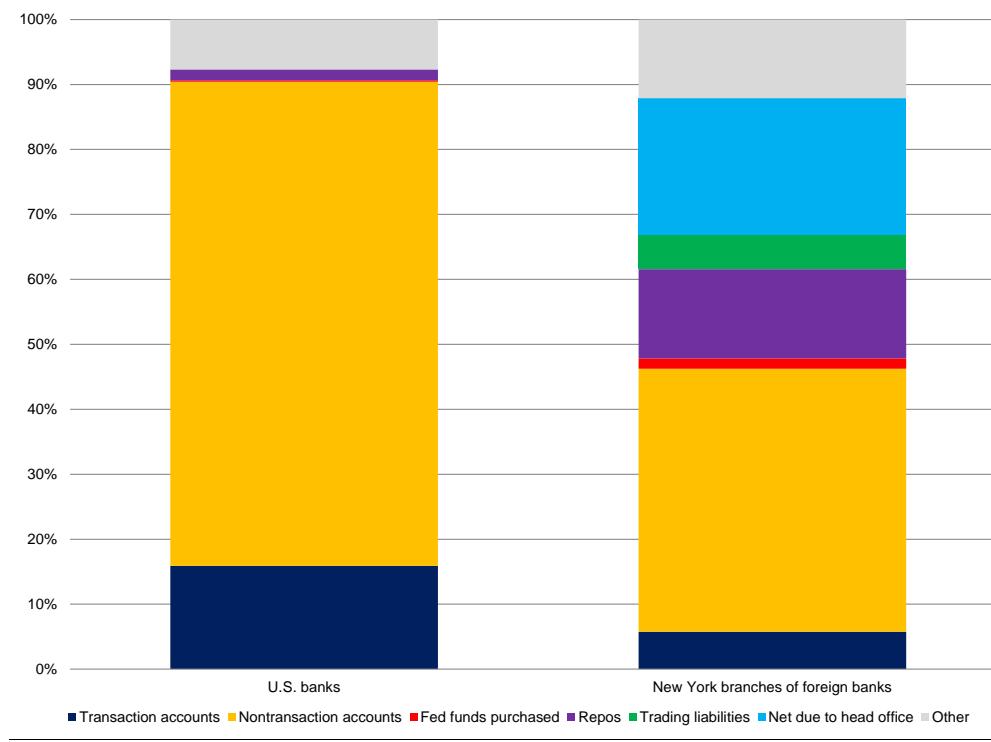
These flows are important, but completely ignored! The dynamics of the fed funds market get most of the airtime, but flows there are small, almost insignificant at the system level.

There will be two types of flows after liftoff: fast and slow.

Slow flows will involve cash pools trading out of institutional-class prime money funds and into government-only money funds. These flows will swell in anticipation of the October 2016 deadline for prime money funds to comply with SEC reforms to float their net asset values (NAV), **but only gradually**. Flows here will likely amount to roughly \$500 billion.

Exhibit 13: U.S. and Foreign Banks Fund Reserves Differently

Percent, 2015Q1



Source: FDIC, Credit Suisse

Fast flows will involve cash pools trading out of bank deposits and into government-only money funds. These flows may occur fast: either coincident with, or soon after liftoff. Flows here will likely amount to roughly \$500 billion as well.

Both fast and slow flows will ultimately net down to flows between banks and the Fed via money funds. The RRP facility will be the enabler of these flows (see Exhibit 14).

Slow flows – the institutional prime to government-only money fund flows – are unlikely to be disruptive. As money leaves, prime funds won't roll the yankee and Eurodollar CDs and CPs they bought from the foreign banks that used this funding to arbitrage the difference between IOER and money market rates on and offshore. The dynamics of these flows will be as simple as the example described on page 3: as foreign banks lose funding from prime funds and give up reserves, the Fed will swap reserves for RRPs for government-only money funds so they can absorb outflows from prime money funds, closing the loop.

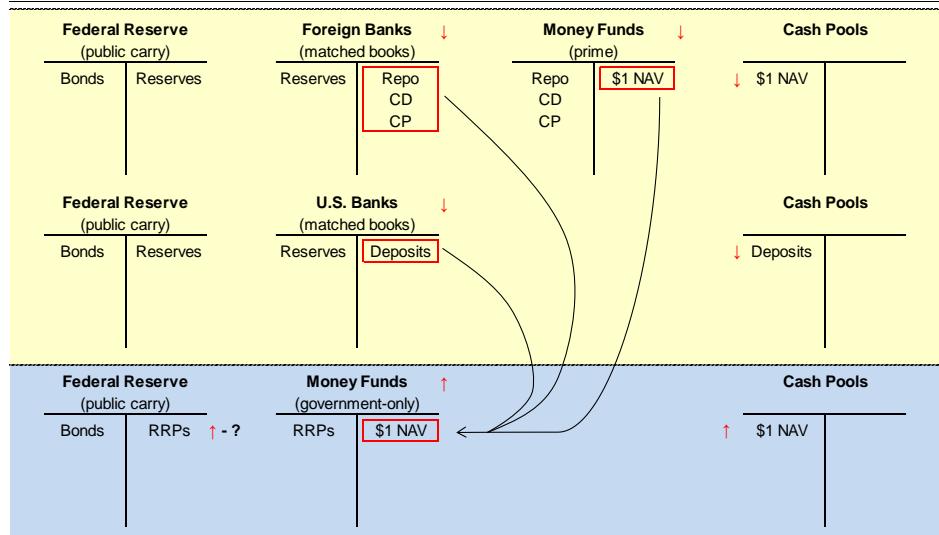
Fast flows – the deposits to government-only money fund flows – may lead to unforeseen dislocations, however. This is because the large U.S. banks that hold most of the hot money (in the form of non-operating institutional deposits) that could leave fast once interest rates move higher are positioned very differently for potential deposit outflows.

As it turns out, the largest U.S. banks hold similar amounts of non-operating deposits, but the HQLA portfolios backing them vary significantly from bank to bank (see Exhibit 15).

Someone won't get things right.

Estimating the exact amount and interest rate sensitivity on non-operating institutional deposits is not an exact science. The concept of non-operating deposits itself is a new concept (a creation of Basel III) and banks are presently building their systems and models to estimate their exact volume and behavior. The potential for model risks abounds.

Exhibit 14: Fast and Slow Flows

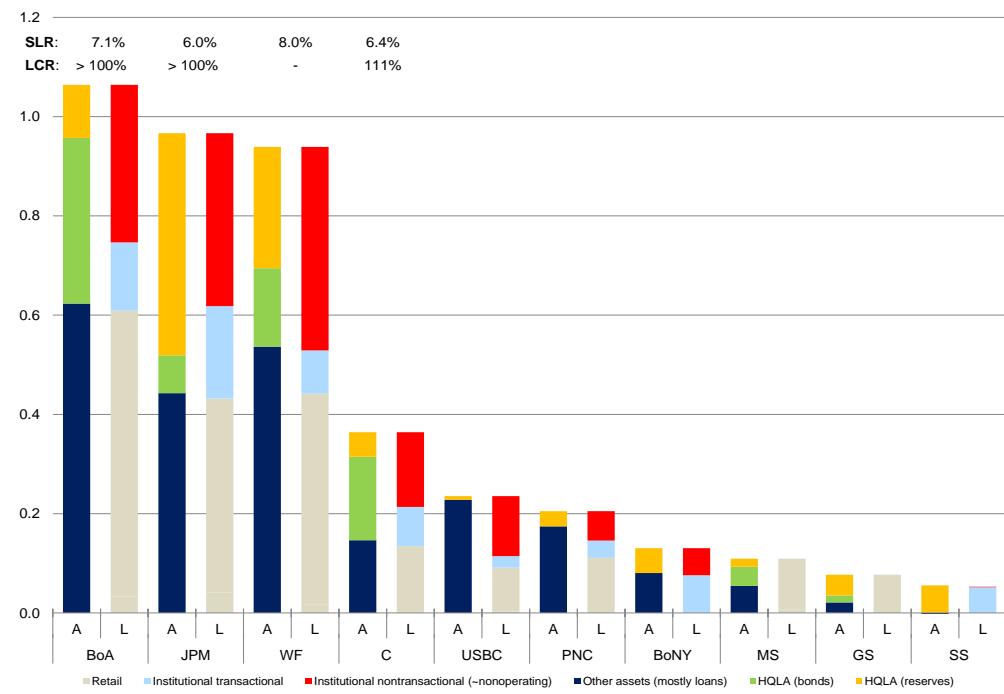


Source: Credit Suisse

Based on our impression listening to recent earnings calls, the executives and CFOs of big banks seem more confident about the **estimates** of how much non-operating deposits their institutions have and the interest rate sensitivity, stickiness and hence HQLA dimension of these deposits than the back-office modelers that generate these estimates.

Exhibit 15: Someone Won't Get Things Right

\$ trillions, 2015Q1



Source: FDIC, Call Reports (FFIEC031), company 10Qs, earnings presentations and fixed income investor presentations, Credit Suisse

Of particular interest is how much of non-operating deposits are those of financial institutions (such as asset managers, hedge funds, private equity funds and FX reserve managers) with a 100% HQLA requirement. Only one of the top four U.S. banks has disclosed that of the \$390 billion of deposits it had from financial institutions as of the first quarter of 2015, \$200 billion is non-operating (with a 100% HQLA requirement). Assuming a similar split at the other three top U.S. banks points to at least an additional \$450 billion of such deposits in the system. According to the U.S. Flow of Funds accounts, financial institutions hold \$1.1 trillion in deposits. If we are right, 60% of these are non-operating.

Losing these deposits will be a non-event for banks that have more reserves than non-operating deposits. As deposits leave for money funds, banks give up reserves, which the Fed will swap into RRP and give to money funds. The only trade that occurs in the financial system is the Fed swapping reserves for RRP – a non-event in markets.

As deposits leave, these banks will gain balance sheet relief and remain LCR compliant, freeing them up to do whatever they please with their surplus capital: buy back debt, buy back stock or compete retail deposits away from others – all positives for their equity price.

Life may not be so simple for banks that have fewer reserves than non-operating deposits, however. If deposits leave faster or in greater volume than assumed, these banks will have to choose between one of three options: (1) paying up for wholesale deposits in order to slow their outflow to a pace more in line with their HQLA profile (a first resort response); (2) repoing U.S. Treasuries from their HQLA portfolio to raise the liquidity to finance deposit outflows (as a next resort); or (3) sell U.S. Treasuries and other HQLA assets such as agency MBS right in the middle of a hiking cycle (as a last resort option).

Whichever one of these scenarios will dominate, one thing is for sure. These banks either won't gain balance sheet capacity as fast as those that are "over-reserved." Or if they do, the higher funding costs and trading losses incurred will weaken their ability to compete for (or much worse, retain) retail deposits – all potential negatives for their equity price.

A rising tide – rising interest rates – may not lift all boats as is typically the case during hiking cycles. The implication for bank equities is straightforward (see Exhibits 16).

Exhibit 16: Not All HQLA Portfolios Are Positioned for Balance Sheet Relief

\$ billions, 2015Q1

	Institutional Deposits		HQLA (by asset)			HQLA (by location)		
	Transactional ¹	Nontransactional ²	Reserves	US Treasuries	MBS	Bank	Dealer	Holdco
BoA	137	318	107	60	274			
JPM	186	348	447	11	65			
WF ³	87	410	244	81	76			
C	79	151	49	135	57	218	24	
MS	-	-	16	80	36	55	78	
GS	-	-	42	64	10	55	88	32

¹Some transactional deposits may be viewed by banks as "operating excess balances" and classified as nonoperating deposits instead.

²Proxy for nonoperating deposits.

³Unencumbered MBS only.

Source: Credit Suisse

Liftoff, Libor-OIS and the U.S. Treasury Market

It is far less obvious what the sum total of these flows will mean for the money and fixed income markets. Libor-OIS could certainly widen if banks that are under-reserved start paying more to slow the flow of non-operating deposits, or if they crowd into the repo market to "liquify" their HQLA. But when this widening will occur is not entirely obvious.

A lot will depend on how fast government-only money funds pass higher interest rates on to their investors. At the moment, money funds are "eating" the fees associated with their business – costs are not being passed on to investors. A key question is whether sponsors will keep the first hike to themselves or pass it on to investors promptly?

Our instinct says promptly – as soon as the first hike.

Were this to happen, Libor-OIS could widen as soon as T+1. What gives us confidence in this call is that from the banking system's perspective, Basel III (and, in particular, the Liquidity Coverage Ratio (LCR)) has dramatically reduced the attractiveness of institutional deposits and dramatically increased the attractiveness of retail deposits for funding.

On the other end of the spectrum, the SEC's money fund reform has dramatically reduced the attractiveness of institutional-class prime money funds and dramatically raised the attractiveness of institutional-class government only money funds. And the attractiveness of retail money funds (both prime and government-only) has been reduced somewhat.

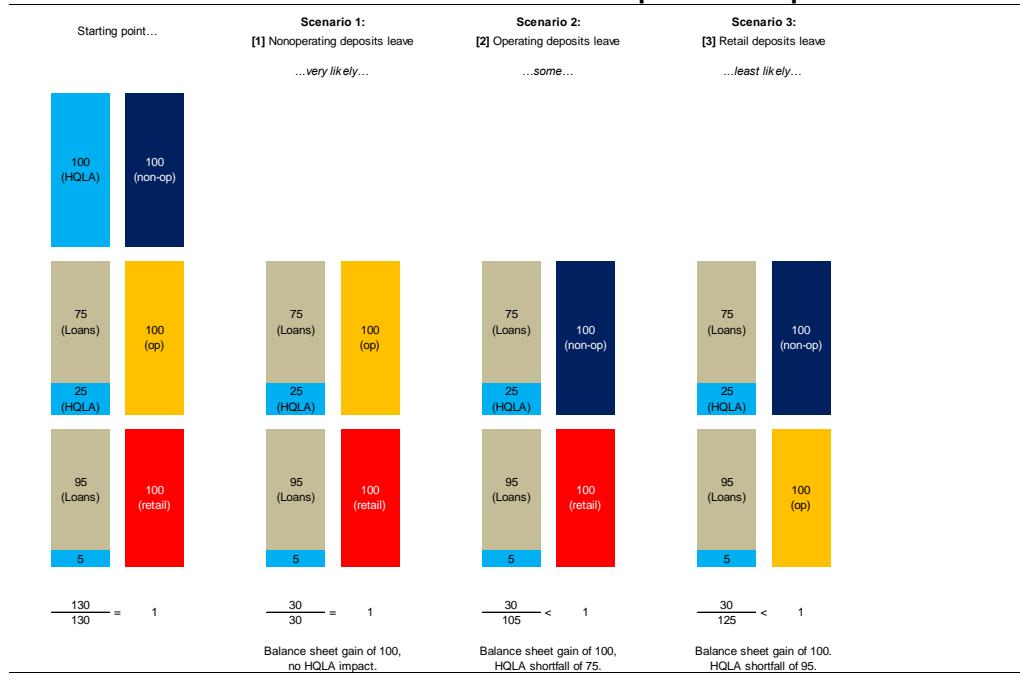
Under the LCR, banks only have to hold 3-5% of HQLA for each dollar of retail deposit. These numbers jump to 40% and 100% for non-operating institutional deposits depending on their type, with huge (essentially make-or-break) implications for banks' net interest margins and return on equity. These rules make it abundantly clear that the fight for **retail** deposits – both between banks and money funds and between banks – will be fierce, unlike anything we have seen in past hiking cycles. And as banks concentrate their efforts to retain retail deposits, they will fight much less aggressively for institutional deposits.

Money funds will do the exact opposite.

They will compete fiercely among each other for the **institutional** deposits that banks do not want (one large asset manager recently announced a new business unit specifically to this end), and fight less for retail deposits. In addition to the higher deposit rates retail depositors are set to get from banks, deposit insurance limits are also much higher post-crisis (\$250,000, up from \$100,000 before the crisis), which would make competition for retail money harder and margins on retail funds narrower than on institutional-class funds.

Other fixed income themes all derive from scenarios for deposit outflows (see Exhibit 17).

Exhibit 17: Basel III Hardwires the Asset-Side Response to Deposit Outflows



Source: Credit Suisse

The examples discussed in the previous section all describe scenarios where non-operating deposits with a 100% HQLA requirement leave and some banks are under-reserved. In a worst case, banks may have to sell U.S. Treasuries from their HQLA portfolios. Such sales would pressure the year segment of the curve: our analysis of who holds U.S. Treasury debt (see [here](#)) suggests that banks have concentrated their recent purchases in that segment of the curve. But competition for retail deposits between banks could push in the opposite direction: as some banks lose **retail** deposits, they may face HQLA shortfalls and may have to buy U.S. Treasuries to make up for this shortfall (also see our mortgage market team's comment on the potential for HQLA shortfalls [here](#)).

Which way the balance will tip is hard to say but rising volatility in the year segment of the U.S. Treasury curve is high and not something the market is currently pondering.

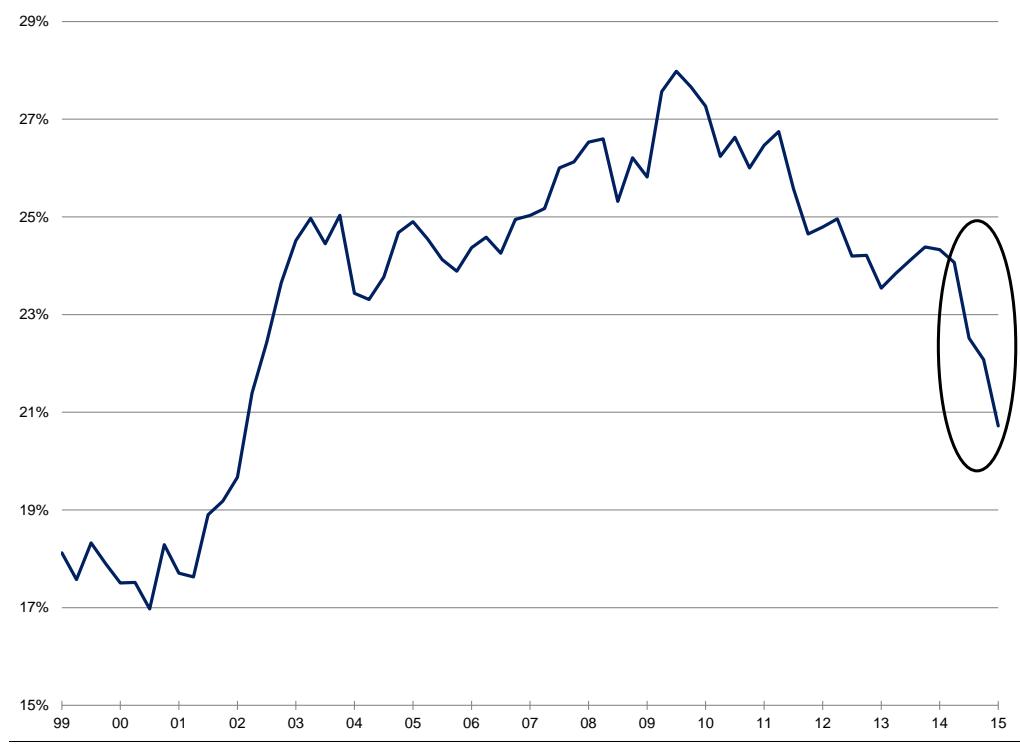
Liftoff and the Dollar

Finally, there is a currency dimension to the exit: the potential for a reallocation out of euros for U.S. dollars for reasons that lurk in the deepest berths of the global plumbing.

Since the ECB cut deposit rates below zero in June 2014, FX reserve managers have been reducing their EUR exposure. The euro's share of global FX reserves fell from 25% to 20% by March, 2015 (see Exhibit 18). The U.S. dollar absorbed all of these flows.

Exhibit 18: Negative Rates Can be Painful

The euro's share of global reserves



Source: IMF, Credit Suisse

The entity that absorbed these U.S. dollar inflows was none other than the New York Fed, through an RRP facility – the foreign repo pool – it maintains for FX reserve managers (see Exhibit 19). This facility is separate from the one the Fed will rely on for liftoff.

Balances outstanding in the foreign repo pool averaged around \$100 billion during the first half of 2014 and then shot up to \$160 billion fast in the months after the ECB's move, indicating reserve managers' strong demand for safe, short-term, U.S. dollar instruments.

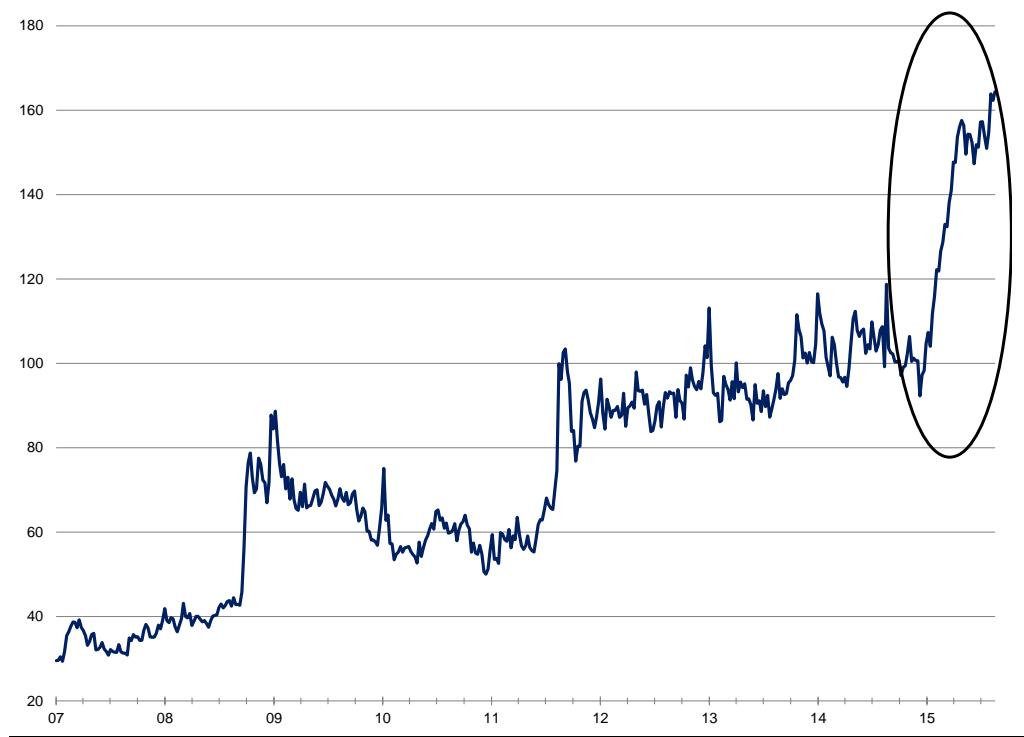
But the foreign repo pool is not full allotment. Its size is determined by the New York Fed.

Yield differentials matter, and quantities do too. At the moment, FX reserve managers face a shortage of short-term dollar-denominated sovereign instruments that could absorb their flows out of euros and into dollars. Deposits at U.S. banks are not an option for two reasons: most FX reserve managers are only allowed to hold claims on the sovereign (claims on banks are claims on the private sector) and banks themselves would turn such deposits away as they classify as non-operating deposits with a 100% HQLA requirement.

But these flows and corresponding pressures on the euro's value versus the U.S. dollar could grow further if the Fed delivers a full allotment RRP facility during liftoff. A full allotment facility could lead to money funds trading out of U.S. Treasury bills (money funds hold about \$250 of Treasury bills; see pp. 17 [here](#)), leaving more for FX reserve managers to invest in. This in turn could unlock flows that are constrained by quantities at present...

Exhibit 19: The “Other” RRP Facility - the New York Fed’s Foreign Repo Pool

RRPs' liabilities to foreign official accounts, \$ billions



Source: Federal Reserve (H.4.1), Credit Suisse

Conclusions

The Fed is between a rock and a hard place.

If it worries too much about the turbulence we highlight, that may follow from a full allotment RRP facility, it runs the risk of not being able to control short-term interest rates.

If it wants to demonstrate its ability to control short-term interest rates, it must live with turbulence during liftoff despite all its communication efforts to ensure the opposite.

In the end, mechanics will trump rhetoric. The side-effects of financial re-regulation will trump the good intentions of enhanced monetary policy transparency.

Get ready for a turbulent exit...

Appendix – The Politics of the Exit

Initially, the Fed's intention (or more precisely the New York Fed's intention, in agreement with then Chairman Ben Bernanke) was to turn RRPs into fixed rate, **full allotment** operations. However, this idea soon hit the wall of concerns raised by regional Fed presidents and differences between the New York Fed and the Federal Reserve Board.

Four concerns emerged in particular. The first three are entirely misplaced and the fourth could have been dealt with through more deft communication, but never was.

The first concern (voiced mostly by regional Fed hawks) was that a full allotment RRP facility would keep the size of the Fed's balance sheet large for a long time to come, which would bring with it "obvious" inflationary risks. This concern is misplaced. Inflation is nowhere to be seen, and the size of the Fed's balance sheet certainly does not drive it.

The second concern was that a full allotment RRP facility would "disintermediate" banks. This concern is also misplaced. If anything, banks view excess reserves more as a burden rather than a boon. When combined with the supplementary leverage ratio (SLR), excess reserves dilute banks' net interest margin and return on equity. It is true that at the moment banks hold hundreds of billions worth of excess reserves as HQLA, but they could hold other instruments at no haircut as well, namely U.S. Treasury securities. The liquidity coverage ratio (LCR) does not require banks to hold ultra short-term assets – such as reserves – but with the stock of excess reserves determined by the Fed, the banking system as a whole simply has no choice. **Some** swapping of reserves for RRPs may actually be neutral from an LCR perspective (see below), and if anything, banks would ideally prefer more, not less choice as to how they structure their HQLA portfolios.

The third concern was that a full allotment RRP facility would increase the size of money funds – entities not under the direct supervision of the Fed. This concern is misplaced as well. Money funds are far more transparent and easier to understand for regulators than banks, and with the SEC's recently concluded reforms of the sector, a safer set of vehicles to enable liftoff. While it is true that the Fed does not directly supervise money funds, it does have a powerful seat on the Financial Stability Oversight Council which in turn wields powers granted by Congress to require any financial entity to submit information, submit to Fed supervision and in extremis meet prudential standards set by the Fed.

The fourth concern was that a full allotment RRP facility would encourage runs during a crisis. This concern is also misplaced, but could easily have been dealt with by more deft communication. Those in favor of a full allotment RRP facility could have articulated the difference between the meaning of full allotment in "peace time" and "war time."

In "peace time," essentially now, the notion of full allotment is about how to calibrate the mix between reserves and RRPs given no change in the size of the Fed's balance sheet. Here, full allotment is about the Fed's **ability to control short-term interest rates**. The question is how high to build the wall of the Hoover Dam for normal times (see above).

In "war time," that is during systemic crises, the notion of full allotment is about the Fed increasing the size of its balance sheet when the pressure is on to issue the supply of safe assets. The question is how much to add to the height of the Hoover Dam when a tsunami is about to surge downstream. It relates to a deeper question of whether to follow the Bank of England down the path of Dealer of Last Resort that the Fed will have to spend some time thinking about, but the way officials have been talking about RRPs so far is one sided. Balance sheets never increase on one side only, and if during the next crisis the Fed were to increase the supply of RRPs on the liability side of its balance sheet, it would also have to do something else on the asset side. Whether that will be outright asset purchases from asset managers (via dealers), repos (TOMOs) with dealers **in size**, or discount window loans to banks won't matter. What will matter is that the collateral that comes in through either of these operations will be in exchange for central bank funding. In this context,

RRPs would **not** facilitate a run, but provide a safe asset in a new (not yet familiar) form – not in the form of currency or reserves but RRP. In this context, RRP are no different from a surging supply of U.S. Treasury bills (in the form of SFP bills) during the 2008 crisis.

To make up for everything a fixed rate, fixed allotment facility was not, two additional tools entered the debate – the term deposit facility (TDF) and segregated cash accounts (SCA) – both of which have more to do with internal Federal Reserve politics than substance.

RRPs, the TDF and SCAs all aim to achieve one thing, which is to reduce the amount of excess reserves in the banking system to a point where reserves are scarce again and there are more incentives for banks to trade them to meet regulatory requirements.

RRPs reduce the amount of excess reserves by swapping them into a liability that can be held by money funds. The idea of RRP originated at the New York Fed.

TDFs reduce the amount of excess reserves by swapping reserves into term deposits, which, unlike reserves, cannot be used to meet reserve requirements. The TDF was an idea of the Federal Reserve Board, to address discomfort with the New York Fed's plan to rely on money funds as the enablers of liftoff. Banks don't seem too excited about the TDF, however. They typically swap existing reserves for TDs, but do not borrow to get them.

SCAs reduce the amount of excess reserves by stapling reserves to deposits such that reserves de facto become the assets of deposit holders and cease to be the assets of banks, such that banks would no longer be able to use them to meet reserve requirements. SCAs were an idea of Jamie McAndrews, head of research at the New York Fed (see [here](#)). Like the TDF, SCAs were also conceived to address discomfort with money funds.

Importantly, however, it is only RRP that reduce excess reserves in a way that provides balance sheet relief for banks. The TDF and SCAs do not and both are subject to the same Basel III constraints and transmission bottlenecks as excess reserves that we described in Global Money Notes #1 (see section "Basel III Disrupts Arbitrage" [here](#)).

On the importance on achieving reserves scarcity with balance sheet relief, consider that the New York Fed in its flagship presentation on the exit (see [here](#)) places great emphasis on how RRP give banks balance sheet relief, while the TDF does not; how RRP reduce banks' balance sheet costs, while the TDF does not; and how RRP enhance welfare, while the TDF does not. That's three pages in a 30-page report devoted to praising the attractiveness of o/n RRP over the TDF, authored by someone who according to the attendance [log](#) of the March FOMC meeting was in the room helping the Manager of the System Open Market Account brief the FOMC on how to size the o/n RRP facility for liftoff.

On the important matter of pricing, also consider that both the TDF and SCAs cost more than RRP. The TDF is priced at a slight premium over IOER versus a deep discount for RRP, and SCAs would be priced at a slight (not a deep) discount to IOER (see [here](#)).

Pricing and balance sheet relief do matter, which is why the Fed has ultimately decided to put more muscle behind RRP than the TDF as the primary "crutch" under short-term interest rates during liftoff. SCAs seem to have faded as an idea altogether.

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Global Money Notes #3

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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.

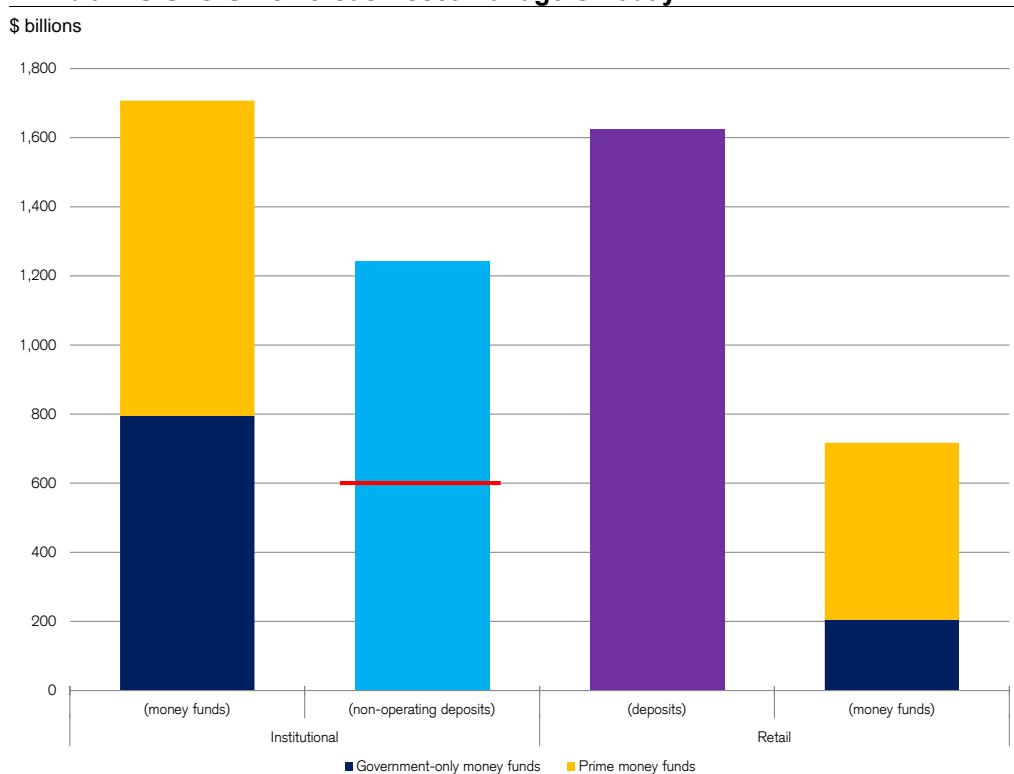
Exhibit 1 shows how funds are presently distributed in the U.S. money market.

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

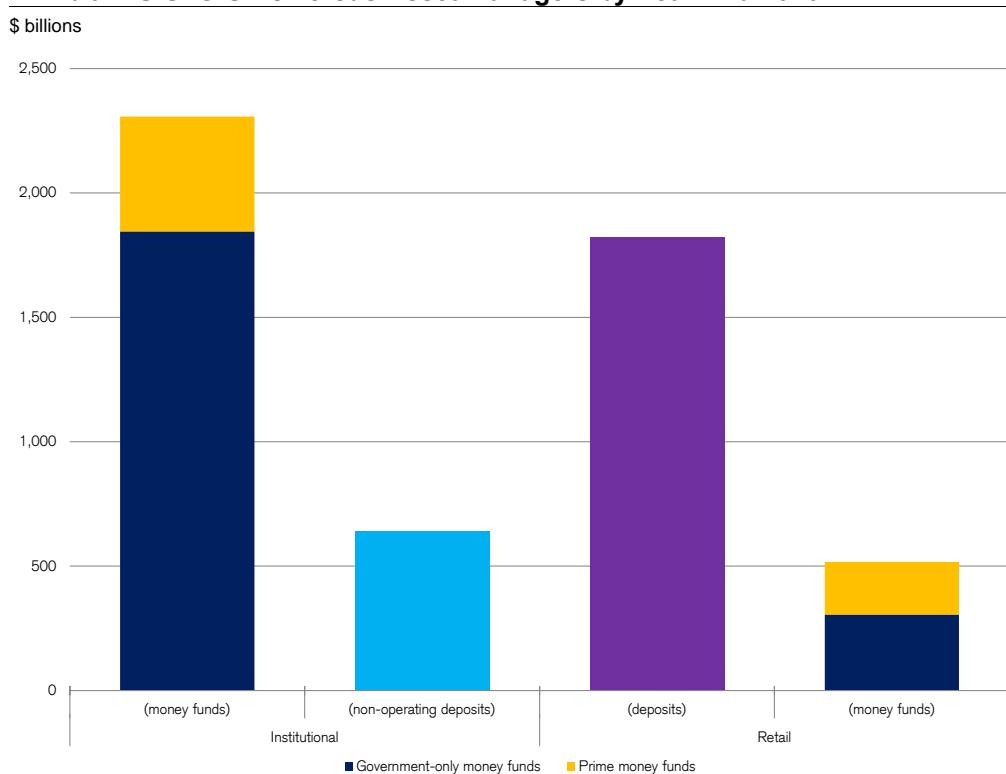
ROEs on retail versus wholesale deposits are so different because Basel III requires banks to invest only 5 cents of every dollar of retail deposits into high-quality (but relatively low-yielding) liquid assets (HQLA), whereas a bank may have to invest as much as 100 cents of every dollar of certain 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

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.

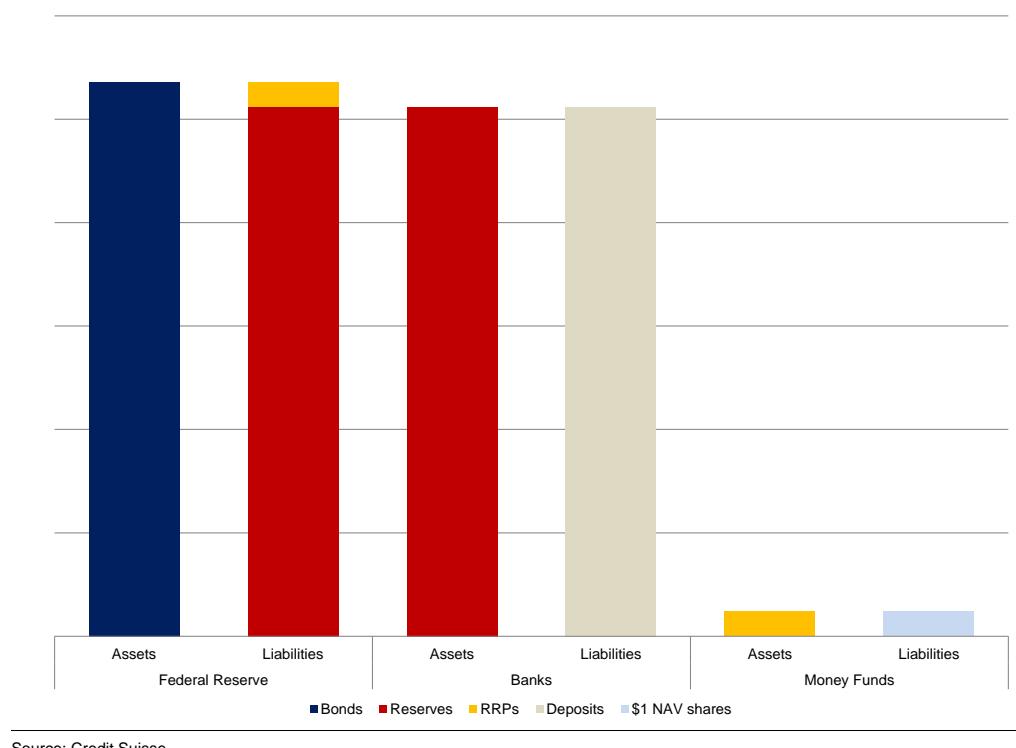
As AuMs from existing investors are set to shrink, and a bigger share of a shrinking pie will likely go to lower-margin government-only money funds, it will be imperative for money funds to grow their business by trying to attract new sources of cash by going after wholesale deposits in the banking system. 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 RRPs. 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 RRPs, and the Fed will passively accommodate the order flow for one instrument versus the other, **swapping** (a more accurate term than draining) reserves for RRPs.

Exhibit 3: The Financial System with a Small RRP Facility

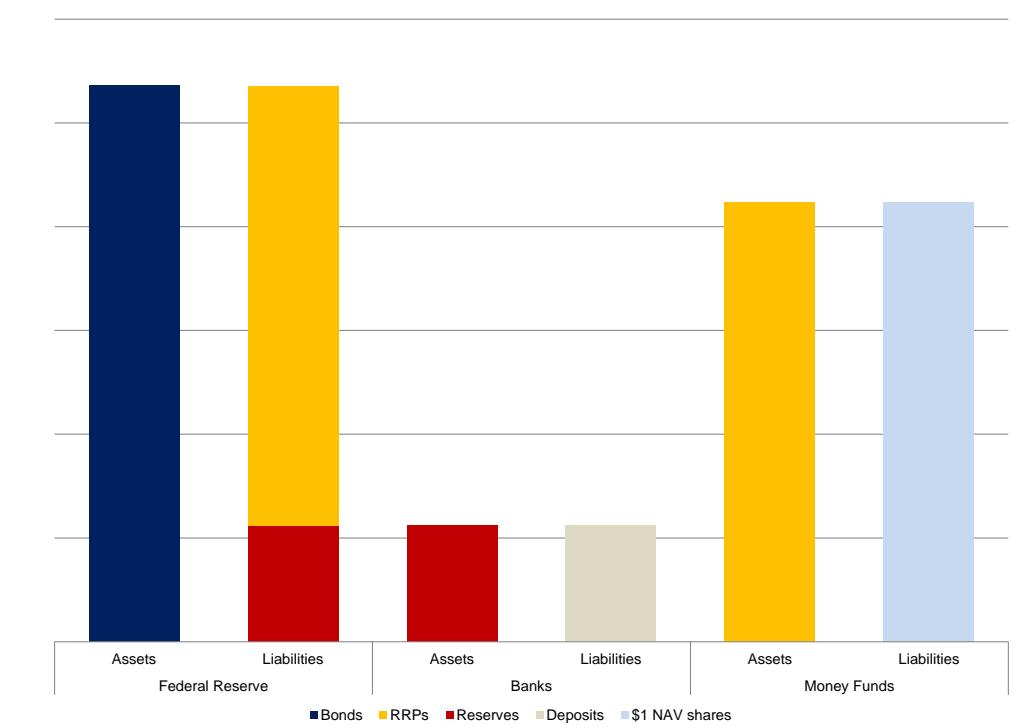
The financial system at present; no scales, chart for illustrative purposes only.



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 RRPs 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 RRPs 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 RRPs 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.

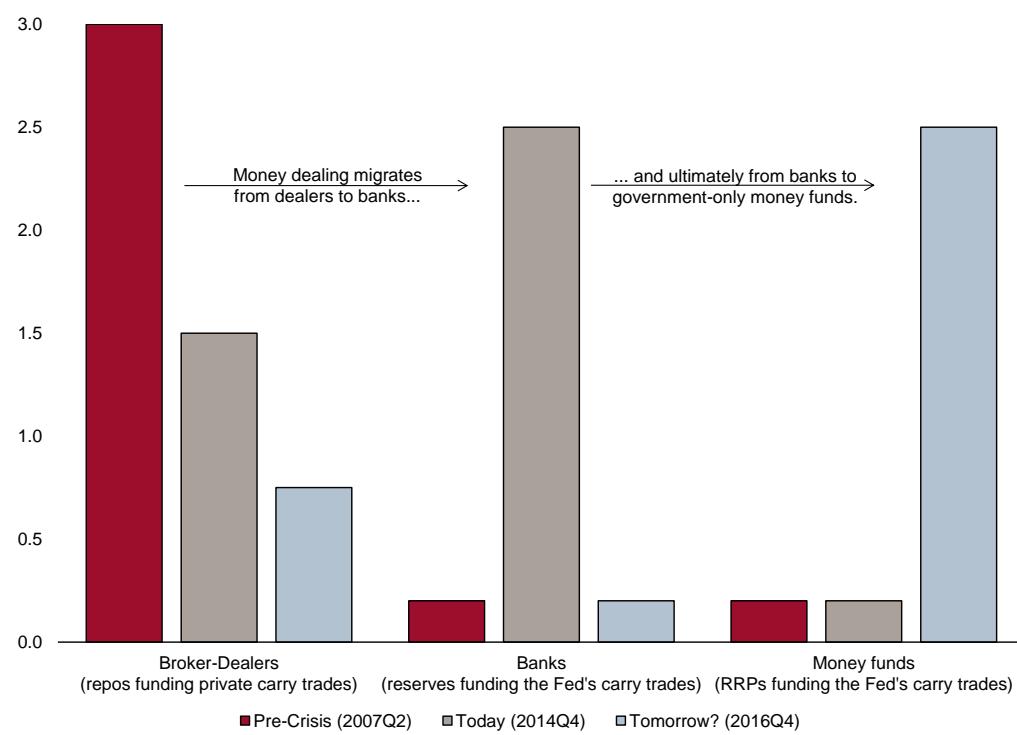
Finally, another reason why we believe money funds' fees will need to remain structurally lower going forward is that if a large RRP facility will remain a permanent feature of the financial ecosystem and RRPs will become the core asset of money funds' portfolios, it will be difficult for money funds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

For money funds, RRPs 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, buyside² 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 Buyside 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 buyside 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 buyside 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 – "Buyside 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 buyside 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, Fl)	x	x	x	100 (non-op, Fl)	x	100 (non-op, Fl)	x	100 (non-op, Fl)	Buyside Deposits OK to lose, if liquidity matters
60 (Credit) 40 (HQLA)	100 (non-op)	60 (Credit) 40 (HQLA)	100 (non-op)	60 (Credit) 40 (HQLA)	100 (op)	75 (Credit) 25 (HQLA)	100 (op)	75 (Credit) 25 (HQLA)	100 (op)	Corporate Deposits Right, can't lose
95 (Credit) 5	100 (retail)	95 (Credit) 5	100 (retail)	95 (Credit) 5	100 (retail)	95 (Credit) 5	100 (retail)	90 (Credit) 5	100 (retail)	Retail Deposits X
$\frac{170}{170} = 1.0$		$\frac{70}{70} = 1.0$		$\frac{70}{130} < 1.0$		$\frac{70}{145} < 1.0$		$\frac{70}{165} < 1.0$		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 buyside 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 chose 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 chose 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 chose 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:

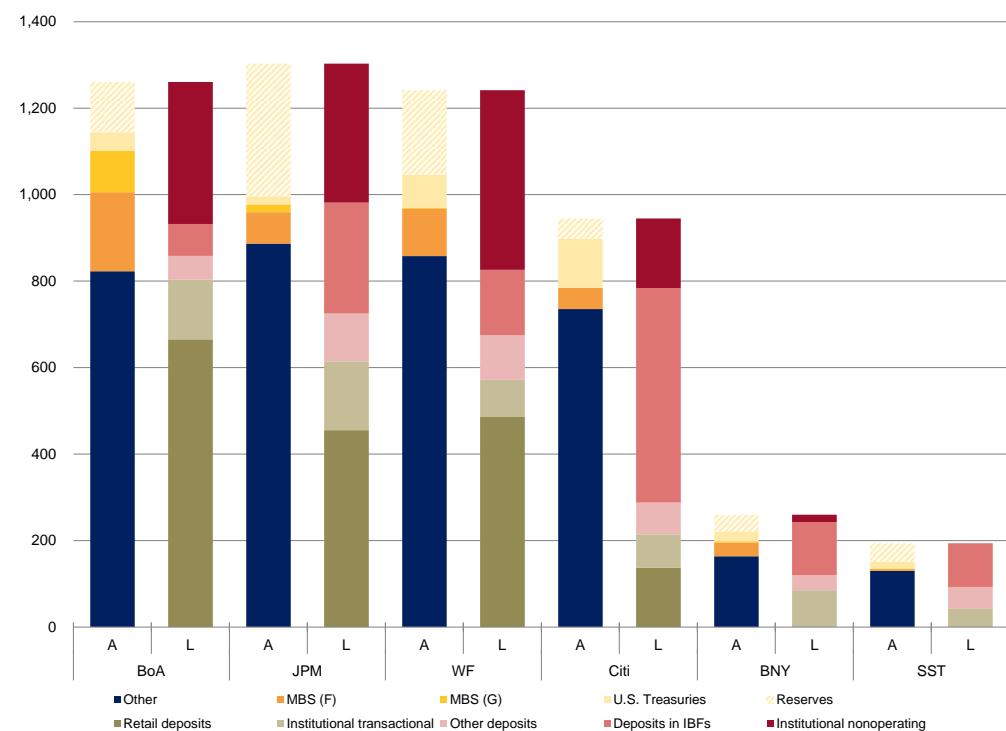
1. Our focus is outflows from deposits into money funds and the swapping of reserves into RRPs. In a large bank holding company every penny of reserves and every penny of deposits are booked in the holdco's bank operating subsidiary. The broker-dealer subsidiary and the holding company have none of these.
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 takeoff.

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 buyside. 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 Level 1	MBS (G)	MBS (F) ¹ Level 2	Nonint.-bearing ²	Deposit profiles... ³ ...at 100% LCR	...at 125% LCR	
BoA	106.8	64.1	88.3	168.1	279.9	87%	65%	183.0
JPM	447.4	19.4	13.7	88.0	250.1	81%	60%	215.2
WF	244.4	71.7	2.0	90.5	243.1	61%	46%	84.6
Citi	49.4	111.4	0.6	39.3	58.2	22%	12%	-
BNY	50.1	27.4	2.9	31.2	95.2	182%	95%	31.7
SST	55.6	12.4	1.9	4.4	20.9	-	-	-
Total	953.7				947.3			514.5
2015Q3								586.0

	HQLA (by type)				Institutional Nonoperating Deposits			Credit (bonds)
	Reserves	U.S. Treasuries Level 1	MBS (G)	MBS (F) ¹ Level 2	Nonint.-bearing ²	Deposit profiles... ³ ...at 100% LCR	...at 125% LCR	
BoA	116.6	42.3	96.1	182.8	294.9	86%	64%	185.1
JPM	306.7	18.8	17.8	72.9	238.2	62%	44%	65.6
WF	195.2	77.2	1.9	109.5	248.2	55%	41%	39.4
Citi	47.4	112.4	0.8	48.7	64.3	23%	14%	-
BNY	39.2	22.3	2.7	31.6	94.0	107%	50%	18.5
SST	42.6	15.7	1.6	3.9	16.4	-	-	-
Total	747.8				956.0			308.5
2015Q3								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.

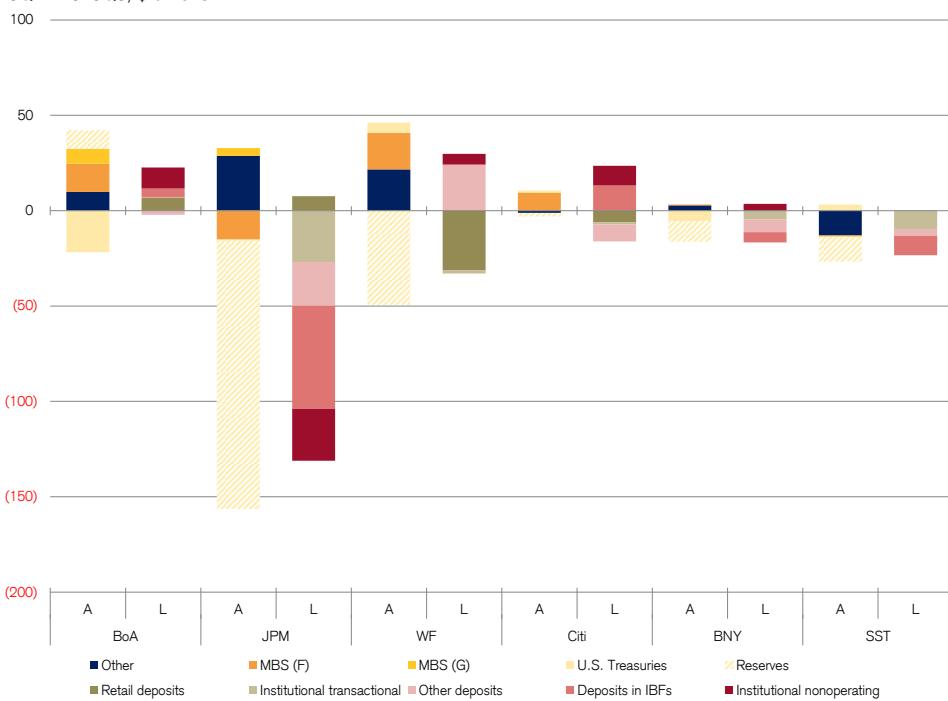
JP Morgan stands out in Exhibits 7 and 8 as a bank that is particularly conservative in its HQLA profile (which, as shown in the last column of Exhibit 8, is also paired up with a large credit portfolio). Were all its institutional non-operating deposits to leave, it would have sufficient cash at the 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, buyside 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).

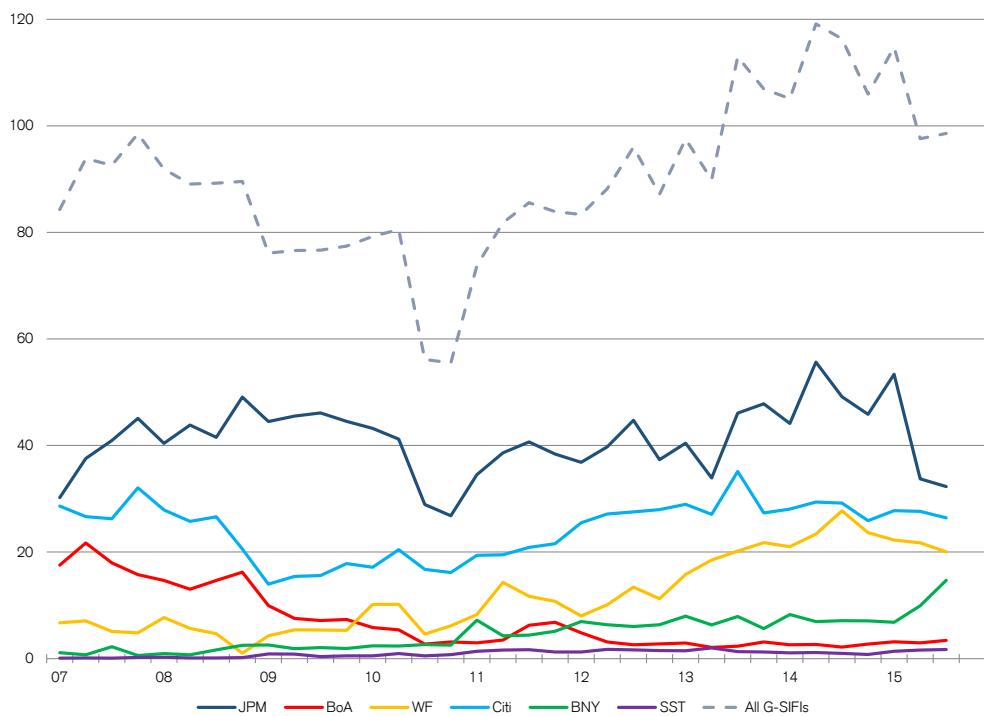
JP Morgan appears systematically over-reserved relative to Bank of America.

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

\$ billions

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

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

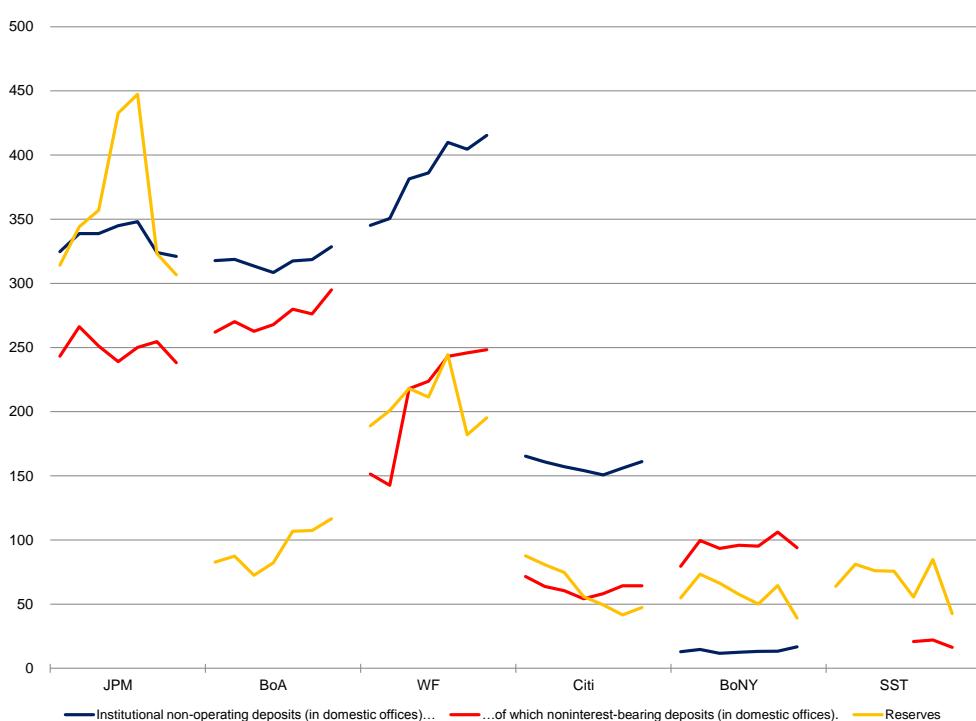
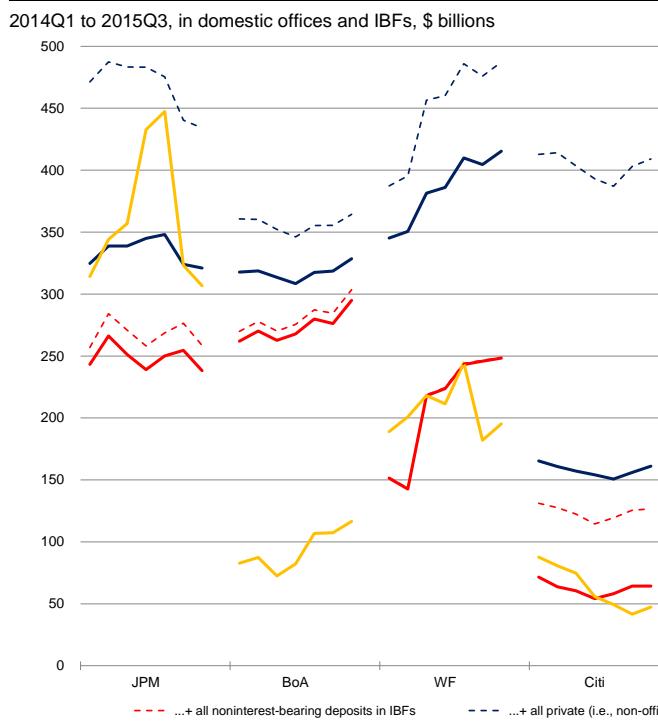


Exhibit 12: Cash Balances Relative to Fickle Deposits (Global)



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 breaches 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.

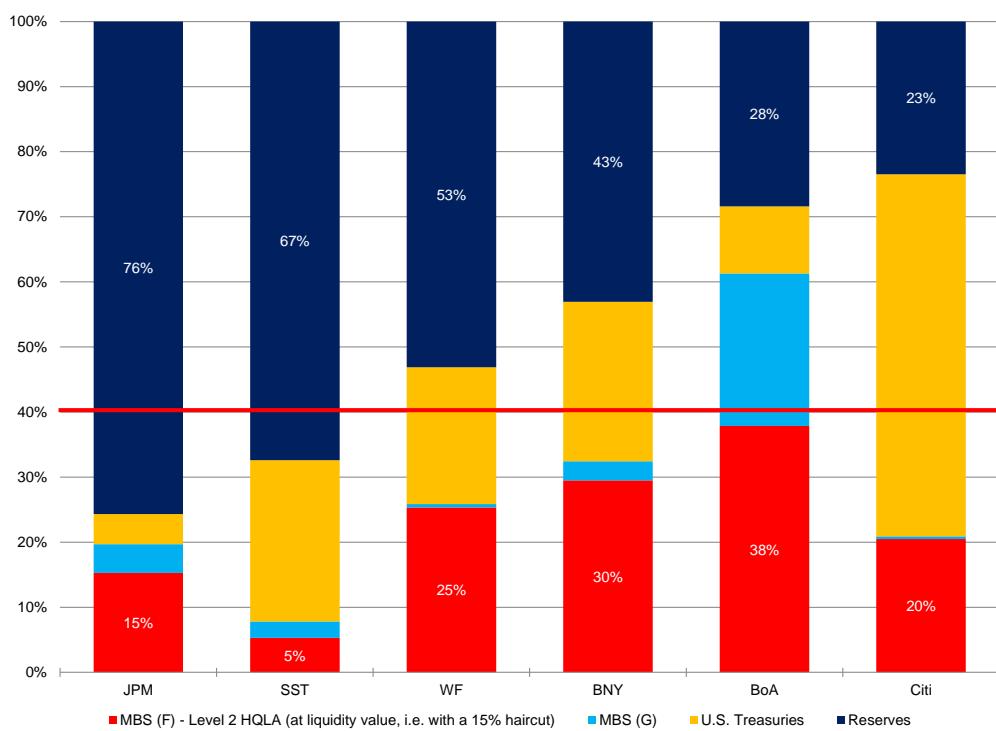
Banks that have booked most of the bonds in their HQLA portfolio in the available for sale (AFS) book are exposed to mark-to-market declines (through the AOCI filter) eroding their regulatory capital as rates rise and the value of fixed income assets deplete.

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

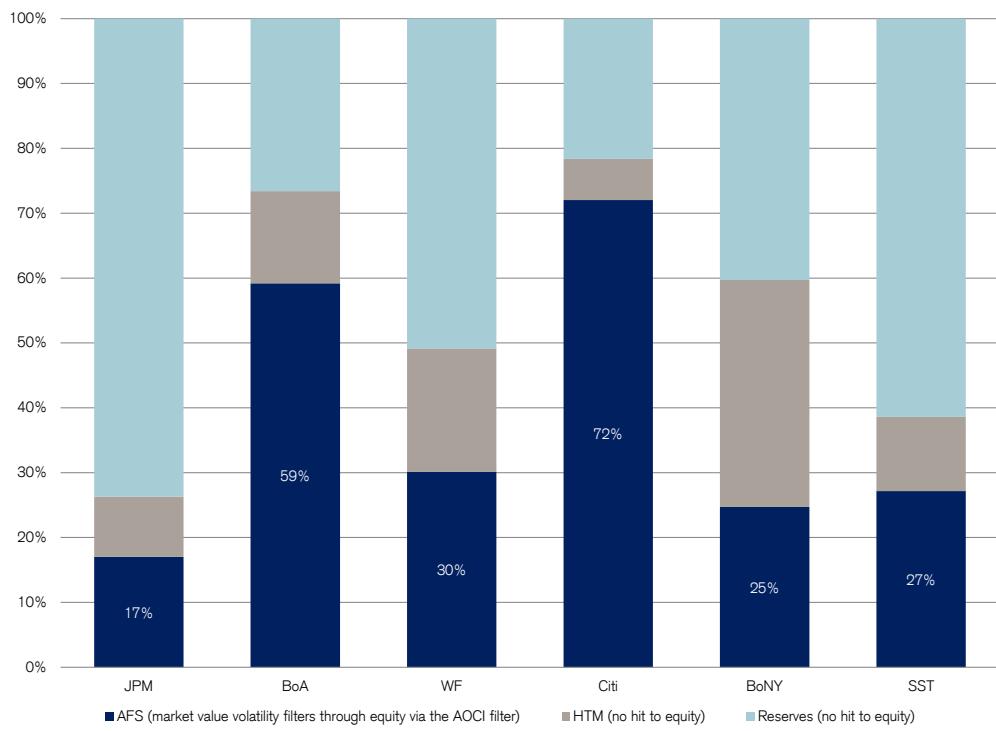
% of HQLA portfolios



Source: Call Reports (FDIC), Credit Suisse

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

% of bond HQLA booked in banks' available-for-sale vs. hold-to-maturity portfolios, 2015Q3



Source: Call Reports (FDIC), Credit Suisse

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), bps	25	50	50	50	50	
FDIC fee (bank pays), bps	5	5	5	5	5	
Deposit rate (client receives), bps	0	0	25	20	20	
NIM, bps	20	45	20	25	25	
SLR (bank)	6.0%	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.

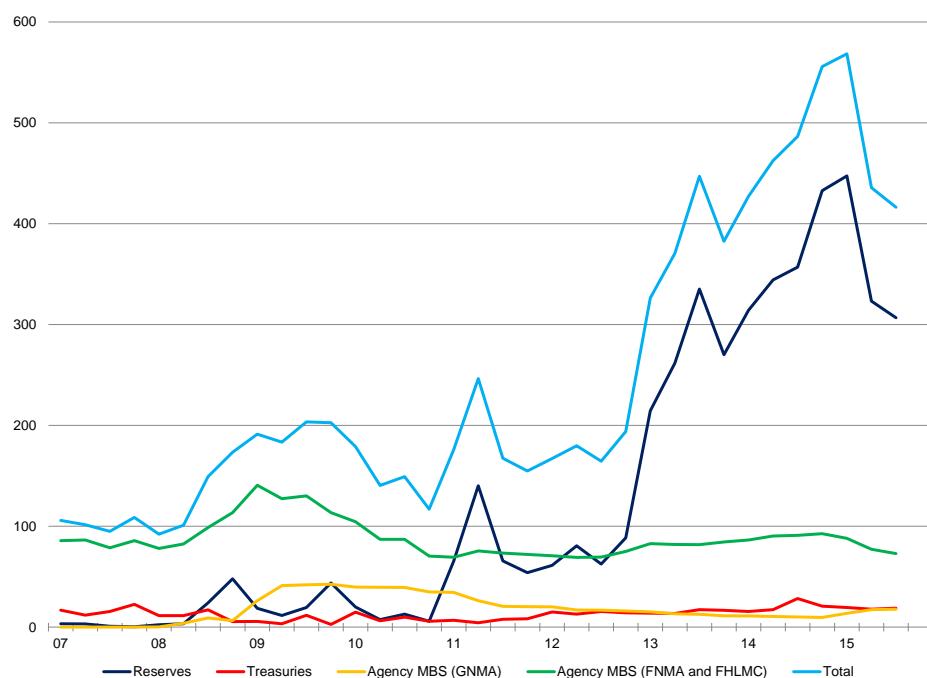
For the bank, offering 20 bps on these deposits (the "In-Between" scenario) is still a low RoE trade, so it will try to offer a lower rate or offset the 20 bps with fees.

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

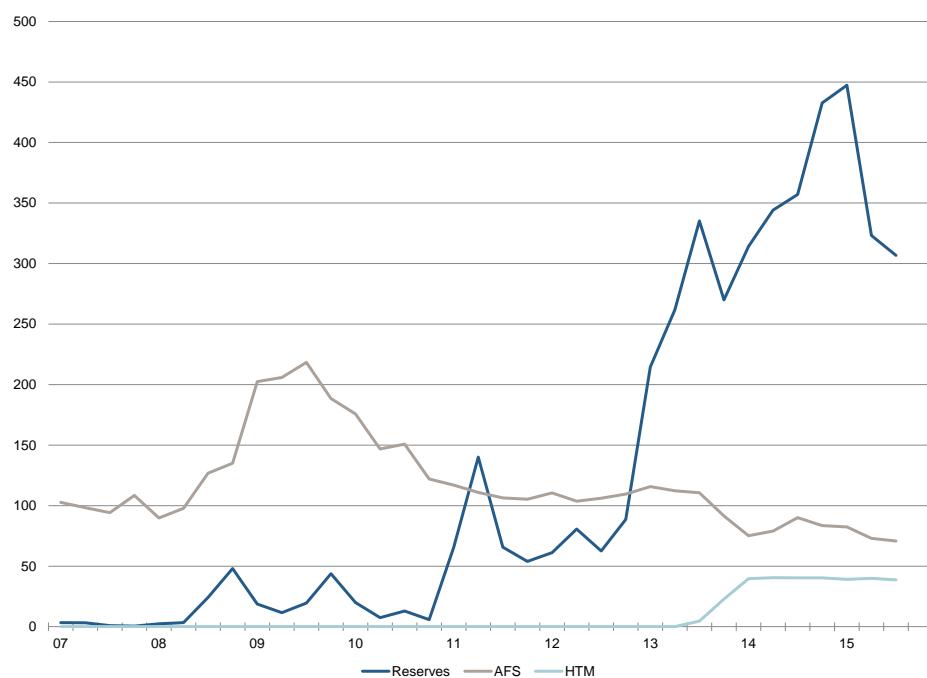
\$ billions



Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-2: JPMorgan Chase Bank, NA

\$ billions



Source: FDIC (FFIEC031), Credit Suisse

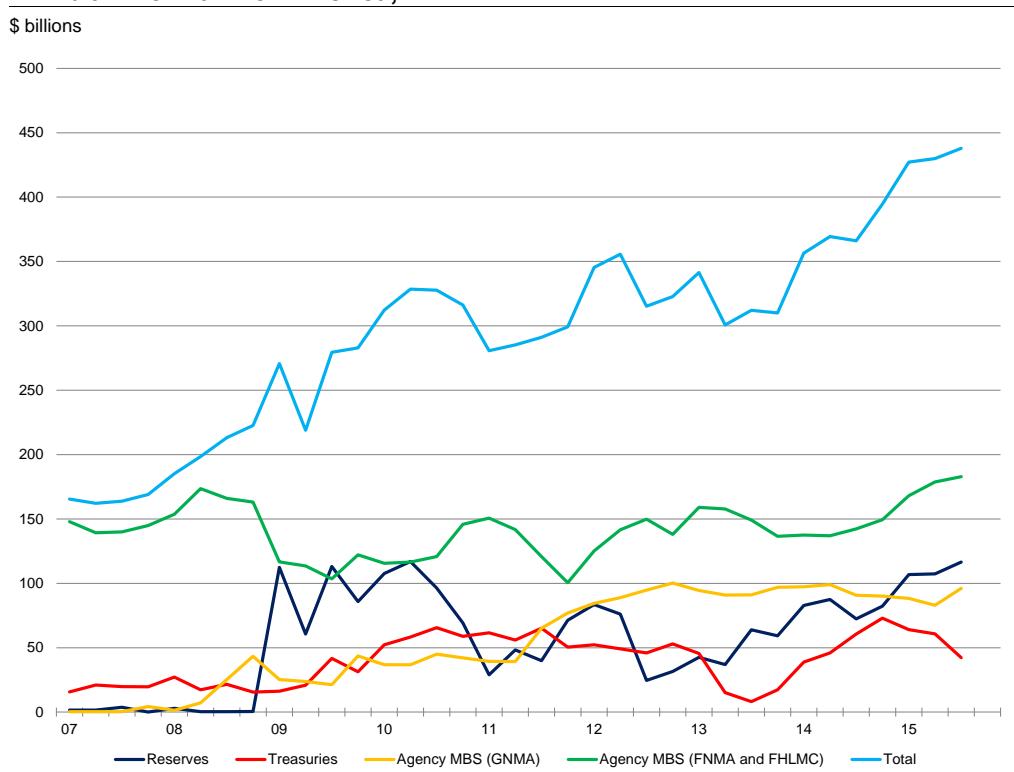
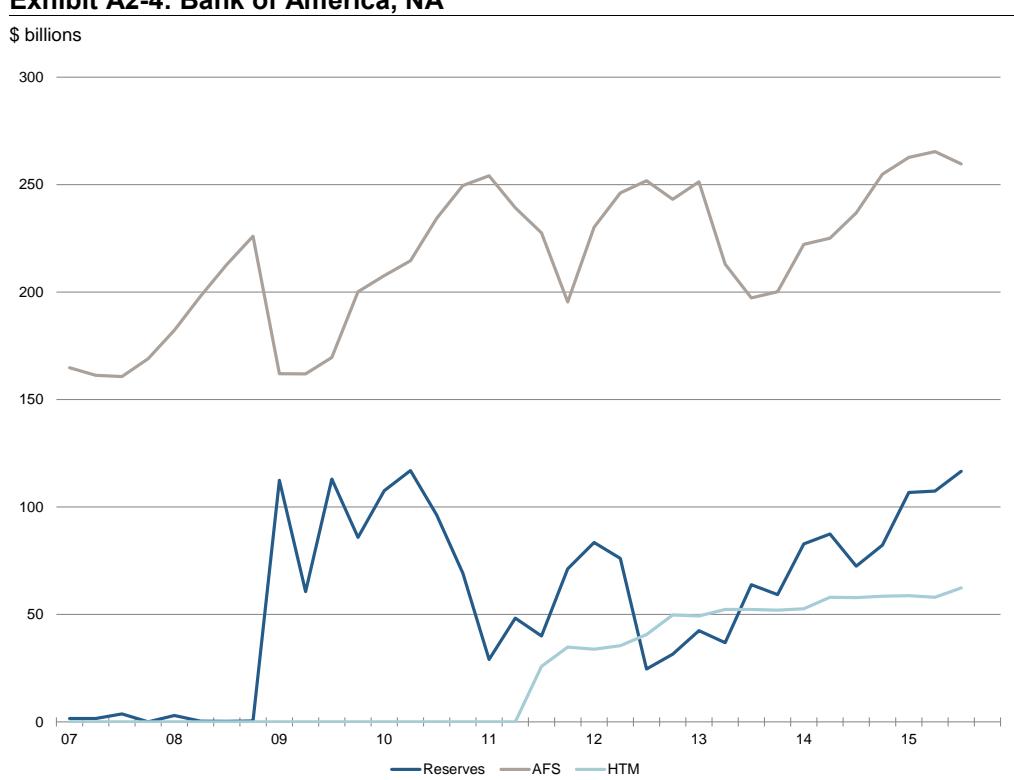
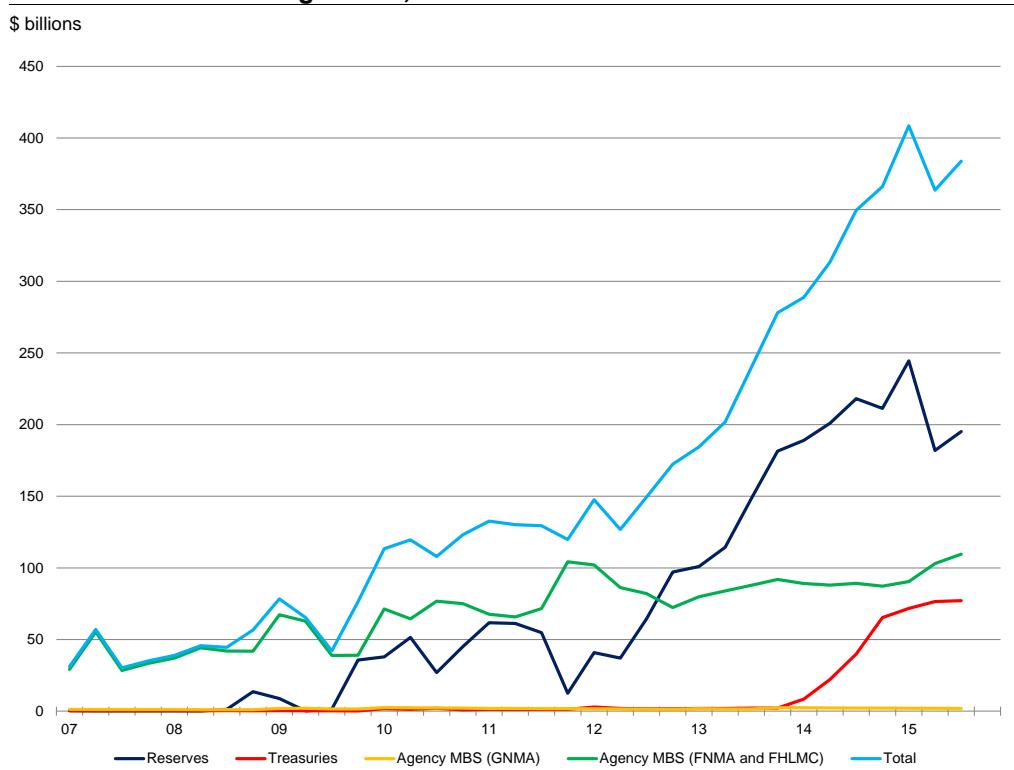
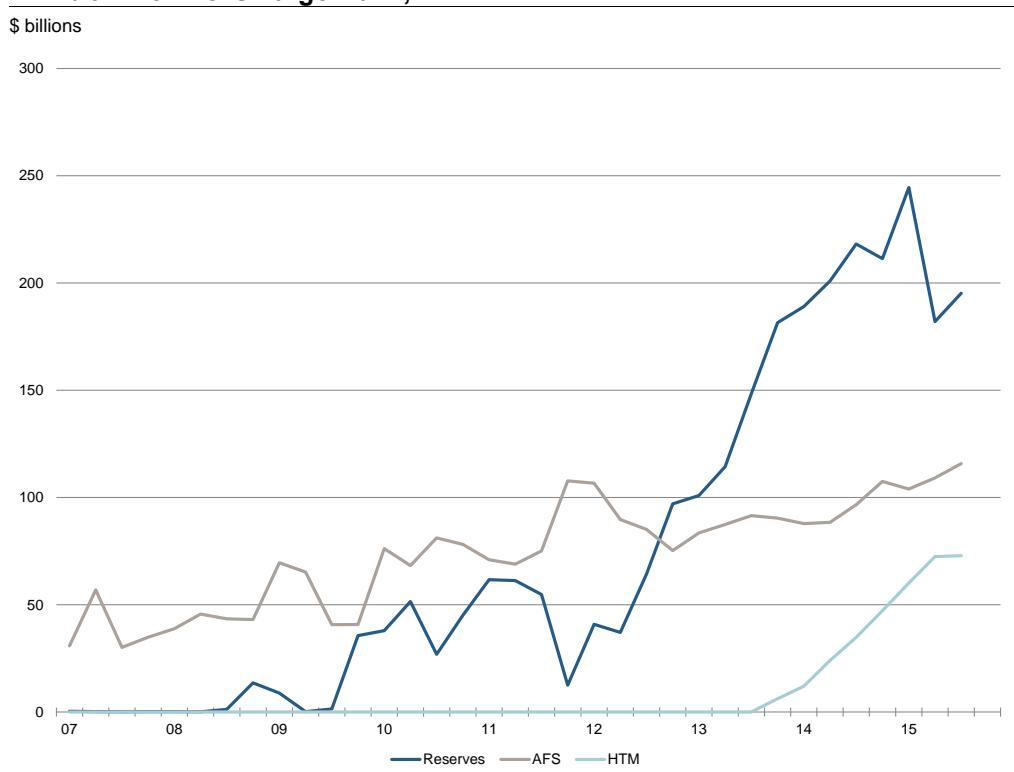
Exhibit A2-3: Bank of America, NA**Exhibit A2-4: Bank of America, NA**

Exhibit A2-5: Wells Fargo Bank, NA

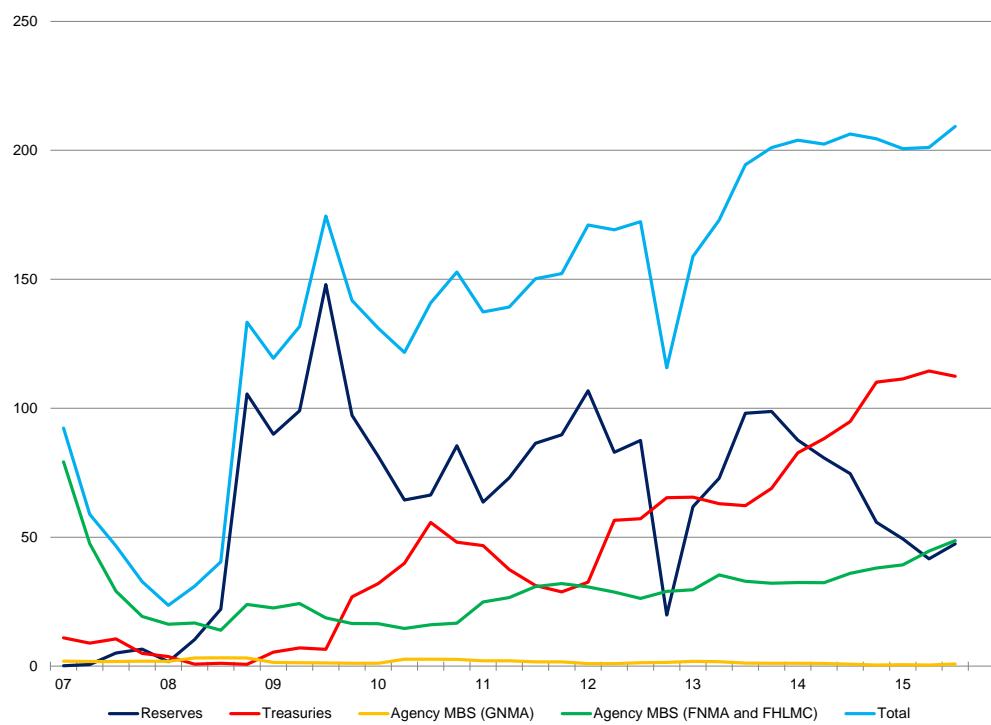
Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-6: Wells Fargo Bank, NA

Source: FDIC (FFIEC031), Credit Suisse

Exhibit A2-7: Citibank, NA

\$ billions

**Exhibit A2-8: Citibank, NA**

\$ billions

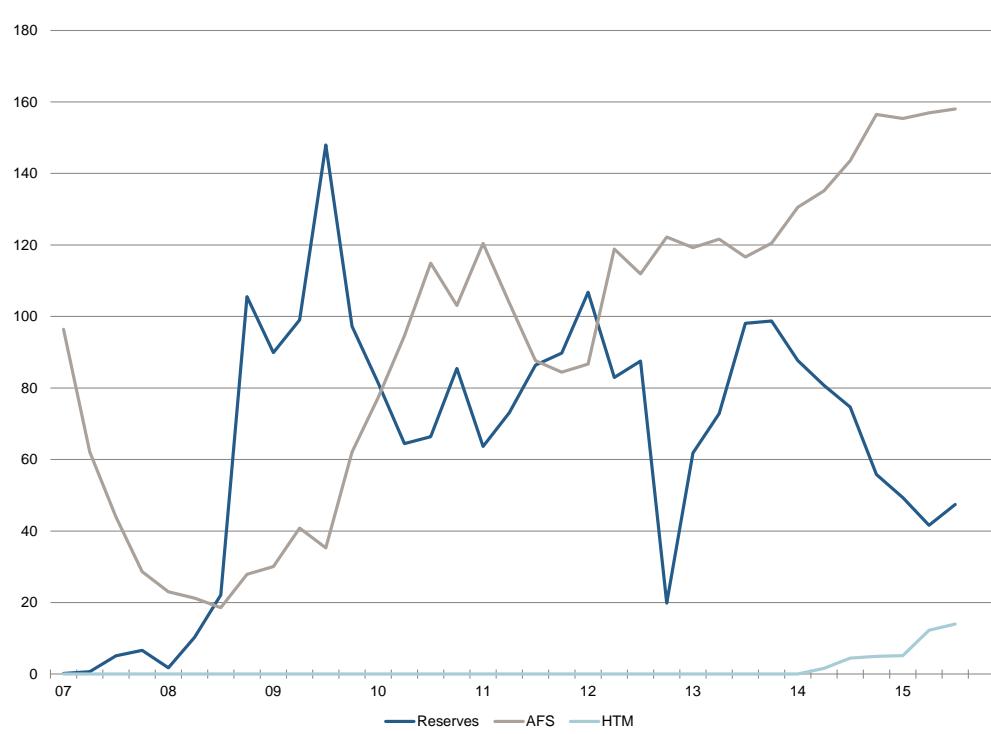
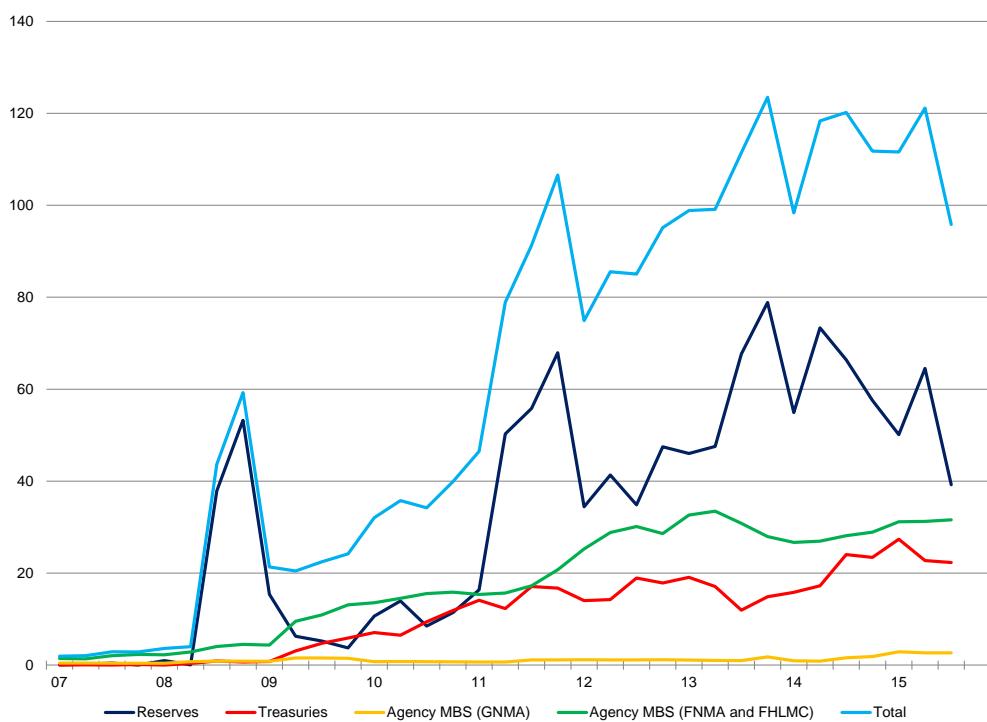


Exhibit A2-9: The Bank of New York Mellon

\$ billions

**Exhibit A2-10: The Bank of New York Mellon**

\$ billions

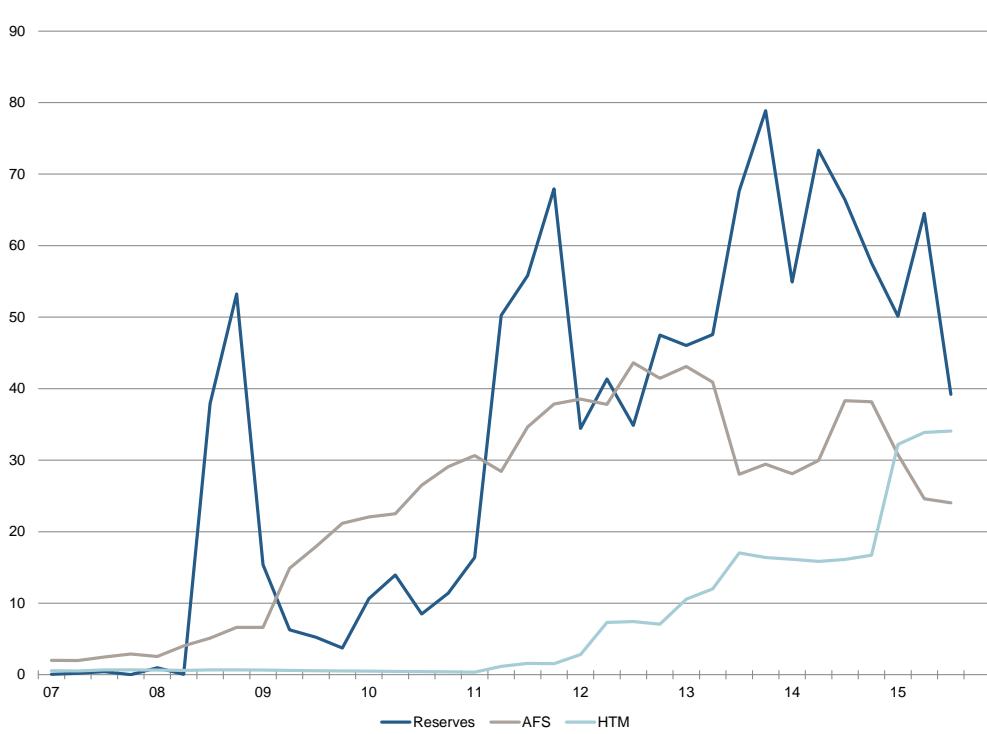
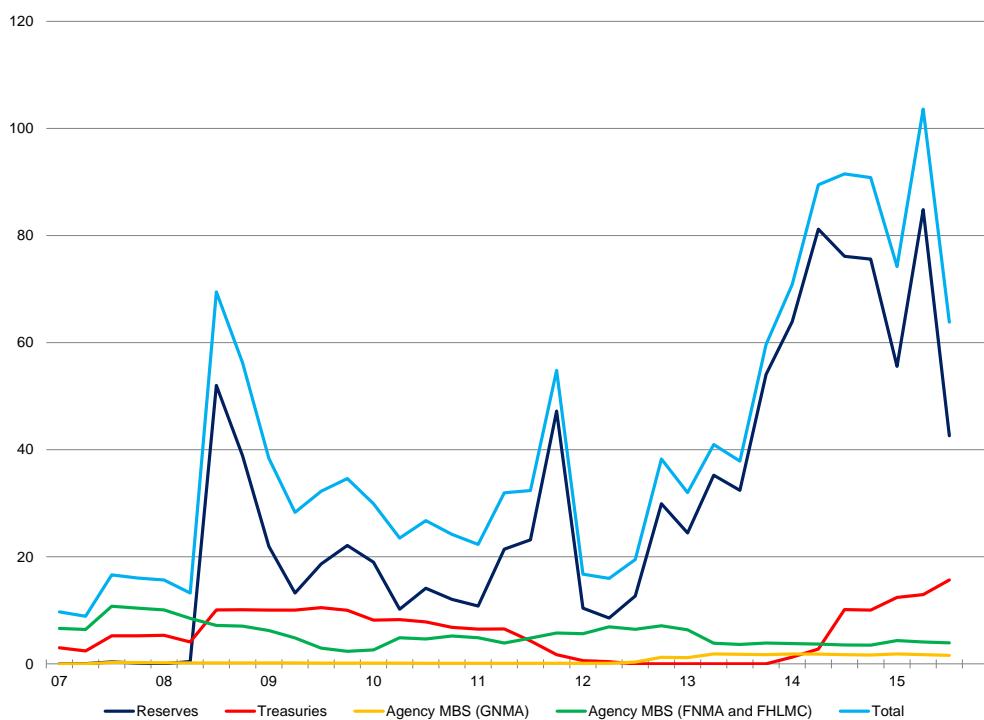
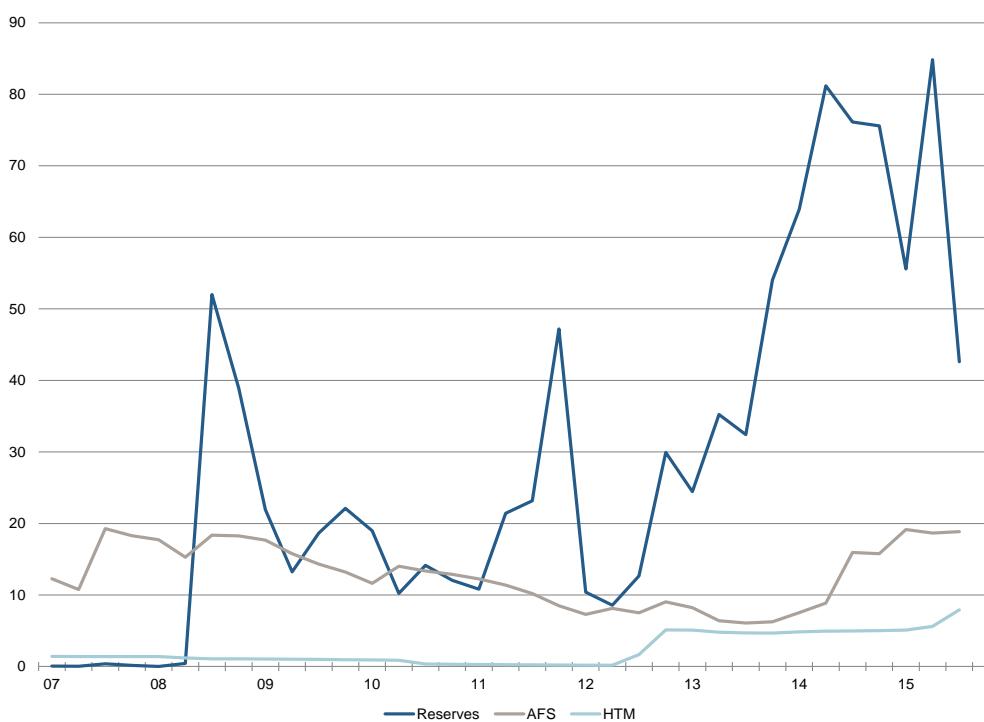


Exhibit A2-11: State Street Bank and Trust Company

\$ billions

**Exhibit A2-12: State Street Bank and Trust Company**

\$ billions



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Global Money Notes #4

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A Tool of Their Own – The Foreign RRP Facility

Since the FOMC hiked interest rates in December, more than \$100 billion in non-operating deposits have left the banking system.

However, it was not the o/n RRP facility that absorbed these outflows. Rather, it was the U.S. Treasury bill market with the help of the foreign RRP facility.

Many clients have asked the Fed about the foreign RRP facility, and the response they got was that it is just a service offering for foreign central banks.

But in our view it is more, far more than "just" a service offering.

It is a policy tool the Fed has been using to exert an upward pressure on bill yields and to facilitate the draining of reserves and the rotation of cash pools out of non-operating deposits and into Treasury bills. At a takeup of \$220 billion (and rising), the foreign RRP facility is already a more prominent policy tool than the o/n RRP for money funds with a trend takeup of a mere \$80 billion (and falling) – not bad for a policy tool that no Fed official has ever mentioned before.

For bank equity and fixed income investors with an eye on whether the outflow of non-operating deposits will force banks to rebalance HQLA portfolios, the new news in this issue of Global Money Notes is that we are far deeper into the process of deposit outflows (\$300 billion and accelerating) than what the smaller-than-expected takeup in the o/n RRP facility would have us believe (looking at o/n RRP volumes, one would assume outflows are not happening).

The \$100 billion in non-operating deposits that have flown out of banks since the December rate hike are big enough to force some big banks to rebalance between Level 2 and Level 1 assets in their HQLA portfolio in order to remain compliant with the letter and spirit of the liquidity coverage ratio. The maximum some banks can lose is \$30 billion before their Level 2 limits are breached – and \$100 billion in outflows since December mean that this scenario is now live.

It is one thing if these rebalancing flows are driven by the gradual outflow of non-operating deposits – the resulting trades may occur gradually, over time. But it's a completely different matter if they are forced by the Fed on compliance grounds and at banks where deposit outflows have not triggered them yet.

Since the December rate hike large U.S. banks have sold \$10 billion in agency MBS and bought \$13 billion in Treasuries. Whether these rebalancing flows have been triggered by the outflow on non-operating deposits or regulatory push to make U.S. G-SIBs comply with global HQLA portfolio composition benchmarks we do not know. But if it is the latter, flows out of MBS and into Treasuries could be substantial: \$100 billion at best and \$175 billion at worse with obvious implications for the mortgage basis, bank NIMs and mortgage REITs.

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

Policy innovations have thrown a curve ball to our [view](#) that non-operating deposits will flow out of banks and into money funds via the o/n RRP facility.

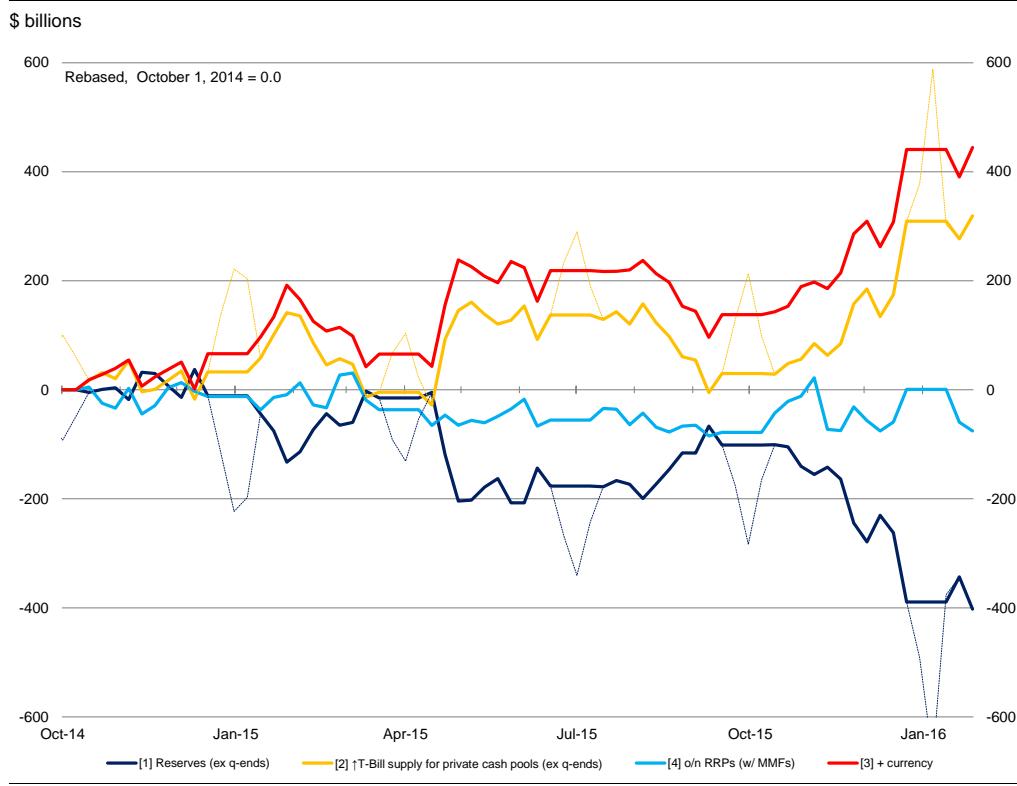
Non-operating deposits are indeed on their way out of the banking system. Since the beginning of 2015 there have been \$400 billion in deposit outflows and a corresponding decline in banks' excess reserve balances at the Federal Reserve (see Figure 1).

Half of these outflows came from JPMorgan proactively driving \$200 billion of non-operating deposits off its balance sheet, completing this process before the December rate hike. \$100 billion occurred at other banks since the December rate hike and reflects a voluntary choice by investors to trade out of non-operating deposits and into other instruments. And for the sake of completeness the remaining \$100 billion reflects the trend-like annual increase in currency in circulation as households withdraw deposits to finance their daily payment needs (an interesting factoid but not the focus of this analysis).

But the destination of non-operating deposit outflows did not turn out to be government-only money market funds via the o/n RRP facility.

We did get a full-allotment o/n RRP facility, but not only did its usage not go up since the hike; it actually declined! And therein lies the rub: as long as the size of the Federal Reserve's balance sheet is unchanged (and it did not change one penny), if one liability line item (reserves) is falling due to deposit outflows, other liability line items must be rising.

Figure 1: Tracking the Reserves Drain



Source: Federal Reserve, Credit Suisse

We will discuss these other liability lines items in detail below, but for now suffice it to say that in the aggregate their increase represents an increase in the supply of Treasury bills available for private [institutional cash pools](#) (the cash balances of asset managers, hedge funds, private equity funds and other investors) as they trade out of non-operating deposits.

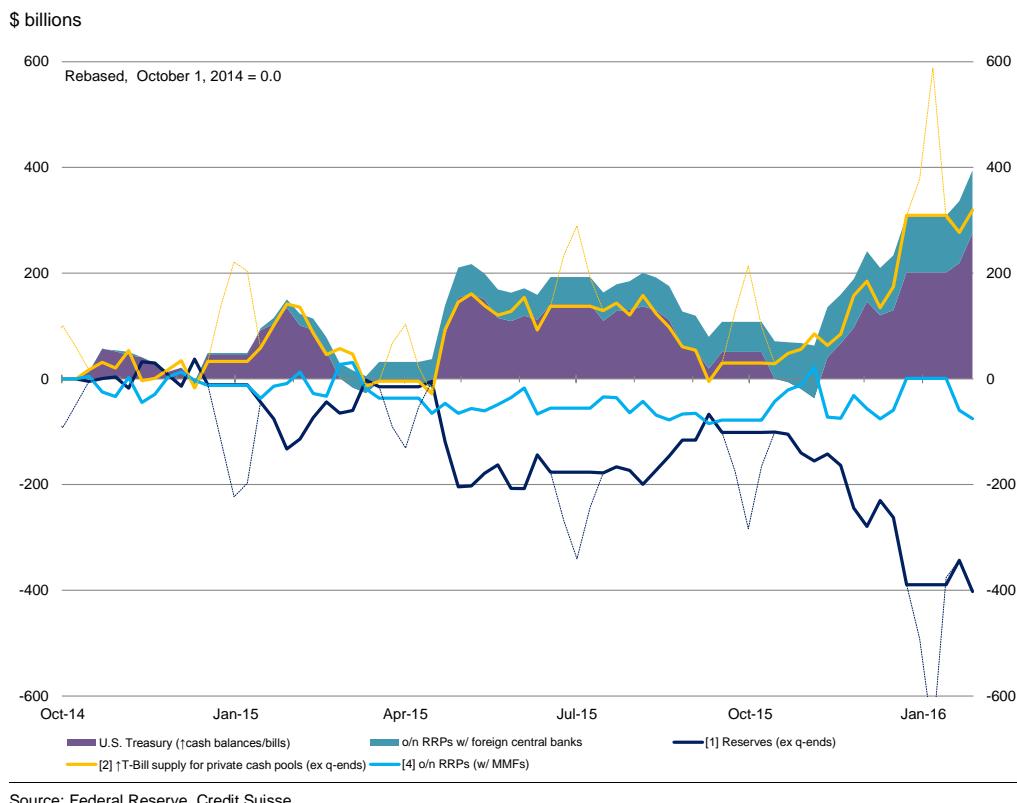
In fact, the effective supply of bills available to private investors is up by more than \$400 billion since October 2015, an amount in excess of the volume of non-operating deposits that have already left the banking system. And similar to the pace of deposit outflows, which have accelerated since the December hike, the pace at which the effective supply of Treasury bills available for cash pools has been accelerating since the rate hike as well.

Other Ways to Drain

Other than o/n RRP with money funds there are at least two other ways through which reserves can be drained and the outflow of non-operating deposits from banks to other corners of the financial system can be greased. As shown in Figure 2, these are:

1. ...the U.S. Treasury boosting its cash balances in the Treasury General Account (TGA) at the New York Fed, and
2. ...foreign central banks boosting their usage of an RRP facility the New York Fed maintains exclusively for them (a facility that is separate from the much talked about o/n RRP facility for other financial institutions, such as money funds).

Figure 2: More Treasury Bills for Private Cash Pools



Like any asset on any balance sheet, the cash balances of the Treasury need funding as well. Given that Treasury earns no interest on its cash balances at the Fed, it finances them in the cheapest possible way which are one-month bills. Buying these bills will be cash pools that heretofore have been sitting in non-operating deposits earning zero. When cash pools buy these bills, they spend a portion of their non-operating deposits (an asset swap). This results in a decline (outflow) of non-operating deposits and an equivalent loss of reserves in the banking system. Offsetting these declines will be an increase in the cash balances of the Treasury financed by bills in amounts equivalent to the amount of reserves and non-operating deposits lost by the banking system, closing the loop (see Figure 3).

Since the resolution of the debt ceiling in October, the Treasury boosted its cash balances from \$50 billion to nearly \$350 billion and funded this by issuing that much in additional bills. On the flipside, this facilitated the flow of that much in non-operating deposits out of the banking system and into the bill market. This way of draining reserves is approaching its limits, however. At a recent TBAC meeting (see [minutes](#)) the Treasury floated the idea of boosting its cash balances to \$500 billion but not beyond – we are only \$150 billion away from that limit (like banks, the Treasury has balance sheet constraints as well, it is just that Treasury's constraints are not imposed by regulations but rather by Congress).

But even if we were to reach capacity in this way of draining reserves, there would still be other avenues to use. This is where the Fed's foreign RRP facility comes in.

Figure 3: Swapping Reserves for TGA Balances

Conceptually, think of the U.S. Treasury as taking over the "money dealer" function presently played by banks.

Step 1:

Federal Reserve	Banks	Cash Pools
Reserves	Reserves Deposits	Deposits

Step 2:

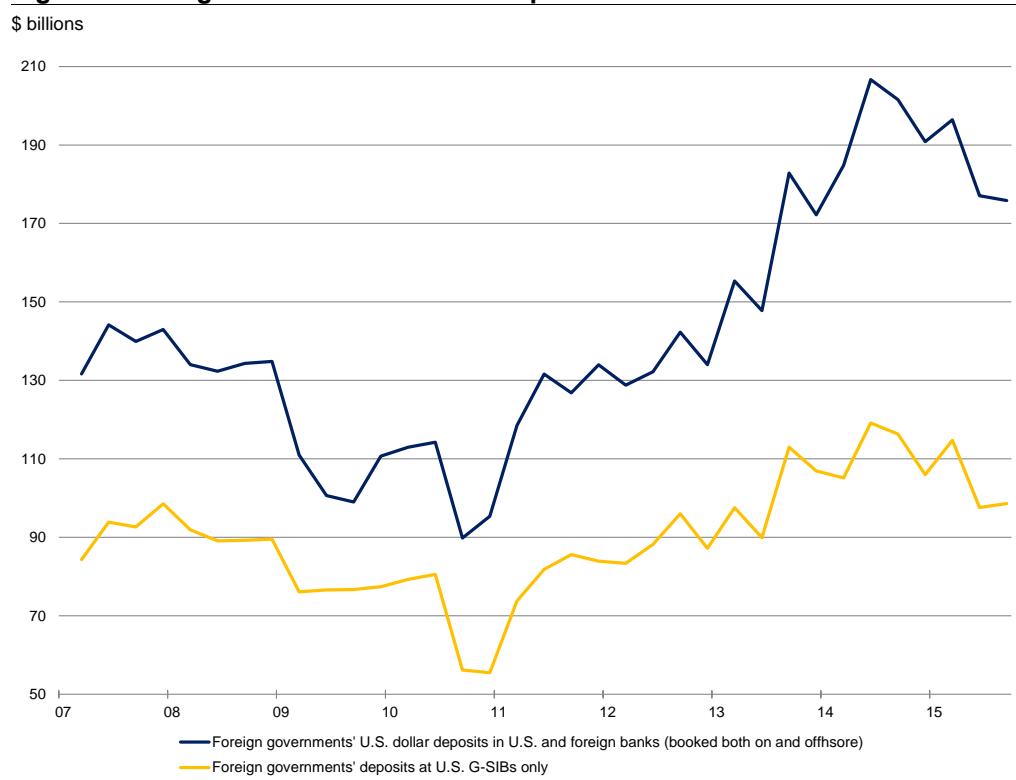
Federal Reserve	Banks	Cash Pools
Reserves TGA	Reserves Deposits	Deposits T-Bills
U.S. Treasury		
TGA	T-Bills	

Notes: TGA = Treasury General Account

Source: Credit Suisse

There are two types of assets on which foreign central banks can draw to boost their balances in the Fed's foreign RRP facility – bank deposits and holdings of Treasury bills.

First, consider a foreign central bank wiring funds from its bank deposit into the foreign RRP facility. This would be an asset swap for the foreign central bank (deposits for RRPs); a decline in both liabilities (deposits) and assets (reserves) for banks; and a liability swap for the Fed (reserves for RRPs). However, looking at the operating and non-operating balances that foreign governments (including foreign central banks) maintain at banks in New York (including both large U.S. banks and the New York branches of foreign banks) we have not seen any meaningful outflows recently (see Figure 4). This makes sense as the HQLA requirements associated with foreign central banks' non-operating deposits are not that onerous: 40% at worst (the same as for corporate non-operating deposits), which is far less than the more punitive 100% requirement for buy-side non-operating deposits. As such, banks do not have much of an incentive to push foreign central banks' deposits off their books since that would leave them with an HQLA shortfall (see page 10 [here](#)).

Figure 4: Foreign Governments' Bank Deposits

Source: Call Reports (FDIC), Credit Suisse

The second source on which foreign central banks can draw to boost their balances in the foreign RRP facility are their holdings of U.S. Treasury bills. Here the process is as simple as trading out of bills and wiring the proceeds out of a bank account over into the foreign RRP facility. Whether it is proceeds from the sale of bills in secondary markets or bill maturities that get wired over into the foreign RRP facility does not matter. What matters is that by trading out of bills, foreign central banks free up more bills for private cash pools to buy as cash pools trade out of non-operating deposits. Consider two examples.

Imagine a foreign central bank that sells bills in the secondary market. As it sells bills its bank deposits go up (an asset swap). On the flipside of this trade cash pools buy the bills and spend bank deposits (also an asset swap, but in the opposite direction). While the cash pool was invested in a bank deposit it did not have the option to wire its balances over into RRPs at the Fed, but the foreign central bank does have that option and exercises it. It makes yet another asset swap (this time deposits for RRPs). In the process, banks lose both deposits and reserves, and the central bank swaps reserves for foreign RRPs. In the end, the foreign central bank swapped bills for RRPs, and the cash pool deposits for bills. Banks lost both deposits and reserves, and the Fed swapped reserves for RRPs, triggered by the secondary market sale of bills. The loop closes (see Figure 5).

Figure 5: Swapping Reserves for Balances in the Foreign Repo Pool**Step 1:**

Federal Reserve		Banks		Cash Pools	
	Reserves	Reserves	Deposits _C	Deposits _C	

Step 2:

Federal Reserve		Banks		Cash Pools	
	Reserves	Reserves	Deposits _C Deposits _F	Deposits _C T-Bills	

Step 3:

Federal Reserve		Banks		Cash Pools	
	Reserves RRP _F	Reserves	Deposits _C Deposits _F	Deposits _C T-Bills	

Notes: Deposits_C = deposits of cash pools; Deposits_F = deposits of foreign central banks; RRP_F = the foreign RRP pool

Source: Credit Suisse

Alternatively, imagine that some portion of a foreign central bank's bill portfolio matures. When bills mature, the foreign central bank's holdings of bills go down and its holdings of cash balances (in a bank deposit) go up. But instead of the usual process of using cash in the bank to buy new bills at the next auction, the foreign central bank decides to wire the funds over into the foreign RRP facility. At the end of the day all that has happened is that the foreign central bank had an asset swap (bills for RRP_Fs); cash pools could take down a bigger share of bills at auction than before as they did not have to bid against foreign central banks and spent cash from non-operating deposits to do so; banks lost both deposits and reserves; and the Fed had a liability swap (reserves for RRP_Fs). This example holds irrespective of whether bills finance increased Treasury cash balances or not.

Since the beginning of 2015, foreign central banks have traded out of \$120 billion of bills (and invested an equivalent amount in the foreign RRP facility) in two waves: \$60 billion during the first half of 2015 and another \$60 billion since the third quarter of 2015. Foreign central banks' pace of bill sales (and equivalently) RRP inflows appear to have accelerated since the December rate hike. But just as there is limited room (about \$150 billion) for Treasury to boost the bill supply in a way that drains reserves, there is limited room for foreign central banks to trade out of bills. According to the November TIC data release, foreign central banks held just north of \$300 billion in bills, meaning that the size of the foreign RRP facility can increase by only that much from here, not more.

For our regular readers these examples of asset and liability swaps and the balance sheet relief they generate for banks should be familiar from our previous works (see for example [here](#)), where we described similar examples involving flows between banks and money funds using the o/n RRP facility. The dynamics here are the same as the dynamics there: cash pools swap assets but not deposits for money fund shares, but rather deposits for bills; the Fed swaps liabilities but not reserves for o/n RRPs but rather reserves for foreign RRPs or alternatively reserves for balances in the TGA; and banks gain balance sheet relief in all three examples by losing some assets (reserves) and liabilities (non-operating deposits) in equal amounts. Three variations on the same theme (see Figures 6, 7 and 8).

Pricing Foreign RRPs

Many clients have contacted the Fed to ask about the foreign RRP facility, and the standard response they got was that "it is just a service offering for foreign central banks."

But in our view it is more, far more than "just" a service offering. It is a policy tool that the Fed has been using to exert an upward pressure on bill yields and to facilitate the rotation of cash pools out of non-operating deposits and into the bill market. At a trend takeup of \$220 billion (and rising), the foreign RRP facility is already a more prominent policy tool than the o/n RRP for money funds with a trend takeup of a mere \$80 billion (and falling).

The pricing of the foreign RRP facility is a key piece of the puzzle.

Figure 9 shows three repo rates (all o/n and against Treasury collateral). The thick blue line shows the o/n RRP rate, the rate the Fed pays money funds. The thin orange line shows the tri-party repo rate, the rate that primary dealers pay money market funds. The thick red line shows the foreign RRP rate, the rate the Fed pays foreign central banks.

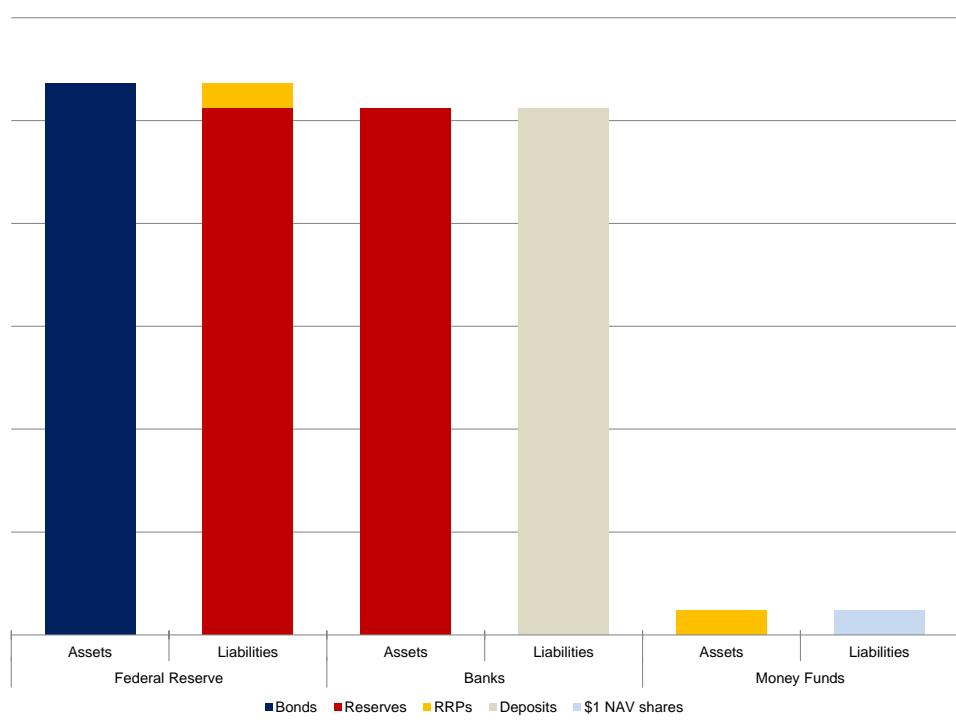
The first two rates are readily published on a daily basis, but the rate on the foreign RRP facility takes a bit of detective work to find. The place to go to is the Fed's unaudited financial statements which get published for the first, second and third quarter of every year (see [here](#)) and which disclose the rate the Fed has been paying on foreign RRPs during the first three, six and nine months of the year on average. Interestingly the Fed's annual audited financial statements – which one would hope would be the window to the foreign RRP rate during the fourth quarter of the year – are silent on the pricing of the facility, which leaves us no choice but to interpolate (the red dashed lines) between existing data points (for 2014Q4) and along existing trends (for 2015Q4 and beyond).

Two things stand out about the interest rate offered by the foreign RRP facility.

First, during 2014, the foreign RRP rate was less than the o/n RRP rate and the tri-party repo rate. But in 2015 a regime shift occurred. The New York Fed started to pay a higher rate on foreign RRPs than it paid on o/n RRPs and gradually moved it over the going market rate (the tri-party repo rate). According to the Fed's unaudited financial statements the foreign RRP rate was raised by 2 bps during each of the first three quarters of 2015, and if we extrapolate this trend, the facility currently pays 35 bps, or 10 bps over the o/n RRP rate for money funds. That said, we won't know for a fact what the foreign RRP rate was during 2016Q1 until the next unaudited financial statements are published in April.

Figure 6: The Financial System With a Small o/n RRP Facility

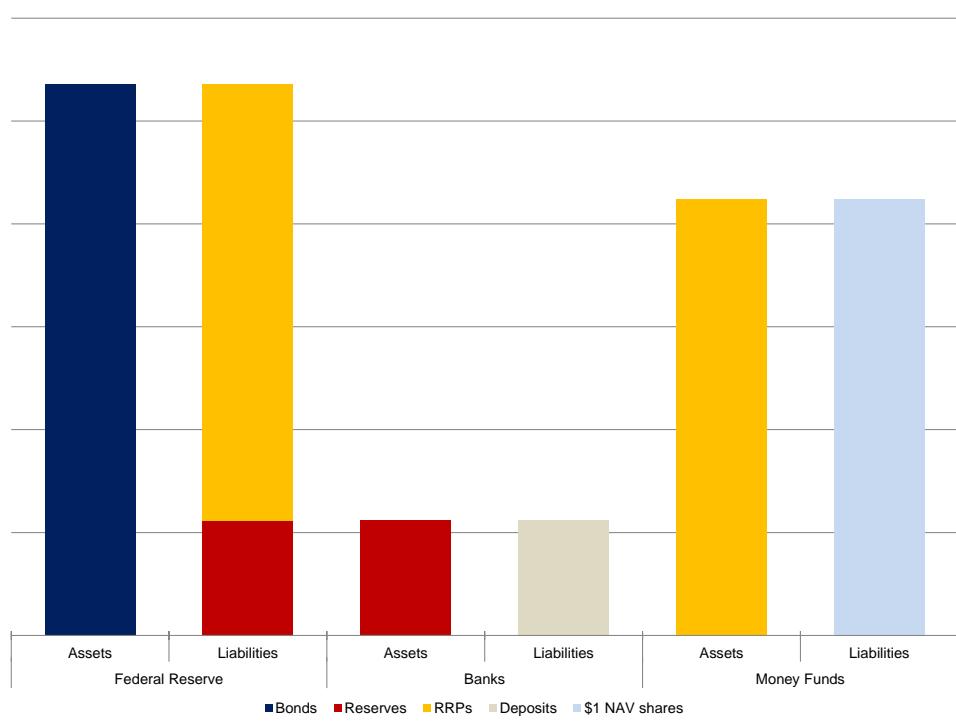
Illustrative example (no scales)



Source: Credit Suisse

Figure 7: The Financial System with a Big o/n RRP Facility

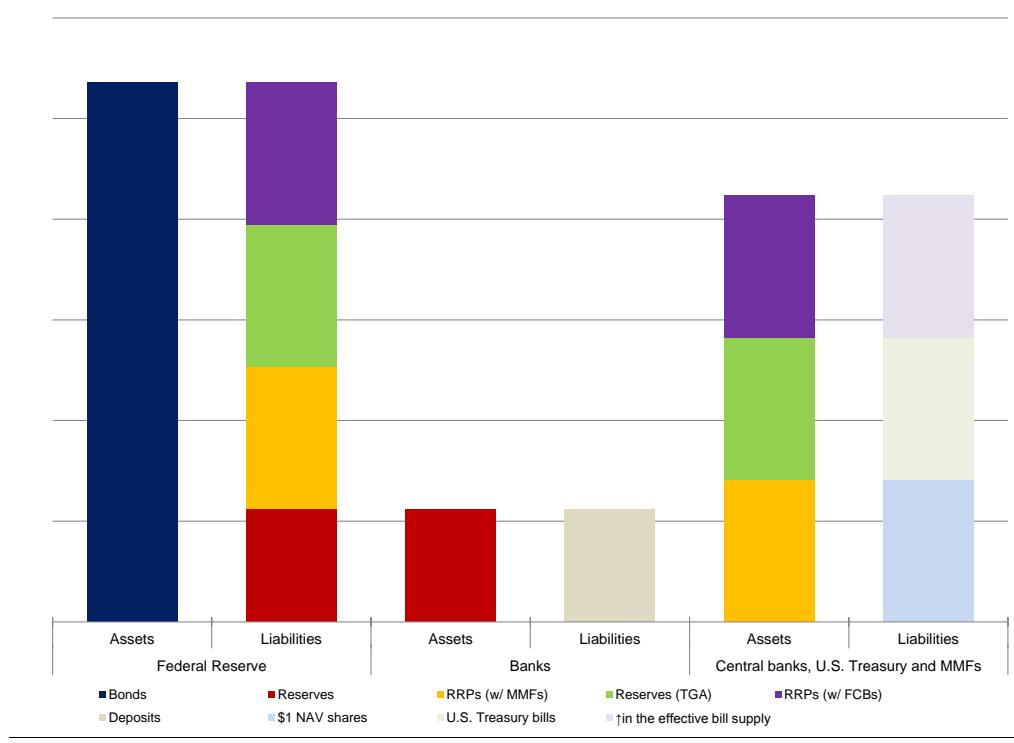
Illustrative example (no scales)



Source: Credit Suisse

Figure 8: Alternatives to a Big o/n RRP Facility

Illustrative example (no scales)



Source: Credit Suisse

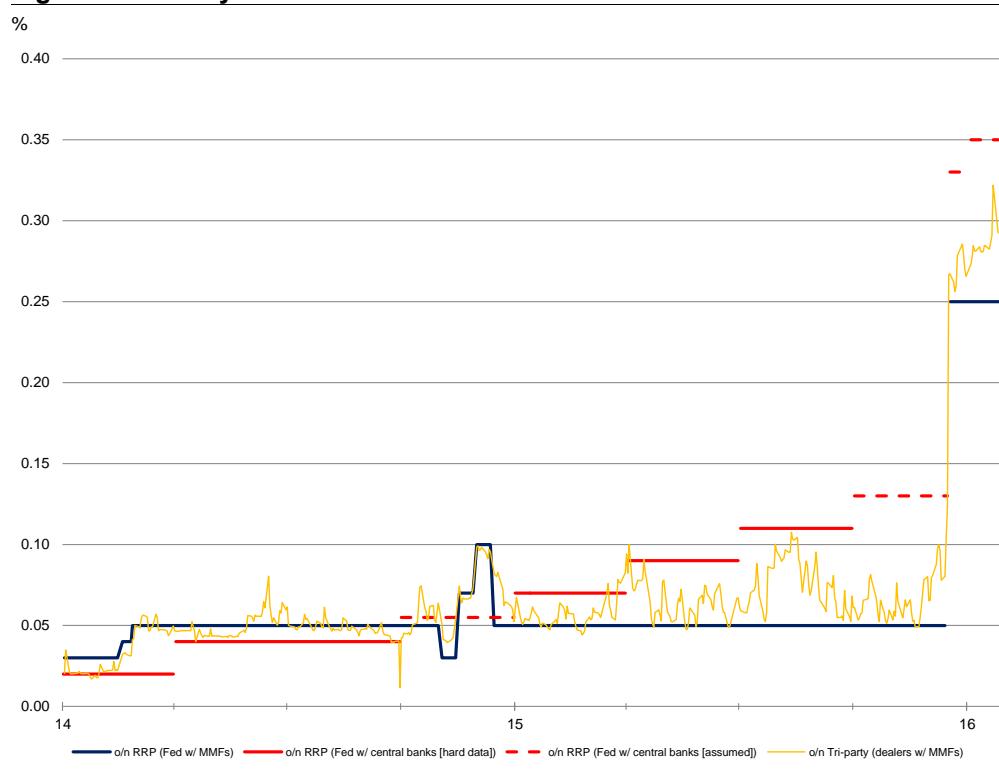
Second, the New York Fed appears to be pricing the foreign RRP facility opportunistically, with an aim of luring foreign central banks out of certain segments of the bill market (see Figure 10). During 2014 the foreign RRP rate was only marginally above one-month and three-month Treasury bill yields and it never went above six-month Treasury bill yields.

But starting in 2015, the foreign RRP rate was raised meaningfully above one- and three-month bill yields and for the bulk of the first half of 2015 the rate was even higher than six-month bill yields – this generous pricing (a meaningfully better yield on an o/n instrument than a one-, three- or even six-month instruments) explains why foreign central banks traded \$60 billion in bills for foreign RRP during the first half of 2015.

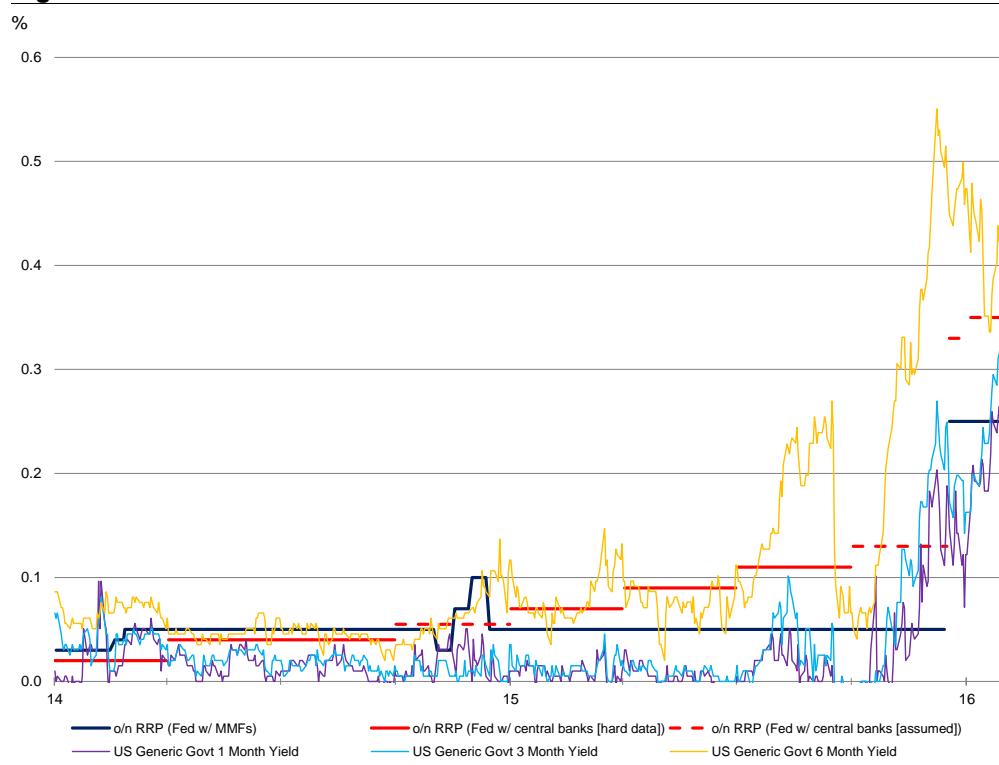
During the second half of 2015 (including the weeks after the December hike) the New York Fed's strategy seems to have remained broadly the same: it continued to price the foreign RRP facility in a way that would encourage foreign central banks to trade out of one- to three-month bills so that (1) there are more bills available for cash pools to buy as they trade out of non-operating deposits and for money funds to buy as they voluntarily convert prime funds into government-only funds and (2) to ensure that all of the extra bill issuance that came from funding the Treasury's increased TGA balances also goes exclusively to cash pools and to money funds, and not to foreign central banks.

Looking at bill yields since the December hike, no one expected one- or three-month yields to be so close to the o/n RRP rate. The fact that their beta has been so high despite the fact that the conversion of \$200 billion in money funds and \$300 billion in deposit outflows increased private demand for bills by \$500 billion during the second half of 2015 can only be attributed to the coordinated efforts of the Treasury and the New York Fed.

But despite this very successful experiment, the New York Fed has some explaining to do.

Figure 9: A Pretty Good Deal

Source: Federal Reserve, Bank of New York, Credit Suisse

Figure 10: Please Leave the Bill Market Behind

Source: Federal Reserve, U.S. Treasury, Credit Suisse

First, for a facility that appears to be more meaningful than the o/n RRP facility (both in terms of the amount of reserves it helped drain and the impact it has on short-term interest rates), it is a touch bit odd to us that the foreign RRP facility has never been mentioned in FOMC minutes before. That flies in the face of central bank transparency.

Second, given that the foreign RRP rate has such a great influence on bill yields and is an effective tool to manage the supply of bills available for cash pools, its pricing should be more transparent and available at a higher frequency. Discuss.

No Pact With the Devil

Compared to o/n RRPs for money market funds, increased bill issuance by the Treasury and the use of the foreign RRP facility to free up the amount of bills available for private cash pools is a more democratic way of sorting out the question of who should benefit as banks are pushing buy-side non-operating deposits off their balance sheets.

The old script was government-only money funds with the use of the o/n RRP facility. Here the buy-side would not have much choice as to how to invest cash in the “new normal.”

The new script is more Treasury bills with the help of a structural increase in the cash balances of the Treasury and incentivizing foreign central banks to leave the bill market. Here, the buy-side has a choice: if you want to be passive in managing your cash portfolio go for a money fund where the money fund will have the option to choose between bills and o/n RRPs and will take a fee for this. If you want to run your cash portfolio yourself, then be our guest, you can do that too. Run your bill portfolio directly and save the fees.

Based on our conversations with buy-side investors (those who were already incentivized out of non-operating deposits by their banks or who are presently considering where to move), an overwhelming majority prefer the ability to run a bill portfolio directly, on their own.

In the end, the Fed's long-standing aversion to money funds (whether prime or government-only) seems to have dominated the FOMC's thinking.

Policy innovations (much like the idea of segregated cash accounts, see [here](#)) ended up reducing the potential role for money funds as middle-men.

To be sure the sun still rises in the morning and the Earth still revolves on its axis under this alternative configuration, but as always some groups win (cash pools through more bills, higher yields), and some groups lose (money funds through forgone AuM and fees).

In the very end cash pools did end up getting their Treasury bill “fix” (see [Pozsar, 2011](#)).

But don't write off the o/n RRP facility just yet. As we have discussed above, there remains only limited room for the U.S. Treasury to boost its cash balances (about \$150 billion more) and for foreign central banks to trade out of bills and into foreign RRPs (about \$300 billion more). The point is that both of these options are finite and when they reach their limits (keep in mind that we have yet to see prime to government-only money fund flows in the run-up to the October 2016 floating NAV deadline) the o/n RRP facility – and on the flipside, government-only money funds – may well become the only game in town.

Forced HQLA Portfolio Rebalancing?

For bank equity investors and fixed income investors with an eye on whether the outflow of non-operating deposits will force banks to rebalance HQLA portfolios, the new news from this analysis is that we are far deeper into the process of deposit outflows (\$300 billion and accelerating) than what the smaller-than-expected uptake in the o/n RRP facility would have us believe (looking at o/n RRPs, one would assume deposit flows are not happening).

The \$100 billion in non-operating deposits that have flown out of banks other than JPMorgan since the December rate hike are big enough to force some big banks to rebalance between Level 2 and Level 1 assets in their HQLA portfolio in order to remain compliant with the letter and spirit of the liquidity coverage ratio (LCR; see pp 17-18 [here](#)). Some banks can only lose \$30 billion in deposits before their Level 2 limits are breached – and \$100 billion in deposit outflows since December mean this scenario is now live.

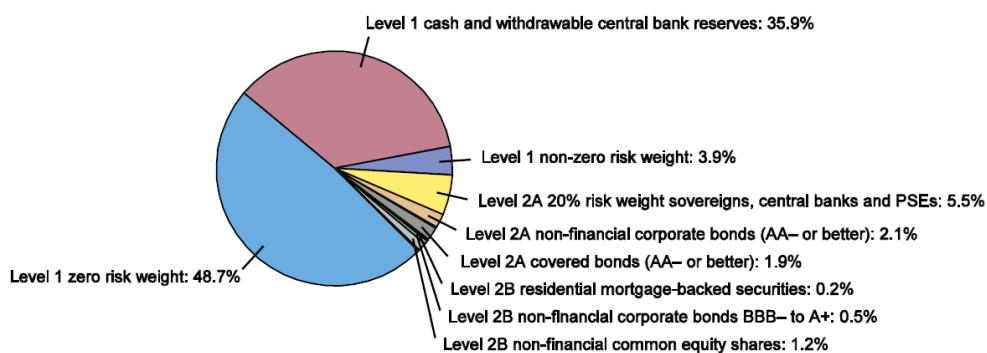
Indeed, some of these rebalancing flows may already be happening: according to the Fed's weekly H.8 release since the December rate hike, large banks have sold \$10 billion in agency mortgages (Level 2 assets) and bought \$13 billion in Treasuries (Level 1 assets). These flows bear close watching and have obvious implications for the bid for Treasuries and the agency mortgage basis (and mortgage REITs as derivatives of the MBS basis).

Furthermore, it is one thing if these rebalancing flows are driven by the gradual outflow of non-operating deposits – the resulting rebalancing flows may occur gradually, over time.

But it is a completely different matter if these trades are forced by the Fed on compliance grounds and in portfolios where deposit outflows have not triggered them yet!

To appreciate this scenario, consider the following chart from the September issue of the BIS's [Basel III Monitoring Report](#) (see Figure 11). According to the BIS, the largest banks across the globe have built their HQLA portfolios by allocating about 35% to central bank reserves, 50% to sovereign debt (Level 1 assets) and only 15% to Level 2 assets.

Figure 11: The Model HQLA Portfolio



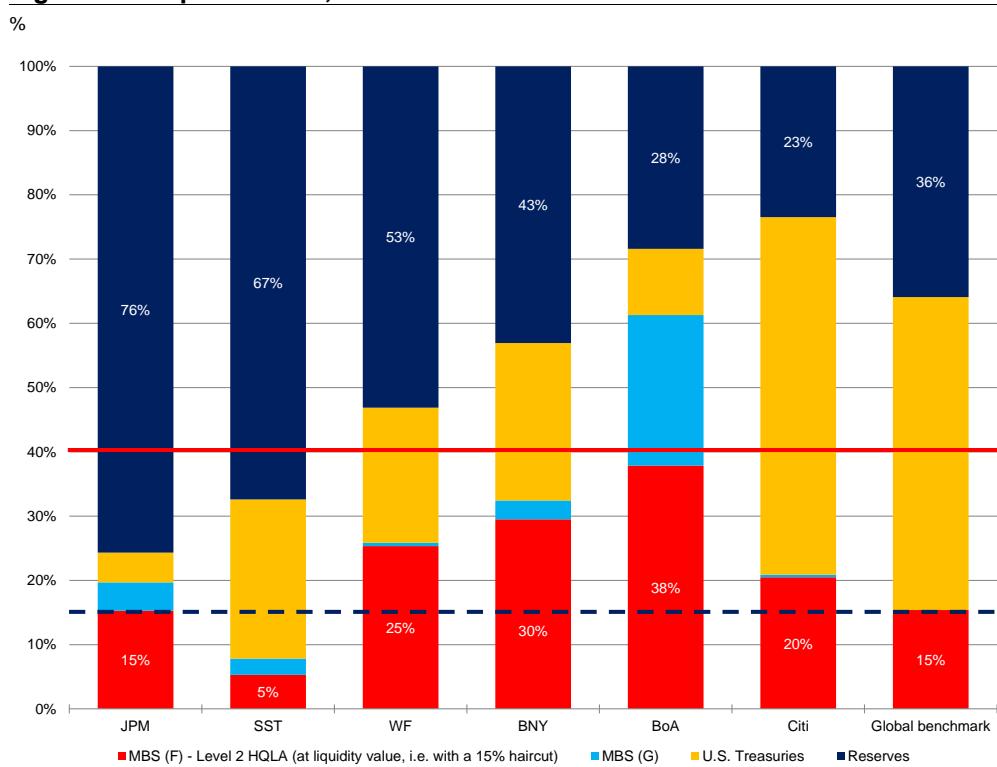
Source: Basel Committee on Banking Supervision

Compared to this global benchmark, the largest U.S. depository institutions stack up as follows (see Figure 12). JPMorgan is smack in line with the global Level 2 allocation average and is way overweight in reserves at the central bank – a remarkably conservative HQLA posture. But three banks – Wells Fargo, BoNY and Bank of America – seem well above the global average as far as their Level 2 allocation is concerned.

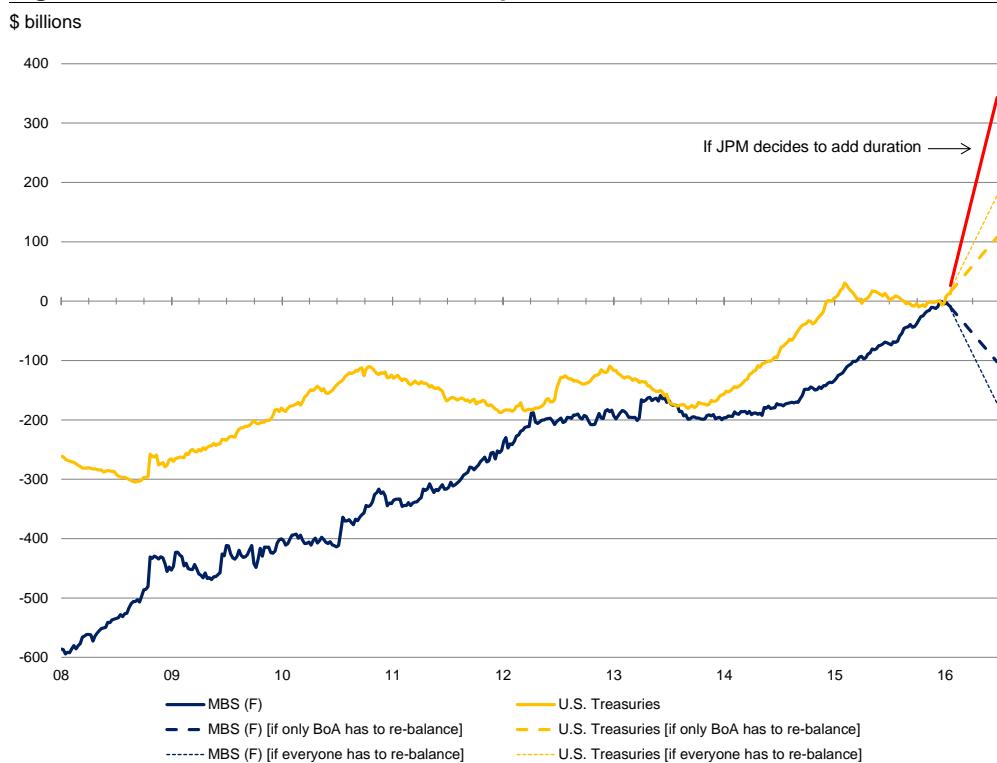
Up to now, the Fed has been concerned with ensuring that all major banks are compliant with the LCR, and in fact over-compliant (about 115%) with the Basel III minimum of 100%.

But the next stage of compliance with the letter and spirit of the LCR will move beyond the need for “all children to be above average” and focus on enforcing “uniform diets” – that is for all HQLA portfolios to have a similar mix of reserves, Treasuries and agency MBS.

Again, whether the rebalancing flows we have been seeing since the Fed hike have been triggered by the outflow on non-operating deposits or regulatory pressure to comply with global HQLA benchmarks we do not yet know. But if it is the latter, flows out of agency mortgages could be substantial: \$100 billion in sales at best and \$175 billion at worst, with an equivalent amount of bids for U.S. Treasury securities (see Figure 13).

Figure 12: Cups of Water, Ice-Water and Ice Cubes

Source: Call Reports (FDIC), Basel Committee on Banking Supervision, Credit Suisse

Figure 13: Not What the Consensus Expects

Source: Federal Reserve, Credit Suisse

And the bid for Treasuries could be even stronger still, if one considers the fact that JPMorgan is now done optimizing its deposit mix and has twice as big a share of its HQLA portfolio allocated to reserves at the Fed than the global average – in the words of CFO Marianne Lake, the bank has been leaving money on the table through its conservative HQLA posture. Were JPM to trim its reserve balances down to the global average and buy Treasuries, bids could swell to as much as \$350 billion this year (the red line in Figure 13).

These calls are wildly out of consensus, which is for banks to buy, not sell \$100 in MBS over the course of 2016. But in a world where no one expected a full allotment o/n RRP facility but we got one, where everyone expected the take-up of the RRP facility to soar after liftoff but did not, where as recently as December the market expected two rate hikes this year but no more hikes as of today, one must never cease to “invert, always invert”...

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Global Money Notes #5

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What Excess Reserves?

2016 is shaping up to be an important year for the Federal Reserve.

Before the year is over, the Fed will conclude the review of its long-run monetary policy implementation framework, which will include thoughts on the size and composition of its balance sheet in the long run. One conclusion of the review will be that there is limited scope to shrink the balance sheet, in our view.

This is because the Liquidity Coverage Ratio (LCR) coupled with the Fed's preference that banks hold significant amounts of reserves as high-quality liquid assets (HQLA) represents a step change in the amount of reserves banks will have to hold – not to comply with reserve requirements but with the LCR.

In the LCR we have what is essentially a global reserve requirement regime, where regulators prefer reserves over bonds as the primary source of liquidity (for U.S. banks) and reserves over bank deposits as the settlement medium for Eurodollar transactions (for the New York branches of foreign banks).

With Basel III constraining the size and elasticity of matched repo books – the hearts whose beats gave market liquidity a pulse – bond market liquidity will never be what it once was. Regulators know this. After all they were the ones who designed the new system and constrained repo and with it market liquidity.

They do realize that in the post-Basel III world order base liquidity (reserves) will inevitably have to replace market-based liquidity. This in turn means that there are no excess reserves – every penny is needed by banks for LCR compliance. And this also means that the Fed has only a limited ability to shrink its portfolio.

The Fed will also have no choice but to scrap the fed funds rate as its policy target and replace it with the overnight bank funding rate in 2016, in our view.

This will be a necessity, not a choice. One side-effect of the LCR is that the fed funds market will fade into irrelevance as banks no longer hold their liquidity buffers in unsecured interbank markets, but rather in secured repo markets (versus Treasury collateral) or by accumulating reserves at the central bank.

Switchover to the OBFR will be a big deal for at least two reasons: it will be a switch from an interbank rate to a customer-to-bank target rate and it will be a switch from an onshore dollar funding rate to a global dollar target rate.

The Fed targeting OBFR would be as if it targeted Libor today. What this means for the Fed's reaction function isn't clear, but our instinct tells us that we will deal with a Fed inherently more sensitive to global financial conditions, inherently more sensitive to global growth and inherently more dovish than in the past...

Contrary to conventional wisdom, there are no excess reserves – not one penny.

Labelling the trillions of reserves created as a byproduct of QE as “excess” was appropriate only until the [Liquidity Coverage Ratio](#) (LCR)¹ went live, but not after.

Before the LCR, excess reserves were indeed excess: every penny was in excess of the amount of reserves required by the Federal Reserve’s [Regulation D](#). Under the LCR, all excess reserves became required: not to comply with Regulation D, but with the LCR.

It is helpful to think about the LCR as a *global* reserve requirement regime.

Before the LCR, banks were required to hold reserves only against demand deposits issued in the U.S. (i.e., reserves were required only against onshore overnight liabilities).

As banks went about their usual business of making loans and creating deposits, they routinely fell short of reserve requirements. To top up their reserve balances, banks with a shortfall of reserves (typically the big money center banks) borrowed fed funds from banks with a surplus of reserves (typically the small regional banks).

These transactions comprised the fed funds market.

Under the LCR, banks are required to hold reserves (and more broadly, high-quality liquid assets or HQLA) not only against overnight deposits, but all short-term liabilities that mature in less than 30 days, regardless of whether those liabilities were issued by a bank subsidiary, a broker-dealer subsidiary or a holding company onshore or offshore (i.e. reserves are required not only against onshore overnight bank liabilities but any short-term liability issued by any legal entity under the hood of a bank holding company *globally*).

Take note of the *global* scope of the LCR and consider that the genesis of the Eurodollar market was that banks did not have to hold reserves against deposits issued offshore. Under the LCR this loophole is gone. From a liquidity requirement perspective, onshore and offshore dollar deposits are treated the same, and as an important corollary, the Fed’s [dollar swap network](#) makes onshore and offshore deposits practically the same.

The LCR thus represents a structural leap in the demand for reserves not only by U.S. banks but also by all foreign banks that are active in Eurodollar markets. All this in turn will underwrite the need for a big Fed balance sheet for a long time to come.

The LCR has implications for the future of fed funds market, the Fed’s reaction function and the Fed’s balance sheet. This issue of Global Money Notes discusses each in turn. Part one provides a detailed look at the present and future of the fed funds market to explain why the Fed has no choice but to scrap the fed funds rate as its policy target.

Part two explains what switching from the fed funds rate to the overnight bank funding rate (OBFR) would mean for the Fed’s reaction function and how the Fed now has two parallel corridor systems: one onshore for banks and one offshore for the shadow banking system.

Part three explains why the LCR coupled with regulators’ preference for reserves to play a more prominent role in liquidity portfolios means that the term excess reserves is a misnomer and why there is only limited room for the Fed to shrink its balance sheet.

Finally, part four concludes with the notion that quantities matter again but in ways the Fed has yet to appreciate and different from the way they mattered under Paul Volcker’s reign. Back then the issue was too much private money creation too willingly accommodated by the Fed until Chairman Volcker came along. Now, the issue is constrained private money creation and a Fed unwilling to fill the vacuum and focused solely on prices, not quantities.

Focusing on prices only is possible if balance sheets are completely elastic. In the new financial world order they are almost completely inelastic. Something will have to give...

¹ For an explanation of technical terms please refer to the glossary on page 14.

Part I - LCR and the Fed Funds Market

One unintended consequence of the LCR is that the federal funds market will slowly fade into irrelevance.

The fed funds (FF) market is a shadow of its former self, down from \$250 billion in 2007 to about \$60 billion today. All of this decline came from the near-total collapse of bank-to-bank FF trades. What is left of the FF market reflects transactions between the Federal Home Loan Banks (FHLBs) as lenders and a dozen or so foreign banks as borrowers.

Banks no longer trade in the FF market for at least three reasons.

First, banks have no incentive to borrow reserves as they already hold amounts in excess of what is needed to comply with reserve requirements. With so many reserves, the days of money center banks falling behind reserve requirements are over, possibly forever.

Second, banks have no incentive to lend reserves either. This is because only reserves held at the Fed are HQLA but when reserves are lent in the FF market and become fed funds sold, the lending bank ends up with less HQLA and worsens its LCR.

Third, in general the LCR disincentivizes banks from lending to other banks on an unsecured basis (the FF market is unsecured) and rather incentivizes them to lend on a secured basis via repos (versus Treasury collateral) or to keep cash at the central bank.

In plain English this means that the widely-held view that the trillions of "excess" reserves sloshing around in the financial system are depressing the FF rate to trade below IOER and are causing the Fed difficulties to control short-term interest rates is simply *incorrect*.

Excess reserves are not sloshing but rather sitting at the Fed. They sit passive and inert because banks must hold these reserves as HQLA to meet LCR requirements. You have to fund what you hold and since HQLA cannot be encumbered, you can only fund them unsecured. And banks always attempt to fund assets with positive carry.

Therefore it is not surprising that unsecured bank funding rates up to the one month (the point within which banks must hold HQLA against liabilities) all trade lower than IOER. Structurally, that means operating and non-operating deposits, CDs, CP (both onshore and Eurodollar), and the effective FF rate will nearly *always* yield less than IOER.

Regulatory parameters will set the spread between IOER and funding rates and differences between regulatory regimes will determine where U.S. and foreign banks fund.

That is all there is to understanding the performance of money markets after liftoff, really (see Exhibit 1). Analyses that do not put the LCR front and center lack in perspective.

Of the unsecured markets mentioned above, FF is a special case: it exists in a bubble. It's a \$60 billion air pocket in a broader money market complex that's about \$600 billion in size.

There are ten FHLBs and about a dozen non-U.S. banks that trade in this air pocket, and at present they appear to be splitting the bounty so to speak. The lending side of the market gets 12.5 above the RRP rate and the borrowing side gets 12.5 above the FF rate.

We highlighted the "split" behaviour in a previous [issue](#) of Global Money Notes and argued that the small size of the market and the small number of participants make the market prone to trade in a very stable manner (our analysis of the micro-structure of the market was the basis of our call that the FF rate would trade in the middle of the range after liftoff).

Indeed, the FF rate has been trading in the middle of the target range for the past 15 months in a remarkably stable manner – practically along a straight line (see Exhibit 2).

Exhibit 1: From Inside to Outside Liquidity Portfolios

MML = money market lending. MMF = money market funding. Reverses = reverse repos with clients (*not* the Fed).

From endogenous liquidity....	Assets	Liabilities
	MML (private)	MMF (private)
<hr/>		
...to exogenous liquidity...	Assets	Liabilities
	HQLA (public)	MMF (private)
<hr/>		
...reversed in or held outright...	Assets	Liabilities
	Reserves Reverses T - Notes	MMF (private)
<hr/>		
...and funded mostly unsecured.	Assets	Liabilities
	Reserves Reverses T - Notes	Unsecured

Source: Credit Suisse

Is that stability a virtue or a vice? To answer that question, consider Exhibit 3.

You see two lines that for a while trade identically.

Now consider that the thin blue line plots the path of the effective FF rate and the thick orange line plots the path of the RMB/USD exchange rate from March to October in 2015.

Both trade along a straight line and then there is a jump: the PBoC devalues in August and the Fed hikes interest rates in December. Then, trading along a straight line continues.

But now, think about the fact that the reason USD/RMB trades along a straight line is because the PBoC is enforcing that price by putting its big balance sheet behind it.

But the Fed is not an active participant in the FF market: it only sets the range but does not enforce how FF trades within that range.

What that means is that the FF market is a market that enforces itself to trade along a straight line. But should a venue that trades that way still be considered a market?

Official control versus self-control?

Part II - LCR and the Fed's Reaction Function

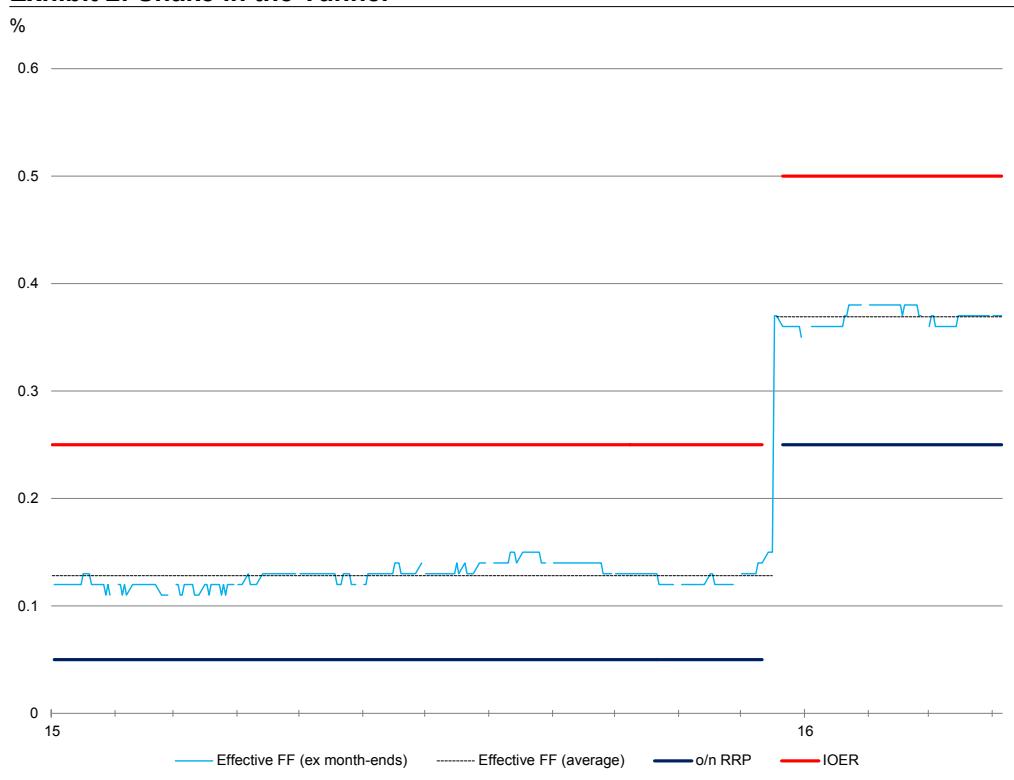
Liberty Street, we have a problem.

The FF market has gone from a big pond where FHLBs were small fish to a small pond where FHLBs became one big fish, providing a stable source of funding for risk-free arbitrage at the New York branches of a handful of foreign banks (see Exhibits 4, 5 and 6).

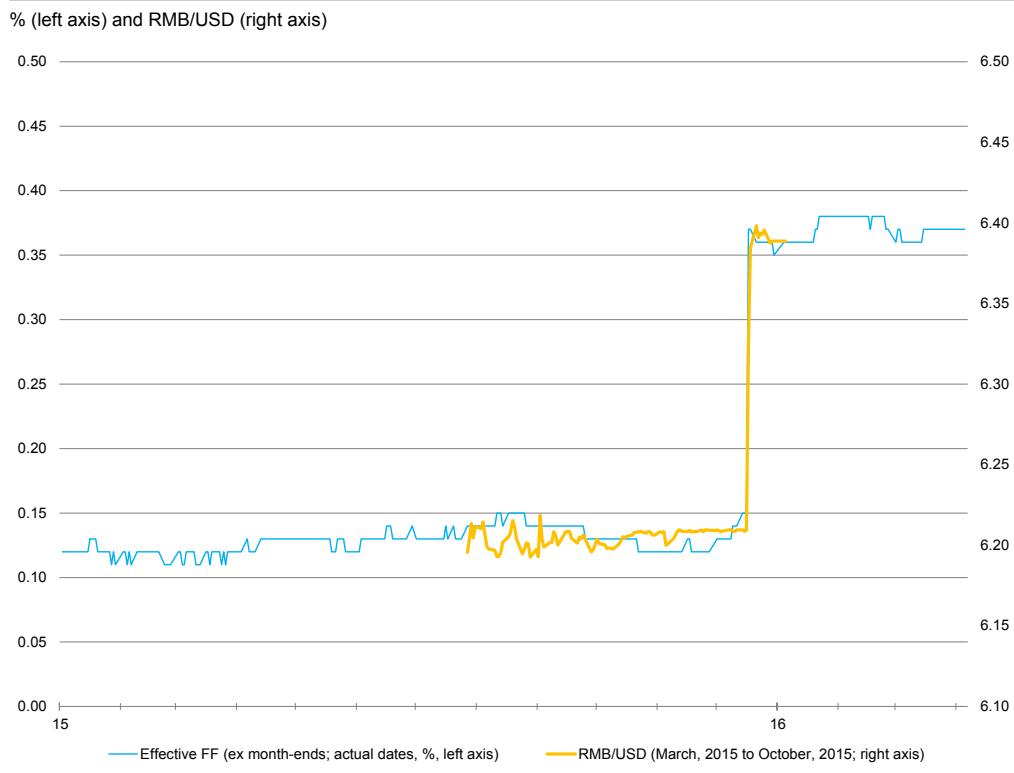
It is a problem when the Fed's policy target (probably the most important price in the world for interest rate derivatives) is set in a market as small (\$60 billion), as sparsely populated (10 lenders and a dozen borrowers), and as easy to influence as the FF market today.

Nothing in our narrative suggests anything metaphysical about how FF trades in that IOER works like a [magnet](#) pulling money market rates closer together nor the urban legend that the large capacity of the o/n RRP facility "[could actually reduce o/n RRP takeup](#)".

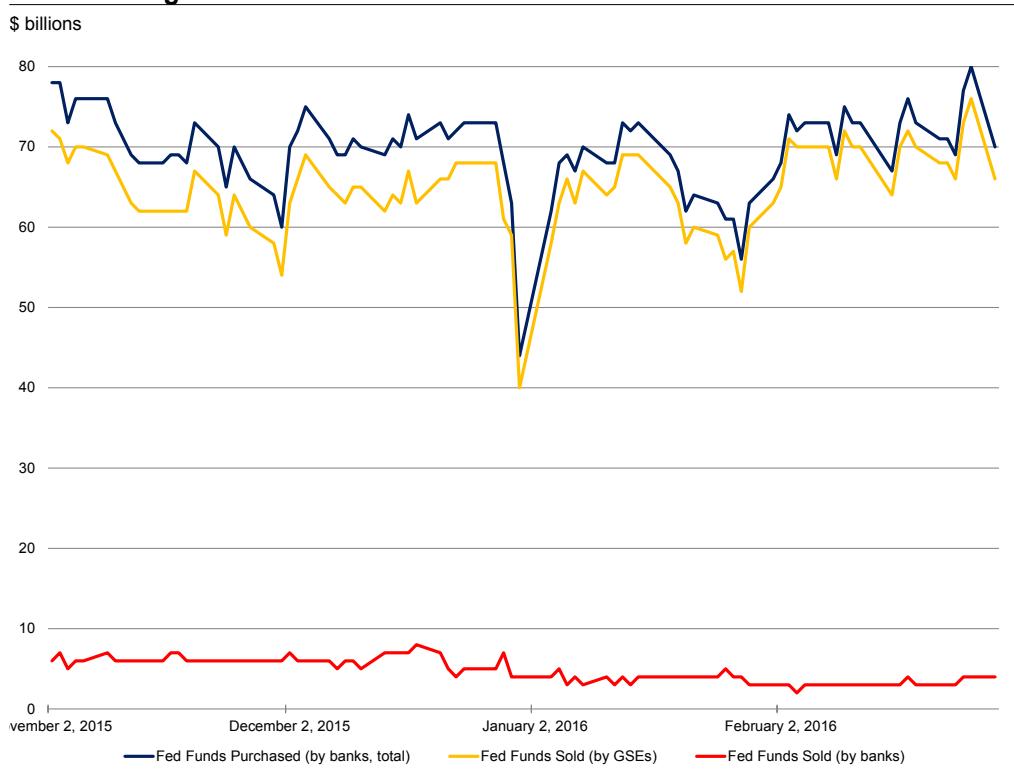
What we see is a small market where participants seem to have come to an agreement about how the market should trade.

Exhibit 2: Snake in the Tunnel

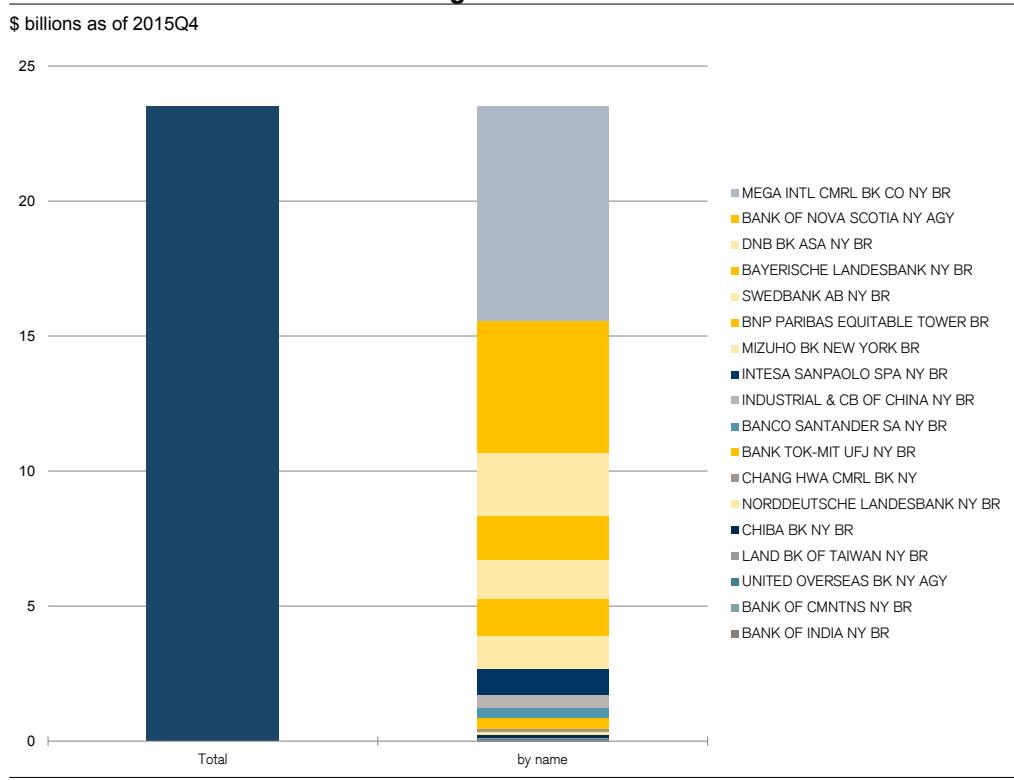
Source: Federal Reserve, Credit Suisse

Exhibit 3: Official Control versus “Self” Control

Source: Federal Reserve, Credit Suisse

Exhibit 4: Big Fish in a Small Pond

Source: FRBNY, Credit Suisse

Exhibit 5: Who Determine the Fixing on Trillions of Derivatives?

Source: FFIEC, Credit Suisse

Exhibit 6: The FHLBs' Unsecured Exposure by Credit Risk and Country

\$ millions as of 2015Q4

Carrying Value(2)	Investment Grade				Unrated	Total
	Double-A	Single-A	Triple-B			
Domestic	\$ 5,164	\$ 6,426	\$ 1,476		2	\$ 13,068
U.S. subsidiaries of foreign commercial banks	—	954	—		—	954
Total domestic and U.S. subsidiaries of foreign commercial banks	5,164	7,380	1,476		2	14,022
U.S. branches and agency offices of foreign commercial banks						
Canada	3,166	5,316	—	—	—	8,482
Australia	5,709	—	—	—	—	5,709
Netherlands	—	5,620	—	—	—	5,620
Finland	3,852	—	—	—	—	3,852
Germany	—	2,425	—	—	—	2,425
Norway	—	2,340	—	—	—	2,340
Sweden	200	1,440	—	—	—	1,640
Japan	—	375	—	—	—	375
United Kingdom	—	250	—	—	—	250
France	—	200	—	—	—	200
Total U.S. branches and agency offices of foreign commercial banks	12,927	17,966	—	—	—	30,893
Total unsecured investment credit exposure	\$ 18,091	\$ 25,346	\$ 1,476	\$ 2	\$ 44,915	

Source: Office of Finance, Credit Suisse

Moreover, the o/n RRP facility seems irrelevant in determining where FF trades.

This is because early return of cash is paramount, FHLBs will never invest in a facility that gives their cash back late in the day. The FHLBs would prefer keeping cash in their Fedwire accounts earning zero to locking it up for an entire day in o/n RRPs for a yield.

We think the Fed will soon have to begin a conversation with market participants about the problems of the FF market, the fading relevance of the FF rate as a reliable measure of banks' funding costs and the need to switch to another, more meaningful policy target.

The overnight bank funding rate (OBFR) is the obvious candidate and we think the switchover will happen before year-end.

We know that the OBFR is a volume weighted median of where global banks fund themselves in o/n FF and Eurodollar transactions and that it gets around the small volume and the small number of participants in the FF market. The volume of o/n Eurodollar transactions is near \$250 billion and there are hundreds of market participants.

Switching over to the OBFR is not without questions, however. Three come to mind in particular, regarding design, concept and implications for the Fed's reaction function.

First, regarding design, we looked but could not find any hints as to whether the Fed surveys the rates on both operating and non-operating deposits to calculate OBFR.

The detail is crucial since the U.S. experience shows that banks value and price the two deposits differently. As European banks (the largest participants in Eurodollar market) ramp up their compliance with Basel III and reprice their deposits, the generally lower rates offered on non-operating deposits could cause Eurodollar rates to drift away from the FF rate over time. We do not see any signs of this yet (the two rates trade on top of each other at present), but without knowing the precise types of deposits the OBFR is designed to track, we cannot exclude this scenario. This is important to keep in mind especially if OBFR ends up replacing the effective FF rate in the pricing of swaps and futures contracts.

Second, regarding concept, switching from FF to OBFR is a big deal in the sense that the FF market is an interbank market, whereas OBFR is a customer-to-bank market.

Operationally targeting a customer-to-bank rate is very different from targeting an interbank rate. We are actually unaware of any central bank that is influencing customer-to-bank rates through open market operations (OMO). Does OBFR point to a system

where OMOs are obsolete and where administered target ranges are the norm? Where the Fed stands ready to make markets at the upper and lower bounds of the range? And where benchmark rates are set by surveyed customer-to-bank and not interbank trades?

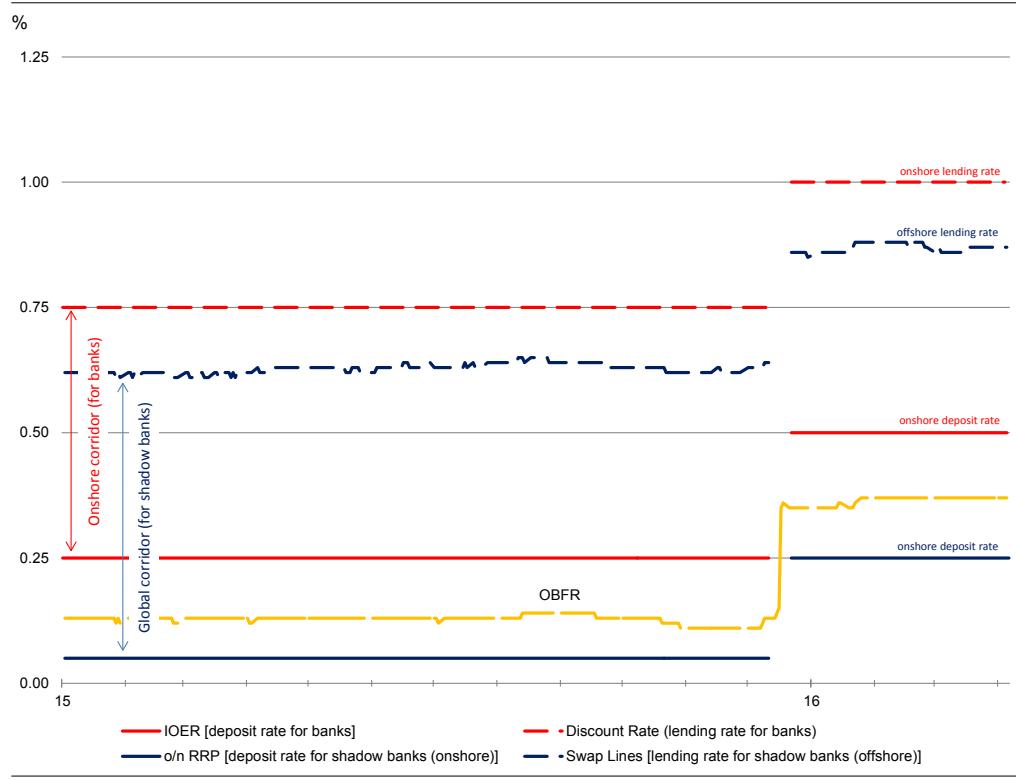
Third, regarding the reaction function, imagine the Fed targeted Libor as its policy rate.

Targeting the OBFR would essentially be the same, to the extent that both Libor and OBFR are meant to measure where banks fund in the Eurodollar market. Conceptually this means that the Fed would target *global* as opposed to domestic dollar funding conditions only: a central bank that targets the range where *global* dollar funding rates should trade.

With the standing FX swap network (see [Mehrling, 2015](#)) with the BoC, the BoE, the BoJ the ECB and the SNB, the Fed already made one big leap toward becoming the de-facto central bank of the world by being ready to broadcast global dollar liquidity at OIS + 50 bps.

Switching over to OBFR would represent a second major leap. But in this case, not as dealer of last resort in the cross-currency basis market, but rather as a central bank that aims to target the price of dollar funding not only onshore but also globally (see Exhibit 7).

Exhibit 7: The New World Order



Source: Federal Reserve, Credit Suisse

We have not one corridor, but two *parallel* corridors. The corridor everyone talks about is the o/n RRP-IOER range. The corridors everyone should be talking about are the Fed's onshore corridor for traditional banks and a *global* corridor for the shadow banking system.

The solid red line (IOER) shows where banks can deposit cash at the Fed onshore and the dashed red line shows where banks can borrow from the Fed onshore (through the standing discount window facility). This is the onshore corridor for traditional banks.

The solid blue line (o/n RRP) shows where shadow banks (dealers and money funds) can deposit cash at the Fed onshore and the dashed blue line shows where shadow banks (non-U.S. banks active in Eurodollar markets) can borrow from the Fed *offshore* (indirectly through their home central banks' standing FX swap lines with the Fed).

This is the global corridor for the shadow banking system.

In normal times, the OBFR (a measure of onshore and offshore funding costs) trades between the onshore deposit legs of the two parallel corridors (the o/n RRP-IOER range).

And unlike in 2007, when Libor shot 50+ bps above the fed funds rate, OBFR generally should never gap north of the rate on dollar swap lines – the offshore discount window rate.

What all this means in light of the Fed's domestic mandates on jobs and inflation is an open question, but our instinct tells us that all this points to a Fed that is inherently more sensitive to global financial conditions beyond the trade weighted value of the dollar; inherently more sensitive to the global growth outlook; and hence inherently more dovish.

The more plates you juggle, the more careful you will have to be.

Just think about it: if the design of your parallel corridor system pre-commits you to step in as dealer of last resort in Eurodollar markets you will be extra careful in how much you tighten dollar funding conditions globally. Tighten too much and the first port of call won't be the IMF like in the past, but your standing dollar swap lines with other central banks.

We think that switching from FF to OBFR will be a necessity, not a choice.

Unsecured interbank markets and the fed funds rate as a policy target are set to fade into irrelevance post-Basel III. OBFR is the alternative and switchover is bound to happen sooner rather than later. Therefore starting to think about these question *now* is paramount.

Part III - LCR and the Fed's Balance Sheet

The idea that there are no excess reserves stems from the fact that new regulatory rules underwrite demand for a big Fed balance sheet for a long time to come (possibly forever).

The Fed is currently considering imposing rules to require banks to hold a certain minimum target portion of their HQLA portfolios in reserves. This further underscores this point. As we have highlighted in earlier work (see [here](#)), the LCR is subject to considerable interpretation when it comes to how banks can build their HQLA portfolios: the outflow assumption on liabilities and eligible assets are uniform, but there is no guidance on the target duration of a portfolio or the mix between reserves and bonds among Level 1 assets.

Banks have taken very different approaches in building these portfolios: some banks have mostly reserves (JP Morgan), some mostly Treasuries (Citi) and some mostly mortgages (Bank of America) in their HQLA portfolio (see Exhibit 8; note that the issue we raise here pertains to the Level 1 portion of HQLA portfolios which is entirely separate from some large banks' Level 2 allocation issues which we discussed [here](#)).

The [Basel III Monitoring Report](#) of the BIS is a helpful benchmark in terms of what the Fed may potentially chose as a target, and that is about 85% Level 1 assets (made up of a minimum of 35% reserves and 50% Treasuries) and a maximum of 15% Level 2 assets.

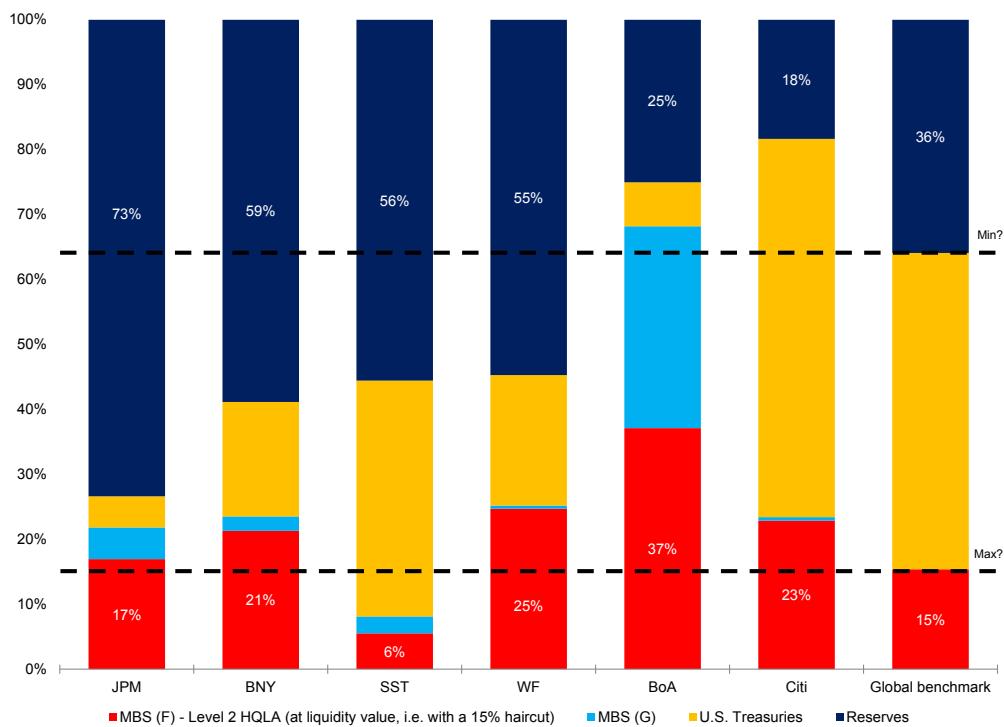
If history is any guide the Fed will likely choose something tougher than this

Under the leadership of Governor Tarullo the Fed chose to implement regulatory reforms a touch tougher and a touch faster than the Basel III baseline, and will likely chose HQLA portfolio mix targets that are a touch tougher than the findings of the BIS report.

Any question about when or whether the Fed will finally start to shrink its bloated balance sheet then ultimately comes down to this: do you think the Fed's regulatory arm would be comfortable with a banking system that has a greater share of bonds in its HQLA portfolio?

Exhibit 8: Are Banks Due for Uniform Liquidity Diets?

Bank operating subsidiaries only, % as of 2015Q4



Likely not.

In an important [speech](#), former BoE Governor Mervyn King noted the steady erosion of U.K. banks' reserve buffers from about 30% of assets in the 1960s to practically nothing by the eve of the crisis. In this sense the odd thing is not that the size of the Fed's (and other central banks') balance sheet rose five-fold since the crisis, but that it did not during the decades prior to the crisis and that regulators let banks shrink their official reserve buffers to nothing relative to the ballooning size of wholesale repo and Eurodollar markets.

Had the Fed forced banks to hold an additional say \$50 billion in extra reserves year after year as wholesale funding markets expanded after President Nixon took the U.S. dollar off the gold standard in 1971, the size of its balance sheet would be roughly where it is today.

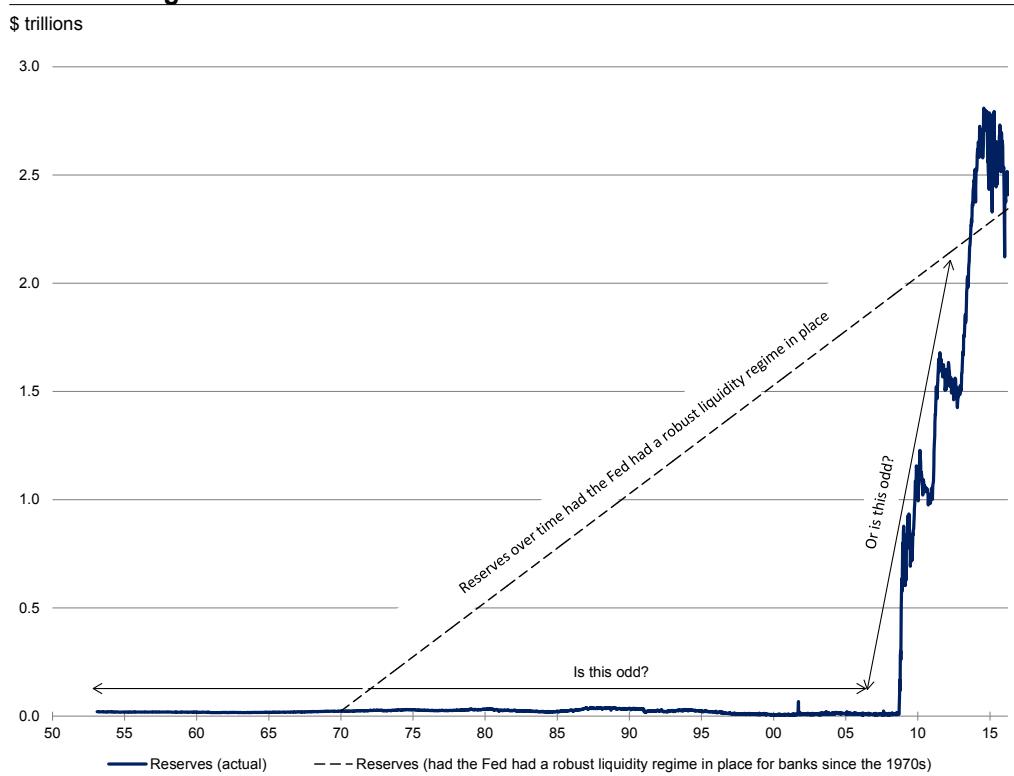
Big is not odd; small was odd (see Exhibit 9).

Don't get your hopes up about going back to an all-bonds liquidity portfolio.

With Basel III throwing sand upon sand into the functioning of matched repo books (the hearts whose beats gave market liquidity a pulse), bond market liquidity will never be what it once was. Regulators know this. After all they were the ones who designed the new system and put in place the constraints on repo and market liquidity that come with it.

They do realize that in the post Basel-III world order base liquidity (central bank reserves) will inevitably have to replace market-based liquidity.

With this in mind, does the Fed shrinking its balance sheet by taking reserves out of the banking system and replacing them with U.S. Treasuries and MBS still sound probable?

Exhibit 9: Big Is Not Odd...

Source: Federal Reserve, Credit Suisse

Instead of asking when the Fed will shrink its balance sheet, it's about time the market gets used to the idea that we are witnessing a structural shift in the amount of reserves the U.S. banks will be required to hold, where reserves replace bonds as the primary source of banks' liquidity. And that this shift will underwrite demand for a large Fed balance sheet.

And we are also witnessing a structural shift in the amount of reserves held by foreign banks as well. Gone are the days when foreign banks settled their Eurodollar transactions with deposits held at correspondent money center banks in New York. Under the new rules, interbank deposits do not count as HQLA, and foreign banks are increasingly settling Eurodollar transactions with reserve balances at the Fed. Foreign banks' demand for reserves as HQLA to back Eurodollar deposits and as ultimate means of settlement for Eurodollar transactions will underwrite the need for a large Fed balance sheet as well.

Prime money fund reform is a very important yet grossly under-appreciated aspect of this, one with geo-strategic relevance for the United States.

Prime money funds have been providing the overwhelming portion of funding for foreign banks' reserve balances. If the prime money fund complex shrinks dramatically after the October 14th reform deadline, funding these reserve balances will become structurally more expensive. This in turn means that for foreign banks across the globe running Eurodollar businesses – lending Eurodollars and taking Eurodollar deposits – will become structurally more expensive. Why? Because if the LCR requires banks to hold more reserves as the preferred medium for settling Eurodollar transactions and the funding of these balances become more expensive, funding the liquidity portfolio corresponding to Eurodollar books may become a negative carry trade. Will that help diminish the dollar's pre-eminence as the global reserve currency and play into China's hand? You bet...

Conclusion - Quantities Matter Again

Of course the bulk of banks' demand for HQLA is driven by non-operating deposits. If banks push these deposits out, or if they choose to leave the banking system voluntarily in search of money market instruments elsewhere, the need for reserves would be lower.

That is true.

Keep in mind, however, that with the private sector's ability to issue money market claims sharply limited by Basel III, money can only find a home on the sovereign's balance sheet: either through the Treasury bill market or through the Fed's o/n RRP facility.

Either option will mean that demand for a large Fed balance sheet will remain: reserves will not be eliminated, but swapped into other liabilities – larger cash balances for the U.S. Treasury (and on the flipside more bills for institutional cash pools) and more o/n RRPs for money funds (and on the flipside safer money funds for institutional cash pools).

Oddly, however, the Fed keeps emphasizing that the o/n RRP is not there for the long haul or to meet money funds' demand for safe assets, but to put a floor under interest rates.

We disagree. Quantities matter again, in ways the Fed has yet to appreciate.

Quantities matter for HQLA reasons: we now have what is effectively a global reserve requirement regime which requires banks to hold more reserves than in the past. There is no turning back to the old days where reserves were scarce. The LCR does not allow that.

Quantities matter for balance sheet reasons as well: private balance sheets are smaller and less flexible, limiting the amount of short-term wholesale liabilities (and chiefly the size of dealers' matched repo books, or [private money](#)) that financial institutions can issue.

Quantities matter for money demand reasons too: with institutional money demand up – not down – since the crisis (partly due to initial margins at CCPs), if the private sector can't issue shadow money claims someone else will have to, otherwise rates go down, not up.

In this sense, debates about whether the RRP facility should be temporary or permanent; whether it should be allowed to grow into a structural source of supply for safe assets; or how deep the Fed should or should not get in bed with money funds are just a sideshow.

The real question is:

How big will the o/n RRP facility *have to* get for it to serve as a hard floor for the short-term rates complex (in the absence of alternatives such as the ones we discussed [here](#)).

Safe assets are needed to store pools of wealth and to grease financial economy transactions (see [Pozsar](#), 2014). If their provision were inelastic or only reluctantly elastic, the Fed would be unable to control short-term rates. The Fed has yet to learn that lesson.

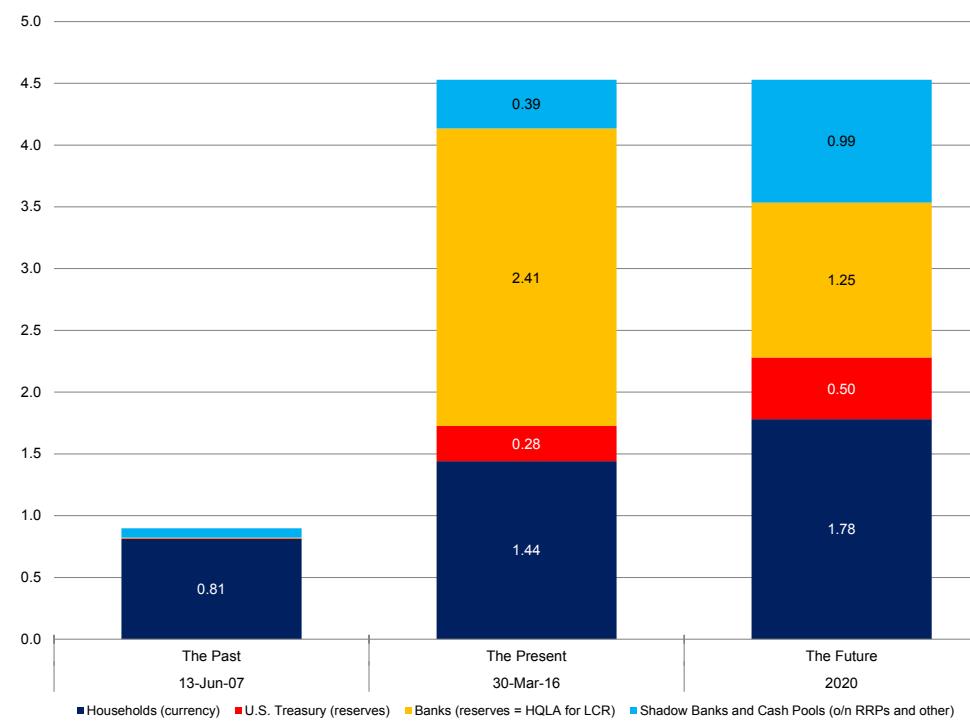
Either way, after taking into account households' demand for cold hard cash, the U.S. Treasury's decision to structurally boost its cash balances (from practically nothing to \$300 billion today and possibly as high as \$500 billion in the future), and the structural leap in U.S. and foreign banks' demand for base liquidity (reserves) under the global LCR regime, we see very little room for the Fed to ever shrink its balance sheet (see Exhibit 10).

Currency outstanding, U.S. Treasury's structural cash balances and demand for reserves under the LCR regime lock in the size of the Fed's balance sheet at around \$3.5 trillion and as discussed in the [maiden issue](#) of Global Money Notes, the remaining \$1 trillion will be needed as reverse repos for money funds and foreign central banks to offset the (forced) shrinkage in dealer matched books and the corresponding decline in safe assets.

Big ain't inflationary. Big is necessary. It is the future. Get over it...

Exhibit 10: How I Stopped Worrying and Love the Fed's Big Balance Sheet

\$ trillions



Source: Federal Reserve, Credit Suisse

Glossary

Basel III is the most significant reform to hit the banking system in a generation. It represents an entitlement reform for the banking system: as an analogy think of retirement ages being raised from 60 to 80. It has four cornerstones: risk-based capital requirements; the (supplementary) leverage ratio (SLR); the liquidity coverage ratio (LCR) and finally the net stable funding ratio (NSFR). It applies to the largest banks in the G20 economies.

HQLA is a term introduced as a part of bank liquidity requirements under Basel III. It stands for High-Quality Liquid Assets. HQLA fall into two broad categories: Level 1 and Level 2. Level 1 HQLA include reserves, U.S. Treasuries and Ginnie Mae MBS. Level 1 assets can be held in unlimited amounts and at no haircut. Level 2 HQLA include Fannie Mae and Freddie Mac MBS. Level 2 assets can only make up 40% of an HQLA portfolio and must be included at a haircut of 15%. Level 2 assets also include corporate and municipal bonds and also some equities. However banks don't hold large amounts of them as HQLA.

LCR stands for the Liquidity Coverage Ratio, a cornerstone of Basel III. The LCR requires banks to take stock of their short-term liabilities, assign pre-set outflow assumptions to them and hold an amount of HQLA against them equal to their outflow assumptions. The minimum LCR U.S. banks must have is 100% but are encouraged by the Fed to target an LCR of about 115% (with the 15% extra being banks margin of safety). Since July 1st of 2015 the largest U.S. banks have been subject to *daily* LCR compliance requirements.

For more on the LCR see Section II ("Rules") of [Global Money Notes #3](#).

Non-operating deposits are a concept introduced as a part of LCR. They refer to deposits that are in excess of an institutional depositors typical outflow needs. Depending on the type of institution the outflow assumption associated with non-operating deposits are 40% at the minimum and can be as high as 100%. The higher the outflow assumption the lower the attractiveness of the deposit as a source of funding for a bank. This is because high HQLA requirement deposits leave no freedom for a bank to decide how to invest on its asset side: these deposits can only be held as low-yielding cash at the Fed.

For more on non-operating deposits see Section II ("Rules") of [Global Money Notes #3](#).

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Global Money Notes #6

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QE, Basel III and the Fed's New Target Rate

QE and Basel III have forever changed the way money markets trade.

Changes are so fundamental that one's knowledge of markets pre-crisis may be a hindrance to successfully trading money markets today. And judging from the Fed's narrative on [money markets after liftoff](#), policymakers too are still in the early stages of making sense of the numbers they see on their screens.

Forget everything you know, and start from a blank page. Everything's in play...

There was a time when banks deployed massive amounts of balance sheet to arbitrage. The typical day of a money market trader involved borrowing and lending within and across various money markets segments both onshore and offshore: arbitraging small differences between fed funds and eurodollar rates and between various unsecured and secured (repo) rates were the norm.

Banks' aim was to conduct arbitrage until spreads became so narrow and the relationship across the entire spectrum of money market rates so tight that arbitrage was no longer possible. Policing these money market relationships – ensuring that spreads remained tight at all times – was the name of the game.

Policing the tightness of spreads required "endless" amounts of balance sheet. One can either control prices or quantities, but not both. Under the old regime, the focus was on prices and tightness. Quantities (balance sheet) were endless and an afterthought, and the volume of matched money market books that accumulated through banks' money dealing activities – borrowing in one segment of the money market in order to lend in another – were massive indeed.

Matched money market books also meant that for the largest of global banks – the main arbitrageurs in the system – liquidity buffers were interbank loans.

Liquidity was stored inside the system.

The Great Financial Crisis taught bankers and regulators alike that "inside" liquidity is the least reliable when most needed. The system needed a reboot.

Basel III tore up the old model and forced banks to hold liquidity buffers with the sovereign instead of banks. *Liquidity is now being stored outside the system.*

Money is now less "inside" and more "outside".

Understanding the implications of this regime shift must be at the center of evaluating the performance of money markets after liftoff. Analyses that don't do that lack in perspective and confuse rather than illuminate at a time of change.

No change is more important than the choice of an alternative reference rate and the related choice of the Fed's new target rate. While at the moment the OBFR is the *only* possible candidate, a recent [speech](#) by President Dudley hints that the Fed may be laying ground for a repo rate as the *preferred* alternative.

QE and Basel III have euthanized interbank money markets.¹

There isn't much happening in interbank money markets in general in a banking system awash with massive amounts of reserves that banks are required to hoard in order to comply with new rules designed to ensure they can survive a 30-day liquidity storm.

Compared to the past, when banks traded scarce reserves frantically to settle interbank payments, banks today have abundant pools of reserves and settle payments leisurely.

There are no better tell-tale signs of this than the facts that interbank settlements occur much earlier in the day and intraday credit extended by the Fed is nil today (see [here](#)). This is in sharp contrast to the pre-crisis era, when banks had incentives to delay interbank payments until late in the day and drew massive volumes of intraday credit from the Fed.

Intraday credit (daylight overdrafts) meant an increase in liabilities for the deficit banks (those making the payments) and an increase in excess reserves for the surplus banks (those receiving the payments) and the Fed intermediating between them – *during the day*.

Intraday credit had to be repaid by the end of the day (before sundown) and the shifting of intraday credit and corresponding excess reserves from the Fed's balance sheet onto banks' balance sheet happened in the overnight fed funds market – *during the night*.

Fed funds are thus overnight credit not daylight credit, and interbank credit not Fed credit...

...or at least they were until QE and Basel III changed everything.

Historically, the overnight interbank fed funds market was where the Fed set its policy rate, but with QE and Basel III taking the life out of what once was a vibrant market, the Fed will have no choice but to switch to a new target rate and OIS markets to a new reference rate.

This issue of Global Money Notes explores the ways in which QE and Basel III have influenced the hierarchy and trading pattern of various money market interest rates and how they impact the search for an alternative reference rate and the Fed's new policy rate.

Its centerpiece is an interactive slide deck (see [here](#)) that guides the reader through the new money market landscape one step at a time. The deck starts with a blank page (literally) and explains the hierarchy between and behavior of all relevant money market rates in the post-QE, post-Basel III world. We do so through a careful review of each market participant's balance sheet – who they lend to and who they borrow from and why.

It is not for the faint-hearted: it runs close to 100 pages.

The deck builds on earlier work: first came the mapping of the shadow banking system (see [Pozsar et al., 2010](#)); then came mapping the hierarchy of money (see [Pozsar, 2014](#)); now comes mapping the hierarchy of interest rates that comes with the hierarchy of money.

The deck's target audience is anyone who trades money markets on a daily basis, the central banking community and members of the Alternative Reference Rate Committee.

We recommend reading the slide deck one click at a time in electronic (not hard copy) form and on a computer screen (not a tablet device).

Reading the deck is not essential for everyone, but do know that putting it together helped us understand money markets to the core and reach the conclusions summarized below.

Money Markets after QE and Basel III

Basel III forced banks to replace eclectic interbank portfolios with high-quality liquid assets (HQLA) in the form of reserves held at the Fed or Treasuries (reversed in or held outright).

Simplicity replaced diversity.

Basel III simplified things on the funding side, too. For an asset to qualify as HQLA, it must be unencumbered, which means that it can never be funded secured, only unsecured.

¹ QE and Basel III euthanized unsecured interbank money markets, but not secured interdealer money markets. We will discuss trends in interdealer money markets on Page 6.

Figure 1 (overleaf) shows the resulting shift in the rate pairs that banks “play off” against each other: the relevant pairs are no longer within and across private money market segments but rather unsecured rates and IOER; unsecured rates and centrally cleared (GCF) repo rates; and unsecured rates and the intermediate points on the Treasury curve.

Matched book money dealing – money market funding of money market lending – is no longer private on both sides, but rather half private, half public. Banks don’t fund each other anymore but rather the sovereign – the U.S. Treasury or its subsidiary, the Fed.

Figure 2 (overleaf) shows this shift in action through the matched money market books of the New York branches of foreign banks. The size of matched books did not change much since the crisis, but their asset side is entirely different: o/n and term loans to other banks (fed funds and deposits, respectively) and interoffice loans are out, and HQLA (reserves) are in. Reverses (or reverse repos, a source of HQLA) are less important but present still.

On the funding side too, interbank (fed funds) trades are gone and what remains are funding from headquarters and unsecured funding from non-bank customers.

Basel III drove a wider wedge between the new rate pairs than the spread between the old pairs used to be: the spread between o/n rates used to be razor thin (about a basis point or two), but the spread between IOER and the effective fed funds rate is 12.5 bps today.

Why? Because banks need every penny of reserves as HQLA against short-term liabilities (demand for which is driven by customer liquidity needs), and since HQLA is a low-margin use of balance sheet and balance sheet is no longer infinite but scarce, o/n spreads have settled *structurally* wider. Furthermore, Basel III limits leverage and by extension the amount of balance sheet available to compress spreads – which is practically nil.

And so, high-volume, low-margin private money dealing gave way to Basel III compliance through *public-private* money dealing at wider margins (see [McCulley and Pozsar, 2014](#)).

Basel III also interacts with QE.

Reserves – the quintessential byproduct of QE – are HQLA and reserves can only be held by banks. By extension, QE influences the composition of banks’ HQLA portfolios.

During the initial rounds of QE, every penny of reserves added to the system were indeed excess – in excess of the amount banks needed to comply with reserve requirements.

But when Basel III – and in particular, the Liquidity Coverage Ratio – went live, all reserves became required: not to comply with reserve requirements but with the LCR (see [here](#)).

Banks have no incentive to either borrow or lend reserves these days.

Banks have no incentive to borrow reserves because they already hold more than what’s needed to comply with reserve requirements, and they have no incentive to lend reserves either because if they do their HQLA portfolios would shrink and their LCR would worsen.

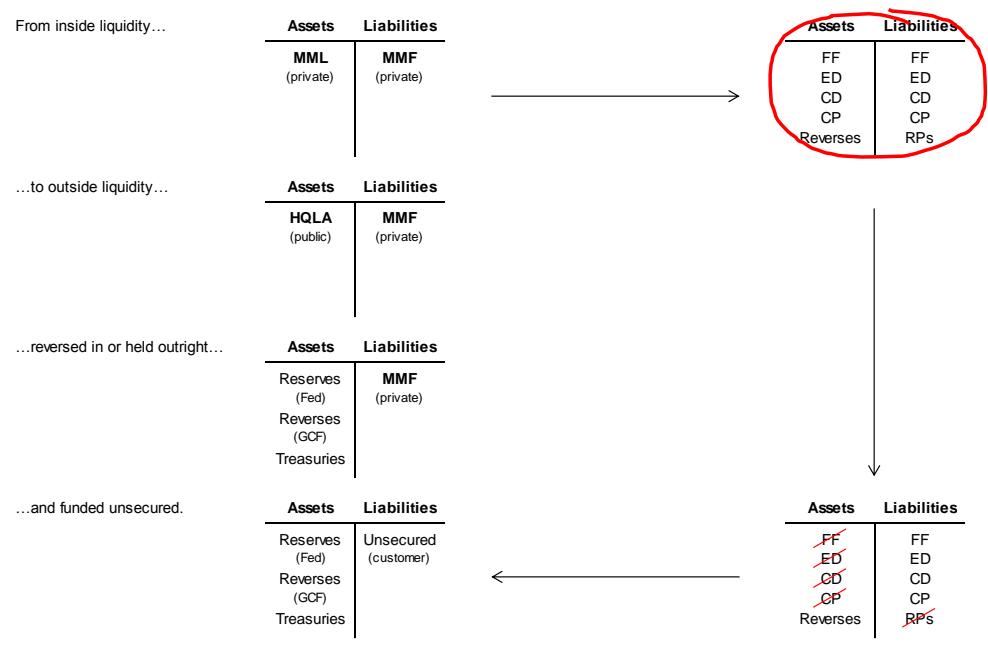
The reason why we still have a fed funds (FF) market is because Basel III does *not* apply to a small corner of the U.S. banking system – the Federal Home Loan Banks (FHLBs).

The FHLBs are the only banks left in the system that still have an incentive to lend to other banks on an unsecured basis on scale. On the flipside, the only banks that borrow from the FHLBs are highly rated foreign banks with an aim to arbitrage the FF-IOER rate pair and subject to a version of Basel III lighter than that which applies to U.S. banks.

As we have discussed in previous issues of Global Money Notes (see [here](#) and [here](#)) the small size of the FF market (about \$60 billion), the small number of FF market participants (10 lenders and a dozen or so borrowers) and the even balance of power between the two sides of the FF market make the FF rate prone to trade along a suspiciously straight line.

It appears that informal agreements between the two sides of a small market that’s slowly (but surely) fading into irrelevance have more to do with where the effective FF rate trades than the Fed’s new operational framework or the magnetic pull of IOER (see [here](#)).

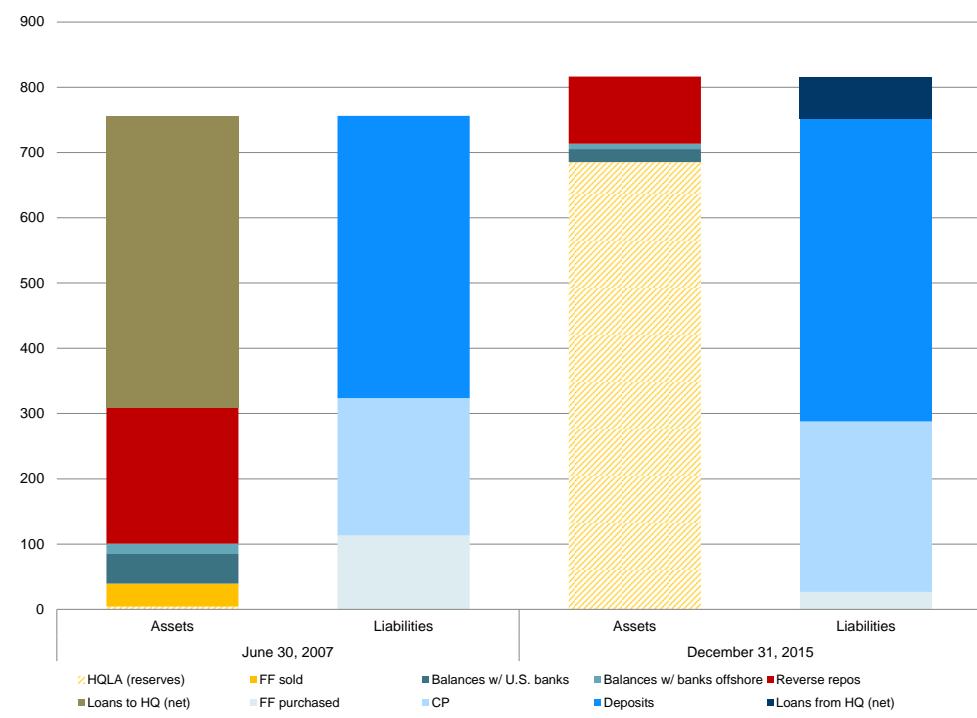
Scrapping the FF rate as the Fed’s policy target won’t be a choice but a necessity, in our view.

Figure 1: From “Inside” Liquidity to “Outside” Liquidity

Source: Credit Suisse

Figure 2: Money Dealing Now and Then

New York branches of foreign banks, \$ billions



Source: FDIC, Credit Suisse

No problem, you say: we have the Fed's new overnight bank funding rate (OBFR) as an alternative to the FF rate. Unlike the FF market, the o/n eurodollar (ED) market frequented by U.S.-based banks is deeper (\$250 billion versus \$60 billion), more populous (hundreds of borrowers versus a dozen) and hence more reliable a yardstick of o/n bank funding conditions. In addition, the OBFR trades on top of the FF rate and also along a straight line, so the Fed's operating framework must be doing something right, right? Not so fast...

That OBFR also trades along a straight line has to do with the fact that bank funding desks use the FF rate as a reference point to price o/n ED deposits. Things get circular...

Furthermore, unlike the FF rate – a yardstick of o/n onshore interbank funding conditions – the OBFR is a yardstick of mostly offshore (as opposed to onshore) funding conditions and references mostly customer-to-bank (as opposed to interbank) trades. And that's a big deal.

It is a big deal because switching from the FF rate to OBFR as the Fed's policy target is not without a broad set of existential questions. Were that switch to happen the Fed would go from targeting an onshore rate to targeting an offshore rate; from targeting an interbank rate to targeting a customer-to-bank rate; from an operating framework built around TOMOs (or temporary open market operations) to one centered around POMOs (permanent open market operations); and by extension, from targeting interest rates by fine-tuning the amount of reserves to targeting the quantity of reserves in HQLA portfolios through episodic rounds of asset purchases (regulatory as opposed to quantitative easing).

Alternative Reference Rates and Basel III

The reasons why banks don't trade in the o/n FF market apply to all other unsecured segments of the interbank money market, including the eurodollar market. Whatever the volume of o/n eurodollar transactions there are *no* interbank trades there. Not one penny. And that opens up an existential can of worms for the concept of "IBOR" in general.

IBOR stands for interbank offered rates and submissions are based on the hypothetical question of "where you think you could get unsecured funding from other banks".

From other banks... at a time when unsecured interbank markets have already faded as a part of the ecosystem. LIBOR curves today (to the extent that submissions reflect actual trades) are based exclusively on customer-to-bank and *not* interbank trades.

It must be tough around the FOMC today. Your policy target (FF) is questionable. The OBFR is not a slam dunk to switch to. Benchmark ("IBOR") curves no longer measure what their name implies. Only the need for change is obvious. But not the direction.

A recent white paper of the [Alternative Reference Rate Committee](#) (ARRC) proposed two alternatives to choose from: the OBFR and some o/n Treasury general collateral repo rate.

The question of alternative reference rates and alternative policy rates are intertwined: ideally, they would be the same. So it is likely that the rate the ARRC will ultimately choose will also be the Fed's new target rate. But there are problems with both alternatives.

As discussed above, switching to the OBFR is not an easy deal (onshore versus offshore; interbank versus customer-to-bank; TOMOs versus POMOs; prices versus quantities).

But switching to a repo rate won't be simple either. In fact, it is *impossible* at present.

Why?

Because primary dealers do not have access to the discount window and so there is no ex-ante mechanism in place that would enable the Fed to cap repo rates in a crisis.

And if you can't cap it, you can't target it...

That said, it would make total sense for the Fed to target an interdealer repo rate going forward. In fact the new (post-Basel III) world order begs for it. Banks have access to reserves at the Fed and reserves are the main form of HQLA they hold to survive a 30-day liquidity storm as required by the LCR. In English this means that banks can bleed liquidity (lose reserves) for weeks before they tap markets for liquidity or the Fed as the last resort.

These massive reserve holdings – representing weeks' worth of liquidity needs – are the reason why banks no longer trade liquidity among each other anymore. Everyone's flush...

In contrast, broker-dealers do *not* have access to reserve accounts at the Fed. For them HQLA is Treasuries reversed in through GCF repo trades or Treasuries held outright. In a 30-day storm, broker-dealers won't have the luxury of running down reserve balances. They will have to repo out HQLA (their unencumbered Treasury portfolio) from the get go. In other words, dealers are flush with collateral, not reserves. And collateral *ain't* money...

On a day-to-day basis, the interdealer GCF repo market is the main market where liquidity gets redistributed within the dealer community (between primary and non-primary dealers).

The volatility of the o/n GCF repo rate is similar to what the volatility of the FF rate used to be when banks too were liquidity constrained, similar to the way dealers are liquidity constrained today. Figure 3 (overleaf) plots the behavior of the o/n GCF repo rate versus that of the FF rate: like electrocardiograms, flickers mean life and flatlines the opposite of life. The o/n GCF repo market is the *only* functioning money market left standing today.

But the GCF repo market is a market where broker-dealers account for the bulk of activity and where banks are present only as *opportunistic* lenders and seldom ever as borrowers (banks typically lend in the GCF repo market if the o/n GCF repo rate is above IOER and typically don't borrow as repos encumber collateral, reduce HQLA and worsen one's LCR).

And because it is broker-dealers that do the bulk of borrowing and lending in interdealer markets, capping a *repo* target rate in a crisis is possible only if dealers too have access to the discount window (IOER serves as a ceiling for the o/n GCF rate only in normal times, not crisis times). President Dudley's recent [speech](#) on Amelia Island arguing for discount window access for primary dealers should be understood in this context. In specific:

"Now that all major securities firms in the U.S. are part of bank holding companies and are subject to enhanced prudential standards as well as capital and liquidity stress tests, providing these firms with access to the Discount Window might be worth exploring."

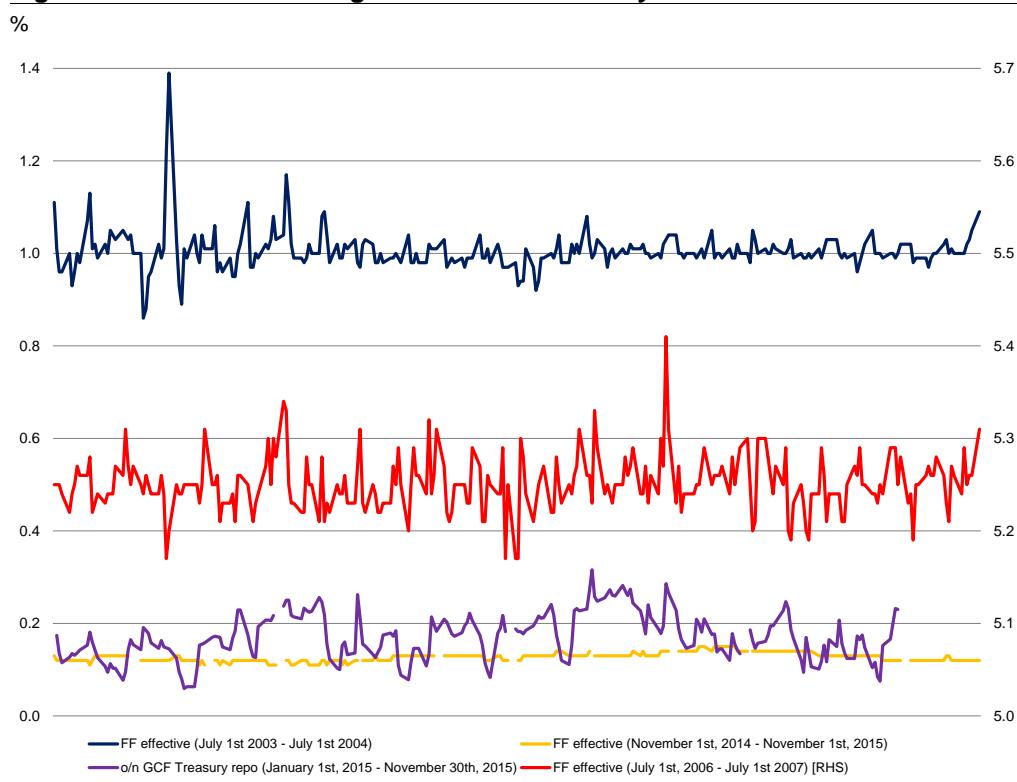
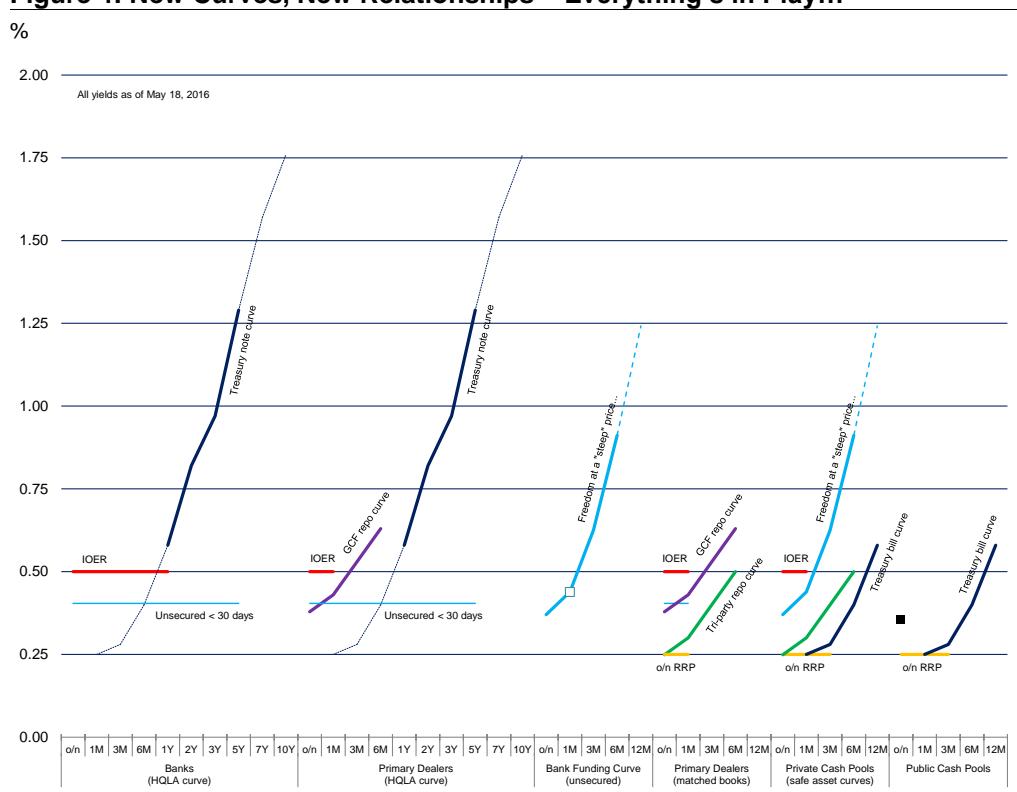
President Dudley's call to emancipate the Fed from Lender of Last Resort (for banks) to Dealer of Last Resort (for the system as a whole – both traditional and shadow) *despite* the spirit of the Dodd-Frank Act (which limits the Fed's 13(3) lending authority) may signal the Fed's discomfort with the OBFR as a target rate and preference for a repo rate instead.

After all, a local interdealer repo target rate would get around the global customer-to-bank aspects of OBFR. But then the Fed has been comfortable with a target rate that's a funding rate for shadow banks, not banks – there... the devil's ugly head popped up again.

And even then, don't forget that before DoLR and a repo target rate become reality, the Fed will have to get a lot of lawyering done in a climate that's all but cooperative.

Until we hear more about DoLR, do know that the OBFR is the *only* game in town.

Is it essential that an alternative reference rate be capped by the Fed's discount window? Most definitely. When the relationship between the FF and Libor rates broke down in 2007 (i.e., when the par exchange rate between onshore and offshore dollars broke down) the Fed had to roll out dollar swap lines to regain control of Libor (the old reference rate). OBFR is capped by the swap lines (see [here](#)) but if the target becomes a repo rate, the Fed – learning from experience – will prefer to have a mechanism for control in place...

Figure 3: An 'Electrocardiogram' of the U.S. Money Market**Figure 4: New Curves, New Relationships – Everything's in Play...**

Source: Federal Reserve, DTCC, The Bank of New York, Credit Suisse

Rules of the Game

The New New Testament (Basel III) comes with its own set of Ten Commandments which we list below and plot in Figure 4. Ignore them or face money market purgatory...

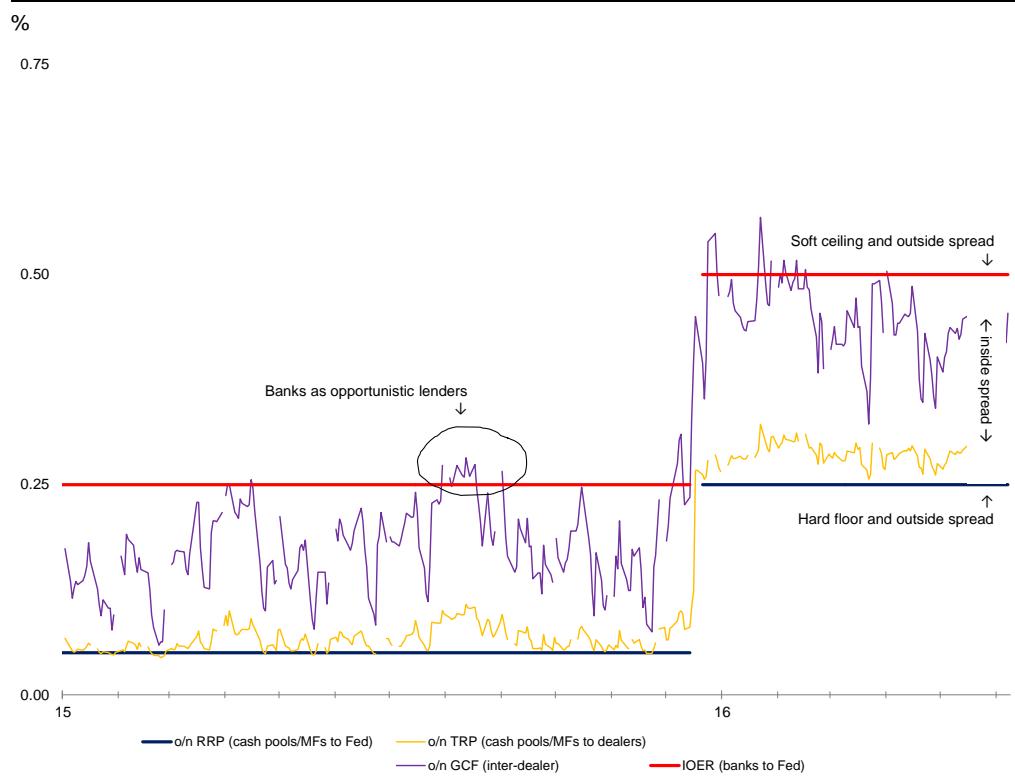
1. Unsecured interbank markets are dead. Long live secured interdealer markets. The o/n interbank FF rate is not much of a measure of anything anymore, really. The o/n interdealer GCF repo rate is the only meaningful money market rate today.
2. Focusing on where the effective FF rate trades within the Fed's target range is like missing the forest for the trees. The greatest story never told is that the Fed's target range is a *de facto* corridor for the o/n secured rates complex: the o/n RRP rate is a hard floor under o/n tri-party Treasury repo rates and IOER is a soft ceiling for the o/n GCF Treasury repo rate.² The o/n tri-party and GCF Treasury repo rates represent primary dealers' core borrowing and lending rates on the liability and asset side of their matched repo books, respectively. In that sense, the o/n RRP and IOER rates set the range within which primary dealers can make two-way markets on an o/n basis (the "inside" spread; see Exhibit 5 overleaf).
3. The o/n RRP rate will always provide a hard floor under o/n tri-party Treasury repo rates as long as the o/n RRP facility remains full allotment.
4. Those calling for the o/n RRP facility to be abolished (citing low utilization rates) should calm down and realize that o/n tri-party repos with dealers, Treasury bills and o/n RRPs with the Fed are substitutes. The reason why usage of the o/n RRP facility has been falling lately was due to a \$400 billion increase in the effective bill supply since the first rate hike (see [here](#)). More bills mean less need for o/n RRPs. That said, low usage today does not mean low usage forever. If bill supply shrinks and a full allotment RRP facility is not there to fill the void, the floor will leak.
5. The IOER rate will always provide a soft ceiling for the o/n GCF repo rate. Banks with large reserve balances serve as opportunistic lenders in the GCF repo market and will always pour money into it if the o/n GCF repo rate creeps above IOER. For banks, this is an asset swap (swapping o/n reserves for Treasuries reversed in through an o/n GCF repo trade) with zero impact on liquidity (LCR), leverage (SLR) or capital (RWA) positions. Not all banks that have access to the GCF repo market will do this arbitrage trade – only those banks that have built their HQLA portfolios with an eye to harvest the option value of reserves. These banks – and one in particular (JPM) – are the system's main money dealers today.
6. Embrace the HQLA curve: for the bank operating subsidiaries of global banks the HQLA curve is IOER up to the point where Treasuries start yielding more and for their dealer subsidiaries the HQLA curve is the GCF repo curve up to the point where Treasuries held outright start yielding more than Treasuries reversed in.
7. O/n unsecured rates (OBFR) are a soft floor under o/n GCF repo rates. O/n GCF trades are a source of HQLA and because HQLA must be unencumbered at all times, they cannot be funded secured, only unsecured. Primary dealers will never let o/n GCF repo rates settle below OBFR; if they did, funding HQLA reversed in via o/n GCF repos would be a negative carry trade (see Exhibit 6 overleaf).
8. Closely related, for as long as banks are subject to the Liquidity Coverage Ratio and there are more reserves in the system than required by Regulation Q, the FF and OBFR rates will always trade below IOER: as discussed above, IOER is an integral part of banks' HQLA curve and banks will always price o/n funding in a way that makes the funding of an o/n HQLA ("base HQLA") a positive carry trade. The quantity of reserves in the system does not matter much in determining the spread between FF and IOER for as long as there are substantially more reserves in the system than what banks are required to hold for reserve requirements (about \$100 billion) and major banks are subject to the Liquidity Coverage Ratio.

² All repo rates mentioned on this page refer to o/n tenors and Treasury collateral.

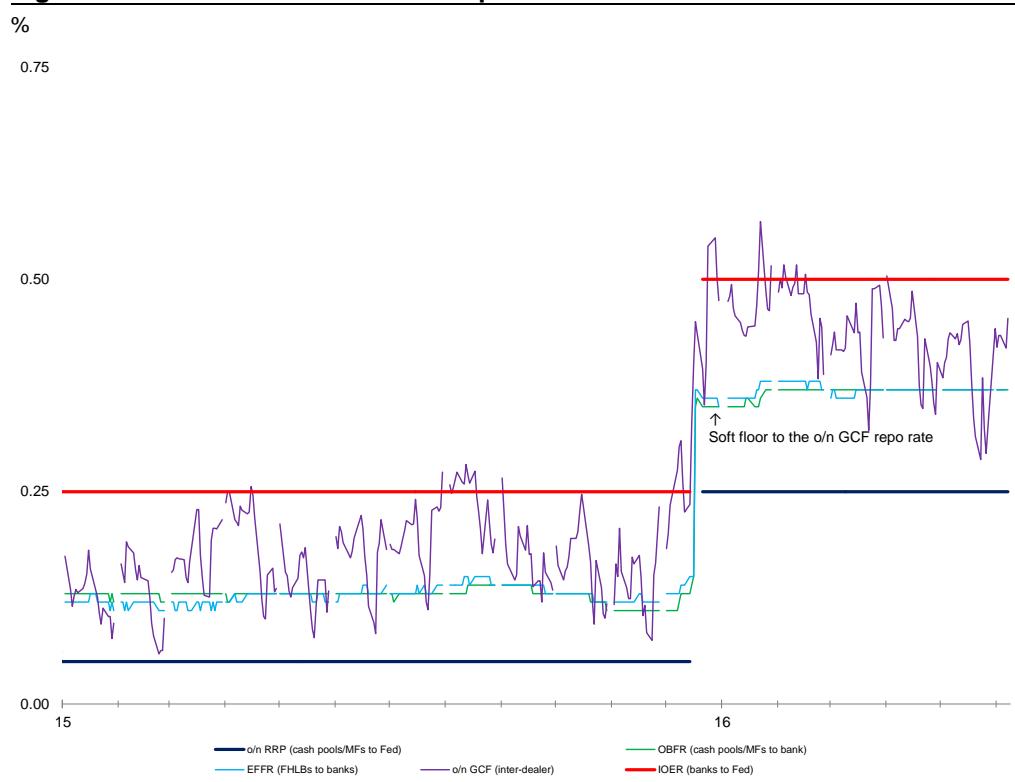
9. The steepness of the unsecured bank funding curve beyond the 30-day point is structural and reflects the price of “freedom”: three- and six-month funding have no HQLA requirements and with term funding banks can do anything they please.
10. The Fed’s foreign repo pool is most definitely a policy tool. The Fed’s repos with foreign central banks and multilateral organizations pre-date the tri-party repo system and are executed on a bilateral basis. They return cash early, at 8:30 AM, in an era when repo trades that settle through the tri-party platform – including o/n RRP with the Fed – return cash at 3:30 PM. Investors find out the rate they will earn overnight at around 4:00 PM – so late because the Fed needs time to finish its daily survey of where dealers got funded during the day. The rate paid by the foreign repo pool is very close to the o/n GCF repo rate but it is not the same. Our instinct says that it *matches* the volume weighted average rate of o/n GCF repo trades done both bilaterally and on a tri-party basis and which the Fed derives from the above dealer survey. And so the Fed pays a *market rate*. But the fact that the rate on the foreign repo pool matches a market rate and hence does not influence interdealer repo rates does not mean that it does not impact things elsewhere. Since late 2014, the rate paid by the foreign repo pool has been “surfing” the structural widening between o/n GCF and tri-party repo rates and has been consistently yielding more than Treasury bills. Over this period, the foreign repo pool morphed into a superior alternative to bills – *nothing* beats o/n trades with the Fed with an 8:30 cash return yielding more than term bills. As foreign central banks traded out bills and into the foreign repo pool – greased by an apparently secret removal of “the constraints imposed on customers’ ability to vary the size of their investments” – the effective supply of Treasury bills increased by \$250 billion. And since o/n tri-party Treasury repos, Treasury bills and o/n RRP with the Fed are substitutes (see point 4 above), \$250 billion in extra bills meant \$250 billion worth of bids *not* hitting primary dealer’s shrinking balance sheets begging for o/n tri-party trades they cannot make, and that much in bids *not* hitting the Fed’s o/n RRP facility. If the o/n RRP facility and Treasury bills are substitutes and the foreign repo pool and Treasury bills are substitutes as well, then the o/n RRP facility and the foreign repo pool are substitutes too. Both facilities are full allotment but one at an administered price and one at a market price, and both facilities are in the business of providing safe, short-term assets in an era where *quantities* matter more than prices.³ So to reiterate, the foreign repo pool *is* a policy tool. And just like the use of metaphors from physics to describe how FF trades, saying that the foreign repo pool is not a policy tool when in fact it is confuses, rather than illuminates at a time of change. In Exhibit 4 (see Page 7 above) the foreign repo pool is marked by a black dot – an allegory for the foreign repo pool as the system’s wandering black hole...

And with all that dig in, and enjoy [Money Markets after QE and Basel III...](#)

³ The foreign repo pool is in a league of its own. Central bank facilities are either fixed price, full allotment (where the central bank sets the price and the market determines the quantity) or fixed size, variable price (where the central bank sets the size and the market determines the price). Oddly, the foreign repo pool is neither: its size is full allotment and its rate varies with the market (in fact its rate is the interdealer market rate). It is a gift wrapped in gold: giving an interdealer rate for a segment of cash pools in violation of the hierarchical nature of money markets, where only dealers should earn the interdealer rate and only those private cash pools that are big enough to extract a pound of flesh from primary dealers. The foreign repo pool flattens the hierarchy...

Figure 5: A Target Range for the o/n Secured Rates Complex

Source: Federal Reserve, DTCC, The Bank of New York, Credit Suisse

Figure 6: A Soft Floor for o/n GCF Repo Rates

Source: Federal Reserve, DTCC, Credit Suisse

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Global Money Notes #7

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Japanese Banks, LIBOR and the FX Swap Lines

July saw the maturity of \$100 billion in formerly six-month unsecured funding provided by prime money funds to foreign banks in New York. With then only three months left to go until the October 17 prime money fund reform deadline, most of this funding was refinanced into three-month unsecured funding. The rest went to boost prime money funds' growing liquidity buffers.

The rapidly shortening tenor of foreign banks' funding profile from six months to three months, together with shrinking demand for three-month funding, has been driving three-month Libor fixings higher since the middle of July.

August and September will see the maturity of another \$200 billion in formerly six month unsecured bank funding provided by prime funds to foreign banks. But unlike in July, we now have less than three months to go until October 17th and so most of this funding will be refied on terms shorter than three months; the rest of the maturities will be used to boost liquidity buffers further still.

Term unsecured funding lost to money fund reform can be replaced by another form of unsecured funding, but not secured funding. This is because global regulatory guidance appears to be that banks are not supposed to let their liquidity coverage ratios deteriorate as money fund reform runs its course. Replacing unsecured funding with secured (repo) funding would encumber HQLA portfolios and so worsen LCRs, which makes secured funding a no go.

Term unsecured funding can be shortened to a month at most for similar reasons: an increase in funding less than a month would worsen one's LCR

With secured funding off limits, and the size and tenor of term money markets shrinking and shortening by the day, banks have three options to choose from: (1) pay up for dollar funding from money funds in New York and secure a bigger share of a shrinking pie; (2) raise dollar funding offshore via FX swaps; or (3) leave money markets altogether and issue term unsecured debt instead.

Japanese banks are the key drivers of current dynamics. In recent weeks, they have been issuing three-month paper to money funds at 90 bps. While much higher than three-month Libor at 75 bps at present, 90 bps are way cheaper than the cost of raising three-month dollar funding via FX swaps at 120 bps.

Given their sheer size – they are the largest issuers of unsecured paper – Japanese banks appear to be the marginal price setters of the term premium in unsecured money markets at present. There is plenty of room for them to pay up for funding from money funds before they become indifferent between raising dollars in New York City via money funds or in Tokyo via FX swaps. With the term premium being credit blind and country neutral, Japanese banks' frantic quest for term funding is driving the term premium wider for everyone else and will push three-month Libor to 90 bps by September, in our view.

FX swap lines are not meant to make life cheap, but to make sure life goes on as we know it. Even though it is already cheaper to do so, Japanese banks won't tap the Fed's dollar swap lines until it becomes impossible to tap money funds for funding beyond one month. At that point, the swap lines will save the day and make sure life goes on without banks worsening their LCR.

Having a view on how much steeper the U.S. dollar Libor curve will get from here and what other funding rates will rise as we approach the October 17 prime money fund reform deadline requires familiarity with the structural balance sheet features of every single foreign bank branch in New York City – what their assets and liabilities are, their funding relationship with headquarters, and to which U.S. repo market segment they have access.

This issue of Global Money Notes provides a one-by-one review of the balance sheet of every major foreign bank branch in New York that is a habitual issuer of unsecured paper to prime money funds. Our analysis relies on the call reports of foreign bank branches. While these reports are publicly available, they are not collected by data vendors in an easily digestible form at present and – perhaps as a result of that – are not used by any branch of government for purposes of financial stability analysis. Conducting the analysis that follows would not have been possible without the help of Sarah Quirk Smith on our Global Strategy and Economics team, who wrote a program to scrape together every line item from individual call reports. The underlying data are the same that goes into the Fed's 4.30 statistical release (see [here](#)), but having the numbers on a branch by branch basis allows us to look behind the aggregate and peel the onion to uncover layers of "stress."

Our analysis has seven parts to it.

Part one explains the three phases of prime money fund reform and the dynamics that are currently driving 3-month U.S. dollar Libor higher by the day. Part two explains the options of bank funding desks to replace funding from prime money funds, and why there is room for 3-month Libor to catch up with the all-in cost of dollar funding raised via FX swaps. Parts three to six discuss the structural balance sheet features of the New York branches of four groups of foreign banks – those that do mostly arbitrage, those from Japan, those from the eurozone and those from Canada – and what these features mean for the future of the o/n eurodollar market that underpins the Fed's overnight bank funding rate (OBFR) and the JPY, EUR and CAD cross-currency bases (we provide a balance sheet snapshot of Swiss, British, Singaporean and Chinese banks without commentary in the Appendix). Finally, part seven concludes by explaining when it is reasonable to expect foreign banks to tap the Fed's dollar swap lines and why October will feel like a month-long quarter-end.

Part 1 – The Three Phases of Money Fund Reform

It is helpful to think about the implementation of prime money fund reform in three phases.

Phase one, now complete, was about the pre-announced conversion of prime funds (which fund foreign banks' New York branches, broadly speaking) to government funds (which fund the U.S. government and primary dealers, broadly speaking). These conversions affected both retail and institutional-class money funds. \$350 billion worth of such conversions have been announced since last March, all of which are now complete. At the system level, adjusting for these conversions was relatively simple. The asset managers themselves were in control of the amount and timing of conversions, and bank funding desks could easily figure out how much funding they would lose by keeping track of the list of prime funds about to convert. Banks responded to the loss of funding from conversions by tapping either the FX swap or term debt markets, and the newly formed government funds invested the inflows from conversion mostly in agency discount notes and bills (inflows to the latter were helped by extra bill issuance and foreign central banks trading out of bills and funneling cash into FRBNY's foreign repo pool instead, see [here](#)).

Phase two, currently underway, involves only institutional-class funds (but not retail funds) and is about the build-up of liquidity buffers in anticipation of outflows come October 17th. Unlike the pre-announced conversions of phase one, these types of flows have a more "sinister" nature. In phase one, asset managers were in total control – they decided how much in AuM will convert and when, and these conversions were telegraphed well in advance. While in phase one, the conversions were forced onto investors, in phase two, asset managers are the ones being forced: investors will either stay in prime funds or they

will transition to government funds. And unlike conversions, no one has a clear sense as to how much money is going to flow from prime to government funds. Under intense regulatory spotlight, prime funds are preparing for the worst and hoping for the best. In an era of limited secondary market liquidity, the only true liquidity is maturity, and prime funds are building up massive liquidity buffers. While the SEC requires prime funds to keep at least 30% of their AuM in 1-week liquid assets, their current liquidity buffer is already 50% of AuM and the industry target for late September is near 70% (see Figure 1). In essence, it is the ramping up of these liquidity buffers that is behind the recent steepening of the U.S. dollar Libor curve. Between July 1st and October 17th, about \$300 billion in 6-month CD and CP issued by foreign banks to institutional-class prime funds is set to mature, and since the week beginning July 18th – which marked the start of “T - 3 months” to the October 17th deadline – it is increasingly difficult to roll these maturities into 3-month paper (see Figure 2). Importantly, the money is still with prime funds, but the growing size of liquidity buffers makes it feel as if term money has already left the room. To be sure, 3-month money is still available, but less so by the day and, as August progresses, term funding will soon be available for only two months at most. Before long, even 2-month funding will fade away. At that point, the dollar swap lines will save the day.

Phase three, which has yet to occur, will be about the flow of funds from prime to government funds. The outflows from prime to government funds are actually not a big deal. Investors transferring money over to government funds will be a smooth affair, as prime funds will be flush with liquidity and in a position to manage as much as \$550 billion in outflows (70% of their AuM as of June 30th) with ease. As funds get wired out of prime and into government funds, the latter will place the proceeds either into Treasury bills, agency discount notes, repos with primary dealers or, as a last resort, RRP with the Fed. Bottom line, liquidity will be there for outflows, and inflows will find assets to the last penny.

The big deal instead is the extent to which these outflows will limit foreign banks' ability to fund at tenors longer than one month, and prompt them to use the Fed's dollar swap lines until the dust settles and there is clarity around how much money will stick with prime money funds and come back to term unsecured money markets after October 17th.

Part 2 – An Airbag Loaded with Bricks

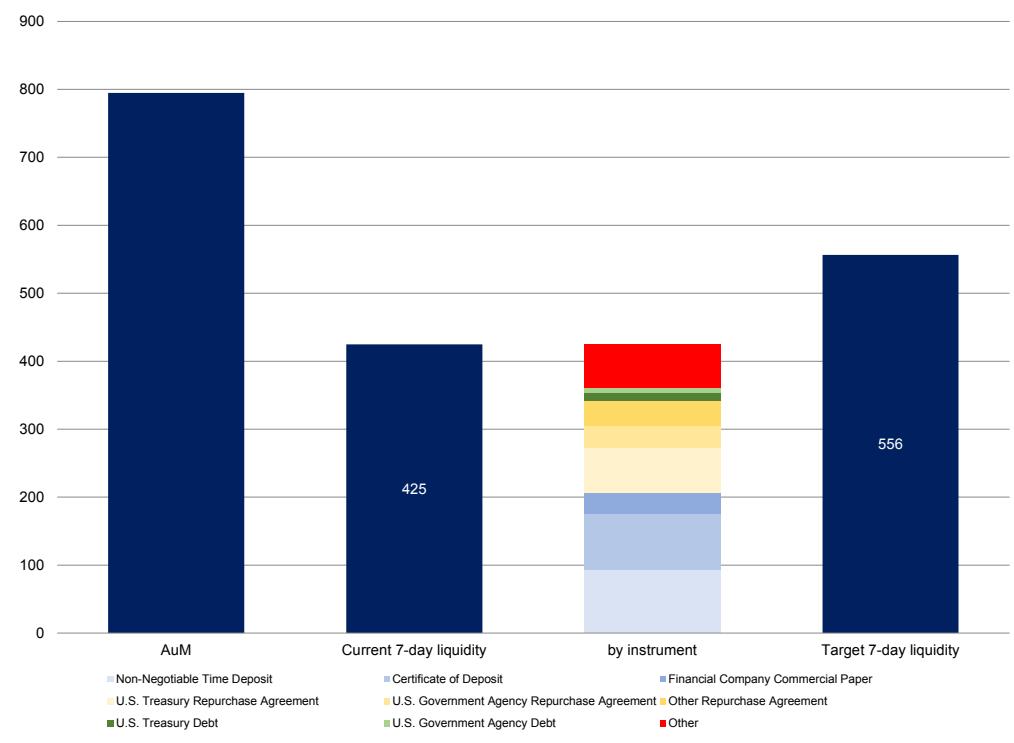
That prime money funds will be well placed from a liquidity perspective for outflows means that banks will end up short liquidity one way or another. While every single bank that will be impacted by prime money fund reform is subject to Basel III and compliant with the liquidity coverage ratio (meaning they have the liquidity to pay off maturities as prime funds pull away), regulatory guidance appears to be that banks should maintain their liquidity ratios (LCR) while prime money fund reform runs its course. In English, this means that foreign banks are not meant to lose HQLA or let their LCR deteriorate between now and October 17th. In essence, foreign banks' HQLA buffers are like airbags filled with bricks – they look soft and puffy on paper, but feel hard if you ram your head into them.

This in turn means that foreign bank branches will have no option but to replace the unsecured funding they get from prime funds with another source of unsecured funding. But not secured funding, as secured funding encumbers HQLA and so worsens banks' liquidity coverage ratios (for more on Basel III's funding rules of HQLA portfolios, see [here](#)).

The universe of foreign bank branches that are habitual issuers of unsecured paper to prime money funds is huge – as of March 31st, 2016, their aggregate balance sheet size was more than \$1.8 trillion (see Figure 3). Our number is different from the Fed's aggregate of \$2.1 trillion as we do not aggregate the balance sheets of all branches, only those that are habitual issuers of unsecured paper to prime funds. While these data may seem a bit lagged and stale in the context of the day-to-day monitoring of the yields where banks issue CP and CD presently, and the week-to-week monitoring of money fund flows, it is the only measure we have to gain insight into the structural balance sheet positions with which foreign bank branches are entering the brewing storm of prime money fund reform.

Figure 1: Battening Down the Hatches

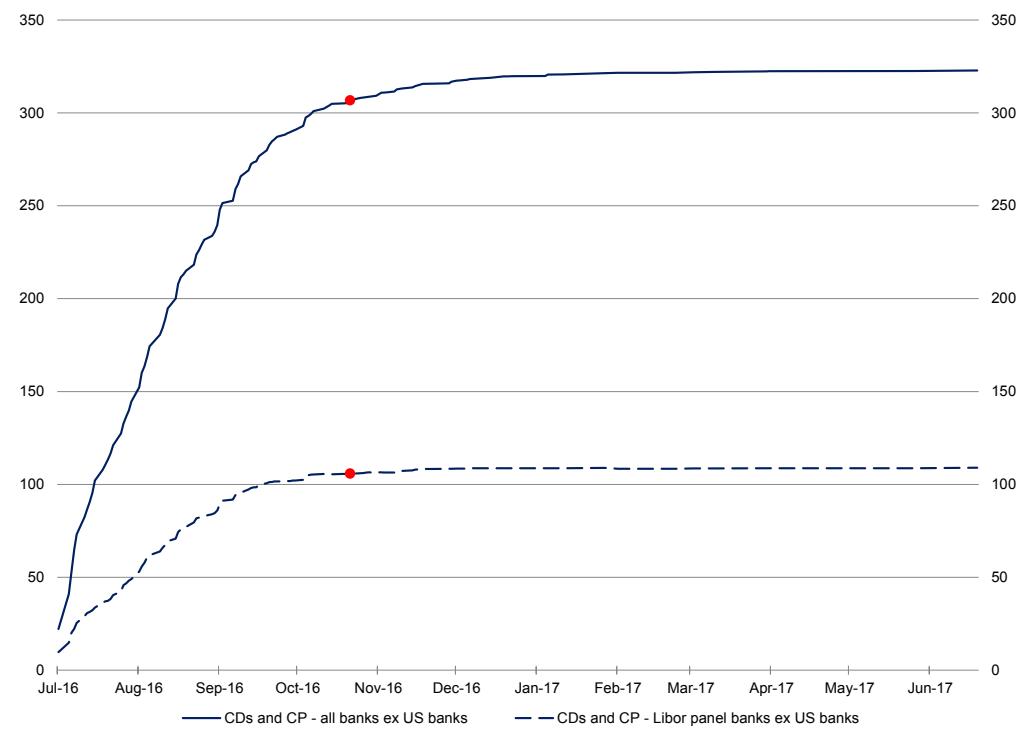
Institutional-class prime funds, \$ billion



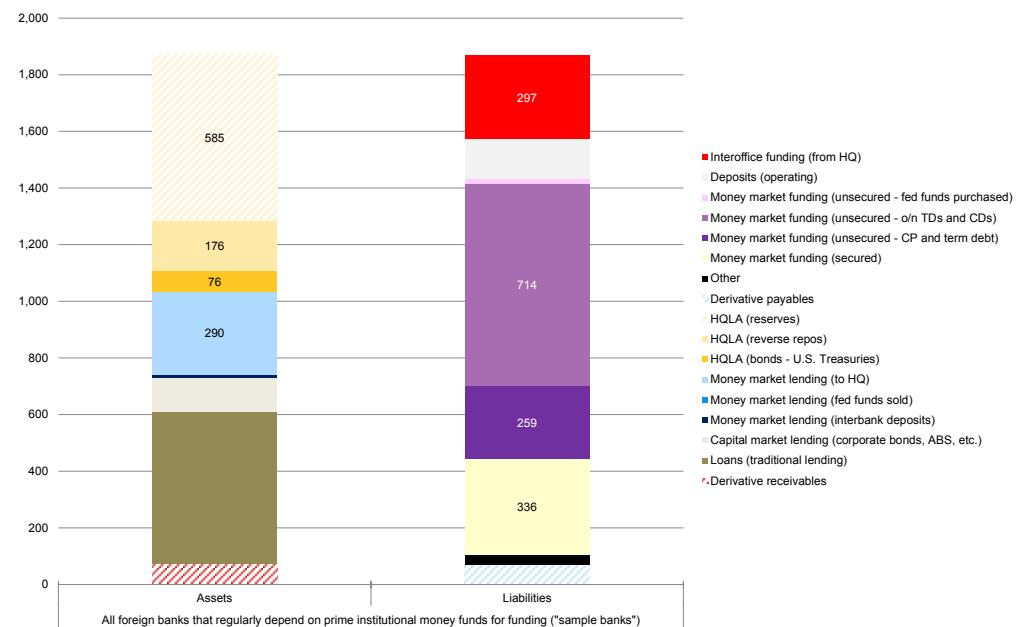
Source: Crane Data, Credit Suisse

Figure 2: The Last Hurrah

Holdings of institutional-class prime funds, \$ billion



Source: Crane Data, Credit Suisse

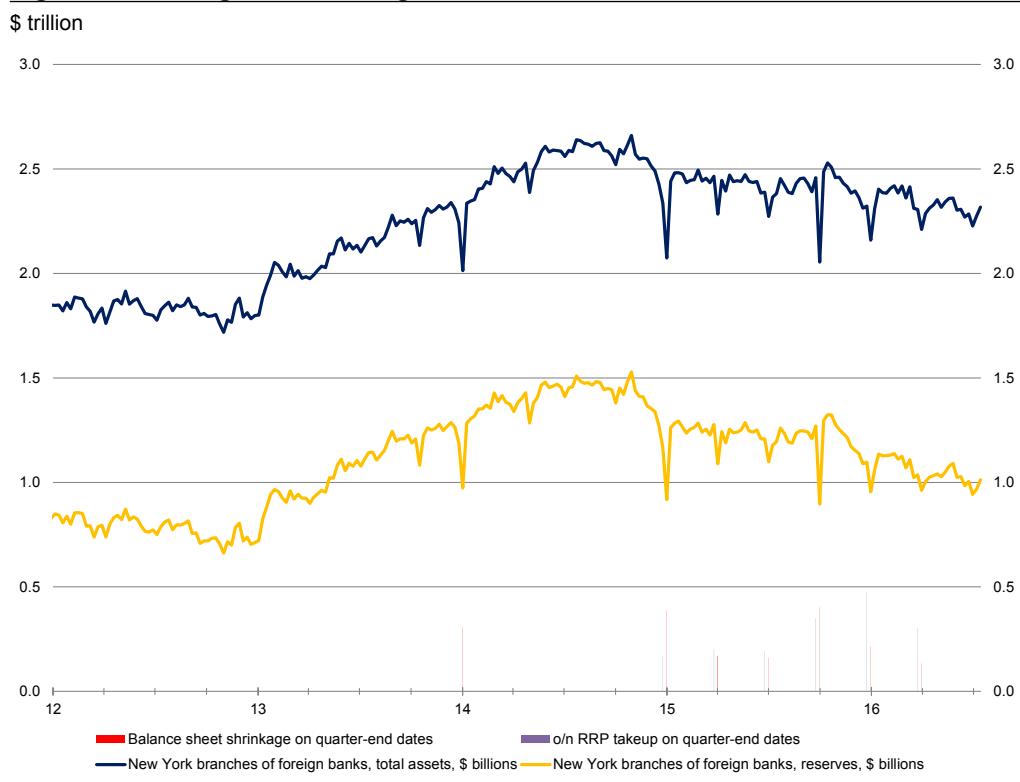
Figure 3: Foreign Bank Branches in New Yorkas of March 31st, 2016, \$ billion

Source: FFIEC 002, Credit Suisse

The question we are trying to answer is what will happen to the balance sheet of these branches when a sizeable chunk of the \$714 billion in unsecured funding goes away due to prime fund reform (again, see Figure 3). Unsecured funding funds one of four activities.

First, unsecured funding can fund IOER arbitrage trades. Similar to the way foreign banks borrow from the FHLBs in the o/n fed funds market in order to fund reserves at the Fed earning IOER, foreign banks borrow from prime funds in the o/n Caribbean eurodollar market to fund reserves at the Fed earning IOER (in essence, the cost of these arbitrage trades is what is captured by the Fed's new [overnight bank funding rate](#)). The volume of such o/n eurodollar transactions is about \$250 billion on any given business day, but the quarter-end balance sheet snapshot on display in Figure 3 only includes \$100 billion of such trades. This is because on quarter-ends, foreign banks trim arbitrage by \$150 billion (see Figure 4). As such, foreign banks could lose \$100 billion in funding from the \$714 billion pod highlighted in Figure 3 without any major consequence for their balance sheet or the market. As money leaves prime funds for government funds, prime funds won't roll overnight loans to banks, banks give up the reserves that were funded overnight and the Fed swaps these reserves into o/n RRP for government money funds – unless of course these flows are absorbed by the Treasury boosting its cash balances or FRBNY luring more foreign central banks into the foreign repo pool, boosting the effective bill supply.

Second, unsecured funding can also fund HQLA portfolios. Unlike arbitrage trades, where banks decide to put on trades that inflate their balance sheet, the amount of HQLA a bank needs to hold to be compliant with the liquidity coverage ratio is determined by the liquidity needs of a bank's customers. These liquidity needs determine a bank's liability profile which in turn determines a bank's HQLA needs. By definition, assembling an HQLA portfolio that complies with a bank's customer-driven liability profile can only be funded on tenors longer than 30 days. This is because funding shorter than 30 days would increase a bank's HQLA needs further. In fact, any trade that involves funding reserves at the Fed (or other forms of HQLA) with funds shorter than 30 days is surely motivated by arbitrage (see previous example) and not genuine HQLA needs. But arbitrage is possible only if one has "excess" balance sheet, which is a luxury available to only a handful of foreign banks. Foreign bank branches' genuine HQLA needs – and the associated volume of funding – is

Figure 4: Arbitrage On, Arbitrage Off

Source: Federal Reserve, Credit Suisse

about \$600 billion. About one half of this comes from prime funds (see Figure 2 above), which in turn means that foreign banks would have to replace that much in term unsecured funding in order to maintain their LCR as prime fund reform washes through the system.

Third, unsecured funding can also fund loan books in New York. Here, the options are fairly limited. Loans are illiquid and hence cannot be sold and so a bank either pays up for funding and sees its net interest margin erode on fixed rate loans (painful), or it pays up for funding without a sweat and passes it on to customers via floating rate loans (painless).

Fourth, unsecured funding can also fund dollar loans to headquarters, which typically represent the dollar funding leg of dollars loaned through FX swaps. Loans to headquarters can also fund customer loans that finance the global flow of commodities and tradable goods. As dollar funding from prime money funds gradually fades away, the options are either to (1) reduce the volume of dollars loaned through FX swaps or shrink one's commodity and trade finance books (in essence reducing one's balance sheet) or (2) keep on bidding for unsecured funding from prime money funds at higher and higher rates and pass higher rates on to those on the other side of FX swaps and to customers. Either way, it is clear that the impact of prime fund reform will continue to be felt in offshore dollar funding markets and remain visible in the JPY and EUR cross-currency bases.

It is important to appreciate that, until now, all four of the above activities (assets) have been funded in the “no man’s land” that’s between the 30-day point of the LCR and the 1-year point of the NSFR. The most active funding points in this no man’s land were three and six months and the single largest buyer base of unsecured paper of those tenors were prime funds. And it is precisely this part of the market that prime money fund reform is about to obliterate by decimating the buyer base of, and hence demand for, these tenors.

Structurally, foreign banks have two choices to make between now and October 17th – the first one involves “digging your heels in” and the second one involves term debt markets.

First, keep hanging around in “no man’s land” and issue unsecured paper at ever shorter tenors (but not shorter than one month) and ever higher rates. The view here is that sharply higher funding costs are a temporary phenomenon, and that it is better to pay a steep price for short-term funding for a few months than to lock in expensive long-term term funding for several years. This choice is based on an optimistic view of the post-reform prospects of prime funds: that much less money will leave than what prime funds are currently provisioned for and that it is worth paying a steep price for a few months because after October 17, at least some of the money that is currently on the sidelines will be back in “no man’s land” for term trades. But, until then, the cost of term dollar funding raised onshore from prime funds will be high – driving three-month Libor higher and higher – and will approach the cost of term dollar funding raised offshore via FX swaps.

Second, turn the page and leave “no man’s land” behind and issue term debt. Term debt issuance will have to be ramped up to get compliant with the NSFR and TLAC anyway. This stance is based on a pessimistic view of the post-reform prospects of prime funds and, unlike the previous choice, won’t have much of an impact on U.S. dollar Libor fixings.

Judging from the recent issuance record of foreign banks, Canadian banks appear to be going down the path of term debt, and Japanese and French banks are showing a high tolerance for pain, by borrowing for three months at 90 bps – versus Libor at 75 bps. While much higher than the current three-month Libor fixing, these levels are still cheaper than the all-in costs of using either JPY or EUR to raise dollar funding via FX swaps at 120 bps.

Bottom line, what we need to do from here is to separate the arbitrageurs from the “rest,” and figure out what the rest’s structural balance sheet features suggest about their ability to shrink balance sheet, reprice certain assets or tap alternative sources of funding and what these mean for various cross-currency bases, the Libor curve and various repo rates.

With that, let the great onion peeling begin...

Part 3 – Les Arbitrageurs

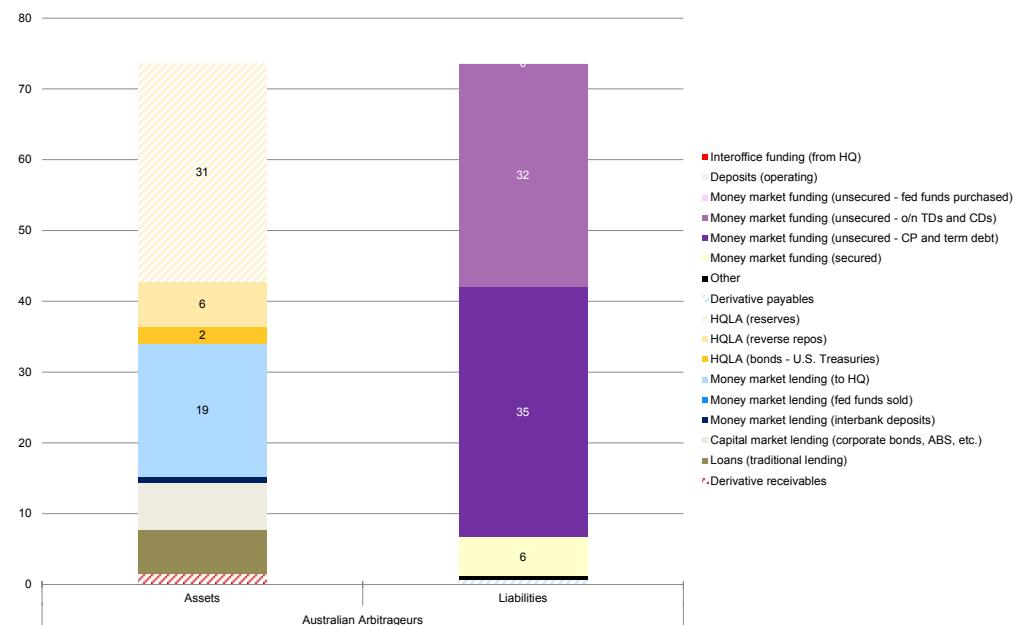
You can spot an arbitrageur by the share of one’s balance sheet devoted to high-volume, low margin activities, like borrowing fed funds and eurodollars overnight to fund reserves at the Fed earning IOER. The bulk of such arbitrage trades are generated by a small coterie of Australian, Canadian, German, Dutch, Finnish, Swedish and Norwegian banks.

Their branches run a \$250 billion balance sheet in the aggregate (for a country by country breakdown of this aggregate, see Figures 5 - 8). Reserves clearly dominate the asset side (taking up anywhere between 100% and 50% of arbitrageurs’ balance sheets) and unsecured funding – mostly o/n deposits – from prime funds dominates the liability side. As noted above, the quarter-end snapshot of March 31st showing \$103 billion in o/n deposits outstanding is an understatement, as on days other than quarter-end, arbitrage volumes are greater by as much as \$150 billion. Ditto fed funds (FF) borrowed – the quarter-end snapshots provided by call reports suggest that arbitrageurs borrow only about \$10 billion, when in fact we [know](#) that daily average volumes in the FF market are around \$65 billion.

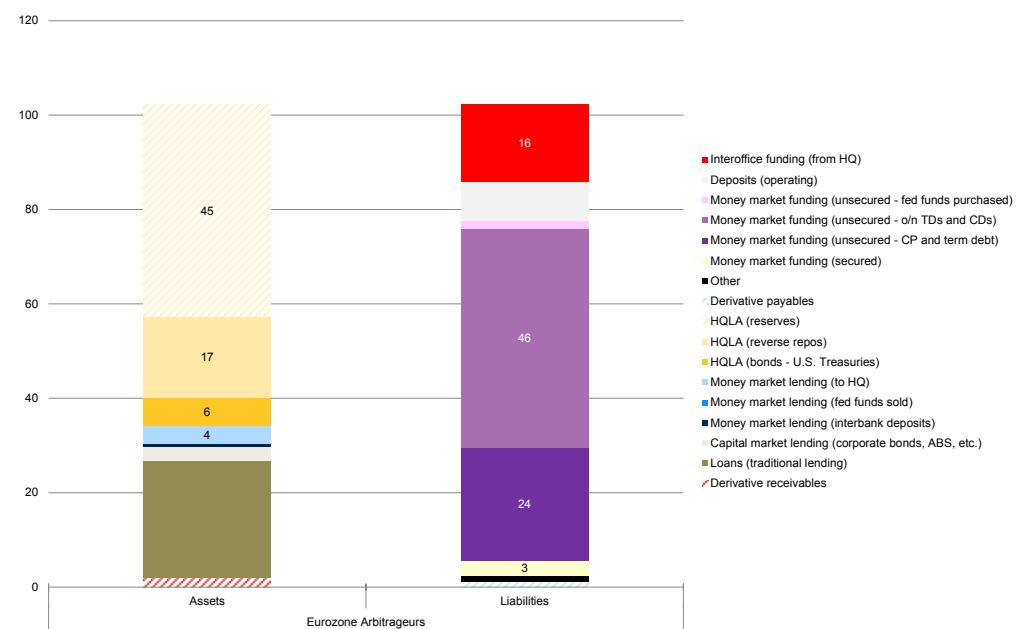
The implications of prime fund reform are the least painful for these banks. This is because their balance sheet is mostly about o/n arbitrage trades, which can be turned off and on with ease. Furthermore, they have no significant HQLA needs to fund; they have no loan books to fund; and they have no U.S. dollar needs at headquarters to worry about.

For these banks, money fund reform will be as simple as shrinking their balance sheet.

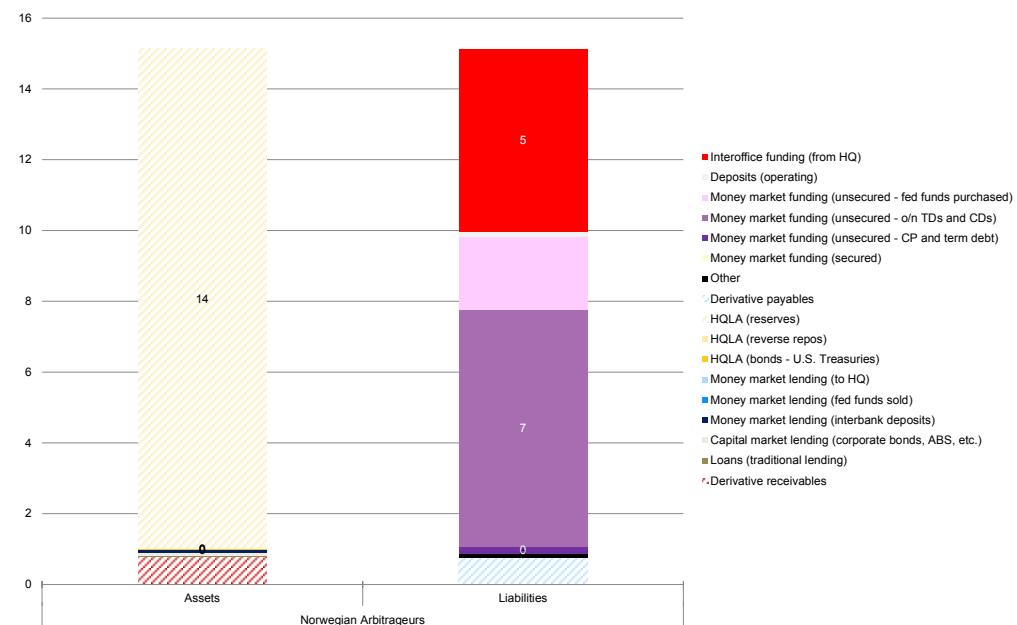
On the flipside, the reduced availability of o/n eurodollar funds for arbitrage will also mean much reduced volumes behind the Fed’s new overnight bank funding rate (OBFR). Prime fund conversions to date have already reduced these volumes by close to \$80 billion, and volumes could shrink by another \$100 billion as prime outflows accelerate (see Figure 9). In other words, the depth of the o/n eurodollar market relative to that of the fed funds

Figure 5: Australian Arbitrageursas of March 31st, 2016, \$ billion

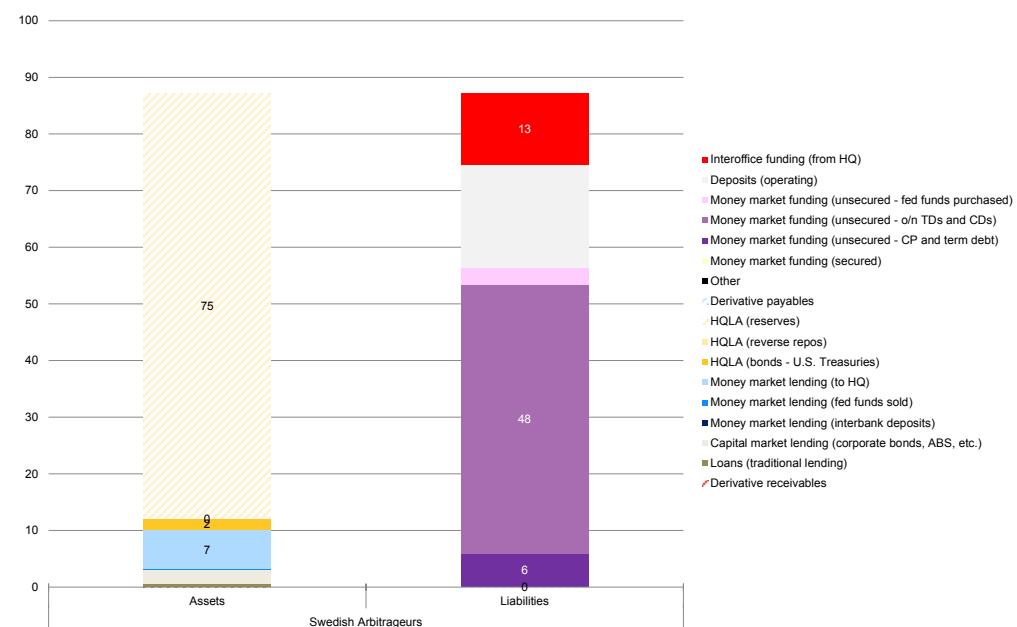
Source: FFIEC 002, Credit Suisse

Figure 6: Eurozone Arbitrageursas of March 31st, 2016, \$ billion

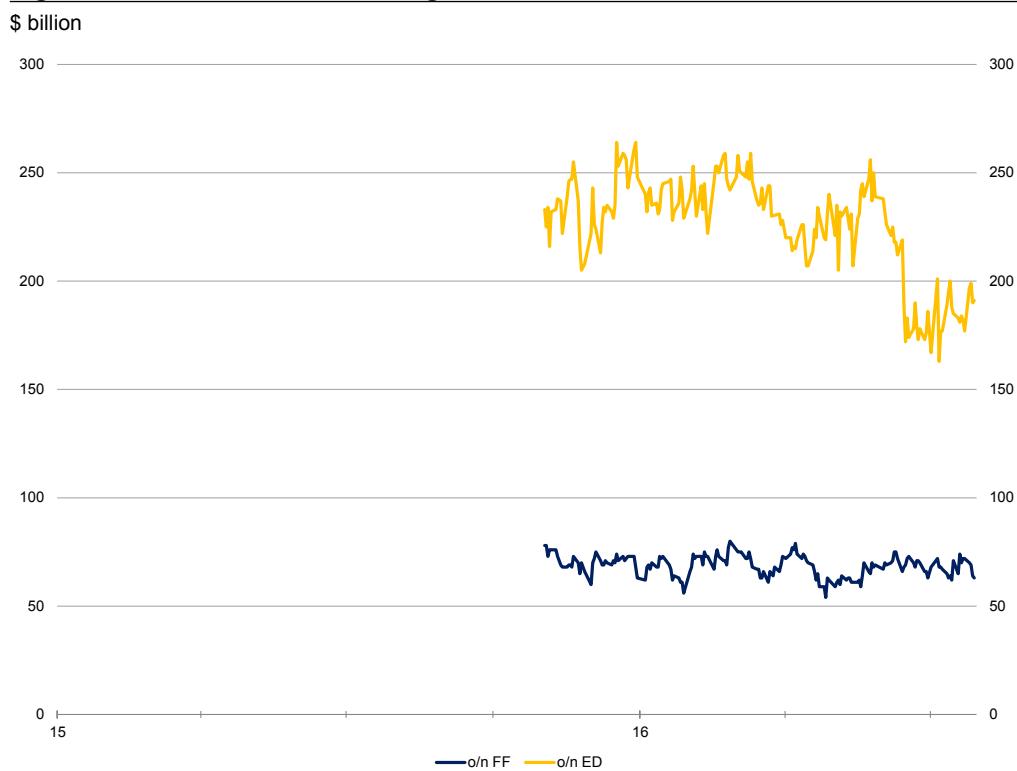
Source: FFIEC 002, Credit Suisse

Figure 7: Norwegian Arbitrageursas of March 31st, 2016, \$ billion

Source: FFIEC 002, Credit Suisse

Figure 8: Swedish Arbitrageursas of March 31st, 2016, \$ billion

Source: FFIEC 002, Credit Suisse

Figure 9: The Incredible Shrinking o/n Eurodollar Market

Source: FFIEC 002, Credit Suisse

market is set to shrink and with it the allure of the OBFR as an alternative reference rate (see [here](#) for why we think the o/n GCF repo rate is a superior alternative to the OBFR).

Part 4 – Japanese Banks

Japanese banks in New York have close to a \$600 billion balance sheet in the aggregate (see Figure 10). On the asset side, there are no traces of arbitrage. The dominant form of assets are customer loans in New York (around \$300 billion), dollars lent to headquarters in Tokyo (around \$150 billion), and HQLA (around \$130 billion). On the liability side, unsecured funding accounts for 2/3rd of funds raised. Secured funding accounts for the rest.

But this aggregate picture hides two distinct funding strategies.

Appreciating each is essential in anticipating how Japanese bank branches will influence how money markets will trade between now and the October 17th reform deadline.

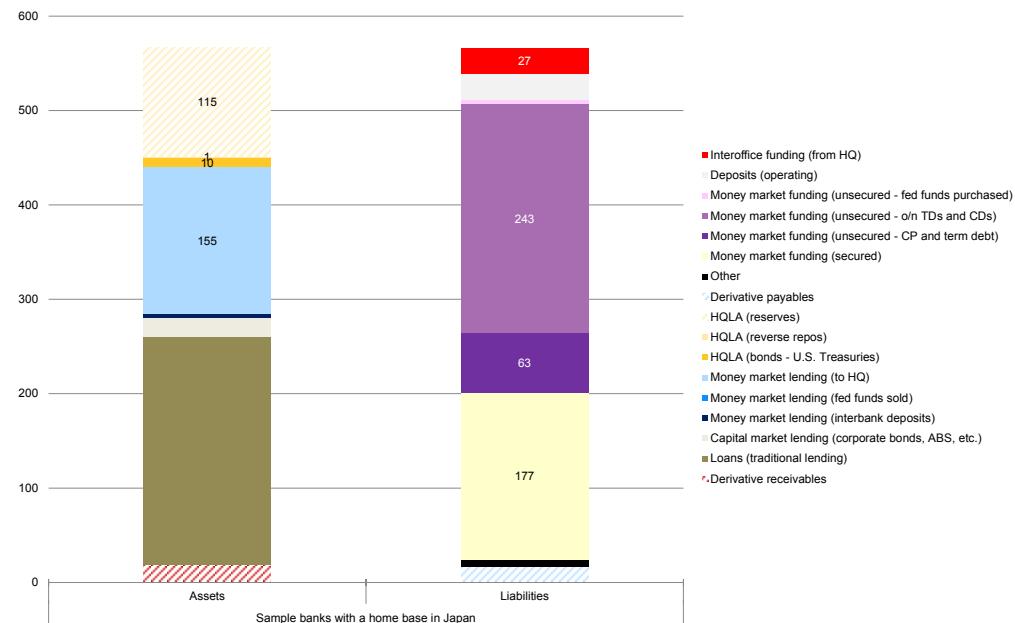
Figure 11 shows the balance sheet of the Norinchukin Bank's New York branch, which is unique by any standard. At \$120 billion, it is the second largest foreign bank branch in New York (after Deutsche Bank) and it relies almost exclusively on secured funding in the GCF repo market. Norinchukin, like many other Japanese investors that try to avoid depressed rates in Japan, invests in U.S. dollar assets. But unlike other Japanese investors, who fund their U.S. dollar assets in the FX swap market, Norinchukin funds its U.S. dollar assets (mostly U.S. Treasuries) through its New York branch in the GCF repo market.

How come Norinchukin can pledge so much in Treasuries without affecting its LCR? Well, as an agricultural cooperative, Norinchukin is not subject to Basel III and so it can utilize its U.S. Treasury portfolio to a maximum extent to raise dollar funding cheaply in New York.

Norinchukin also taps the unsecured market to the tune of about \$26 billion and if this source of unsecured funding slips away due to prime fund reform, Norinchukin will have that much more funding to do in the repo market, pulling o/n GCF and tri-party repo rates

Figure 10: Japanese Banks

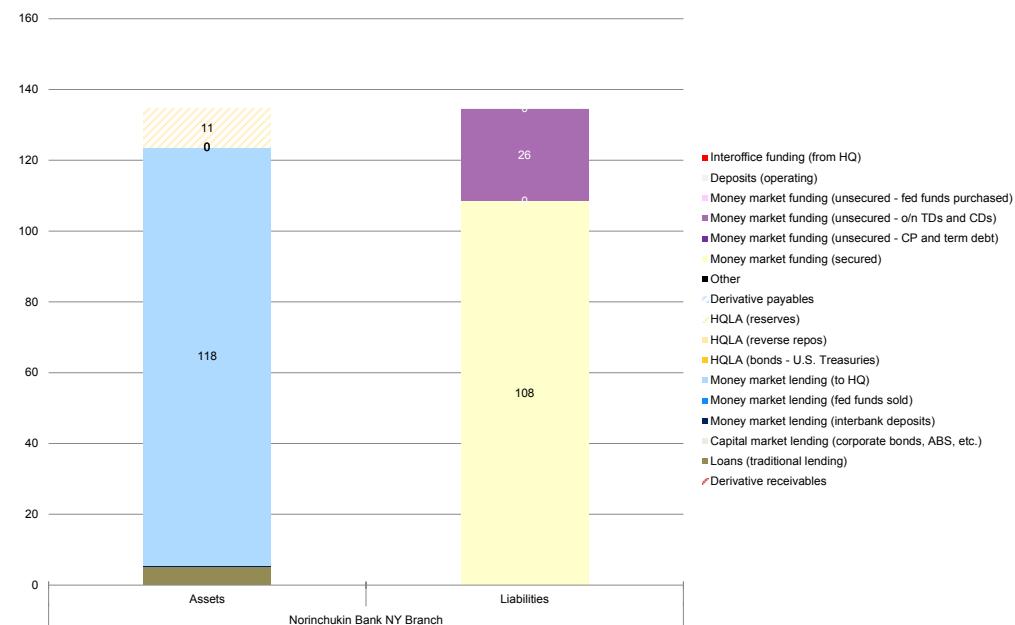
as of March 31st, 2016, \$ billion



Source: FFIEC 002, Credit Suisse

Figure 11: Norinchukin Bank New York Branch

as of March 31st, 2016, \$ billion



Source: FFIEC 002, Credit Suisse

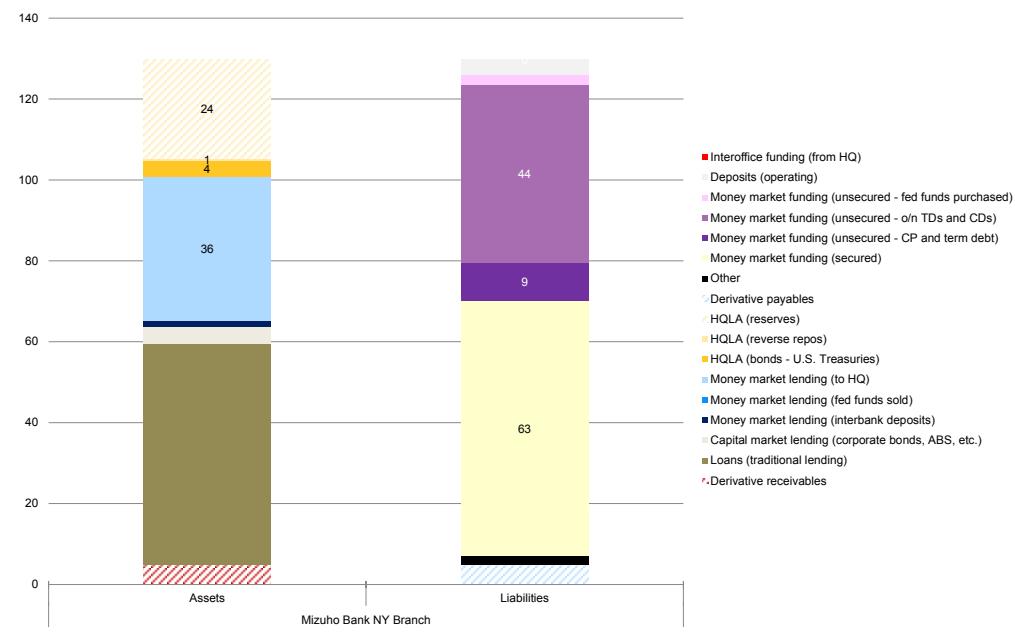
higher and wider. This is because the intermediation of flows away from unsecured to secured markets will flow through primary dealers' balance sheets, and primary dealers –

who since July 1st are now all subject to daily average balance sheet reporting – will charge for a greater use of their much scarcer balance sheets through wider repo spreads.

Figure 12 shows the balance sheet of Mizuho Bank's New York branch. This branch has more of a real economy “feel” to it than Norinchukin’s: about half of its \$120 billion in

Figure 12: Mizuho Bank New York Branch

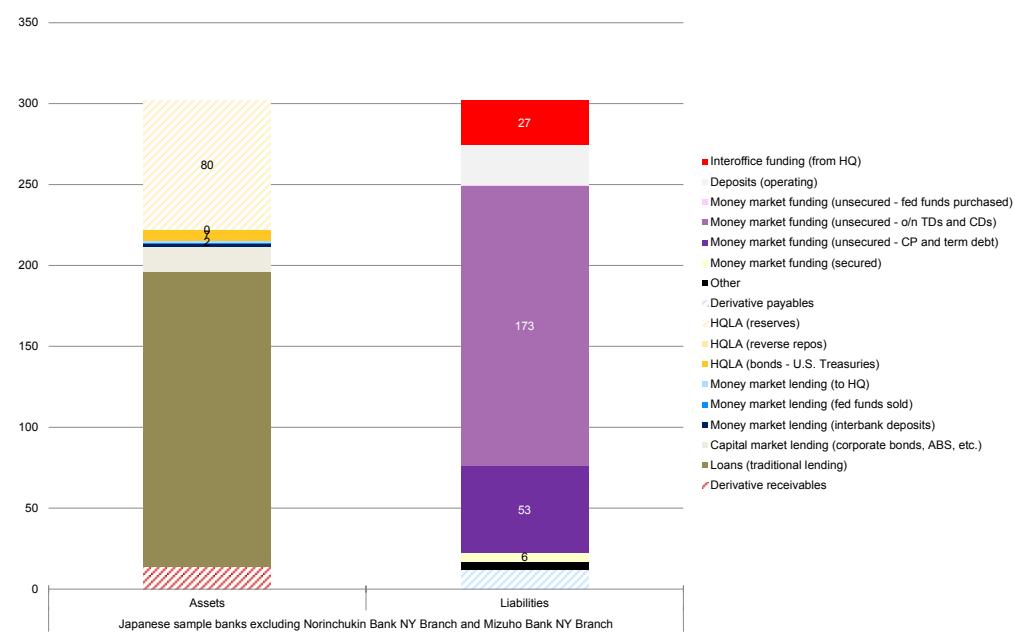
as of March 31st, 2016, \$ billion



Source: FFIEC 002, Credit Suisse

Figure 13: Other Japanese Banks

as of March 31st, 2016, \$ billion



Source: FFIEC 002, Credit Suisse

assets are customer loans, about \$40 billion are dollar loans to headquarters in Tokyo, and the rest (about \$30 billion) are HQLA. On the liability side, half of the funding comes

from the unsecured market and the other half from the secured (repo) markets. Similar to Norinchukin, Mizuho taps the GCF repo market as well and not the tri-party repo market (we know this because cross-referencing Mizuho's call report with Crane's data on money fund holdings, Mizuho's New York branch does not appear to be doing any repos with money funds; Mizuho's dealer subsidiary does, but we are not talking about dealers here).

If unsecured funding becomes less and less available and more and more expensive, Mizuho will likely respond by raising fewer dollars for Tokyo (a reduction of the supply of offshore dollars in the Tokyo money market) as it aims to prioritize funding for its illiquid loan book in New York. In turn, Tokyo will likely respond by trying to find an alternative source of dollar funding via FX swaps, which would push the cross-currency basis more negative still. Ultimately, the cost of onshore and offshore dollar funding would converge.

Figure 13 shows the universe of Japanese sample banks, excluding the New York branches of Norinchukin and Mizuho. The dominant names in this \$300 billion lot are the New York branches of Sumitomo Mitsui Banking Corp. and the Bank of Tokyo Mitsubishi.

What we see is a picture that is drastically different from the prior two cases.

Illiquid loans dominate on the asset side and unsecured funding from prime money funds on the liability side. And, unlike the previous two banks, which ship dollars back to headquarters, these banks are already tapping headquarters for dollar funding. As unsecured funding from prime funds becomes less available and more expensive, they will have to pay higher rates to take down a large share of a shrinking CP and CD market (the path they have chosen to date), step up their term debt issuance (no sign to date), or tap the FX swap market through headquarters (no sign yet, as it is costlier than the first).

The sheer size of the New York branches of Sumitomo and the Bank of Tokyo-Mitsubishi is important to highlight in this regard as they are the single largest issuers of unsecured paper to prime money funds. In recent weeks, they have been issuing three-month paper at 90 bps, which while much higher than the comparable Libor fixing at 75 bps, is way cheaper than the all-in cost of raising three-month dollar funding via FX swaps at 125 bps.

In this sense, Sumitomo Mitsui and the Bank of Tokyo-Mitsubishi appear to be the marginal price setters of the term premium in unsecured money markets at present.

There is plenty of room for them to pay up for CDs and CP before they become indifferent between raising dollars onshore in New York (by issuing unsecured paper to prime funds) or offshore in Tokyo (by swapping yen for dollars via FX swaps). With the term premium being credit blind and country neutral, these two banks' quest for term funding is driving the term premium wider for every other issuer and pushing three-month Libor higher by the day – three-month Libor could hit 90 bps by the end of August, in our view.

Part 5 – Eurozone Banks

Eurozone banks in New York (excluding the Landesbanks) have close to a \$500 billion balance sheet in the aggregate (see Figure 14) – a bit smaller than the Japanese banks.

The eurozone aggregate also masks various funding strategies – four in particular.

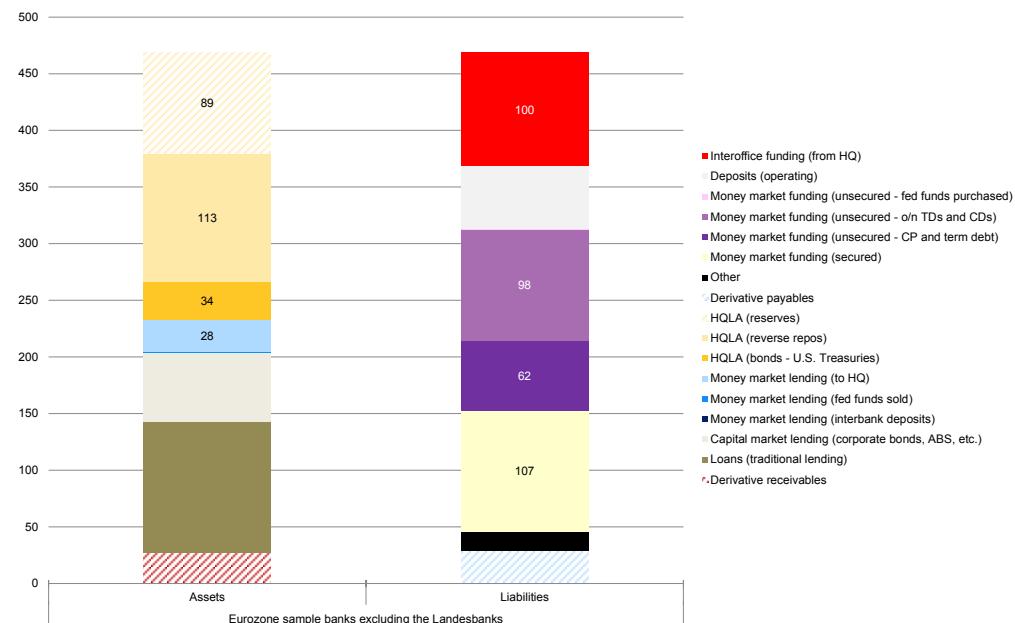
First, French "dealer banks" – the New York branches of Credit Agricole, Natixis and Societe Generale – harbor broker-dealer operations, which other foreign banks typically run out of a broker-dealer subsidiary, not a branch (see Figure 15). This is clear from their sizeable matched repo books (about \$100 billion in the aggregate), which dominate their combined balance sheets. The rest of their balance sheet consists of credit (\$70 billion) and HQLA (\$50 billion) on the asset side, and unsecured funding on the liability side.

Like with Japanese banks, prime funds are the largest source of unsecured funding for French dealer banks and, if that funding source goes, the FX swap market is the backup alternative (French dealers banks already have a net funding need from headquarters).

Second, unlike the branches of its dealer compatriots, the balance sheet of BNP Paribas' New York branch has a distinct real economy feel to it (see Figure 16). Just over half of its balance sheet is made up of credit (loans, corporate bonds, ABS, etc.) on the asset side, with the rest in HQLA. On the liability side, we can see only unsecured sources of funding, most of which – like in all prior examples – come from prime money funds. At present,

Figure 14: Eurozone Banks

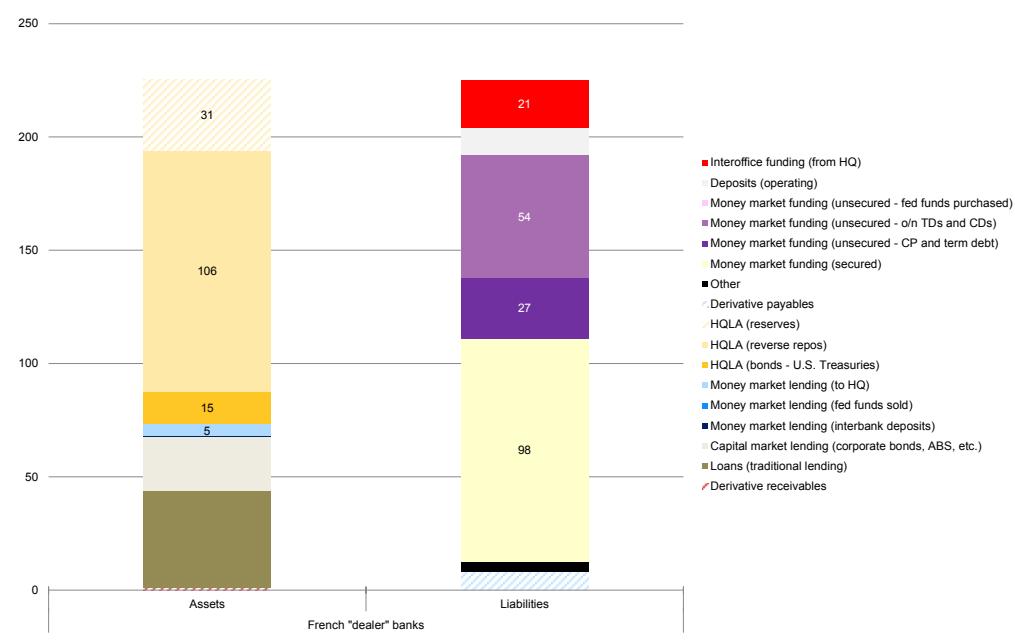
as of March 31st, 2016, \$ billion



Source: FFIEC 002, Credit Suisse

Figure 15: French “Dealer” Banks

as of March 31st, 2016, \$ billion



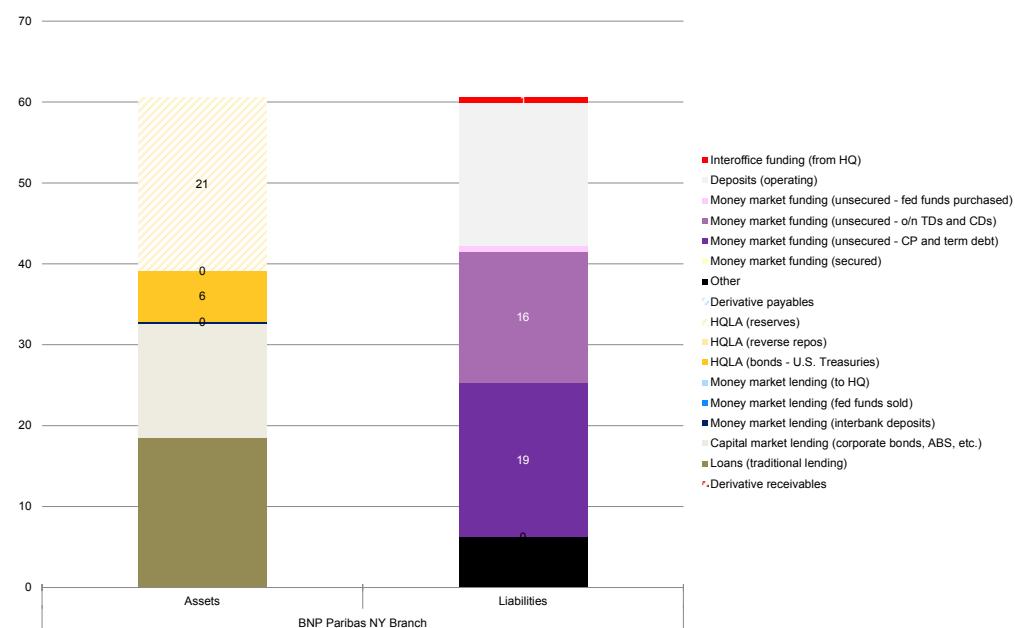
Source: FFIEC 002, Credit Suisse

BNP does not appear to be tapping headquarters for funding, but were that to change, it could join the dealer banks in crowding into the FX swap market and bid for dollar funding.

Third, Deutsche Bank's New York branch, like BNP Paribas', also has a real economy feel to it, with close to one half of its balance sheet funding loans and other forms of credit, and the rest of its assets is HQLA. However, unlike BNP, Deutsche Bank sources the bulk of its funding from Frankfurt and barely relies on prime funds anymore (see Figure 17).

Figure 16: BNP Paribas New York Branch

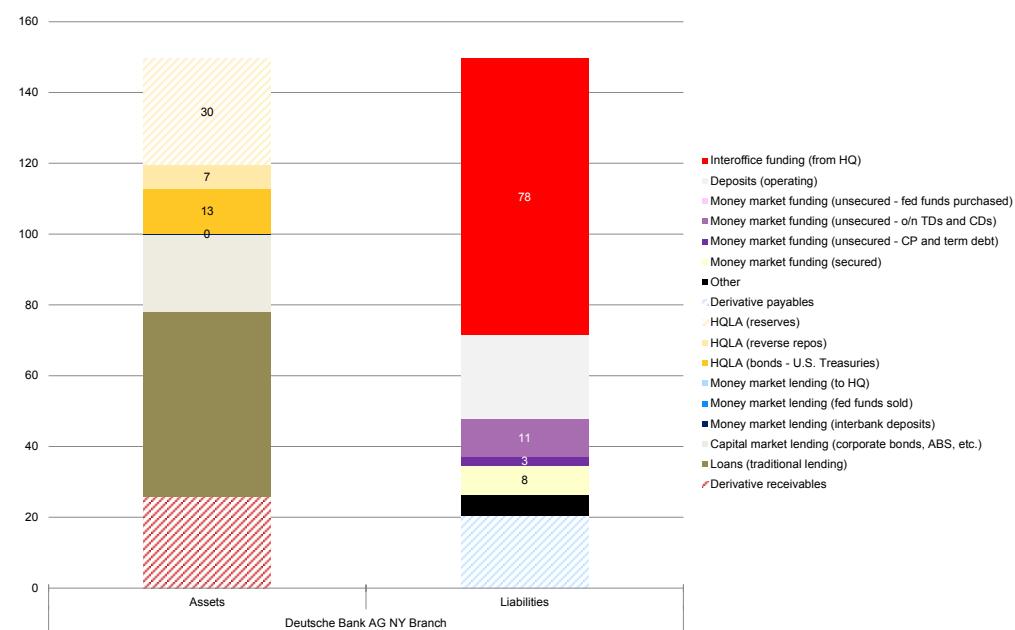
as of March 31st, 2016, \$ billion



Source: FFIEC 002, Credit Suisse

Figure 17: Deutsche Bank New York Branch

as of March 31st, 2016, \$ billion

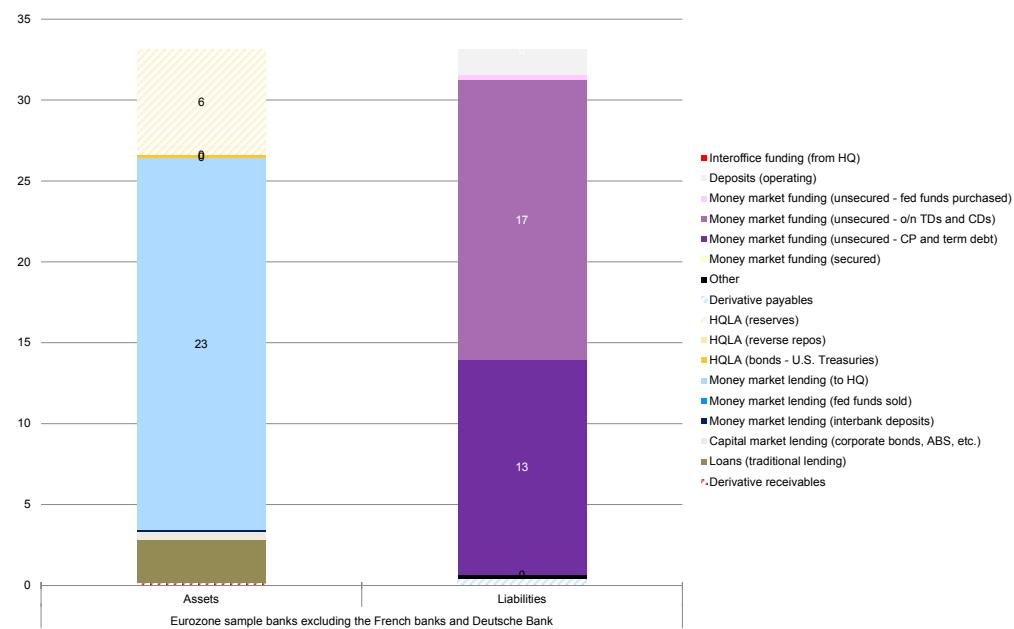


Source: FFIEC 002, Credit Suisse

The balance sheet of Deutsche Bank's New York branch provides a good example of what the balance sheets of the New York branches of the Bank of Tokyo-Mitsubishi, Sumitomo, Credit Agricole, Natixis, Societe Generale and BNP Paribas may look like once funding from prime funds goes away or becomes as expensive as the all-in costs of offshore dollar funding via FX swaps. They will all be calling headquarters for funding and in turn headquarters will be tapping the FX swap market for dollars – potentially to the tune of \$100 billion each involving the swap of euros and yen for U.S. dollars. In both cases, the impact of such flows would be quite considerable for the relevant cross currency bases. In fact, according to the Bank of Japan's latest Financial System Report (see [here](#)), the current size of the JPYUSD swap market is around \$300 billion. One can only imagine the “wonders” that an extra \$100 billion in bids for U.S. dollars could do to the JPY basis.

Figure 18: Other Eurozone Banks

as of March 31st, 2016, \$ billion



Source: FFIEC 002, Credit Suisse

Fourth, the remainder of eurozone banks – KBC, DZ Bank and Fortis – are unique in that all their New York branches do is borrow dollars from prime funds and send dollars back to headquarters where they fund legacy dollar assets that are hard to fund in repo markets (see Figure 18). If these branches encounter problems rolling their funding with prime funds, their role would shrink and headquarters would take over the funding of legacy assets by tapping the FX swap market – exacerbating the dynamics described above.

Part 6 – Canadian Banks

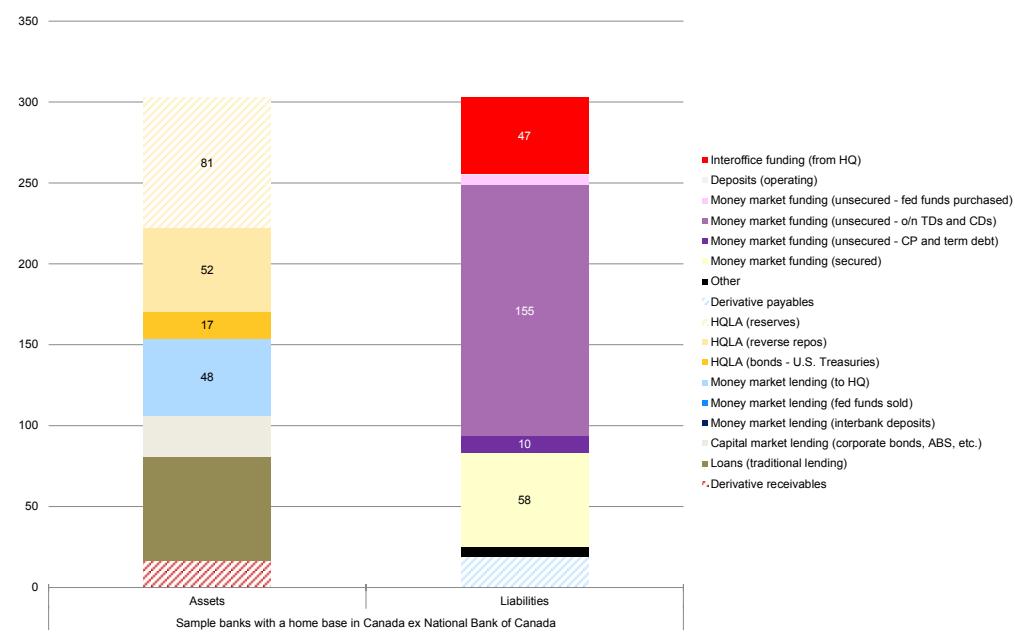
Canadian sample banks have a \$300 billion dollar balance sheet in the aggregate. On the liability side, unsecured funding dominates at \$155 billion (see Figure 19). But from this aggregate, we need to exclude two names which distort the picture. These names are the New York branch of the Bank of Nova Scotia and the Chicago branch of Bank of Montreal.

Figure 20 shows that the Bank of Nova Scotia's reliance on unsecured funding from prime money funds is minuscule and so its balance sheet should not be included in an analysis of Canadian banks' exposure to prime fund reforms. Furthermore, the Bank of Nova Scotia is running a primary dealer operation out of its New York branch – this can be seen from its large and comparable size of its repo and reverse repo positions – and so it is more akin to French “dealer banks” than the typical New York branch of a foreign bank.

Figure 21 shows that BMO's Chicago branch is also in the matched-book repo business, but unlike the Bank of Nova Scotia, it also raises over \$40 billion in unsecured funding from money funds. One interesting feature of its balance sheet is that about \$10 billion of the \$40 billion in unsecured dollar funding raised is "northbound" – it flows back to headquarters in Montreal, where it is presumably funding Canadian dollar (CAD) assets.

Figure 19: Canadian Banks

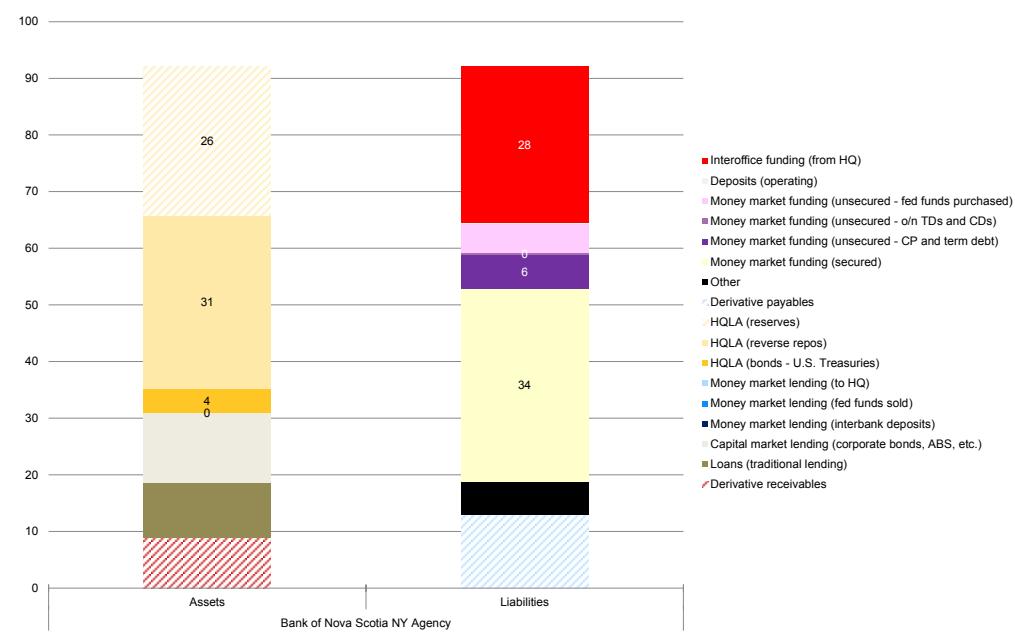
as of March 31st, 2016, \$ billion



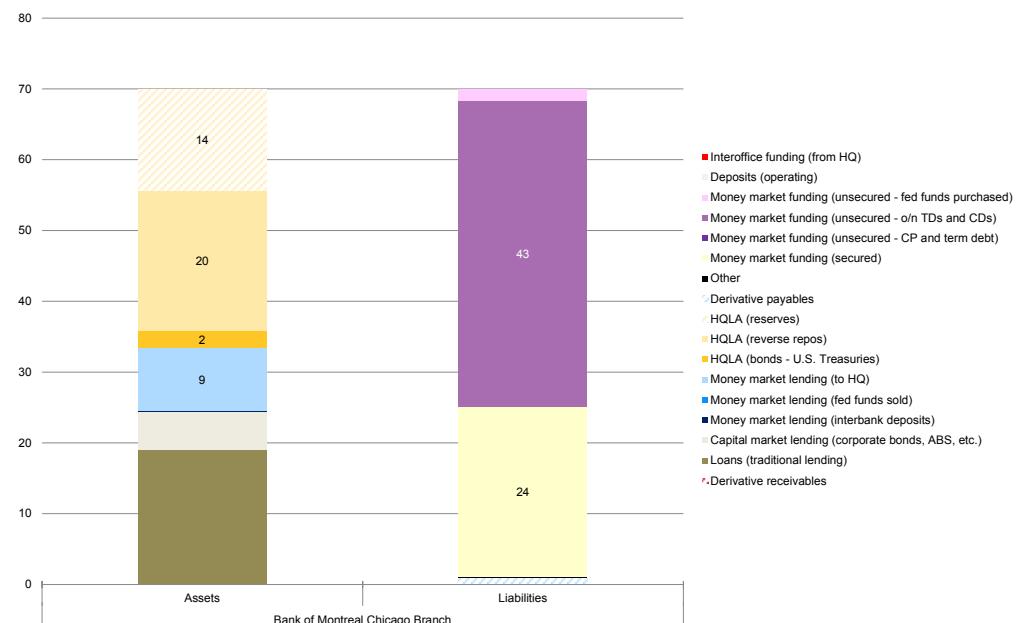
Source: FFIEC 002, Credit Suisse

Figure 20: Bank of Nova Scotia New York Branch

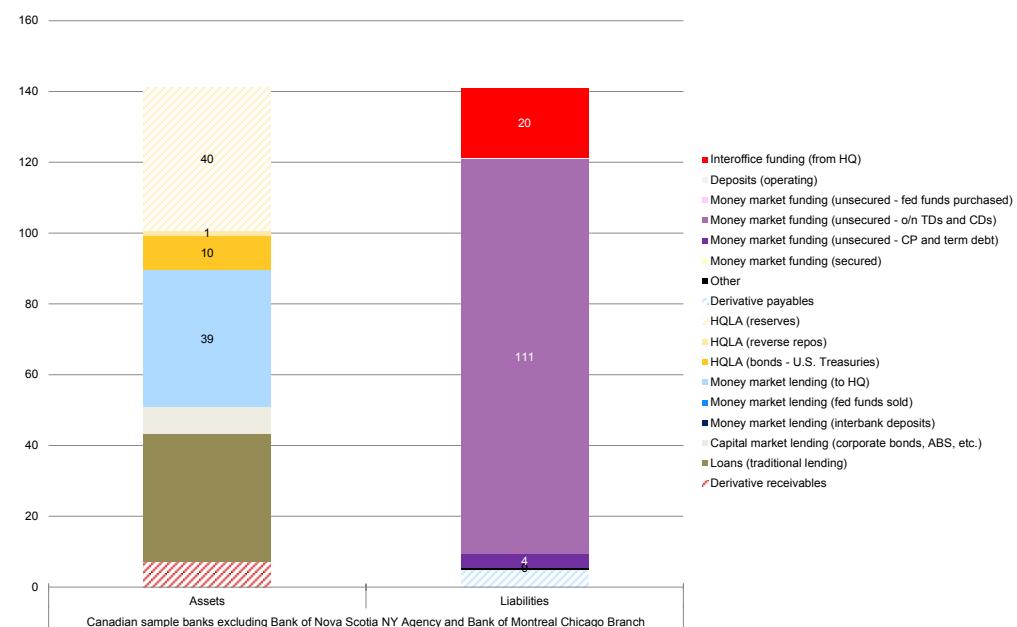
as of March 31st, 2016, \$ billion



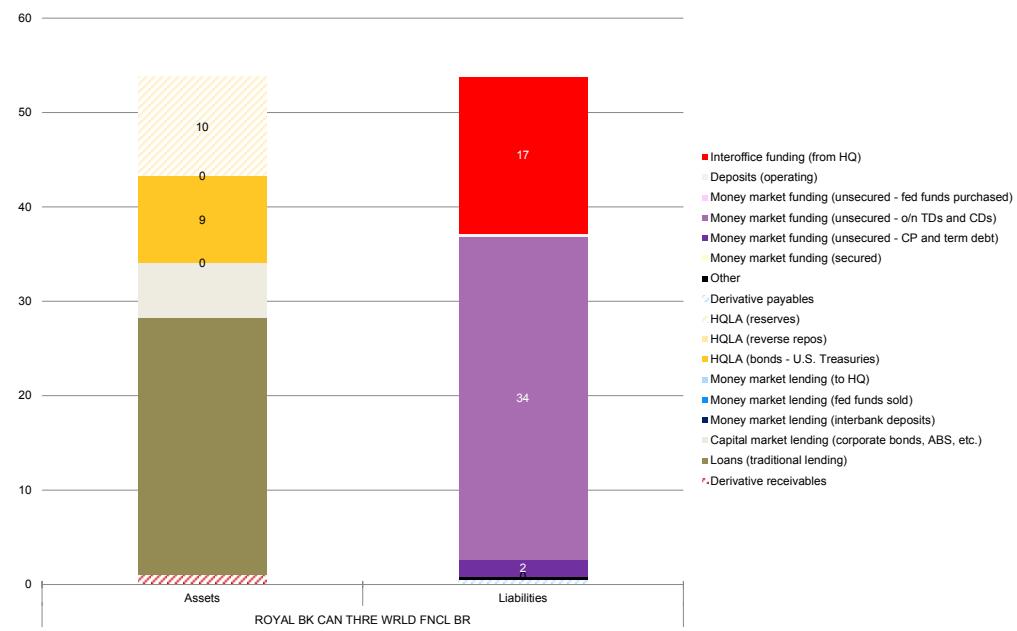
Source: FFIEC 002, Credit Suisse

Figure 21: Bank of Montreal Chicago Branchas of March 31st, 2016, \$ billion

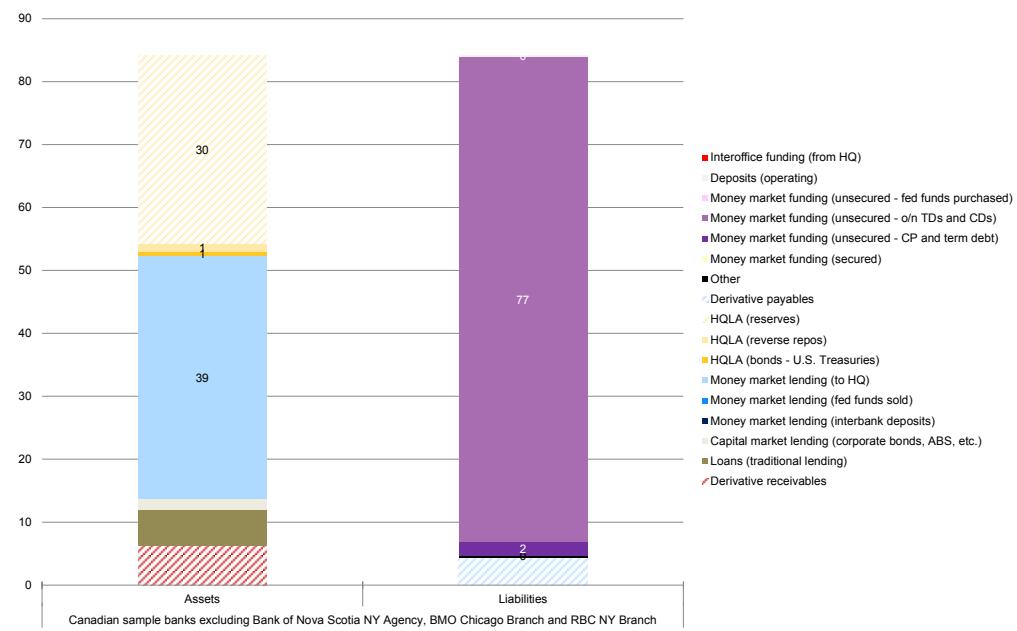
Source: FFIEC 002, Credit Suisse

Figure 22: Canadian Banks ex Bank of Nova Scotia and BMOas of March 31st, 2016, \$ billion

Source: FFIEC 002, Credit Suisse

Figure 23: Royal Bank of Canada New York Branchas of March 31st, 2016, \$ billion

Source: FFIEC 002, Credit Suisse

Figure 24: Other Canadian Banksas of March 31st, 2016, \$ billion

Source: FFIEC 002, Credit Suisse

Figure 22 shows Canadian sample banks excluding the New York and Chicago branches of the Bank of Nova Scotia and BMO. This is a different image from where we started. Unlike all Canadian bank branches combined, this subset of Canadian bank branches rely nearly exclusively on unsecured funding from prime funds. \$40 billion of this funding is northbound (going back to Canada), where – similar to BMO – it is funding CAD assets.

Figure 23 shows the balance sheet of RBC's New York branch, which is another outlier. Its balance sheet has a real economy scent to it – its main assets are loans and the rest of its balance sheet is HQLA (reserves and Treasuries). On the funding side, unsecured funding dominates and it also taps headquarters of U.S. dollars funding. RBC's options are fairly limited if it is unable to roll unsecured funding with prime funds. Its loan book would be difficult to shrink and so the alternatives are to issue term debt or to ask headquarters to swap CAD for USD via the FX swap market and downstream it to the New York branch.

Figure 24 shows the previous subset of Canadian sample banks excluding the New York branch of RBC. What we see is a simple balance sheet structure which relies exclusively on unsecured funding, the bulk of which is northbound, flowing back to headquarters.

The dominant names in this group are the New York branches of Toronto-Dominion Bank and CIBC. Together with the Chicago branch of BMO, these banks are responsible for the northbound flow of about \$50 billion of U.S. dollars to Canada where these dollars are used to fund CAD assets. What types of assets is difficult to say, but a likely candidate are currency forwards whereby the long-only investors in Canada hedge their long U.S. dollar exposures back to CAD. It appears that the banks providing these hedges – TD, BMO and CIBC – get CAD by swapping USD with the Bank of Nova Scotia and RBC, which take these dollars, downstream them to their New York branch, and deposit them at the Fed.

It appears to be a distinctly Canadian game of cul-de-sac where TD, BMO and CIBC are all exposed to basis risk as their cost of unsecured funding goes up as prime money fund reform runs its course; the long-only community in Canada is exposed to rising hedging costs; and finally RBC and the Bank of Nova Scotia are set to benefit as lenders of CAD.

Conclusions - A Month-Long Quarter-End...

Three conclusions stand out from our analysis.

First, contrary to wide-held expectations, the impact of money fund reform on repo rates is shaping up to be relatively minor. Foreign bank branches that arbitrage a lot and are set to shrink their balance sheet as money flows from prime to government funds do not own a lot of Treasuries and so will have little to sell when their unsecured funding disappears. On the other hand, foreign banks that do not arbitrage will have to maintain their LCR and so won't be in a position to either sell or repo the Treasuries in their HQLA portfolio. The exception to this rule is Norinchukin's New York branch (not subject to Basel III), which as of March 31st, 2016, had \$20 billion in unsecured funding from prime money funds and could potentially direct up to that much in funding needs into the term GCF repo market. Were this to happen, the spread between GCF and tri-party repo rates would widen as primary dealers step in to intermediate between Norinchukin and government money funds the flows that heretofore happened between Norinchukin and prime money funds directly.

Second, the cost of three-month unsecured funding raised onshore in New York from prime funds will converge to the cost of three-month funding raised offshore via FX swaps. The all-in cost of swapping euros or yen for dollars is around 120 bps, which makes unsecured funding at 95 bps look cheap by comparison. This gives us confidence that unsecured rates have upside from here which three-month Libor will gradually capture.

Third, the all-in cost of dollars raised through the dollar swap lines are already cheaper than the all-in cost of dollars raised through FX swaps. Although the ECB and the BoJ now both have a pre-announced schedule (see [here](#) and [here](#)) of one-week dollar operations, central banks actively discourage banks from actually tapping the Fed's dollar swap lines.

Both schedules of weekly operations run through the end of October and so fully cover the period when term unsecured funding markets may temporarily "close" due to prime money fund reform. In that sense, these operations are meant to put foam on the runway in order to ensure that banks will have access to funding that does not hurt their liquidity ratios.

As we approach October 17th, there will be a point where banks will only be able to fund with prime money funds at tenors shorter than 30 days. 30-day funding from prime money funds has a 100% outflow assumption meaning that every penny of such funding must be invested in HQLA. In turn, transitioning from a world where term funding is available beyond 30 days (0% HQLA need) to one where it is not (100% HQLA need) would be a shock to foreign bank balance sheets. Central bank funding has a 0% outflow assumption even at tenors shorter than 30 days and so could solve banks' funding needs with ease.

This is to say that the purpose of pre-announced dollar swap operations is not to make life cheap (for those with massive dollar funding needs), but to make sure life goes on... – that bills get paid and that the regulatory parameters set by Basel III are not breached.

As long as markets are continuous and trades get done, the Fed, the BoJ and the ECB encourage and expect banks to tap private markets, whatever the cost of funds. In other words, the swap lines are not meant to police the euro or yen cross-currency basis – yet.

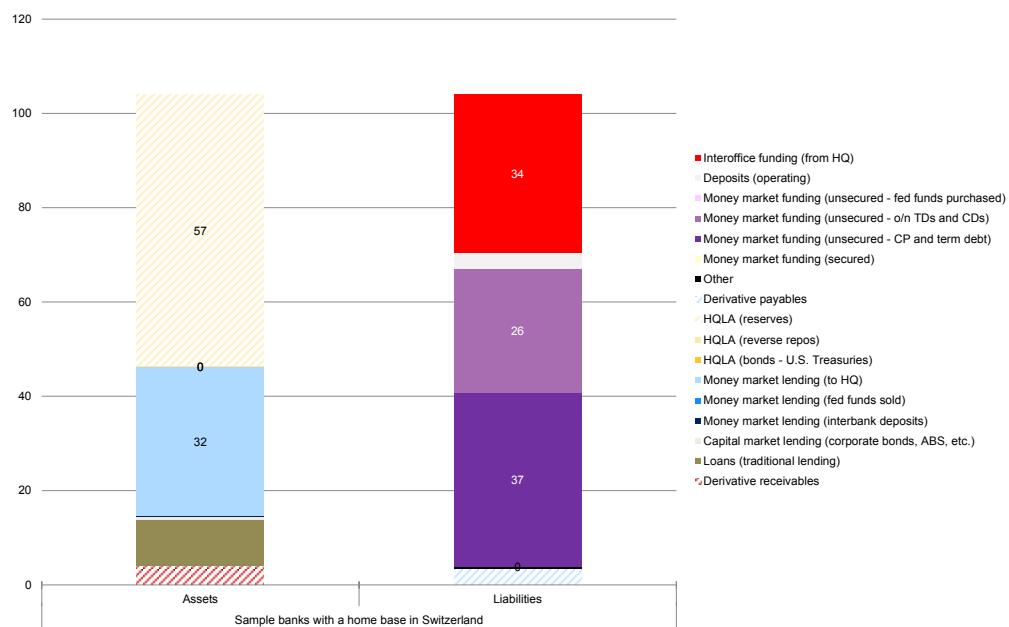
Rather, for now, the purpose of these swap operations appears to be to help banks sail through the storm of money fund reform without a dent in their 30-day liquidity buffers.

Dealer of last resort will be another day...

Appendix

Figure 25: Swiss Banks

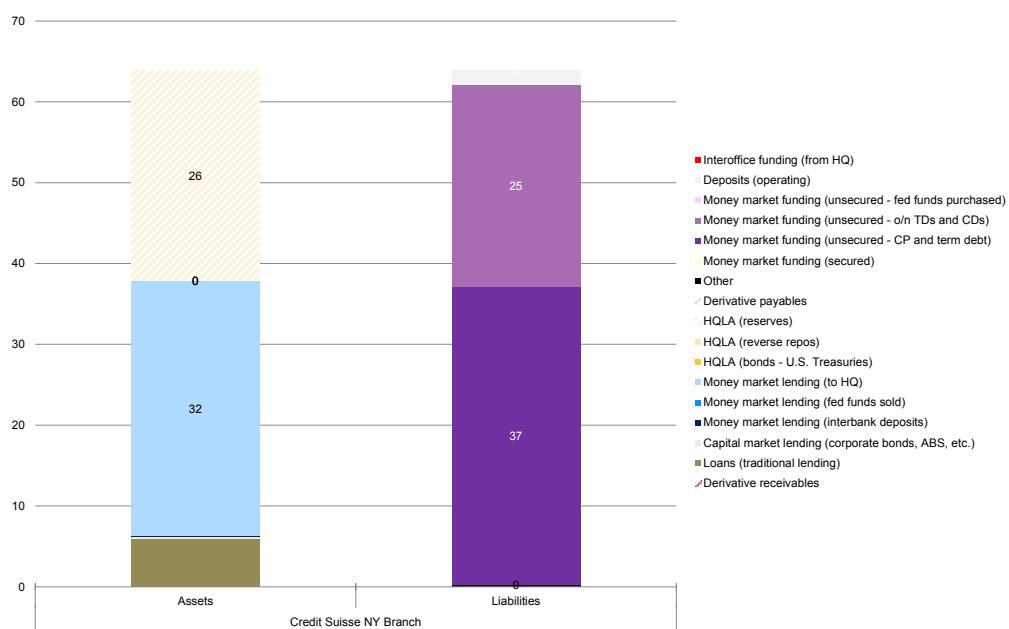
as of March 31st, 2016, \$ billion



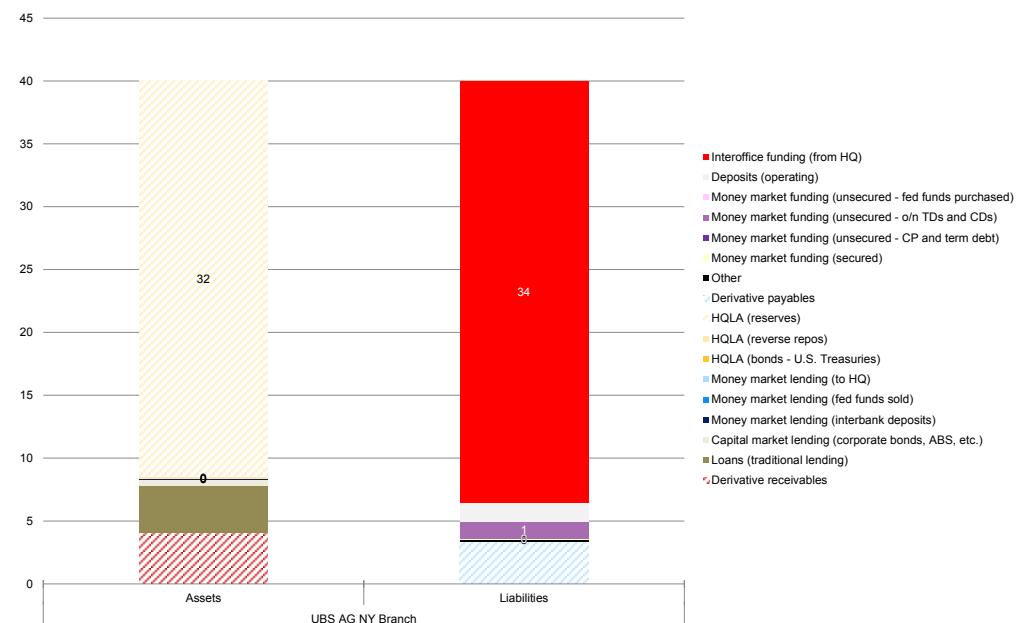
Source: FFIEC 002, Credit Suisse

Figure 26: Credit Suisse New York Branch

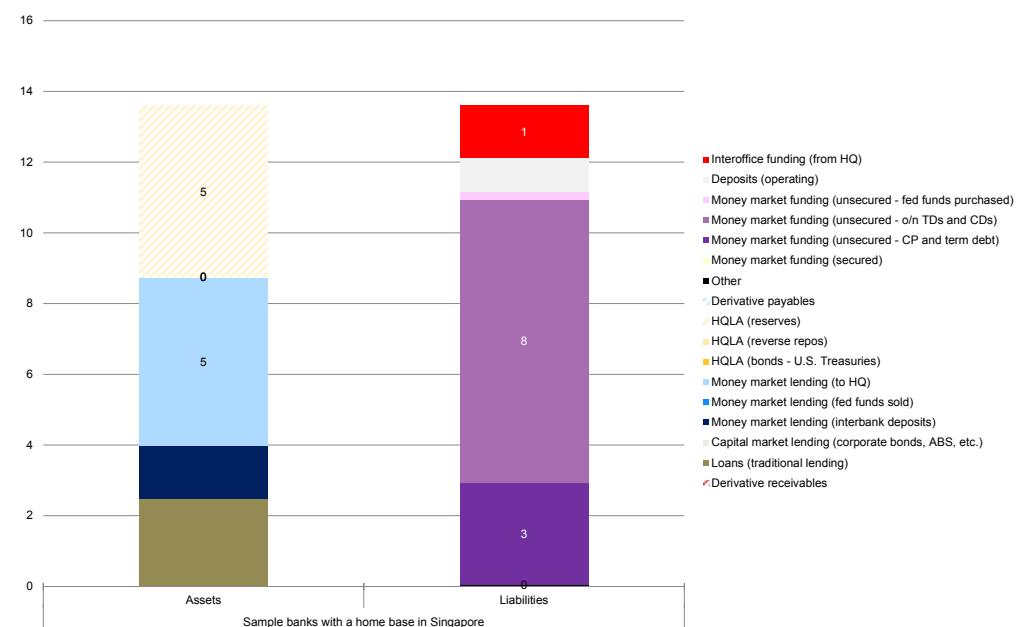
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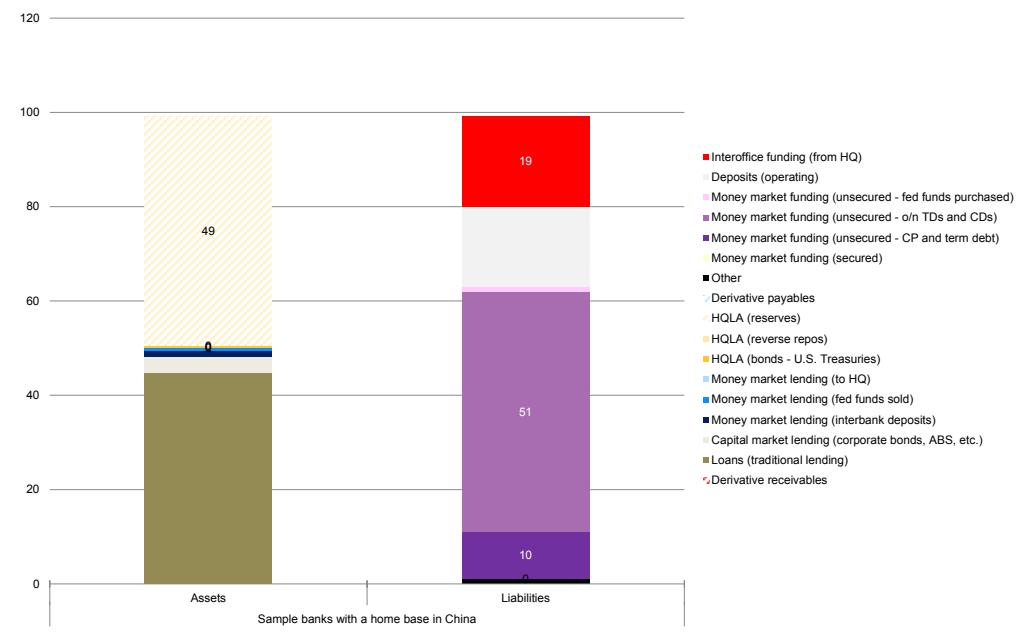
Source: FFIEC 002, Credit Suisse

Figure 27: UBS AG New York Branchas of March 31st, 2016, \$ billion

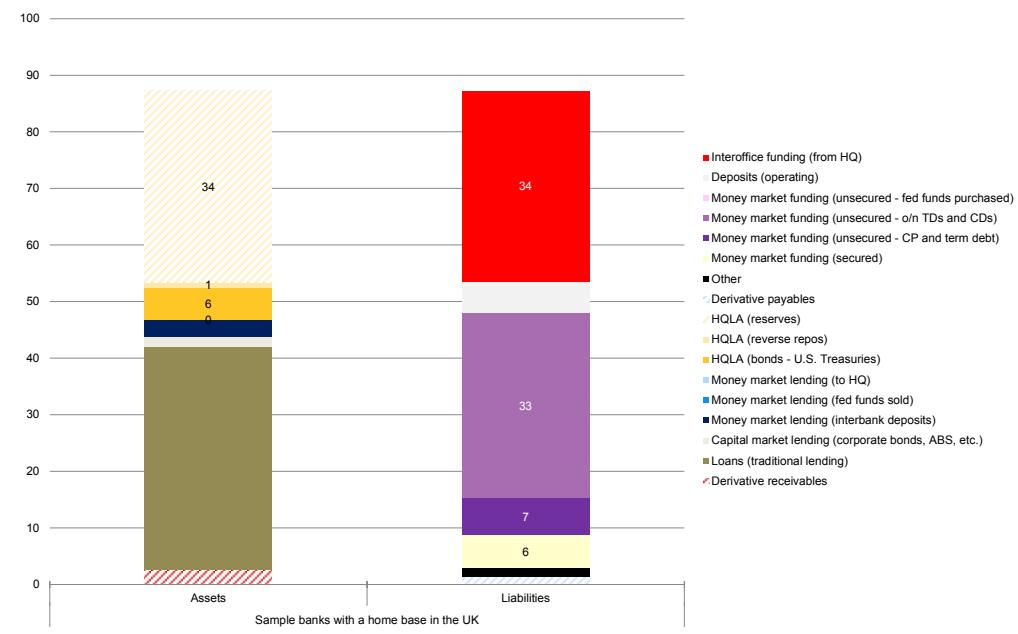
Source: FFIEC 002, Credit Suisse

Figure 28: Singaporean Banksas of March 31st, 2016, \$ billion

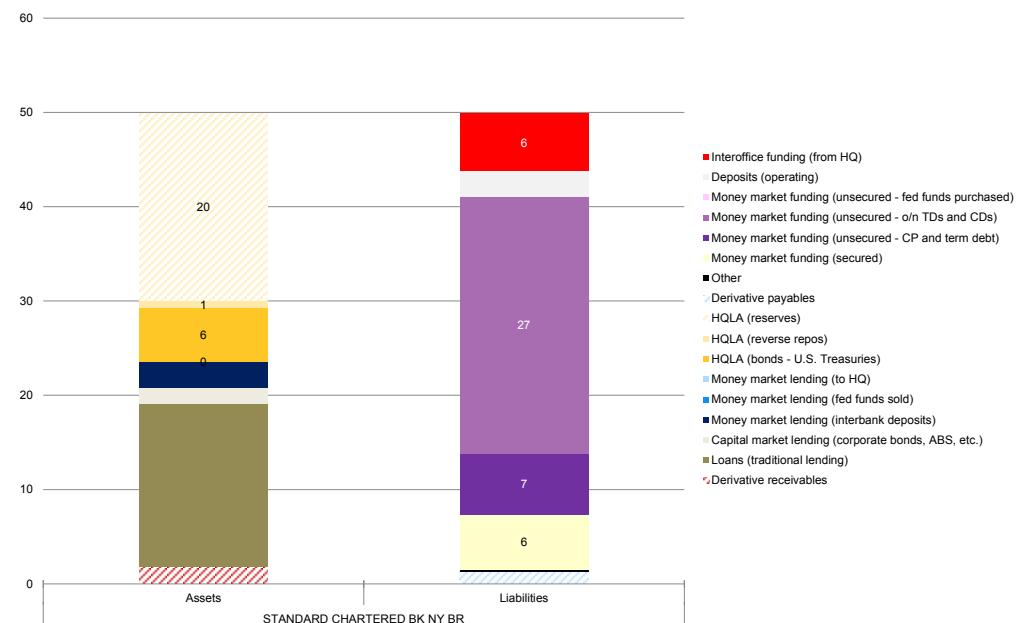
Source: FFIEC 002, Credit Suisse

Figure 29: Chinese Banksas of March 31st, 2016, \$ billion

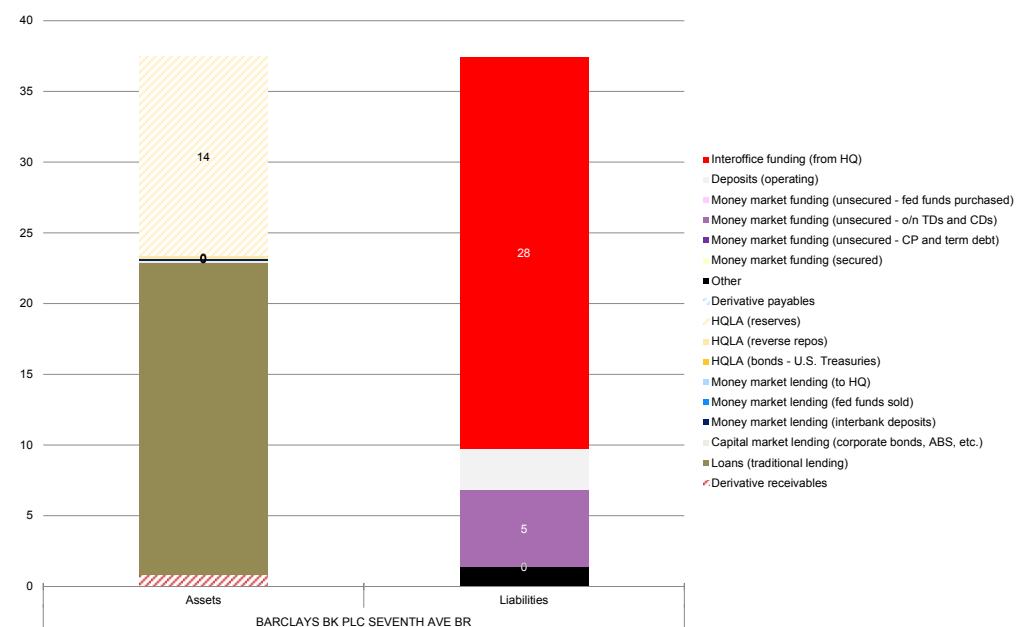
Source: FFIEC 002, Credit Suisse

Figure 30: British Banksas of March 31st, 2016, \$ billion

Source: FFIEC 002, Credit Suisse

Figure 31: Standard Chartered Bank New York Branchas of March 31st, 2016, \$ billion

Source: FFIEC 002, Credit Suisse

Figure 32: Barclays Bank New York Branchas of March 31st, 2016, \$ billion

Source: FFIEC 002, Credit Suisse

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Global Money Notes #8

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From Exorbitant Privilege to Existential Trilemma

We have yet to see what President Trump means for the Fed's independence and monetary policy going forward, but for now our expectation remains that the FOMC will remain willing and free to normalize short-term interest rates.

With that assumption in mind, this issue of *Global Money Notes* explains why an FOMC determined to normalize interest rates has no choice but to become a Dealer of Last Resort in the FX swap market and provide quantitative Eurodollar easing ("QEE") for the rest of the world through its dollar swap lines.

The U.S.'s exorbitant privilege – its ability to borrow in its own currency anywhere in the world thanks to a vast and deep Eurodollar market – is waning.

The first throw of sand at the gears of the global Eurodollar market was the adoption of Basel III which imposed liquidity requirements on a system born out of banks' desire to avoid reserve requirements in the first place (see [here](#)).

The second was money fund reform.

Prime funds' loss of over \$1 trillion in assets under management amounts to the clamping of a major global funding "artery" whose role was to bridge the Eurodollar market's marginal dollar needs. These needs are now bridged through a smaller and increasingly tight "vein" that's the balance sheet of American banks under Basel III. The result is a Eurodollar market that's structurally more expensive and less liquid and dominant than it used to be.

Basel III and money fund reform are turning the exorbitant privilege into an existential trilemma that's usually a problem for EM central banks with pegs to the dollar, rather than the Fed at the center of the dollar-based financial order.

According to the Fed's newfound trilemma, it is impossible to have constraints on bank balance sheets (restricting capital mobility in global money markets), a par exchange rate between onshore dollars and Eurodollars, and a domestically oriented monetary policy mandate. Something will have to give.

It's either the cross-currency basis, the foreign exchange value of the dollar or the hiking cycle. It's either the Fed's regulatory and monetary objectives, or control over the Fed's balance sheet size. It's either quantities or prices...

Cross-currency bases will have to go more negative before the Fed steps in, and -150 bps on the three-month dollar-yen basis is not an unlikely target.

In a way, QEE is the missing piece in a mosaic where the ECB and the BoJ continue on with QE at an aggressive pace, and investors in their jurisdictions are filling their duration gaps with higher-yielding U.S. dollar assets on a hedged basis. But the private provision of FX swaps to hedge these flows can't possibly keep pace with the public creation of euros and yen on massive scale.

Elephant-size €QE and QQE can only be countered by elephant size QEE: the Fed needs to lend banks a hand and provide dollar hedges more cheaply.

It's either Lender of Last Resort or Dealer of Last Resort.

Take your pick...

Part 1 – Clamping an Artery

Going into the October 14 prime money fund reform deadline, institutional-class prime funds prepared for the worst and hoped for the best – they provisioned for about 70% of assets under management (AuM) leaving and expected that only 50% will leave. But outflows turned out to be far worse than expected – just under 90% of AuM – and so expectations that any margin of safety built into pre-cautionary liquidity buffers will quickly flow back to the CD and CP markets and compress rates post-deadline didn't materialize.

Judging from price action and high-frequency data on foreign banks' CD and CP issuance since May, the bulk of unsecured funding lost to prime money fund reform was replaced mostly through the FX swap market, and to a lesser extent through the term debt market.

With that shift, large American banks and asset managers (corporate bond funds) replaced prime money market funds as the marginal lenders of dollars to foreign banks, and by extension, the outer rim of the U.S. money market (the offshore FX swap market) and capital markets replaced the inner core (the onshore CD and CP market in New York).

Figure 1 shows the price impact of this shift in the FX swap market, and Figure 2 shows where we believe foreign banks' marginal funding curve currently trades: in our view, the orange curves are a more accurate reflection of foreign banks' marginal funding curve for dollars longer than 30-days than the blue U.S. dollar Libor curve. We plotted the orange lines by taking the average of three-month FX-swap implied costs of dollar funding for key currencies and the yields of major foreign banks' one- and two-year fixed rate debt.

Going forward, we expect these markets to be a deeper source of marginal ("just-in-time") funding than the term CD and CP market. While at \$1 trillion the term CD and CP market remains large, its nature has changed. Pre-reform, prime funds represented a \$1 trillion pool of "omnipresent" liquidity that was sliced and diced according to foreign banks' needs: investors in prime funds rolled their o/h balances everyday which foreign banks could tap in custom terms and size any day – the way a marginal funding market is supposed to trade.

But this omnipresent pool of liquidity is now gone.

What's left is investors with a periodic as opposed to constant presence in the market. With that shift the term CD and CP market became more similar to the real estate market (where trades happen if a buyer wants exactly what a seller has at exactly the same time) than a marginal funding market where pools of liquidity are ready for any trade at any time.

The key question from here is how much money will come back to prime money funds.

If the answer is a lot, then rates could come down as prime funds pour money back into the term CD and CP market. The recent climb in rates will go down in history as cyclical.

If the answer is not much, then funding rates will stay elevated indefinitely. We've reached the "new normal" and the recent climb in rates will go down in history as structural.

Which one will it be?

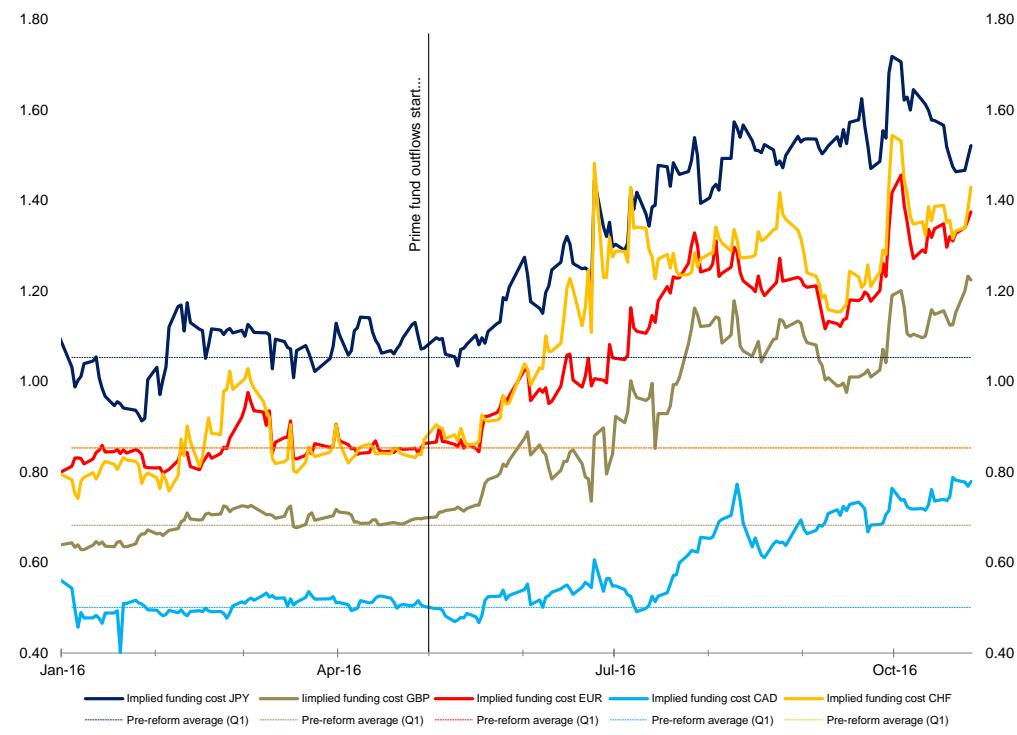
It looks like the latter, for four reasons: regulatory constraints on generating yield, preference for safety over yield, economies of scale, and the "gravitational" pull of Basel III.

First, the SEC's new liquidity rules will limit prime funds' ability to generate yield to lure money back from government funds. The new rules effectively turn half the portfolio of prime funds into a government fund, which will limit yield spreads over government funds to about a half of their historical average.¹ Whatever spread prime funds will have over government funds, it won't be enough to compensate investors for the risk of liquidity gates.

¹ The SEC's new rules require prime money funds to hold at least 30% of their AuM in liquid assets such as U.S. Treasuries. But since reaching the 30% minimum would require the imposition of liquidity gates and fees, prime money funds are implementing the new rules with a considerable margin of safety, running their liquidity buffers at close to 50% of their AuM on average.

Figure 1: Funding at the “Outer Rim”

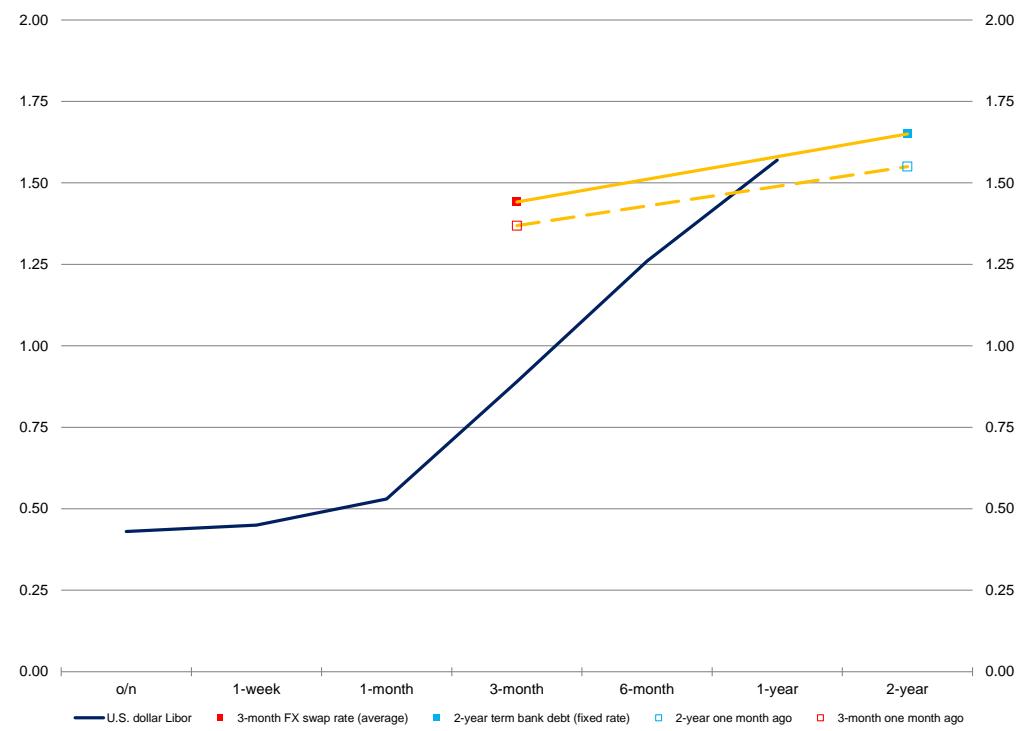
FX swap-implied costs of three-month U.S. dollar funding, %



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 2: Which is the True Marginal Bank Funding Curve?

% as of October 28, 2016 unless otherwise noted



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Second, reforms will also limit treasurers' demand for yield and hence prime money funds. When regulatory reforms are turning prime funds from a liquidity vehicle to a credit vehicle, effectively cutting the system's menu of options for safe, par on demand vehicles from three (demand deposits, government funds and prime funds) to two (demand deposits and government funds), the natural response of investors is to gravitate toward safety (that is government funds), not yield (that is, prime funds). This, combined with prime funds' constraints to generate yield going forward, will severely limit flows back into prime funds.

Third, if there is neither yield pickup, nor reach for yield, the future of what is left of institutional-class prime funds looks rather bleak. Institutional prime funds lost \$800 billion in AuM since 2015, leaving only \$100 billion in assets to look after (see Figure 3). Whether such a small asset-base can support overheads that were scaled to manage trillions, not billions is yet to be seen. Economies of scale matter and are make or break.

Fourth, the future of retail prime funds also looks bleak due to the gravitational pull of Basel III. Retail prime funds lost \$250 billion in AuM since 2015, with only \$250 billion left. Retail deposits are "gold" for large American banks as they require no HQLA and count as NSFR at face value. In an era when banks like Goldman Sachs are paying over 100 bps for checking accounts, funds will continue to migrate out of prime funds paying only 25 bps.

If we are right that prime funds will shrink further from here, the steepening of the Libor curve, the widening of Libor-OIS spreads and the increase in offshore dollar funding costs we have witnessed to date are all structural, not cyclical. At best we are looking at funding markets to stabilize at current levels, and at worst we are looking for the curve to steepen, spreads to widen and cross-currency bases to sink much deeper into negative territory as prime money market funds fail to attract cash back and continue to bleed assets over time.

The end-state of the system is one where foreign banks raise their marginal dollars mostly in the FX swap market (from American banks) or the capital market (from asset managers).

The end-state is dominated by American banks because post-reform, they are the only ones left with access to cheap retail dollars onshore to lend offshore via FX swaps – all foreign banks that used to lend via FX swaps raised dollars wholesale from prime funds (for a review of the impact of money fund reform on the FX swap market see [Appendix 1](#)).

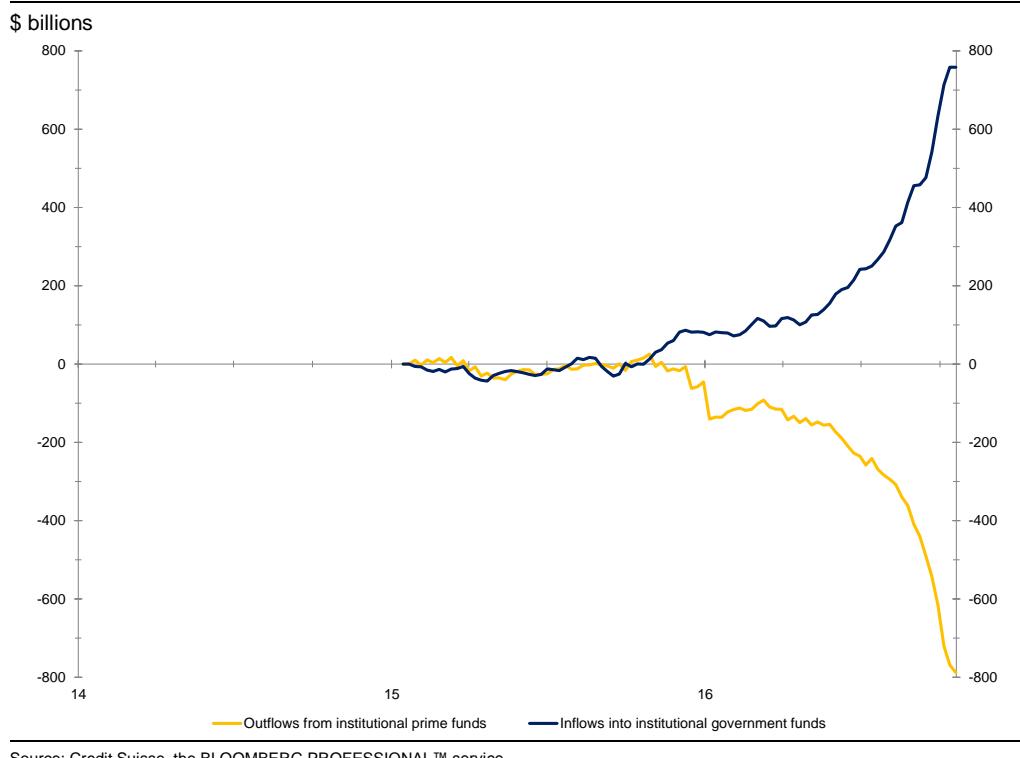
As large American banks grow to dominate the FX swap market, they will inevitably become the marginal price setters in the system. Going forward, the key questions from a pricing perspective will be how American banks' growing FX swap books will push up against their balance sheet constraints: (1) how much balance sheet they will have to onboard these trades from an SLR perspective; (2) what will these trades do to their LCR; (3) what will the looming requirement to currency-match HQLA portfolios mean for their appetite to do these trades; and (4) will the Volcker Rule let them run speculative books?

None of these constraints mean anything good for the marginal cost of Eurodollar funding going forward, which means that what's referred to as a "global dollar shortage" is bound to get worse in the future. But in light of the points raised above, none of this is about a shortage of dollars *per se*, but rather a shortage of balance sheet to intermediate dollars (please, let's forget the whole "shortage versus scarcity" debate and call a spade a spade).

Effectively, what we have here is a case where money fund reform amounts to the clamping of a major global funding "artery" and a redirection of flows through a smaller and increasingly tight "vein" that is the balance sheet of American global banks under Basel III.

For a sense of scale, consider that over \$1 trillion has left prime funds. Now consider the image of American banks absorbing these flows through hamstrung balance sheets...

...what you see is an elephant inside a snake (see Figure 4), and a global dollar funding market structurally more expensive and less liquid and dominant than it used to be.

Figure 3: Tectonic Shifts

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Part 2 – QEE and the Fed as Dealer of Last Resort

What does all this mean for the Fed?

Quite a lot, which makes the fact that no Fed official devoted a speech to the topic of prime money fund reform and its local and global repercussions puzzling to say the least.

First, the local repercussions.

Prime money fund reform just made the [ARRC](#)'s quest for an alternative reference rate more difficult and will increase the allure of a repo rate as an alternative (see [here](#)). Outflows from prime funds to date have reduced the volume of o/n Eurodollar trades from \$250 billion to \$90 billion today (see Figure 5).² By the time the dust of reform will settle, the OBFR will have lost most of its volume advantage over the fed funds rate, in our view.

Next, the global repercussions.

The message that emerged from the previous section is that the era of cheap marginal flows into the Eurodollar market are over. Tapping the CD and CP markets via prime funds is a thing of the past and the future likely belongs to American global banks that are set to become the dominant price-setters of the marginal dollars the rest of the world needs. The key to figuring out where cross currency bases will settle is to figure out the interaction between American banks' growing [FX swap books](#) and their [balance sheet constraints](#).

The more dollars American banks will intermediate through the FX swap market, the less balance sheet they will have left over for everything else, and the higher the price of the marginal FX trade will have to be. Standard logics of arbitrage do not hold under Basel III: with balance sheets no longer unlimited, the more you arb the higher the marginal price.³

² This is because institutional-class prime money funds were the single biggest lenders of o/n Eurodollars in the Caribbean-based segment of the Eurodollar market as measured by the Federal Reserve's new overnight bank funding rate (OBFR).

³ Banks arbitrage differences between onshore and offshore funding rates by borrowing onshore in the CD and CP market from prime money funds and lending the proceeds in the FX swap market. Such arbitrage trades inflate banks' balance sheets.

Either way we look at it, cross-currency bases are bound to get more negative, with no private mechanism in place to check three-month points from sinking as low as -150 bps.

The limit to this will be the extent to which the rest of the world will be able to cope with higher dollar funding costs and how these will feed back to the Fed's reaction function.

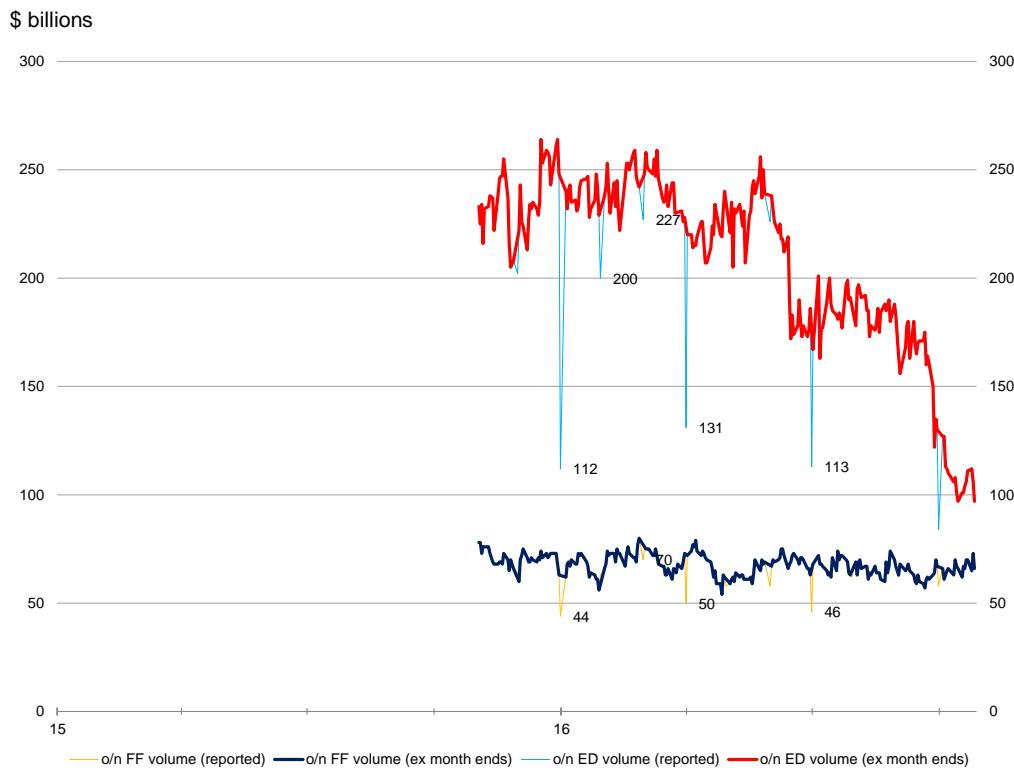
There are at least three feedback channels.

First, an ongoing increase in the FX swap-implied cost of dollar funding and increasingly negative cross-currency bases mean tighter financial conditions for the rest of the world. In turn, tighter financial conditions point to slower, not faster global growth as foreign banks pass on higher costs to their customers or worse: de-lever their books. These dynamics are disinflationary on the margin and don't help interest rate normalization back in the U.S.

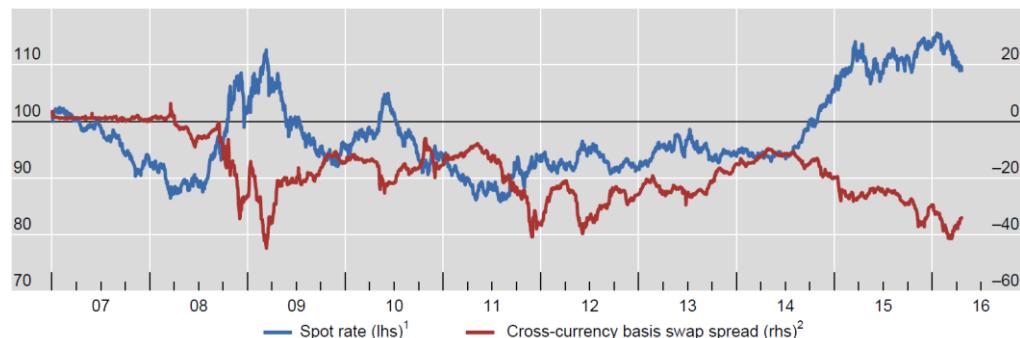
Second, increasingly negative cross-currency bases mean rising hedging costs for foreign investors on their U.S. dollar assets, which force them out the duration curve and down the credit spectrum. In turn, this tends to ease financial conditions, raise financial stability risks, and also blunt the traditional channels of monetary policy transmission back in the U.S. Chairman Greenspan's conundrum is back and spreading to mortgage and credit curves.

Third, everything described above goes hand-in-hand with a further strengthening of the dollar (see Figure 6) – this is because increasing hedging costs are prompting foreign investors to reduce their hedge ratios or take on naked exposures, both of which tend to drive the appreciation of the dollar. If the Fed leaves the intermediation of all of the rest of the world's marginal dollar needs to American banks' constrained balance sheets, offshore financial conditions may tighten and the dollar may strengthen to the point where they are no longer consistent with the path the Fed envisioned for the funds rate (see [Shin, 2016](#)): rounds of RMB devaluation would follow which also won't help interest rate normalization.

Figure 5: It's Back to the Drawing Board for the ARRC...



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 6: The Cross-Currency Basis and the U.S. DollarJanuary 2nd, 2007 = 100 (LHS), basis points (RHS)

¹ Simple average of bilateral exchange rate of the dollar against CAD, EUR, GBP, SEK, CHF and JPY. Higher values indicate a stronger US dollar.
² Simple average of the five-year cross-currency basis swaps against CAD, EUR, GBP, SEK, CHF and JPY vis-à-vis the US dollar.

Source: BIS

It seems like balance sheet constraints are in conflict with monetary policy objectives...

Balance sheet constraints are driving prices in a way where financial conditions abroad are tighter than financial conditions in the U.S. Where borrowing a Eurodollar is more expensive than borrowing an onshore dollar. The feedback of this on the U.S. dollar and financial stability risks are making interest rate hikes less possible and also less effective.

What to do?

In this environment, the only bank that could counter the tendency of cross-currency bases to sink deeper and deeper into negative territory is none other than the New York Fed.

It could do so by scrapping its philosophy that it should primarily serve the system as a Lender of Last Resort – providing a liquidity backstop when no one wants to lend – and become a Dealer of Last Resort – providing a backstop to prices when dealers hit their balance sheet constraints and have no room left to make markets at reasonable spreads.

The tool to use is the Fed's dollar swap lines but the aim would no longer be to backstop funding markets, but to police the range within which various cross currency bases trade.

Just as the reasons why various cross currency bases spiked during 2008 and 2011 (credit and sovereign risks) were different from the reasons why they have been widening since 2014 (Basel III and money fund reform), the mindset with which the dollar swap lines should be deployed today should also be different – not to provide a liquidity backstop because prime funds won't lend to banks, but to provide a balance sheet backstop because private market makers are pushing up against their balance sheet constraints, and are giving quotes that are strengthening the dollar and forcing the Fed to stay on hold.

Of course, if the Fed were to switch from treating the swap lines as a funding backstop to a pricing backstop, its attitude toward being tapped would have to be relaxed. In English, this means that long held notions of stigma would have to be expunged from the market's conscience and everyone would have to adopt a mindset where if banks' quotes are more expensive than the quotes of the Fed, everyone would default to trading with the Fed with no further thought, period – much like the ECB's repo facilities are routinely tapped.

Will this really happen?

It's not unlikely. We know from the July FOMC minutes that the Fed is actively looking into "approaches to reducing perceived stigma associated with borrowing at the discount window" and is conscious that "the dollar is the principal reserve currency and that monetary transmission in the U.S. occurs through globally connected funding markets".

The Fed's ongoing review of its Long-Run Monetary Policy Implementation Framework (to be published in January) may conclude the Fed should become a Dealer of Last Resort and be willing to make markets once spreads hit certain levels (the "outside" spread). Not doing so would have unwanted feedbacks on the dollar, the RMB's peg to the dollar, and the Fed's ability to raise rates. Were the Fed to turn into a Dealer of Last Resort, it would give up control over its balance sheet and so should charge more for the dollar swap lines.

Recognize that the theme we've been emphasizing about the U.S. money market (see [here](#))⁴ – that the sovereign has effectively crowded out private banks in money markets onshore⁴ – is also inevitable in money markets offshore. The Eurodollar market is a private system and the historically tight relationship between onshore and offshore funding curves implied a "par exchange rate" between onshore dollars and Eurodollars – OIS, Libor and FX swap curves were all on top of each other. The widening spreads between Libor and OIS, and Libor and FX swap-implied dollar funding rates (that is, the cross-currency basis) reflect a structural breakdown of the par exchange rate between onshore dollars and Eurodollars – just as the crisis of 2008 marked a similar breakdown. But 2008 was a panic. It was temporary. Today is structural. It feels more persistent than temporary. It is driven by balance sheet constraints due to Basel III which limit American banks' ability to serve as private dealers of dollars from onshore to offshore. It also means that a dollar abroad is more expensive than a dollar at home, which will continue to push the spot value of the dollar higher and higher unless the Fed decides to give up control over its balance sheet and ease the shortage of offshore dollars by becoming a public dealer of Eurodollars.

Regulatory reforms turned the exorbitant privilege into an existential trilemma typically associated with emerging market economies with fixed exchange rates to the U.S. dollar.

According to the impossible trinity of yore it is only possible to have two of three goals: free capital mobility, a fixed FX rate and monetary policy oriented toward domestic goals.

The Fed now faces the impossible trinity in a new form: it's impossible to have constraints on bank balance sheets (restraining free capital mobility in global money markets), a par exchange rate between onshore and offshore dollars across the term structure, and a monetary policy oriented toward domestic goals. Either way, something will have to give:

- (1) Reforms – the domain of Governor Tarullo – are limiting balance sheet quantities and driving a wedge between the price of onshore and offshore dollars as evident in more negative cross-currency bases. This contributes to the dollar's strength.
- (2) Monetary policy independence – the domain of Chair Yellen – is under threat, as a stronger dollar increases the chance of further RMB devaluation by the PBoC. The deflationary risks inherent in RMB devaluation limit the Fed's ability to hike.
- (3) Quantitative Eurodollar easing ("QE") for the rest of the world is the solution, which is President Dudley's domain. If the increasing cost of Eurodollars is what's driving the appreciation of the dollar, and the appreciation of the dollar is what stands in the way of the Fed's hiking cycle, it appears that the right thing to do is to break the impasse and give the rest of the world what it needs through the swap lines so as to relieve the pressure on the dollar so that the FOMC can hike.

It's either quantities or prices...

Monetary policy divergence is not a new phenomenon – we've seen it in the past. But in the past, unconstrained balance sheets ensured that cross currency bases were minimal (or in other words, deviations from covered interest parity weren't large or persistent).

⁴ Look no further than the demise of prime funds and rise of government-only funds, the increased volume of bills issued by the U.S. Treasury, the increased volume of floaters issued by the FHLBs and the increased size of the Fed's foreign repo pool and o/n RRP facility as counterparts to less short-term funding raised by banks and primary dealers' diminished repo books.

Under the old regime, the focus was on prices and tight spreads – or in the present context a “par exchange rate” between onshore and offshore dollar funding curves. Quantities (balance sheet) were endless, and the volume of matched money market books that accumulated through global banks’ money dealing activities – borrowing in onshore segments of the money market in order to lend offshore – were massive indeed. No longer.

Basel III restricting quantities and money fund reform clamping a main funding artery is turning the Fed’s world on its head. Quantity constraints will have to be relaxed if the Fed wants to have monetary independence and parity between onshore and offshore dollars.

Barring the scrapping of Basel III or the blanket exemption of reserves from the SLR, quantitative Eurodollar easing (“QEE”) for the world – the fixed-price, full-allotment broadcast of Eurodollars globally through the dollar swap lines – is the solution we need.

In a way, QEE is the missing piece in a mosaic where the ECB and BoJ continue with QE and investors in their jurisdictions are looking to fill their duration gaps with higher-yielding dollar assets on a hedged basis. But the private provision of FX swaps to hedge these flows cannot possibly keep pace with the public creation of euros and yen on mass scale.

Conclusions

Elephant-size €QEs and QQEs can only be countered by elephant-size QEEs by the Fed: the Fed needs to lend banks a hand and provide Eurodollars more cheaply to the world...

It's either regulatory and monetary objectives or the Fed's balance sheet size.

It's either the cross-currency basis, the dollar or the next hike.

It's either Lender of Last Resort or Dealer of Last Resort.

Take your pick...

Appendix 1 – Pricing at the Outer Rim

Figure A-1 lists the four steps involved in foreign banks' and investors' use of FX swaps. It also demonstrates the example of a firm borrowing euros to arbitrage funding costs. All three cases are examples of market participants borrowing dollars via FX swaps.

Figure A-2 aims to explain how two of these borrowers (banks and real money accounts) link up with the suppliers of dollars via FX swaps, using the dollar-yen basis as an example.

On the demand side we have real money accounts such as insurance companies and pension funds with a need to hedge dollar investments (motivated by search for yield), and banks with a need to fund dollar loans (search for lending opportunities outside of Japan).

On the supply side, we have prime money funds that lend dollars onshore (in New York to the New York branches of Japanese banks which then "forward" those dollars to Tokyo) and institutional cash pools that lend dollars offshore (from New York or anywhere in the world to Tokyo). Institutional cash pools include FX reserve managers like the RBA (see page 44 of their latest [annual report](#) for a sense of their size in the FX swap market), multilateral accounts like the IMF or the World Bank, asset managers and hedge funds.

Structurally, these four groups of players line up such that Japanese real money accounts only have access to the FX swap market for dollars, but not the cheaper CD and CP market where money funds lend. Japanese banks have access to both sources, but they historically opted for the latter as CD and CP funding is typically cheaper than FX swaps.

On the lending side, regulations allowed prime funds to lend only in CD and CP markets but not the FX swap market, and institutional cash pools were free to lend wherever. Free to be, they historically opted for FX swaps as swaps paid better than CD and CP. Not doing so would have been like not picking up €500 bills from the pavement day after day.

Those who could borrow dollars only through FX swaps (real money accounts) and those who chose to lend dollars only through FX swaps (institutional cash pools) "met" through the matched books of market makers – global banks active in the FX swap market.

No market is ever balanced, however, and market makers' job is to smooth temporary imbalances in order flows through their speculative books. Demand for dollars in Tokyo has been persistently stronger than the supply of dollars from cash pools, and global banks bridged this structural dollar shortage by tapping markets onshore to lend offshore. It is here – in the speculative books – where the price of the marginal FX swap trade is set.

Figure A-3 builds on Figure A-2 by adding the typical tenors that each participant trades in.

Japanese real money accounts borrow at the three-month point of the FX swap market (to hedge quarterly coupon flows), and banks borrow in the three-month CD and CP market from prime funds to minimize their HQLA funding costs while staying LCR compliant.

Institutional cash pools typically lend at the richest point of the FX forward curve, which, given the hedging needs of real money accounts and banks, is the tree-month point. Correspondingly, market makers' books are dominated by matching three-month swaps.

Imbalances in order flows also involve mostly three-month FX swaps. Global banks fund these speculative long positions with funding that is structurally cheaper to raise. For non-American global banks these come from prime funds at tenors shorter than 30-days.

But for American global banks these funds are essentially for "free" – they have endless amounts of retail deposits at their disposal, and if they need to raise funds elsewhere, the FHLBs are there to offer one-week or one-month money at 55 and 60 bps, respectively.

Given these structural funding relationships, Figure A-4 demonstrates what the demise of prime money funds means for the balance of pricing power in the system going forward.

First, it means that Japanese banks (and banks from other jurisdictions as well) will lose access to cheap onshore dollars via CD and CP and will replace them with FX swaps.

Second, just as Japanese banks will be shifting toward FX swaps for funding, the size of non-American speculative books in the market will be shrinking. This is because the cheap source of CD and CP funding from prime funds to non-American global banks that are active arbitrageurs of the difference between offshore and onshore rates will be gone.

Enter the American bank, which, as noted above, has a funding advantage over everyone else and hence is uniquely positioned to dominate the FX swap market going forward.

As large American banks grow to dominate the FX swap market, they will inevitably become the marginal price setters in the system. The key questions from a pricing perspective will be how an increased volume of speculative FX swaps positions will interact with American banks' regulatory constraints – how much balance sheet will they have to onboard these trades from an SLR perspective; what will these trades do to their LCR; what will the looming requirement to currency-match HQLA portfolios mean for their overall appetite to do these trades; will the Volcker Rule let them run speculative books?

Figure out these questions and you will find the 'keys to the kingdom'. And remember this: under Basel III, the more dollars American banks intermediate via FX swaps, the less balance sheet they will have left over for everything else, and the higher the price of the marginal FX trade will have to be. Standard logics of arbitrage do not hold under Basel III: with balance sheets no longer unlimited, the more you arb the higher the marginal price.⁵

Either way we look at it, cross-currency bases are bound to get more negative, with no private mechanism in place to check three-month points from sinking as low as -150 bps.

The limit to this will be the extent to which the rest of the world will be able to cope with higher dollar funding costs and how these costs will feed back to the Fed's reaction function

In this environment, the only bank that can counter the tendency of cross-currency bases to sink deeper and deeper into negative territory is none other than FRBNY (see above).

Other than money fund reform in the U.S., there are at least three risks on the horizon which point to a further increase in American banks' dominance in the FX swap market.

First, money fund reform in the EU. Investors should know that about half of money funds in the EU are U.S. dollar-denominated. If the EU reforms follow the spirit of U.S. reforms, we can expect a further steepening of the U.S. dollar Libor curve, a further migration of funding from Eurodollar CD and CP markets to FX swaps, a further reduction in funding for non-American global banks for arbitrage, and more on the plate of American global banks. If institutional-class prime outflows were the first wave to push the Libor curve steeper and cross-currency bases more negative, and retail-class prime fund outflows are the second, then EU money fund reform will be the third. We should forget about Libor normalization...

Second, shortages of JGB bills are making it increasingly difficult for hedge funds and asset managers to find assets to invest yen collateral when lending dollars via FX swaps. This will naturally impede the volume of FX swaps intermediated through matched books, and will pressure large American banks to increase their speculative books further. This will exacerbate balance sheet pressures and push cross-currency bases more negative (note that unlike hedge funds and asset managers, large American banks can deposit yen at the BoJ via their Tokyo branches and so aren't limited by the shortage of JGB bills).

Third, the reform of the U.S. corporate tax code and the potential re-patriation of hundreds of billions of cash currently parked abroad. These offshore cash balances form an integral part of the funding base of Eurodollar loan books across the globe. Were these cash balances to flow back into the U.S., then even more of the funding of Eurodollar assets would have to come from large American banks through FX swaps. The impact of this on cross-currency bases would make money fund reform look like baby stuff (see Figure A-5).

⁵ Banks arbitrage differences between onshore and offshore funding rates by borrowing onshore in the CD and CP market from prime money funds and lending the proceeds in the FX swap market. Such arbitrage trades inflate banks' balance sheets.

Figure A-1: FX Swap Uses

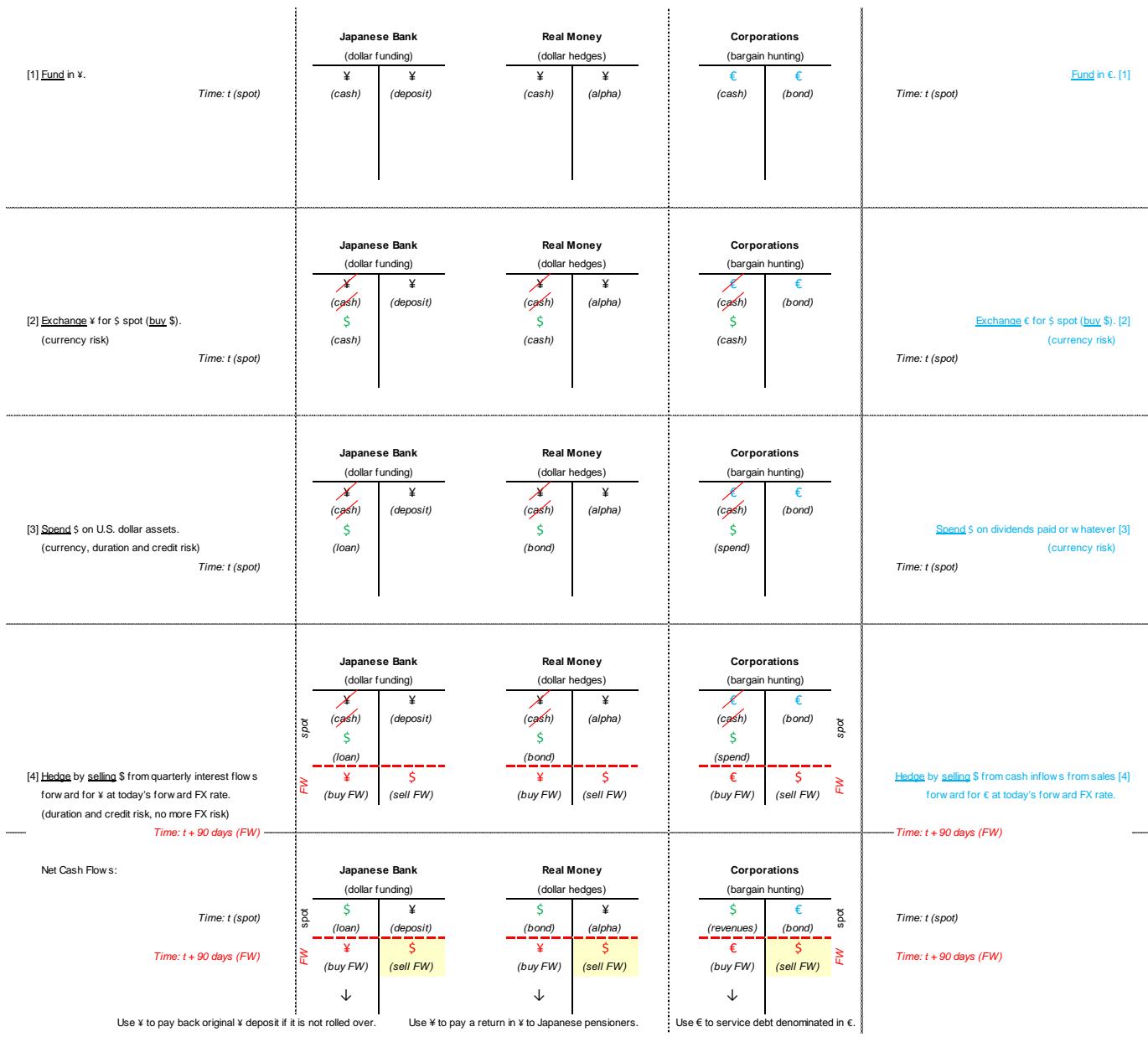
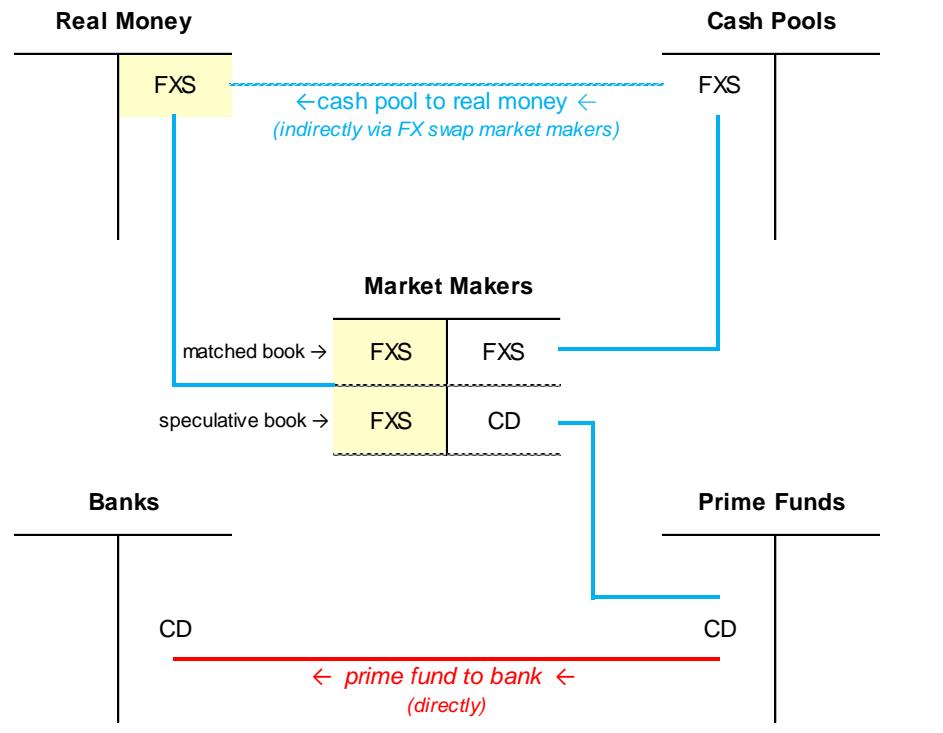
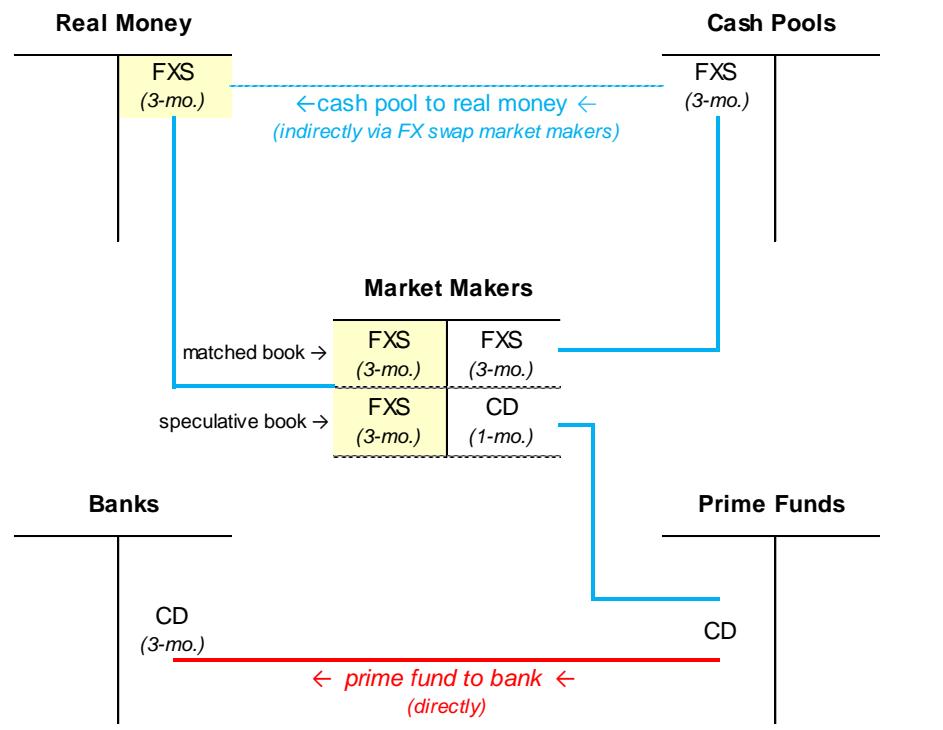
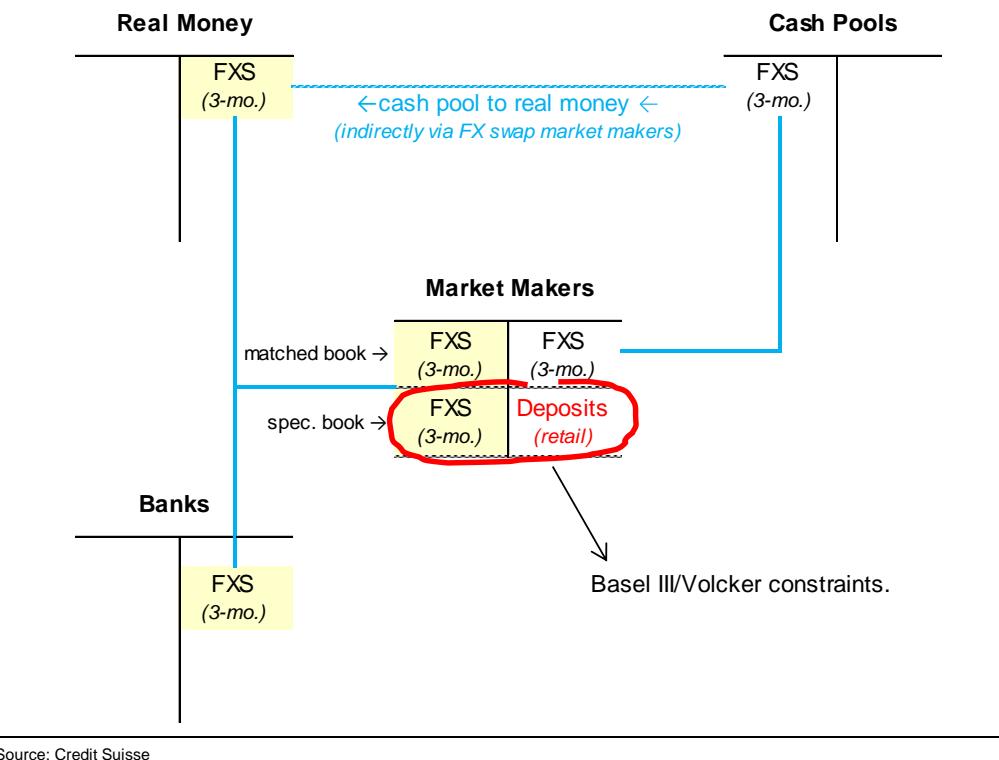


Figure A-2: FX Swap Links

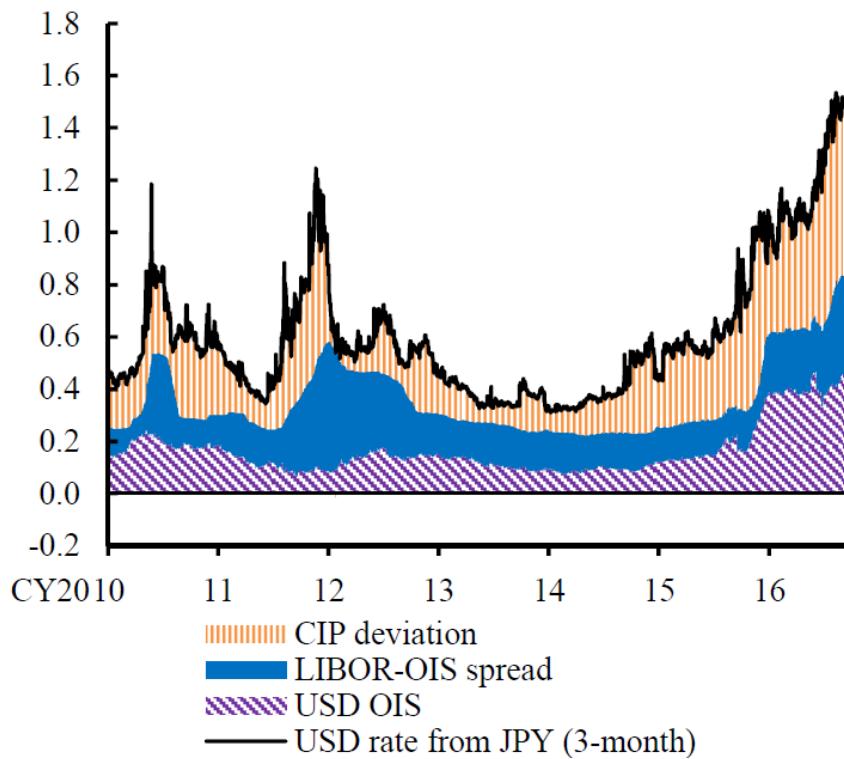
Source: Credit Suisse

Figure A-3: FX Swap Terms

Source: Credit Suisse

Figure A-4: FX Swaps without Prime Money Funds**Figure A-5: Another Trillion, Another Percentage Point...**

Three-month FX-swap implied cost of dollar funding for yen-based borrowers, %



Source: Bank of Japan

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Global Money Notes #9

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Excess Reserves and Global Dollar Funding

According to market lore, the recent collapse in the \$/¥ cross-currency basis was driven by a grand bargain brokered by the Bank of Japan between pension funds and megabanks. According to the bargain, pension funds agreed to swap their U.S. Treasuries for the JGBs of megabanks, and the megabanks used the Treasuries to tap repo markets in New York which have become cheap to fund in post-money fund reform. Megabanks lent the cheap dollars back to the pension funds via FX swaps, and helped them avoid having to deal with U.S. money center banks positioned to extract a pound of flesh.

There was no grand bargain.

Anecdotally, the price of the collateral swap to start this chain of trades is about 45 bps which would make the lending of dollars uneconomical compared to other alternatives. Furthermore, there was no meaningful increase in either tri-party or bilateral repo volumes since November, when the deal was struck.

According to another lore, the collapse of the \$/¥ basis was driven by the anticipated easing of Basel III in the U.S., which will free up balance sheets for arbitrage. That makes sense, but these changes are not imminent and will take time to implement. Three-month bases should not be influenced by them.

In this issue of Global Money Notes we explain how extraordinary measures taken by the U.S. Treasury to avoid the debt ceiling have flooded the system with \$400 billion in reserves which drove the recent collapse of the \$/¥ basis. These measures are temporary. Once reversed, the basis will widen again.

The broader lesson from our analysis is that the Fed only has limited room to shrink its balance sheet. The difference between key cross-currency bases trading at -100 or -25 bps is an extra \$400 billion of reserves in the system. Whether reserves are drained by Treasury boosting its cash balances, or by a runoff of the SOMA portfolio is the same thing. They both mean fewer reserves.

With every \$100 billion of reserves drained, the \$/¥ basis increases by 10 bps. With every \$100 billion of reserves drained, the world gets a 10 bps hike. And it's not just the Fed's decisions. Treasury needs to coordinate with the Fed regarding the impact of its cash management practices on financial conditions.

The Mistake of 1937 has often been cited as a cautionary tale to highlight the risks involved in premature rate hikes. Those comparisons never made sense.

The Mistake of 1937 revolved not around prices, but quantities.

The Fed raised reserve requirements which caused a recession. The parallel with today is a Fed hell-bent on shrinking its balance sheet. Without a meaningful dilution of Basel III, it won't be able to. Or if it does so nonetheless, another mistake may be upon us. Don't let the DSGE people hijack the Fed's balance sheet. Shrinking it is a matter of taste, not a matter of necessity.

Big is beautiful. Big is necessary. Learn to live with it...

Part 1 – Feast and Famine

The Basel III compliant global banking system passed its first liquidity stress test with flying colors.

During the weeks before the SEC's money fund reform deadline, twice as much money left prime money funds than during the weeks following Lehman Brothers' bankruptcy in 2008. While the outflows in 2008 caused panic and required the Federal Reserve to step in as dealer of last resort in the global dollar funding market, the financial system made hardly a peep this time around despite significantly greater outflows. We should not be surprised, as one key requirement of Basel III is that globally active banks hold a liquidity war chest of at least 30-days worth of net cash outflows in high-quality liquid assets (HQLA). In other words, global banks should be able to withstand a 30-day freeze in funding markets and "bleed" liquidity for 30-days before they pick up the phone to call the discount window.

Foreign banks, who were most dependent on prime money funds for funding, held most of their HQLA in the form of reserves at the Federal Reserve Bank of New York (FRBNY). During the outflows they simply ran down their reserve balances. On the flipside, the Fed, instead of being forced to step in to make markets and inflate its balance sheet on the spot to ease the pain from the loss of funding, stood ready with its enlarged balance sheet to ensure the seamless redistribution of liquidity across the system: from prime funds to government funds, and from foreign bank branches to U.S. banks and primary dealers.

We can identify two distinct flows related to money fund reform (see Figure 1).

First, the outflow of \$800 billion of client funds from institutional-class prime money funds (henceforth prime funds). The money that left appears unlikely to ever come back. For the portfolio managers (PMs) that run prime funds and for undiversified asset managers that depend heavily on fees from prime funds for revenues an era of "famine" has begun – assets under management by prime funds have collapsed back to levels last seen in 1993.

Second, the inflow of \$800 billion of client funds into institutional-class government-only money funds (henceforth government funds). The money that flowed in appears to have settled in its new habitat. For the PMs that run government funds and for asset managers that collect revenues from fees from government funds an era of "feast" has begun – assets under management by government funds are now at an all-time record \$2.2 trillion.

Going one level deeper, we can track these money flows on a sector by sector and instrument by instrument basis since April, 2016, when the outflows started (see Figure 2).

Unsecured funding markets got hit the most, where prime funds are lending \$600 billion less than a year ago. Foreign banks suffered \$450 billion of this loss and U.S. banks only \$40 billion (see Figure 3).¹ Primary dealers lost \$100 billion in secured (repo) funding.² The Federal Home Loan Bank system (FHLBs) and U.S. Treasury lost \$35 billion each. Funding to municipalities and supranationals accounts for the rest of the \$800 billion loss.

On the flipside, the \$800 billion that was absorbed by government funds was re-deployed more or less equally between the FHLB system, the repo market and the U.S. Treasury.

The FHLB system absorbed about \$250 billion of inflows. After accounting for the roughly \$35 billion of agency discount notes sold by prime funds, money fund reform netted a significant, just over \$200 billion in additional funding for the FHLB system. The FHLBs passed most of this new funding on to U.S. money center banks through advances.

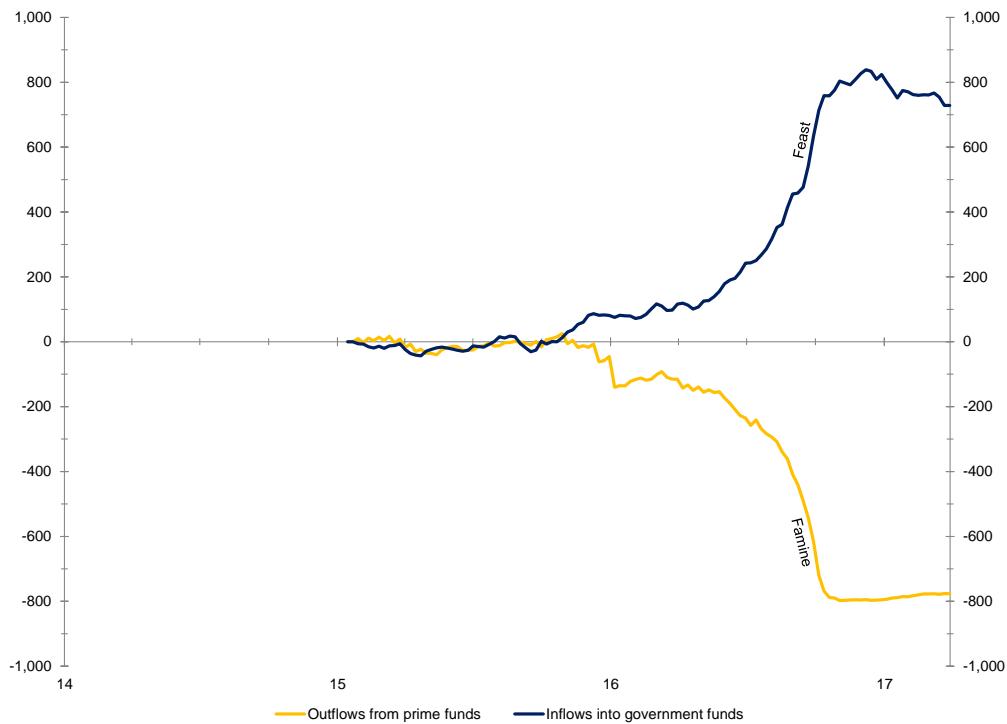
The U.S. Treasury also absorbed about \$250 billion of inflows. After accounting for the \$35 billion of U.S. Treasury bills sold by prime funds, money fund reform delivered just

¹ In calculating the amount of on-balance sheet funding lost by banks we include time deposits, certificates of deposits (CD) and financial commercial paper (CP). We exclude asset-backed commercial paper (ABCP) which is an off-balance sheet form of funding. The rest of the funding loss (\$110 billion) fell on ABCP issuers and non-financial corporate issuers of commercial paper.

² Of this \$100 billion, \$70 billion was backed by government collateral and \$30 billion was backed by non-government collateral.

Figure 1: Feast and Famine

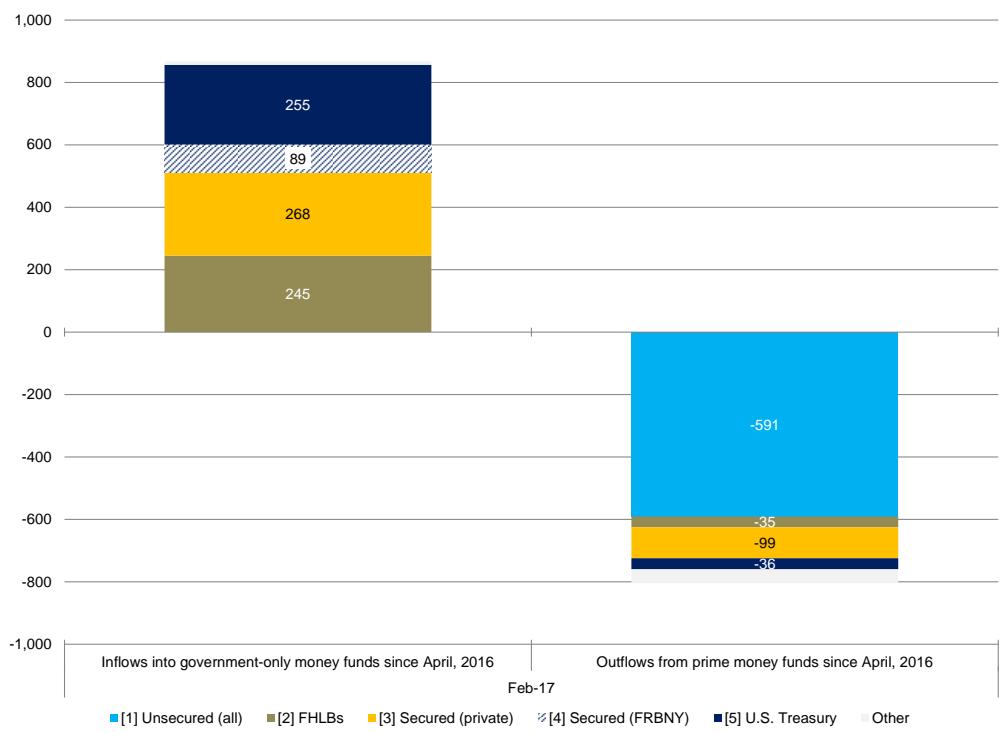
\$ billion



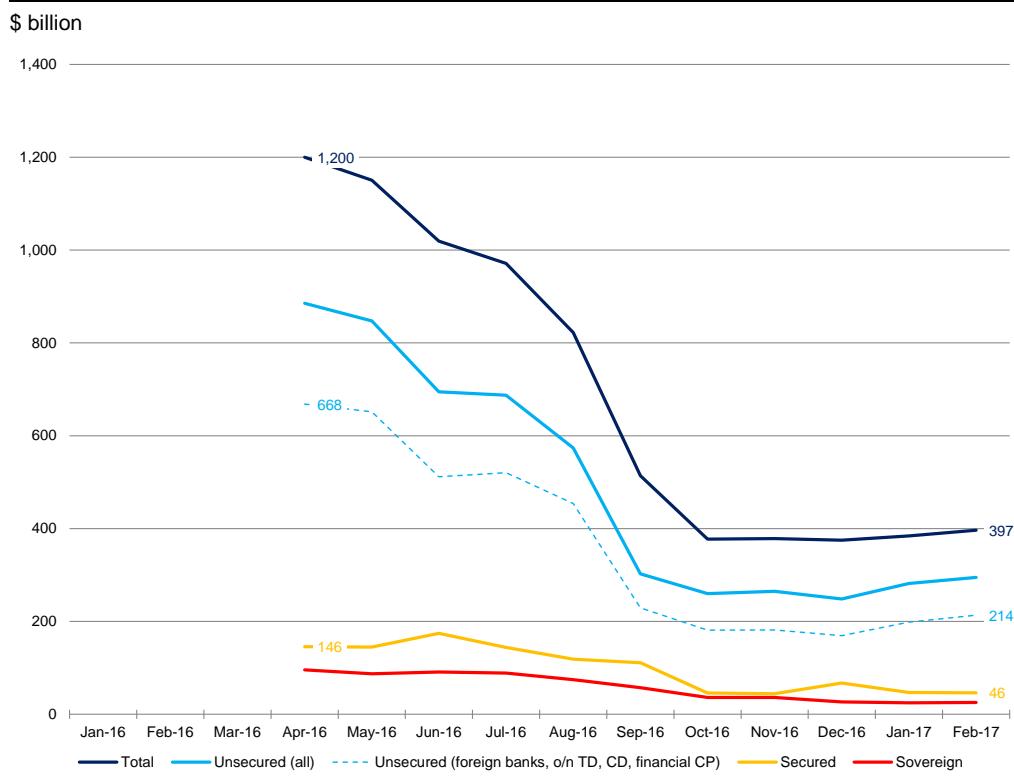
Source: ICI, Credit Suisse

Figure 2: Swaps of IOUs

\$ billion



Source: ICI, Credit Suisse

Figure 3: Prime Fund Assets

Source: ICI, Credit Suisse

over \$200 billion in net new demand for bills from government funds. Roughly one fifth of this demand was accommodated by the corporate treasury department of Microsoft Corp., which sold \$40 billion of bills and replaced them with longer-dated notes (see Figure 4).³

The repo market absorbed the remaining \$350 billion of inflows. FRBNY's o/n RRP facility absorbed about \$100 billion, all of which represents net new demand as prime funds were never big investors in o/n RRPs. Primary dealers absorbed most of the remaining \$250 billion of inflows.⁴ After accounting for the \$70 billion of government repos that prime funds traded out of as outflows mounted, money fund reform delivered just under \$200 billion in net new demand for government repos and hence financing for rates trading in general.

Putting the pieces together, of the \$500 billion in unsecured bank funding that was lost due to money fund reform, \$400 billion was intermediated back into the global funding market, but through a different set of intermediaries than before – U.S. money center banks (via the FHLBs) and primary dealers, as opposed to the New York branches of foreign banks.

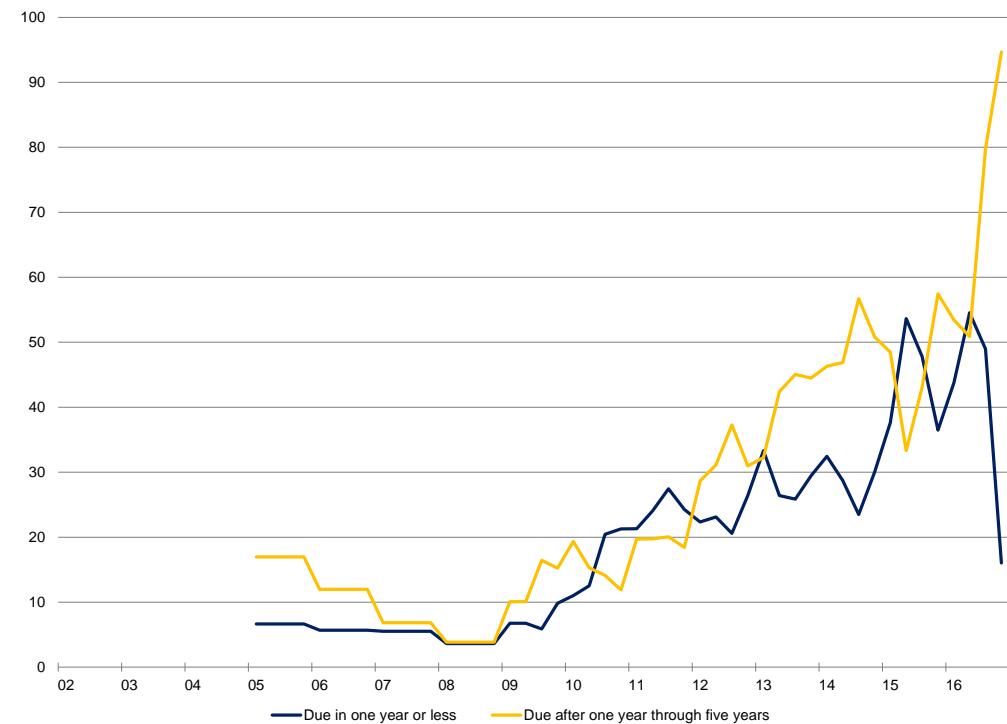
The individual “circumstances” of the new set of balance sheets that dominate the marginal price setting process in money markets are important to appreciate, because in a post-Basel III financial order, capital requirements, reporting rules, funding options and money market lending preferences baked into various balance sheets have an outsized impact on how money markets trade. And these “circumstances” are different for large U.S. banks and primary dealers than they are for the New York branches of foreign banks.

³ Microsoft is different from all other cash-rich corporations in that its cash balances are invested near-exclusively in U.S. Treasury securities as opposed to corporate bonds.

⁴ “Most” and not “all” because some of the increase in government funds’ repo lending went to foreign bank branches, not primary dealers. Furthermore, a small share went to the buyside directly (notably Prudential, Annaly and Harvard’s endowment).

Figure 4: Windows and Treasuries

Microsoft's portfolio of U.S. Treasury securities, \$ billion



Source: Microsoft Corporation, Credit Suisse

In the following sections, we explore each of these differences in detail. Figure 5 (overleaf) is the centerpiece of our analysis and anchors our discussion for the remainder of this issue of Global Money Notes. It is a detailed map of the chains of money market trades that prime funds used to fund, and the chains of trades that replaced them post-reform.

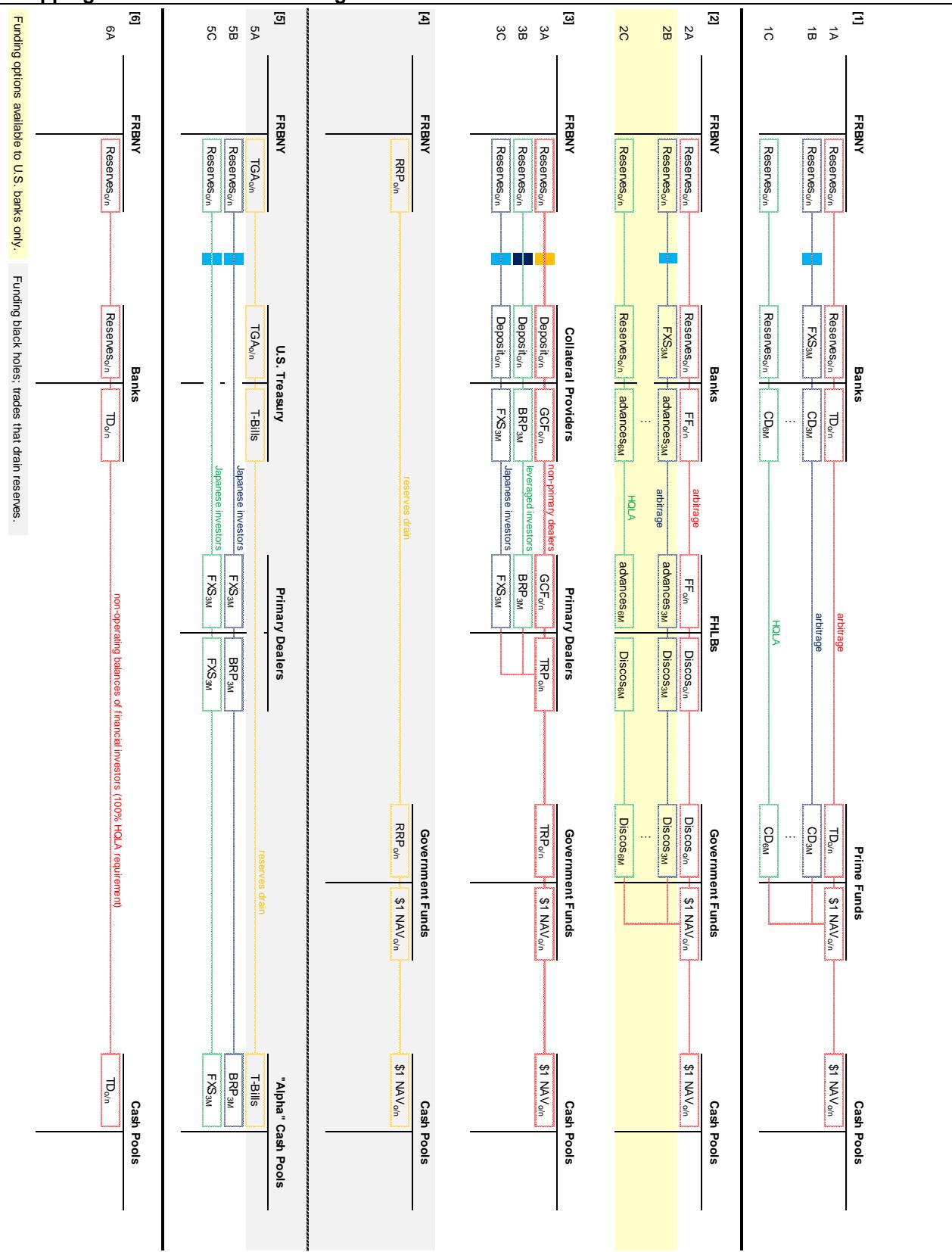
Of all funding markets, these changes affected prices in the FX swap market the most. We will pay special attention to this market and how its dynamics are affected by developments in other funding markets and the quantity of reserves in the financial system.

Part 2 – Prime Funds to Foreign Banks

Chain 1 shows how cash taken in o/n by prime funds is lent out either o/n or term. Overnight funds are typically lent to foreign bank branches through the Eurodollar market (via o/n time deposits), which foreign banks park at the Fed to earn interest on reserves (IOER; see Chain 1A). U.S. banks typically do not participate in these arbitrage trades because they are subject to daily average balance sheet reporting and so need at least a 60 bps spread to consider expanding their balance sheet on any given day.⁵ Currently, IOER arbitrage trades net about 9 bps. In contrast, foreign banks report balance sheet only on month-ends, and so have a lower threshold to expand balance sheet intra-quarter.

Term funds up to three-months are typically lent to foreign banks as well (mostly via CDs), which foreign banks use to arbitrage rates in the FX swap market (see Chain 1B). The ultimate borrower of dollars in such transactions is typically a foreign real money account from Japan or Europe without access to other funding markets. The very moment the real

⁵ We arrive at 60 bps by using the following parameters: a 10% return on equity target and a 6% leverage ratio.

Figure 5: Mapping the Global Dollar Funding Market

Source: Credit Suisse

money account receives the dollars via FX swaps, those will be in a deposit in its name at a clearing bank (J.P. Morgan Chase Bank, NA or The Bank of New York Mellon), and the clearing bank will keep every penny of that deposit in reserves at the Fed (not shown).⁶ Whether the real money account spends its deposit on U.S. Treasuries, MBS or credit is beyond the scope of this analysis, but when the dollars are spent, reserve balances will continue to travel from the clearing bank of the foreign real money account to the clearing bank of the entity that sold it some financial asset. This other clearing bank will be FRBNY in case the real money account purchased U.S. Treasuries directly from the U.S. Treasury at auction, or J.P. Morgan or BoNY if the securities were purchased from other market participants. Like in the previous example, U.S. banks typically do not participate in these arbitrage trades due to their daily balance sheet constraints. If they do participate, it is typically when cross-currency bases get wide enough (60 bps) to justify expanding their balance sheet.⁷ These opportunities typically arise around quarter-ends or during periods when foreign banks are unable to raise dollars from prime funds cheaply and on scale.

Term funds beyond three-months are lent to both foreign and U.S. banks, which banks use to fund HQLA portfolios. A large portion of these portfolios are held in reserves at the Fed (see Chain 1C). For reserves held at the Fed to count as HQLA, they must be funded on terms longer than 30 days. Anything shorter and reserves are parts of arbitrage trades.

Money market fund reform hit the funding of arbitrage trades the most (see Figure 6). The New York branches of foreign banks lost access to \$200 billion in o/n Eurodollar funding and issue that much less in o/n time deposits to fund IOER arbitrage trades. One and three-month funding (mostly CDs) declined by \$100 billion and \$150 billion, respectively. Finally, the availability of funding at longer tenors (typically six-months) declined by about \$60 billion. A breakdown between how much of these losses hit foreign versus U.S. banks is not available, but anecdotally the loss of o/n to three-month funding hit mostly foreign banks, and the loss of longer-dated funding hit mostly U.S. banks (\$40 out of \$60 billion).

Getting a clear sense of the amount of funding lost at each point along the benchmark unsecured funding curve (the U.S. dollar Libor curve) is important because it gives us a sense of the current depth of funding markets – that is the ability of changes in volumes to affect rates. Consider that the big moves we have seen in the three and six-month Libor fixings during the run up to the money fund reform deadline were on the back of losing a “mere” \$150 and \$60 billion of funding at each funding point, respectively. These are important pieces of information to keep in mind for analyses that will try to estimate the potential impact of U.S. corporate tax reform and the associated repatriation of corporate cash balances on U.S. dollar Libor fixings and global dollar funding markets in general.

We next look at the nationality of the New York bank branches that bore the brunt of the loss of unsecured funding between April, 2016 and February, 2017 (see Figure 7).

Scandinavian branches got hit the most, losing over \$100 billion in funding, most of which they used to fund o/n IOER arbitrage trades, and the rest to lend in the FX swap market. Appendix A1 shows the individual balance sheets of Swedish and Norwegian arbitrageurs where the declines are clearly visible. But the balance sheet data come with two caveats.

First, they are quarter-end snapshots as of June 30, 2016 and December 31, 2016, whereas the changes in funding volumes quoted above are on an intra-quarter basis.⁸ Because foreign bank balance sheets are significantly greater during the quarter than on quarter-ends, the decline in the size of balance sheets as reported in Appendix A1 (based on call reports) will always be smaller than the decline in intra-quarter volumes

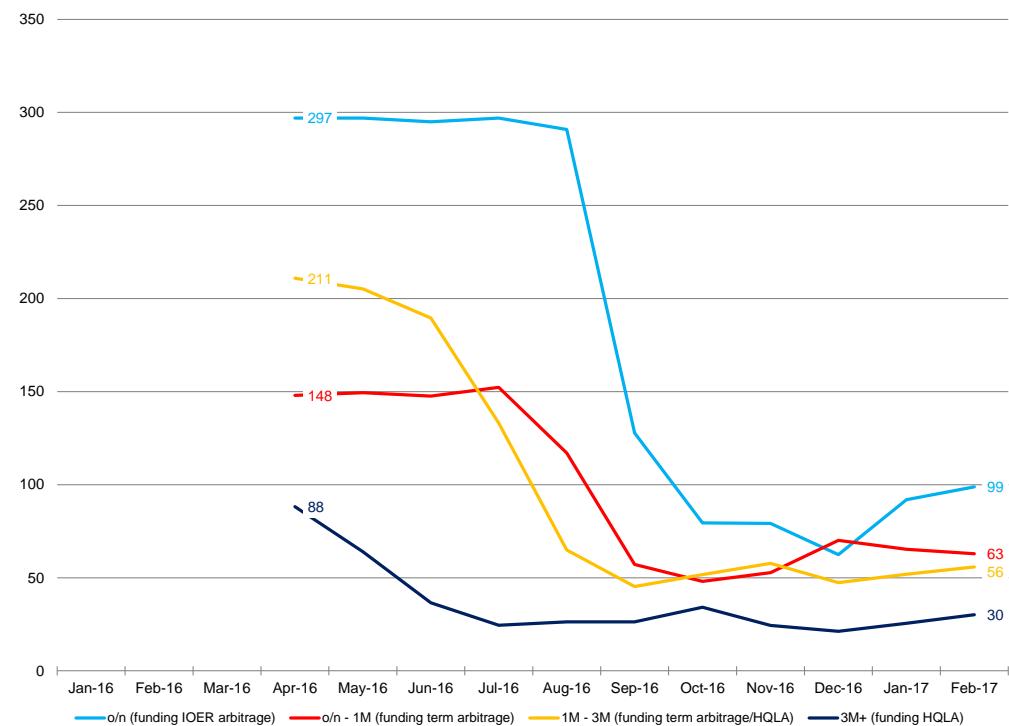
⁶ This is because the deposit in question is the non-operating deposit of a financial customer which has a 100% HQLA requirement under the liquidity coverage ratio (LCR) rules of Basel III.

⁷ In plain English, this means that U.S. banks tend to function as a lenders of “next-to-last-resort” to foreign banks and investors in the FX swap market. Colloquially, the last thing the system does before tapping FRBNY’s FX swap lines is tap J.P. Morgan...

⁸ The changes in volumes reported on previous pages were from April, 2016 to February, 2017, both intra-quarter months.

Figure 6: Less Funding for Arbitrage

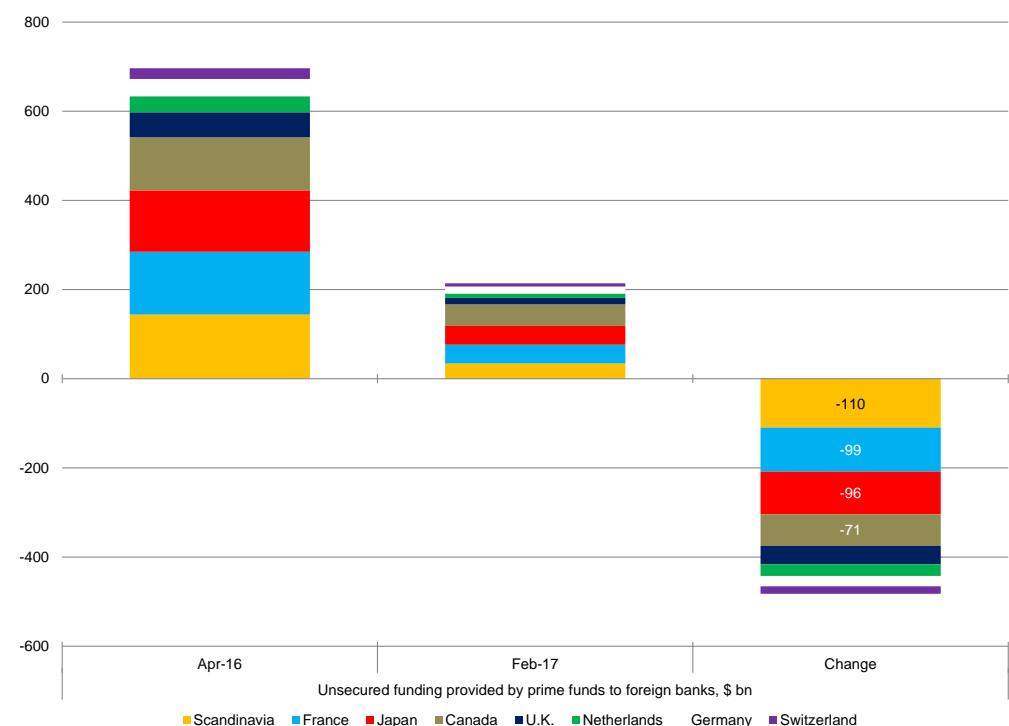
Loss of unsecured funding by tenor, \$ billion



Source: ICI, Credit Suisse

Figure 7: Loss of Unsecured Funding by Country

Loss of unsecured funding by country, \$ billion



Source: ICI, Credit Suisse

(based on money fund filings). In recent months, the intra-quarter versus quarter-end discrepancy has been at least \$150 billion mostly due to o/n arbitrage trades (see [here](#)).

Second, quarter-end balance sheet snapshots are not a reliable indicator of foreign banks' intra-quarter activity in the FX swap market. This is because quarter-end FX swap trades are HQLA swaps (reserves at the Fed for reserves at other central banks or foreign bills) that typically do not expand banks' balance sheets. But intra-quarter arbitrage trades do.

These two caveats will apply to all other balance sheets discussed below.

French branches lost \$100 billion in unsecured funding. Most of this was used to fund lending in the FX swap market (affecting the EUR and JPY cross-currency bases), and the rest to fund HQLA portfolios associated with French banks' broker-dealer operations in New York. Appendix A2 shows the individual balance sheets of French bank branches.

Japanese branches lost about \$100 billion in funding as well, but unlike other banks, they used most of these funds to lend in the real economy. Japanese branches managed to replace the funding they lost as they didn't shrink their balance sheets (see Appendix A3).

Canadian branches lost about \$70 billion in funding. Most of this was used to fund lending in the FX swap market (affecting the CAD cross-currency basis), and the rest to fund the HQLA portfolios of Canadian banks' dealer operations in New York (see Appendix A4).

The remaining roughly \$100 billion in funding was lost by U.K., Dutch, German, Swiss and Singaporean branches. U.K. branches lost \$40 billion and the rest about \$15 billion each, most of which went to the FX swap market (for selected balance sheets see Appendix A5).

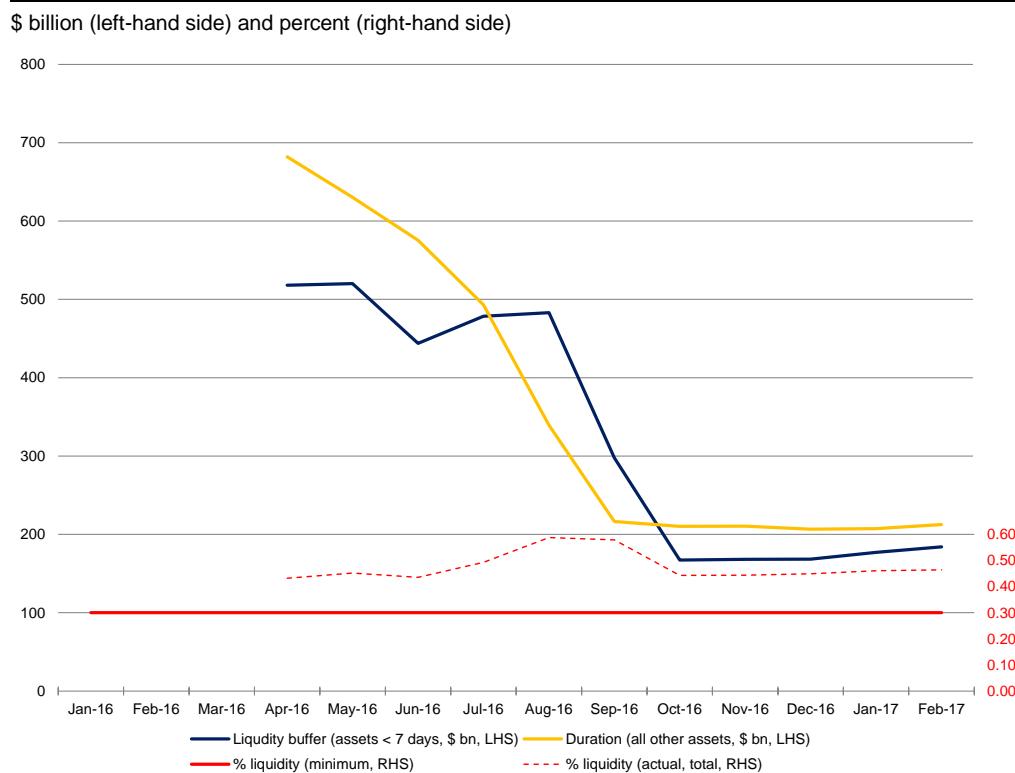
Of the \$400 billion that is left with prime funds today, about one half is allocated to assets with less than seven days to maturity, and forms prime funds' liquidity portfolios. The other half is in term assets, and forms prime funds' term portfolios. Meaningful reallocations from the liquidity to the term portfolios are unlikely as the regulatory minimum for liquidity is 30% of total assets, and prime funds converged around their current liquidity allocation of just under 50% as the industry benchmark (see Figure 8). That is, unless prime funds attract inflows, foreign bank branches have lost \$250 billion in term unsecured funding, some of which has translated into a loss of their share of the FX swap market.⁹ "Some" and not "all" as some of the unsecured funding that foreign entities lost through branches were made up by tapping the tri-party repo market through their primary dealer arms (we will discuss the details of this funding switch and the net effects in Part 4 of our paper).

The fact that prime funds are unlikely to improve the depth of unsecured funding markets (by lending more into the one and three-month points by reducing their liquidity portfolios) doesn't bode well for the credibility of the three-month U.S. dollar Libor fixing. Beyond the \$150 billion decline in the market for three-month unsecured funds between foreign banks and money funds as described above, DTCC data suggests that there is barely any issuance at the three-month point in the CD and CP markets. In line with these trends, the fourth quarter volume [report](#) on Libor from ICE shows a 7.5 point decline in transaction versus model-based submissions from a year ago – today, only 30% of submissions for three-month U.S. dollar Libor are based on trades; the rest are model-driven (see Figure 9).

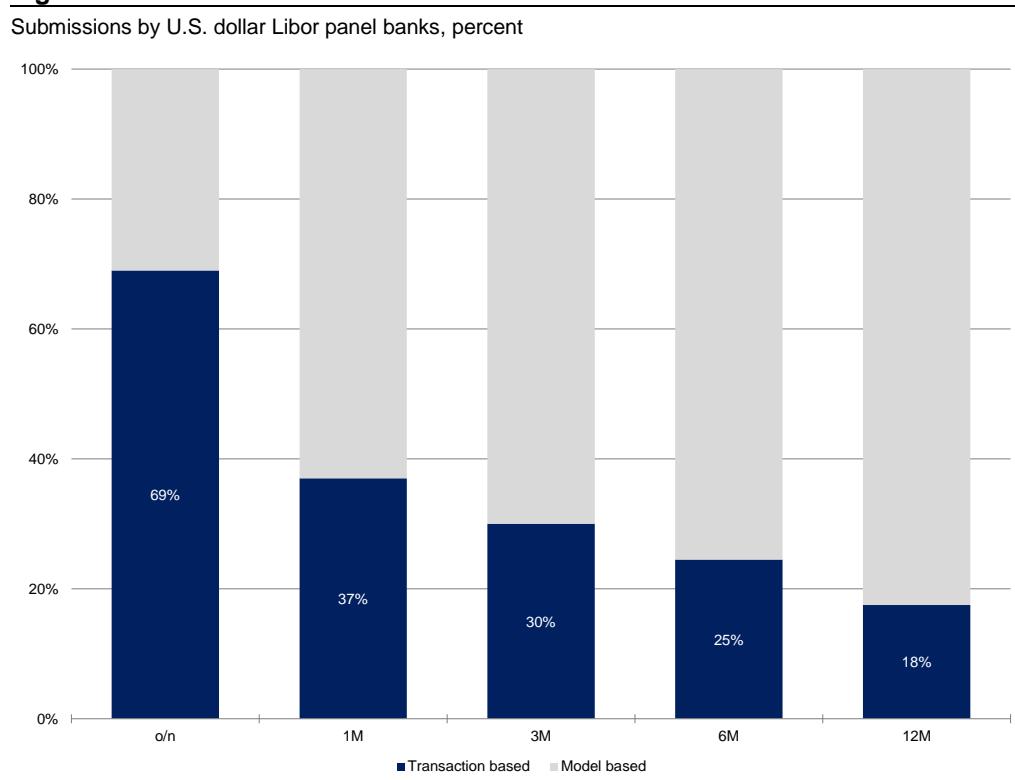
Three-month U.S. dollar Libor is slowly becoming an inactive funding point.

We'll return to this point in Part Six of our paper and discuss its implications for three-month Libor-OIS and cross-currency bases in light of developments in other funding markets.

⁹ We derive \$250 billion as the sum of \$100 and \$150 in one and three-month funding lost due to money fund reform (see above). We don't count the \$60 billion in six-month funding lost as a loss for foreign banks as those funds were lent mostly to U.S. banks.

Figure 8: Don't Expect a Miracle from WAM Extensions

Source: ICI, Credit Suisse

Figure 9: Science Fiction

Source: ICE, Credit Suisse

Part 3 – Government Funds to U.S. Banks

Chain 2 shows how government funds lend cash either o/n or term to the FHLBs via agency discount notes and floating rate securities, and how the FHLBs pass these funds on to foreign banks via o/n fed funds trades and to U.S. money center banks via advances.

Overnight funds are lent via the purchase of o/n discount notes which the FHLBs use to lend o/n in the fed funds (FF) market. Such o/n FF trades form an integral part of FHLBs' liquidity portfolios, similar to the way o/n reserve balances form an integral part of U.S. and foreign banks' HQLA portfolios.¹⁰ The other side of these trades are a dozen or so foreign banks that are highly rated enough for the FHLBs to be able to lend to them on an unsecured basis (o/n FF trades are unsecured). Foreign banks typically deposit these funds at the Fed earning interest on reserves (see Chain 2A). In essence, these types of arbitrage trades are the same as the ones described in Chain 1A, except that the latter involves a longer list of counterparties. This is because prime funds' risk tolerance is greater than those of the FHLBs. Access to o/n FF market is limited only to the highest rated banks in the global financial system and that list includes banks from Canada, the Netherlands, Australia, France, Finland, Germany, Norway and Sweden (see Figure 10).¹¹ Similar to o/n Eurodollar trades, U.S. banks are notably absent from the o/n FF market.

Term funds are lent via the purchase of term discount notes which the FHLBs use to fund advances to member banks which are exclusively U.S. banks, but not foreign banks. From the perspective of one's ability to raise three-month funding in order to fund three-month lending in the FX swap market cheaply, U.S. banks have a very clear advantage over foreign banks. All U.S. money center banks are member banks of the FHLB system and so for example J.P. Morgan Chase Bank, NA of Columbus, OH can tap FHLB Cincinnati to raise cheap dollars to lend them via FX swaps to pension funds in Tokyo (see Chain 2B).

Figure 10: Leaning on the Rest of the World to Set the Fed Funds Rate

Ratings of unsecured investment credit exposure by domicile of counterparty, \$ million, December 31, 2016

Carrying Value(2)	Investment Grade				
	Double-A	Single-A	Triple-B	Unrated	Total
Domestic	\$ 680	\$ 6,063	\$ 3,106	\$ 130	\$ 9,979
U.S. subsidiaries of foreign commercial banks	—	297	—	—	297
Total domestic and U.S. subsidiaries of foreign commercial banks	680	6,360	3,106	130	10,276
U.S. branches and agency offices of foreign commercial banks					
Canada	1,913	8,460	—	—	10,373
Netherlands	—	6,579	—	—	6,579
Australia	5,948	—	—	—	5,948
France	—	5,319	—	—	5,319
Finland	4,695	—	—	—	4,695
Germany	500	3,223	—	—	3,723
Norway	—	3,575	—	—	3,575
Japan	—	2,322	—	—	2,322
Sweden	500	1,250	—	—	1,750
Total U.S. branches and agency offices of foreign commercial banks	13,556	30,728	—	—	44,284
Total unsecured investment credit exposure	\$ 14,236	\$ 37,088	\$ 3,106	\$ 130	\$ 54,560

Source: Office of Finance

¹⁰ In fact, these o/n fed funds trades are the only place where the FHLBs can park their cash while meeting two crucial requirements: (1) earning a non-zero rate of interest and (2) getting their cash back early. Although the FHLBs have reserve accounts at the Fed which provide near 24-hour access to cash, those accounts pay zero interest. The FHLBs also have access to o/n RRP which pay interest, but give cash back only at 3:30 PM. Foreign banks have a captive audience in the FHLBs!

¹¹ Canadian banks include National Bank of Canada, Bank of Nova Scotia, Royal Bank of Canada and the Bank of Montreal. Dutch banks include Rabobank. Australian banks include National Australia Bank, Australia and New Zealand Bank, Westpac and Commonwealth Bank of Australia. French banks include BNP Paribas. Finnish banks include Nordea. German banks include DZ Bank, Bayerische Landesbank and Landesbank Baden-Württemberg. Norwegian banks include DNB Bank. Swedish banks include Svenska Handelsbanken, Skandinaviska Enskilda Banken (SEB) and Swedbank. Eighteen foreign banks in total.

Yet another advantage of U.S. banks over foreign banks is the ability of the former to tap six-month advances to fund HQLA portfolios (see Chain 2C). If a U.S. bank can issue fewer six-month CDs due to prime funds' diminished presence in the CD market, it did not necessarily lose that funding if the FHLBs are lending more via advances on the back of government funds' increased purchases of agency discount notes and floaters. But if foreign banks can issue fewer six-month CDs, their next port of call is the "outer rim" of funding markets – either the FX swap market or the debt capital market (see [here](#)).

Thus, while the FHLBs trade exclusively with foreign banks through their liquidity portfolio, they trade exclusively with U.S. banks through their loan portfolio (see Figure 11).

Of the \$200 billion in net new funding absorbed by the FHLBs due to money fund reform, about \$40 billion was absorbed by the FHLBs issuing more o/n discount notes. These fund o/n FF loans to highly-rated foreign banks and so indirectly IOER arbitrage trades. The increase in o/n lending by the FHLBs is visible in the increase in traded o/n FF volumes from \$60 billion before money fund reform to around \$90 billion today (see Figure 12).

The remaining \$140 billion in net new funding was directed at funding an expansion in lending to U.S. banks via advances. \$40 billion of this went to funding HQLA portfolios (offsetting the loss of term funding from prime funds) and the rest (likely) to fund U.S. banks lending dollars in the FX swap market, grabbing market share from foreign banks.

Part 4 – Government Funds to Primary Dealers

Chain 3 shows how government funds lend cash to primary dealers via tri-party repos. Nearly all the funds lent by government funds to primary dealers via repos are overnight.

Primary dealers lend these o/n balances either o/n or term in the GCF repo market to other primary dealers or in the bilateral repo market to customers (see Chains 3A and 3B). Similar to Chains 1B and 2B above, the very moment other dealers and customers raise funds via repo, those funds will be deposited in their name at a clearing bank and the clearing bank will keep those deposits in reserves at the Fed (not shown). When the deposits are spent, the reserve balances will travel from one clearing bank to another.

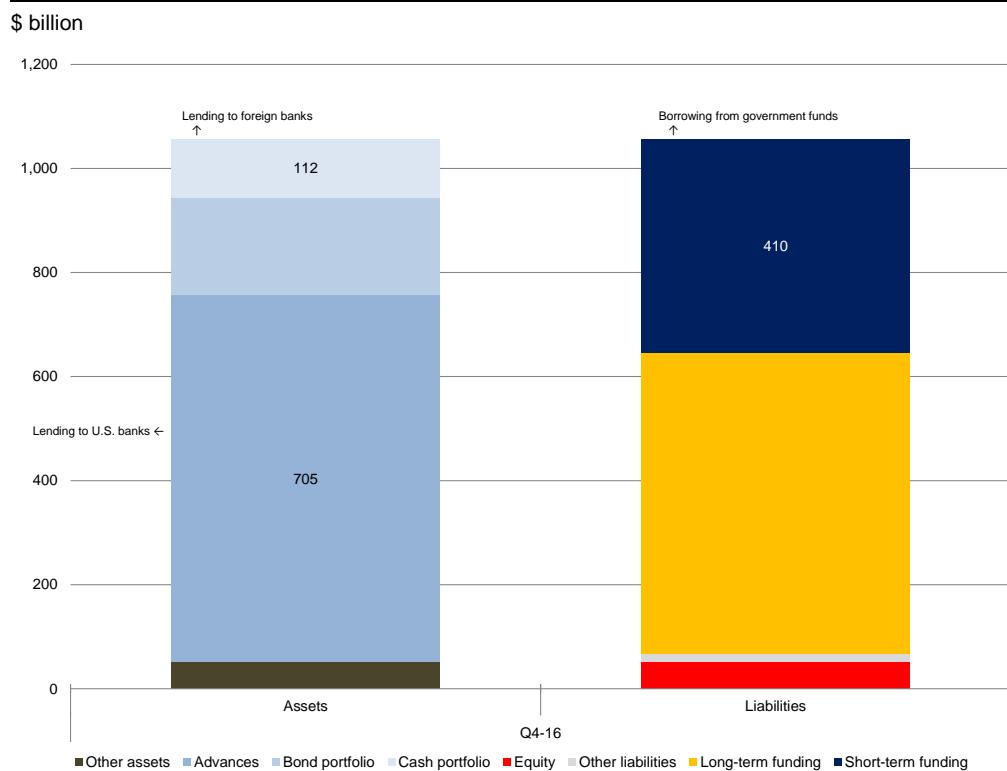
Primary dealers can also use the funds raised via o/n repos to lend in the FX swap market (see Chain 3C). Like before, how the funds lent into the FX swap market are spent by foreign real money accounts is beyond the scope of this analysis. The key lesson is that arbitraging the difference between onshore and offshore dollar funding rates can be funded in both unsecured and secured markets. Foreign banks fund unsecured and primary dealers secured. Prime funds fund the former and government funds the latter.

We next look at the nationality of primary dealers that absorbed most of the new repo funding between April, 2016 and February, 2017 (see Figure 13 and Appendix A6).

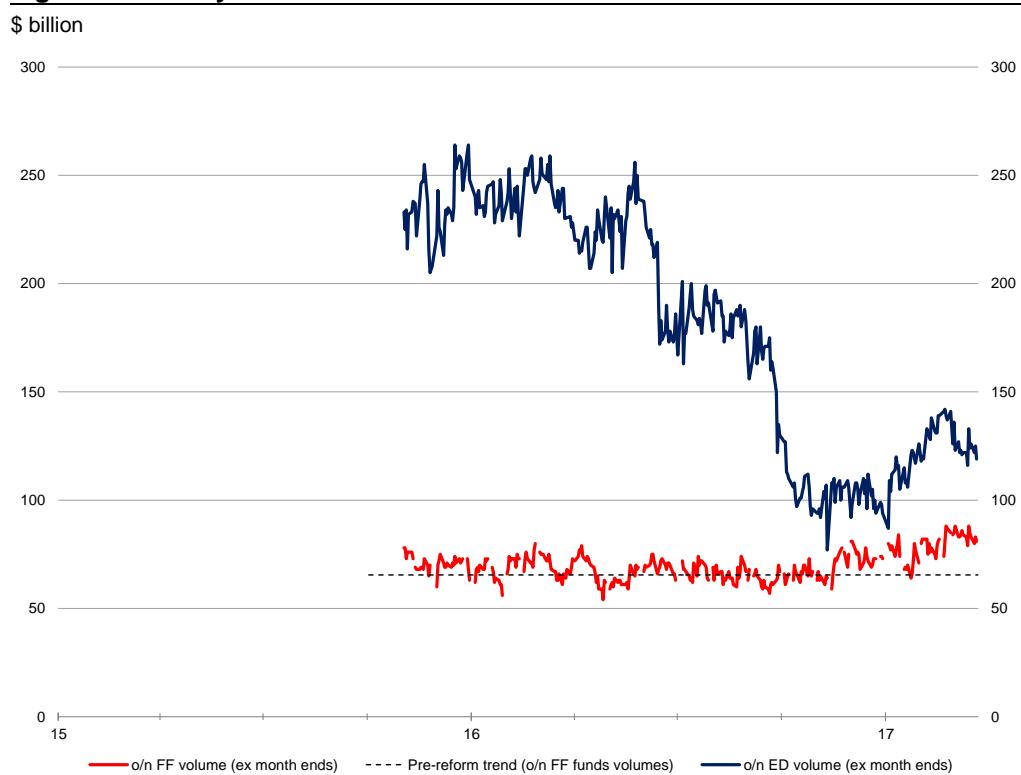
Scandinavian banks absorbed nothing as they do not run dealer operations in the U.S., and their branches did not substitute unsecured funding with secured funding. They didn't, as the assets they funded (reserves) cannot be pledged as collateral. This is because repos involve the trading of securities for cash, and as the highest form of cash in the global financial system, reserves cannot be traded for anything better in money markets.

French entities absorbed \$60 billion. Roughly \$40 billion of this net new repo funding was absorbed by one entity, the primary dealer arm of BNP Paribas; the New York branches of French banks absorbed the rest. After accounting for the loss of about \$100 billion in unsecured funding, reform meant the net loss of \$40 billion of funding for French entities.

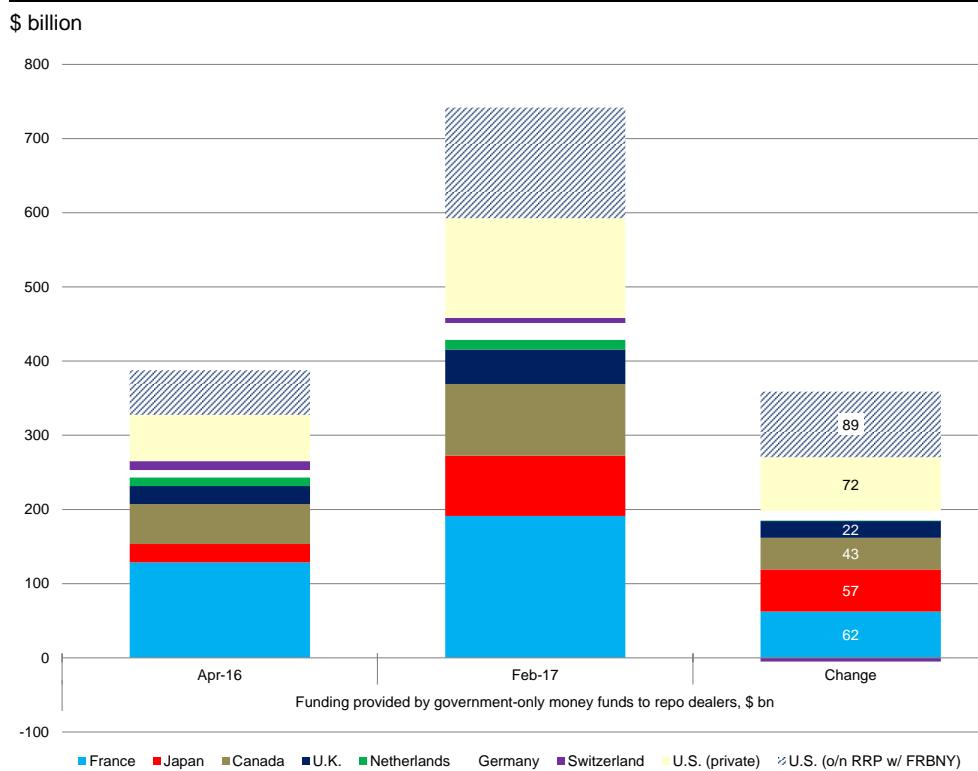
Japanese entities absorbed another \$60 billion. New York branches of Japanese banks accounted for about a half of this increase, which was a direct response to the loss of unsecured funding (see Appendix A3). That Japanese banks could tap the repo market on

Figure 11: The FHLBs Are a Key Cog of Global Dollar Funding Markets

Source: Office of Finance, Credit Suisse

Figure 12: Money Fund Reform Boosts o/n Fed Funds Volumes

Source: FRBNY, Credit Suisse

Figure 13: Gains of Secured Funding by Country

Source: ICI, Credit Suisse

this scale without breaching their LCR was because one of the banks (Norinchukin) is not subject to Basel III and another (Sumitomo) had an LCR well above the minimum.¹² Japanese banks' primary dealer operations absorbed the rest. After accounting for the loss of \$100 billion in unsecured funding, reform meant the net loss of about \$40 billion in funding for Japanese entities onshore in the U.S. But given that Japanese banks did not shrink their dollar books globally (see the [speech](#) by Deputy Governor Nakaso), they must have replaced this loss with funding raised outside New York (see [this](#) piece by the BIS).

Canadian entities absorbed about \$40 billion. The New York primary dealer arm of the Royal Bank of Canada absorbed about \$10 billion, and the Chicago branch of BMO about \$20 billion. Bank of Nova Scotia's New York agency appears not to have pursued recent inflows to the repo market. After accounting for the \$70 billion in unsecured funding lost, reform meant the net loss of \$30 billion in funding for Canadian entities in the U.S.

U.K. primary dealers absorbed \$20 billion. The New York primary dealer arms of Barclays and HSBC absorbed the bulk of this and the New York primary dealer arm of RBS the rest. After accounting for the \$40 billion in unsecured funding lost, money fund reform meant the net loss of about \$20 billion in funding raised by U.K. entities onshore in the U.S.

Swiss primary dealers absorbed nothing, they lost market share over the period.

U.S. primary dealers absorbed about \$70 billion in new repo funding. The bulk was absorbed by J.P. Morgan Securities, Bank of America Merrill Lynch and Morgan Stanley, and \$10 billion was absorbed by Goldman, Sachs & Co. and Citigroup Global Markets.

¹² In other words, they had room for their LCR to fall as they pledged U.S. Treasuries from their HQLA portfolio in the repo market.

After accounting for the loss of about \$40 billion in unsecured funding and the gain of about \$140 billion in net new funding via advances from the FHLBs (see above), money fund reform netted \$170 billion in net new funding for U.S. banks and primary dealers. We mapped \$130 billion of this gain to the loss of French, Japanese, Canadian and U.K. banks above, and the remaining \$40 billion can be traced to German and Dutch banks.

Figure 14 provides a big picture summary of the flows we've discussed so far. Going from left to right, foreign bank branches have lost around \$400 of unsecured funding due to money fund reform, on net. Some of their losses due to outflows from prime money funds were moderated by increased lending of o/n fed funds (FF) by the FHLB system.

Money fund reform netted \$200 billion in new repo funding for foreign primary dealers. This increase reduced by half the net loss of unsecured funding by foreign bank branches.

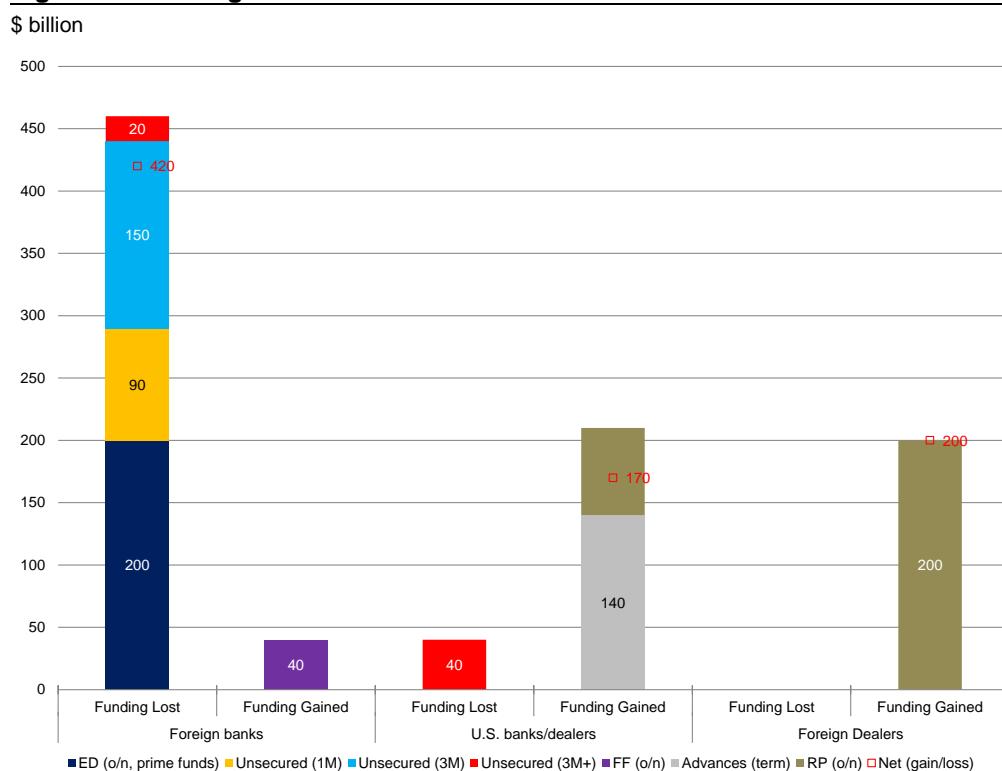
Money fund reform netted \$100 billion in new funding for U.S. banks and \$70 billion in new repo funding for U.S. primary dealers (middle columns), for a total gain of \$170 billion. This is the funding grab by U.S. intermediaries from foreign intermediaries we predicted [here](#).

In the grand scheme of things, money did not disappear from the system, it's just flowing through a different set of balance sheets. Money fund reform has changed where the marginal FX swap trades are being funded and where the marginal prices are being set...

Money fund reform-related flows all ran their course by early November.

All the interesting price action (the narrowing of Libor-OIS spreads and the collapse of cross-currency bases) that happened in funding markets since then had little to do with reform as a catalyst. Money fund reform set the stage. The debt ceiling was the show...

Figure 14: The Big Picture



Source: ICI, FRBNY, Credit Suisse

Part 5 – Funding Black Holes

Every funding chain discussed above had one unifying purpose: to arbitrage rates across various segments of the money market – secured and unsecured, onshore and offshore. The protagonists were money dealers – foreign banks' New York branches, the FHLBs, U.S. banks and primary dealers (both U.S. and foreign). Their market making activities give rise to the flow of reserves across hundreds of different reserve accounts on the balance sheet of FRBNY, and across thousands of customer deposits at clearing banks.

Drain some reserves and funding rates will respond...

Chain 4 shows a simple transaction that drains reserves from the banking system and hence money dealers. It shows governments fund putting cash in the Fed's RRP facility.

Government funds typically do this when they have nowhere else to put their money – government funds typically work the markets hard to get as many U.S. Treasury bills and discos as they can, and have a very strong aversion to using the o/n RRP facility on days other than quarter-ends. This is visible from the fact that when faced with the choice of lending to the Fed (via the o/n RRP facility) or to primary dealers (via o/n tri-party repos) at the same rate, they will choose dealers over the Fed as they've done since November.¹³

Just like light from a black hole, funds placed with the Fed via o/n RRPs never escape. They don't because the Fed is not a money dealer in normal times, only in crisis times. Unlike banks and dealers, which trade money on both sides of their balance sheet, the Fed just takes money in, but it does not lend it out on the other side of its balance sheet.

If reserves are drained, dollars are “off the grid” and funding conditions tighten...

Of the \$800 billion that flowed into government funds, only \$100 billion went into the o/n RRP facility. As such, the associated tightening in funding conditions has been marginal.

But o/n RRPs are not the only way to drain reserves from the system. For example, reserves are also drained when foreign official and supranational accounts place cash with FRBNY via the foreign RRP facility, or when the U.S. Treasury increases its cash balances at its Treasury General Account (TGA) at FRBNY. Balances in the foreign RRP facility have been stable at around \$250 billion since the beginning of 2016, but TGA balances have seen a \$400 billion swing recently, with a big impact on funding conditions.

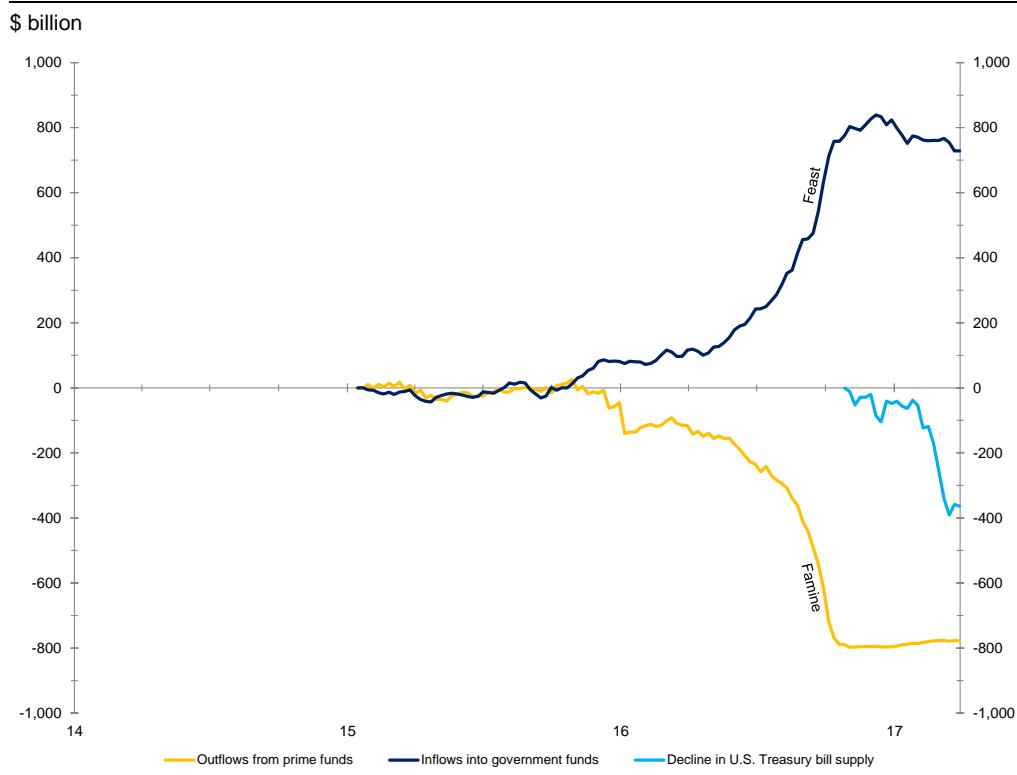
Balances in the TGA are an asset of the U.S. Treasury and every asset needs funding. Given that the TGA earns zero interest, Treasury funds them with bills to minimize negative carry. Since November, the Treasury reduced its cash balances by \$400 billion and reduced bill issuance by the same amount. Both developments were related to the extraordinary measures taken by Treasury to avoid the debt ceiling. Importantly, government funds did not see a corresponding decline in their bill holdings (see Figure 15).

If government money funds did not give up bills, who did and where did the money go? That is the \$400 billion question hanging over the \$/¥ cross-currency basis. The answer:

...a bit to the bilateral repo market and a lot the FX swap market.

The bilateral repo market is a market between primary dealers and large asset managers and hedge funds. PIMCO for example is famous for refusing to lend cash on the tri-party

¹³ Money funds' aversion has to do with counterparty limits, stigma and an unwillingness to upset the relationship with their primary dealer customer base. Tri-party repo is a relationship business where the ability to get funding when needed and the ability to get collateral when needed are key pillars of the harmony between government funds and dealers. If government funds were to upset the dealers (for example, by abandoning them for the Fed when spreads are nonexistent), they may not get product from the dealers when the tides change. In contrast, the inter-dealer GCF repo market is a blind-brokered market where relationships do not exist (they don't because in a blind-brokered market you do not know who you are lending to). Because of this feature, the nature of trading in the GCF repo market is defined by an “extract a pound of flesh” mentality when opportunities arise. The rules of the game in the tri-party market are different – “relationships first”. Civil, as opposed to opportunistic. For richer, for poorer.

Figure 15: If Money Funds Did Not Give Up Bills, Who Did?

Source: ICI, FRBNY, Credit Suisse

platform. It lends exclusively on a bilateral basis. Similarly, the largest hedge funds lend their cash via bilateral repos as they don't have access to tri-party repos to begin with.

The benefits of bilateral trades over tri-party trades are their put option features: whereas tri-party repos return cash at 3:30 PM, bilateral repos are negotiated either with an 8:30 AM cash return or a put option which can be exercised at anytime during the business day. This put option mimics one's ability to trade bills for cash intra-day with "t+0" settlement.

Bills and bilateral repos are viewed as very close substitutes. As a general rule of thumb, when the supply of Treasury bills falls, the bilateral repo market absorbs cash, and when the supply of Treasury bills increases, the reverse is true. Substitution between the two is seamless not because the maturity of bilateral repos can be tailored to mimic those of bills, but also because both instruments provide intra-day liquidity without major restrictions.¹⁴

The market has a unique dynamic to it.

Its players are among the most sophisticated traders of money markets. Those who play in the bilateral repo market as cash investors never "farm out" their cash management function to money funds. In fact, many of them manage their cash in house because they do not want to be constrained by the rules imposed on money funds. It is helpful to think about these market participants as "alpha" cash pools that aim to beat the benchmark returns in money markets, in contrast to "regular" cash pools content with the benchmark returns offered by most money funds (the concept of "alpha" cash pools versus "regular" cash pools is analogous to the concept of the "alpha" male versus the average Joe).

For example, some of the excess returns to trading money markets could come from "alpha" cash pools hoarding U.S. Treasuries with a few months to maturity, in anticipation of a reduction in bill issuance due to the debt ceiling and government funds scrambling for

¹⁴ The same cannot be said about tri-party repos or FRBNY's o/n RRP facility, as they provide liquidity only after 3:30 PM.

bills in response. Selling into government funds' frenzied search for bills would yield profits, similar to the way Microsoft Corp.'s selling of U.S. Treasury bills into the flows from prime funds to government funds between June and November turned a profit. The only difference is that while Microsoft Corp. bought U.S. Treasury notes with the proceeds, "alpha" cash pools recycled the proceeds back into the money market via bilateral repos.

Anecdotally, the preferred lending habitat of "alpha" cash pools is three-months and in. Their options are bills, quasi bills (bilateral repos) or synthetic bills (lending via FX swaps). Chain 5 shows what happens when "alpha" cash pools switch between these instruments.

In the first example (see Chain 5A), "alpha" cash pools hold bills which fund TGA balances at the Fed. When these balances increase, reserves get drained from the financial system, similar to the way o/n RRP s drain reserves. Both places are "funding black holes".

Draining a lot of reserves through the TGA is a big deal because it takes reserves out of the financial system and away from the banks and primary dealers that arbitrage various corners of the global dollar funding market and intermediate dollars – or more precisely, reserves – from those who have them to those who need them. The cases to remember from earlier pages are Chain 1B where foreign banks were intermediating dollars raised from prime funds (via CDs) to real money accounts in regions with negative interest rates; Chain 2B where U.S. banks were intermediating dollars raised from government funds (via the FHLBs) to the same real money accounts; and Chain 3C where primary dealers were intermediating dollars from government funds (via repos) to similar types of accounts.

In the second example (see Chain 5B), bilateral repos substitute for U.S. Treasury bills. The "alpha" cash pools, instead of channeling billions of dollars into the black hole via bills, are lending to primary dealers instead via bilateral repos and reserves find their way back into the global financial system through chains similar to Chain 3C (and also 2B and 1B).

In the third example (see Chain 5C), "alpha" cash pools are lending of dollars directly in the FX swap market (via market maker's matched books; for details see the Appendix to the previous issue of Global Money Notes [here](#)). FX swaps substitute for repos. Instead of funding dealers harvesting cross-currency bases, "alphas" are harvesting the bases directly.

Whether "alpha" cash pools are in one instrument versus another depends on their preferred lending habitat, risk tolerance and market views. Some are only comfortable to toggle between bills and repos, and some also dabble in FX swaps. When bills are in short supply, "alphas" toggle between repos and FX swaps according to their tastes and views.

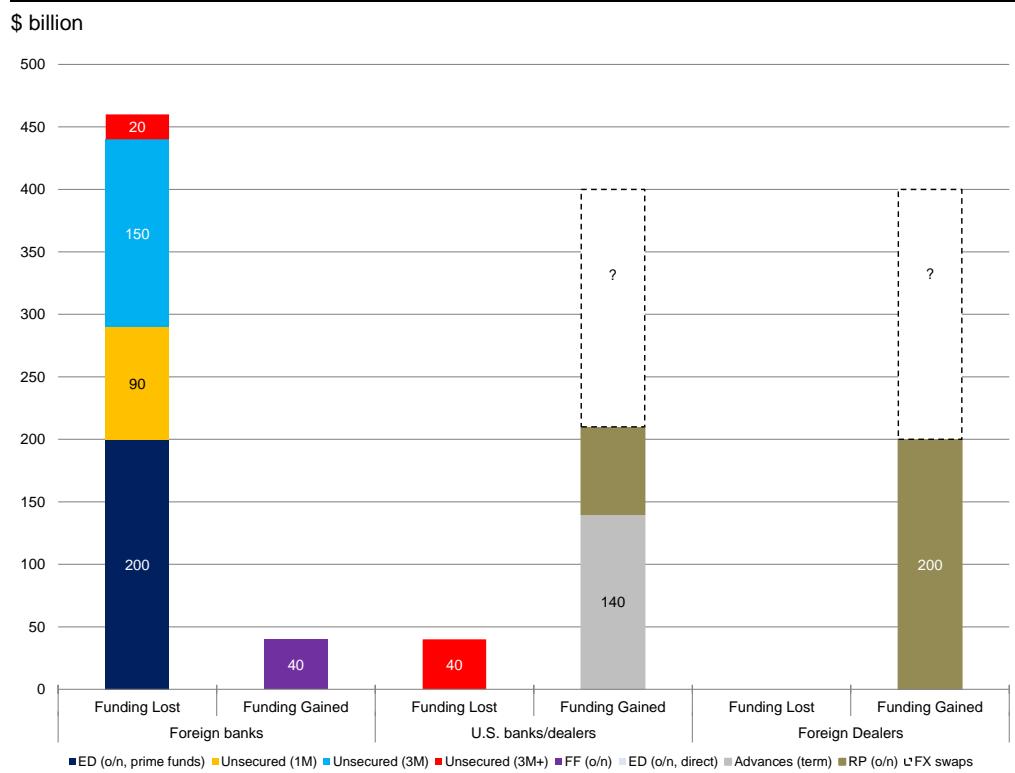
The size of the bilateral repo market is big.

According to FRBNY's FR2004 survey, the size of the entire repo market is circa \$2 trillion (U.S. Treasury and MBS collateral only). In comparison, the size of the tri-party repo market between dealers and government funds (U.S. Treasury and MBS collateral also) is only \$600 billion. Most of the difference between the two numbers accounts for the size of the bilateral repo market between dealers and large asset managers and hedge funds.¹⁵

Because public data on the size of the bilateral repo market does not exist, the best thing we can do is to use the FR2004 survey to infer the size and direction of change since November. It's up, but not by \$400 billion. And this means that most of the \$400 billion that left the bill market went into the FX swap market via matched books like in Chain 5C.

Figure 16 (overleaf) helps visualize the increase in the volume of funding raised via FX swaps as bill supply shrank by \$400 billion since November. The lesson here is that data on money funds' portfolio holdings only helps to track funding flows in the tri-party repo market, but not the bilateral repo market or the FX swap market (a currency repo market). And as it happens, the bilateral flows are more important to understand recent price action in money markets than tri-party flows. Adjust your radar to capture more of the landscape.

¹⁵ "Most" and not "all" as there are other cash lenders in the tri-party repo market other than money funds (seclenders, for example)

Figure 16: The Bigger Picture

Source: ICI, FRBNY, Credit Suisse

Figure 17 (overleaf) shows the total amount of reserves that have been drained from the system through various measures since December 10, 2014 – the peak date of reserves. Once we control for quarter-end dynamics, the total amount of reserves drained from the financial system peaked at just under \$800 billion last November. The main contributors to this drainage were J.P. Morgan pushing out \$200 billion in non-operating deposits in 2015 into the bill market with help from the U.S. Treasury, which increased its TGA balances by \$100 billion that year, and FRBNY, which uncapped the foreign RRP facility it maintains for foreign official accounts. Once in motion, these dynamics intensified during 2016, with the Treasury increasing TGA balances by an extra \$300 billion and foreign official accounts (mostly Japan's Ministry of Finance) putting \$250 billion into the foreign RRP facility.¹⁶

But the flows took a sharp turn in November, when Treasury started to burn through its TGA balances in order to avoid the debt ceiling. TGA balances collapsed by \$400 billion and the amount of reserves drained over the previous two years was quickly cut in half. Dollars that were formerly off the grid, found their way back into the financial system.

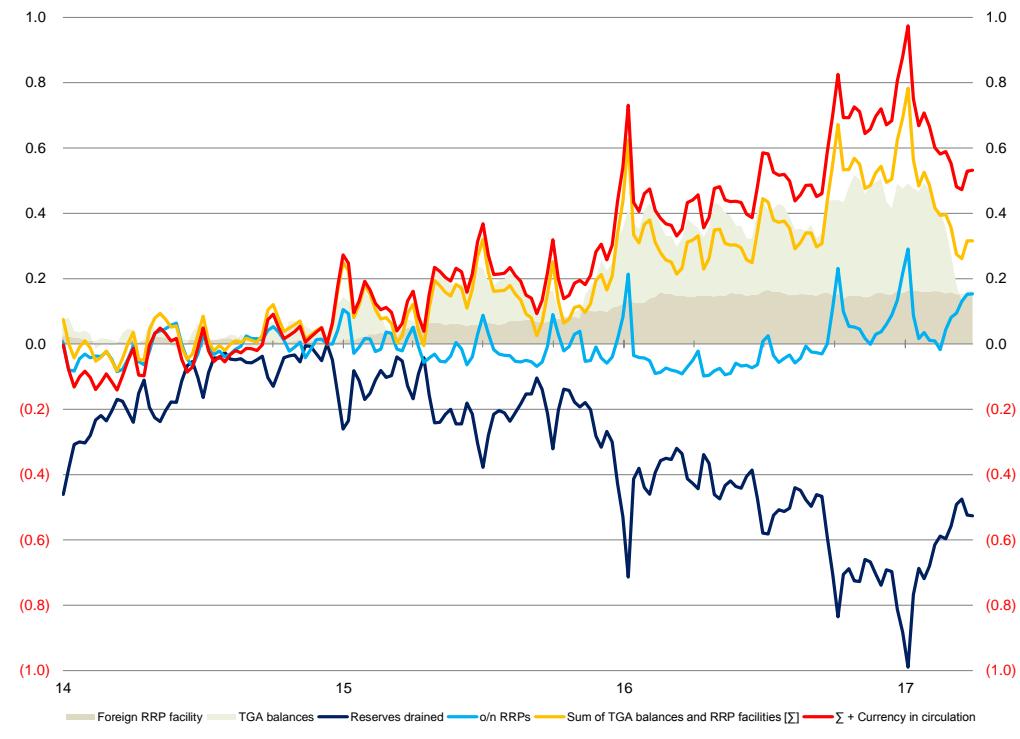
Famine, followed by plenty...

Figure 18 shows how the three-month \$/¥ cross-currency basis responded to these flows. As reserves were drained, its trading range went from -10 to -40 basis points (bps) in 2014, to -20 to -60 bps in 2015, and to -40 to -90 in 2016. With every \$400 billion drained, the trading range of the basis sank by about 40 bps. And when the flows turned and reserves became plentiful again, the basis duly collapsed by a whopping 60 bps since November.

¹⁶ In Figure 17, the red and dark blue lines are mirror images of each other. The orange line is the sum of the outstanding balances in the o/n RRP facility, the foreign repo facility and the TGA. The red line is the sum of the orange line and currency in circulation.

Figure 17: Reserves...

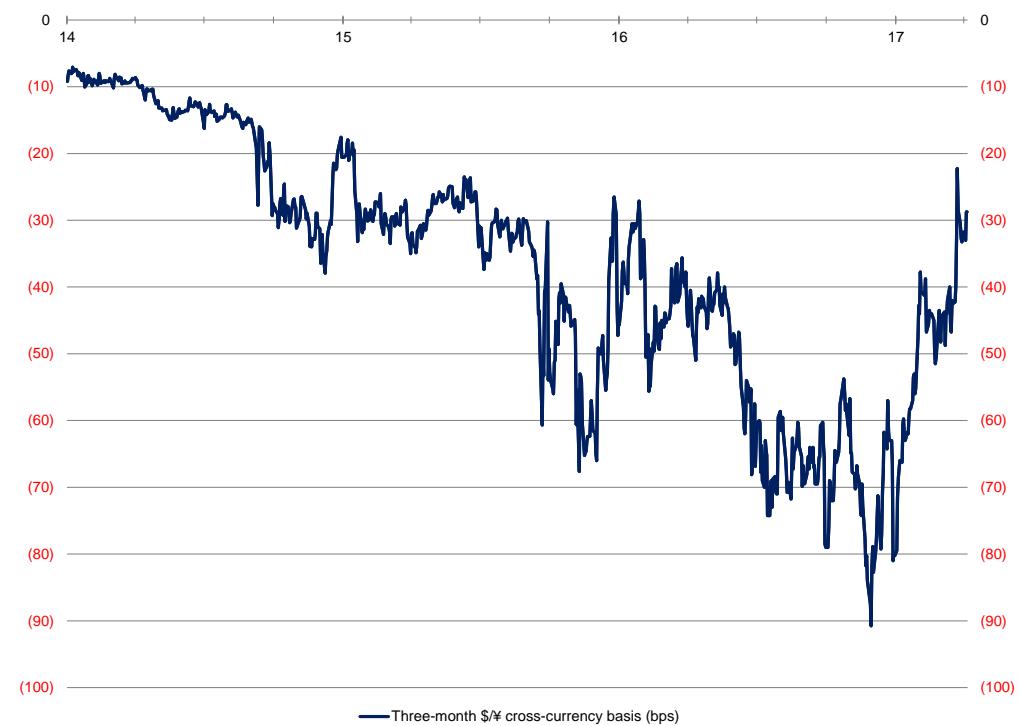
Base = 0, December 10, 2014, \$ trillion



Source: FRBNY, Credit Suisse

Figure 18: ...and the Cross-Currency Basis

Basis points



Source: ICI, FRBNY, Credit Suisse

Part 6 – Libor-OIS and the Cross-Currency Basis

The \$200 billion in extra repo funding absorbed by primary dealers since April, 2016 did not overwhelm o/n markets initially – primary dealers competed hard for the new funds until about November (see Figure 19). This is what the roughly 5 basis point spread of o/n tri-party repos over the Fed's o/n RRP rate tells us. On the other side of primary dealers' matched repo books, the inter-dealer o/n GCF repo rate was trading close to IOER also until about November. This was indicative of primary dealers having ample opportunities to lend cash – some of it to foreign banks who tried to balance the replacement of unsecured funding from prime funds with operating deposits or term debt (both of which take time).

In November, however, the repo market started to trade very differently. The spread between the o/n tri-party repo rate and the Fed's o/n RRP rate collapsed to nothing, as did the spread between the o/n GCF repo rate and the o/n tri-party repo rate. The former was indicative of primary dealers proactively trying to deflect o/n money coming to them (basically by refusing to pay more than the rate paid by the Fed's RRP facility), and the latter was indicative of dealers struggling to find opportunities to lend cash to other dealers and customers at attractive spreads. Two events explain these market dynamics.

First, the Treasury starting to burn through its TGA balances starting in early November and reduce its issuance of bills due to the debt ceiling (see previous section). As the supply of bills fell, “alpha” cash pools put some money into the market for bill equivalents – the bilateral repo market. This depressed o/n bilateral rates. In turn, o/n tri-party rates followed o/n bilateral rates which then compressed the o/n tri-party – o/n RRP spread.

Second, the election victory of Donald J. Trump in early November, causing an 80 bps selloff in the 10-year U.S. Treasury yield by mid-December. This mini-bear market in U.S. Treasuries lead to a reduction in dealers' U.S. Treasury inventories and reduced appetite among the buyside to put on financed long positions in U.S. Treasuries. Fewer bids for cash in exchange for U.S. Treasury collateral meant that primary dealers had fewer outlets for the funds that came in via o/n repos. And as cash got “trapped” in the inter-dealer market, the spread between the o/n tri-party and o/n GCF rates collapsed. By this time, foreign banks' bids for cash in the GCF and bilateral repo markets also faded completely.

Depressed o/n rates bled through to term repo rates as well, which in turn made term repo rates trade lower relative to term unsecured rates as measured by Libor (see Figure 20).

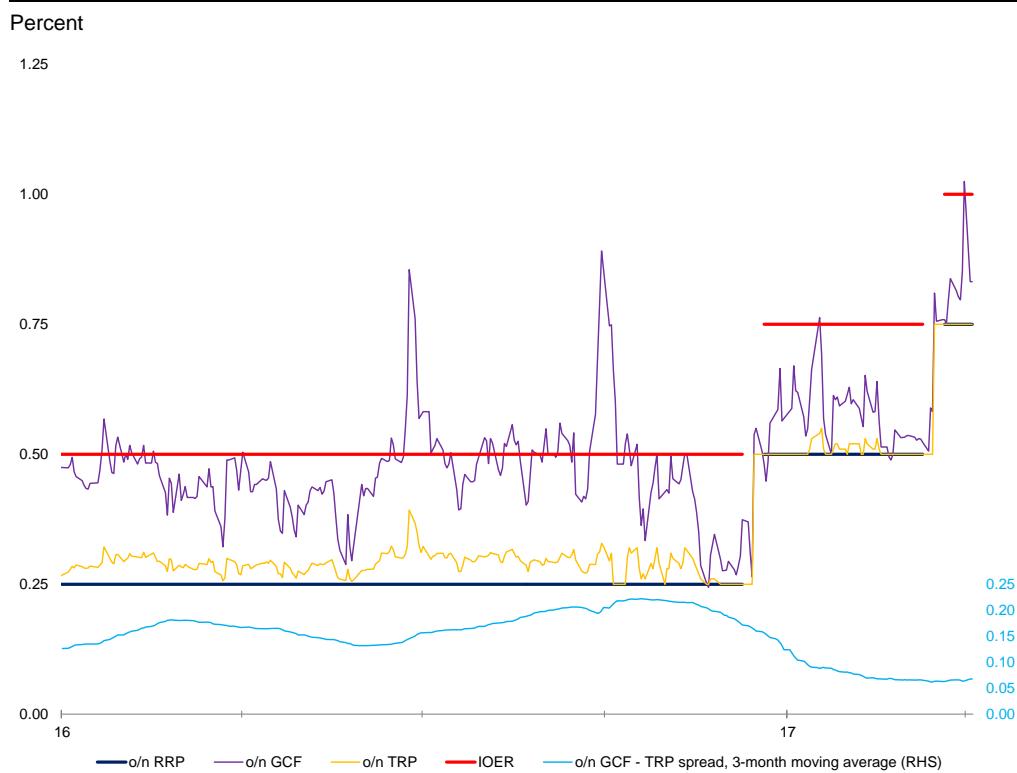
Three-month GC repo rates are typically about 10 bps lower than comparable Libor rates, but as the decline in bill supply flooded the bilateral market with cash since November (both o/n and term), three-month GC rates declined by 40 bps relative to three-month Libor. This funding advantage lasted through February and narrowed to 30 bps by early April.

Figure 20 also shows the funding advantage that opened up for U.S. banks with access to advances from the FHLBs.¹⁷ This funding advantage was nonexistent before June, but as flows from prime funds to government funds cumulated, three-month U.S. dollar Libor rose but advance rates did not (thanks to government funds' strong demand for agency discos). U.S. banks funding advantage peaked at 30 bps, just before the recent Fed hike.

To sum up, first money fund reform, and then extraordinary measures by the Treasury opened up significantly cheaper sources of funding to lend dollars in the FX swap market. U.S. banks funded via the FHLB system and primary dealers via bilateral repos to arbitrage implied rates in the FX swap market. These new, and significantly cheaper funding “pipes” for dollars account for roughly one half of the correction in the three-month cross-currency basis. The other half is explained by the reduced presence of foreign real money accounts in the U.S. Treasury and MBS markets (also due to Trump) and hence lower hedging needs. Foreign banks that scrambled for dollars in the midst of prime fund outflows by tapping the FX swap market have also faded as they refinanced with term debt.

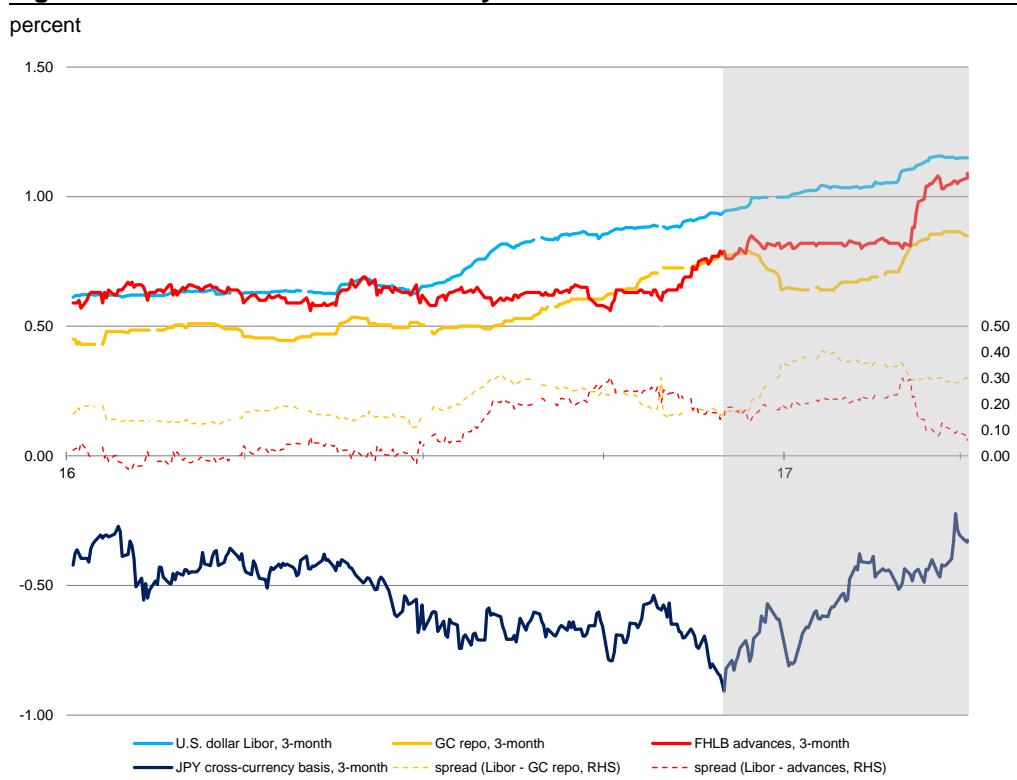
¹⁷ We derive the three-month advance rate by adding a 30 bps spread to the three-month agency discount rate.

Figure 19: Price Action in o/n Money Markets



Source: FRBNY, Credit Suisse

Figure 20: Price Action in Term Money Markets



Source: FRBNY, Credit Suisse

Figure 20 also helps inform our earlier point that three-month U.S. dollar Libor is slowly becoming an inactive funding point.

In the post-Basel III funding market order, three-month unsecured funding is typically used for arbitrage, and arbitrage typically involves the lending of U.S. dollars via FX swaps. This can be funded via CDs (at rates close to three-month Libor), via advances (at rates 20 bps below three-month Libor), or via repos (at rates 30-40 bps below three-month Libor). Unless the funding advantage of U.S. banks (with access to FHLB advances) or primary dealers (which fund via repos) both shrink back to their historical norms, intermediaries that can only fund FX swap trades via unsecured markets won't get their chance to fight: U.S. banks and dealers will always crowd them out with significantly cheaper dollars.

Since the Fed's recent hike, U.S. banks' funding advantage (via FHLB advances) appears to have closed. Furthermore, the three-month cross-currency basis at -30 bps is now well below the 60 bps spread that's needed for U.S. banks to expand their balance sheet. As such, the main market makers in the FX swap market are primary dealers at present. In turn, the funding advantage of primary dealers is a function of TGA balances and bill supply. Should U.S. Treasury decide to ramp up its cash balances to \$400 billion again over the coming weeks and months, repo rates would back up and three-month Libor will become an active funding point again. Currently we are about 20 bps away from that.

Increased bill supply is the factor that binds everything together. We have deduced in the previous section that most of the \$400 billion that left the bill market was put back into funding markets via matched FX swap books. An increase in matched book volumes helps markets clear "organically" and reduces the need for dealers to tap funding markets (i.e. to bid for CDs, repos or advances) to smooth imbalances in order flows by scaling up speculative books.¹⁸ In recent years, these imbalances were on the bid side of the market – there were more borrowers of dollars via FX swaps than lenders of dollars via FX swaps.

Take a lot of reserves out quickly and you'll tip the balance the market has been moving toward since November. Were that to happen, repo and advance rates will converge with Libor rates as dealer tap these funding markets to build up their speculative books. Once all three rates converge, watch for three-month U.S. dollar Libor-OIS to widen again.

Conclusions

Our mental image of "excess reserves" is one of banks parking large pools of cash at the Fed doing nothing with them. This issue of Global Money Notes debunked that image.

Reserves are far from being "excess" – they are needed and are being traded actively.

U.S. Treasury's extraordinary measures to avoid the debt ceiling have put \$400 billion in reserves back into the financial system, which drove the collapse of cross-currency bases.

What this tells us is that the Fed has only limited room to shrink its balance sheet.

Whether reserves are drained by U.S. Treasury boosting its cash balances or by a passive runoff of the SOMA portfolio is the same thing. They both mean fewer reserves.

With every \$100 billion of reserves drained, cross-currency bases increase by 10 bps. With every \$100 billion of reserves drained, the rest of the world gets a 10 bps rate hike. And it's not just the Fed's balance sheet decisions. Treasury needs to coordinate with the Fed regarding the impact of its cash management practices on global financial conditions.

Don't let the DSGE people hijack the Fed's balance sheet.

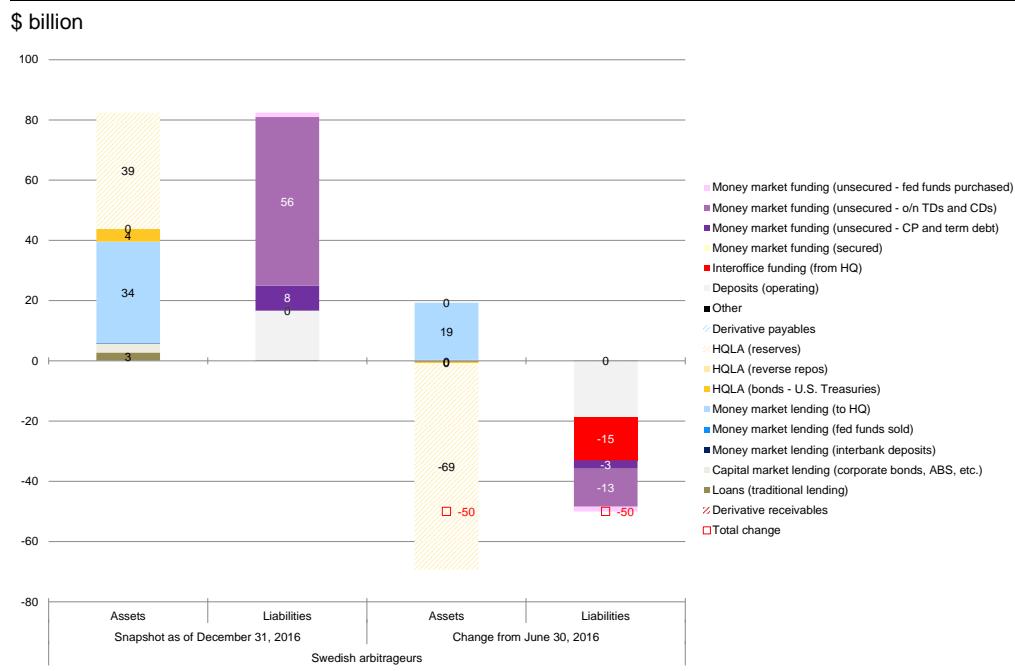
Shrinking it is a matter of taste, not a matter of necessity.

Big is beautiful. Big is necessary. Learn to live with it...

¹⁸ Matched books are FX swap to FX swap trades. Speculative books are made up of CD to FX swap and repo to FX swap trades.

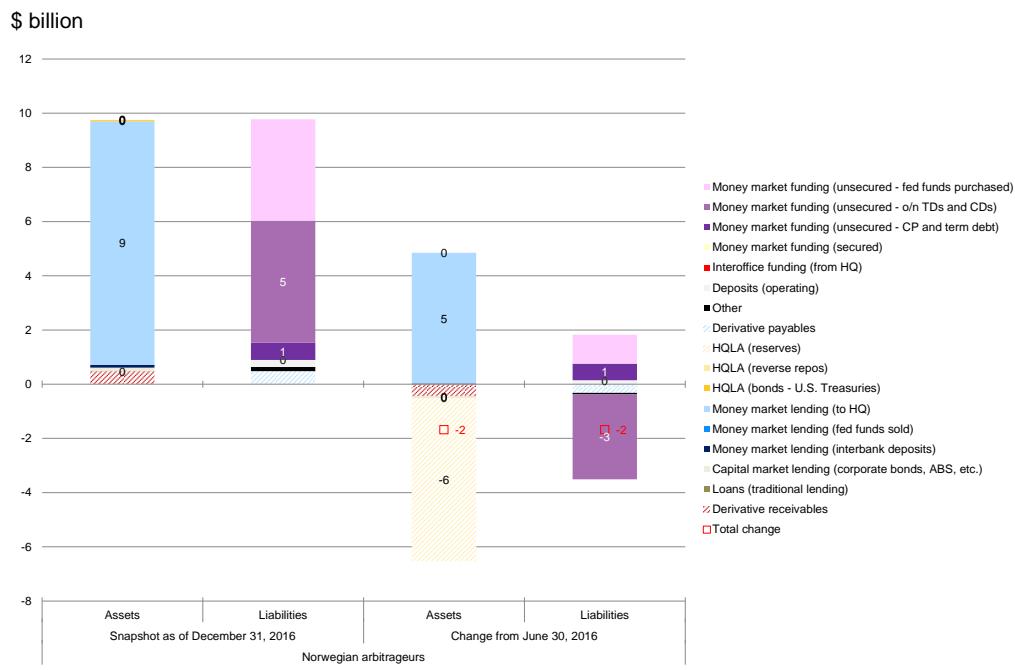
Appendix A1 – Scandinavian Arbitrageurs

Figure A1-1: Swedish Arbitrageurs



Source: FFIEC002, Credit Suisse

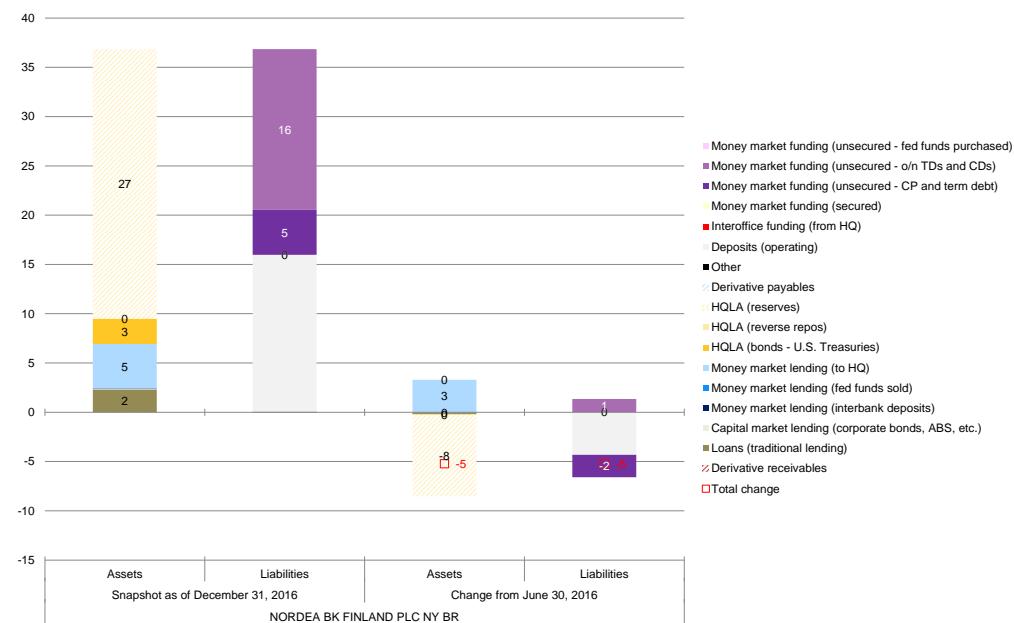
Figure A1-2: Norwegian Arbitrageurs



Source: FFIEC002, Credit Suisse

Figure A1-3: Nordea

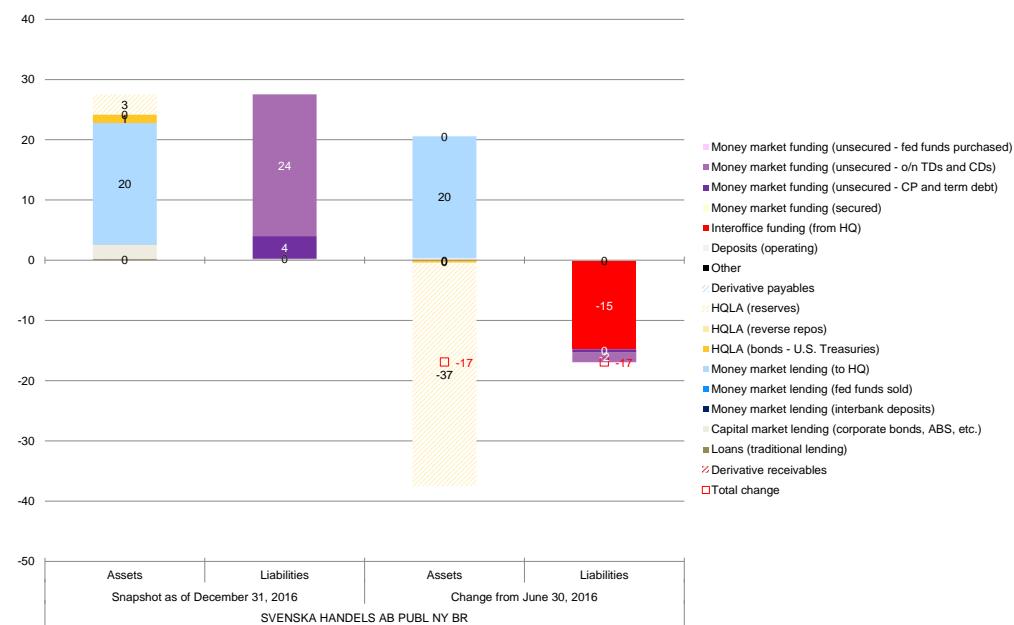
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A1-4: Svenska Handelsbanken

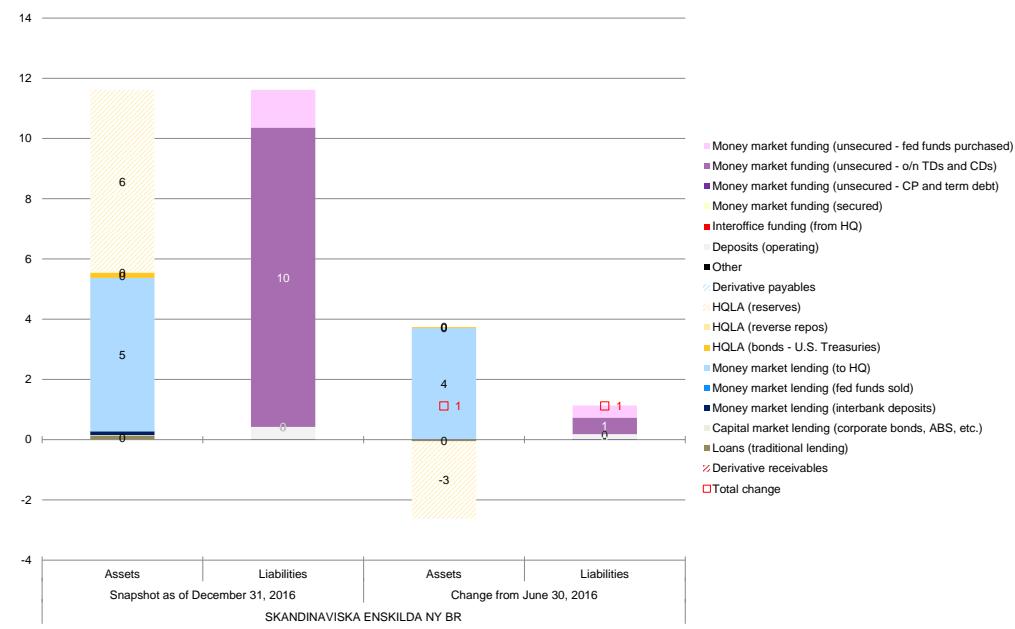
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A1-5: Skandinaviska Enskilda Banken

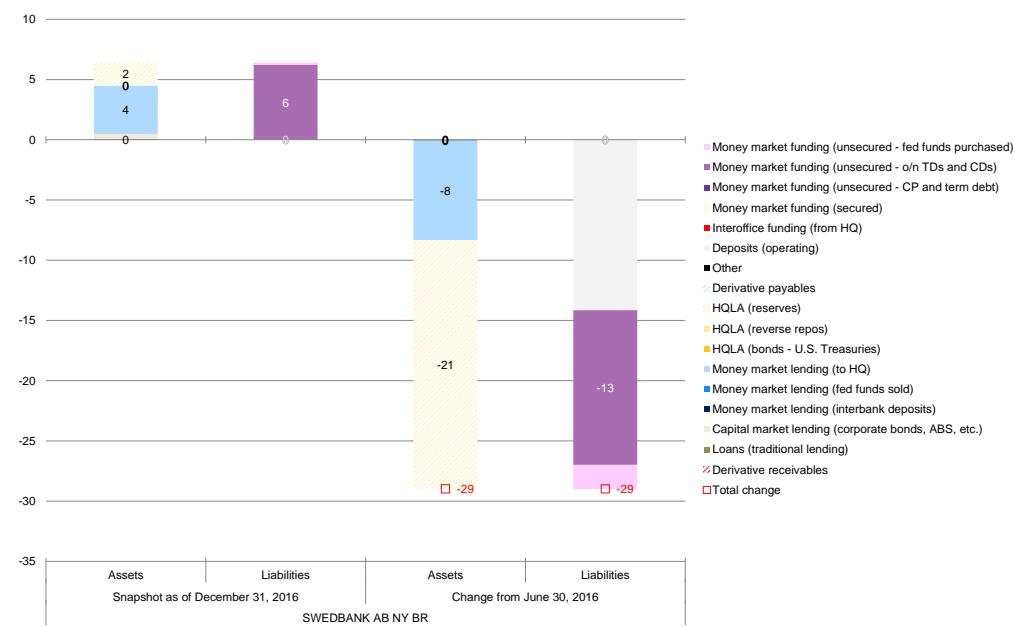
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A1-6: Swedbank

New York branch, \$ billion

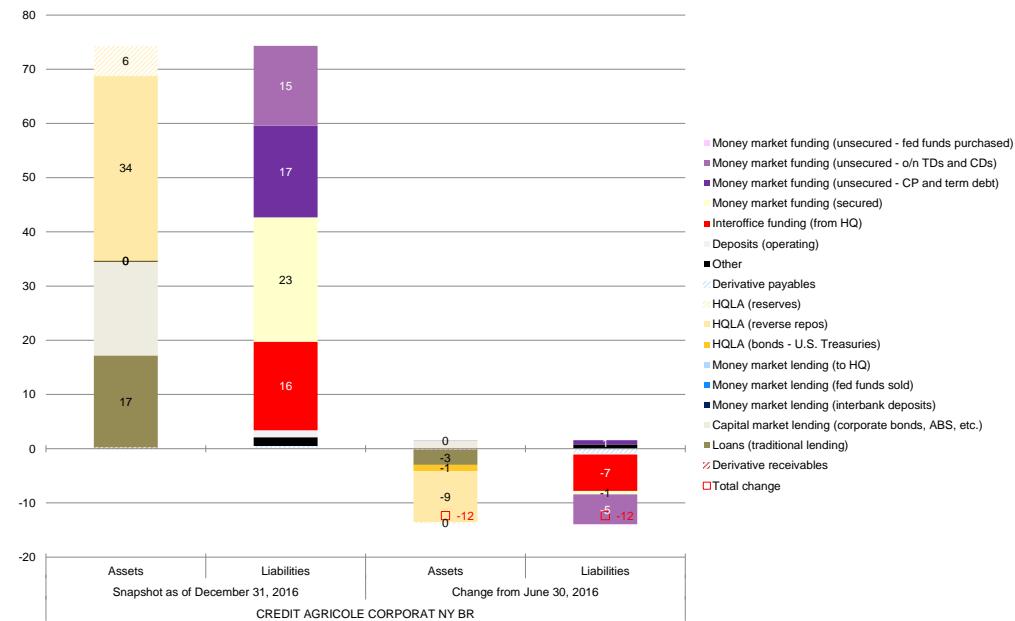


Source: FFIEC002, Credit Suisse

Appendix A2 – French Banks

Figure A2-1: Credit Agricole

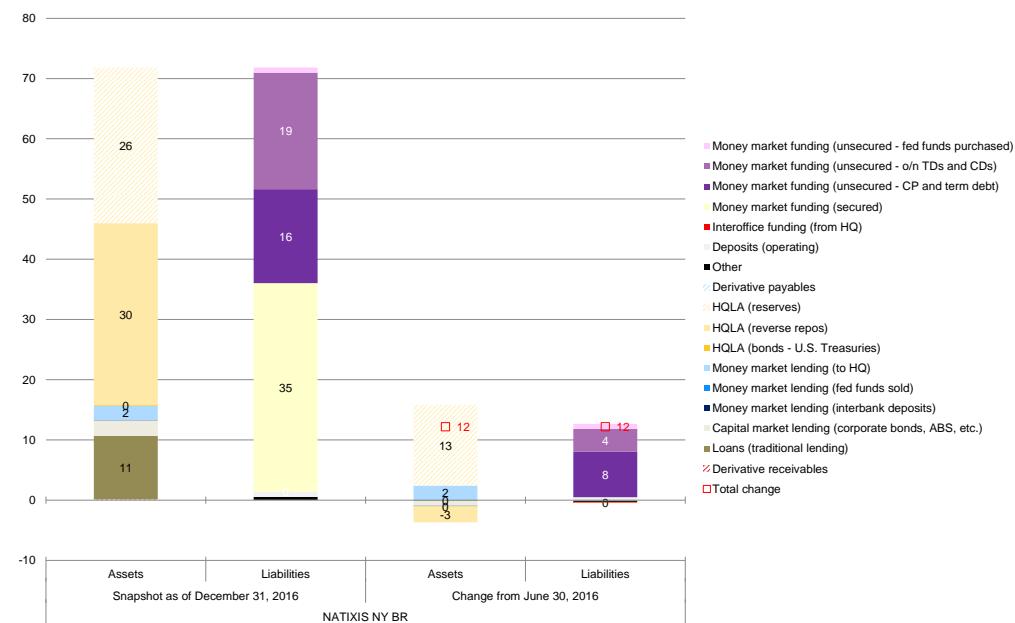
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A2-2: Natixis

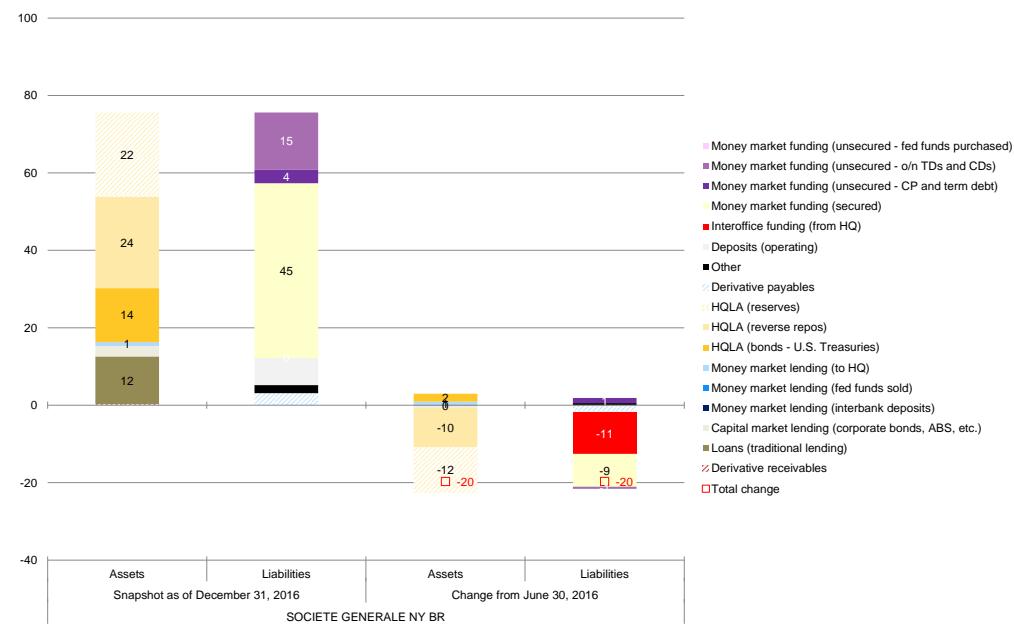
New York branch, \$ billion



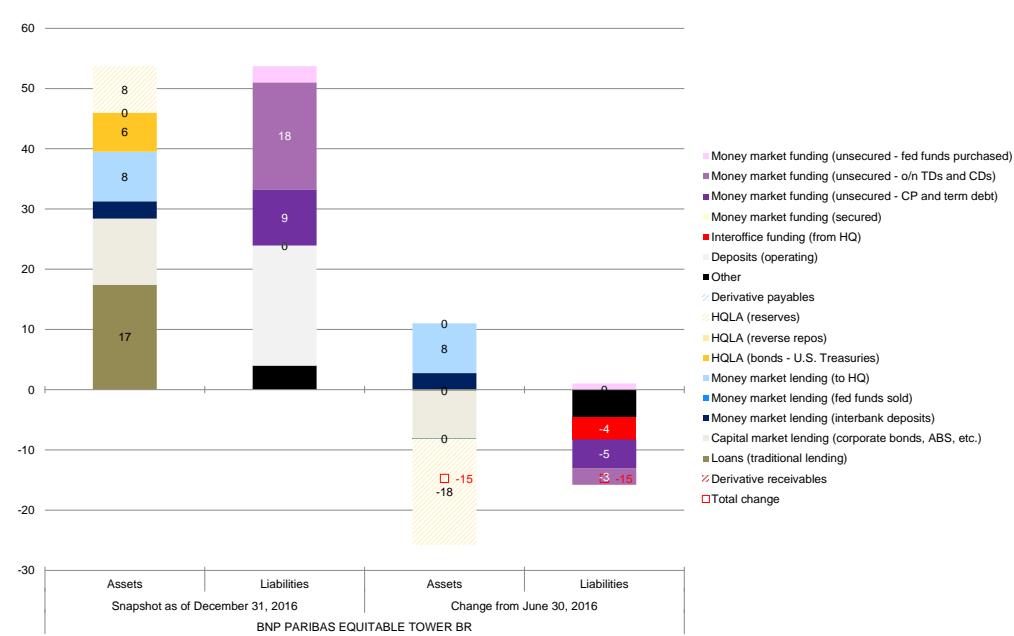
Source: FFIEC002, Credit Suisse

Figure A2-3: Societe Generale

New York branch, \$ billion

**Figure A2-4: BNP Paribas**

New York branch, \$ billion

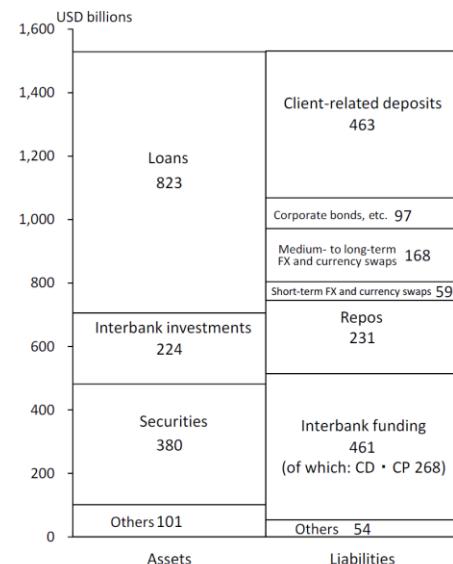


Appendix A3 – Japanese Banks

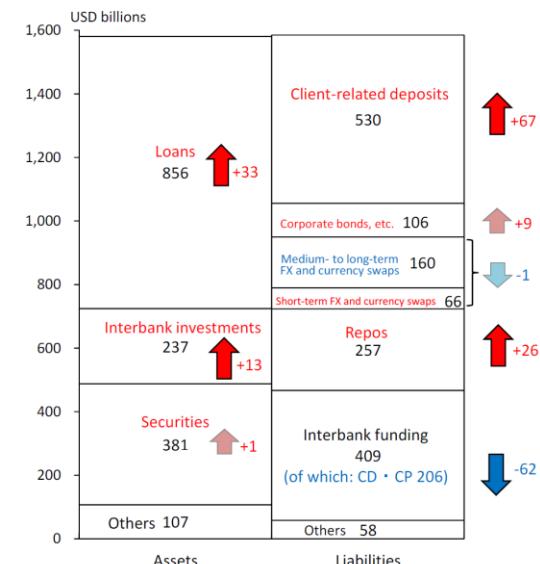
Figure A3-1: Japanese Banks' Global Dollar Book

\$ billion

As at end-March 2016



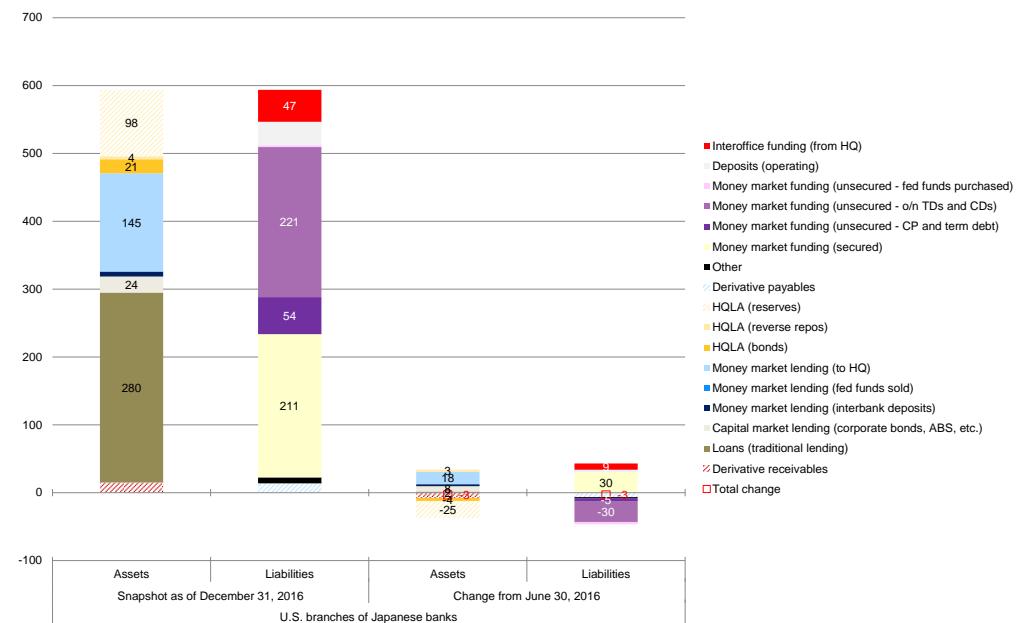
As at end-October 2016



Source: Bank of Japan

Figure A3-2: Japanese Banks' New York Dollar Book

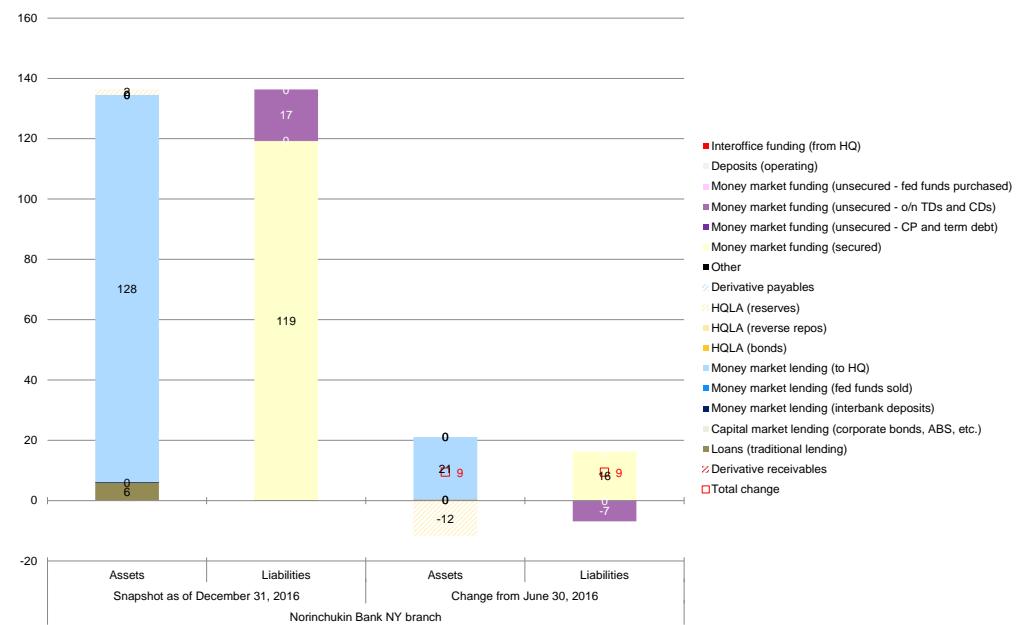
\$ billion



Source: FFIEC002, Credit Suisse

Figure A3-3: Norinchukin Bank

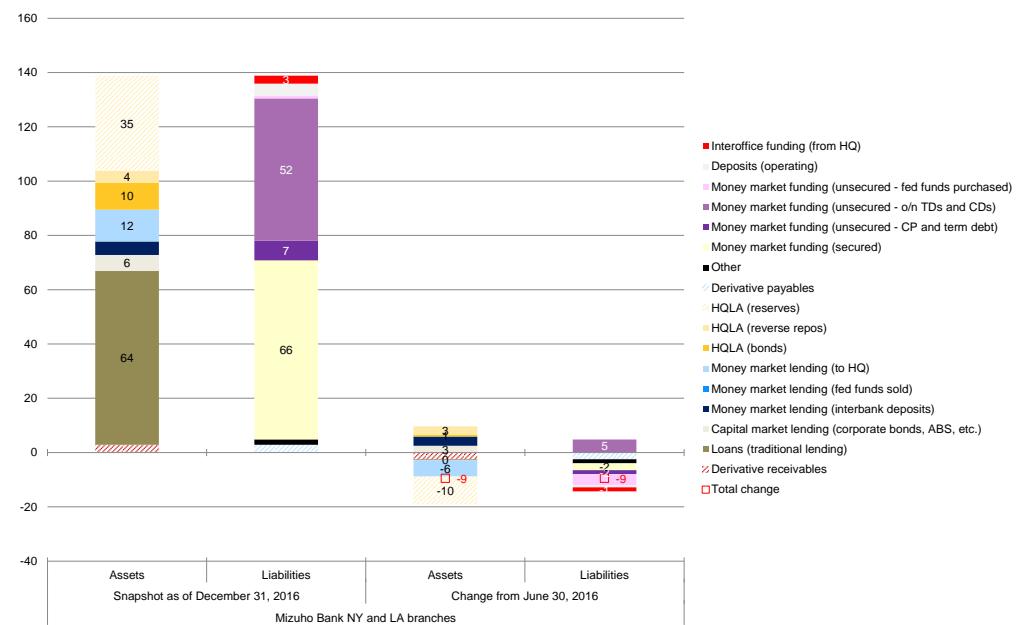
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A3-4: Mizuho

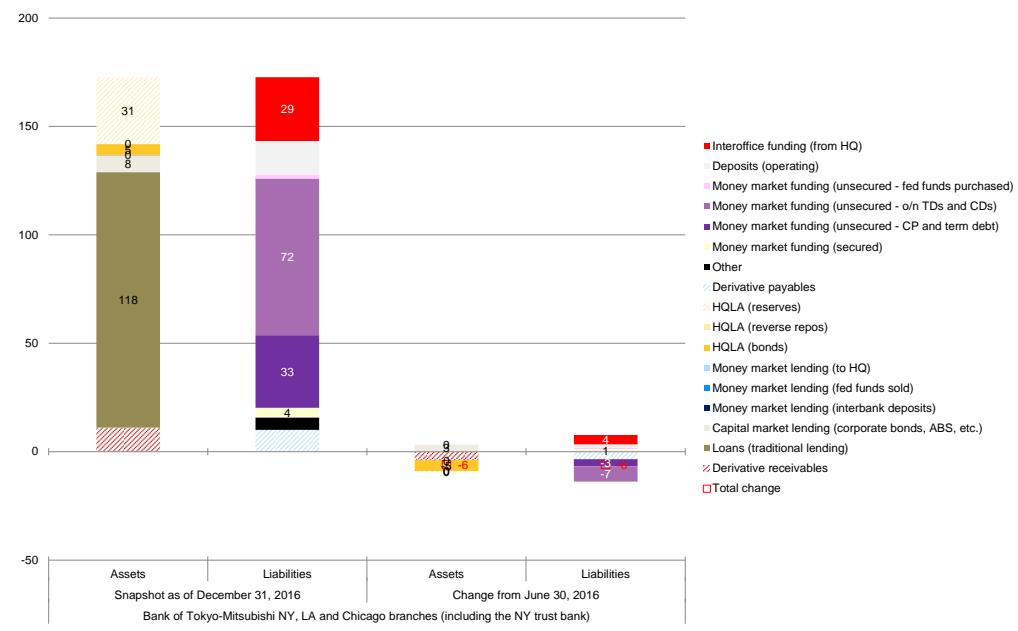
New York and Los Angeles branches, \$ billion



Source: FFIEC002, Credit Suisse

Figure A3-5: Bank of Tokyo-Mitsubishi

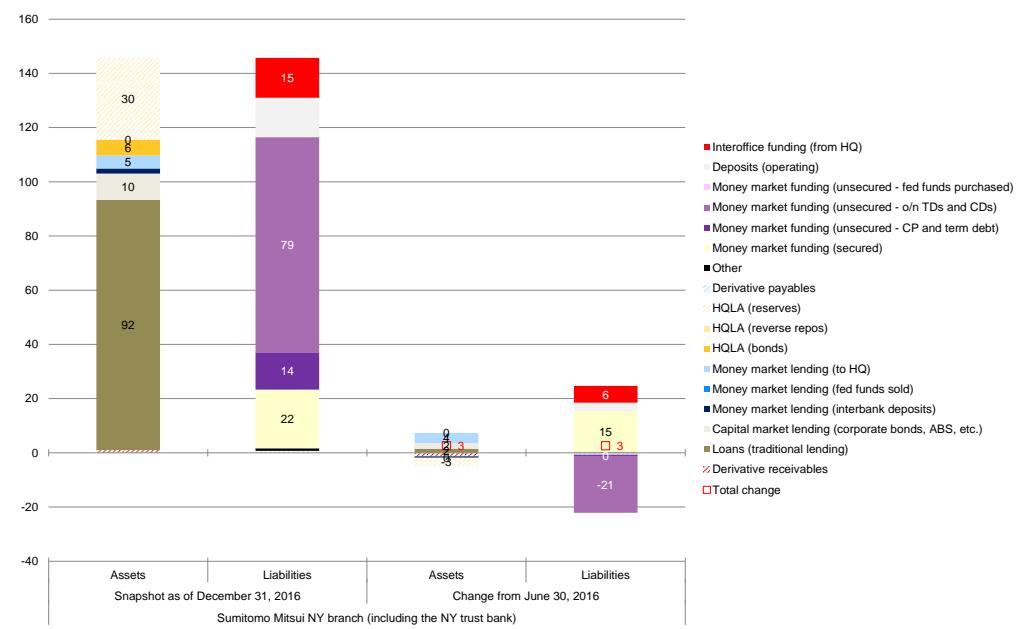
New York, Los Angeles and Chicago branches, \$ billion



Source: FFIEC002, Credit Suisse

Figure A3-6: Sumitomo Mitsui

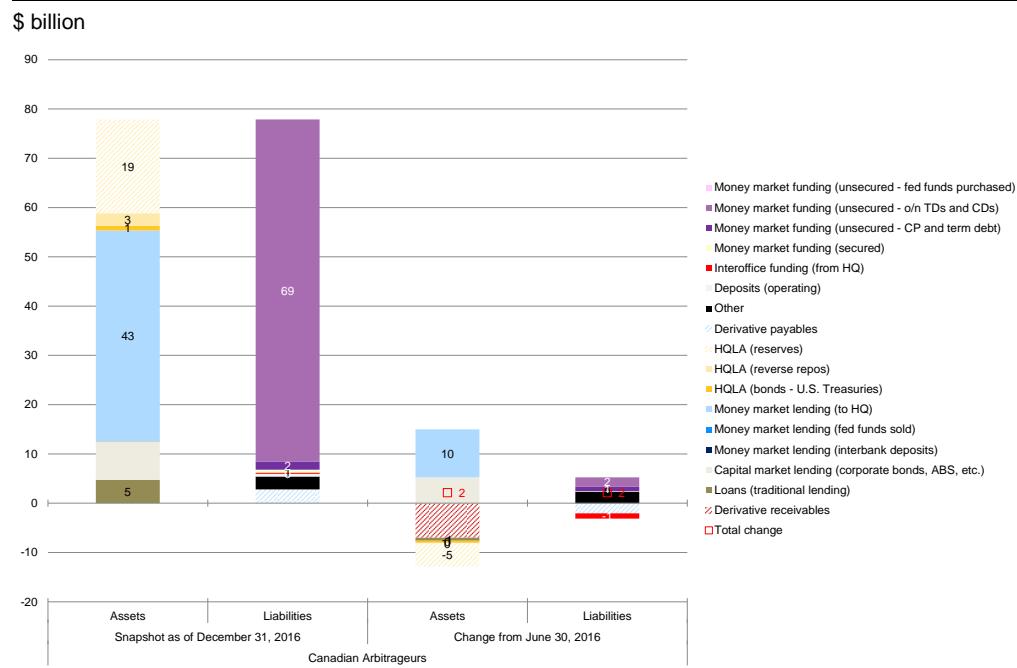
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

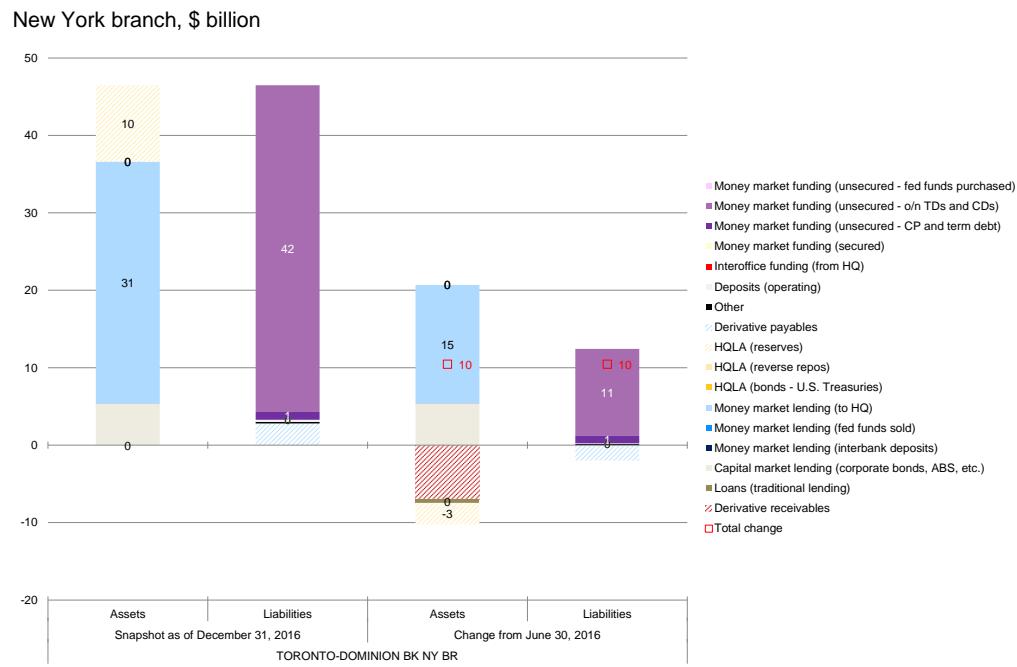
Appendix A4 – Canadian Banks

Figure A4-1: Canadian Arbitrageurs



Source: FFIEC002, Credit Suisse

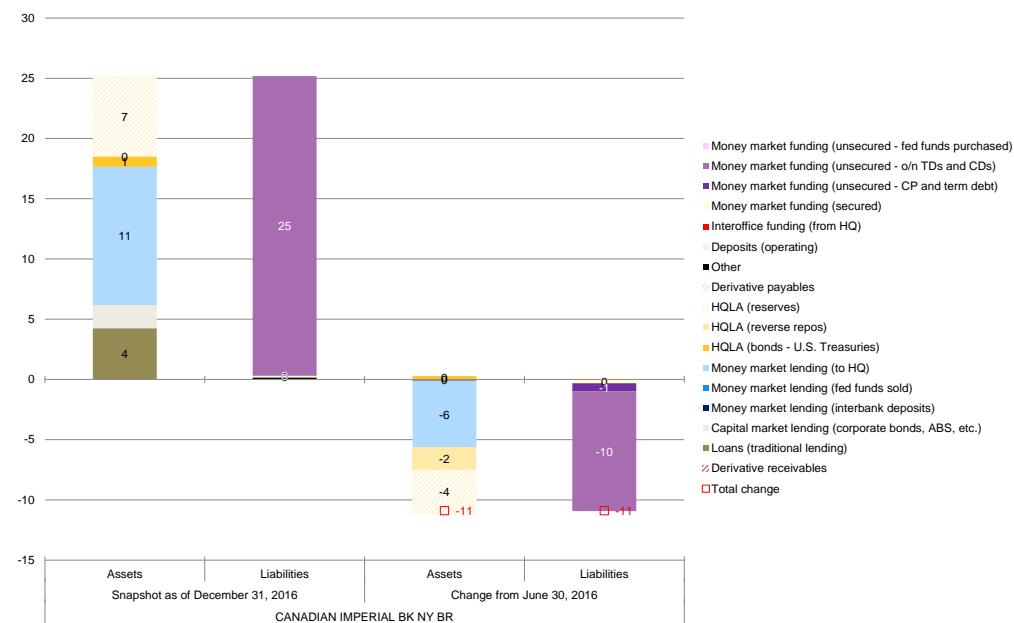
Figure A4-2: Toronto Dominion Bank



Source: FFIEC002, Credit Suisse

Figure A4-3: CIBC

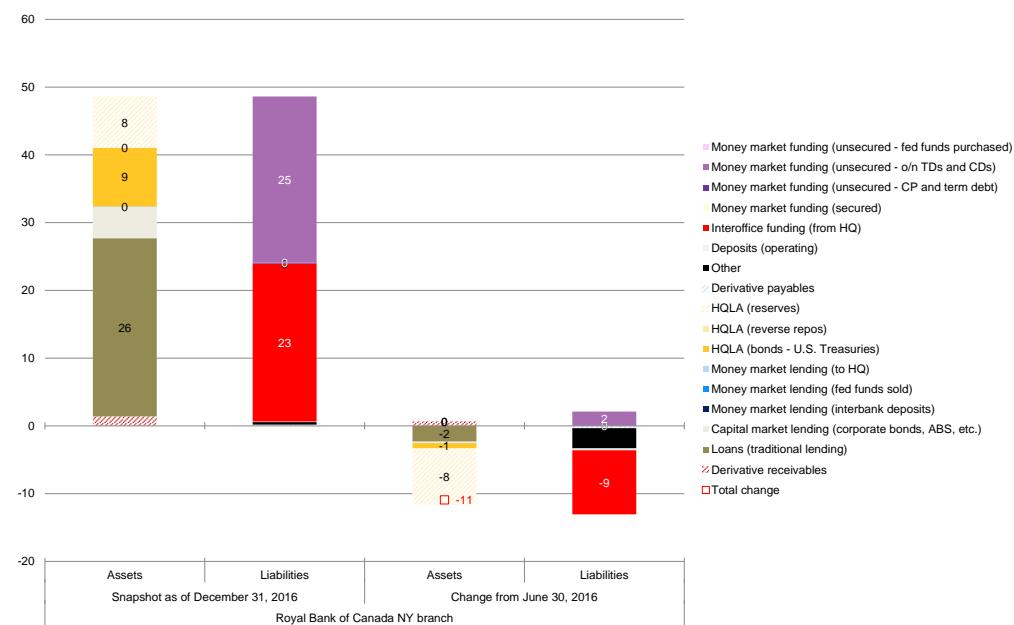
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A4-4: Royal Bank of Canada

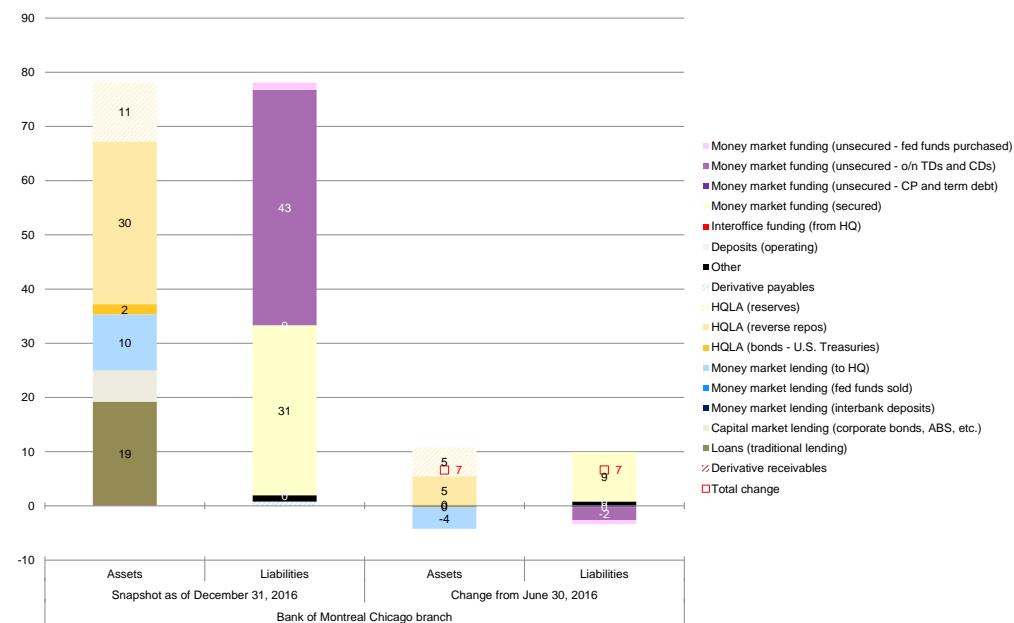
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A4-5: Bank of Montreal

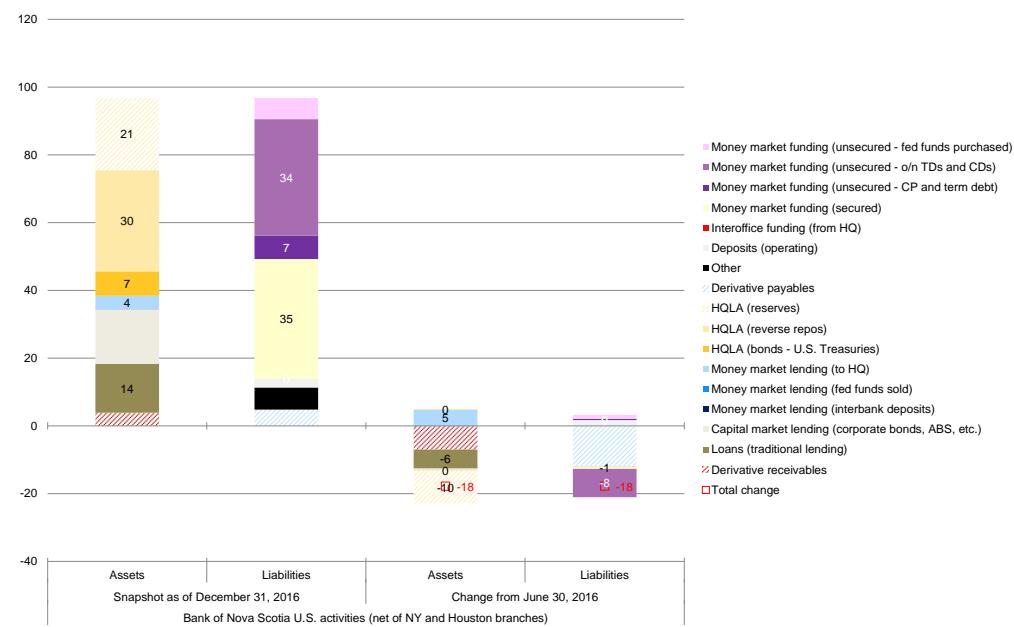
Chicago branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A4-6: Bank of Nova Scotia

New York agency and Houston branch, \$ billion



Source: FFIEC002, Credit Suisse

Appendix A5 – European Arbitrageurs and U.K. Banks

Figure A5-1: Eurozone Arbitrageurs

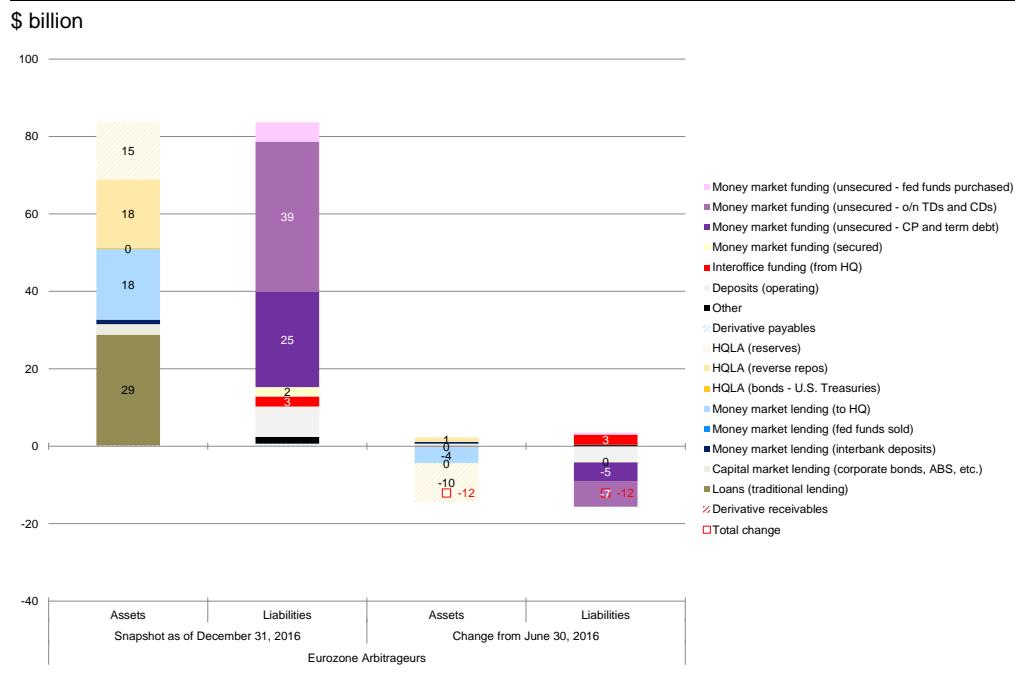


Figure A5-2: Rabobank

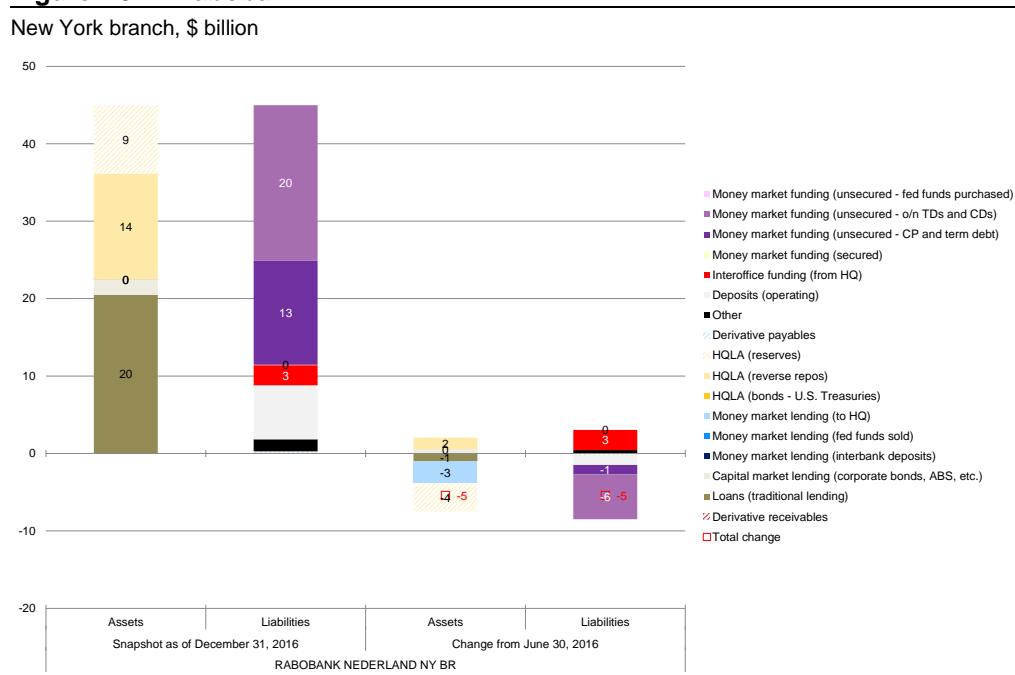
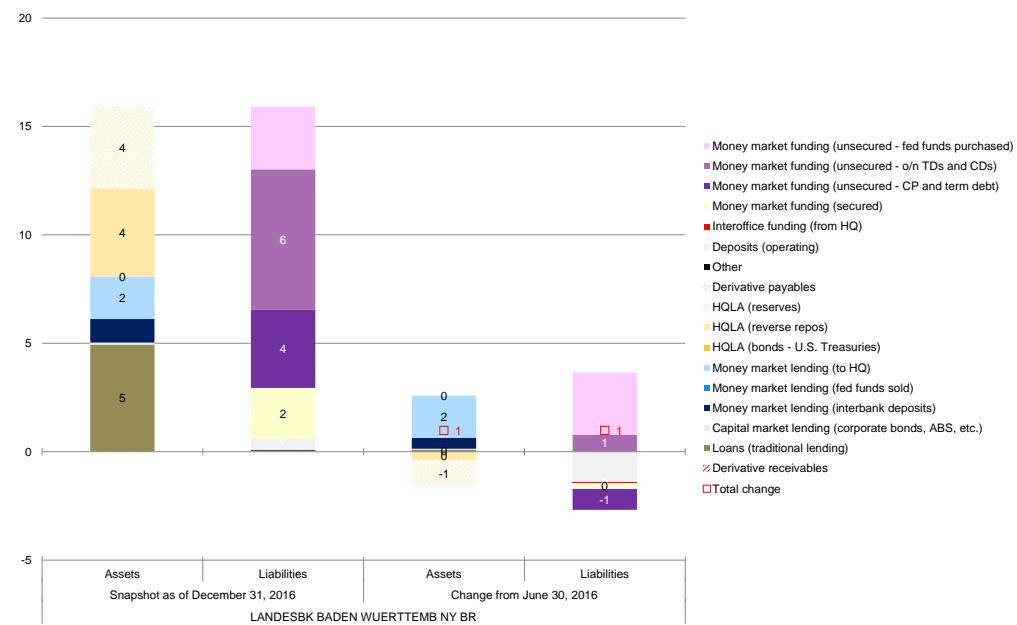


Figure A5-3: Landesbank Baden-Württemberg

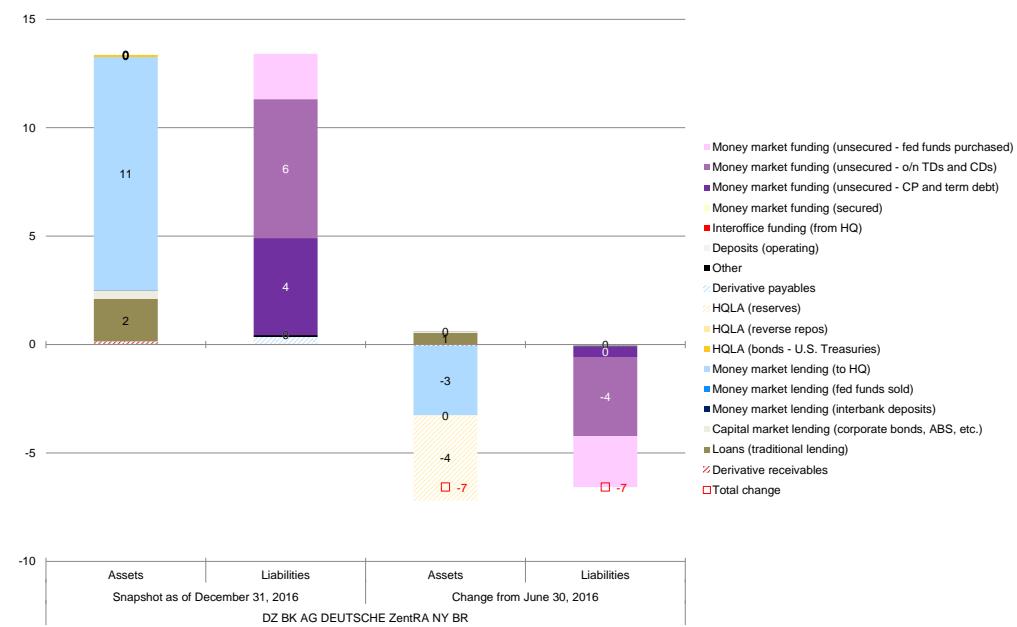
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A5-4: DZ Bank

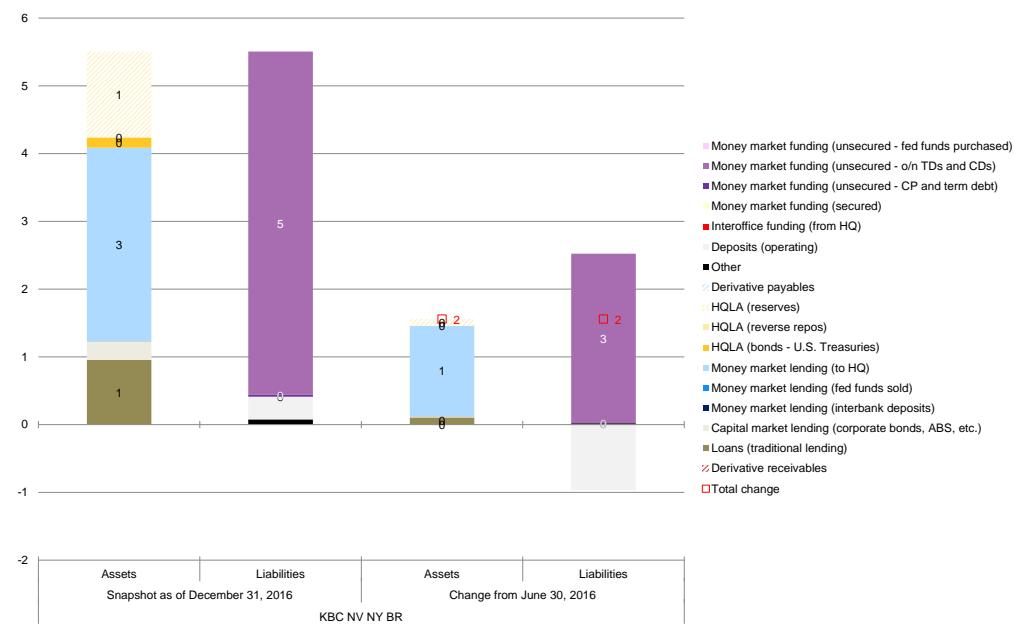
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A5-5: KBC

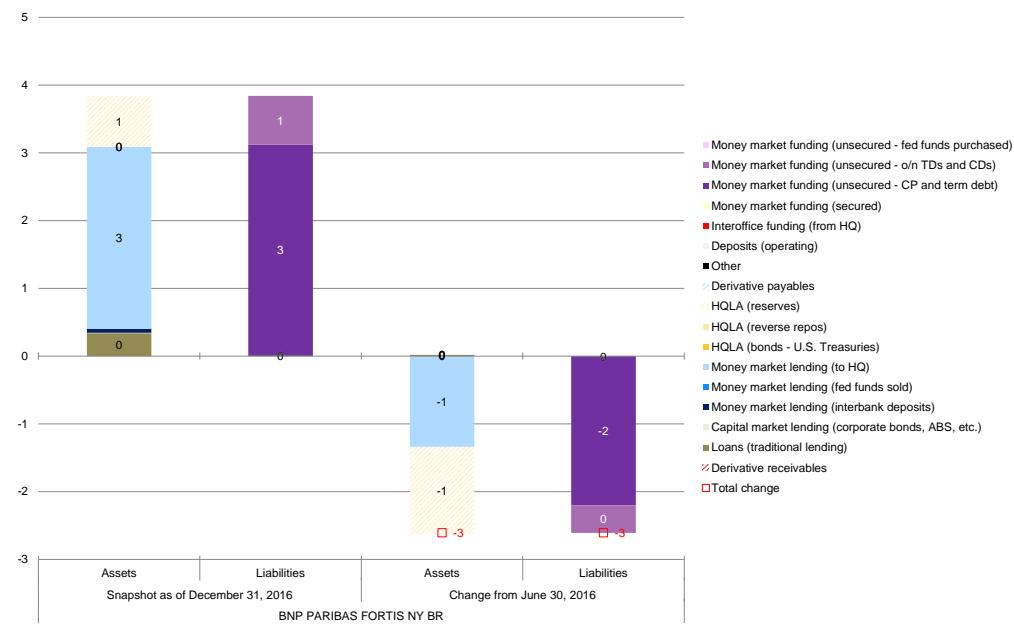
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A5-6: BNP Paribas Fortis

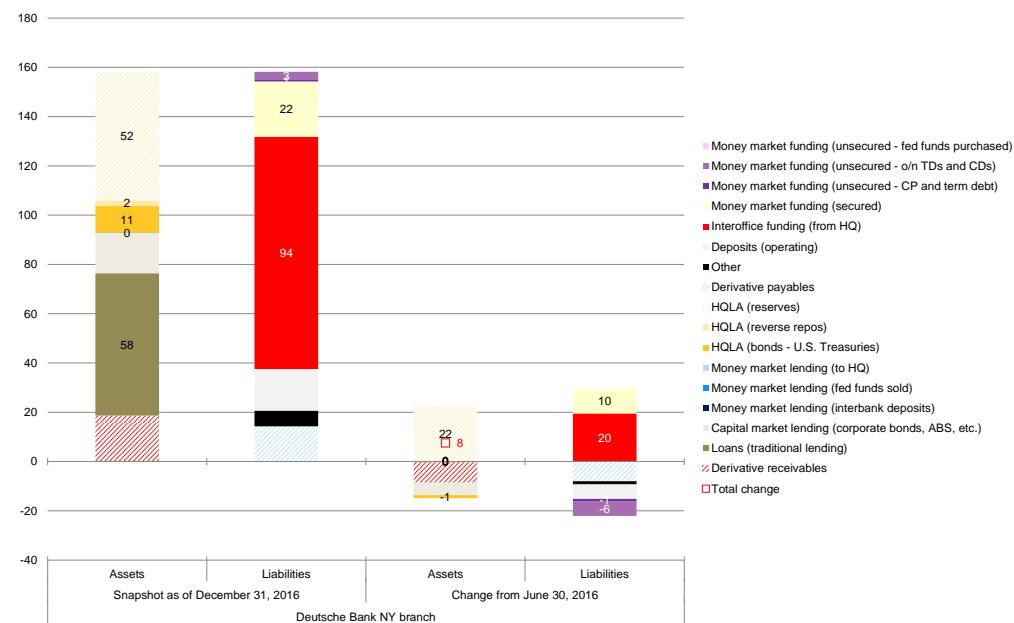
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A5-7: Deutsche Bank

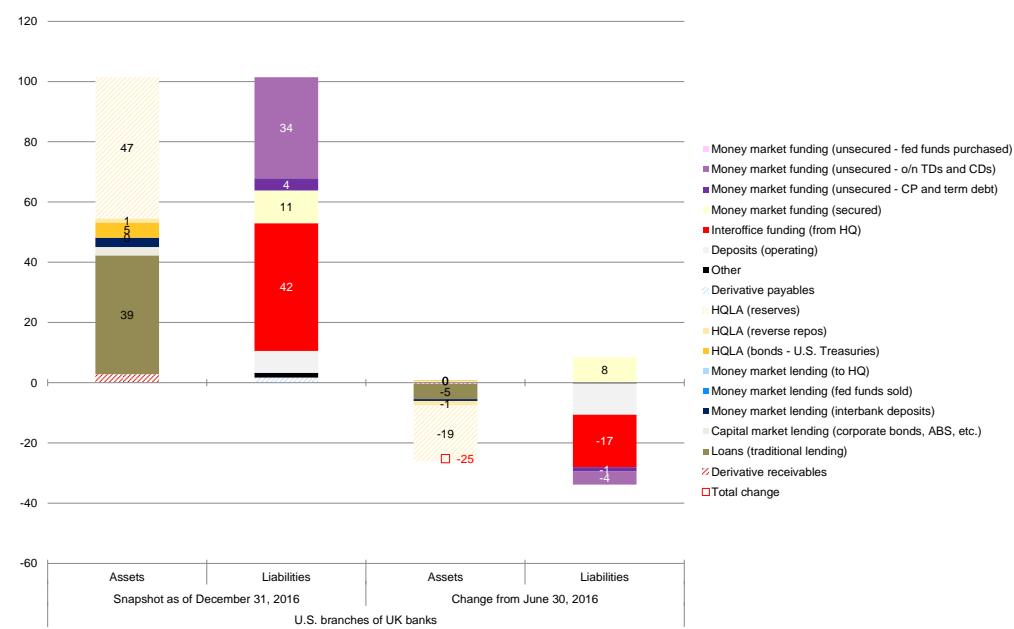
New York branch, \$ billion



Source: FFIEC002, Credit Suisse

Figure A5-8: New York Branches of U.K. Banks

\$ billion

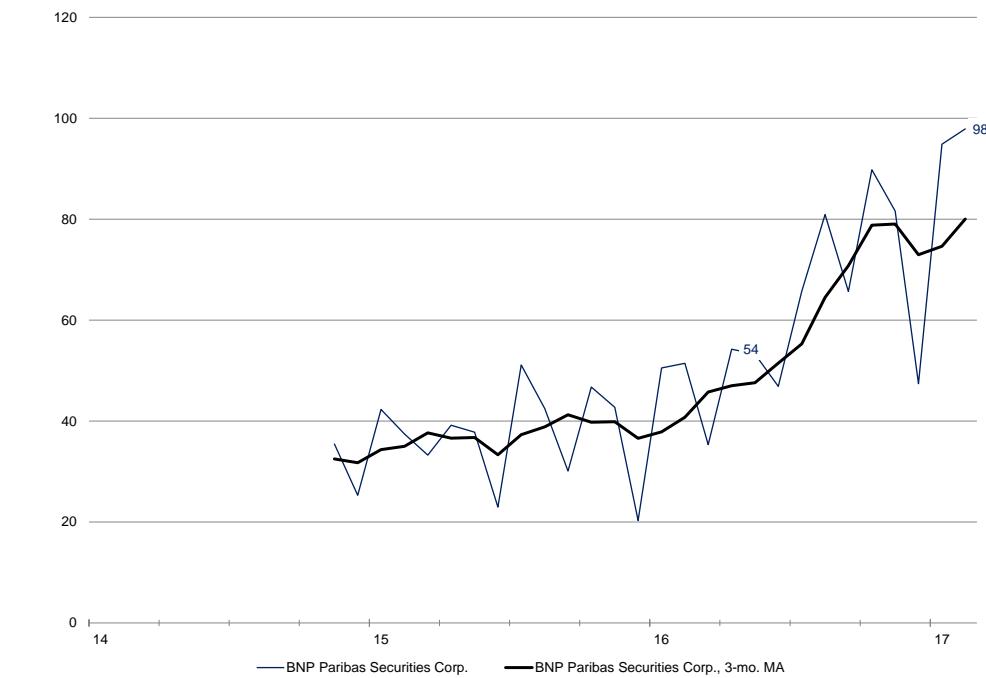


Source: FFIEC002, Credit Suisse

Appendix A6 – Primary Dealers

Figure A6-1: BNP Paribas

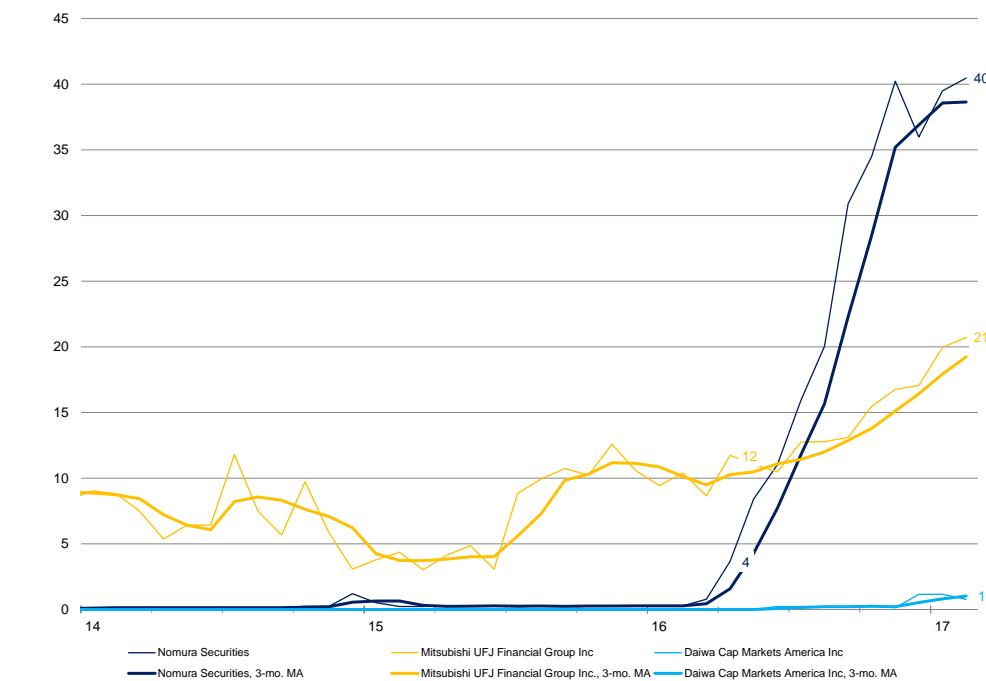
o/n tri-party repos backed by U.S. Treasury and MBS collateral, \$ billion



Source: OFR, Credit Suisse

Figure A6-2: Japanese Primary Dealers

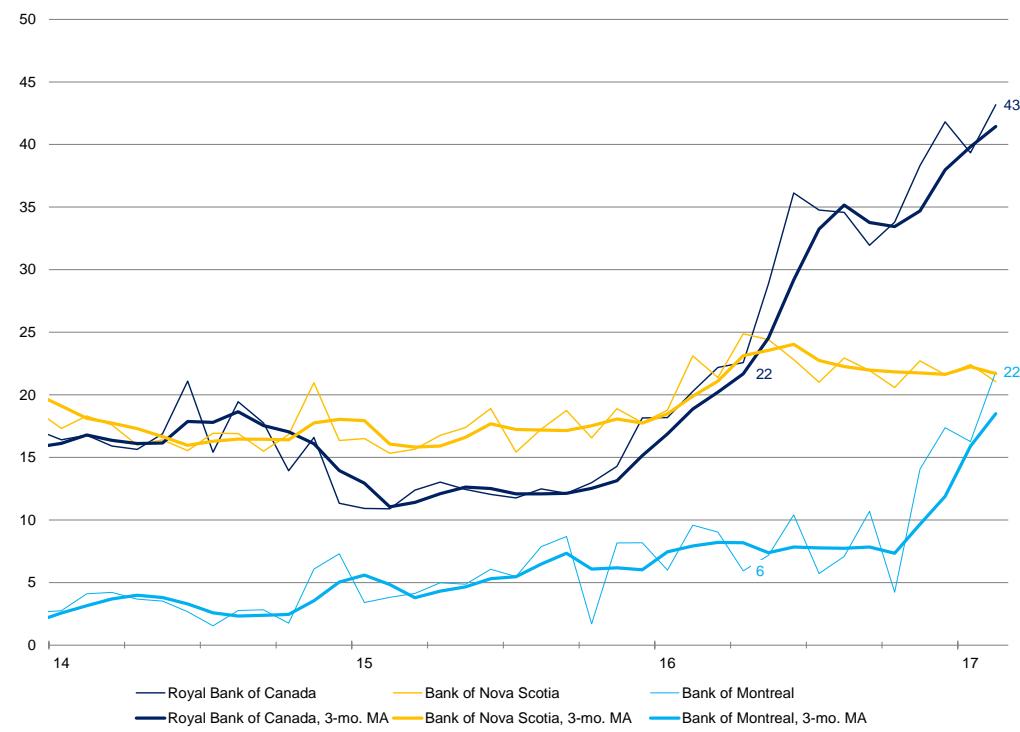
o/n tri-party repos backed by U.S. Treasury and MBS collateral, \$ billion



Source: OFR, Credit Suisse

Figure A6-3: Canadian Primary Dealers

o/n tri-party repos backed by U.S. Treasury and MBS collateral, \$ billion

**Figure A6-4: U.K. Primary Dealers**

o/n tri-party repos backed by U.S. Treasury and MBS collateral, \$ billion

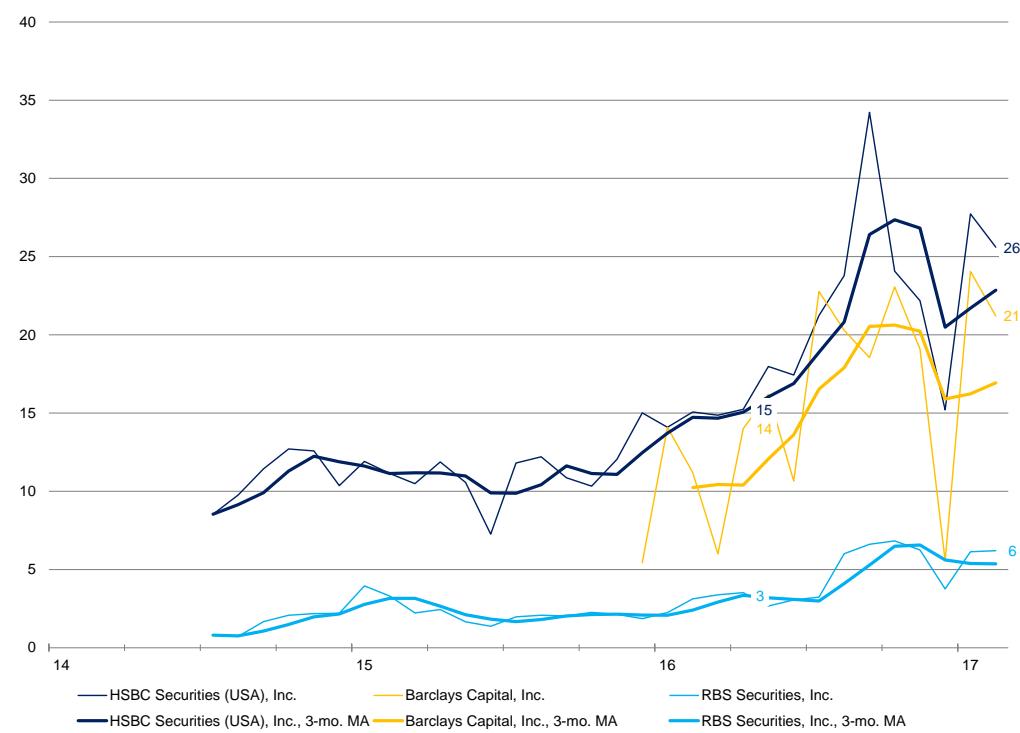
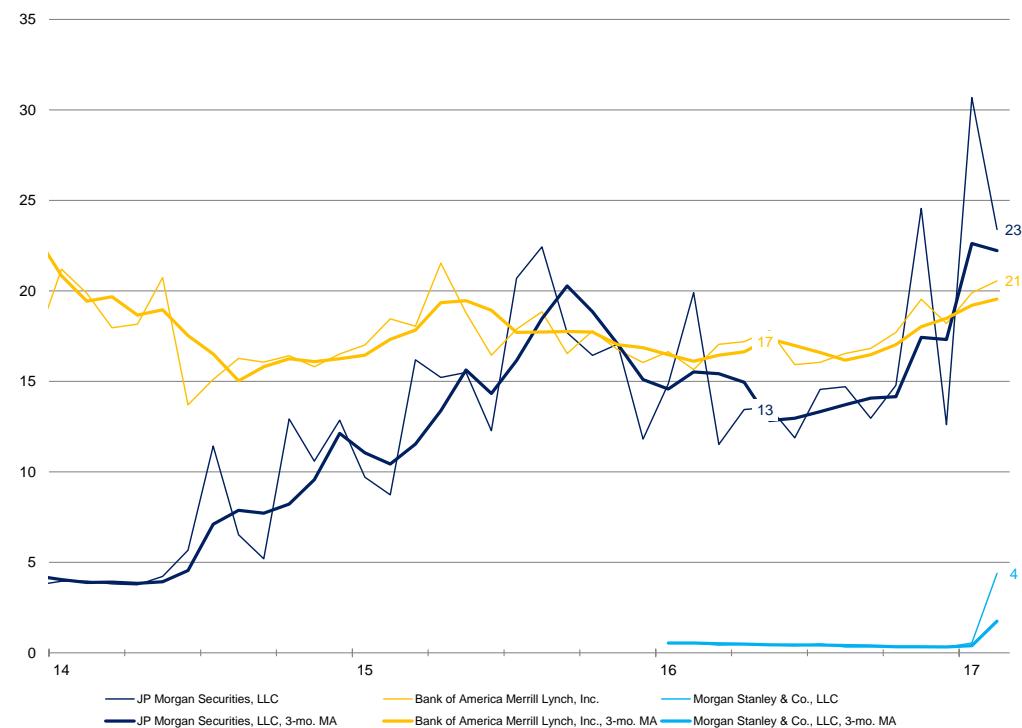
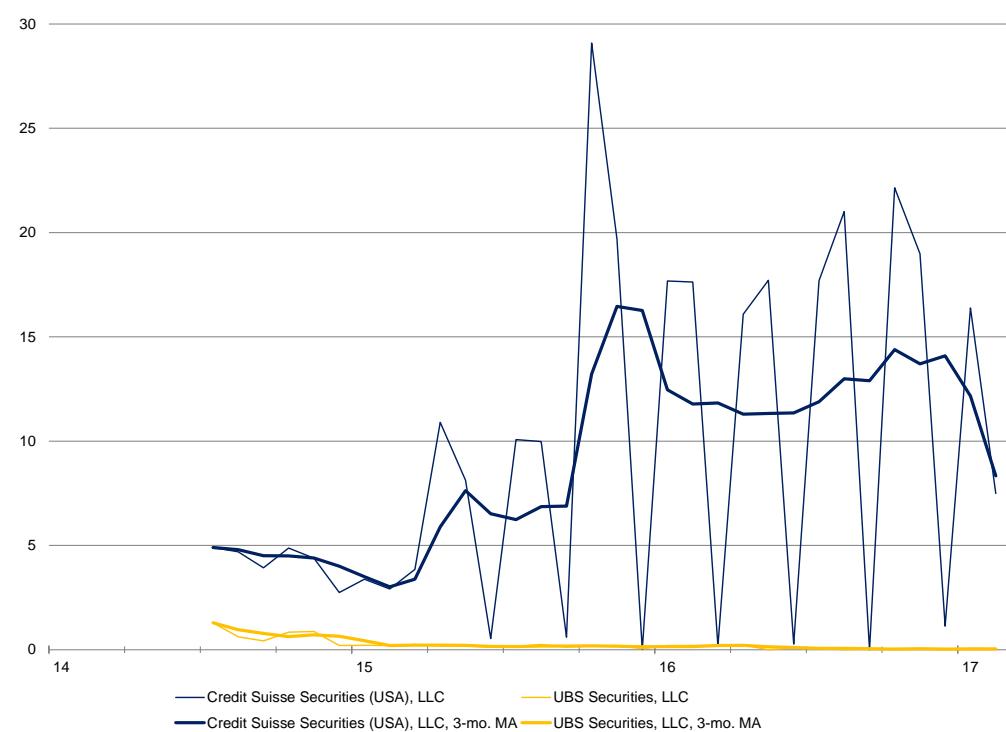


Figure A6-5: U.S. Primary Dealers

o/n tri-party repos backed by U.S. Treasury and MBS collateral, \$ billion

**Figure A6-6: Swiss Primary Dealers**

o/n tri-party repos backed by U.S. Treasury and MBS collateral, \$ billion



Source: OFR, Credit Suisse

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Global Money Notes #10

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Sterilization and the Fracking of Reserves

The defining fixed income market event of this year is shaping up to be the normalization of U.S. Treasury's cash balances. Normalization is set to drain close to \$400 billion of reserves from money markets during the fourth quarter, and the impact of that will be felt the world over: repo spreads, spreads to OIS and cross-currency bases are all set to widen, re-tracing most of the narrowing they've been through since January. According to our calculations, 3-month Libor-OIS could widen by at least 20 bps from current levels by year-end¹.

The "other" normalization – that of the Fed's balance sheet – is not a worry for this year. Even if it were to start now, its initial pace of \$10 billion a month is small compared to Treasury's removal of \$400 billion in reserves. We'll worry about balance sheet taper next summer, once its annual run-rate has accelerated to over \$100 billion. But that's still at least nine months away...

This issue of Global Money Notes introduces two new concepts: sterilization and the fracking of reserves. Both concepts are essential to understand how the draining of reserves and the destruction of reserves (through taper) affect the way repo and FX swap markets trade in the post-Basel III financial order.

Sterilization is a concept that's more familiar for investors in emerging markets than for investors that have grown up trading money markets in the G3 space. The same goes for central banks. For EM central banks, sterilization is always a deliberate step to tighten money markets. In contrast, the Fed lets sterilization run its course freely and doesn't link it to money markets conceptually one bit. That's a mistake, in our opinion.

\$1 trillion of reserves have been sterilized through various liability swaps on the Fed's balance sheet between January 1st, 2015 and December 31st, 2016. As sterilization increased, reserves declined, dollar liquidity suffered, and term spreads in money markets widened. To be able to settle, the system started to "frack" U.S. banks' HQLA portfolios for reserves. But like fracking shale formations, that process is costly and messy from a Basel III perspective.

From a funding perspective, destroying reserves through balance sheet taper is the same as sterilizing reserves through the normalization of Treasury's cash balances. And if the fallout from the latter will mean a replay of the spread widening we have seen in dollar funding markets late last year, the Fed may even re-consider the timing, pace and endpoint of its tapering plans...

This issue of Global Money Notes has six parts to it.

Part one discusses how the Fed has been sterilizing reserves through its increased offering of overnight liquidity services to institutions. Part two discusses the concept of fracking HQLA portfolios for reserves. Part three discusses the concept of the quarter-end turn premium. Part four identifies J.P. Morgan's reserves-rich HQLA portfolio as the Bakken Shale of global financial system and the bank as the system's lender of next-to-last resort. Part five discusses what happens when sterilization goes into reverse. Finally, part six concludes with what the normalization of Treasury's cash balances means for Libor-OIS.

¹ For the underlying rationale, please see page 18.

Part 1 – Basel III and the Sterilization of Reserves

In the post-Basel III financial order, the Manager of the System Open Market Account (SOMA) became the world's most powerful bank treasurer.

With great power comes great responsibility. That includes broadening the discourse about the Fed's role in money markets beyond the overnight point and asking the question of whether at times the Fed should police term spreads by stepping in for balance sheet constrained banks as a market maker even outside of crisis times. The stakes are no less than the Fed's control over the global monetary transmission process and the maintenance of some semblance of bounded parity between the cost of onshore dollars and Eurodollars.

Part of the discussion about the Fed's balance sheet has revolved around the composition of the SOMA portfolio, the risks that a large amount of reserves could pose to the Fed's ability to control the fed funds rate, and how these risks could be mitigated through the draining of reserves via the overnight RRP facility. More recently, discussion turned to the reduction of the SOMA portfolio through the tapering of Treasury and MBS reinvestments.

The biggest theme, however, got entirely unnoticed. And that theme has to do with the Fed's growing role as a bank for institutions – a direct result of Basel III incentivizing banks to push institutional deposits off their books and onto the balance sheet of the sovereign.

The Fed's increased offering of overnight liquidity services to a growing customer base is driving massive shifts on the liability side of its balance sheet. Gone are the days when currency was the Fed's dominant liability and reserves a fragment of its balance sheet:

- (1) U.S. Treasury no longer keeps its excess cash with private banks, but at its account at the Fed. Its balances can run as high as \$400 billion (see Figure A1).
- (2) Foreign central banks have moved their cash from private banks as well, and keep about \$250 billion on deposit at the Fed's foreign repo pool (see Figure A2).²
- (3) Money funds became habitual users of the o/n RRP facility, placing \$150 billion with the Fed on an average day and double that on quarter-ends (see Figure A3).
- (4) Central counterparties are the latest addition to the Fed's growing customer base, with ICE and CME keeping a combined \$100 billion at the Fed (see Figure A4).

Figure 1 shows the sea change in the Fed's balance sheet since the financial crisis. Currency outstanding doubled; reserves went from a negligible item to a dominant item; and liquidity services provided to institutional cash investors ranging from U.S. Treasury, foreign central banks, money funds and CCPs grew from nothing to \$800 billion at the peak.³

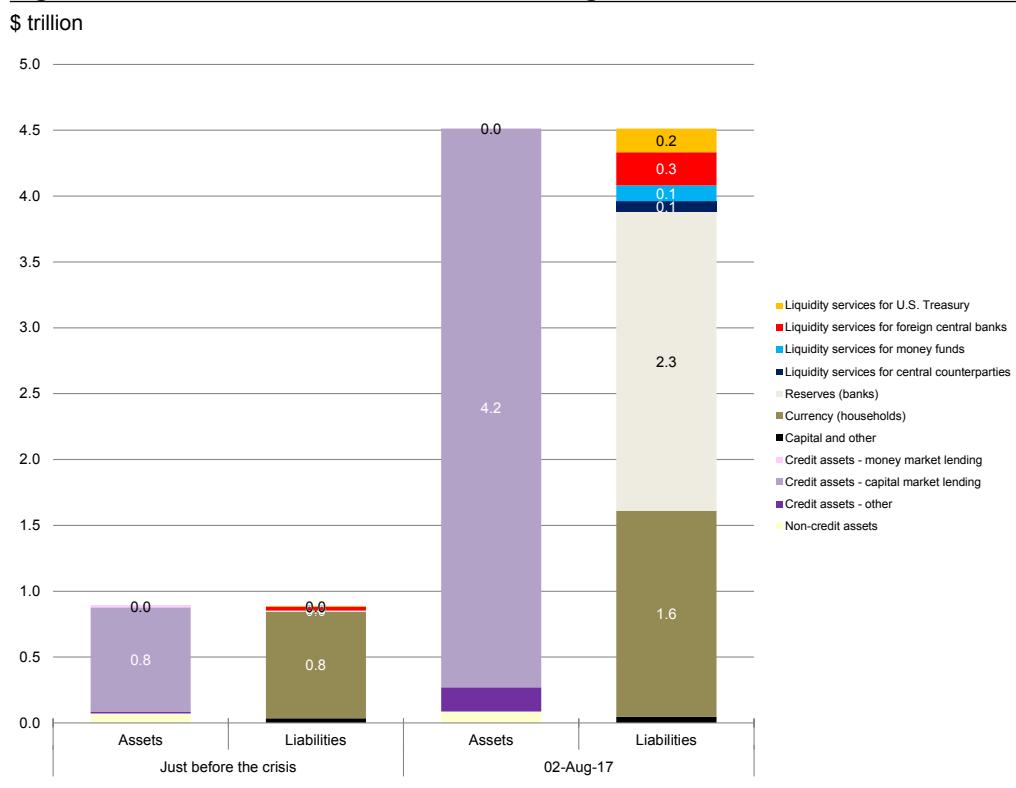
Figures 2 and 3 show how for every dollar moved from a bank to the Fed directly, reserves fall by a dollar and balances in institutional liquidity accounts increase by a dollar. Far from being an active driver of these flows and associated liability swaps, the Fed has been a passive accommodator of them. As banks pruned their books to get Basel III compliant, customers looked to park their liquidity elsewhere and the Fed welcomed them.

The unifying theme across these flows is that every time the above institutions move their funds from a bank to the Fed, reserves are drained from the banking system and funds move from entities that trade reserves (banks) to an entity that does not (the Fed). In previous issues of Global Money Notes (see [here](#)) we have referred to these accounts as "funding black holes" – the institutional equivalents of keeping cash under the mattress.⁴

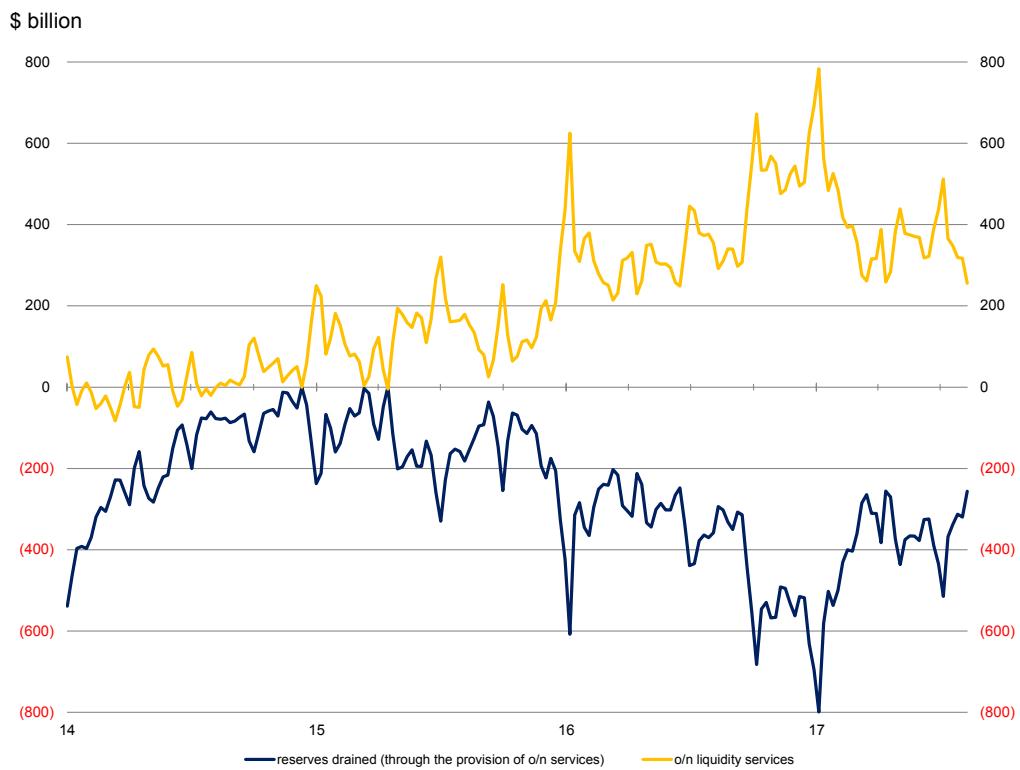
² Foreign central banks also moved some of their dollar reserves from U.S. Treasury bills to the Fed's foreign repo pool (see [here](#)).

³ The volume of overnight liquidity services provided to institutional cash investors fluctuates over time. It has been increasing on a trend-basis since 2015, and peaked at \$800 billion in November, 2016. In recent months, volumes fell to a lower \$250 billion.

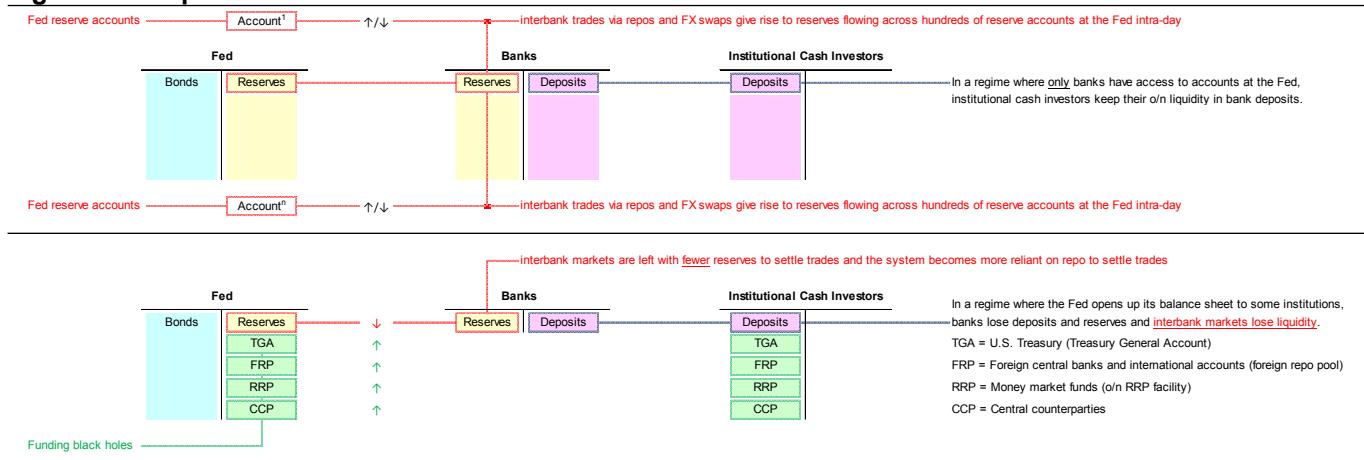
⁴ Increases in currency outstanding have a similar impact on reserves. Every time a bank deposit is converted to currency, the Fed swaps reserves into currency (this is true whether deposits are withdrawn through visits to an ATM or by shifting one's liquidity to a safe at a freeport in Geneva). The result is fewer claims on banks and more on the Fed directly (see Figure 4).

Figure 1: The Fed's Increased Service Offering

Source: Federal Reserve, Credit Suisse

Figure 2: Reserves and Overnight Liquidity Services

Source: Federal Reserve, Credit Suisse

Figure 3: Swaps of IOUs

Source: Credit Suisse

Because unlike banks, the Fed doesn't trade the funds it takes in via funding black holes, when the amount of reserves declines, term money markets tighten. This is especially true in the FX swap market where the amount of reserves held by banks at the Fed determines the amount of U.S. dollars that banks can swap for yen, euros, pounds and Swiss francs in the form of reserves at other central banks without having to sell or repo something first.

Reserves weren't always the grease to FX swap transactions. Before the crisis, banks stored their liquidity in interbank money markets, and endless arbitrage across interbank markets ensured parity across OIS, repo, Libor and FX swap implied funding curves. Arbitrage involves borrowing in one market and lending in another. Lending involves the creation of deposits, and interbank lending involves the creation of interbank deposits. Arbitrage involving FX swaps were typically settled using interbank deposits, and, if deposits were insufficient, one could always repo bonds cheaply by calling up a dealer.

No longer. Post-Basel III, banks keep their liquidity with the sovereign, not other banks, and reserves, not interbank deposits are the system's main settlement medium (see [here](#)).⁵

FX swaps used to mean deposit swaps. Now they mean reserve swaps.

When the amount of reserves declines, banks increase their reliance on repos to settle. But that is not without costs. In a regime where balance sheet is rationed repos are costly, and the more the banking system relies on repos to settle FX swap trades, the farther FX swap implied rates drift from the OIS curve and the wider the cross-currency basis.⁶

Investors who have grown up trading emerging markets (EM) are more familiar with the impact that central banks' liability swaps can have on conditions in money markets than investors who have grown up trading G3 money markets. Effectively what we are saying is that draining reserves is the equivalent of sterilization operations by EM central banks. Think of the PBoC buying dollars by creating yuans and then sterilizing yuans by swapping them into central bank bills. The Fed swapping reserves for other liabilities is the same.

EM central banks' sterilization operations are always deliberate. They are aimed at tying up funds to keep them from fanning excessively easy conditions in money markets and excessive lending growth. But the Fed does not think of reserves getting drained or swapped into other liabilities as sterilization and lets liability swaps run their course freely. Left unaddressed, the net impact of sterilizing reserves are tighter funding conditions, similar to the one that we have seen gradually emerge in the FX swap market since 2015.

⁵ In a post-Basel III financial order, banks only trade with each other on a secured basis, not unsecured. That means that secured repos and FX swaps replaced unsecured fed funds and interbank deposits as the instruments through which the system settles.

⁶ See Parts II and III for details.

Part 2 – Sterilization and the Fracking of Reserves

The sterilization of reserves in the U.S. financial system started on January 1st, 2015 – the go-live date of Basel III and the start of banks' efforts to prune their balance sheets of unwanted institutional deposits. Sterilization commenced only weeks after the Fed ended QE and the corresponding injection of reserves to the financial system in November 2014. Flows related to money fund reform drove a second wave of sterilization during 2016, but during this episode it was flows initiated by money fund investors rather than banks that drove the swap of reserves to other liabilities. By the end of 2016, the cumulative amount of reserves that have been sterilized has reached \$1 trillion (see Figure 4), and FX swap implied costs of dollar funding rose to levels that are typical of crisis times (see Figure 5).⁷

Sterilization impacts FX swap-implied rates through two channels: (1) the gradual shift in the funding of intra-quarter FX swap trades away from arbitrage to “fracking” reserves in U.S. banks’ HQLA portfolios, and (2) the quarter-end turn premium. The first channel we discuss in the remainder of this section, and the second we discuss in the following section.

Figure 6 shows the hierarchy of market making in the FX swap market. It shows how market making can shift from broker-dealers to banks, from foreign banks to U.S. banks and from U.S. banks doing arbitrage to fracking their HQLA portfolios in normal times, and from fracking to the Fed in crisis times. It highlights four distinct levels of intermediation.

Level 1 intermediation involves broker-dealers that run matched FX swap books and intermediate between accounts that are long dollars and wish to lend dollars via FX swaps, and accounts that are short dollars and wish to hedge their short positions via FX swaps. Dealers either sit in a bank or a bank holding company. Because they run matched books, dealers’ market making activity has a neutral impact on their parent’s liquidity position. But matched books seldom clear markets, and bridging imbalances in order flows is always for a parent bank’s treasurer to decide one level higher in the hierarchy. It is at these higher decision-making levels where the cross-currency basis gets determined through arbitrage.

Level 2 intermediation involves foreign banks bridging imbalances through arbitrage by tapping unsecured CD and CP markets. Because foreign banks report balance sheet only on quarter-ends, intra-quarter, their balance sheets are boundless. That means that for trades shorter than three months, foreign banks will lend dollars even at very low spreads.

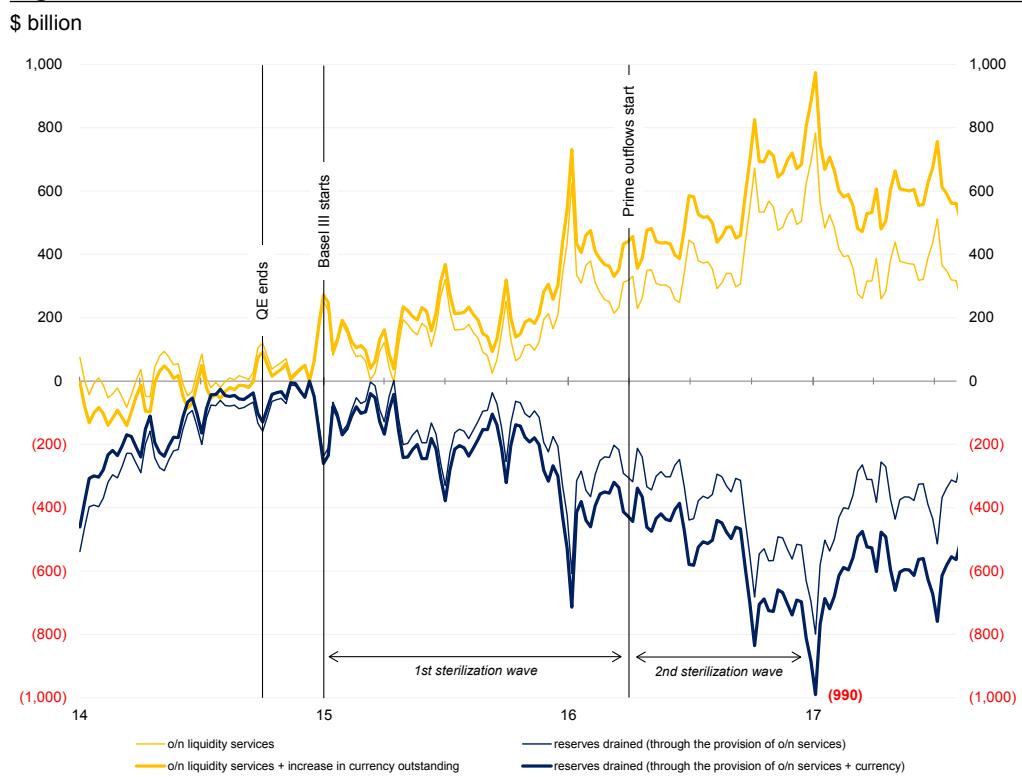
For trades three months or longer, the picture is more complicated. Trades shorter than three months can always be erased from balance sheets before reporting dates – e.g., overnight trades can be turned off from one day to another, and most term trades can be structured such that they mature before quarter-ends. But trades three months or longer always stay on the books on quarter-ends. Because they are reported, they use equity, and because they use equity, they better not dilute return-on-equity (RoE) targets. Most foreign banks have a leverage ratio of only 3% which means that for an RoE target of 15%, a three-month FX swap trade must earn a spread of about 45 bps at a bare-bone minimum.

Intra-quarter balance sheet galore and relatively cheap balance sheets notwithstanding, foreign banks’ ability to step in as arbitrageurs is always a function of conditions in wholesale funding markets. When markets are under strain, activity shifts one level higher.

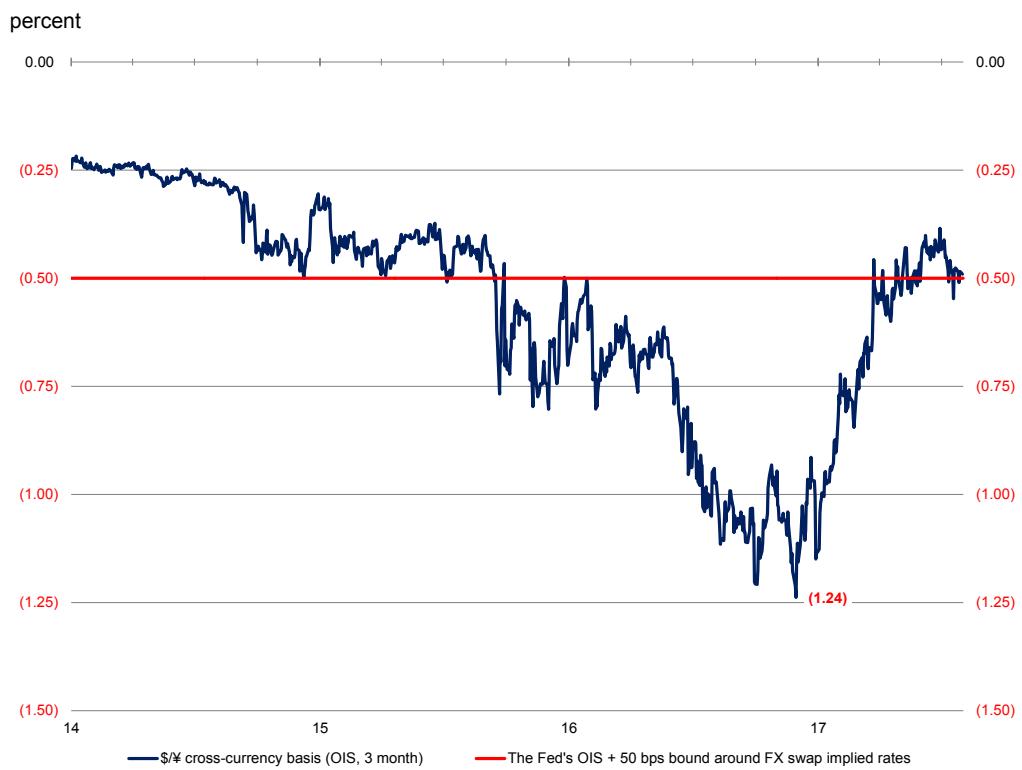
Level 3 intermediation involves U.S. money center banks stepping in for foreign banks. Unlike foreign banks, which only have access to at times volatile wholesale funding, U.S. banks have access to more stable funding such as retail deposits or FHLB advances. Access to state sponsored funding means that U.S. banks can get dollars when others can’t.

But stable funding does not mean cheap balance sheets. Because U.S. banks have double the leverage ratio of most foreign banks, and because U.S. banks report balance sheet every day and not just on quarter-ends like most foreign banks, the minimum spreads at which they step in to make markets are much wider than those of foreign banks.

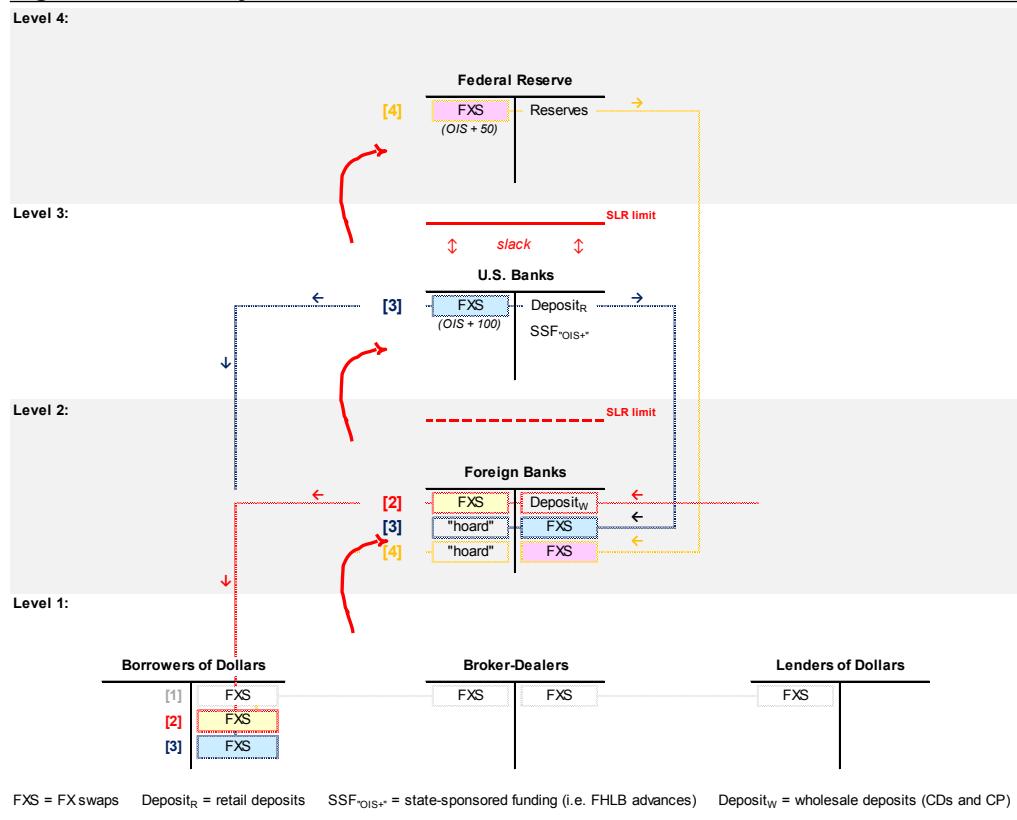
⁷ Also see Figure A5 and A6 in the appendix.

Figure 4: Waves of Sterilization

Source: Federal Reserve, Credit Suisse

Figure 5: The Mother of All Bases

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 6: Hierarchy at the Outer Rim

Source: Credit Suisse

For a U.S. bank subject to a 6% leverage ratio (eSLR) and a 15% return-on-equity target, three-month spreads are at least 100 bps. At face value, the math works out to 90 bps, but U.S. banks manage to a stressed SLR, not to mention their outsized [G-SIB surcharges](#).

Level 4 intermediation involves the Fed stepping in as the system's lender of last resort at OIS + 50 bps during times of systemic credit stress. But it need not be the case that the Fed lends via the swap lines only when private markets freeze due to credit risk concerns. The Fed has neither funding nor balance sheet constraints. Whether it should step in to police term spreads at OIS + 50 bps in normal times is up to the FOMC to decide – and fostering debate about that is the job of the Manager of the System Open Market Account.

Prime money fund reform was a watershed event in that it pushed arbitrage volumes in the FX swap market away from cheap foreign to expensive U.S. balance sheets (see [here](#)). The flow of funds away from prime to government funds, and from the CD and CP market to FHLB's advances reduced the weight of foreign banks' intra-quarter arbitrage volumes and increased those of U.S. banks. Lower funding costs through advances notwithstanding, the wider spread targets of U.S. banks led to cross-currency bases drifting structurally wider.

Putting trades on for 100 bps assumes a simple arbitrage where a bank borrows reserves to lend dollars via FX swaps – a trade which would only impact banks' leverage ratios. But money fund reform also meant the sterilization of reserves, and sterilization meant that U.S. banks had to "drill" into their HQLA portfolios to meet the market's needs for dollars. By lending reserves from their HQLA portfolios, banks swap dollar liquidity for liquidity in other currencies (in the form of deposits at other central banks). This can worsen a range of Basel metrics. Fixing these requires balance sheets which can increase spreads further.

In a way, lending dollars via arbitrage is like drilling oil in Saudi Arabia and lending dollars from HQLA portfolios is like fracking – cheap and easy versus expensive and messy. Fracking is best understood through the quarter-end turn premium, which we discuss next.

Part 3 – Sterilization and the Turn Premium

Money market rates used to be a simple function of Fed expectations and a term premium. Now we need to add a turn premium – the premium that flares up around quarter-end turns. Understanding the turn premium is important because expectations for the size of *future* quarter-end turns can account for up to $\frac{1}{2}$ of the cross-currency basis at longer tenors *today*.

Understanding the turn premium begins with understanding the role of reserves in the post-Basel III financial order, where balance sheet is rationed and repo costly and scarce. The turn premium exists because foreign banks turn off their arbitrage activities around quarter-end reporting dates. When arbitrage is off, money funds that typically lend to foreign banks, lend to the Fed via o/n RRP instead. When o/n RRP take-up spikes, the volume of reserves falls and dollars get scarce. U.S. banks fill the void by fraching their HQLA portfolios for reserves. But U.S. banks are subject to tougher Basel III ratios and liquidity stress tests than foreign banks, and the price at which U.S. banks lend reserves via FX swaps depends on the degree to which the marginal trade hurts their Basel metrics. That, in turn, depends on the amount of reserves in U.S. banks' HQLA portfolios. Figure 7 shows what quarter-ends look like when reserves are abundant and when they are scarce.

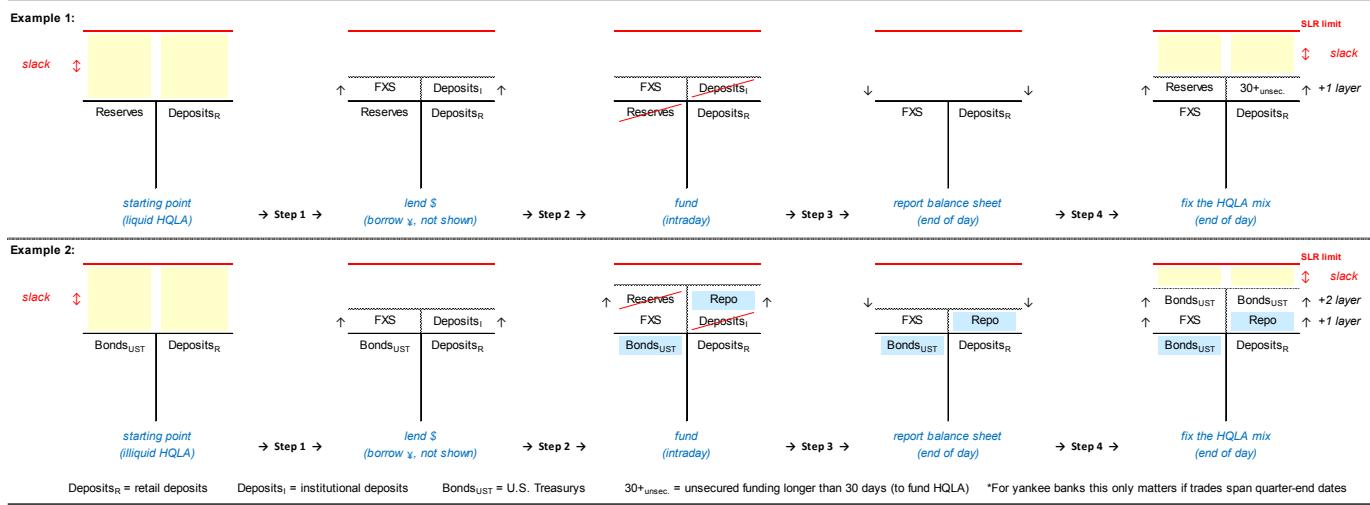
In the first example, a U.S. bank starts with reserves on the asset side of its balance sheet, funded with retail deposits. The bank then lends dollars through an FX swap transaction (step 1): it books an FX swap loan on the asset side and a deposit on the liability side, which expands its balance sheet. When the borrowing entity withdraws the dollars, the bank funds the withdrawal by wiring reserves to the reserve account of the recipient bank (step 2). Once the flows have settled, the bank files its end-of-day balance sheet snapshot (step 3): its SLR is unchanged, but its LCR is qualitatively different. Its LCR is different because the FX swap trade reduced the bank's dollar liquidity (fewer reserves at the Fed) and increased the bank's yen liquidity (more reserves at the BoJ). The Fed may or may not have issues with this. If the bank that lent the dollars keeps most of its dollar HQLA in the form of reserves at the Fed, swapping some dollars for yen (reserves for reserves) may not raise eyebrows. But if the bank that lent dollars keeps most of its dollar HQLA in the form of U.S. Treasuries or MBS, the swapping of dollars for yen may not be possible without taking some remedial action – the Fed may require the bank to increase the amount of reserves in its HQLA portfolio to restore its dollar liquidity to the starting point (step 4). In this case, the FX swap trade is not balance sheet neutral. The expansion of the HQLA portfolio increases the bank's balance sheet and brings it closer to the SLR limit.⁸

In the second example, a U.S. bank has Treasuries instead of reserves in its HQLA portfolio. Like before, the bank lends dollars to a borrowing entity through an FX swap trade (step 1), and the borrowing entity withdraws its dollar deposit to spend it on something. But the way the bank funds the withdrawal of dollars is different from before. Treasuries are more liquid than most securities, but are less liquid than reserves – they cannot be used for settlement (step 2). The bank lending the dollars cannot fund the withdrawal of dollars unless it turns Treasuries into cash through the repo market.⁹ This funding step represents an extra cost that was not there in the previous example. Once the trade has settled, the bank files its end-of-day balance sheet report: its SLR got worse and its LCR got worse too (step 3). Its SLR is worse because it used balance sheet to fund the withdrawal of dollars. Its LCR is worse too because repos encumber bonds and only unencumbered bonds count as HQLA. To fix its LCR, the bank has to raise unsecured funding and buy more Treasuries (step 4). This funding step represents yet another extra cost that was not there in the prior example. By the time this is done, the bank's balance sheet increased by two extra layers, leaving only half the slack as before. This will raise the price of the next FX swap trade.

⁸ We have little visibility into the philosophy with which the Fed stress-tests banks' HQLA portfolios. Whether the FX swap trade described above would pass from an LCR perspective is determined through the Fed's CLAR process. The point is that FX swap trades that are funded secured (not unsecured) impact banks' LCR, which in turn must be taken into account when pricing them.

⁹ In a post-Basel III financial order, banks only trade with each other on a secured basis, not unsecured. That means that secured repos and FX swaps replaced unsecured fed funds and interbank deposits as the instruments through which the system settles.

Figure 7: Fracking is Messy!



Source: Credit Suisse

Figure 8 shows what sterilization does to one-week forward points around quarter-ends. As sterilization grows, the turn premium grows too, and as the turn premium grows, the cross-currency basis widens. The turn premium grows because fewer reserves make it harder for U.S. banks to step in for foreign banks without having to take steps to protect their Basel III ratios. As the above examples explained, starting liquidity positions matter – stepping in as market maker is much easier when HQLA portfolios are flush with reserves.

Figure 9 shows what sterilization does to the GCF repo rate. As sterilization grows, the turn premium grows too as the quarter-end netting needs of dealers are exacerbated by U.S. banks tapping the GCF market to fund FX swap trades. The spread between o/n GCF and o/n tri-party repo rates grows progressively wider as well, which is a sign of reserves getting more scarce in the interbank money market. In addition, o/n tri-party rates tend to trade at a growing spread over the o/n RRP rate as dealers attempt to take in more cash from government money funds to lend into the o/n GCF market which trades at a premium.

These dynamics have an important message for anyone looking for the o/n fed funds market to trade tighter as reserves are drained: stop expecting that, it will never happen!

Unsecured markets like the fed funds (FF) market are dead under Basel III as banks no longer trade with each other on an unsecured basis. Only secured money markets survive. Locally, banks settle via repos. Globally they settle via FX swaps. The strains you're waiting for in the FF market are right in front of your eyes in the repo and FX swap markets.

These dynamics have an important message for the Fed as well. Reserves are not excess. Dropping the E from IOER is progress (see Simon Potter's speech [here](#) versus [here](#)), but talking the talk ain't the same as walking the talk. Taper with care, or the dollar gets scarce!

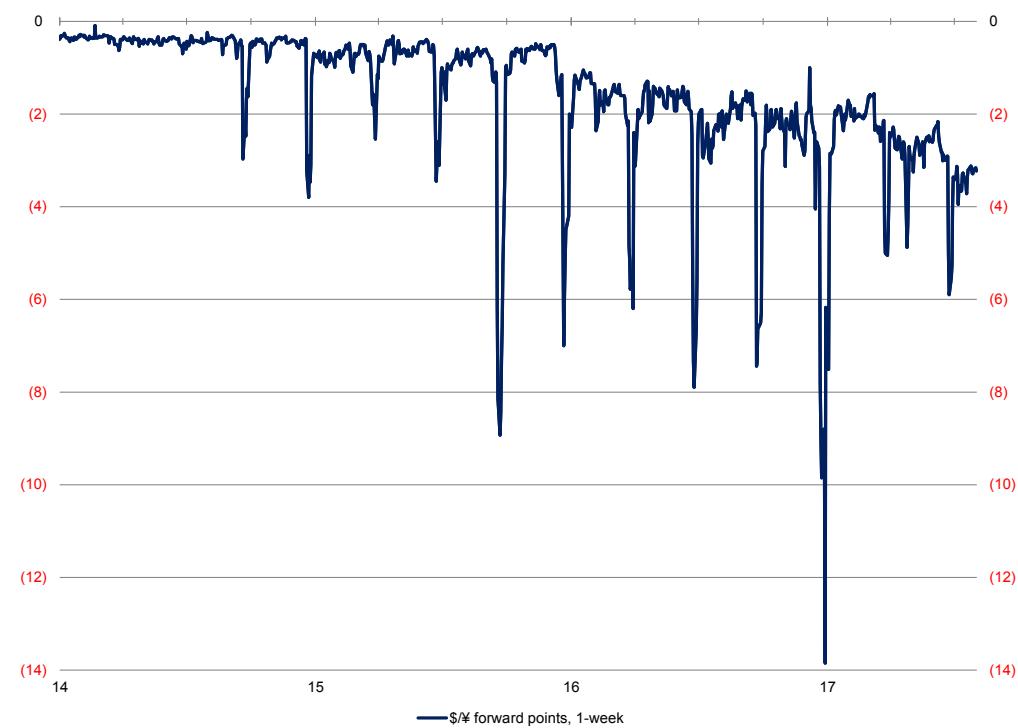
If the dollar gets scarce, the Fed may need to inject reserves back into the system through open market operation on the asset side of its balance sheet much sooner than it thinks.

To ease funding conditions, the Fed would have to inject reserves back into the system, for example through the dollar swap lines. Doing so would involve booking dollar loans at OIS + 50 bps in the form of FX swaps on the asset side of the balance sheet, and creating those dollars in the form of reserves on the liability side of the balance sheet (see Figure 10).

In other words, to keep conditions in the FX swap markets unchanged, market making activities on the liability side of the Fed's balance sheet which drain reserves, should have a symmetrical counterpart on the asset side ready to add reserves back in as needed. At the very least, this would involve "relaxing" access to the swap lines on quarter-ends, to offset some of the funding pressures that come from the recurring spikes in RRP take-up.

Figure 8: Sterilization and the Turn Premium in the FX Swap Market

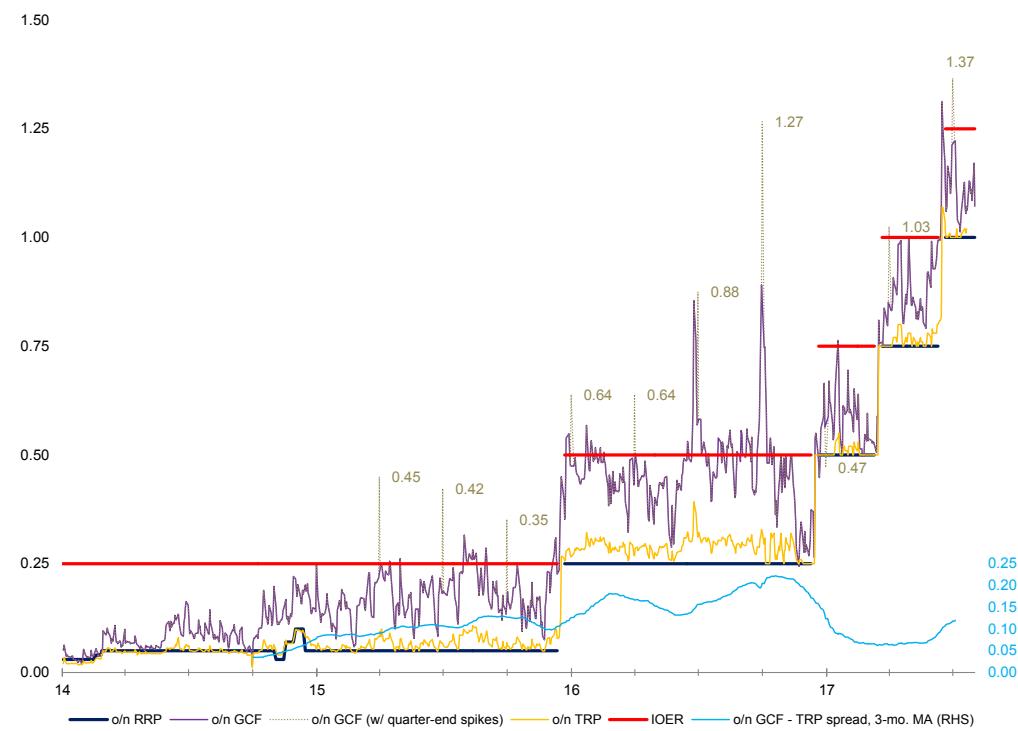
forward points



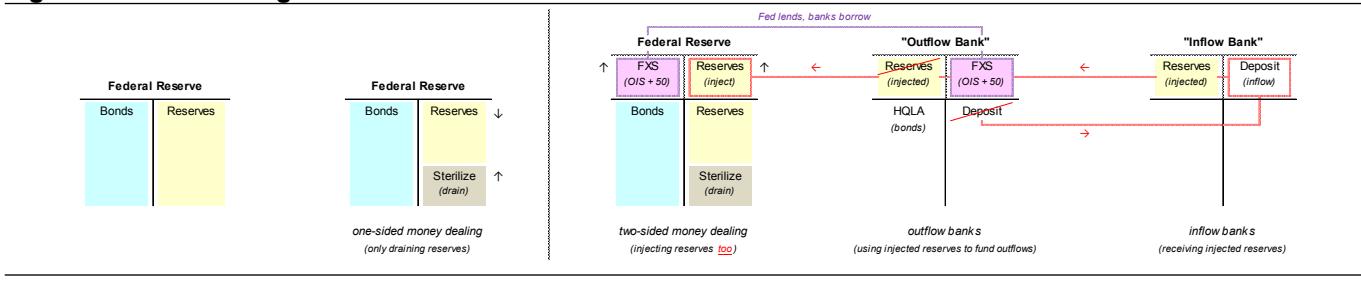
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 9: Sterilization and the Turn Premium in the GCF Repo Market

percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 10: Neutralizing Sterilization

Source: Credit Suisse

Part 4 – Sterilization and J.P. Morgan

For the moment, the Fed operates squarely as a one-sided money dealer: it makes markets only on the liability side of its balance sheet but not on the asset side. Figure 11 shows the Fed's one-sided nature as market maker and the volume of sterilization in context.

First, market making in overnight liquidity services which drain reserves (the light blue line) are currently not being neutralized by activities which would add reserves back in either via repos, FX swaps or discount window lending (see the dark blue, red and orange lines).

Second, the amount of reserves sterilized to date is by no means trivial – it is close to the amount of reserves added through either the discount window or the swap lines in 2008. The injection of reserves through the swap lines in 2008 substituted for the breakdown of interbank markets – reserves replaced interbank deposits as the settlement medium. But today, reserves are the system's settlement medium. Draining as much of them as the amount added at the height of the crisis is bound to have a significant market impact, especially considering that the size of the FX swap market doubled since then (see [here](#)).

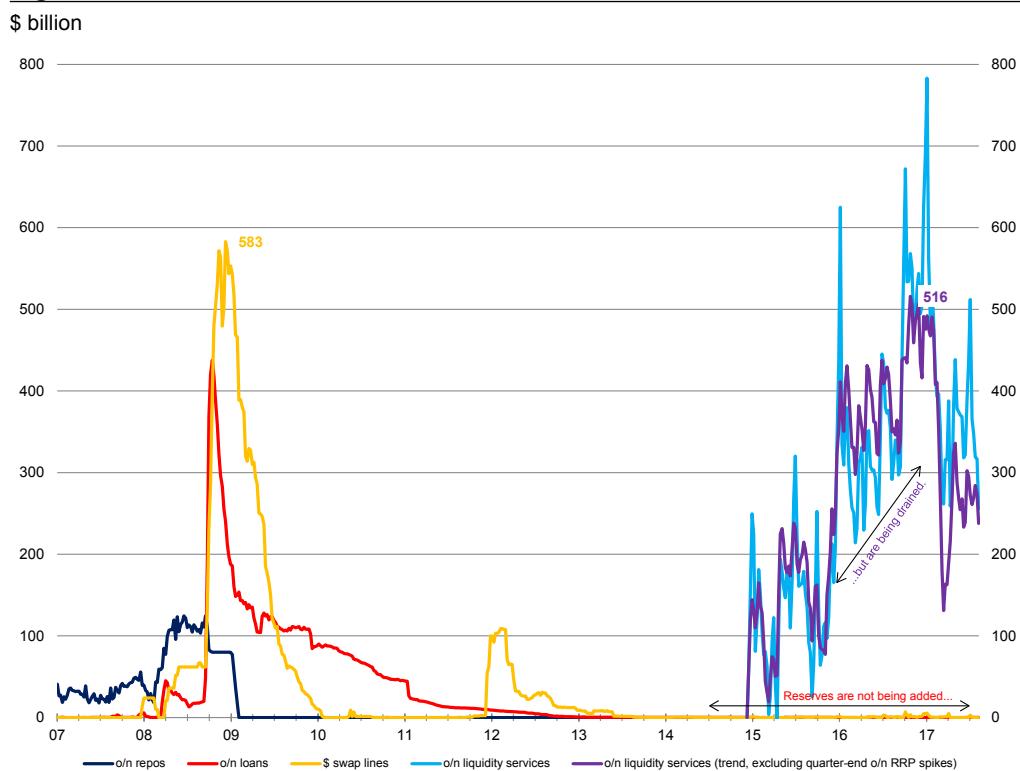
The reason why the Fed remains a one-sided money dealer is that its guiding philosophy about liquidity provision remains anchored by the view that it should add reserves only during crisis times when markets cease to exist due to a flare-up of credit risk concerns. Liquidity provision in order to police the range within which FX swap markets trade in normal times – i.e., outside of crises – is not yet a stated aim of the Fed, and so when the OIS + 50 bps bound for FX swap implied rates is breached, the Fed does nothing about it.

Short of a public backstop to the FX swap market, only private backstops are available in normal times. In turn, the spreads at which private backstops kick in are to a large extent determined by the parameters with which the Fed chose to apply Basel III to U.S. banks. As our discussion above has shown, these private spreads are at least 100 bps, which has implications for how wide cross-currency bases can go in times of stress (see Figure 12).

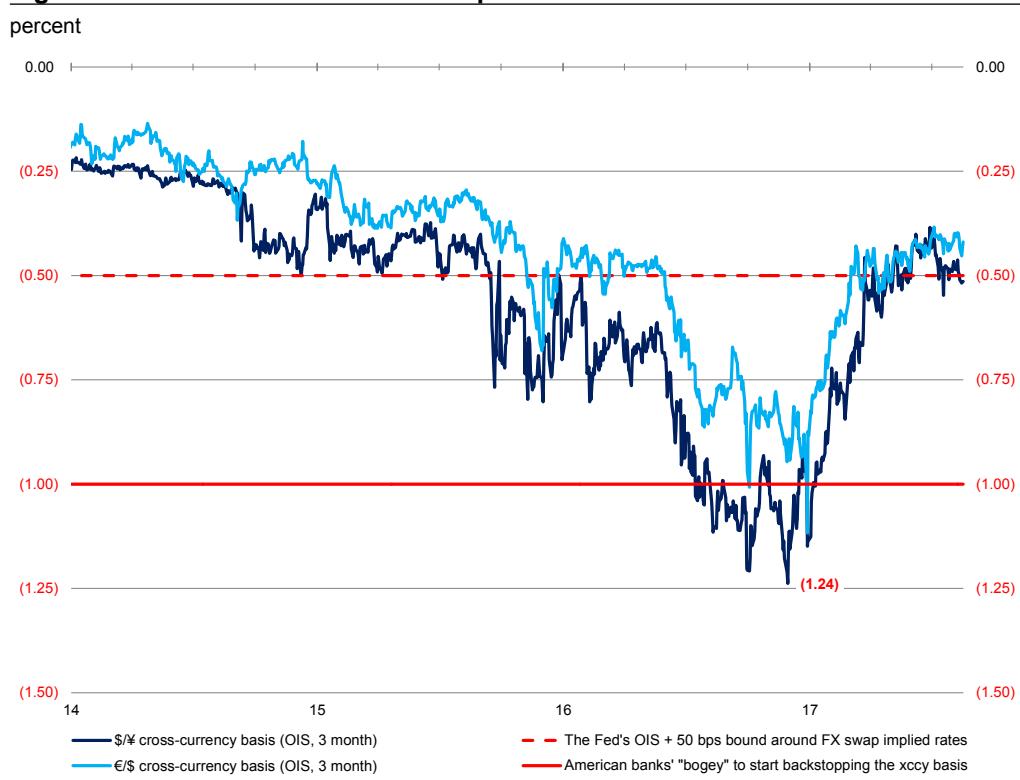
By being unwilling to step in to police the cross-currency basis at OIS + 50 bps, the Fed leaves it to large U.S. banks to act as the world's dollar lenders of next-to-last resort, and to one large U.S. bank in particular – J.P. Morgan Chase Bank, N.A. of Columbus, OH.

Unlike the Manager of the SOMA, J.P. Morgan cannot create reserves out of thin air, but it holds far more reserves than any other bank in the financial system (see Figure 13). With slight exaggeration, J.P. Morgan has twice as many reserves at the Fed as the second most reserve-rich U.S. G-SIB (Wells Fargo), four times as many as the third most reserve-rich U.S. G-SIB (Bank of America), and more than all foreign G-SIBs combined.

Having a lot of reserves does not mean being a money market Samaritan. The game is to figure out where less liquid banks would lend, and lend just below that rate (see Figure 14). As discussed above, the less liquid a bank's HQLA portfolio, the harder it is to lend reserves via FX swaps and the higher the price charged for dollars. J.P. Morgan is the closest to the example of a bank that can frack its HQLA portfolio without messing up any of its Basel III metrics. Think of J.P. Morgan's HQLA portfolio as the "Bakken Shale" of the global financial system, and the bank as the system's *de facto* lender of next-to-last resort.

Figure 11: Sterilization in Context

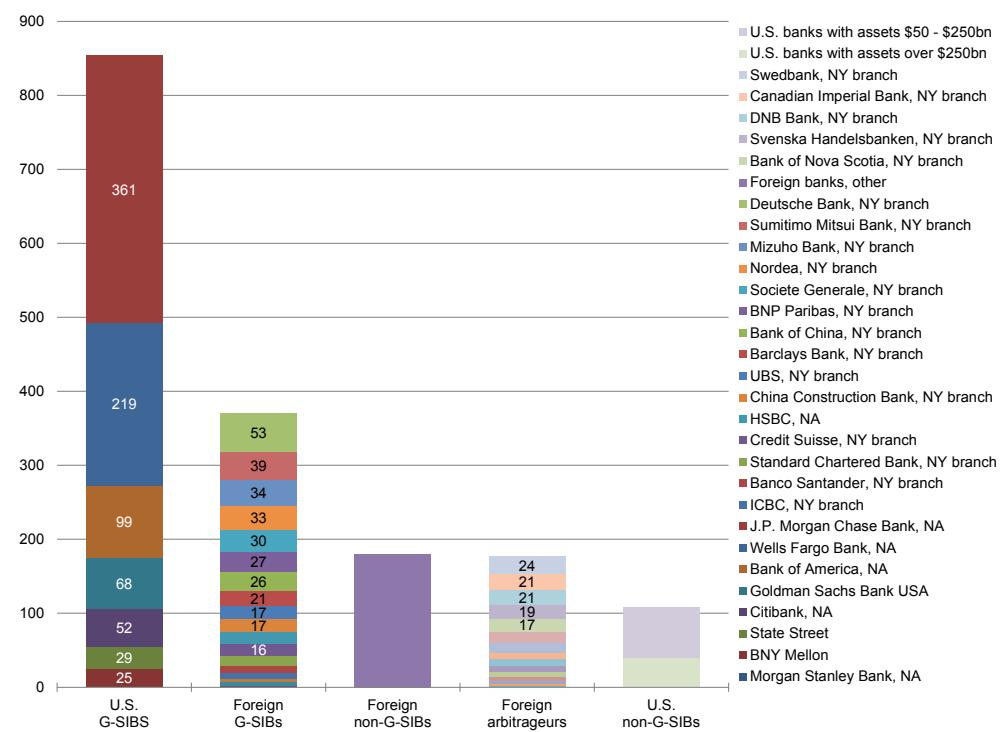
Source: Federal Reserve, Credit Suisse

Figure 12: Public vs. Private Backstops

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 13: J.P. Morgan's Absolute Dominance

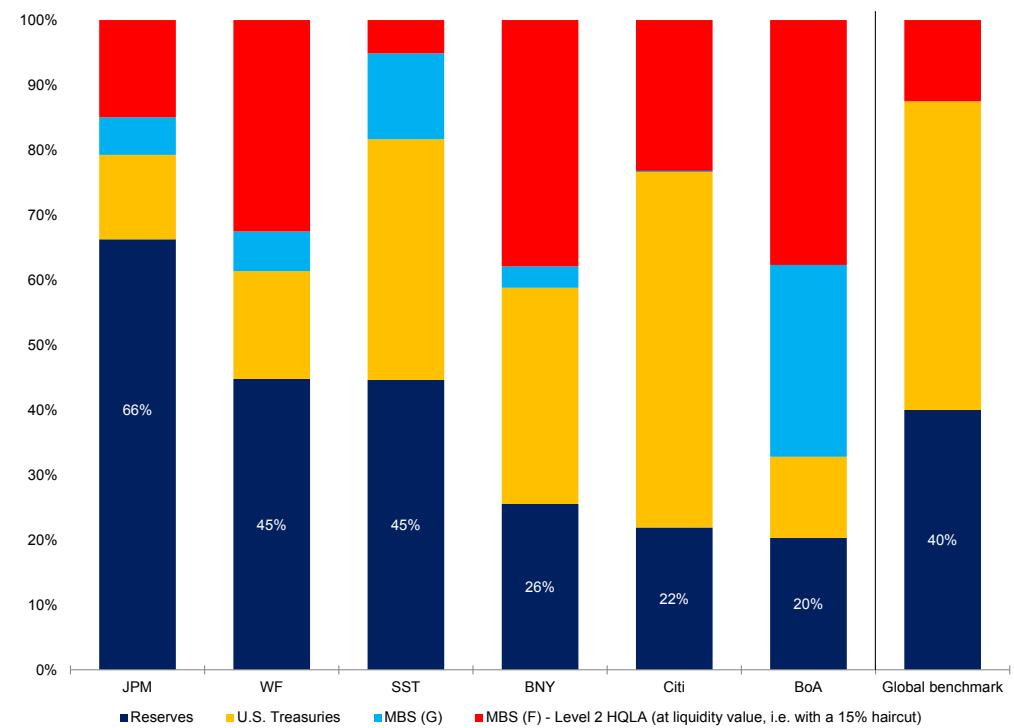
2017Q1, \$ billion



Source: Federal Reserve, FFIEC, Credit Suisse

Figure 14: J.P. Morgan's Relative Dominance

2017Q1, percent



Source: FFIEC, BIS, Credit Suisse

Part 5 – Sterilization in Reverse

When J.P. Morgan's spreads are tested, everyone's on edge – including the Fed. After all, what spreads of over 100 bps over OIS mean is that in some regions of the world, dollars are going for a price that's way outside the Fed's desired range for FX swap implied rates, and imply at least four additional hikes over and above what's actually been administered.

Calls for a more liberal access to the swap lines and the Fed to step in as market maker to enforce the OIS + 50 bps bound were intense last year in the wake of money fund reform. But the Fed remained silent about the widening of cross-currency bases and the tightness of global dollar funding markets in general. Central bankers at the [BoJ](#), the [RBA](#) and the [BIS](#) cared about the basis and gave smart speeches, but there were no speeches from the Fed.

A good bank treasurer knows about every major shift to occur on his bank's balance sheet – weeks in advance. Maybe the reason why the Fed decided to hold off on deploying the FX swap lines last fall was that it knew full well that due to the looming debt ceiling, its largest customer was about to run down its cash balances. That in turn would mean an injection of about \$400 billion of reserves into the banking system – sterilization in reverse.

Figure 15 shows what happens when reserves enter the system via reverse sterilization. When U.S. Treasury ran down its cash balances from \$400 to \$50 billion late last year (see Figure A1), the supply of bills only fell by \$100 billion. This means that most of the decline in TGA balances came from Treasury paying for social programs (UI claims, etc.), the wages and salaries of federal employees, and the vendors of the federal government.

The accounts of the individuals and businesses that received these payments are mostly with large U.S. banks. As the federal payments trickled in, U.S. banks' balance sheets increased on both sides. On the asset side, banks credited customer deposits with the funds received from the federal government. On the liability side, the Fed credited banks' reserve accounts and debited the TGA every time the U.S. Treasury made a payment.

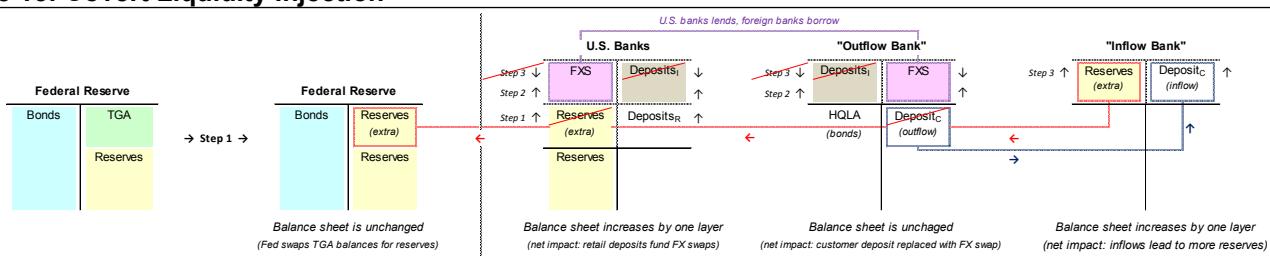
This type of balance sheet expansion is the best any bank can wish for. The types of liabilities that increased are retail and corporate operating deposits. These deposits cost nothing as they are noninterest-bearing. They also have very low HQLA requirements. That means that they can be used to fund whatever. The types of assets that increased are reserves which are super liquid. That means that they can be lent whenever, wherever.

How do you spend \$250 billion of reserves quickly as a money center bank? By lending them in the richest corner of the global money market, which is the FX swap market...

A good treasurer knows that whether reserves are injected through the swap lines or U.S. Treasury spending down its cash balances is the same thing. Either way, the banking system would end up with more reserves and global funding conditions would ease.

The way reserves flow into the FX swap market from reverse sterilization is similar to the way reserves flow into the FX swap market from the activation of the dollar swap lines (compare Figure 15 to Figure 10 on page 11). But there are also some crucial differences.

Figure 15: Covert Liquidity Injection



Source: Credit Suisse

Adding reserves via reverse sterilization happens passively as the Fed accommodates customers' flows on its balance sheet – just like any private bank would. In contrast, adding reserves via the dollar swap lines happens with the active participation of the Fed – like giving a speech on eliminating stigma associated with the use of the dollar swap lines.

Adding reserves through reverse sterilization means that U.S. banks lend on reserves via FX swaps, and adding reserves via the swap lines means that the Fed lends reserves via FX swaps. Banks have balance sheet constraints and a minimum spread target of 100 bps, but the Fed has no balance sheet constraints and could lend at spreads as low as 50 bps.

Most importantly, an increase in noninterest-bearing deposits due to reverse sterilization means that the marginal cost of dollar funding for U.S. banks changes from OIS-like levels to zero, which can bleed through to the cross-currency basis. An increase in reserves and zero-interest deposits at all major U.S. banks also means that the value of J.P. Morgan's HQLA portfolio and its CIO's ability to police the cross-currency basis diminishes, similar to how the value of the Bakken Shale diminishes when Saudi Arabia floods the oil market.

Figure 16 shows what the surge in zero-interest funding did to the FX swap market. Using the \$/¥ cross as our benchmark, three-month FX swap implied rates have been trading around 1.50 percent despite the fact that the Fed hiked rates three times since December. How come? Because U.S. banks did not have to raise reserves via OIS-linked funding. Noninterest-bearing deposits did the trick. More reserves also meant easier fracking on quarter-ends, as the decline in turn premia year-to-date suggests (see Figures 8 and 9).

If the cross-currency basis could speak...

...it would scream that there is more to understanding it than demand outstripping supply and Basel III limiting banks' ability to fill the gap via arbitrage. The world is more nuanced.

Figure 17 shows the five phases the FX swap market has gone through since 2014. What's been constant since 2014 was growing monetary policy divergence between the U.S. and other markets. What's been in flux was the plumbing of the global financial system and the absolute amount of U.S. dollars sloshing around in the form of reserves at the Fed.

Phase 1, which lasted from January 2014 to September 2015, was driven by foreign banks getting Basel III compliant and adjusting their spread targets for term FX swap trades.

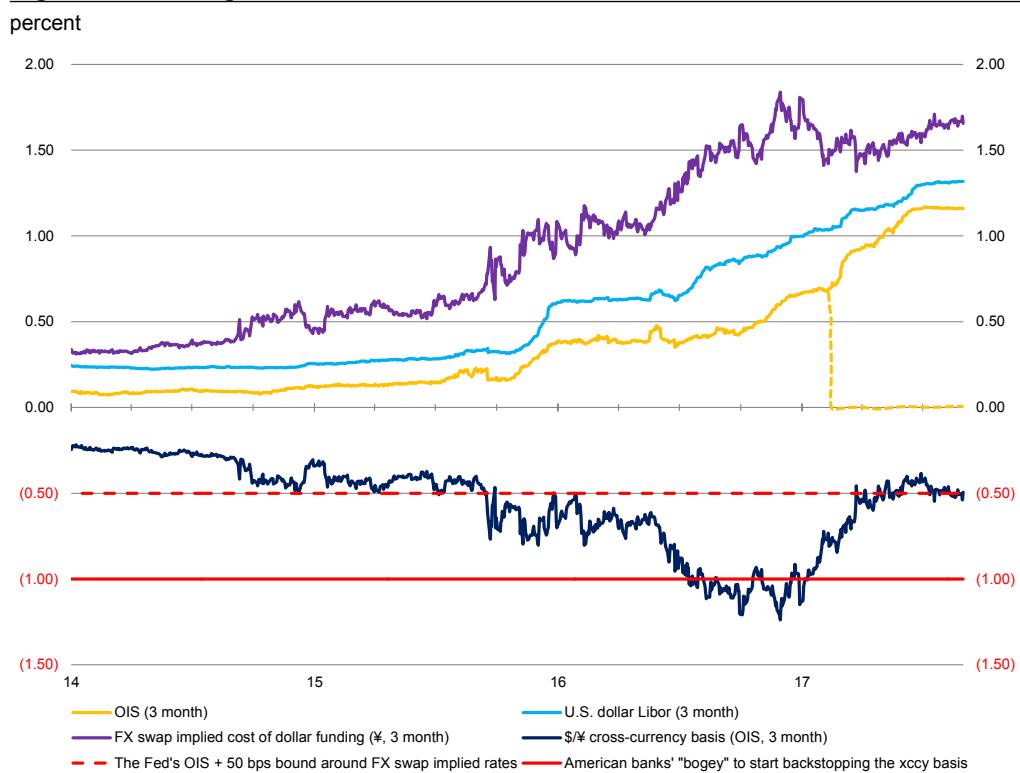
Phase 2, which lasted from October 2015 to April 2016, was driven by Treasury draining \$300 billion in reserves from the system and the impact that had on the turn premium.

Phase 3, which lasted from April 2016 to October 2016, was driven by money fund reform pushing arbitrage flows away from cheap foreign balance sheets to expensive U.S. ones. In the case of the \$/¥ basis, it was most definitely not driven by Japanese banks tapping the FX swap market – we know this from data from the Bank of Japan which shows no increase in Japanese banks' bid for dollars via FX swaps over this period (see Figure 18).

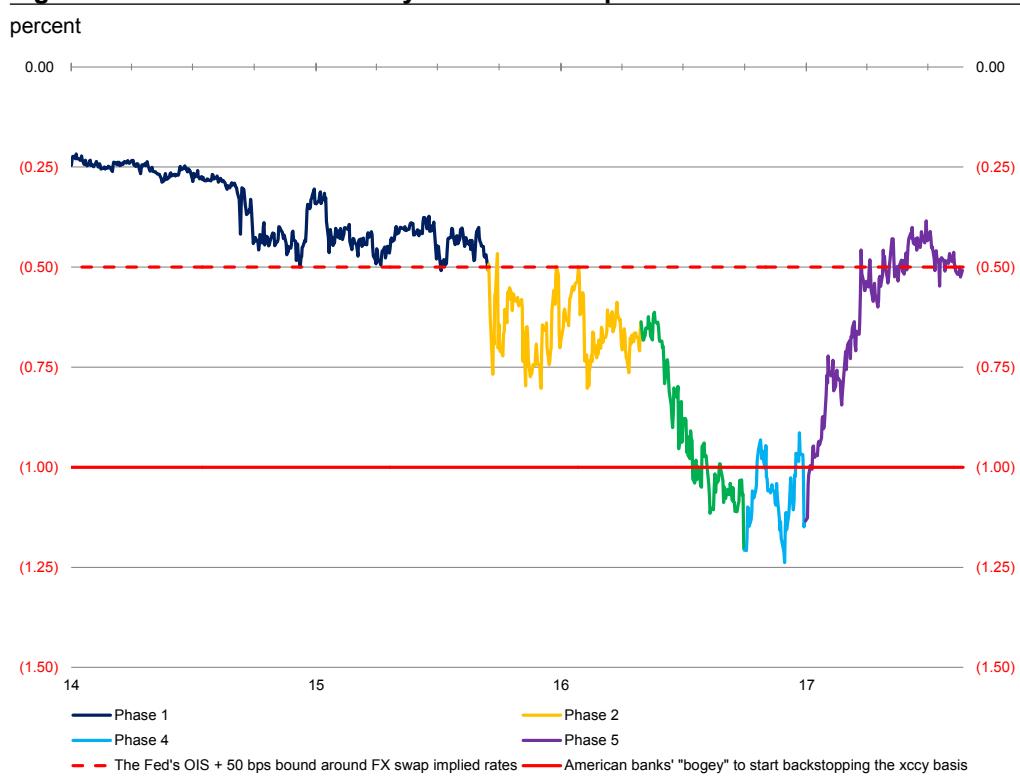
Phase 4, which spanned the fourth quarter of 2016, was very good times for J.P. Morgan. Fracking the Bakken Shale became RoE positive and lending dollars from it turned markets. We learned that the next time the three-month \$/¥ basis widens to over 100 bps over OIS, it'll soon start to narrow. When it comes to cross-currency bases, do not fight J.P. Morgan!

Phase 5, which is the regime we've been in since January 2017, was driven by Treasury burning through its cash balances. \$300 billion in reverse sterilization stole J.P. Morgan's thunder just as Saudi Arabia flooding the world with oil stole the Bakken Shale's thunder.

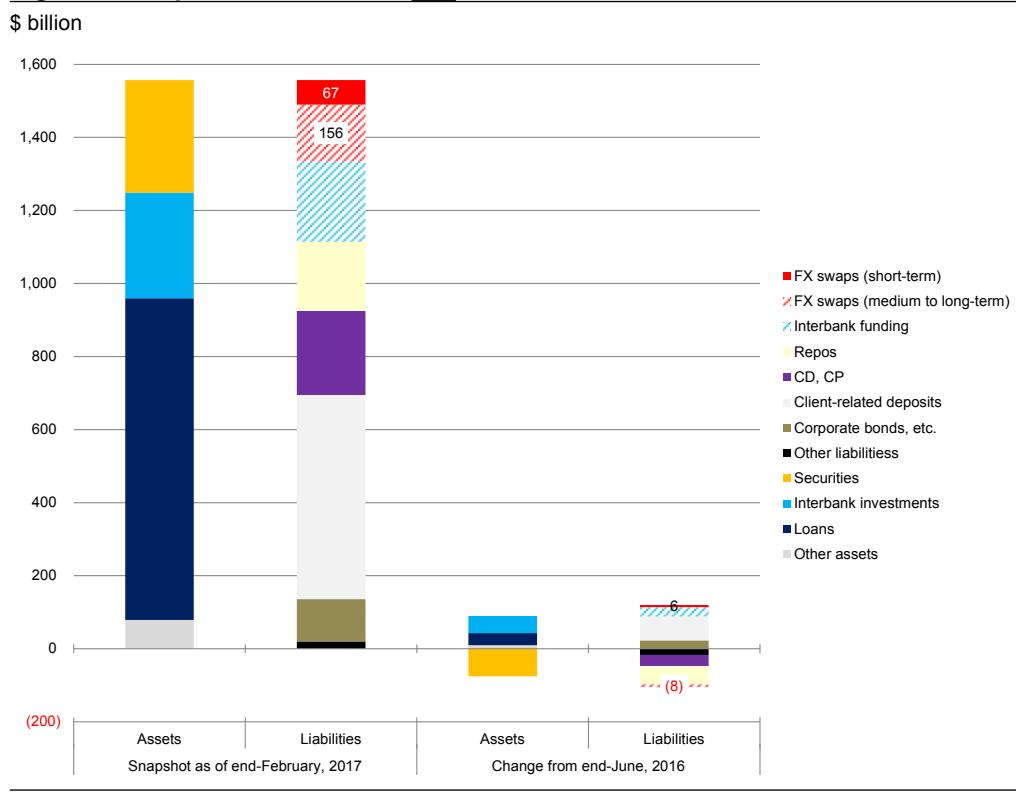
Japan's bid for U.S. fixed income is still there, so the story that reduced hedging needs depressed the basis is hard to believe. Banks drove the net sale of U.S. dollar assets since November – lifers and pension funds did not. And as Figure 18 shows, the corresponding decline in Japan's bid for dollars was in repo and not in FX swaps. Ditto for the story that real money accounts coming out of the weeds when the basis was wide was what turned the market. If that were true, those accounts should no longer be lending at current spreads and their absence should definitely have reversed the basis. Details matter!

Figure 16: Getting Dollars at Off-Market Prices

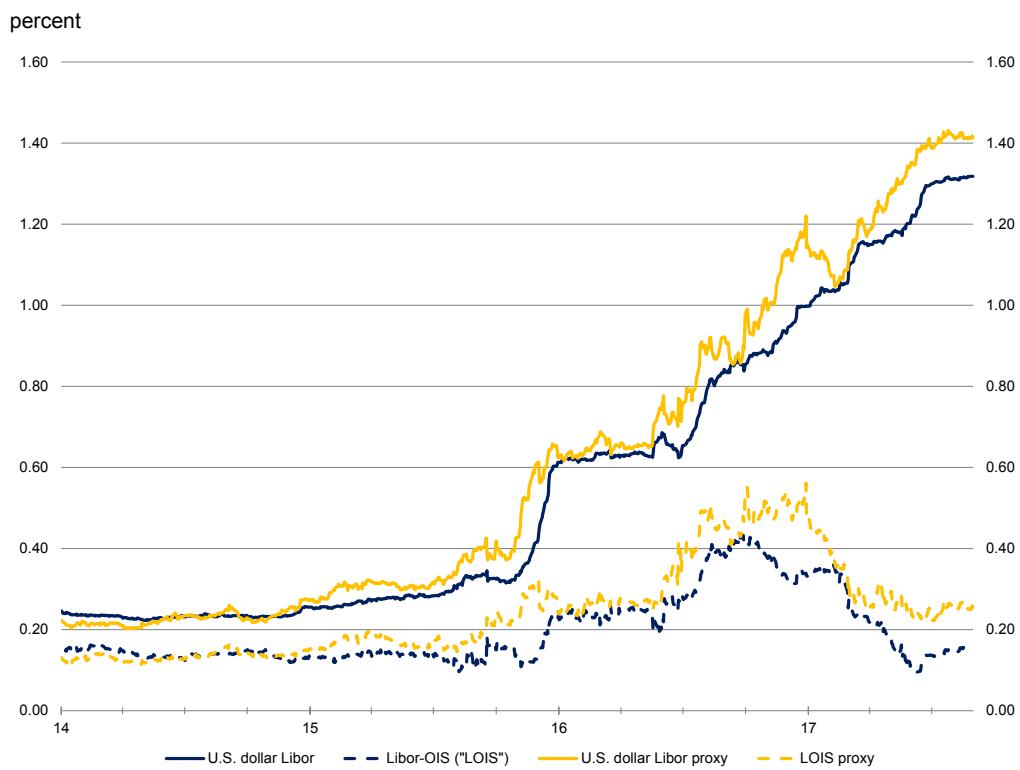
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 17: If the Cross-Currency Basis Could Speak...

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 18: Japanese Banks Did Not Drive the \$/¥ Basis Wider...

Source: Bank of Japan, Credit Suisse

Figure 19: Reverse-Engineering Libor

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Conclusions – Sterilization Redux

Sterilization will soon rear its ugly head again.

We know from the most recent Refunding Statement of the U.S. Treasury (see [here](#)), that TGA balances will be back up to \$400 billion by the end of 2017. Draining that much in reserves will reverse most of the easing that we have seen in funding markets this year.

Fewer reserves mean more fraying and more fraying means wider cross-currency bases. Fewer reserves also mean tougher quarter-ends and greater turn premia, which, in turn, mean even wider cross-currency bases. Treasury normalizing its cash balances is bound to sap global funding markets, and the FX swap market will bear the brunt of normalization.

FX swap-implied rates have great relevance for banks' U.S. dollar Libor submissions in a post-Basel III financial order, and an even greater relevance post-money fund reform.

Banks no longer trade with each other on an unsecured basis under Basel III and so submissions for interbank-offered rates should mostly reflect secured transactions. For a while, banks could substitute unsecured interbank transactions for unsecured transactions with money funds in the CD and CP market. But money fund reform reduced the depth of those markets, which hurt banks' ability to issue unsecured paper reliably and frequently.

Following the guidelines set forth in [The Wheatley Review of Libor](#) (see Box 4.B), banks next switched to the FX swap market as a reliable source of inputs for Libor submissions. As such, the weight of FX swap-implied rates in model-driven submission likely increased since last October. Unfortunately, there is no way to test this assumption, as in June 2016, ICE stopped the publication of individual panel members' U.S. dollar Libor submissions.

Figure 19 shows our quick attempt to reverse-engineer U.S. dollar Libor submissions using FX swap-implied rates. The results are not perfect, but they seem encouraging.¹⁰

Establishing a link between FX swap-implied rates and U.S. dollar Libor is important, because if sterilization tightens the FX swap market it also makes Libor-OIS widen. In our view, Treasury normalizing its cash balances will cause funding spreads to widen by 20 bps from current levels by the end of 2017, with more to come during the first quarter as expectations for turn premia in FX forwards get re-priced as reserves get scarce again.

The Fed's [plan](#) to start shrinking its balance sheet later this year will exacerbate these trends as 2018 progresses – from the perspective of funding markets, destroying reserves through balance sheet taper is the same as sterilizing reserves through liability swaps. But for the rest of 2017, the fixed income market event to focus on is [not](#) balance sheet taper, but the normalization of Treasury's cash balances. And if the fallout from the latter will mean a replay of the spread widening we've seen in global dollar funding markets late last year, the Fed may even re-consider the timing, pace and endpoint of its grand tapering plan.

As Mike Tyson would say: "*Everyone has a plan 'till they get punched in the mouth*"...

One thing is for sure: having loads of reserves means being able to harvest the option value of cash in a post-Basel III world where reserves determine how money markets trade. If there is one bank that's set to benefit from sterilization or taper, that bank is J.P Morgan.

If there is one thing that everyone who trades the basis in a post-Basel III world should do is to follow closely how U.S. G-SIBs' HQLA portfolios and Basel III metrics evolve over time, for reading that stuff may just be as important as Fed watching used to be in the past!

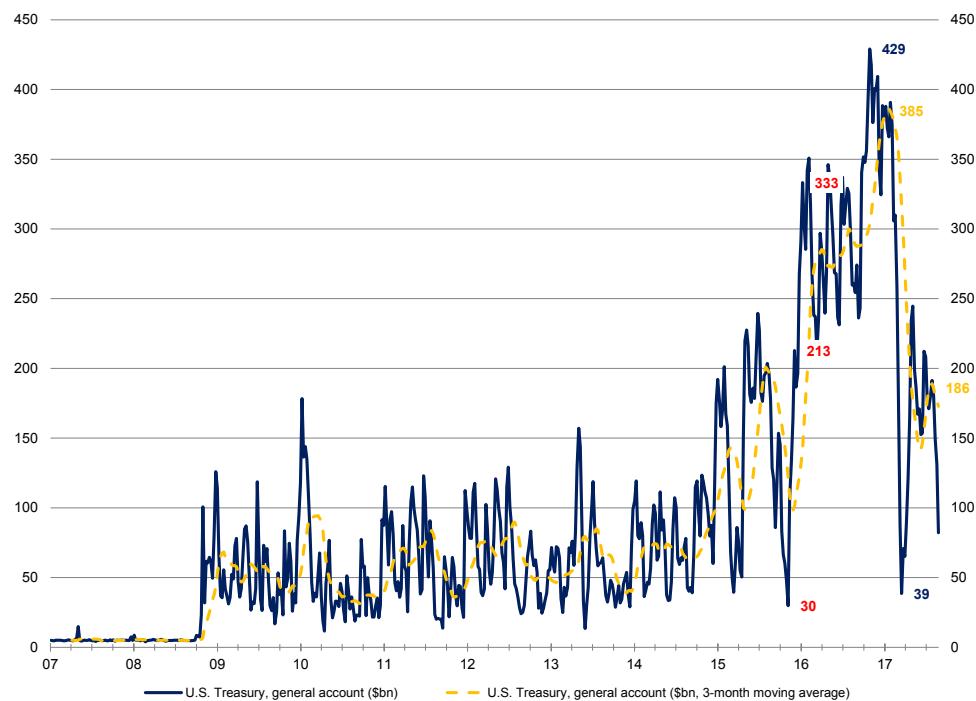
Reserves matter. He who has the most, controls the market for liquidity...

¹⁰ Our back of the envelope calculation is based on the following assumptions. Banks submit either OIS, repo or FX swap-implied funding levels. Of the 17 panel members, only 9 remain once the top four and bottom four submissions are thrown out. We assign a weight of one for GCF repo-based submissions, two for OIS-based submissions, three for FX swap-implied rates derived from GBP, two for FX swap-implied rates derived from EUR and finally, one for FX-swap implied rates derived from CAD. Libor submitters may be using smoothing techniques (which are permissible) to dampen the volatility of FX-swap implied rates.

Appendix

Figure A1: Overnight Liquidity Services for the U.S. Treasury

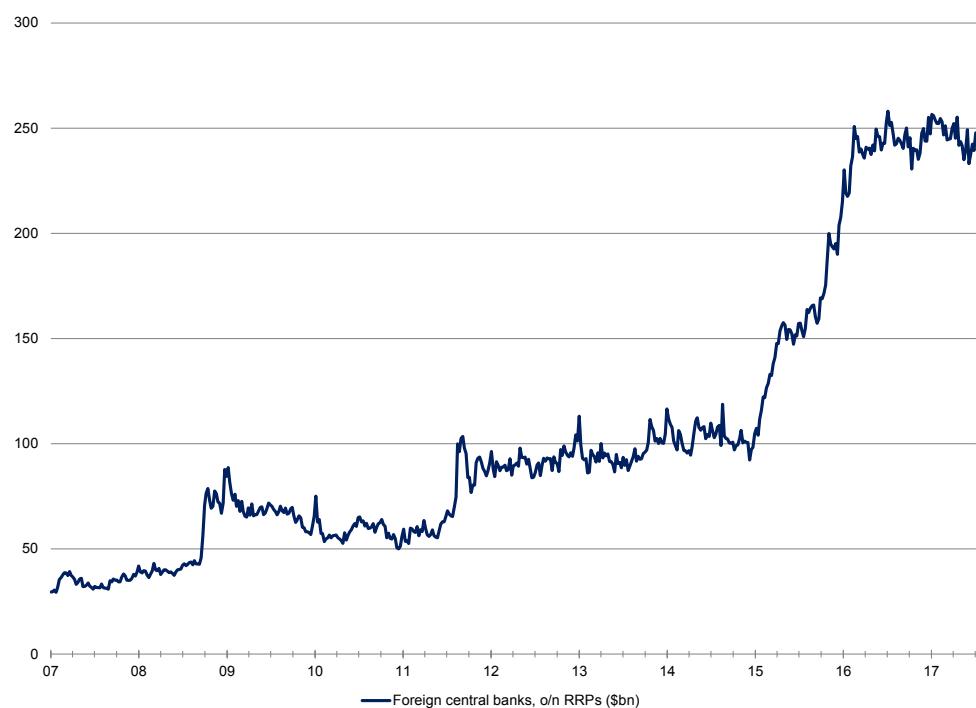
\$ billion



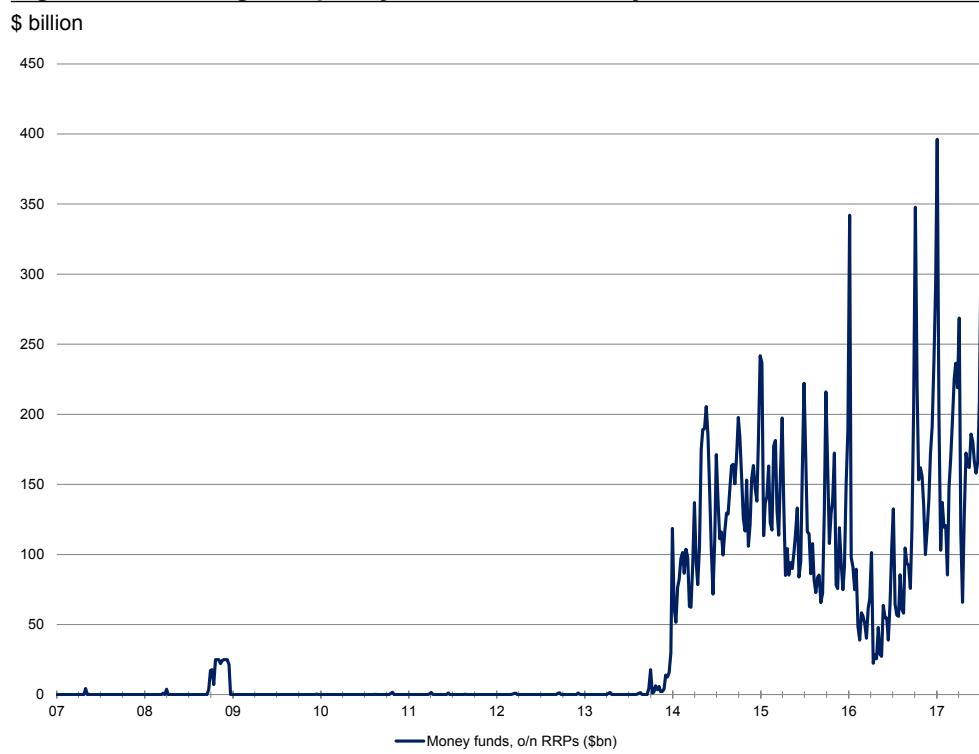
Source: Federal Reserve, Credit Suisse

Figure A2: Overnight Liquidity Services for Foreign Central Banks

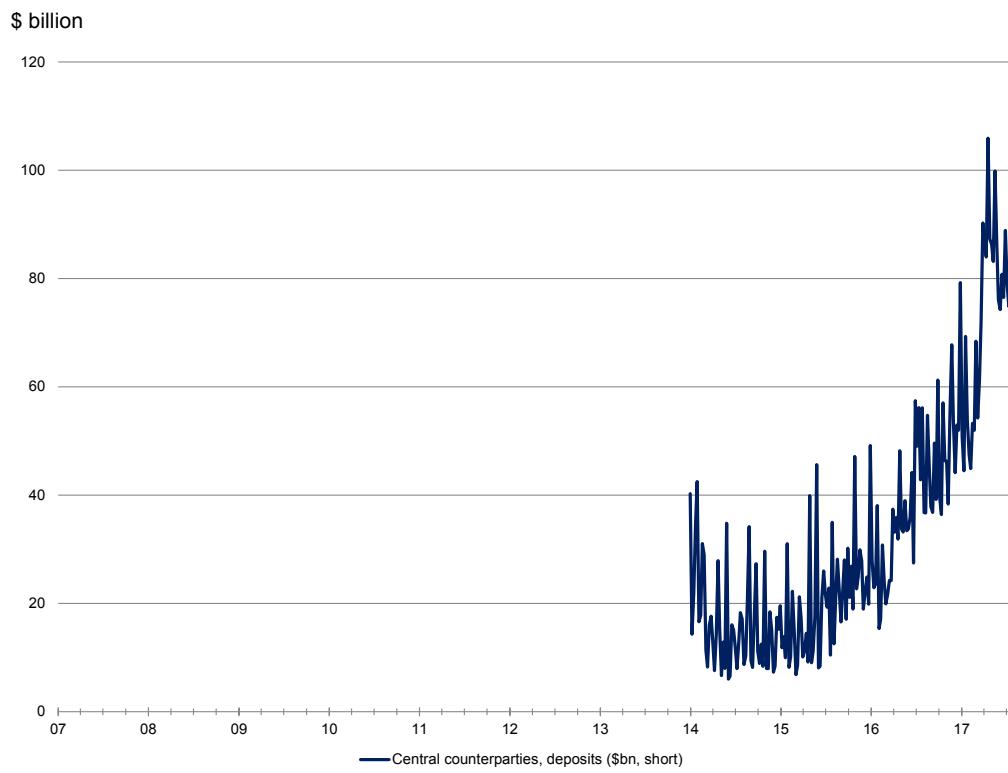
\$ billion



Source: Federal Reserve, Credit Suisse

Figure A3: Overnight Liquidity Services for Money Market Funds

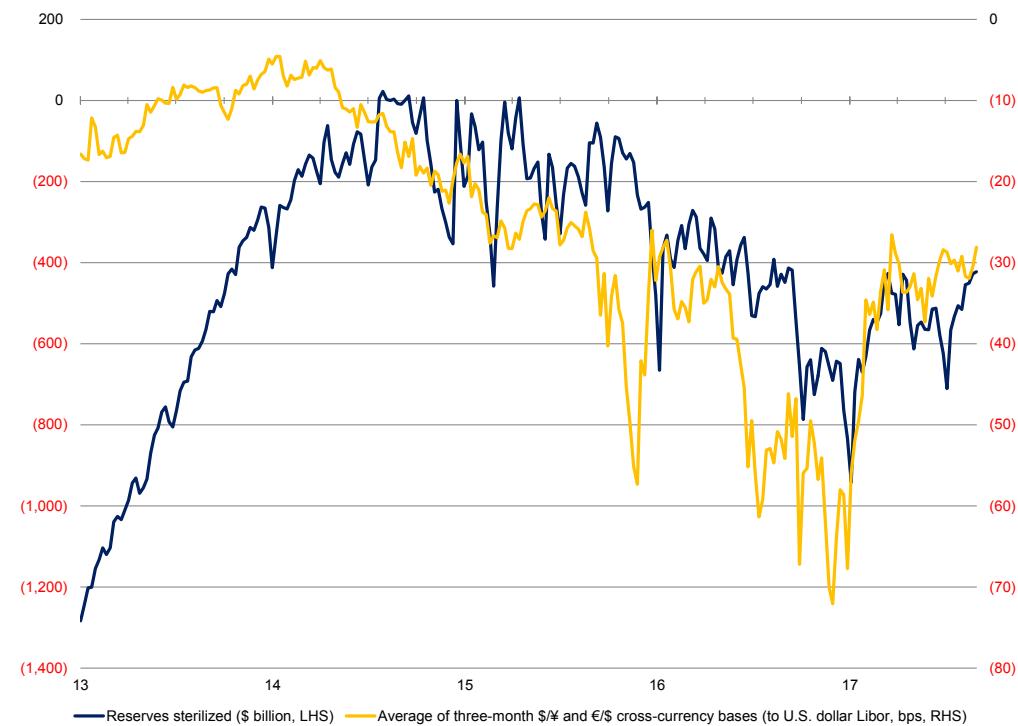
Source: Federal Reserve, Credit Suisse

Figure A4: Overnight Liquidity Services for Central Counterparties

Source: Federal Reserve, Credit Suisse

Figure A5: Sterilization and the Cross-Currency Basis (1)

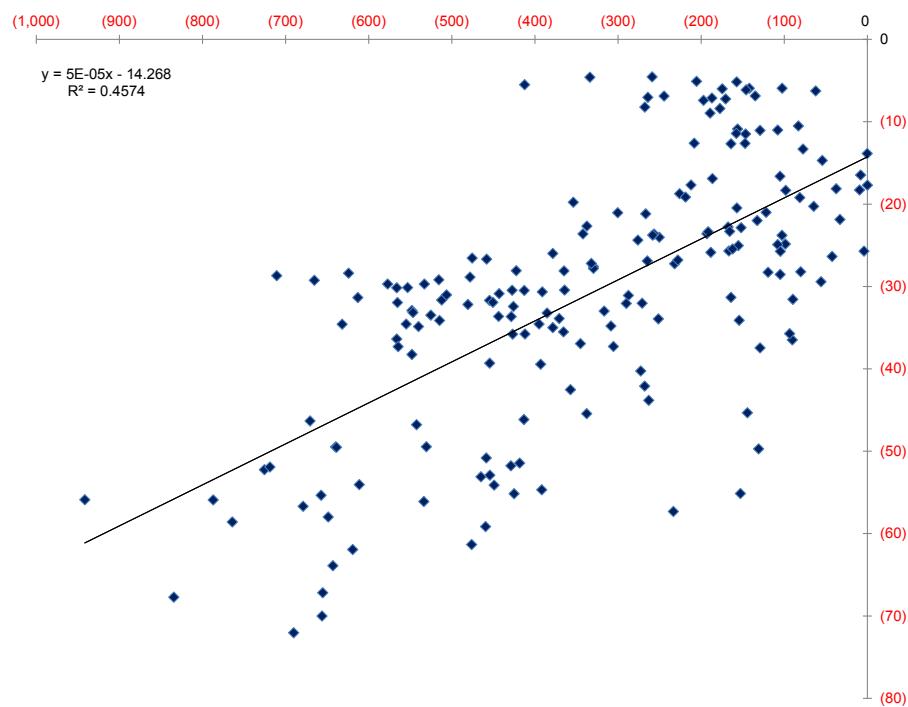
\$ billion (LHS) and basis points (RHS)



Source: the BLOOMBERG PROFESSIONAL™ service, Federal Reserve, Credit Suisse

Figure A6: Sterilization and the Cross Currency Basis (2)

Reserves sterilized (\$ billion, x-axis) and the average of the €/\$ and \$/¥ cross-currency (bps, y-axis)



Source: the BLOOMBERG PROFESSIONAL™ service, Federal Reserve, Credit Suisse

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29 January 2018
Investment Solutions & Products
Global



Credit Suisse Global Strategy

Global Money Notes #11

Repatriation, the Echo-Taper and the €/\$ Basis

The view that the repatriation of U.S. corporations' offshore cash balances will lead to a stronger U.S. dollar and tighter money markets is wrong, in our opinion. It is wrong because offshore cash balances are in U.S. dollars already and are invested mostly in one to five-year U.S. Treasuries and term debt issued by banks.

The move from a global to a territorial tax system marks an inflection point in fixed income markets. The territorial system marks the end of corporations' decades-long habit of putting surplus cash accumulating offshore into bonds. As the corporate bid for U.S. Treasuries and bank debt disappears, yields, swaps spreads and banks' term funding costs could see upward pressure.

In a year where Treasury supply will increase significantly, that's bad enough. But things can get worse: if corporate treasurers add to that supply by selling their roughly \$300 billion hoard of U.S. Treasury notes, rates could move big. In fact, we believe this corporate "echo-taper" could be worse than the Fed's taper..

That's because we know that the U.S. Treasury will re-issue the Treasuries the Fed no longer buys as bills, not notes, and so the Fed's taper won't add a lot of duration back into the bond market. That's not the case with the echo-taper.

The echo-taper reminds us of China's occasional sale of its Treasury holdings when SAFE defends the yuan. There is always an element of surprise to these sales that leaves a typical trail: higher yields and wider swap spreads as dealers deal with "indigestion". If the pace of the echo-taper is surprisingly fast, flows on the back of repatriation may well feel like SAFE dumping bonds...

A wave of M&A transactions on the back of corporate tax reform this year is something to watch for as a factor that could speed up the pace of repatriation.

Debt buybacks could drive similar dynamics. If U.S. corporations buy back their reverse Yankee debt, that will involve the tear-up of €/\$ cross-currency swaps. That, combined with our [view](#) that the increase in Treasury bill supply this year (on the back of the Fed's taper and the Treasury normalizing its cash balances) will tighten the front-end, points to a steeper €/\$ cross-currency basis curve.

Timing the pace of repatriation will be key to trade these themes successfully.

The data sources needed to source alpha change over time. Watching the Fed's open market operations was a thing of the 1980s. Watching FX reserves was a thing of the 1990s. Watching the HQLA portfolios is a thing of the present. Now we have to add watching the portfolios of the iconic firms of the present...

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29 January 2018

The view that the repatriation of U.S. corporations' offshore cash balances will lead to a stronger U.S. dollar and tighter money markets is wrong, in our opinion. It is wrong because offshore balances are in U.S. dollars already and only a small portion is invested in money market instruments.

Offshore balances were invested in the money market a decade ago, but as they grew, corporate treasurers added more risk. [Corporate cash pools](#) became corporate bond portfolios, similar to how China's FX reserves were first invested in U.S. Treasury bills and then notes as reserve accumulation took on epic proportions.

You don't run trillions the way you run billions: size forces you to diversify.

Years of QE and a decade at the zero-bound also forces you to diversify.

Words matter...

In our discourse about corporate tax reform, we should replace the concepts of "cash balances" with "bond portfolios" and "repatriation" with "distribution".

Cash balances are not hallmarks of an era where corporations are net providers of funding – where firms have positive operating cash flows and need to invest their surplus cash. If surplus cash accumulates faster than the need for long-term capital outlays, it tends to gravitate toward the *bond* market, not the money market. The gravitational pull of bonds is even stronger if one knows that, barring tax reform, high corporate tax rates in the U.S. will keep surplus cash balances accumulating offshore in limbo for many years to come, and if aggressive monetary easing keeps yields on cash low and curves historically steep.

Bonds, not cash...

Throughout our analysis, we'll refer to offshore *savings* instead of offshore cash balances. Savings is a neutral term, similar to how FX reserves is a neutral term. Both terms are agnostic as to how funds are being invested. In the current context, savings is a more fitting term than cash balances, as the bulk of offshore savings are invested in bonds, not cash. The term "cash" narrows our analytical perspective. The term "savings" broadens it.

Repatriation is also a misnomer. Repatriation is a relevant concept only in a *tax* context – moving money from offshore tax havens back to the U.S. – not a financial markets context. From a financial markets perspective, the bulk of offshore savings are onshore already – in U.S. Treasuries and agency debt, securitized assets and in corporate and bank debt.

In the past, offshore savings could not be distributed to shareholders without generating a tax liability. Tax reform just changed that. Past earnings are now subject to a low tax rate, enabling the release of billions in savings that have been trapped offshore for years. Money will change tax borders, not financial borders. Eurodollars won't become U.S. dollars.

Distribution, not repatriation...

This issue of *Global Money Notes* has six parts to it. Part one provides an overview of corporate tax reform. Part two describes which corporations have amassed the most offshore savings. Part three describes how offshore savings are invested. Part four describes the main funding strategies used to distribute offshore savings to shareholders in the past, and the legacy of these strategies – funded bonds portfolios. Part five describes what will happen to these funded bond portfolios under the new tax regime, and highlights some potential cross-market impacts. Finally, part six concludes our analysis.

Part 1 – Settling the Past, Plotting the Future

Corporate tax reform has two parts – settling the past and plotting the future.

Settling the past refers to dealing with the stock of offshore earnings that U.S. corporations never paid taxes on to the U.S. government. Under the new rules, offshore earnings that have been reinvested in operating activities will be taxed at an 8% rate, and offshore earnings that have been reinvested in financial instruments would be taxed at a higher 15.5% rate. Paying taxes on the stock of offshore earnings is *mandatory*, meaning that taxes apply whether offshore earnings are “repatriated” – that is, distributed to shareholders – or not.¹

Essentially, settling the tax bill on the stock of offshore earnings will buy U.S. corporations the *option* to distribute offshore savings *if, when and at the pace at which they want to*.

The tax bill that got triggered on January 1, 2018 is payable over a leisurely eight years, and corporations may distribute their offshore savings faster than they pay the tax bill that in principle allows them to do so. Higher interest rates over the coming years should erode the present value of the tax bill, making tax reform a gift that will keep on giving.

Plotting the future refers to moving from a worldwide tax system to a territorial tax system. Under the territorial system, corporations would be able to distribute offshore savings in exchange for paying a token amount – a distribution “toll” charge.² What this means is that in the future, corporations will no longer have the incentive to invest surplus cash in bonds – they’ll be able to distribute them to shareholders right away. Decade-long cycles of accumulation, bond buying and lobbying for tax holidays would become a thing of the past.

Under the territorial system, *free cash flow* will flow more freely across tax jurisdictions. Under the worldwide system, the free flow of offshore free cash flow was blocked by the “Great U.S. Tax Wall”. The territorial system serves up a wrecking ball to that wall: as the U.S. is building walls on its geographic borders, it is eliminating walls on its tax borders – embracing protectionism on the one hand, and tearing down liquidity silos on the other.

The market impact of “dealing with the past” and “plotting the future” is likely to be small.

Paying about \$200 billion in back taxes over eight years on \$2 trillion in offshore earnings will barely leave a trail in funding markets. Paying an extra \$25 billion a year in taxes won’t overwhelm either corporations or funding markets: corporations have ample liquidity to pay such an amount (see [here](#)), and if corporations chose to finance the payment of taxes, issuing an extra \$25 billion in commercial paper a year won’t overwhelm funding markets – money funds will welcome the supply from cash-rich firms that are better rated than banks.

Unshackling the flow of free cash flow will enhance global corporations’ liquidity profile, which should be positive for investment grade (IG) credit spreads and equities. But *everything* is positive for IG credit and equities these days – the liquidity-enhancing impact of moving from a worldwide to a territorial system is a drop in a sea of positive sentiment.

¹ The repatriation tax holiday of 2004 was different. Back then, a repatriation tax was triggered only if a corporation chose to bring home offshore savings. This time a tax liability will be triggered whether a corporation gives money back to shareholders or not.

² The territorial tax system comes with a global minimum tax of 10.5%. Corporations can distribute offshore earnings if they pay at least this rate. Corporate tax rates in Ireland (the globe’s IP haven) are 12.5%. The 2.0% difference is the distribution toll charge.

But if paying taxes and moving to a territorial system won't have a sizeable market impact, what will? Dealing with the balance sheet legacy of the worldwide tax system will; that is, the dismantling of the bond portfolios that corporations amassed over the past decade, and the roll-back of the strategies that have been used by corporate treasurers to fund them.

These flows should impact U.S. Treasury yields, swap spreads, banks' term funding spreads and the longer-end of the €/\$ cross-currency basis curve. We explain how in three steps: first we tally offshore savings, and then we look at how savings are invested and funded.

Part 2 – Behind Every Great Fortune...

Since the repatriation tax holiday of 2004, U.S. corporations have amassed over \$2 trillion in offshore *earnings*.³ But not all of these offshore earnings can be distributed. \$1 trillion have been reinvested in business expansion via investments in PP&E, R&D and M&A⁴ and are hence stuck in illiquid assets. Offshore *savings*, i.e., offshore earnings parked in liquid assets that are potentially available for distribution, are a more "modest" \$1 trillion.⁵

This \$1 trillion in offshore savings belongs to the 150 firms in the S&P 500 ex financials (henceforth the "universe") that provide a precise disclosure of their offshore savings. This amount represents the upper bound of how much money these firms will distribute.

This gigantic pool of savings is also the corporate analogue of China's FX reserves, and, to paraphrase Balzac, behind every great fortune, there is a macroeconomic "crime" – mercantilism in the case of governments, and tax arbitrage in the case of corporations.

Figure 1 breaks down the offshore savings of these 150 firms by industry, skew and name. By industry, information technology (IT) and healthcare dominate offshore savings. But these standard industry classifications hide some important detail. Within IT for example, hardware dominates, accounting for \$350 billion in offshore savings. Software accounts for a smaller \$275 billion. Within healthcare, *all* \$200 billion in offshore savings are accounted for by pharmaceutical companies. Industrials and branded consumer staples account for the bulk of the remaining \$150 billion in offshore savings.⁶

The distribution of offshore savings is skewed not only across industries but also firms. The top ten names control over \$600 billion in offshore savings, the next ten \$125 billion, and the next ten about \$70 billion. The bottom 120 names control just over \$150 billion. The distribution of corporate savings is thus strikingly similar to the global wealth pyramid: just as the richest 10% of households worldwide control 80% of global wealth (see [here](#)), the richest 10% of U.S. corporations control close to 80% of offshore corporate savings.

Apple, Microsoft, Cisco, Oracle, Alphabet and Qualcomm (enablers of the digital economy) dominate the top ten, followed by pharmaceutical giants J&J, Pfizer, Amgen and Merck. Apple's savings pool is off the charts: at the end of 2016, its size was over \$200 billion. Microsoft's pool is a distant second: at the end of 2016, its size was just over \$100 billion. The remaining IT names in the top ten control offshore savings pools of about \$50 billion on average, and

³ As of fiscal year-end March, 2017 U.S. corporations had \$2,225 billion in offshore earnings.

⁴ Property, plant and equipment, research and development, and mergers and acquisitions.

⁵ As of fiscal year-end March, 2017 U.S. corporations had \$1,128 billion in offshore savings.

⁶ Industrials control \$50 billion in offshore savings, led by GE, United Technologies, Honeywell International and Caterpillar. Branded consumer staples control \$40 billion in offshore savings, led by Coca-Cola, Pepsico Inc. and Procter & Gamble Co.

the pharma names in the top ten control savings pools of \$30 billion on average. The size of the savings pools managed by the next ten names is \$10 billion on average, and the size of the savings pools managed by the next ten names is \$5 billion on average. The remaining 120 names control savings pools that are just over \$1 billion on average – about one-third of these names control offshore savings of less than \$1 billion.

This is what we know about the distribution of *disclosed* offshore savings.

There are some corporations that don't disclose offshore savings, but that does not mean they don't have any. To have a more precise estimate of potential distribution flows, we need to estimate the volume of *undisclosed* offshore savings as well. We can derive this in two steps.

First, by calculating the *total* (that is onshore and offshore) savings of the 100 names in the universe that disclose only offshore earnings but not offshore savings, and then examining the distribution of the savings of these 100 names by size buckets.

Second, by applying to these totals some rules of thumb derived from the offshore share of the total savings of the 150 names that disclose foreign savings plus some adjustments.

Thus, the total (that is onshore and offshore) savings of the 100 names in the universe that disclose only their foreign earnings but not their foreign savings is circa \$250 billion.

Figure 2 breaks down this \$250 billion in total savings by industry, skew and name. Vehicle manufacturers dominate, with \$50 billion in total savings.⁷

Energy companies and healthcare (dominated by Medtronic PLC) follow, with about \$40 billion in savings each, followed by information technology and industrials with \$20 billion in total savings each.⁸

The top ten names control \$130 billion in savings, the next ten control about \$30 billion, and the next ten control \$20 billion. The average size of the pools controlled by the top ten, the next ten, the next ten and the lower 70 are \$13, \$3, \$2 and less than \$1 billion, respectively. No name here belongs to the league of the top ten in the previous segment, and the concentration of savings is also less pronounced here than in the prior segment.

Why?

Corporations that rely on booking revenues derived from intellectual property (IP) assets in tax havens are more efficient at shielding earnings from the IRS than firms that don't (IP assets range from the integration of design and hardware into a phone to the formulas of blockbuster drugs). This explains the greater concentration of savings in the first segment.

Compared to the first segment, the second segment of the universe is less reliant on IP assets – there ain't no “killer” apps, brands, codes, designs or formulas in the auto, energy, industrial and medical equipment manufacturing sectors. The strategy to book revenues generated by a portfolio of IP assets in tax havens is not easy to apply in these industries.

⁷ General Motors Co.'s savings include the finance receivables of its finance arm, which inflates our measure of offshore savings.

⁸ Vehicle manufacturers include General Motors Co. and Ford Motor Co. Energy companies include Chevron, Exxon Mobil, Occidental Petroleum and ConocoPhillips. Healthcare is dominated by Medtronic PLC. IT includes IBM and Texas Instruments. Industrials include FedEx and Paccar. Consumer discretionary (ex entertainment) includes Target, Best Buy and Home Depot.

That said, corporations in these industries found other ways to manage down their taxes: [inversions](#) and ways of booking domestic revenues offshore became common strategies. But no matter how aggressive their use of these strategies, firms in the second segment simply couldn't shield earnings with the efficiency of those that book IP assets offshore. This explains the low concentration of savings in the second segment, relative to the first.

Of the \$250 billion of total savings in the second segment, savings pools with an average size of \$1-5 and \$10-30 billion make up roughly \$100 billion each, and savings pools with an average size of less than \$1 billion and \$5-10 billion make up about \$25 billion each.

Applying the offshore share of total savings of similarly sized pools from the first segment yields about \$150 billion in additional offshore savings.⁹

Risks are that this \$150 billion in additional savings overstates the truth, because the names in this segment have a more limited scope to shield earnings relative to the names in the first. To account for this, we adjust down by a fourth the offshore share of total savings derived from the first segment, which yields a smaller \$100 billion in offshore savings.

There are a further 150 corporations in the universe with total savings of circa \$300 billion. But these names don't disclose any foreign earnings, and if there ain't no foreign earnings there ain't no foreign savings. We omit this segment of the universe from our analysis.

Thus, in total, \$1.1 trillion in savings are likely to be distributed *at most*.

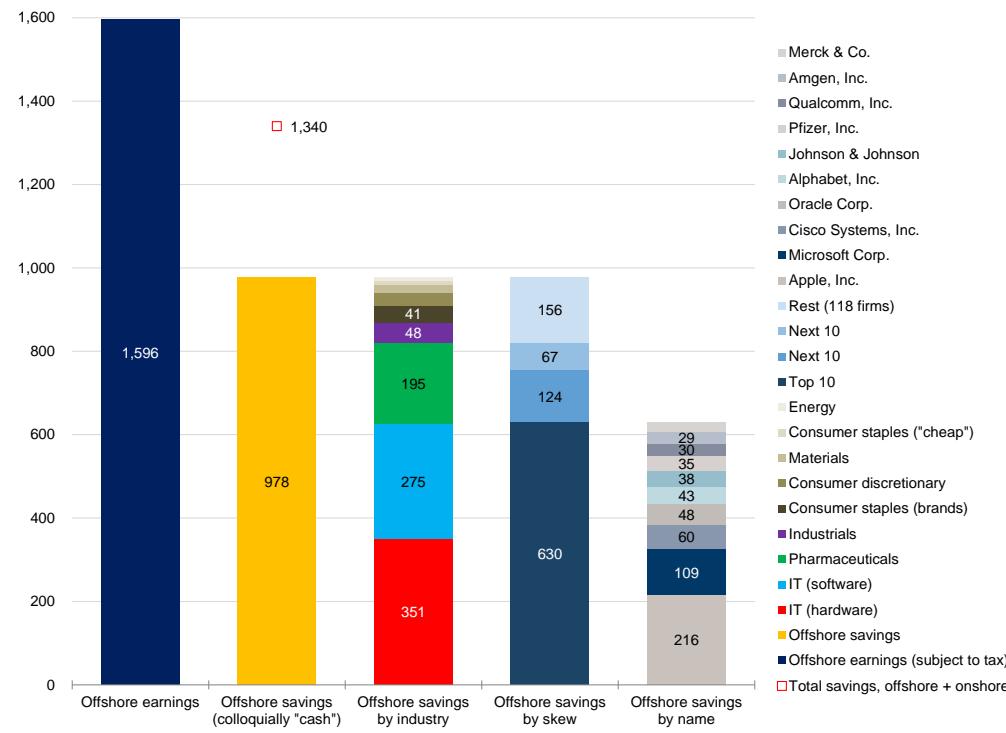
The top ten firms account for \$600 billion of these savings and the top 30 for \$800 – *three-fourths* of the total!

In the next section, we examine how the ten most wealthy firms (henceforth the top ten) invest their savings and whether the cash versus bonds mix in investment portfolios varies by the size of corporate savings pools. Does Microsoft run money the way Apple does? Does the rest of the top ten run money like Apple and Microsoft do? Does the next ten run money like the rest of the top ten? Does the bottom ten run money like the next ten?

⁹ Based on the disclosures of the 150 names that do provide a breakdown between total savings versus offshore savings, corporations with total savings of <\$1, \$1-5, \$5-10 and \$10-30 billion kept 65%, 56%, 57% and 63% of total savings offshore. Corporations with total savings of \$30+ billion kept 81% of total savings offshore. Apple and Microsoft kept over 90% offshore.

Figure 1: The Wealth of Corporations (1)

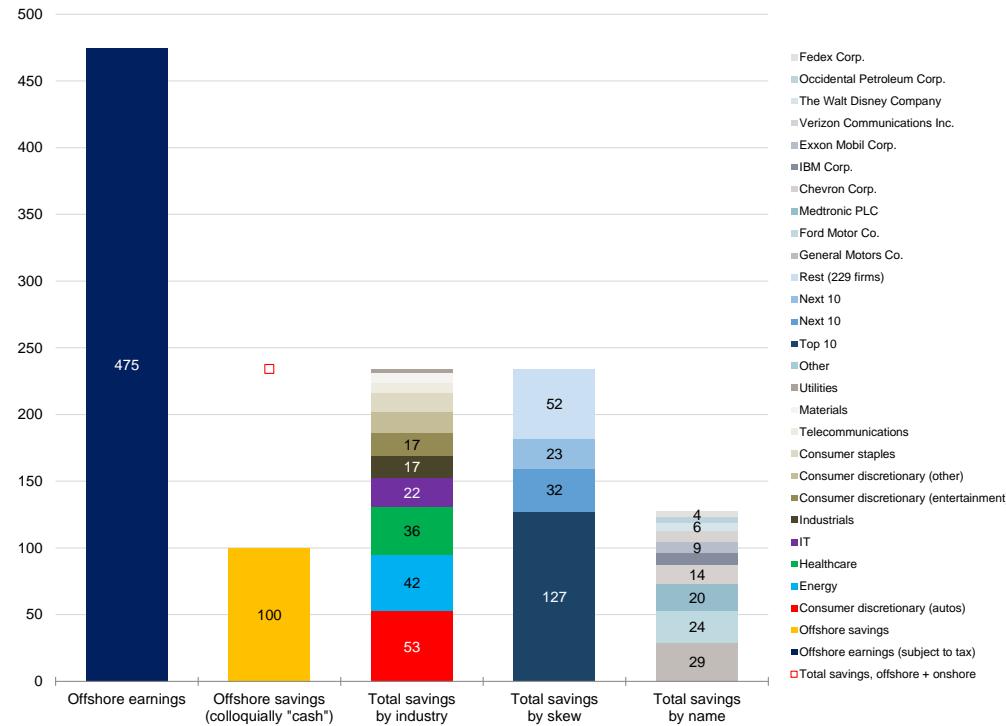
\$ billions, as of December 31st, 2016



Source: HOLT®, Credit Suisse

Figure 2: The Wealth of Corporations (2)

\$ billions, as of December 31st, 2016



Source: HOLT®, Credit Suisse

Part 3 – Bonds, Not Cash

Given that about a half of offshore corporate savings are controlled by the top ten, we examine their investment portfolios first.¹⁰ To obtain the data for this part of our analysis, we have tediously hand-picked twenty years of data on major investment categories – cash, cash equivalents, bonds and equities – and ten years of data on bond investments. The source of the data are the top ten's SEC filings. Because not all firms disclose the details of their investments (some provide limited detail, some provide granular stuff), we had to find the lowest common denominator for investment types and maturity buckets. As such, the charts below represent a *unique dataset* that has not been assembled before.

Figure 3 shows the total savings of the top ten over time by major investment category. Because corporations only provide a breakdown of investments for *total* savings, but not offshore savings, we can only plot total savings by investments, but not offshore savings. That said, cross-referencing Figure 3 with Figure 1, we can see that about 90% of the top ten's total savings are held offshore, and so, for the most part, the investment details shown below reflect the investment details of the top ten's *offshore* investment portfolios.

Figure 3 shows that the rise in the top ten's savings took off right after the financial crisis –total savings went from just over \$100 billion in 2008 to over \$700 billion by end-2016 (the dark blue line). All of this increase came from offshore savings, not onshore savings, and nearly all of this increase was invested in *bonds* (the orange line), not cash. The top ten's holdings of cash and cash equivalents (the light blue and red lines, respectively) barely increased, and given that combined they account for only 10% of total savings, they likely reflect the top ten's *genuine* liquidity needs. Thus, the excess appears to be in the bond segment of these corporate investment portfolios and not the cash segment...

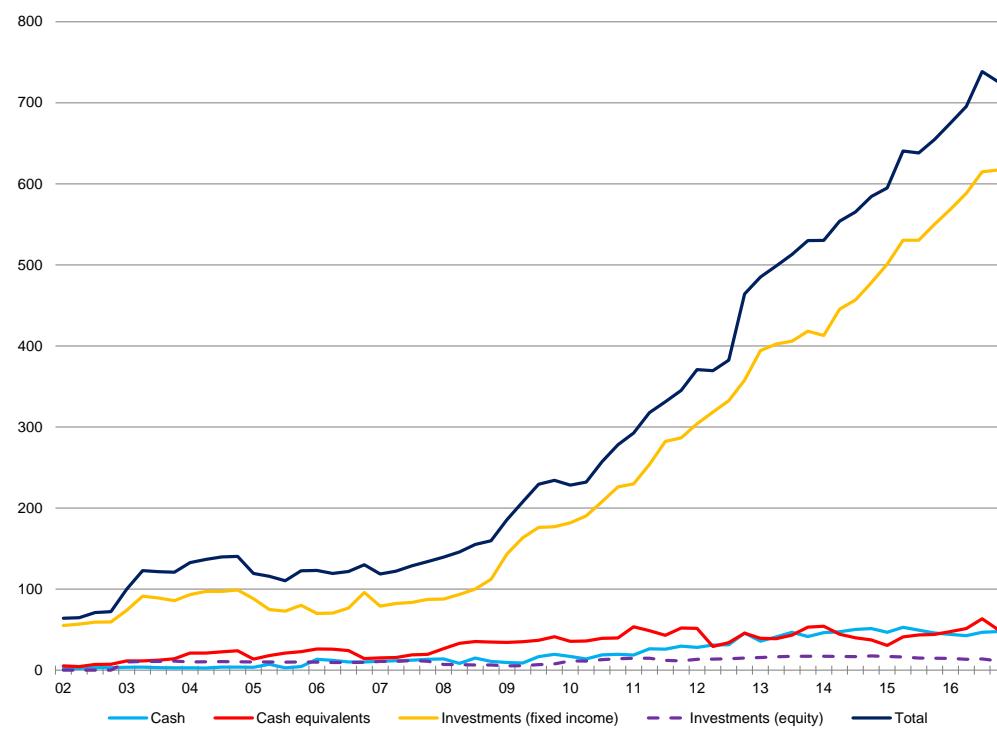
Figure 4 breaks down the top ten's investments in bonds by category. We are only able to provide a complete breakdown going back to 2014. Prior to 2014, some names in the top ten do not provide a detailed breakdown of their bond holdings by type, which explains the gap between the orange line and the stacked areas. Corporate bonds dominate, accounting for 50% of the top tens' investment in bonds, followed by U.S. Treasury and agency debt, which account for a smaller 40%. Mortgage and asset-backed securities are a distant third, with a share of just under 10%. Term money market instruments and supranationals account for 5% of investments, and foreign government bonds account for the final 5% of investments. Foreign bonds *likely* reflect the cash collateral reinvestment leg of FX swaps, where treasurers lend U.S. dollars to earn a premium over Treasury bills – holding foreign government bonds on an outright basis makes little sense given that those issued by sovereigns deemed safe all yield less than U.S. Treasuries (see Figure 5).

Figure 6 breaks down the top ten's investment in bonds by maturity. Some names do not disclose the maturity breakdown of their bond portfolio, which, like before, explains the gap between the orange line and the stacked areas. For the names that provide a breakdown, 70% of their portfolios are in securities that are one to five years in maturity and a smaller 20% are in securities that are less than one year in maturity. The balance is in securities that are longer than five years in maturity. How this maturity breakdown applies

¹⁰ To remind, these names are Apple, Microsoft, Cisco, Oracle, Alphabet, Johnson & Johnson, Pfizer, Qualcomm, Amgen and Merck.

Figure 3: Behind Every Great Fortune...

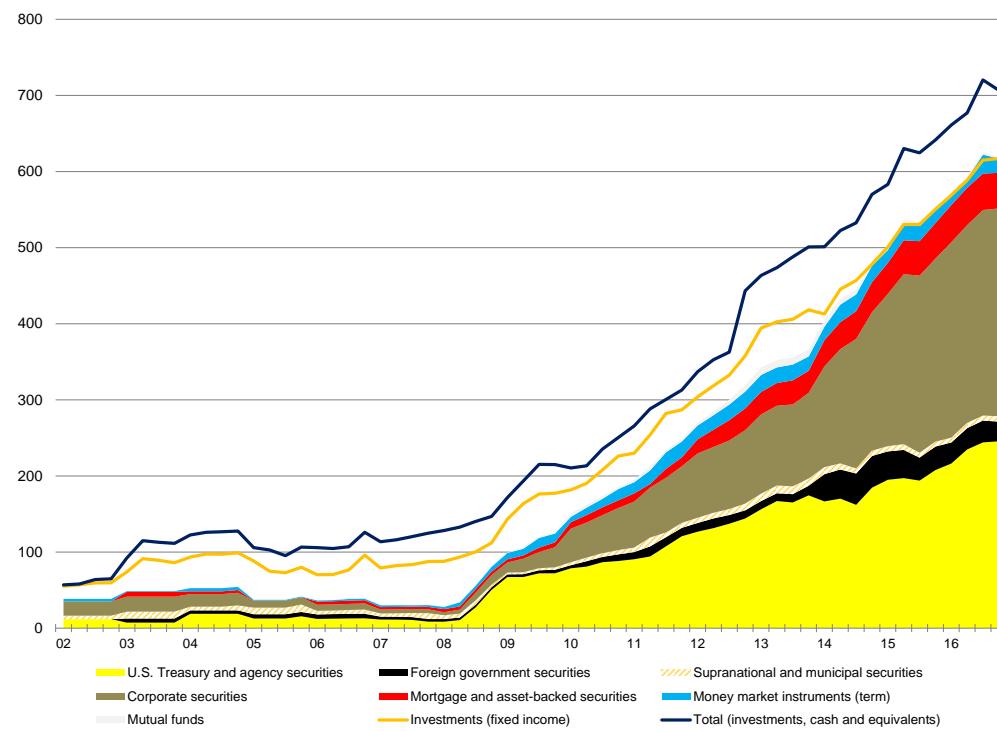
Major investment categories of the top ten, \$ billions



Source: Company data, Credit Suisse

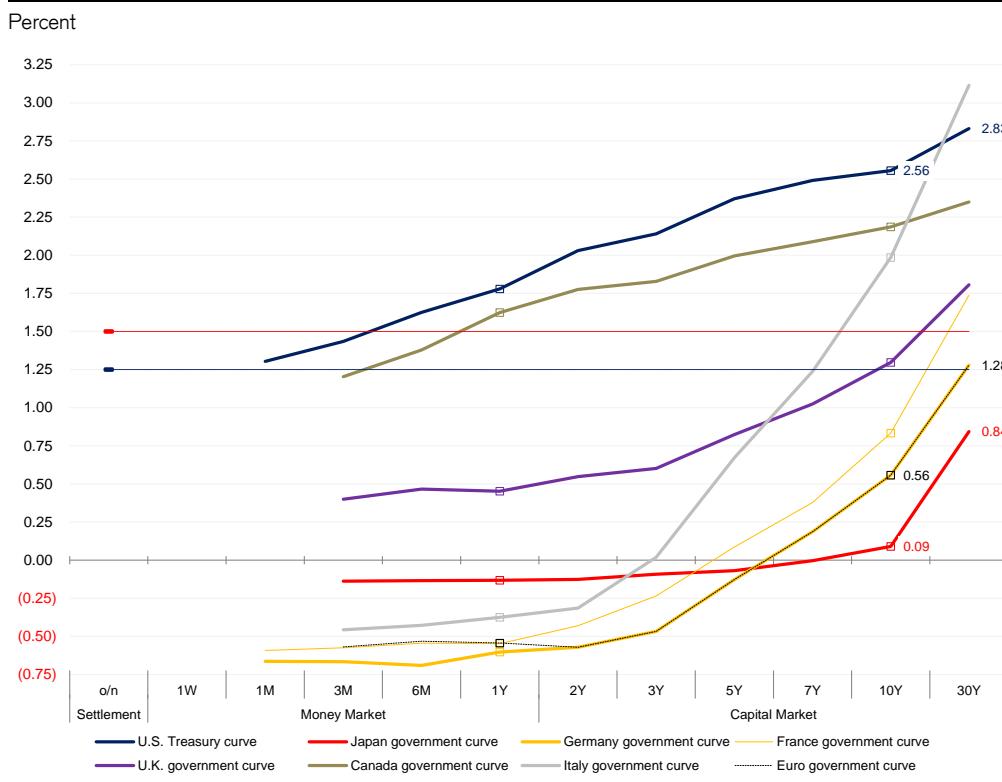
Figure 4: Bonds, Not Cash

Breakdown of the top ten's bond portfolios by asset-class, \$ billions



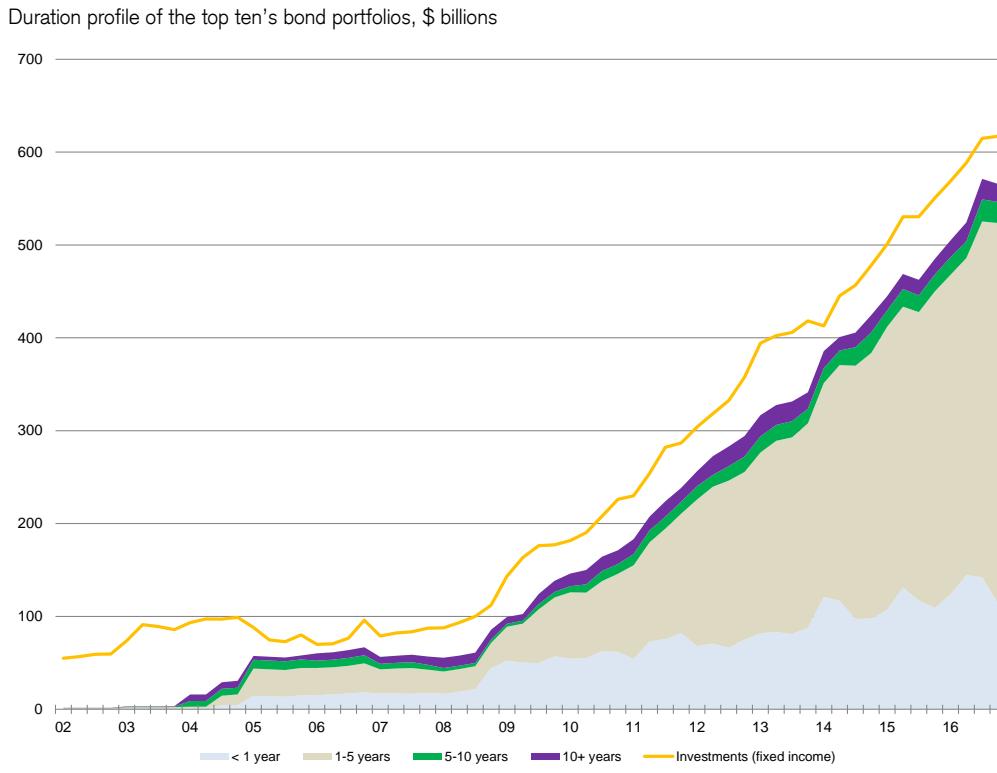
Source: Company data, Credit Suisse

Figure 5: Why Hold Foreign Government Bonds Outright?



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 6: Capital Markets, Not Money Markets



Source: Company data, Credit Suisse

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to various types of bonds is impossible to tell, but we can make some educated guesses: term money market instruments and foreign government bonds as part of FX swaps, both of which by definition are less than one year in maturity, account for a quarter of the sub-one year bucket. That means that only \$75 billion of the top ten's \$550 billion in bonds are shorter than a year. The remaining \$475 billion is up to five years in maturity!

\$250 billion of this \$475 billion is in U.S. Treasuries notes, which ain't chump change: for example, if the top ten liquidated their U.S. Treasury holdings this year, markets would have to reckon with an "echo-taper" – \$250 billion on top of the Fed's scheduled \$230 billion (we'll return to the concept of echo-taper and its market implications in section six below).

The top ten disclose neither the sectors nor the names of the corporate bonds they buy, so the riskiness their corporate holdings is a bit of a mystery. But, anecdotally, debt issued by foreign banks accounts for a big share.

The investment mix and duration profile of the top ten's portfolios are quite heterogeneous. Five themes emerge from a firm-by-firm review of their portfolios (see Appendix 1-10).

First, Apple, Oracle, Qualcomm and Amgen keep most of their savings in corporate bonds of one to five years in maturity (see Figure 7 and Appendix).

Apple and Oracle are big enough to make a difference in corporate issuance size and allocations. In fact, they are so big that they set up their own asset management subsidiaries, Braeburn Capital and Delphi Asset Management Corp., respectively, around the corner from each other in Reno, NV (see [here](#)).

Both Braeburn and Delphi go as low as single A rated names and like to buy industrials as well as the dollar-denominated bonds of U.S., Australian, Canadian and Japanese banks, and are selective buyers of the top one or two bank names from the main Eurozone countries and Scandinavian countries.

Second, Microsoft keeps most of its savings in U.S. Treasuries and agency debt, a strategy unchanged since 2009 (see Figure 8 and Appendix 2).

Microsoft appears to periodically shift its portfolio from bonds shorter than a year to bonds of one to five years. Most recently, it did so during prime money fund reform, when it offloaded its sub-one year portfolio of U.S. Treasuries to government funds and used the proceeds to buy long-term U.S. Treasuries. Microsoft's presence in other segments of the bond market is negligible.

Third, Cisco is a bit of a cross between Apple and Microsoft (see Appendix 3). Since 2010, all the growth in its portfolio went into corporate bonds in the one to five year segment. Its U.S. Treasury and agency portfolio shrank and is concentrated in the sub one-year segment. Similar to Microsoft's portfolio, Cisco's presence in other market segments is negligible.

Fourth, Google is the most diversified across asset classes (see Appendix 5). About a half of its portfolio is in U.S. Treasury and agency debt, a fifth is invested in mortgages and asset-backed securities and another fifth in corporate bonds. The rest is in supranationals and FX swaps, where Google presumably lends dollars and reinvests FX collateral into foreign bonds.

Google didn't create a Braeburn or Delphi-like asset management operation, and it has historically relied on outside asset managers to run its investments through separate accounts. Given Google's relatively high share of longer-dated investments – it appears to run a lot more duration risk relative to other corporate investment portfolios – the bulk of its holdings of U.S. Treasury securities must be longer than one year in maturity.

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Fifth, pharmaceutical giants Johnson & Johnson and Pfizer appear to have relatively volatile investment portfolios (see Appendix 6 and 7).

Johnson & Johnson appears to periodically sell bonds and spend the proceeds – *presumably* on overseas mergers and acquisitions to expand its portfolio of drugs and other products. Its portfolio is dominated by U.S. Treasuries and agency debt with maturities of one to five years.

Pfizer also appears to use its investments for acquisitions periodically. In sharp contrast to the other names, its investment portfolio is dominated by money market instruments. As recently as 2014, FX swaps made up three-fifths of its portfolio and corporate bonds another fifth. By 2017, the size of Pfizer's investment portfolio shrank by a half – *presumably* it was spent on mergers and acquisitions or research and development.

FX swaps accounted for virtually all of this decline, which was probably a contributing factor to the general widening of the €/\$ and \$/¥ cross-currency bases in 2015 and 2016 – less real money lending in the FX swap market meant that more of the flow had to go through the books of arbitrageurs, i.e., balance sheet constrained global banks (see [here](#)).

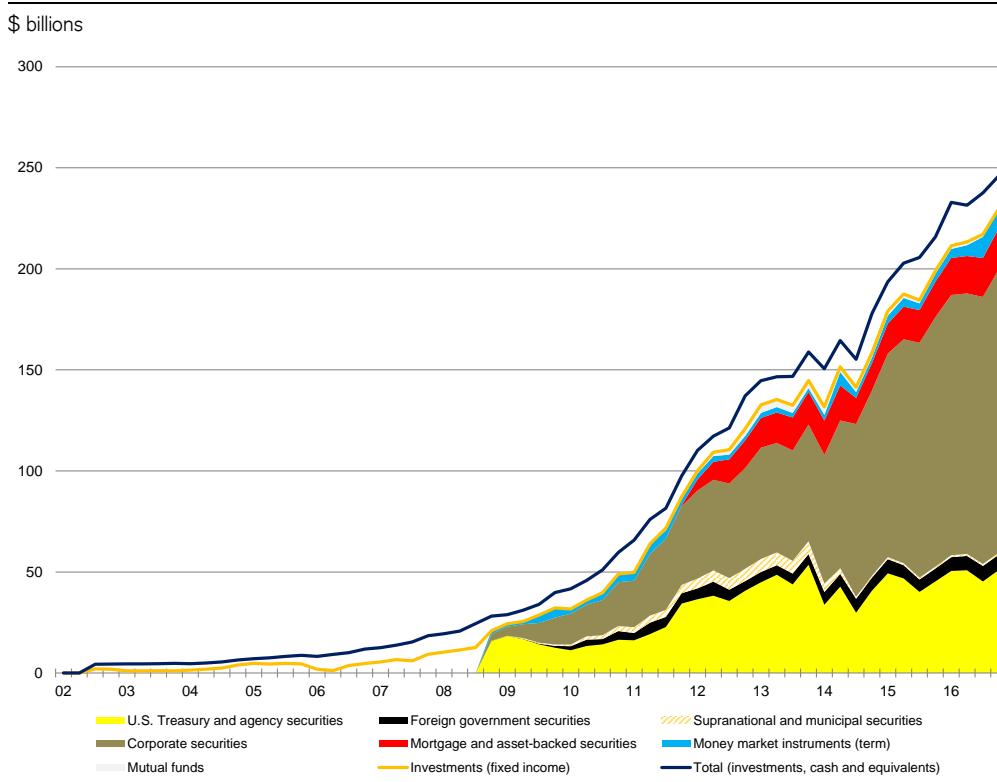
We have all read news articles that showed how the top ten's investment portfolios are bigger than the largest bond funds of the largest asset managers (see for example [here](#)).

This is also true when we compare the size of the top ten's investment portfolios to the U.S. Treasury (or HQLA, narrowly speaking) and credit portfolios (corporate bonds, RMBS and ABS) of large U.S. banks.

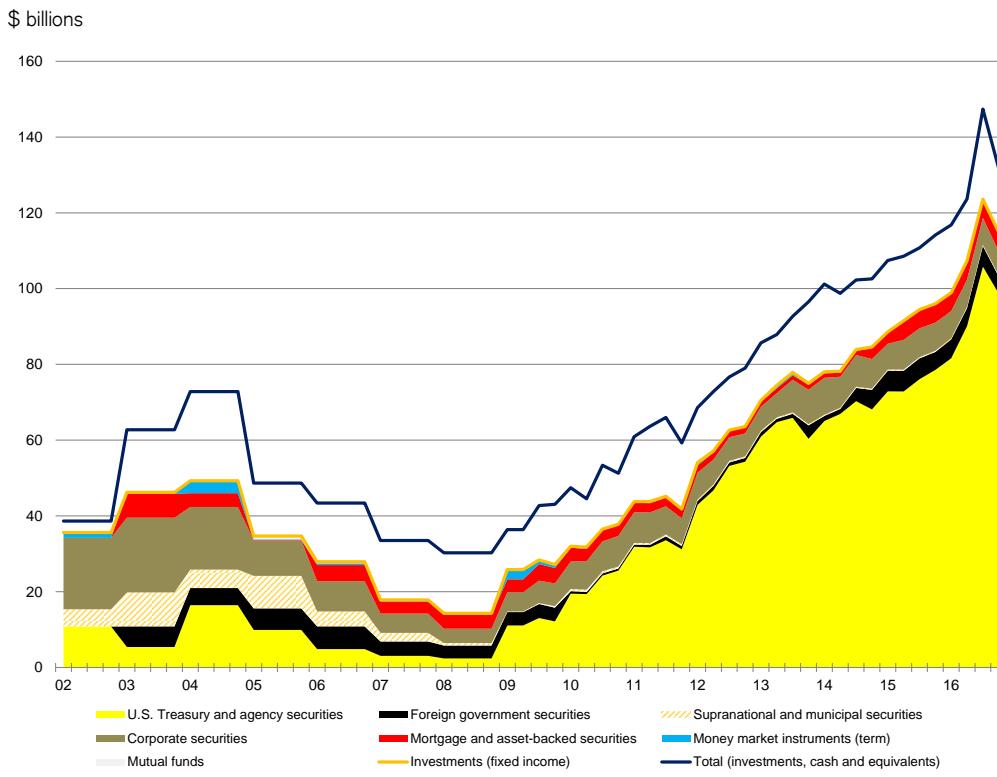
Figure 9 shows that only Citibank has a larger portfolio of U.S. Treasuries than Microsoft, and the software giant's portfolio is twice the size of Bank of America's or J.P. Morgan's. Apple's holdings of U.S. Treasuries is on par with Bank of America's and J.P. Morgan's, and Google and Cisco both hold more U.S. Treasuries than BoNY or State Street.

Thus, global banks and foreign central banks aren't the only captive buyers of Treasuries. U.S. corporations have been captive buyers as well. Their motives of course differ – banks bought for HQLA reasons; foreign central banks bought to manage exchange rates; corporations bought to keep offshore earnings someplace safe till the next tax holiday. Tax reform just killed the captive corporate bid, the implications of which we'll discuss shortly...

Figure 10 shows that Apple runs a credit portfolio as big as Citibank and J.P. Morgan, but bigger than that of Wells Fargo. Of course the riskiness of corporations' and banks' credit portfolios are different – corporations buy bank debt, and banks buy corporate debt – but the top ten corporate treasurer's contribution to the provision of credit across the global financial system is undeniably large and significant. Consider, that, the combined credit portfolios of Oracle, Cisco and Amgen is a third larger than that of Bank of America!

Figure 7: Apple Inc.'s Bond Portfolio

Source: Company data, Credit Suisse

Figure 8: Microsoft Corp.'s Bond Portfolio

Source: Company data, Credit Suisse

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We next discuss the portfolio details of the remaining 140 names from the first segment of the universe, and the top ten names from the 100 that make up the second segment.

Figure 11 shows that relative to the investment portfolios of top ten, the portfolios of the next ten, the next ten and the bottom 120 names from the first segment of the universe are much more geared toward cash and cash equivalents than bonds. Ditto the portfolios of the top ten names from the second segment of the universe.

Thus, at face value, the portfolios of these less wealthy corporations suggest a very different theme from the one that we identified in the case of the top ten – “cash, not bonds”, not “bonds, not cash”!

In total, it seems that \$600 billion in money markets is exposed to repatriation.

Not so fast...

The bars in Figure 11 plot *total* savings, not offshore savings. Offshore savings are marked with “+” signs. The difference between the top of each bar and “+” equals onshore savings.

As a rule of thumb, U.S. corporations can shift onshore savings offshore without a tax hit, but cannot shift offshore savings onshore without a tax hit.

As such, onshore liquidity is more valuable than offshore liquidity, which in portfolio allocation terms means that corporations tend to keep the most liquid tranche of their portfolios onshore, not offshore. On the flipside, because corporations knew that offshore savings will be in limbo for years – until the next repatriation holiday – they kept the less-liquid part of their portfolios offshore.

Figure 12 is derived by pushing the bars in Figure 11 downward until their top lines up with the position of the “+” sign – by doing this, we are aligning the volume of offshore savings with less liquid investments, consistent with the principles of liquidity management above.

Now we see that bonds dominate not only the top 10, but also the top 30 names in the first segment. The bottom 120 names in the first segment practically don't have any bonds, but their offshore cash balances should be interpreted carefully in the context of repatriation: the \$140 billion in offshore cash balances belong to 120 different firms with an average offshore cash balance of about \$1 billion each.

One should *not* assume that the bottom 120 are like the top 30...

Their offshore cash is *not* excess cash earmarked for distribution – they most likely represent the bottom 120 corporations' genuine liquidity needs offshore.

Out of many (evidently small balances) one (seemingly large pool).

The maximum hit to money markets from “repatriation” is about \$200 billion, not the \$600 billion that a cursory look would suggest. Details matter.¹¹

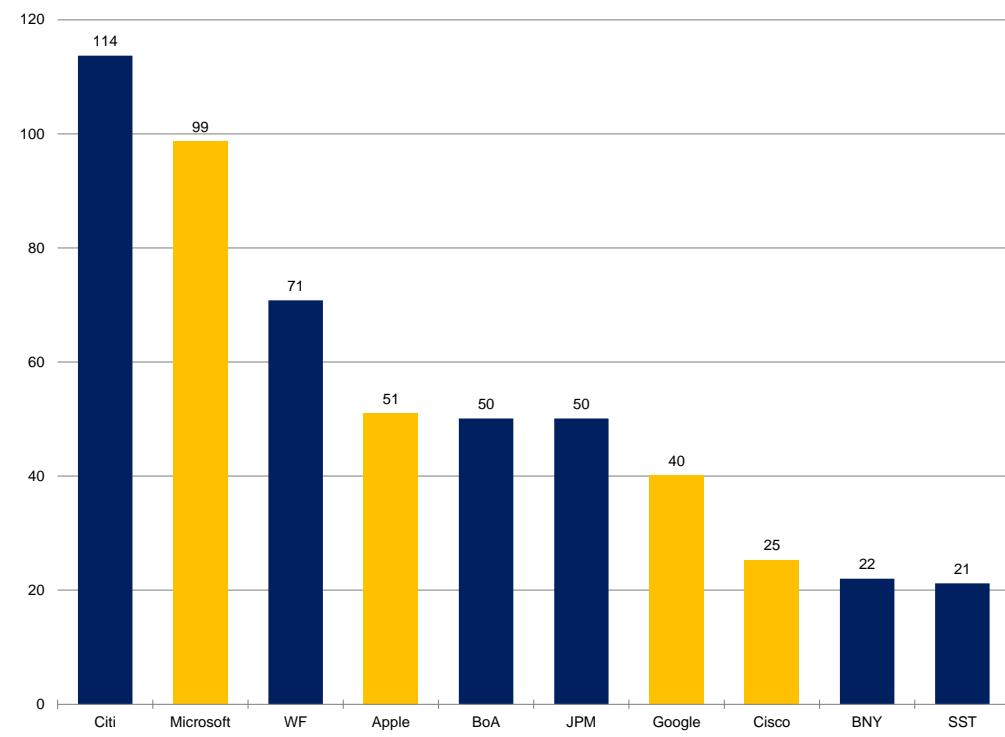
Bonds, not cash...

¹¹ See the leftmost column in Figure 10. \$200 billion comes from the following assumptions: all cash and equivalents of the “next 20” from the first segment gets repatriated. 25% of the bottom 120's balances get repatriated. Bonds < 1 year ex T-bills get liquidated.

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Figure 9: Corporate vs. Bank HQLA Portfolios

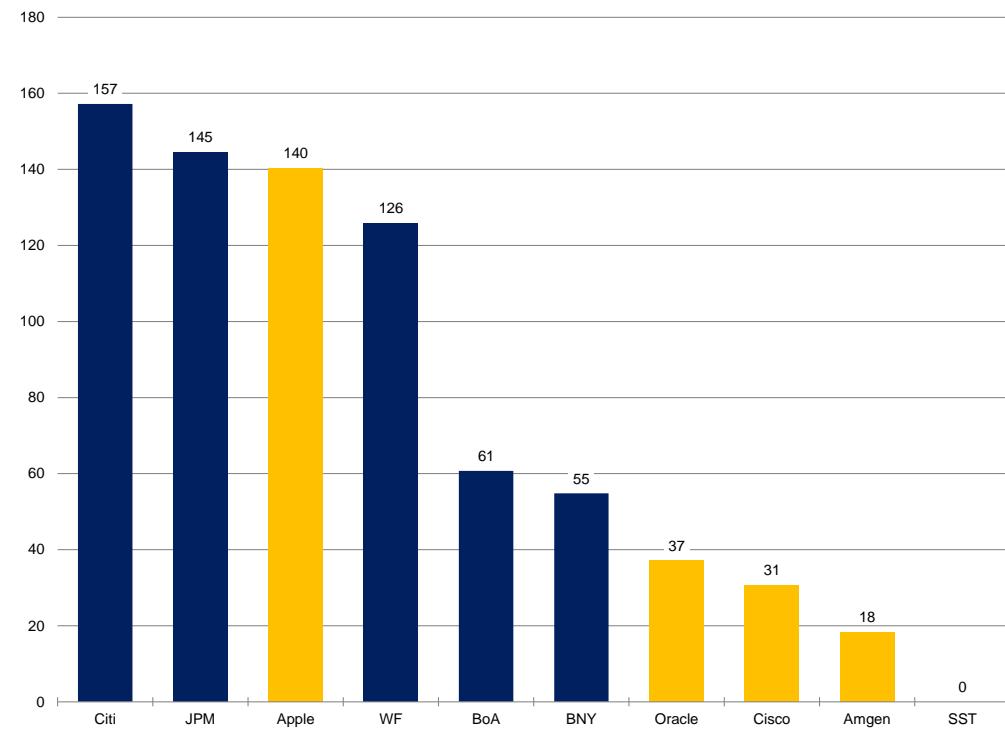
Holdings of U.S. Treasury and agency debt, \$ billions, as of December 31st, 2016



Source: Call reports, company data, Credit Suisse

Figure 10: Corporate vs. Bank Credit Portfolios

Holdings of corporate bonds, ABS, RMBS, etc., \$ billions, as of December 31st, 2016

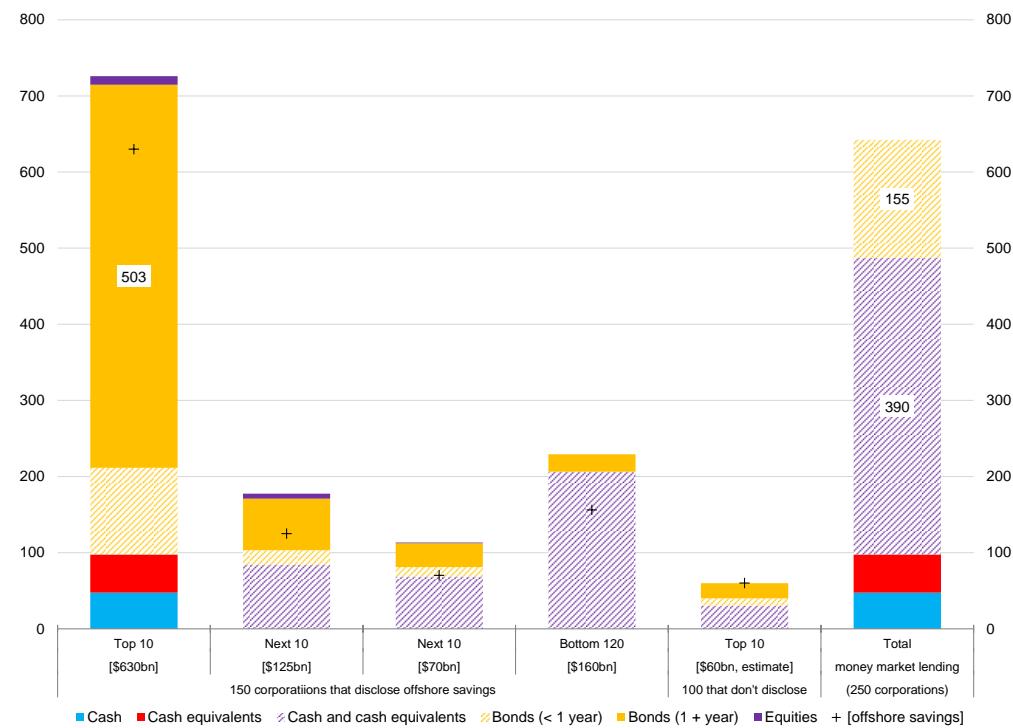


Source: Call reports, company data, Credit Suisse

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Figure 11: Not All Liquidity is Created Equal

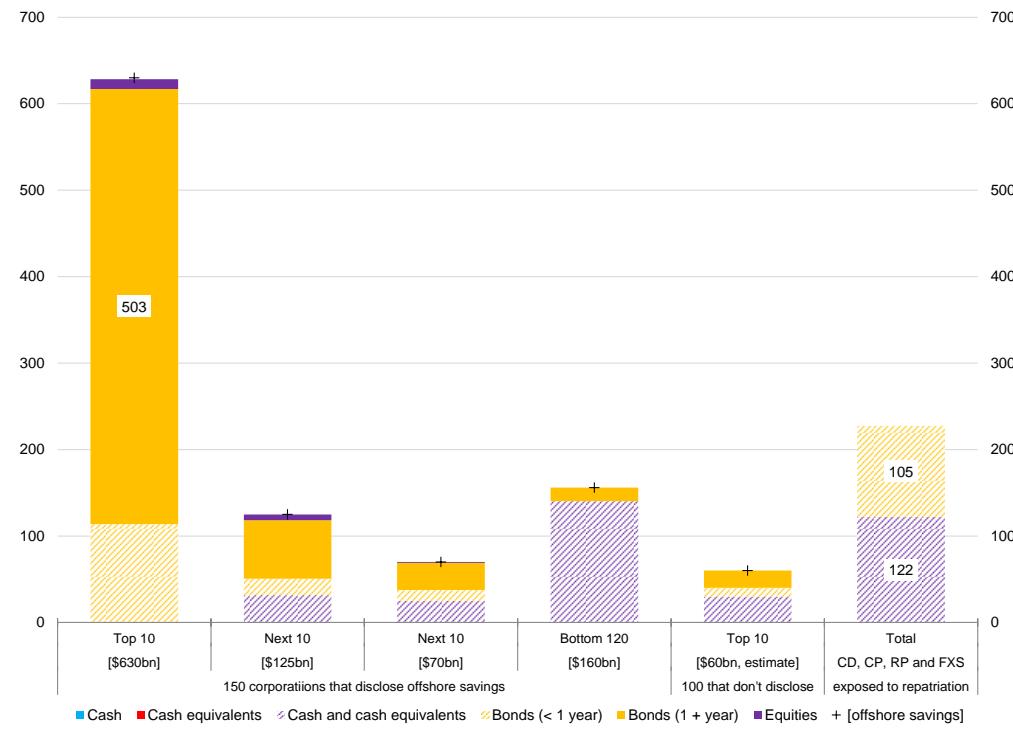
\$ billions, as of December 31st, 2016



Source: Company data, Credit Suisse

Figure 12: Bonds, Not Cash

\$ billions, as of December 31st, 2016



Source: Company data, Credit Suisse

Part 4 – Funded Bond Portfolios

We now know which firms have the most savings offshore and how savings are invested. The next piece of the puzzle is to figure out how these investment portfolios are *funded*.

Savings that accumulate from operating activities are funded by retained earnings.¹² Retained earnings are a “passive” liability – it’s not equity, it’s not debt, and it has no cost.

Savings funded by retained earnings are funds that haven’t been paid out as dividends. Presumably, that’s because management thinks that over time they can invest these funds in higher RoE projects internally than what shareholders could find by investing externally.

Shareholders believe this argument up to a point, but after decades of earnings retention, activists started to bang on managements’ doors to force the release of some savings. And when activists [are at the gate](#), managements listen.

Dividends started to flow...

But because savings accumulated almost exclusively offshore (see previous section), dividends couldn’t be paid out to shareholders without a 35% tax hit upon distribution.¹³

Enlist a banker to whip up a solution...

What’s not possible with the movement of offshore cash balances from operating activities is possible with the movement of cash raised through financing activities: offshore savings could effectively be released by using the proceeds from onshore debt issuance to fund dividends and share buybacks, similar to how homeowners used home equity lines of credit to release the wealth that accumulated as home equity (homeowners’ “retained earnings”).¹⁴

Figure 13 uses the discipline of “[the money view](#)” (at its *lingua franca* – balance sheets) to depict the corporate game of “accumulate, fund and release” that dominated the 2010s.

First, a modern corporation sets up shop with a simple balance sheet. It has an IP asset on the asset side of its balance sheet (the knowhow to integrate software and design into a phone, the code for an app, the formula for a drug) and finances it with debt and equity.

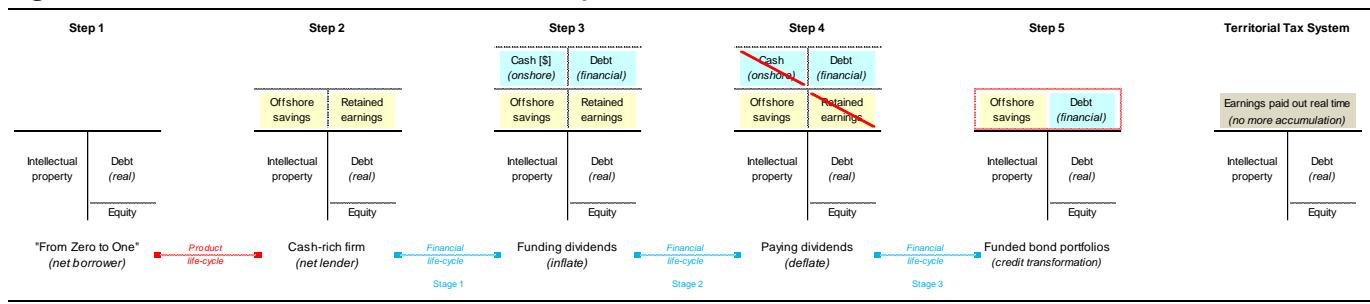
Second, the corporation’s product (the iPhone, the “killer” app, the life-saving pill) becomes a blockbuster. Sales skyrocket, margins stay fat, surplus cash accumulates. As cash accumulates, cash balances increase on the asset side and retained earnings increase on the liability side. The more cash the firm accumulates, the more risk it takes in how it invests it. Over time, [corporate cash pools](#) morph into corporate bond portfolios...

Third, in order to release some offshore savings via financing activities, the corporation issues a bond. Issuing bonds increases the balance sheet on both sides: the corporation ends up with cash on the asset side and debt on the

¹² Initially, at least. Retained earnings funding corporate savings is an accounting *identity*. These savings are the stocks that correspond to the flows we refer to as *free cash flow* (see above). Over time, the funding of savings may change (see below).

¹³ Prior to tax reform, the tax hit was unavoidable. That’s because for offshore savings to be distributed to shareholders, savings must first be wired from offshore subsidiaries back to headquarters in the U.S. where it would then be wired on to shareholders. Offshore savings can only be distributed via first flowing through headquarters (HQ). Wiring money to HQ is what triggers the tax.

¹⁴ Systemic risks are obviously not a concern in the corporate context. Even though offshore savings are in liquid instruments, offshore savings are illiquid (like home equity). In that sense they can’t be used for anything onshore. Finance enabled their use.

Figure 13: Accumulate, Fund, Release and Repeat...

Source: Credit Suisse

liability side. This debt is different from the debt that helped bring the firm to life: it funds financial activities, not real activities.

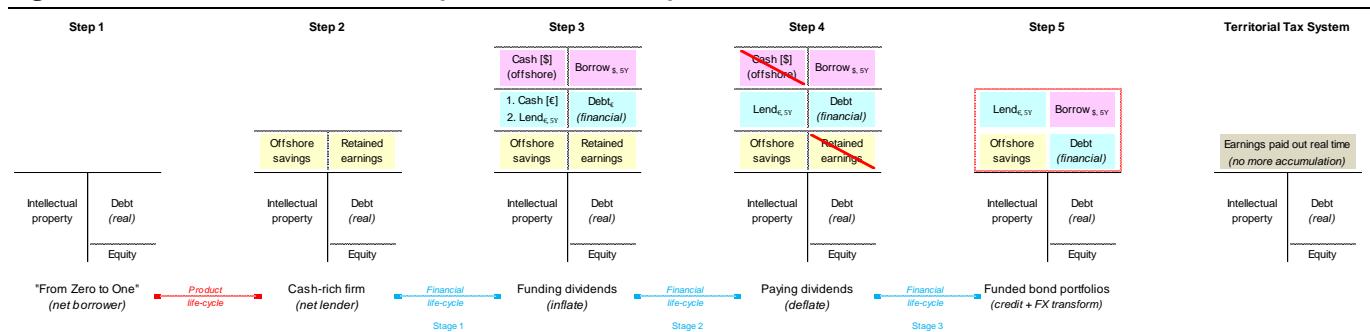
Fourth, the corporation uses the cash from the bond issue to pay a dividend. When dividends are paid, the corporation's balance sheet shrinks on both sides: cash goes down on the asset side and retained earnings go down by the same amount on the liability side.

Fifth, the balance sheet the corporation ends up with is one where the offshore savings invested in bonds is still in place, but instead of being funded by retained earnings, it is now being funded by debt. In other words, offshore portfolios are *funded* bond portfolios. The "game" is to earn a decent credit spread through term-matched credit transformation.

Credit transformation comes from the top ten using their high credit ratings to issue debt at rates lower than other issuers, and buy the debt of lower rated issuers such as banks that need financing for HQLA portfolios and firms that need financing for business expansion. In fact, five of the top ten names are rated AAA or a notch below. The ratings of the other five are one to four notches below AAA, but still occupy the upper half of the investment grade (IG) spectrum. Global banks on the other hand occupy the bottom half of the IG spectrum, which reinforces the point we've heard anecdotally that the top ten like to buy bank debt.

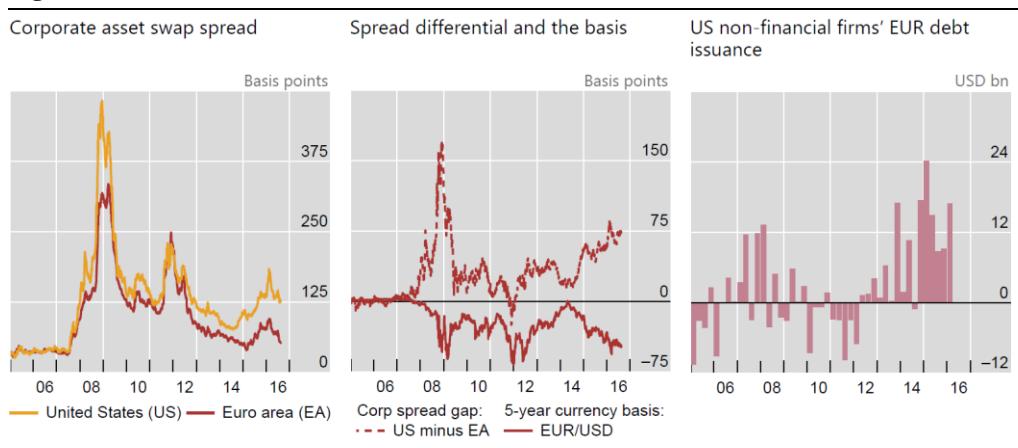
Maturity transformation is *not* a prominent part of these funding strategies: anecdotally, corporate treasurers aim to fund credit arbitrage on a term-matched basis, which is also reinforced by the incentive to fund term when term premia are negative (see [Stein, 2014](#)).

Financing activities to release trapped offshore savings can take more complicated forms. Figure 14 shows an example where the corporation, instead of issuing debt in U.S. dollars, issues debt in euros and then swaps the euros for dollars via cross-currency basis swaps.

Figure 14: Accumulate, Fund, Swap, Release and Repeat...

Source: Credit Suisse

Global Money Notes #11

Figure 15: Reverse Yankee Issuance and the €/\$ Basis

Source: BIS

Indeed, such funding strategies have been used by cash rich firms in recent years. As the ECB's QE program drove credit spreads tighter in euros, reverse Yankee issuance soared (see Figure 15; reverse Yankee debt is euro-denominated debt issued by U.S. corporates). This issuance was then swapped back to dollars, typically on a term-matched basis – no maturity transformation to worry about here either. With cash rich firms issuing mostly two to five year debt, the bid for U.S. dollars was the strongest in that segment of the €/\$ cross-currency basis curve, pressuring the basis more negative there (middle panel).

Figure 16 shows what share of the top ten's portfolios is funded by retained earnings, U.S. dollar-denominated debt and reverse Yankee bonds swapped back to U.S. dollars. Despite a massive amount of debt issuance to distribute offshore savings to shareholders, retained earnings still fund 50% of the top ten's offshore savings. Dollar debt funds about 45% of offshore savings, and euro debt swapped into U.S. dollars funds the remaining 5%.

But when we broaden the funding discussion to the top 30 names, the picture changes...

The 30 most wealthy corporations paid out a higher 90% of their offshore savings already – 75% funded with debt issued in the U.S., and 15% funded with debt issued offshore in Europe and then swapped back to U.S. dollars. Unlike other aspects of our analysis, in terms of using debt to release offshore savings, the top ten appear to lag the league tables.

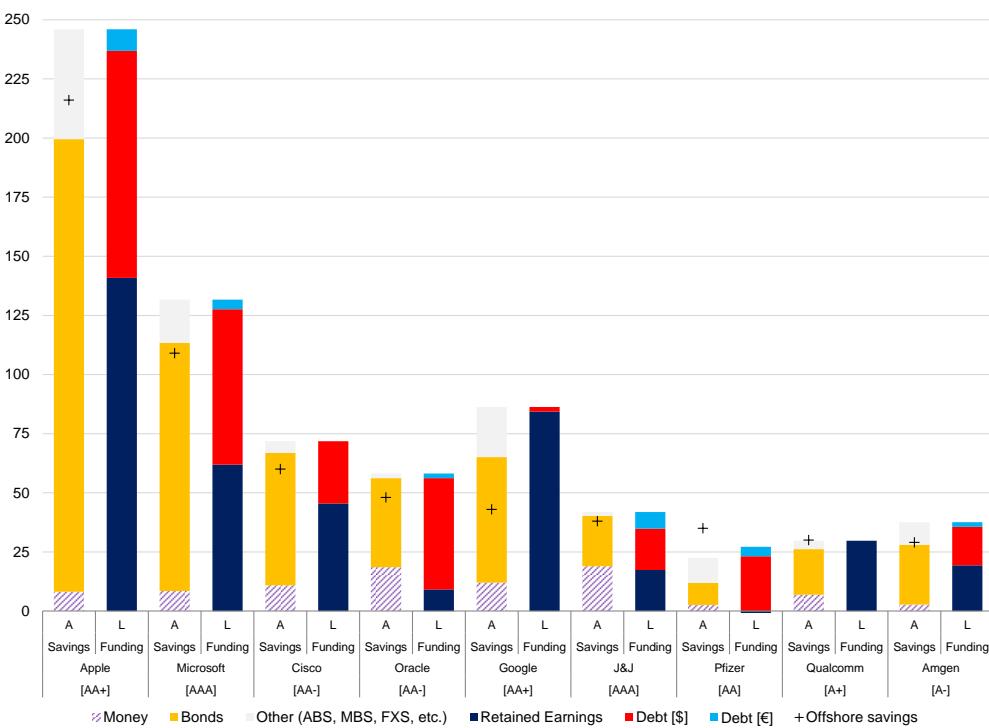
Figure 17 shows the aggregate savings of the top 30 and the funding that corresponds to it – this is the aggregate size of U.S. corporations' funded bond portfolios.

As noted above, the worldwide tax system gave rise to these portfolios, and, on the flipside, the advent of the territorial tax system will be their undoing.

Under the territorial tax system, corporations will no longer accumulate offshore savings, and their incentives will be to dismantle the portfolios they've built up in the past. We discuss the market impact of these changes next...

Figure 16: Funded Bond Portfolios

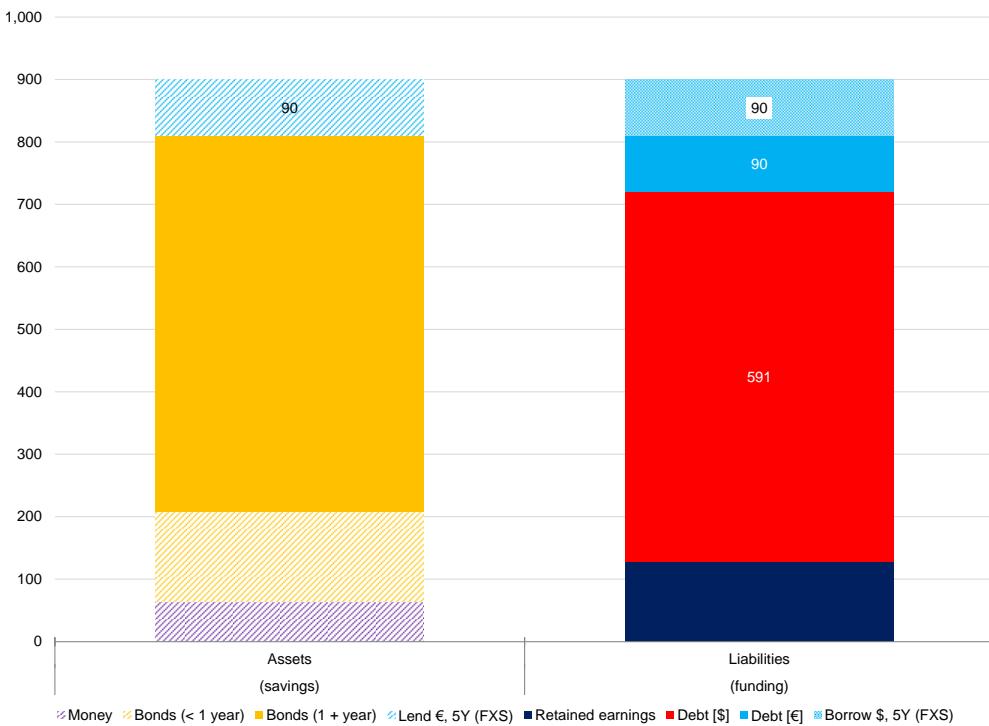
\$ billions, as of December 31st, 2016



Source: Company data, Credit Suisse

Figure 17: Sizing the Echo-Taper

Offshore savings of the 30 most wealthy firms that disclose offshore savings, \$ billions



Source: Company data, Credit Suisse

Part 5 – The Echo-Taper and the €/\$ Basis

Now that we know the lay of the land, we can start thinking about the market impact of corporate tax reform. As noted above, paying taxes won't have much of a market impact, and the benefits of freer cash flow will be a drop in a sea of positive risk market sentiment.

The spot value of the U.S. dollar is not likely to come into play either. That's because most offshore savings are in U.S. dollar-denominated instruments already. If corporations have some amount of offshore savings in a foreign currency, it likely reflects a genuine liquidity need in that particular foreign currency. Such balances are unlikely to be moved around due to tax reform. Furthermore, because we are talking about U.S. corporations that report their results in dollars, it makes no sense for them to keep excess cash in foreign currency-denominated assets as that would increase their earnings volatility, not to mention the fact that yields on U.S. dollar assets have been better than the rest of the G7.

The funding market impact of tax reform will also be small. The top 30's allocation to cash, cash equivalents (money funds) and money market instruments (repo, CP, CD and FXS) is so small, that these balances likely reflect a genuine liquidity need. The market lore that the top ten are big lenders of dollars via FX swaps is not supported by the data. Figure 18 shows that the top ten lend no more than \$30 billion via FX swaps, and, because sophistication comes with size, if the big fish lend only \$30 billion via FX swaps, small fish lend even less. As our analysis has shown, the "fat" is in the bond segment of the top 30's investment portfolios, and not the cash segment. As such, "liposuction" will likely occur in the bond segment of these portfolios, and not the cash segment. And, if cash is left alone, nothing will whack around the cross-currency basis or U.S. dollar Libor-OIS.

In contrast, the capital market impact of tax reform could be meaningful...

As noted above, the big impact will come from the unwind of the legacy portfolios that built up since 2000 under the global tax system, the roll-back of associated funding strategies, and the disappearance of the captive corporate bid for U.S. Treasuries and term bank debt under the new, territorial tax system. What will be their impact on U.S. Treasury yields, swap spreads, bank funding spreads, and the €/\$ cross-currency basis swap curve?

Before answering these *macro* questions, we need to ask two *micro* questions:

- (1) When will the top 30 bring offshore savings home?
- (2) What will the top 30 use their offshore savings for?

First, on timing. As noted in the first section of our analysis, the only thing that's mandatory under tax reform is to pay taxes on the stock of offshore earnings from the past. Paying taxes gives firms the *option* to distribute offshore savings if they want to, when they want to, and at the pace at which they want to. As such, the timing of distribution is *uncertain*. The year 2020 often comes up in conversations with treasurers as the absolute latest time by which offshore savings should be completely distributed – 2020 is another election year and the tax code may get another revamp with less favorable terms on offshore savings.

Between now and 2020, the *uses* of offshore savings will dictate the pace of distribution, which brings us to the second question. Our conversations with treasurers suggest that offshore savings will likely be used to "fund" one of four "trades": mergers and acquisitions, paying dividends, buying back stock or buying back debt. On a first principles basis, you can't pay with bonds for M&As, and can't issue dividends or buy back stocks with bonds – all four uses will require turning corporate investment portfolios back into cash...

How?

There are two ways, and only two ways. You either sell assets, or you let assets roll off. The former is an *active* way of converting bonds into cash, and the latter is a *passive* way of converting bonds into cash. Central banks like to call their own passive conversions taper. Inspired by their terminology, we'll call the roll-off of corporate portfolios the "echo-taper".

How do these different uses of offshore savings impact the *pace* of "repatriation"?

Of the four trades, the first – mergers and acquisitions – is like dating: it is time sensitive, meaning that you engage when you see a target. M&As will thus likely be funded through *active* conversions of bonds into cash. If there is an M&A wave on the back of tax reform, corporate treasurers will actively sell lots of bonds to raise cash to buy targets this year.

An aggressive M&A wave means relatively *fast* "repatriation"...

The other three trades are not time sensitive. Nothing forces you to pay a dividend, to buy back your stock or to buy back your debt, so you tend to do these trades when the money rolls in. If there is no M&A wave this year, then corporations will use their savings to pay dividends and fund stock and debt buybacks at the pace at which their portfolios mature over the next few years – funding through a *passive* conversion of bonds into cash.

Dividends and buybacks mean relatively *slow* "repatriation"...

Of course, these general rules of thumb could be accelerated by market events – were rates and credit spreads to rally, corporations will sell bonds from their portfolios ahead of maturity in order to lock in mark-to-market gains and use the cash to fund faster buybacks. Conversely, if IG spreads sell off, corporations could do debt buybacks selectively to lock in (that is, capitalize) the lower market value of their own debt. Thus, timing can speed up...

Our best guess is that \$400 of the \$800 billion in offshore savings controlled by the top 30 will be utilized this year through M&As, stock buybacks and selective debt buybacks, and the other half by the end of 2019. As a concept, we expect that offshore savings will disappear by 2020.

How will these flows impact markets?

From the perspective of fixed income investors, M&As and stock buybacks matter because the *active sale* or *passive taper* of corporate investment portfolios is what will fund them. The task is to figure out what the sale and taper of these portfolios means for U.S. Treasuries, swap spreads and term bank funding spreads. Selective debt buybacks matter for the same reasons, plus the impact that the unwind of cross-currency basis swaps will have on longer-dated bases if corporations buy back their own reverse Yankee debts.

In a year where Treasury supply is set to soar, the fact that the captive corporate bid will vanish due to the move to a territorial system (no more accumulate, fund and release) is bad enough news. If corporate treasurers add to that supply by selling Treasuries, rates could move more than the market expects. In fact, this corporate echo-taper could be far more potent than that of the Fed! That's because we know that the U.S. Treasury will re-issue the Treasuries the Fed no longer buys as bills, not bonds. As such, the taper of the Fed's U.S. Treasury portfolio won't add a lot of duration back into the market – swapping reserves for bills will tighten funding markets, not capital markets (see [here](#)).

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In contrast, the taper of corporations' U.S. Treasury portfolios could add quite a bit of duration back into the market, and we are not aware of any coordination between the U.S. Treasury and corporate treasurers to take into account the facts that corporations will be absent from auctions going forward and turn into net *sellers* of Treasuries this year. And judging from the "pulse" of the U.S. Financial Accounts, the Fed doesn't seem to focus on the potential impact of repatriation on term premia either... (see Figure 19).¹⁵

Thus, it seems that the event to be concerned about is not taper, but the echo-taper...

In addition to U.S. Treasury yields, the echo-taper will likely also impact IG credit spreads. Corporate treasurers selling their IG holdings can impact banks' term funding spreads, coincident with the taper of the Fed's MBS portfolio also pressuring the same spreads.

Thus, M&As and stock buybacks are bad for bond markets because they are funded by the sale of bonds or the taper of bond portfolios, and they do not withdraw duration from the market. They do not, because the instruments being retired are equities, not debt.

The echo-taper reminds us of China's occasional liquidation of its U.S. Treasury holdings when SAFE defends the FX value of the yuan. There is always an element of surprise to China's sales, and primary dealers tend to be caught off guard. As the dealers digest the increased supply of U.S. Treasuries, they tend to hedge their exposure by selling swaps, which pressures swap spreads wider. If the pace of the echo-taper will be surprisingly fast, we would expect markets to behave precisely as they would if China dumped some bonds.

China sells bonds to buy yuan and U.S. corporations sell bonds to buy equities...

But whoever sells and whatever bond sales fund do not matter much. What matters is that the movement of bonds through the system leaves a typical trail in capital markets: higher Treasury yields in the affected segments and wider swap spreads at corresponding terms.

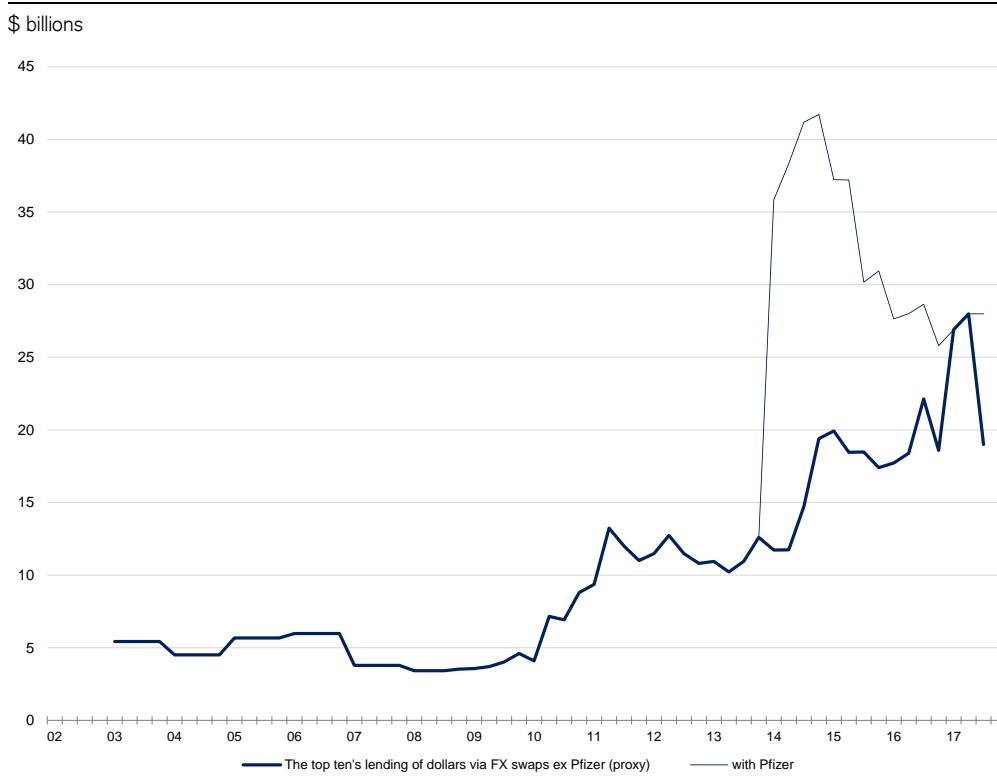
Debt buybacks are better from a bond market perspective...

If corporations sell bonds from their portfolios and use the cash to buy back their own debt, the net supply of bonds falls – i.e., debt buybacks make room for debt sales one for one.

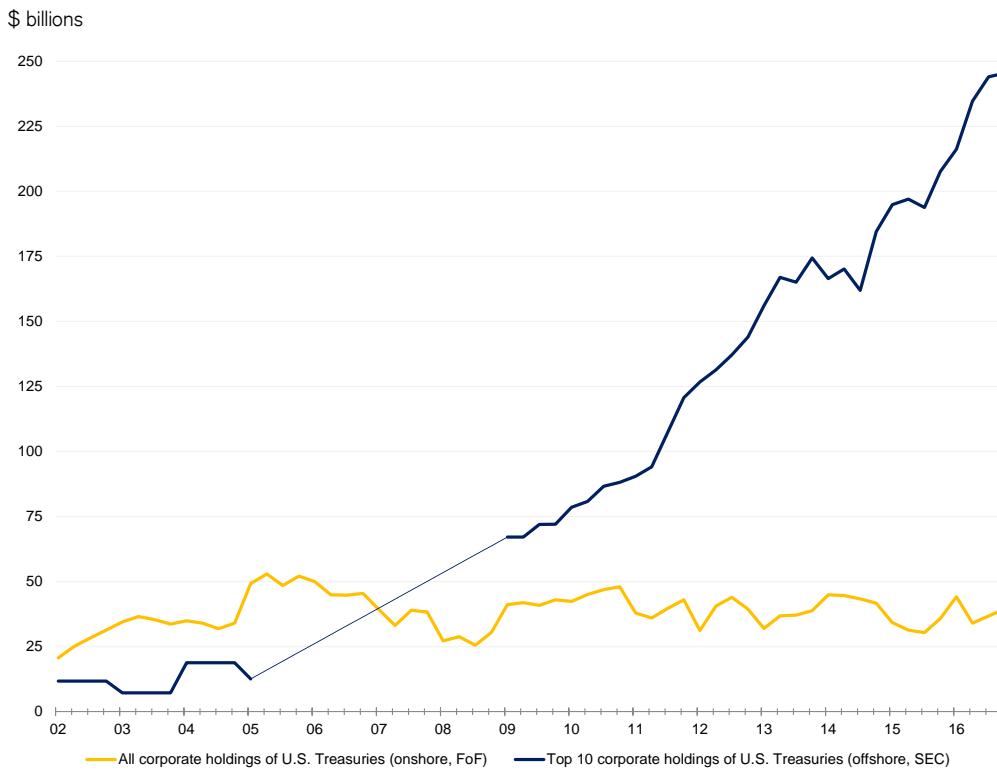
Corporations are unlikely to buy back their debt *en masse*, as gearing enhances RoEs and executives are paid based on RoEs. But buybacks could occur selectively, especially if markets move in ways that make them attractive.

On a relative value basis, debt buybacks will favor reverse Yankee debt over onshore debt. What will be the market impact of that? Figure 17 showed the volume of the top 30's reverse Yankee debt outstanding. As noted above,

¹⁵ Table L.103 in the U.S. Financial Accounts (formerly the Flow of Funds) which tracks the balance sheet of U.S. corporations shows that the sector holds about \$50 billion of Treasuries – a number that hasn't changed in decades (orange line, Figure 19). But on the previous pages, we've shown that the largest corporations have accumulated \$250 billion in Treasuries. Table L.103 tracks the *onshore* savings of U.S. corporations. *Offshore* savings are lumped together with the "Rest of the World" in Table L.133.

Figure 18: Corporate Treasurers are Not Big Lenders of Dollars via FX Swaps

Source: Company data, Credit Suisse

Figure 19: The Fed's Statistical Perspective on Repatriation vs. Reality...

Source: Company data, Federal Reserve, Credit Suisse

reverse Yankee bonds typically have a cross-currency basis swap stapled to them. A buyback of reverse Yankee debt would most definitely trigger the buyback of associated cross-currency swaps, which, all else equal, would make the two to five year segment of the €/\$ cross-currency basis curve less negative.

What is the probability of this happening?

Better than 50%. Recall that corporations have an incentive to buy back their own debt when credit spreads widen and the market value of debt is less than its face value. Expectations for the ECB's taper to commence next year could be the catalyst for a selloff and a wave of debt buybacks. Buybacks could set off a steepening of the term structure of the €/\$ cross-currency basis swap curve, especially if we link this theme up with the significant tightening that we expect in the three-month €/\$ basis on the back of increased U.S. Treasury bill supply during this year (see the prior issue of *Global Money Notes* [here](#)).

Conclusions

The echo-taper, higher U.S. Treasury yields, wider swap spreads and a steeper €/\$ cross-currency swap curve – these are the *potential* macro themes on the back of repatriation.

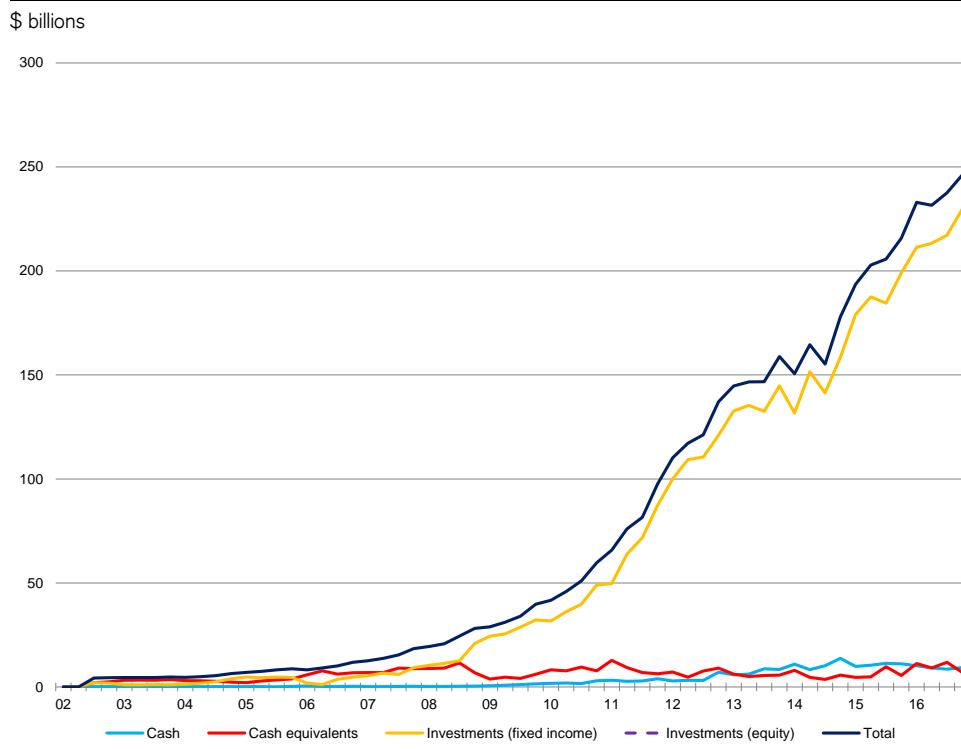
The timing and pace of repatriation will be key to trade these themes successfully, in our view.

Similar to how we made a habit of analyzing U.S. and foreign banks call reports to understand money market dynamics in the post-Basel III era, we will have to make a habit of parsing the SEC filings and listening to the earnings calls of the top 30 corporations that will drive the bulk of M&A deals and stock and debt buybacks on the back of repatriation.

The data we use to source alpha changes over time. Watching open market operations by the Fed was a thing of the 1980s. Watching the FX reserves of central banks was a thing of the 1990s. Watching the HQLA portfolios of G-SIBs is a thing of the present. Now we have to add to that watching the bond portfolios of the iconic corporations of the present...

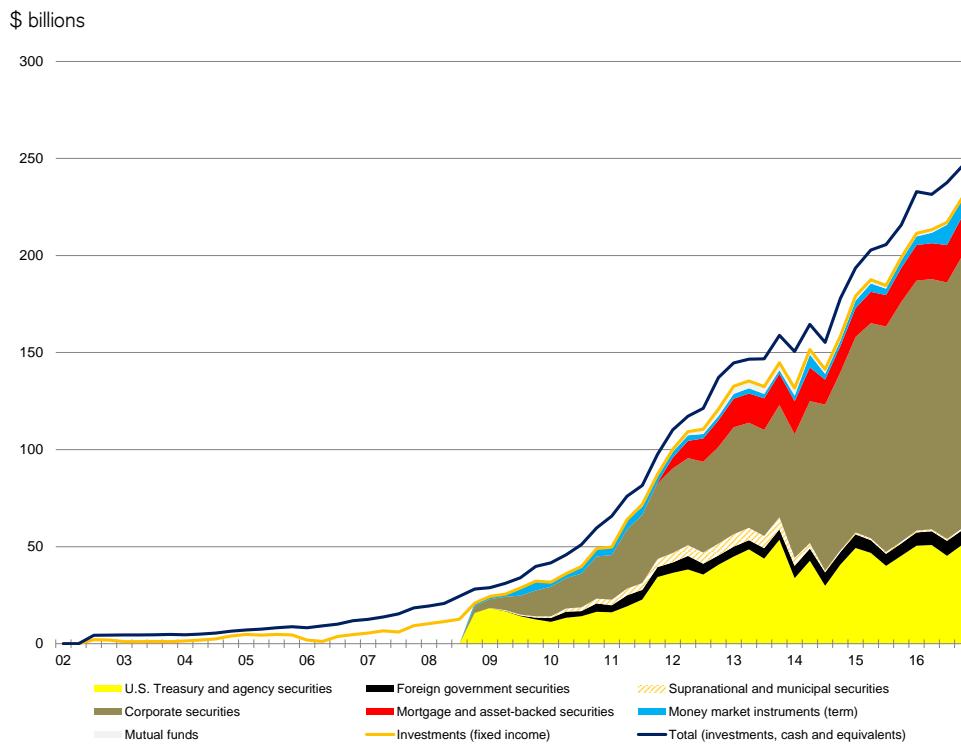
Appendix 1 – Apple Inc.

Figure 20-1: Total Investments by Type

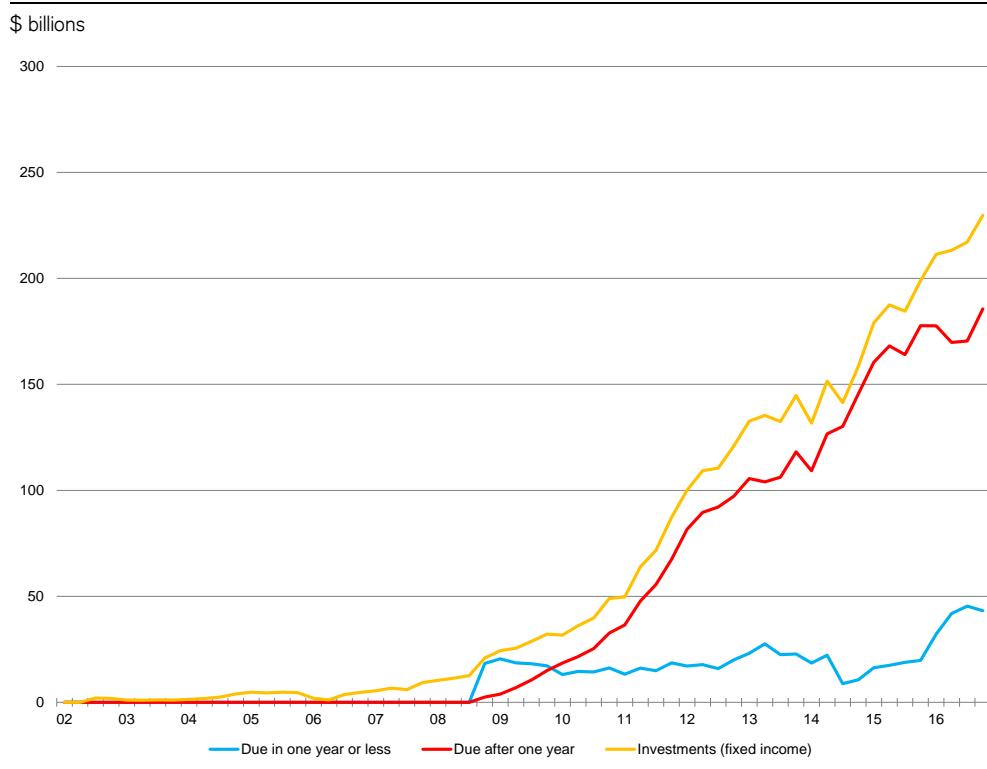


Source: Company data, Credit Suisse

Figure A1-2: Bond Investments by Type



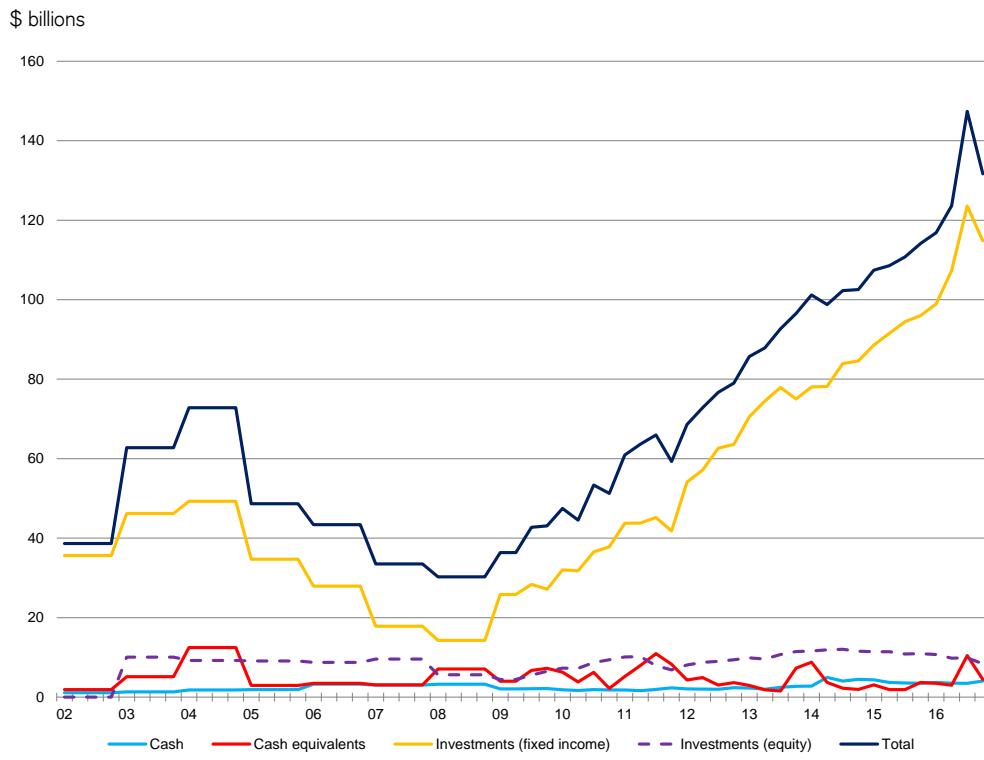
Source: Company data, Credit Suisse

Figure A1-3: Bond Investments by Term

Source: Company data, Credit Suisse

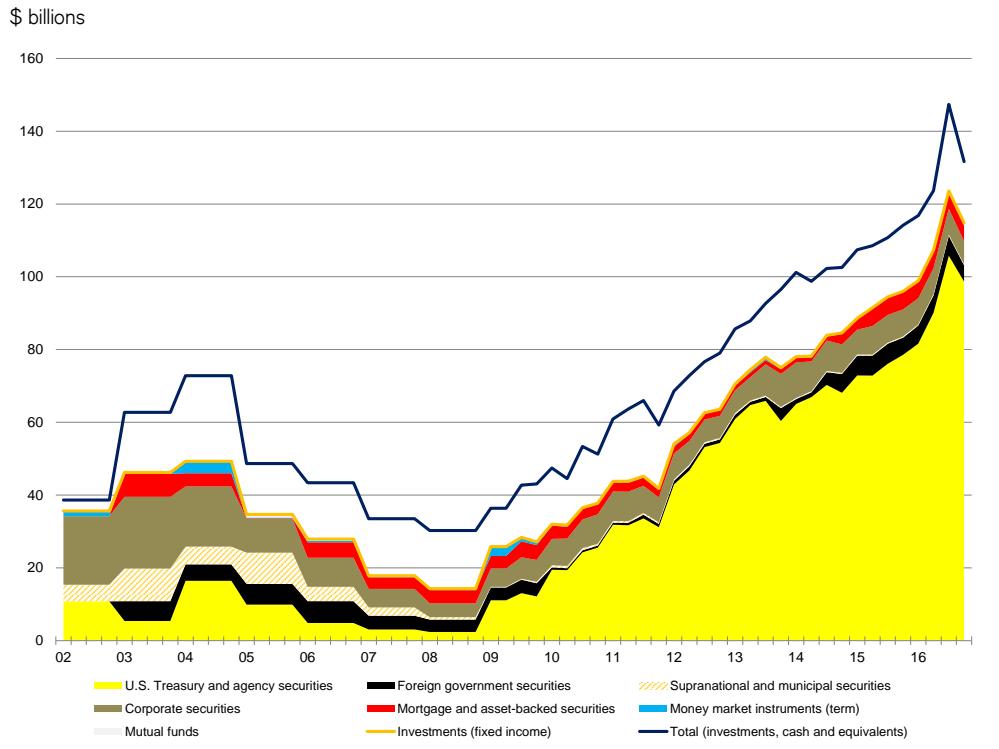
Appendix 2 – Microsoft Corporation

Figure 21-1: Total Investments by Type

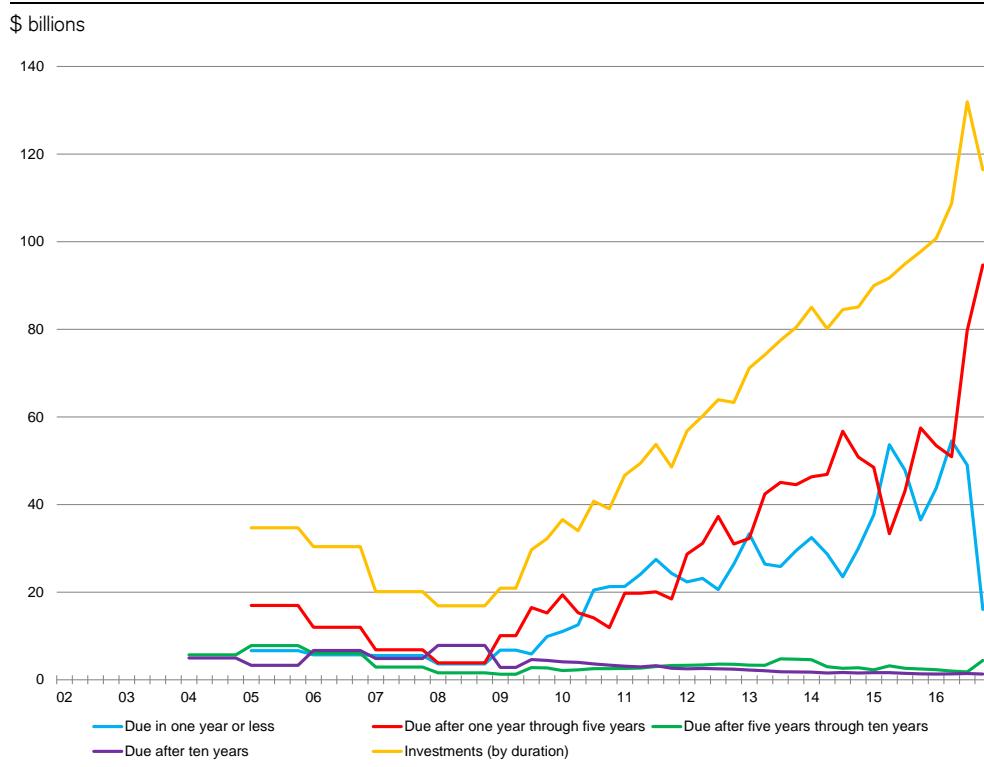


Source: Company data, Credit Suisse

Figure A2-2: Bond Investments by Type



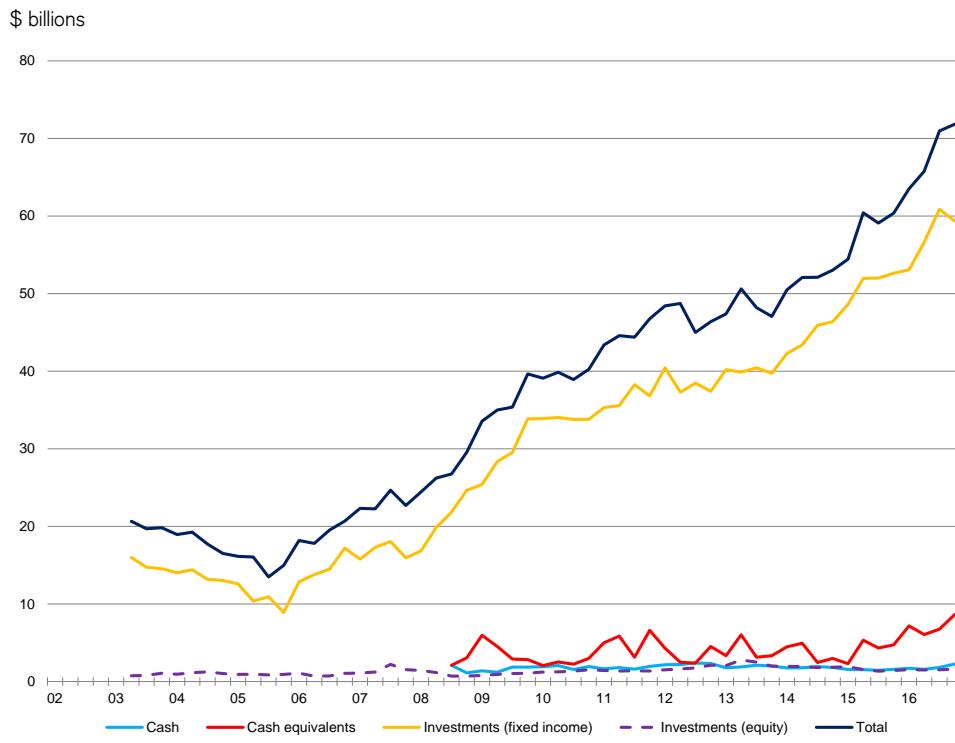
Source: Company data, Credit Suisse

Figure A2-3: Bond Investments by Term

Source: Company data, Credit Suisse

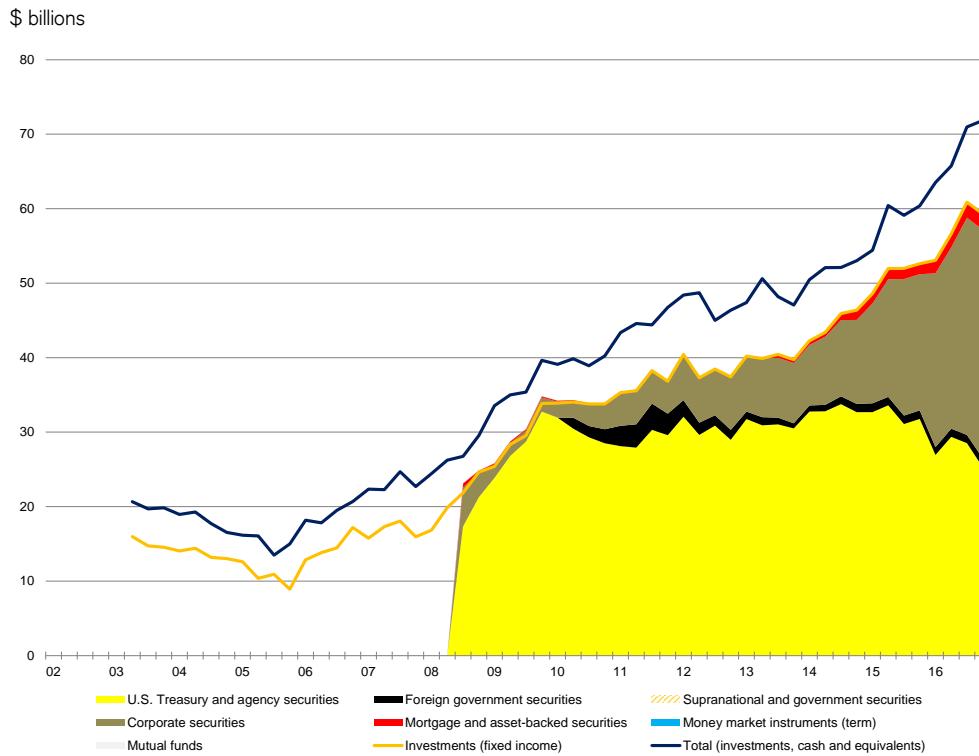
Appendix 3 – Cisco Systems, Inc.

Figure 22-1: Total Investments by Type

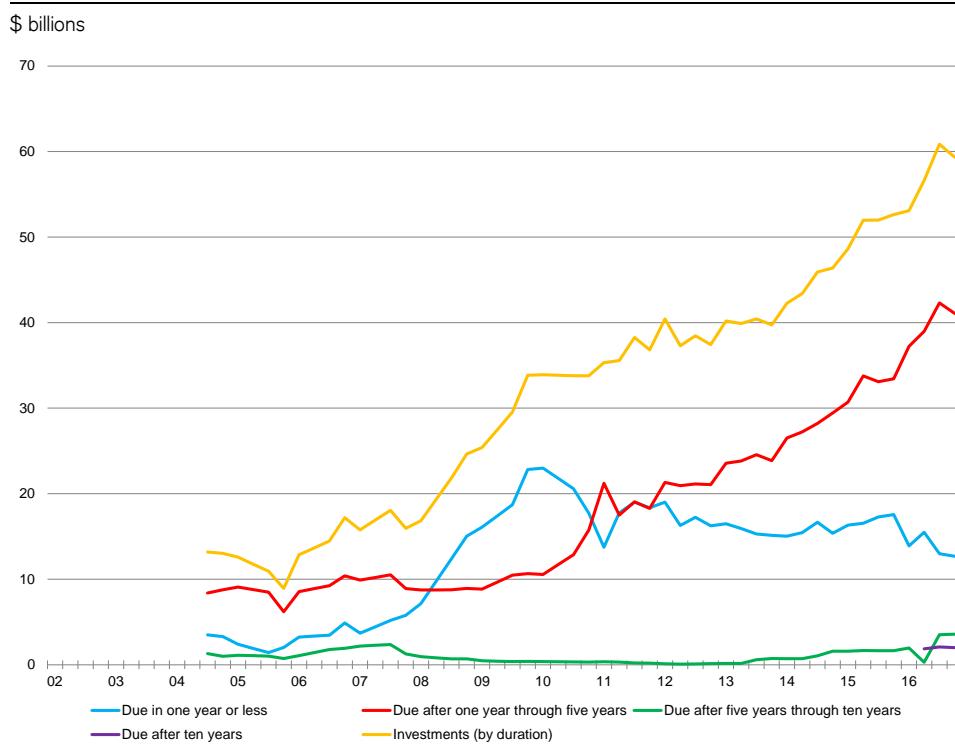


Source: Company data, Credit Suisse

Figure A3-2: Bond Investments by Type



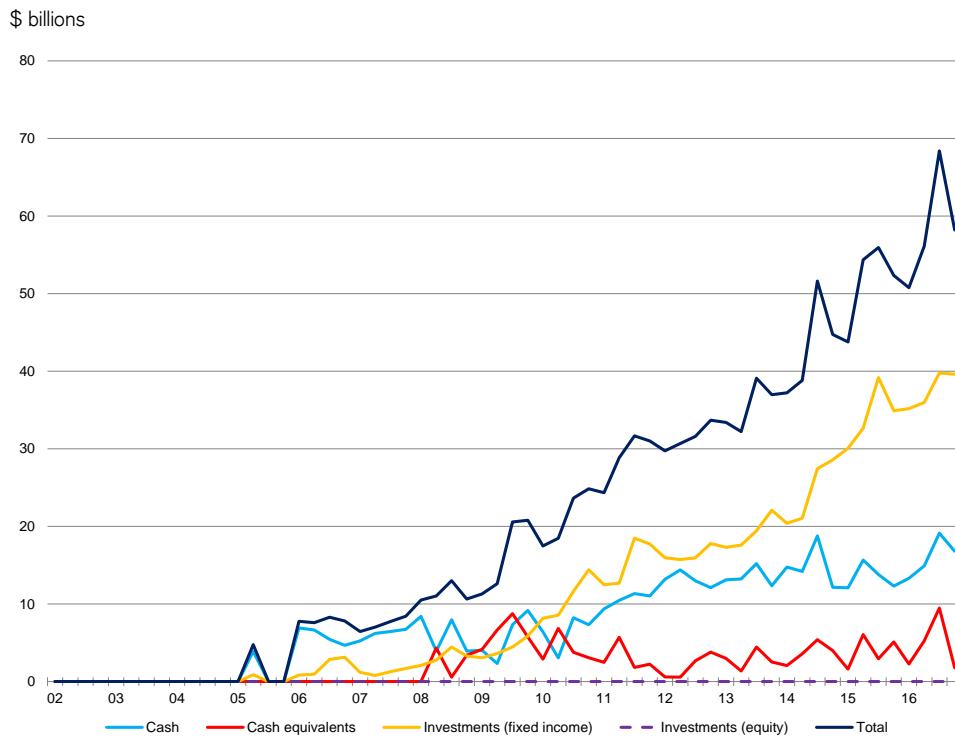
Source: Company data, Credit Suisse

Figure A3-3: Bond Investments by Term

Source: Company data, Credit Suisse

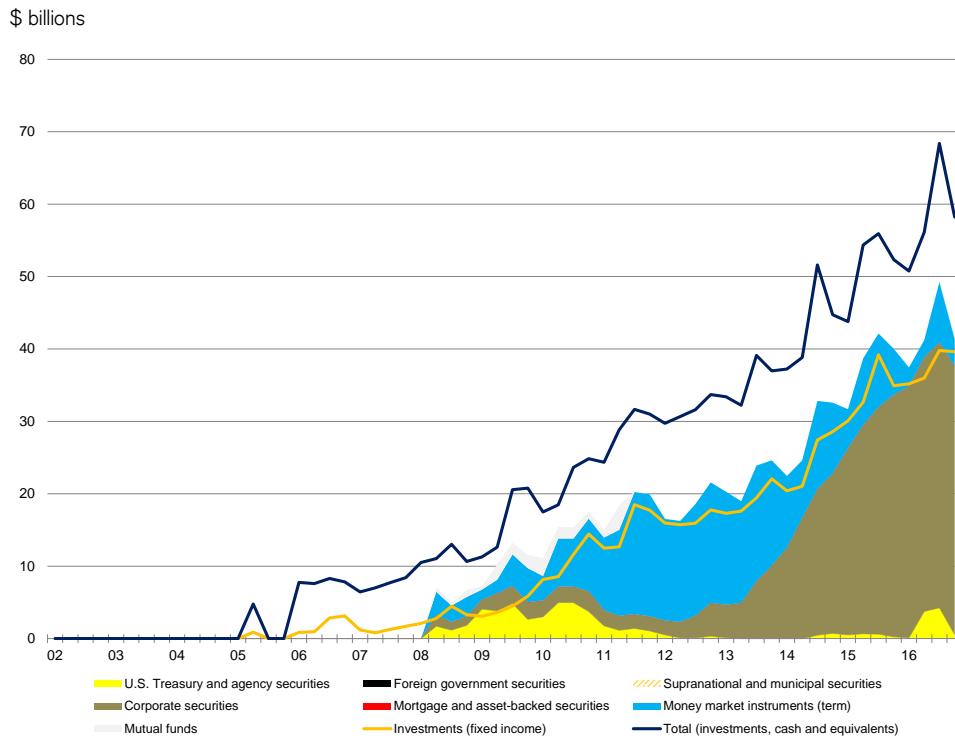
Appendix 4 – Oracle Corporation

Figure 23-1: Total Investments by Type



Source: Company data, Credit Suisse

Figure A4-2: Bond Investments by Type



Source: Company data, Credit Suisse

Figure A4-3: Bond Investments by Term

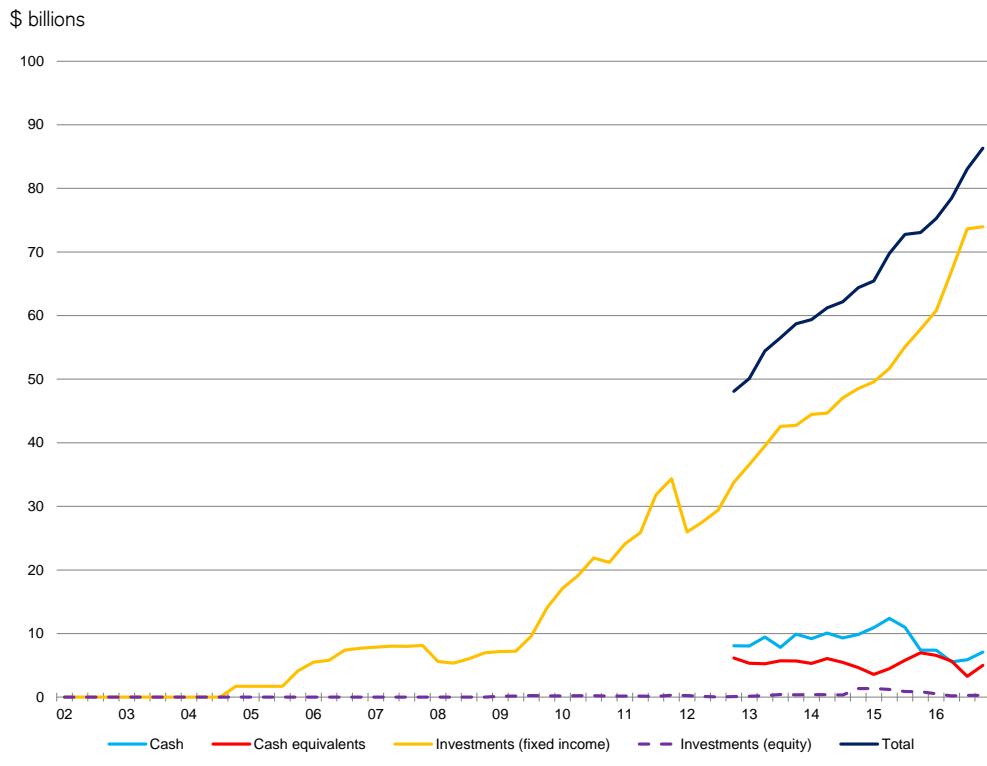
\$ billions

N/A

Source: Company data, Credit Suisse

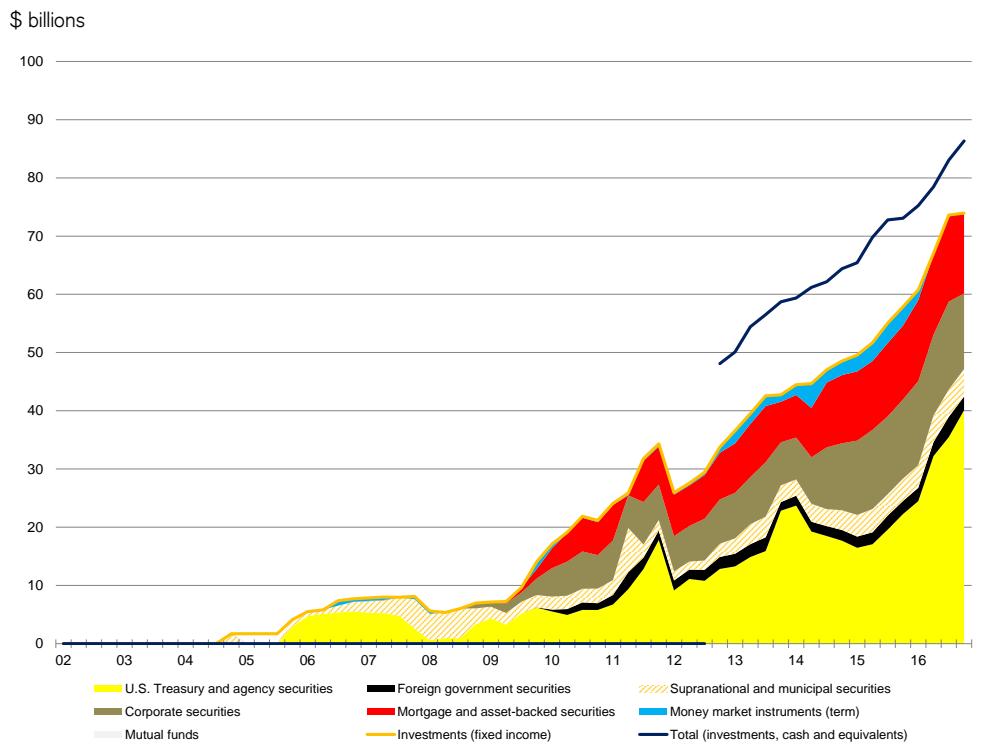
Appendix 5 – Alphabet Inc.

Figure 24-1: Total Investments by Type

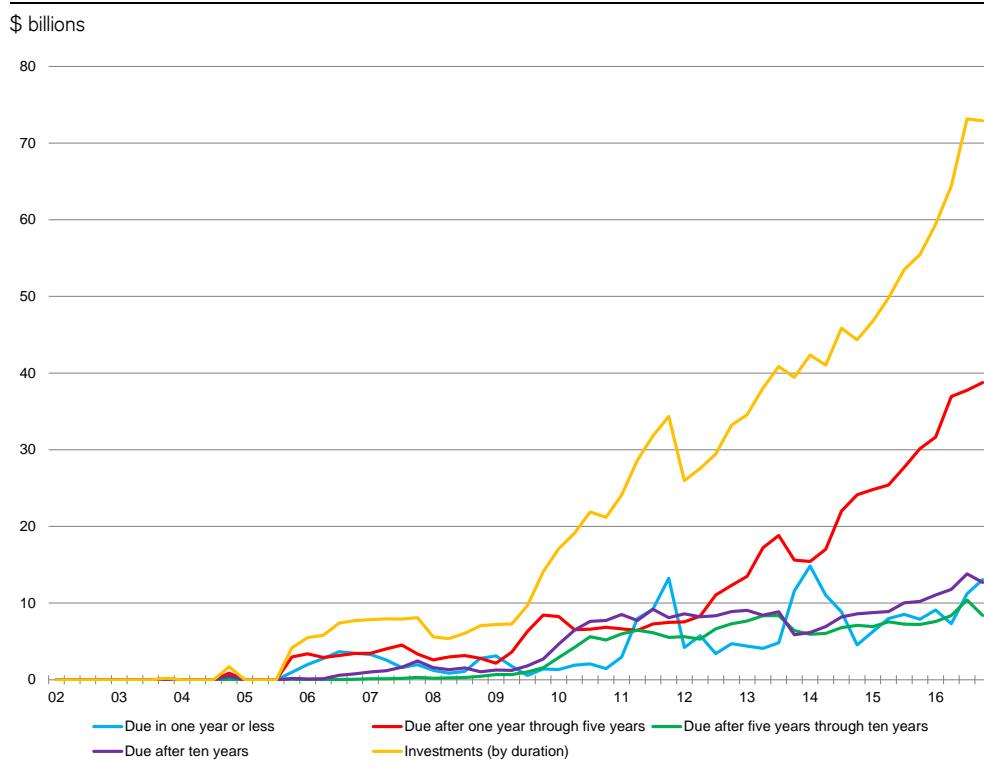


Source: Company data, Credit Suisse

Figure A5-2: Bond Investments by Type



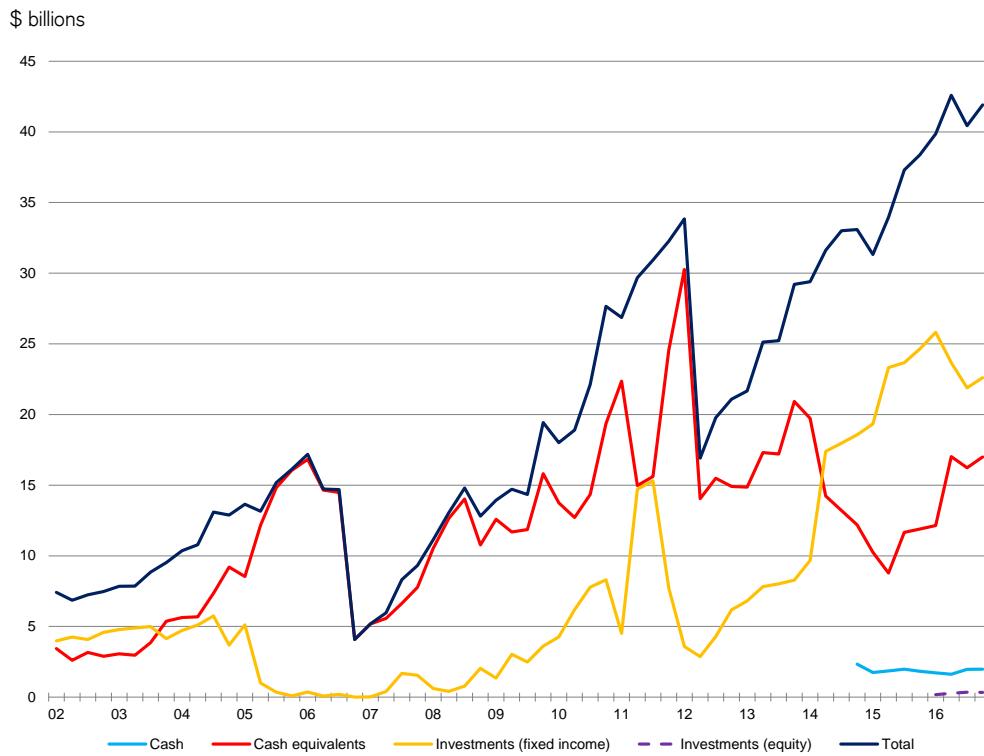
Source: Company data, Credit Suisse

Figure A5-3: Bond Investments by Term

Source: Company data, Credit Suisse

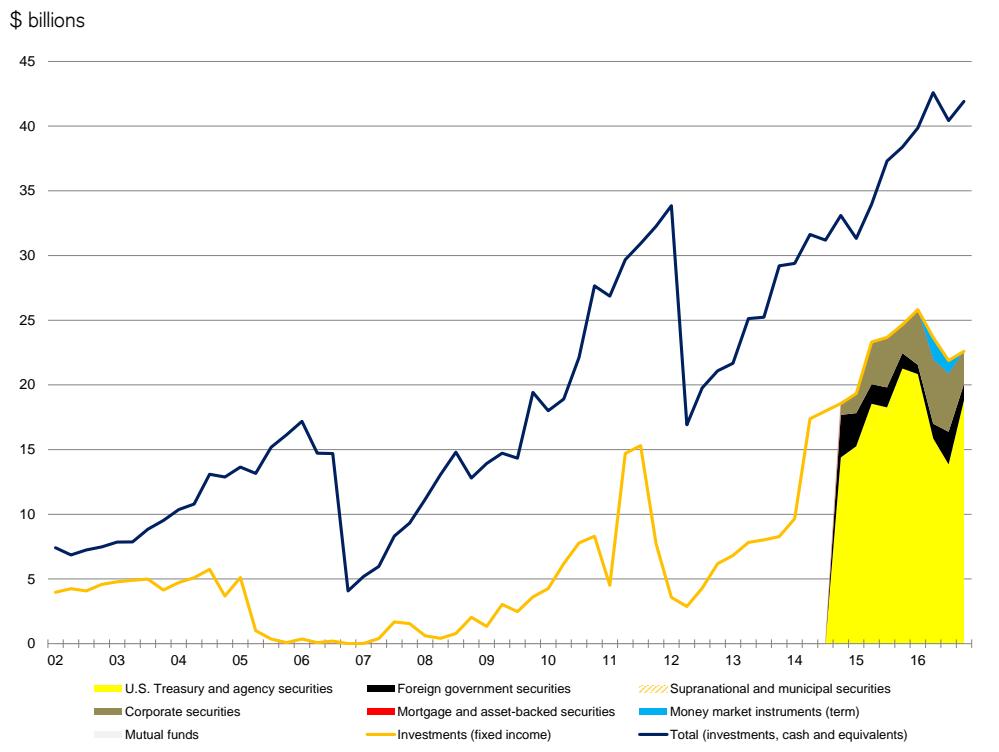
Appendix 6 – Johnson & Johnson

Figure 25-1: Total Investments by Type

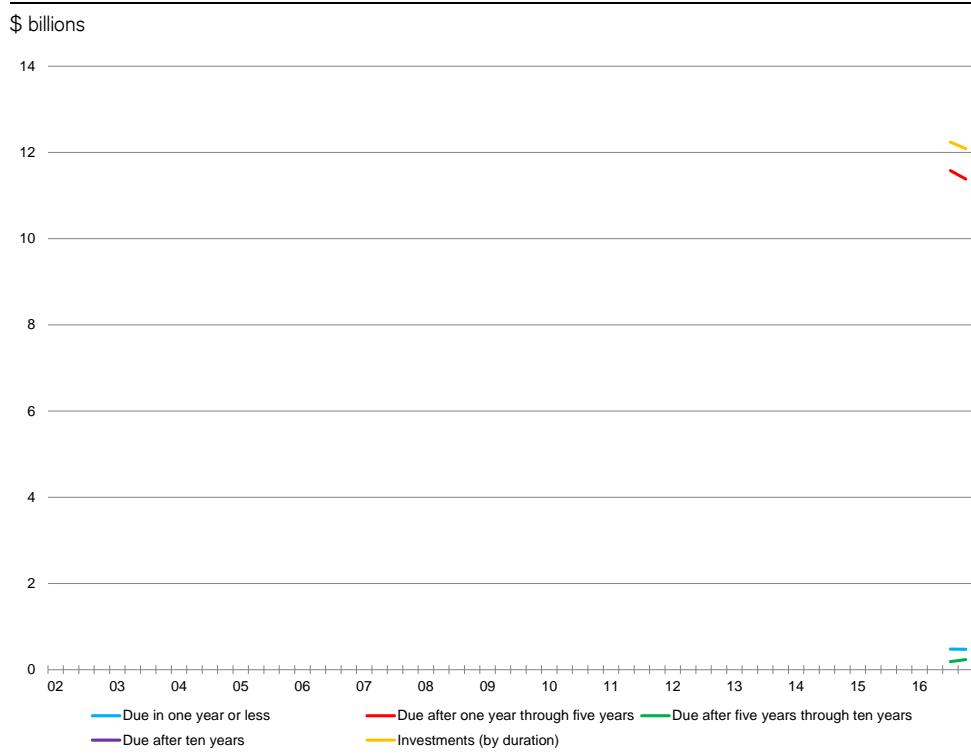


Source: Company data, Credit Suisse

Figure A6-2: Bond Investments by Type



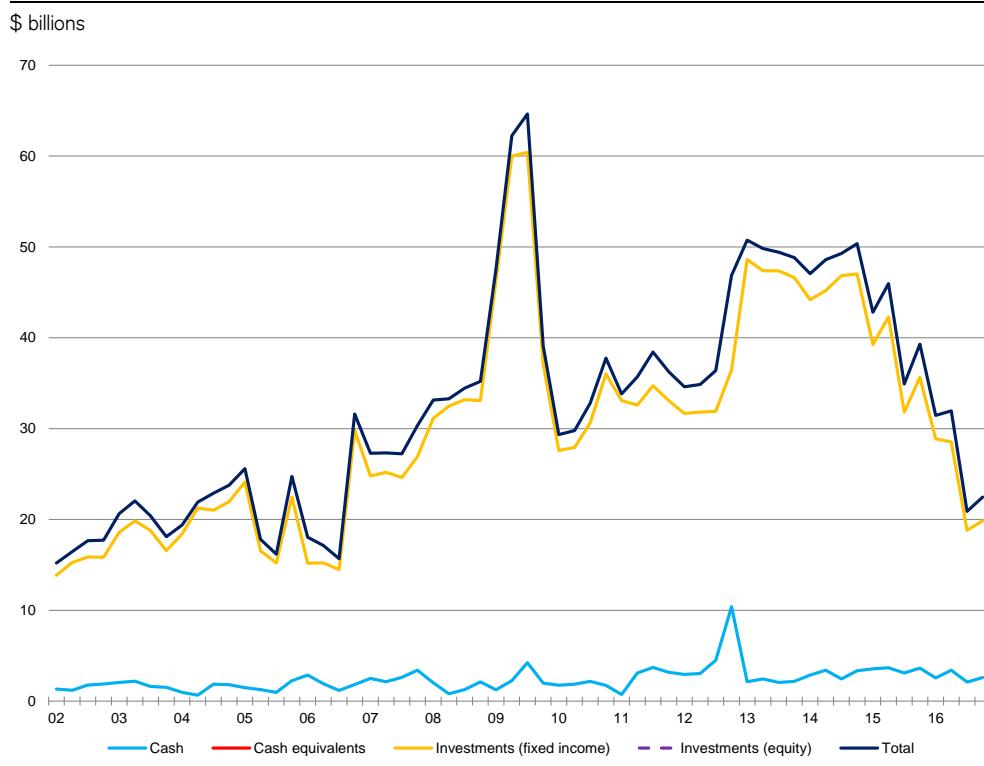
Source: Company data, Credit Suisse

Figure A6-3: Bond Investments by Term

Source: Company data, Credit Suisse

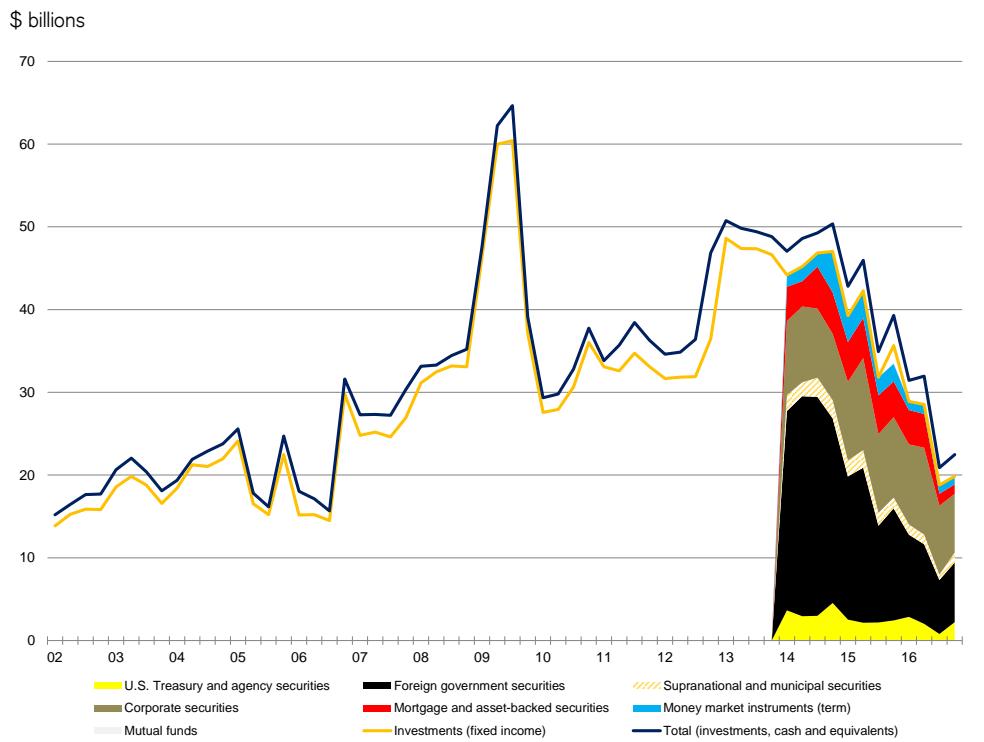
Appendix 7 – Pfizer, Inc.

Figure 26-1: Total Investments by Type

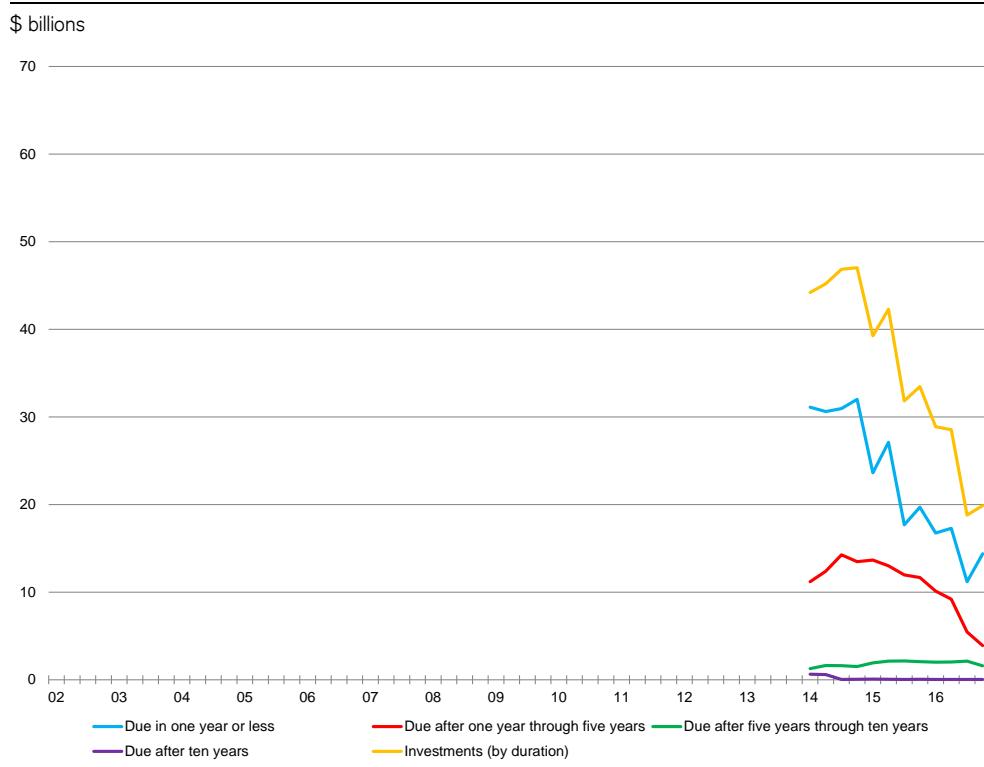


Source: Company data, Credit Suisse

Figure A7-2: Bond Investments by Type



Source: Company data, Credit Suisse

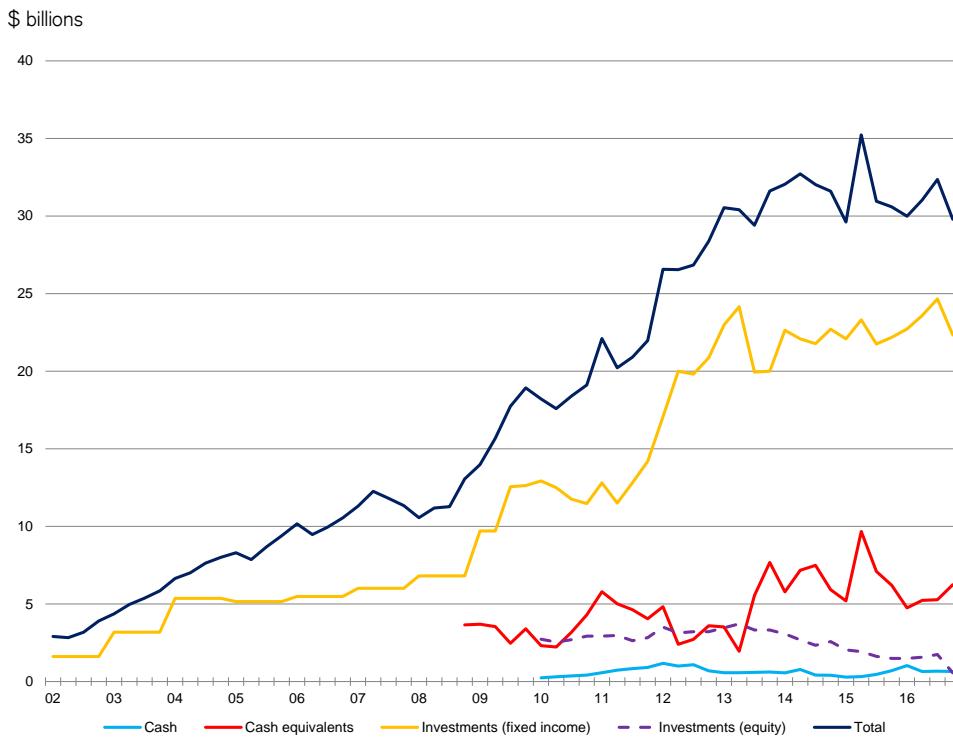
Figure A7-3: Bond Investments by Term

Source: Company data, Credit Suisse

29 January 2018

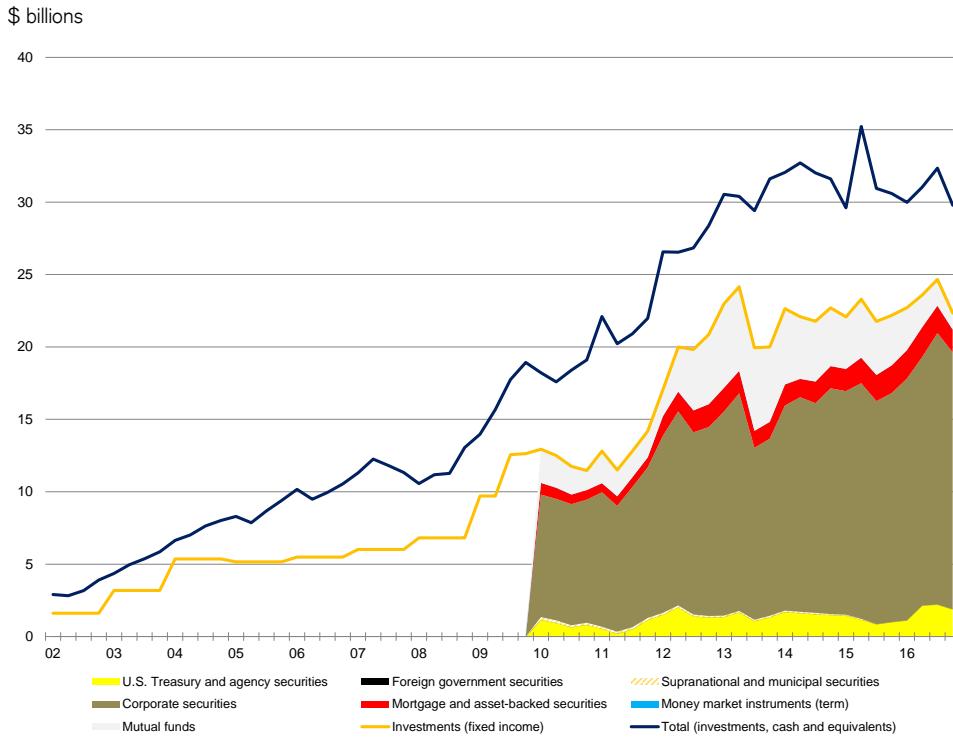
Appendix 8 – Qualcomm Incorporated

Figure 27-1: Total Investments by Type

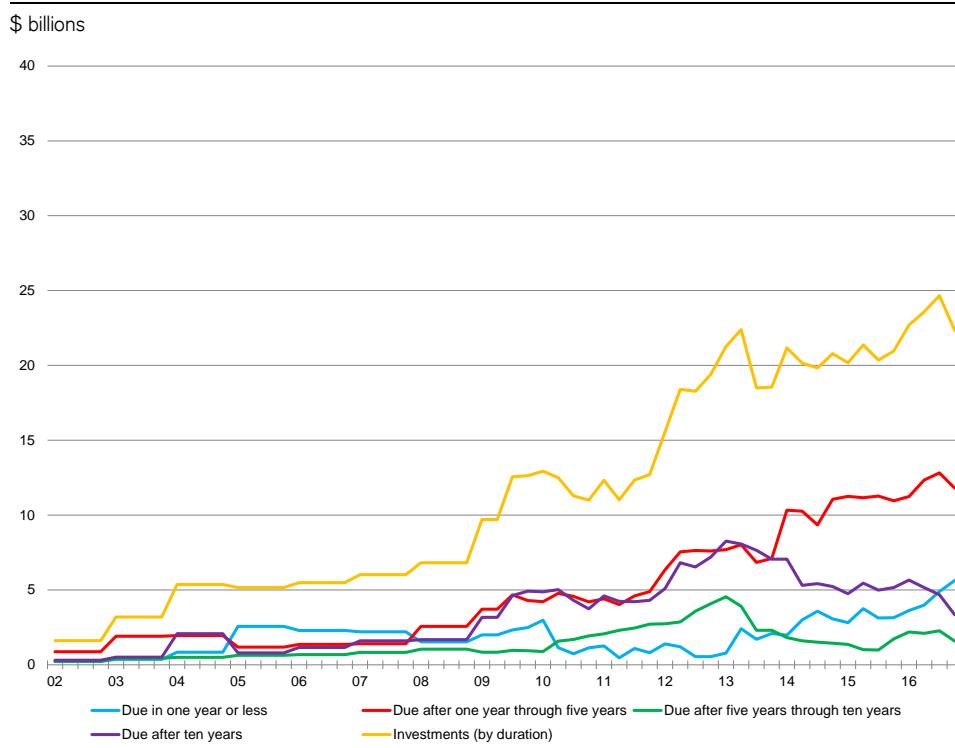


Source: Company data, Credit Suisse

Figure A8-2: Bond Investments by Type



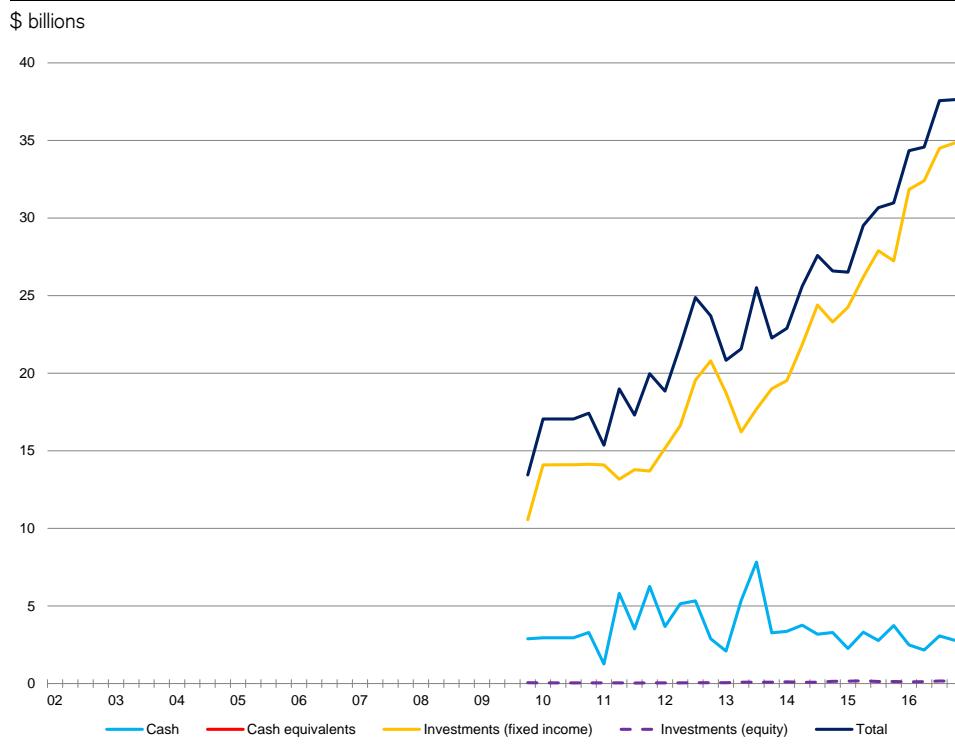
Source: Company data, Credit Suisse

Figure A8-3: Bond Investments by Term

Source: Company data, Credit Suisse

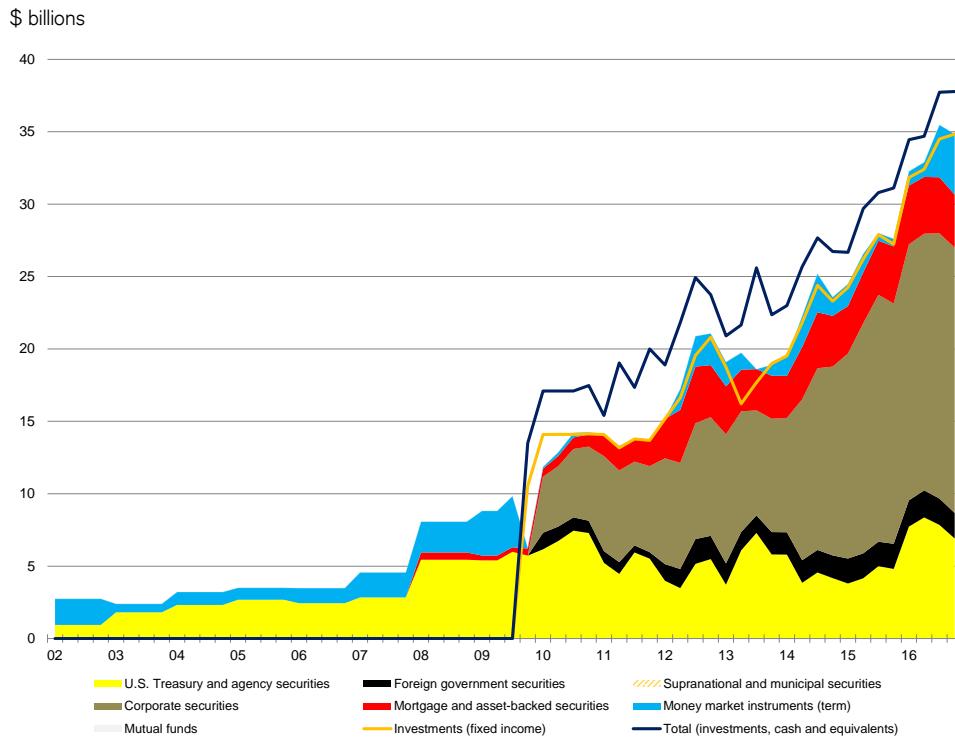
Appendix 9 – Amgen, Inc.

Figure 28-1: Total Investments by Type



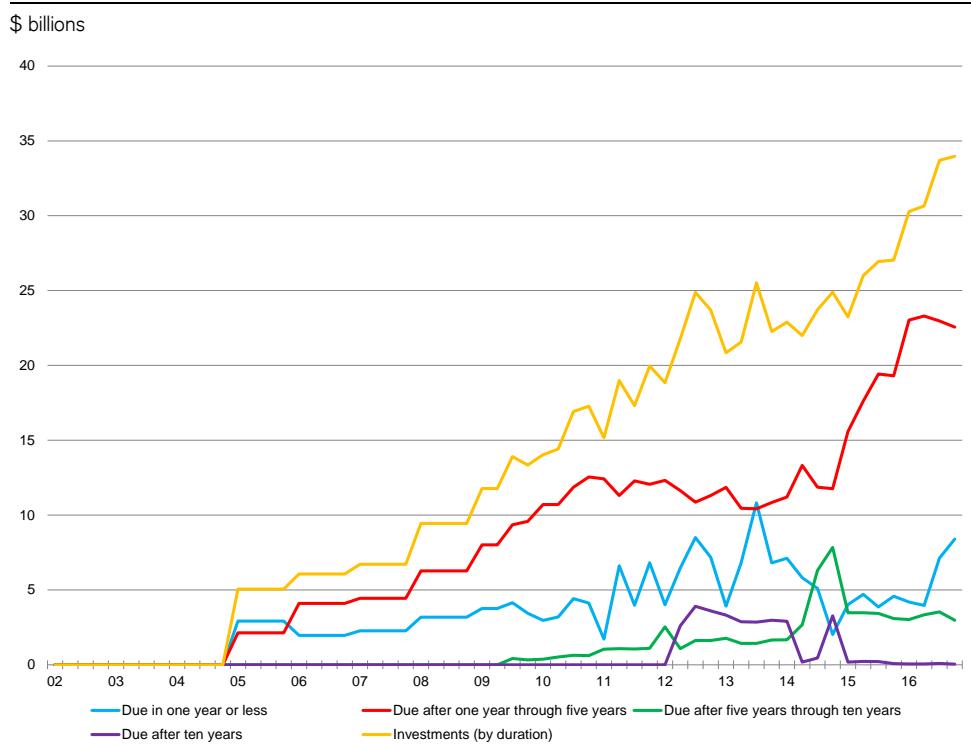
Source: Company data, Credit Suisse

Figure A9-2: Bond Investments by Type



Source: Company data, Credit Suisse

Figure A9-3: Bond Investments by Term



Source: Company data, Credit Suisse

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22 March 2018
Investment Solutions & Products
Global



Credit Suisse Economics

Global Money Notes #12

BEAT, FRA-OIS and the Cross-Currency Basis

Since the global adoption of Basel III in 2015, dollar funding markets were rattled by two events: money fund reform in 2016 and tax reform in 2018. Banks have weathered the storm of 2016 and will weather the storm of 2018, thanks to their robust liquidity buffers. While Libor-OIS spreads look scary, they are not systemic. Spreads have widened not because cash investors don't want to fund banks, but because external forces are changing their habitats.

During money fund reform, \$800 billion went from prime to government funds. Foreign banks lost their access to CD and CP markets which they quickly replaced via FX swaps, pressuring cross-currency bases wider. Pressures on bases persisted until the three-month FX swap-implied cost of dollar funding got flat relative to 1-3 year funding, at which point banks started to term out. Term issuance relieved pressure on cross-currency bases and the CD market.

Back then, the marginal buyers of term debt were corporate treasurers. But now, tax reform is wreaking havoc with their investment patterns. Now that offshore corporate savings are available for use onshore, corporate treasurers are selling 1-3 year bank debt, forcing foreign banks to issue at those segments of the unsecured bank funding curve that are not selling off: barbelling by printing 3-month CD and CP and debt beyond the 3-year point.

Pressures due to repatriation will persist until the 1-3 year segment gets flat relative to the 5-year point, where a deeper buyer base is waiting to roll down the curve – at the right price. What corporate treasurers were to banks during money fund reform, intermediate bond funds will be to banks as they replace corporate treasurers as dedicated buyers of 1-3 year foreign bank debt.

Printing three-month CD and CP is not particularly helpful when the supply of short-term unsecured funding is a lot less flexible on the margin due to the legacy of money fund reform. Despite a steep Libor curve, inflows to prime funds have been negligible. Bill supply also does not help. But there is more...

The base erosion and anti-abuse tax (BEAT) has also been driving markets.

BEAT is forcing foreign banks to substitute FX swaps with unsecured funding and also leads to temporary overfunding on the margin. The only outlet for excess funding is FX swaps. BEAT explains why cross-currency bases are tighter while Libor-OIS is wider, and also introduces upside risks to FRA-OIS.

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Certain aspects of tax reform constitute a re-boot in dollar funding markets, especially the FX swap market. Repatriation and the base erosion and anti-abuse tax (BEAT) are forcing banks to fund in three-month CD and CP markets and fund less via FX swaps.

BEAT impacts the FX swap market the most.

BEAT penalizes inter-affiliate funding by forcing the U.S. branches, broker-dealers and intermediate holding companies (IHCs) of foreign banks to add back to their taxable income base erosion payments like interest paid to headquarters or foreign affiliates.

To preserve the interest deductibility of all their liabilities, BEAT is forcing the branches and IHCs of foreign banks to replace inter-affiliate funding with unsecured funding from third parties. Banks are making adjustments already. Corporations, including banks, pay taxes quarterly and the sooner inter-affiliate funding is reduced, the less the bite of BEAT.

BEAT-related issuance leads to a temporary state of overfunding at headquarters. Excess funds are being lent in the FX swap market, which is the only segment of the money market that trades at a positive spread – however small – to U.S. dollar Libor. The spread that you make is not what you care about when your tax shield is at stake!

Excess dollars are keeping the cross-currency basis tight – for now, but not forever...

BEAT is also forcing banks to reduce their borrowing via FX swaps. Because local currency can only be swapped for dollars at headquarters, but not in New York, at the group level, foreign banks have to replace some FX swap funding with unsecured funding

BEAT thus leads to temporary overfunding and excess dollars in the FX swap market and it also reduces the structural appeal of FX swaps and increases the structural appeal of unsecured funding for global banks to fund their New York branches and broker-dealers.

This explains why cross-currency bases are tighter when Libor-OIS is wider. In a way, BEAT is redistributing pressures from the cross-currency basis to the Libor-OIS basis. The pressures we should be seeing in cross-currency bases from bill issuance are showing up in the Libor-OIS basis instead. This suggests Libor-OIS could widen more from here.

Let's consider some examples.

First, consider the New York branch of a foreign bank which receives funding from headquarters to fill a funding gap in its loan portfolio (see Figure 1). Transitioning from headquarters raising unsecured funding, to the branch raising unsecured funding directly leads to overfunding on the margin. Now that the branch is raising funding on its own, headquarters has some extra liquidity, which will be lent in the FX swap market.

Surplus liquidity will persist until the debt that used to fund inter-affiliate funding matures – that could last from a week to a quarter. When that debt matures, excess funding disappears from the FX swap market. Net demand for unsecured funding is unchanged.

Next, consider the example of an IHC which houses the broker-dealer of a foreign bank (see Figure 2). The dealer's HQLA portfolio has to be funded on an unsecured basis, and the IHC currently receives the funding from headquarters. As before, the interest paid to headquarters is no longer tax deductible and so the IHC is forced to raise unsecured funding from third parties. At the headquarters level, this leads to overfunding as well, with excess funding looking for an outlet, which here too will be the FX swap market.

As before, when the debt that used to fund headquarters' loan to the IHC matures, excess funding will disappear from the FX swap market. The bank shifted some portion of its unsecured funding from headquarters to the IHC. Bid for unsecured funds increased temporarily and the supply of dollars via FX swaps increased temporarily, but when excess funding disappears, the bank's need for unsecured funding is unchanged on net.

Now consider the case of a branch that receives some dollar funding from headquarters, which headquarters raised by swapping some local currency for dollars via FX swaps (see Figure 3). Like before, the interest paid by the branch for the downstreamed dollars is no longer tax deductible, so the branch has to raise unsecured funds from third parties.

As before, headquarters ends up with excess dollars which will be lent via FX swaps. When it lends dollars via FX swaps, headquarters ends up with a matched book position: headquarters went from a borrower to a matched book lender of dollars via FX swaps.

When the FX swap that was initially used to fund the branch matures, the matched book goes away and excess funding disappears from the FX swap market.

Unlike before, the bank's funding model also changed...

The bank shifted some funding from FX swaps to the unsecured market. That's because local currency can only be swapped for dollars at headquarters, but not in New York City – a fact of life. Bid for unsecured funds increased structurally, the supply of dollars via FX swaps increased temporarily, and the bid for dollars via FX swaps declined structurally.

Tracking the flows related to banks' adjusting their funding models is not possible on a high-frequency basis. The Fed's weekly H.8 release has one related line item, which is "*net due to related foreign offices*". Net measures are a pity. Like the BIS, we wished the Fed also embraced the virtue of gross measures more enthusiastically. On a net basis, foreign banks' New York offices owe \$300 billion to related foreign offices. But this net measure does not tell us whether net \$300 billion is the net of gross \$300 billion borrowed and zero lent, or the net of gross \$600 billion borrowed and \$300 billion lent. For gauging the impact of BEAT-related flows, it is gross, not net borrowing that matters.

That leaves us with having to work with the [FFIEC002](#) and [Y-9C](#) reports of foreign banks again. From earlier issues of Global Money Notes (see [here](#) and [here](#)) and our study, [Dollar Funding After the Storm](#), we know that specific branches of foreign banks either lend dollars to headquarters or borrow dollars from headquarters. The statistical concept "*net due to related foreign offices*" only exists at a "macro" level, not a single entity level.

The balance sheets of Deutsche Bank in Germany, Barclays in the UK, DNB in Norway, BTMU and SMBC in Japan, UBS in Switzerland, and NBC, RBC and BNS in Canada all suggest some heavy reliance on headquarters for dollar funding (see Figures 4-12). Their funding would all have to be rejiggered so as to reduce their reliance on headquarters for dollars. To the extent that the dollars from headquarters were raised via FX swaps, replacing FX swaps with unsecured funding would explain why the basis between the dollar and all major currencies (EUR, GBP, JPY, CHF, NOK and CAD) have narrowed and are now borderline positive when the Libor-OIS basis has widened.

In the case of these banks, the aggregate amount of dollar funding received from headquarters is \$300 billion. In the EU there is an additional group of small banks that downstream over \$50 billion in funding to their branches in New York (see Figure 13). In addition to these branches, broker-dealers receive about \$100 billion from headquarters. Re-calibrating the flows around \$450 billion of funding could lead to considerable amounts of overfunding, and to the extent that these funds were raised via FX swaps at headquarters, it could also mean a meaningful decline in the bid for dollars via FX swaps.

In the case of Japan for example, megabanks roll about \$200 billion in the FX swap market compared to \$1 trillion for life insurers (see Figure 14). Japanese megabanks New York branches borrow about \$70 billion from headquarters and their dealer arms about \$30 billion. That means that about \$100 billion in borrowing via FX swaps in Tokyo could be replaced with unsecured funding once the temporary glut of dollars disappears...

...and that's from Tokyo alone!

In an era where prime money funds are a shadow of their former selves and the supply of short-term unsecured funds is less flexible on the margin, that's a considerable amount of pressure on CD and CP rates and Libor fixings in general. BEAT-related issuance will add to the pressures coming from repatriation which is also forcing the same foreign banks to issue CD and CP (see the opening essay). Increased [bill supply](#) also does not help.

Where does all this leave us on the cross-currency basis and the hedging costs of the marginal buyer of U.S. assets – Japanese life insurers and hundreds of regional banks?

The risk that increased supply of Treasury bills will drain o/n repo funding, which has been the dominant source of dollars for Japan Inc.'s hedging needs (see Section 1 [here](#)), still persists, but the impact that bill issuance was supposed to have on the basis is being offset by banks in Tokyo and elsewhere stepping away from the FX swaps on the margin and the temporary overfunding at headquarters leading to an excess lending of dollars in FX swap markets. For now, the supply of dollars is greater than demand for dollars.

For now, but not forever...

As overfunding fades and banks' structurally lower bid for dollars is absorbed by others over time, cross-currency bases will widen again. Until then the pressure on marginal buyers' hedging costs will come not from the cross-currency basis (relative to Libor), but the Libor-OIS basis. Either way, the hedging costs of marginal buyers of U.S. assets are creeping higher. What matters is the FX swap implied cost of dollar funding and not whether the pressures are coming from the cross-currency basis or the Libor-OIS basis.

From a hedging cost perspective, a cross-currency basis of positive 20 and a Libor-OIS of 90 is the same as a cross-currency basis of negative 20 and a Libor-OIS basis of 50.

With hedging costs north of 2.5%, the U.S. Treasury curve is already flat from the perspective of Japanese buyers (see Figure 15). One should always evaluate the flatness of curves from the perspective of the marginal buyer, and the current marginal buyer does not fund at the repo curve, but rather at curves that are driven by repatriation and BEAT.

Further pressures on Libor-OIS and, at some point, renewed pressure on cross-currency bases could pressure U.S. dollar hedging costs to a point where Japanese and other marginal buyers are forced to sell U.S. Treasuries, MBS and credit in the U.S. and shift their portfolios to other regions – like Europe – where hedging costs are less of a drag.

We see marginal flows go the way of Europe already. Whether we will see a rotation out of U.S. assets is down to U.S. dollar hedging costs, which in turn is down to the interplay between and combined impact of taper, the [echo-taper](#), BEAT and bill issuance. How tight the front-end will get and where front-end spreads will settle is the ultimate arbiter of where hedging costs settle and if they will trigger pressures on U.S. rates and credit...

As we have said before, the FX swap lines are not there to make life cheap for banks, but to make sure life goes on if funding markets dry up. But if funding market dynamics are going to turn the marginal buyer of U.S. assets into marginal sellers of U.S. assets, the Fed has a bigger issue at hand and may want to use the FX swap lines to a greater end...

Figure 1: BEAT and New York Branches

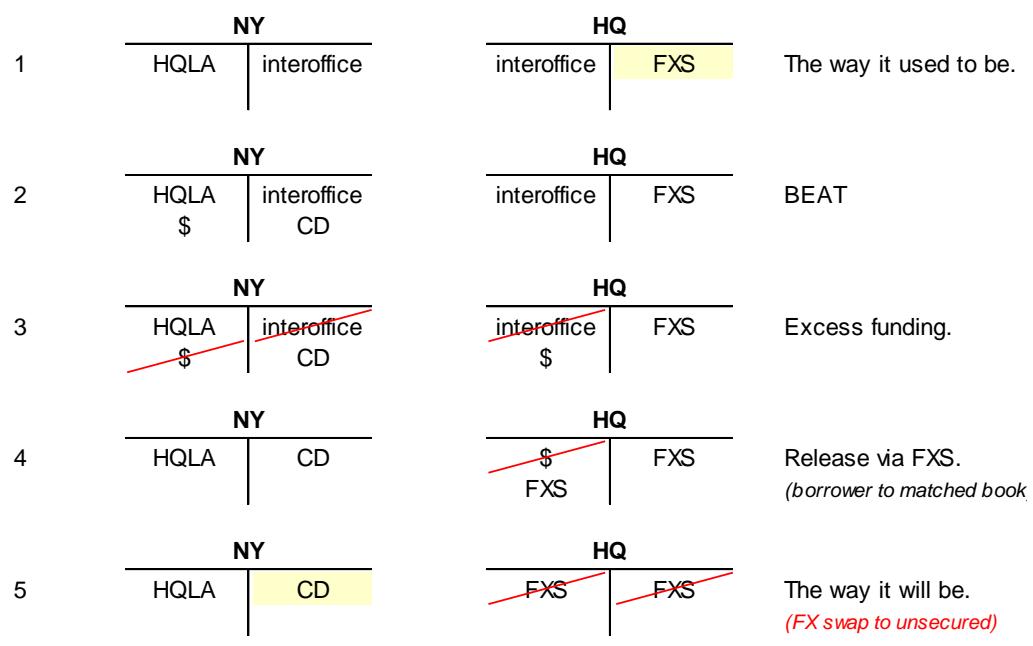
	NY		HQ		
1	Loan	interoffice	interoffice	Debt	The way it used to be.
2	Loan \$	interoffice CD	interoffice	Debt	BEAT
3	Loan \$	interoffice CD	interoffice \$	Debt	Excess funding.
4	Loan	CD	\$ FXS	Debt	Release via FXS.
5	Loan	CD	FXS	Debt	The way it will be. <i>(unsecured to unsecured)</i>

Source: Credit Suisse

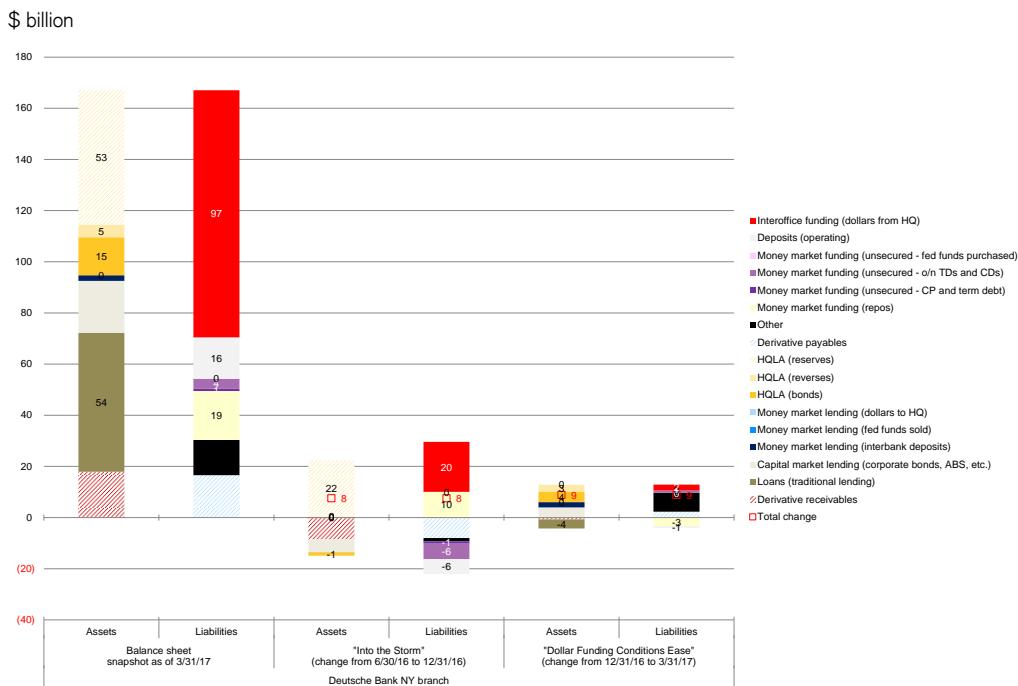
Figure 2: BEAT and Broker-Dealers

	IHC		HQ		
1	HQLA	interoffice	interoffice	Debt	The way it used to be.
2	HQLA \$	interoffice CP	interoffice	Debt	BEAT
3	HQLA \$	interoffice CP	interoffice \$	Debt	Excess funding.
4	HQLA	CP	\$ FXS	Debt	Release via FXS.
5	HQLA	CP	FXS	Debt	The way it will be. <i>(unsecured to unsecured)</i>

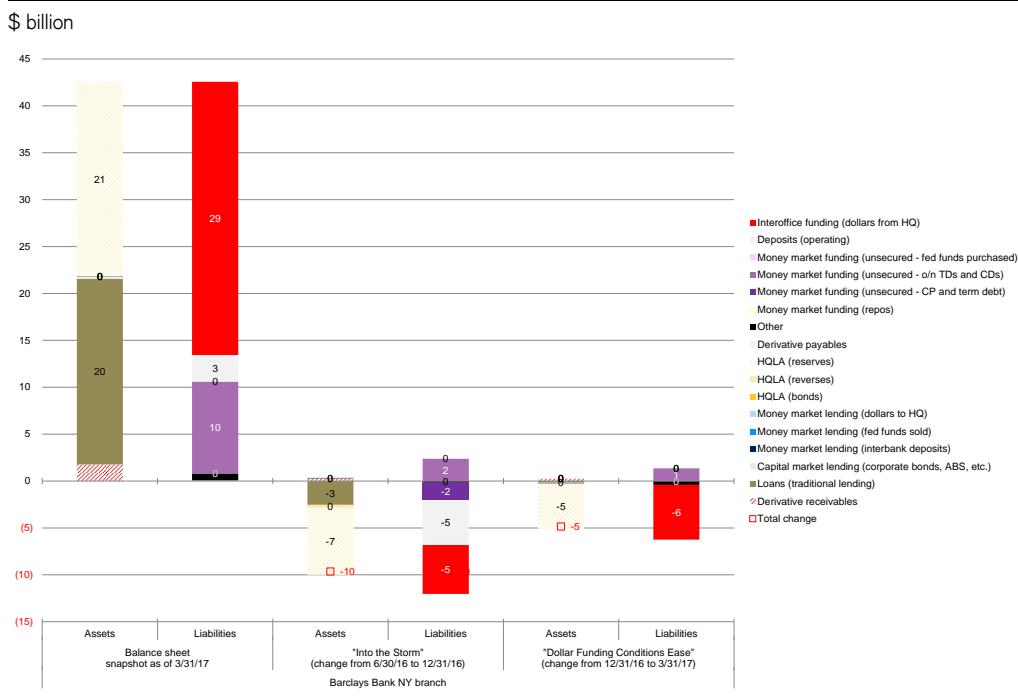
Source: Credit Suisse

Figure 3: BEAT and Banks' Demand for FX Swaps

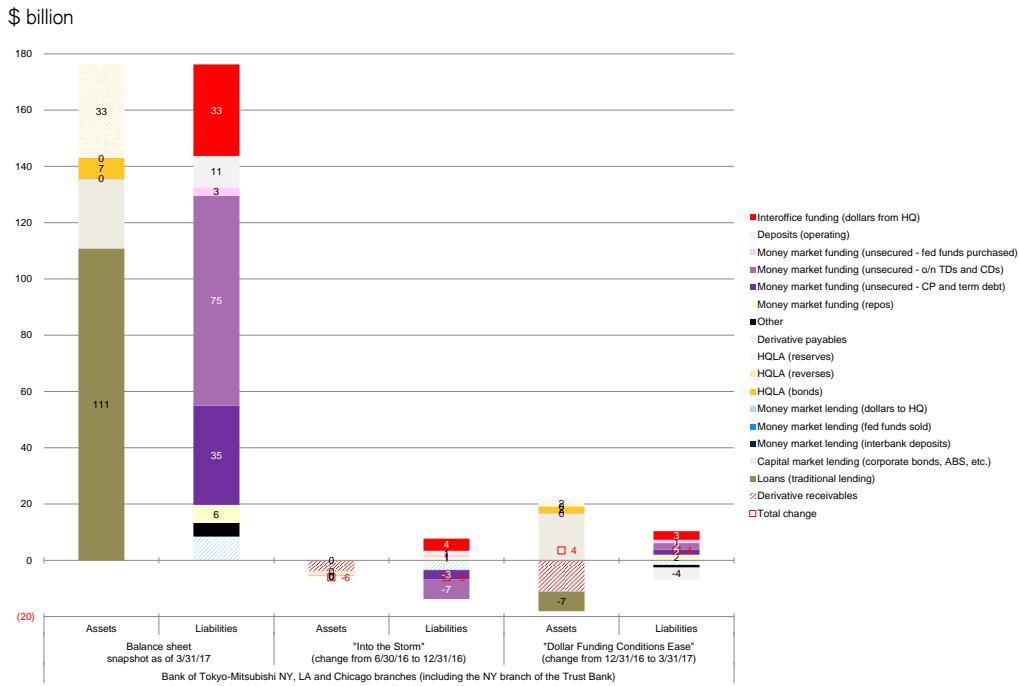
Source: Credit Suisse

Figure 4: Deutsche Bank's New York Branch

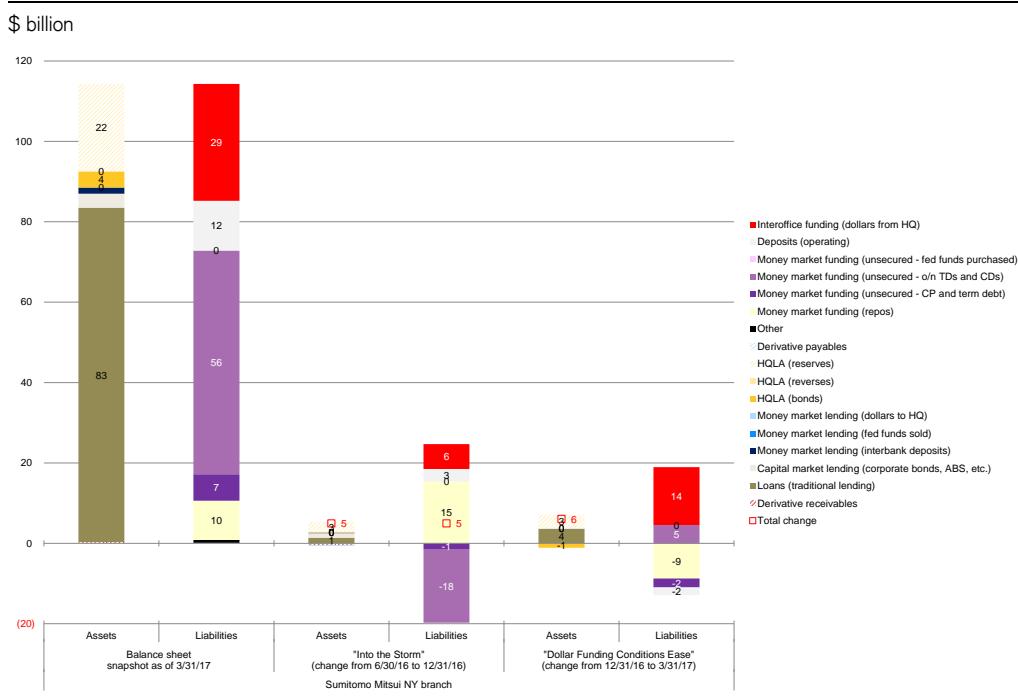
Source: FFIEC002, Credit Suisse

Figure 5: Barclays New York Branch

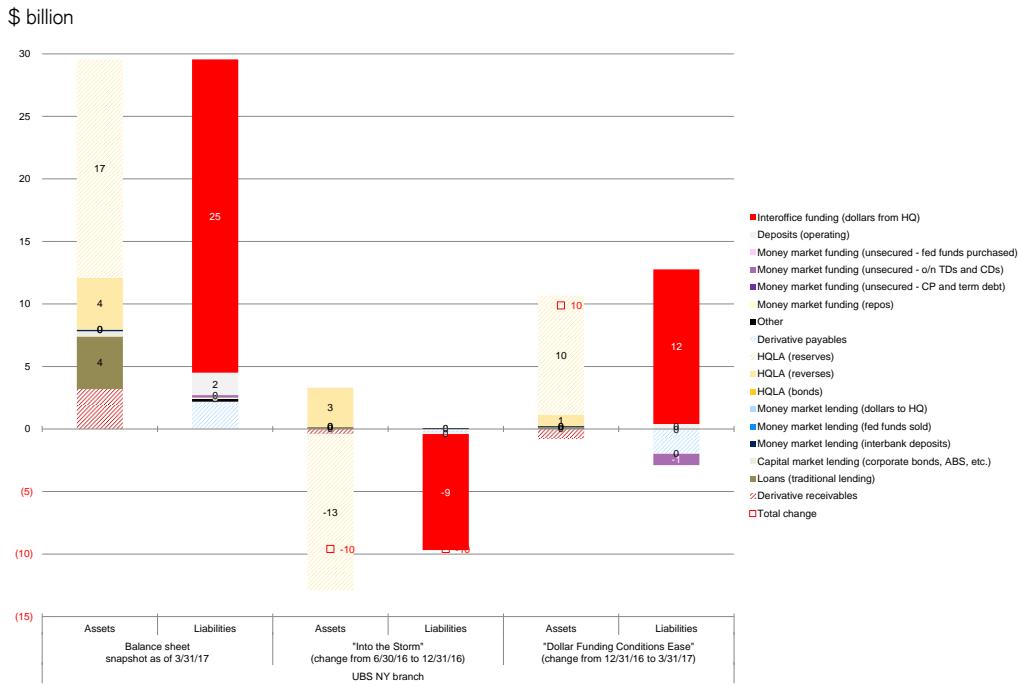
Source: FFIEC002, Credit Suisse

Figure 6: Bank of Tokyo-Mitsubishi New York Branch

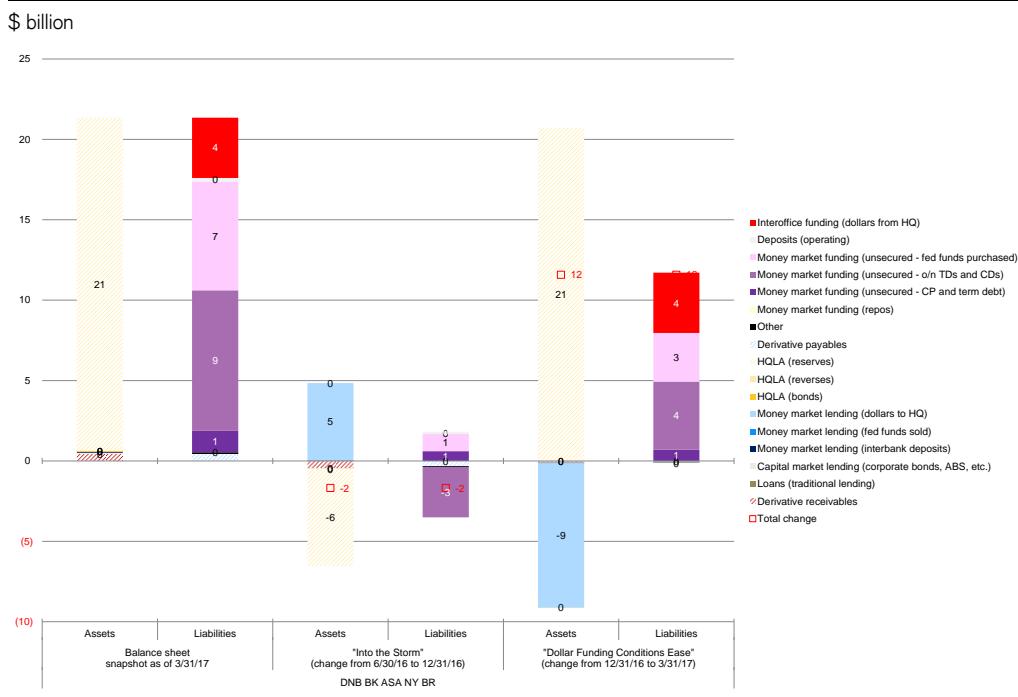
Source: FFIEC002, Credit Suisse

Figure 7: Sumitomo Mitsui New York Branch

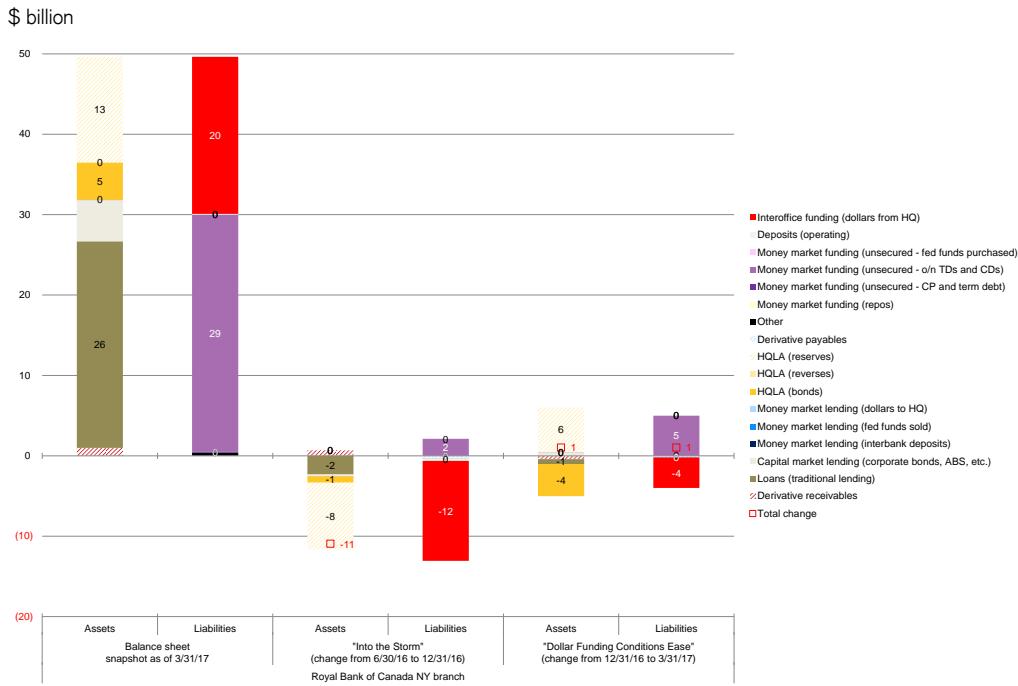
Source: FFIEC002, Credit Suisse

Figure 8: UBS New York Branch

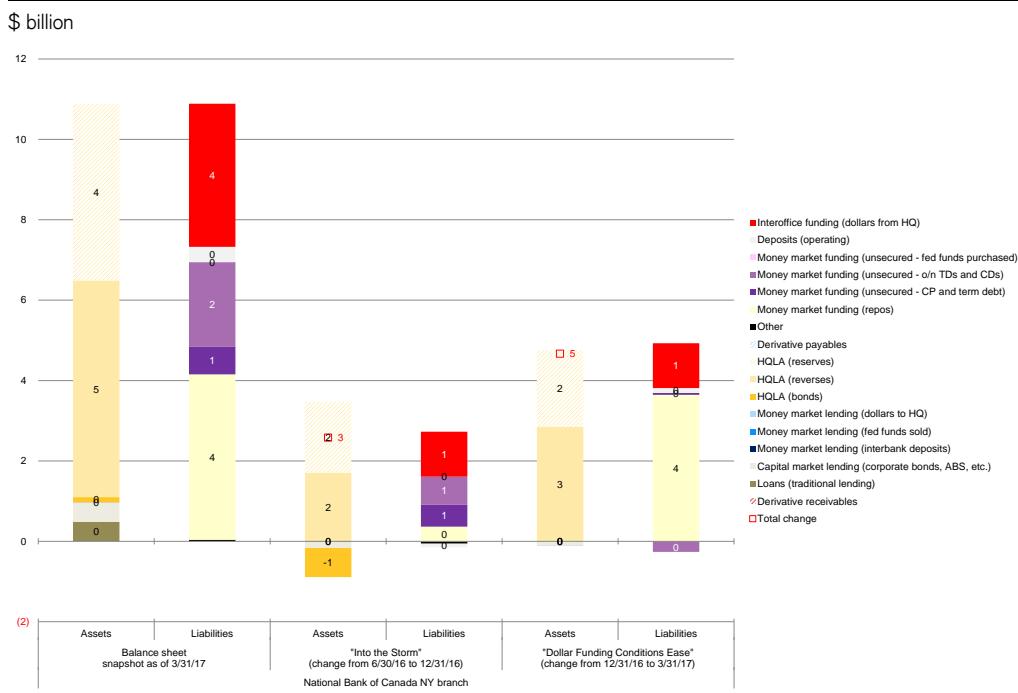
Source: FFIEC002, Credit Suisse

Figure 9: DNB Bank New York Branch

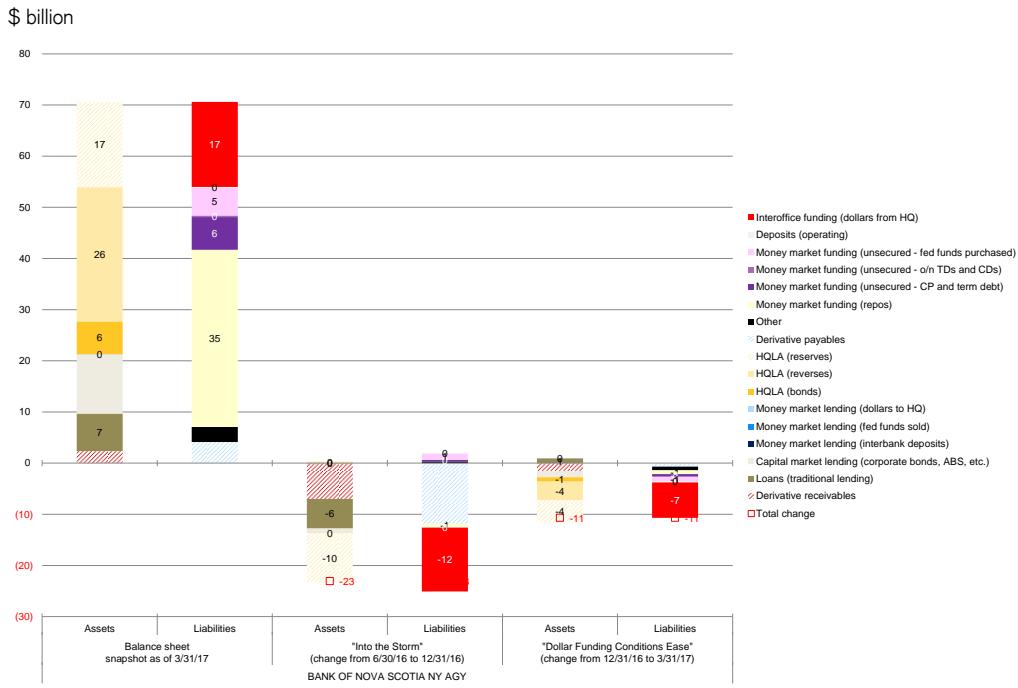
Source: FFIEC002, Credit Suisse

Figure 10: Royal Bank of Canada New York Branch

Source: FFIEC002, Credit Suisse

Figure 11: National Bank of Canada New York Branch

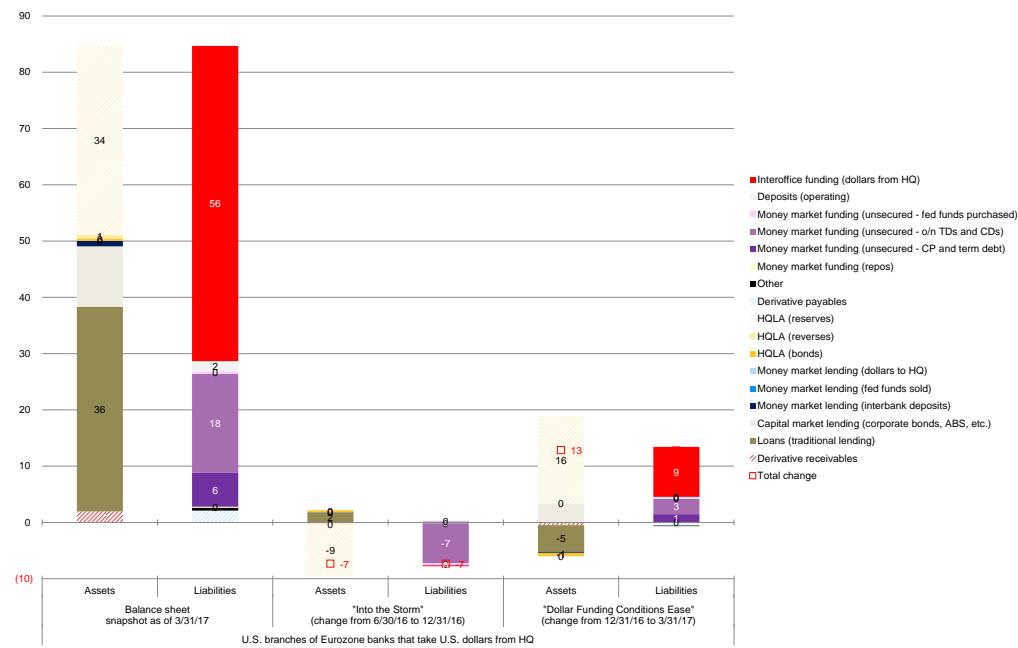
Source: FFIEC002, Credit Suisse

Figure 12: Bank of Nova Scotia New York Agency

Source: FFIEC002, Credit Suisse

Figure 13: New York Branches of Various Eurozone Banks

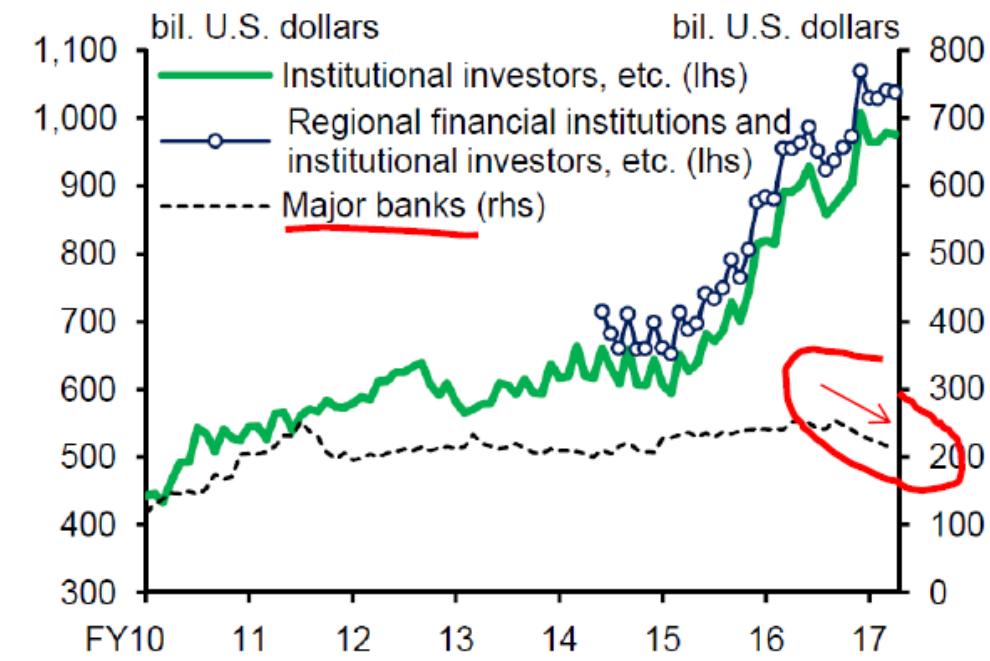
\$ billion, excluding Deutsche Bank New York branch



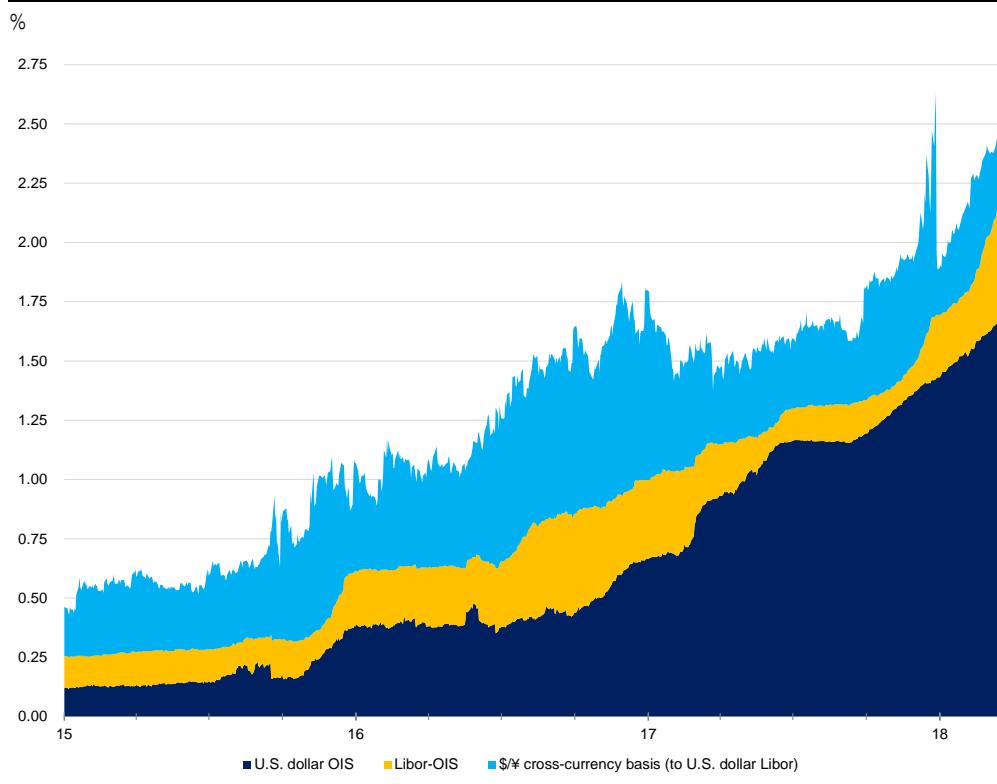
Source: FFIEC002, Credit Suisse

Figure 14: Japanese Megabanks' Dollar Needs in the FX Swap Market

\$ billion



Source: Bank of Japan

Figure 15: Getting Expensive (for Changing Reasons)

Source: Credit Suisse

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13 April 2018
Investment Solutions & Products
Global



Credit Suisse Economics

Global Money Notes #13

Beyond the Outer Rim

Every segment of the global dollar funding market is in flux.

Repo has switched from trading well within the Fed's overnight IOR-RRP band to trading outside the band. Bill supply is the primary culprit for stressed o/n rates and as bill issuance moderates, repo should move back within the band.

Libor continues to trade at a wide spread to OIS which is mostly driven by repatriation. Corporate treasurers have not sold a lot of bank debt to date, but they made it clear to banks that they will no longer buy 1-3 year debt.

Banks basically lost their only dedicated buyer of 1-3 year debt, which prompted them to pre-fund and, as a result, over-fund their balance sheets. The aim of pre-funding was to preserve LCR and NSFR ratios through what was expected to be a difficult and uncertain funding environment in 2018. Banks pre-funded by issuing mostly at three-month and five-year maturities in unsecured dollar funding markets. They also shifted some issuance to euros.

Banks soon realized that funding at the three-month point is extremely illiquid. As they tried to replace 1-3 year debt partly with three-month debt, they learned that on the margin, corporate treasurers invest mostly in repos and bills for liquidity and only a little bit in CD and CP for yield. That's because the mandates of corporate treasurers have changed on January 1st: they now manage to a master that may need immediate liquidity for M&As and buybacks and so their new job is to build a money fund portfolio with the cash from bond sales and maturities. There are no other marginal buyers of CD and CP: prime funds are unable to attract inflows, and offshore money funds afraid of repatriation-related outflows have pared back their investments in CD and CP. Crossover buyers are now buyers of 1-3 year debt in the secondary market, and banks are testing the depth of the new buyer base. If the new buyers' interest at current yields is deep, the 1-3 year bank funding market will settle and pressures on three-month CD and CP, and hence Libor-OIS, may abate. But there are many ifs around that: a stock selloff could trigger more sales of bank debt as treasurers raise funds for buybacks and Libor could widen again.

Cross-currency bases continue to trade tight for a variety of reasons: lower hedging needs on the demand side and repatriation, BEAT and weak equities on the supply side. This issue of Global Money Notes explains the link between equity futures and FX swaps and why cross-currency bases may turn positive...

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In previous issues of Global Money Notes we've referred to FX swaps as the outer rim of funding markets. Money is hierarchical, and in the hierarchy of funding markets FX swaps trade at a premium to other market segments: OIS is at the bottom of the hierarchy, secured repo trades at a spread to OIS, unsecured Libor trades at a wider spread to OIS, and FX swaps typically trade at a spread to Libor. In recent years, the most lucrative money dealing activity was to raise dollars at lower levels of the hierarchy and lend them via FX swaps at the outer rim. The typical borrower of dollars was a real money manager from a negative rate jurisdiction looking to buy dollar assets – bonds – on a hedged basis.

But the buck does not stop at the outer rim....

Equity futures are another important segment of the global dollar funding market. Many banks look at equity futures as a product similar to FX swaps and dynamically shift capital between the two products depending on which trades at a more lucrative spread to Libor.

Exhibit 1 shows the implied yield on three-month \$/¥ swaps and S&P futures in 2017. Like the FX swap implied cost of dollar funding from yen, the implied yield on S&P futures trades at a spread over Libor. We call the spread between FX swap implied rates and Libor the cross-currency basis. We can think of the spread between equity futures implied rates and Libor as the equity futures basis. Exhibit 2 shows these rates in basis form over Libor.

As in repo and FX swaps, most trades in equity futures flow through matched books. In a typical matched book transaction, a customer pays a dealer Libor plus a spread to go long equities, and another customer receives from the dealer Libor plus a spread to go short equities. The dealer makes a bid-ask spread on both the funding as well as the total return leg of the transaction, similar to a matched repo or matched FX swap book.

But markets seldom clear through matched books, and imbalances in order flows are always absorbed by dealers' speculative books – or, in a post-Basel III financial order, banks' treasury functions. For example, in recent years, the bid for dollars via FX swaps exceeded the lending of dollars via FX swaps. This widened the cross-currency basis, which banks' treasury functions harvested by funding in unsecured and secured markets and lending the proceeds in the FX swap market (see Exhibit 3 and the Appendix [here](#)).

Similarly, in recent years, the market's appetite to go long equities consistently exceeded the appetite to go short equities. This imbalance gave rise to the equity futures basis. Banks harvested this basis by going short futures when clients wanted to go long, and offsetting the shorts by funding a long position in underlying cash equities (see Exhibit 4).

Thus, bridging imbalances in order flows always requires some funding on the margin: to raise dollars to lend at the outer rim in the case of FX swaps, and to raise dollars to buy cash equities to offset shorts in the case of equity futures beyond the outer rim.

In practice, the funding to go long cash equities is not raised real time. Banks ideally don't scramble for funding just when they need it. They pre-fund the equity futures desk's funding needs, similar to how they would pre-fund the FX swap desk's funding needs if the desk anticipated cross-currency bases to widen and asked for funding to harvest it.

Now that the equity market has wobbled, fewer clients want to go long equities via futures. All of a sudden, equity futures desks are overfunded: the cash banks raised to fund the purchase of cash equities to offset anticipated shorts via futures is no longer needed (see Exhibit 5). Worse, as clients started to pare their equity longs, to maintain a flat exposure, banks had to sell cash equities from their inventory. The funding that financed equity longs remains in place, but instead of equities, banks now hold cash – yet another source of overfunding which banks need to find an outlet for (see Exhibit 6).

Culturally, some banks' funding, repo, FX swap and equity futures desks are close-knit and sit side by side. When one team ends up overfunded, other teams get to deploy excess cash at more lucrative spreads in other markets. At most banks, however, these desks are siloed and some banks intend not to run speculative positions and enforce that by incentivizing market makers to run matched books through high internal funding costs.

Exhibit 7 zooms in on implied yields in S&P futures since the turn of the year.

The collapse in implied yields since March was driven by the turn in equity markets. Clients' desire to go long equities diminished and long positions via futures were trimmed. Implied yields collapsed and equity futures desks became overfunded for two reasons: first, because funding raised to offset budgeted shorts in equity futures were not needed; second, because reduced client longs forced banks to sell stocks and end up with cash.

The very day implied yields in equity futures started to collapse and crashed below Libor, cross-currency bases started to aggressively tighten too: the more nimble treasury teams took money from equity futures desks and gave it to FX swap desks. When you are suddenly overfunded and bases move against you, your aim is not to maximize profits but to minimize your losses. You go from playing offense to defense. If equity futures trade at a negative carry you move funding to areas that still have a positive carry, however small.

An important takeaway from this analysis is that equity market sentiment can have a major impact on funding markets. When equity markets fall and client interest to go long equity futures wanes, banks' equity futures desks get overfunded on the margin, which spills over into FX swap markets. Note that since the global adoption of Basel III in 2015, this is the first major turn in equity markets and we are witnessing the first major example of how an equity selloff impacts basis markets in a financial system subject to Basel III.

For now, the rule to keep in mind is this: if stocks fall, the cross-currency basis tightens. On the flipside, if stocks rise, futures desks tend to chase funding as the value of equities on their balance sheet rises. This tends to push Libor to trade at a wider spread to OIS.

To be crystal clear, we are not saying that this has anything to do with the widening of Libor-OIS this year, but it could certainly have been a factor behind the Libor-OIS move last December, when certain Canadian banks with large equity futures desks were understood to be aggressive bidders for unsecured funds via term fed funds, CD and CP.

Clearly, Libor-OIS and cross-currency bases can move for reasons other than repatriation and sterilization. The wider you cast your radar to understand every possible factor that could be driving your markets, the less likely you'll be hit out of left field next time around.

We now have three supply-side explanations for the odd behavior of cross-currency bases since February, at a time when Libor-OIS is wider and most funding markets are tighter.

First, due to repatriation, foreign banks lost their dedicated buyer of 1-3 year debt, which prompted them to pre-fund and, as a result, over-fund their balance sheets. The aim of pre-funding was to preserve LCR and NSFR ratios through what was expected to be a difficult and uncertain funding environment. Banks always fund LCR and NSFR ratios unsecured, and excess cash raised unsecured can only be lent profitably via FX swaps – you can buy Treasuries too, but FX swaps are much better when the Fed is hiking.

Second, due to the equity market selloff since March, equity futures desks got overfunded and funding was shifted to FX swap desks to limit firm-wide negative carry.

Third, due to BEAT, foreign banks are forced to trim their reliance on headquarters for funding, which can have an immediate impact on FX swap markets (more on this below) and, over time, it can also show up in foreign banks' CP and CD issuance patterns.

On the demand-side things are changing too.

Due to the widening of Libor-OIS this year, the carry on foreign buyers' hedged U.S. Treasury, MBS and IG credit portfolios have declined by around 60 bps. Appetite to roll these hedged investments diminished, especially when other parts of the world offer better hedge-adjusted carry. In fact, we've seen Japan sell \$50 billion in U.S. Treasuries during the first two months of 2018 and, anecdotally, we have heard about smaller Japanese banks starting to trim their corporate dollar lending books due to hedging costs.

If the rest of the world's demand for dollar assets declines due to dollar hedging costs, cross-currency bases tighten. But we will only know the true extent to which reduced hedging needs have caused cross-currency bases to trade tighter this year when the temporary glut of dollars due to overfunding related to repatriation (defensive overfunding), the equity rut (unforeseen overfunding) and BEAT (opportunistic overfunding) fade away.

When will overfunding fade?

It is hard to say, but given that foreign banks' defensive overfunding was done through a barbelled issuance strategy where they issued sub-1-year (mostly three-month) and longer-than-3-year paper, a significant chunk of overfunding should mature by June.

Regarding unforeseen overfunding, it depends on what stocks do. If equities rally, then equity futures are back in vogue and equity futures desks will get their funding back. But, on the other hand, if the equity rut continues, equity futures desks will continue to struggle and FX swap desks will be given even more funds to reduce negative carry...

Now a word on BEAT.

We did not claim that BEAT has been the primary driver of the Libor-OIS move this year. In our [conference call](#) on March 15th we attributed the Libor-OIS move mostly to repatriation and partly to bill supply. We brought BEAT into the fold in an attempt to rationalize why cross-currency bases have been narrowing since February in an environment where all other funding markets – except equity futures – have been trading much tighter.

In our last [piece](#) we laid out three ways in which a foreign bank optimizing for BEAT could change its funding strategy. In all three examples, increased CD and CP issuance was featured as a source of excess dollars as foreign banks replace inter-affiliate funding with third party funding. In all three examples, FX swaps were the outlet for excess dollars.

We did not include as an example the simplest and most low hanging fruit on the BEAT optimization ladder. Namely, most foreign banks that receive funding from headquarters deposit those funds at the Fed – i.e. interoffice funding is a reflection of global banks' HQLA portfolio construction. If a bank has excess in its dollar HQLA portfolio it can call back some of the funding it downstreamed to New York and reduce deposits at the Fed. If keeping excess HQLA costs 15 bps more because of BEAT, you can reduce the hit by lending your reserves anywhere in the world and to anyone but your New York affiliate. Here too, excess dollars are lent via FX swaps, but this won't show up in CD and CP data.

In fact, foreign banks' cash balances at the Fed are down by around \$60 billion this year, and their balance sheets have shrunk by a similar amount. There is no evidence that foreign banks increased their holdings of U.S. Treasury bills or repos since January. In fact they reduced their investments in both. Thus, reserves did not decline because foreign banks took down bills at auctions or because they lent in stressed repo markets. The decline in reserves is certainly not because branches are upstreaming dollars to headquarters to harvest deeply negative cross-currency bases in the FX swap market – cross-currency bases are extraordinarily tight. When cross-currency bases are tight, branches lend less to headquarters, and so rising values for "net due to head office" in the H.8 report likely reflect reduced "due from" and not increased "due to" head office.

The decline in foreign banks' balance sheets in New York since January, is consistent with the idea that excess cash at the Fed may have been subject to a recall by headquarters and that it's being lent elsewhere in the world through the FX swap market.

Beat that...

Our point was that BEAT could be contributing to tighter cross-currency bases now and could widen Libor-OIS in the future as some banks optimize funding for their affiliates.

Interpreting market moves real time is hard, especially if moves come out of left field.

There are no data and there will be no data to prove that BEAT contributed to tighter cross-currency bases intra-quarter as foreign banks called back excess dollars at the Fed.

Foreign banks most exposed to BEAT are filing their call reports as we speak and we'll soon see how funding relationship with headquarters changed since tax reform went live. But call reports are quarter-end snapshots: they are useful, but are not a definitive guide.

There is also no data to track the funding needs associated with equity futures desks, so we are left with trying to rationalize what we see on the screens through triangulation.

Collecting color is a big part of the game. Market anthropology is also a part of the game: what kind of markets are specific banks active in; do different desks talk to yours truly together, or do they take meetings as separate teams; is the head of funding present in these meetings – these are all important cues when trying to synthesize the market color with the team dynamics you see in meetings and the prices you see on your screens.

Soft intelligence is no replacement for hard data, but sometimes there ain't no data...

What you gained from this issue of Global Money Notes is a framework to think about how equity market sentiment can impact cross-currency bases pieced together from meetings and conversations with bank treasury teams during the first quarter, and a broader perspective to think about markets when too many moving parts jam the signal.

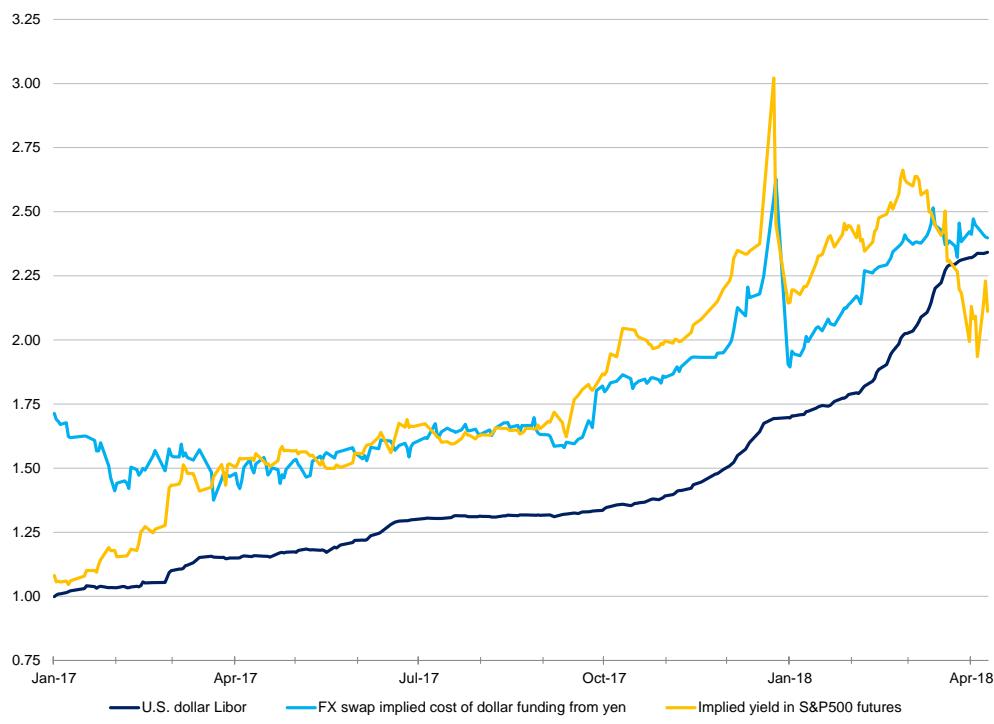
In fielding over 200 calls and meetings with clients since the beginning of the year, there was only one client who inquired about equity futures and asked how equity market dynamics can influence funding markets and especially the cross-currency basis. That suggests that most basis traders do not pay attention to equity futures, but they should!

Cross-currency bases between the dollar and other major currencies may be at risk of turning positive later this year. If the Fed keeps hiking and repatriation keeps Libor-OIS wide, the rest of the world's appetite to buy dollar assets on a hedged basis will diminish. If hedging needs diminish, the cross-currency basis tightens. Less interest in Treasuries, MBS and IG credit from the rest of the world means wider spreads and higher yields, which in turn are not constructive for equity market sentiment. Equity market sentiment in turn can cause wild swings in implied yields in equity futures, and as we've seen this year, these swings can spill over into FX swap markets – potential weakness in equity markets also points to tighter cross-currency bases. In a macro sense, tighter bases to Libor means less interest from the rest of the world to go long U.S. duration and risk assets: tighter cross-currency bases means less interest in U.S. duration and credit risk and tighter equity futures bases means less interest in U.S. equity risk. In recent years demand for risk was rising. The name of the game was to figure out how the system will source funding for carry traders – life insurers in Japan equity investors in the U.S., etc.

But the game is now changing. Less demand for duration and credit risk from overseas and less bullish equity market sentiment leave FX and equity futures desks overfunded. Risks are not that bases widen but that a funding dump will push them positive to Libor...

Figure 1: Beyond the Outer Rim (1)

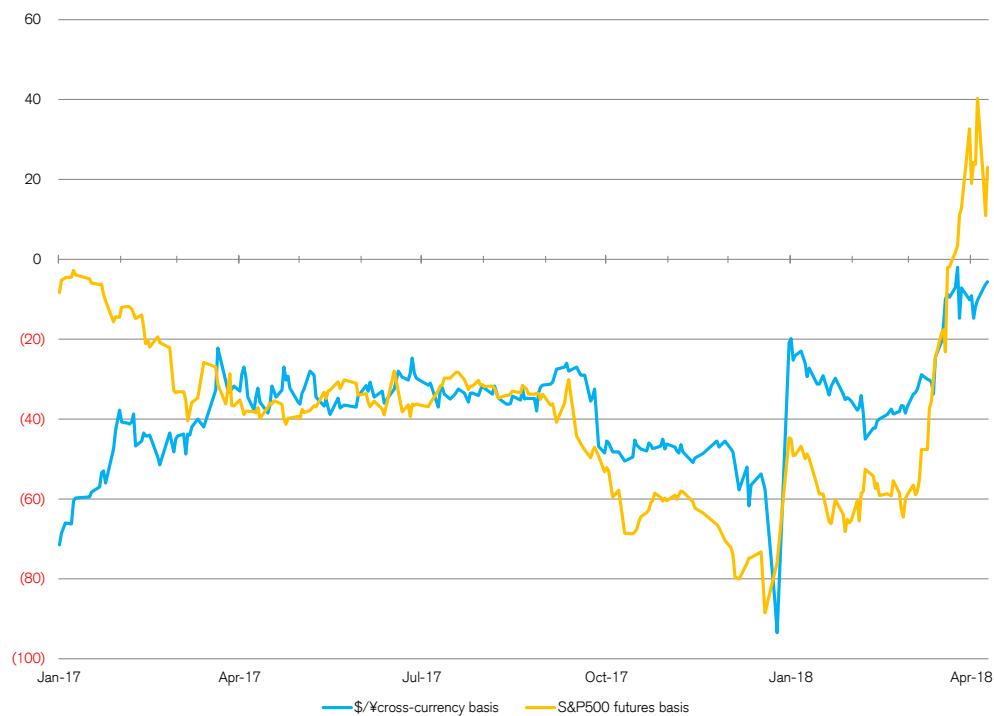
three-month, percent



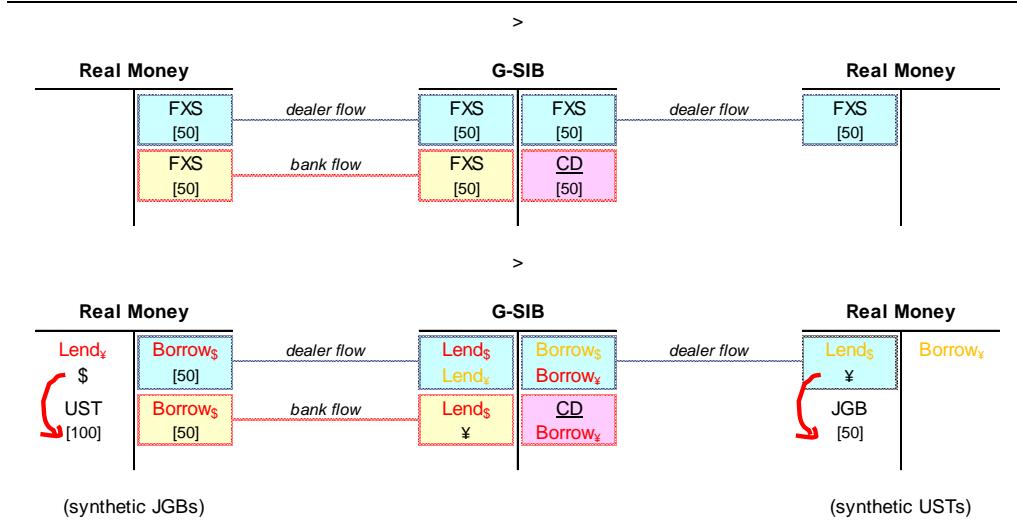
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 2: Beyond the Outer Rim (2)

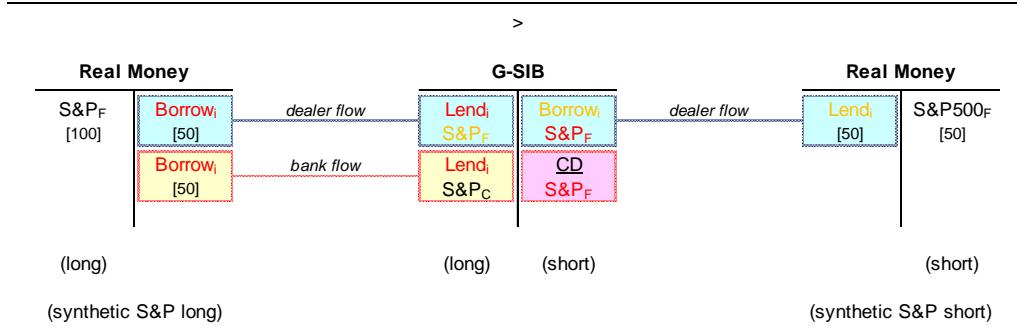
three-month, basis points



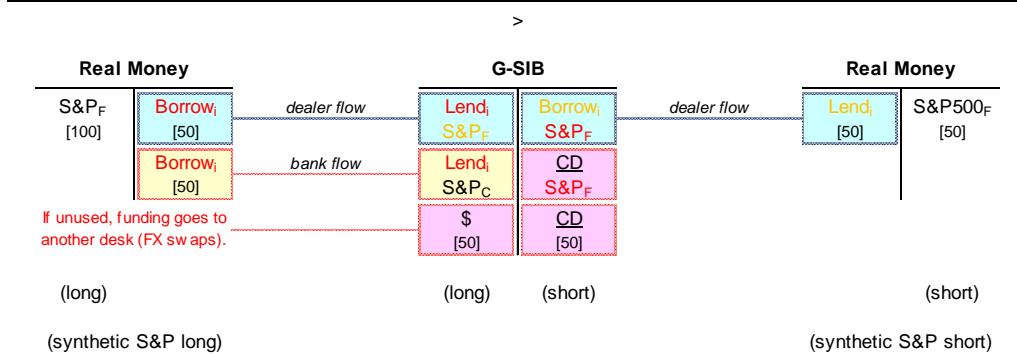
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 3: Harvesting the Cross-Currency Basis

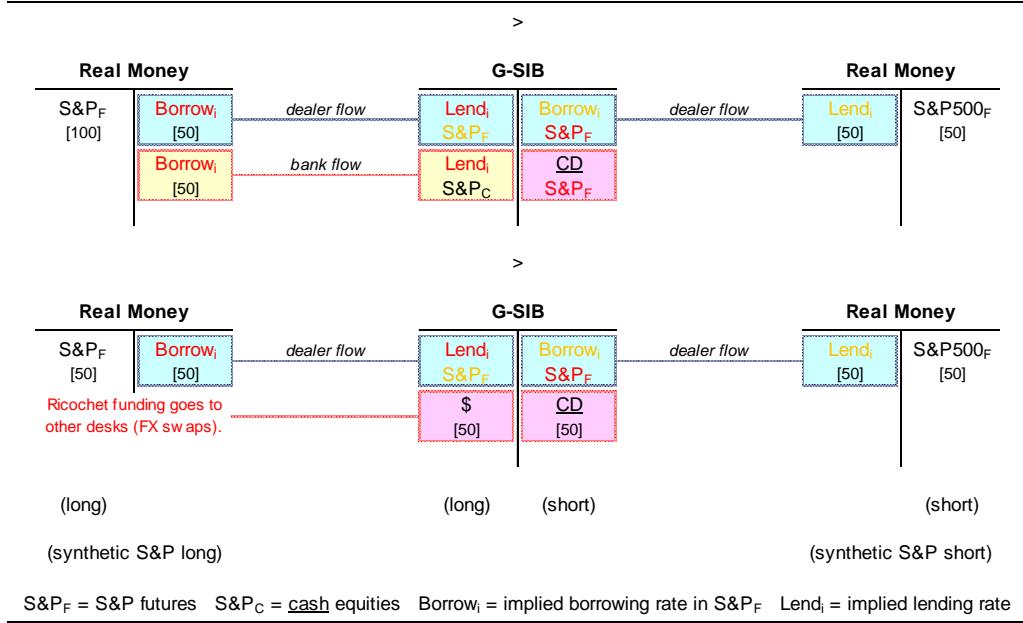
Source: Credit Suisse

Figure 4: Harvesting the Equity Futures BasisS&P_F = S&P futures S&P_C = cash equities Borrow_i = implied borrowing rate in S&P_F Lend_i = implied lending rate

Source: Credit Suisse

Figure 5: Unused FundingS&P_F = S&P futures S&P_C = cash equities Borrow_i = implied borrowing rate in S&P_F Lend_i = implied lending rate

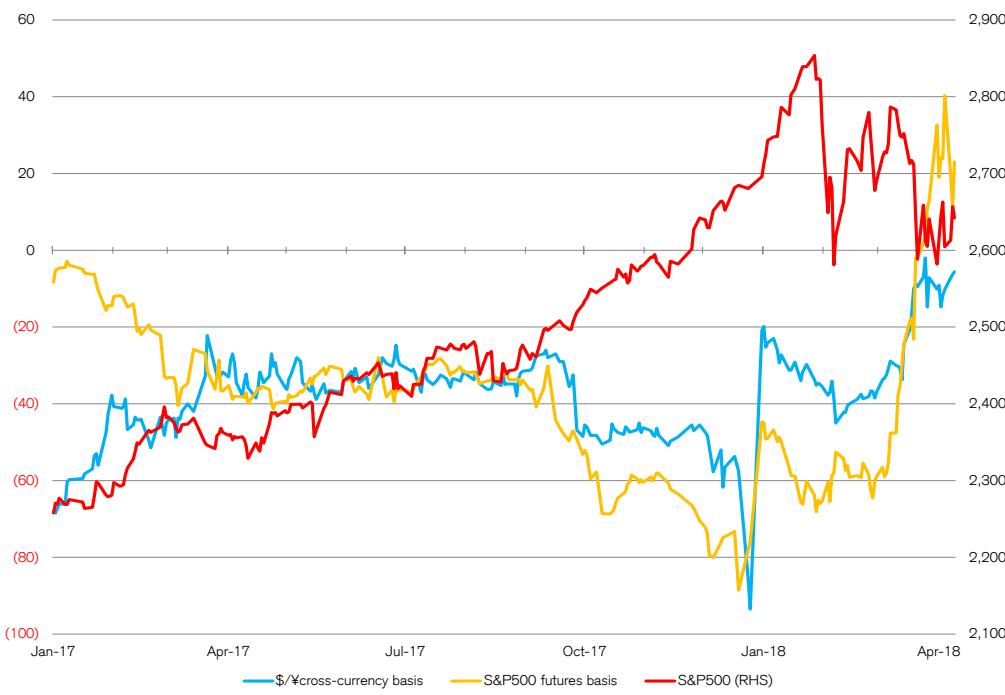
Source: Credit Suisse

Figure 6: Ricochet Funding

Source: Credit Suisse

Figure 7: Collateral Damage

basis points (LHS) and index (RHS)



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

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30 May 2018
Investment Solutions & Products
Global



Credit Suisse Economics

Global Money Notes #14

The Safe Asset Glut

The Fed's control over o/n rates appears to be slipping. Interdealer repo rates are now printing structurally above the IOR rate, and the fed funds rate is weeks away from printing outside its target band. But there is nothing the Fed can do about any of these developments for they all have to do with bill supply.

The \$400 billion in Treasury bills which were issued during the first quarter of this year has caused chronic indigestion in money markets. Bill supply reduced the usage of the o/n RRP facility to zero and bill yields became the effective floor for o/n rates. The new floor is the reason why all the main o/n rates – tri-party repo, GCF repo and fed funds – are trading higher and closer to IOR.

Only the U.S. Treasury can ease overnight rates, not the Fed...

How did we get from chronic bill shortage to chronic indigestion? The last time Treasury issued this many bills, in 2015, the market took them with gusto. Several things changed since then on both the demand side and the supply side.

On the demand side, repatriation reduced the corporate bid for short-term Treasuries. If the global savings glut contributed to the safe asset shortage, the reverse savings glut – repatriation – must be contributing to a safe asset glut.

On the supply side, increased issuance by the Federal Home Loan Banks, the growth of the Fed's foreign repo pool, the Japanese Ministry of Finance's aggressive lending of U.S. Treasury collateral, and fund managers getting more active in FX swaps all reduced the allure of bills. Money funds don't need bills when they have access to agency floaters and dealers are begging for repo. Foreign central banks don't need bills when they can do repos with the Fed. And asset managers and hedge funds don't need bills when they do FX swaps which yield much better than Treasury bills and have only marginally more risk.

We didn't realize institutional investors' diminished appetite for bills last year as the Treasury was bound by the debt ceiling – bill supply was dormant all year. But investments in repo and FX swaps as alternatives to bills increased by \$700 billion last year and supply this year is competing with these alternatives.

The Fed's plan to nudge the o/n fed funds rate more toward the middle of the target band by narrowing the spread between the o/n RRP and IOR rates to 20 bps from 25 bps won't work. A tighter band will make the fed funds rate print outside the band. The Fed should coordinate with Treasury instead...

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Governments tend to do the right thing at the wrong time. Trillions of deficit spending at full employment and just when the Fed is removing liquidity is one example. Issuing hundreds of billions of U.S. Treasury bills when the world no longer needs them is another.

The shortage of safe assets has been the focus of academics and policymakers for the past decade. Yours truly contributed to the debate with a [working paper](#) while taking intellectual refuge as a visiting scholar at the IMF. The paper argued that the rise of the shadow banking system was inextricably linked to the rise of institutional cash pools – large, concentrated pools of cash in the hands of corporate treasurers, reserve managers, asset managers' central liquidity desks and hedge fund treasurers – whose natural habitat is not deposits, but the money market. Cash pools are too large to qualify for deposit insurance and have a tendency to seek refuge from unsecured bank credit risk in the sovereign Treasury bill market and the secured asset-backed commercial paper (ABCP) and repo markets. The inelastic supply of Treasury bills contributed to the massive growth of ABCP and repos before 2008, which drove the excessive maturity transformation and leverage that magnified mortgage-related credit losses during the Great Financial Crisis.

One lesson learned from the crisis was that demand for safe, short-term assets creates powerful incentives for banks and shadow banks to shorten their funding profile. This is profitable in good times but can be costly in bad times. Because private short-term assets are run-prone, financial stability risks are considerable and the public sector may have a role in crowding out banks and shadow banks from money markets by issuing more Treasury bills. The paper argued for the adoption of the supply management of bills as a macroprudential tool, similar to the conclusions of another [working paper](#) from 2010 by Professors Greenwood, Hanson and Stein at Harvard University, which documented the liquidity premium of bills and argued that the government should issue more of them to harvest their premium. The papers identified the macro reasons for why Treasury bills were scarce and documented the micro-aspects of scarcity through their liquidity premium, respectively. They influenced thinking at the Debt Management Office of the Treasury.

A decade and several trillions of QE and a number of other secular developments later, the supply-demand picture of safe, short-term assets couldn't be more different.

The \$400 billion in bills which were issued during the first quarter of this year has caused chronic indigestion in money markets. The scarcity premium of bills is completely gone: instead of trading well below OIS, bills now trade at or above OIS three months and in!

The last time the Treasury printed this many bills, the market digested them with gusto: overnight rates did respond but stayed within the Fed's target band (see Figures 1 and 2).

Not this time around.

Bill supply reduced the usage of the Fed's o/n RRP facility to zero and Treasury bill yields became the effective floor for o/n rates. Bill yields pushed o/n tri-party repo rates from trading just above the o/n RRP rate to just under the IOR rate. With o/n tri-party repo being the marginal source of funding for interdealer GCF trades, the o/n GCF repo rate got pushed higher too and now prints outside the Fed's target range for the fed funds rate.

The fed funds rate is also feeling the heat. Now that o/n repo rates are trading above the funds rate, FHLBs are lending more in o/n repo markets and less in the funds market. Reduced fed funds volumes have been the main driver of the updrift of the o/n funds rate as borrowing is increasingly less about some lazy o/n fed funds-IOR arbitrage and more about settlement constraints and LCR. The Fed's control of its o/n target rate is slipping...

What has changed since last time? What caused the indigestion this time around? The answers are complex and have to do with changes in both demand and supply.

Part 1 – Shadow Banking Ten Years On...

On the demand side, we've just lost a stalwart member of the community of cash pools – corporate treasurers. Corporate tax reform ended the decades-old practice of corporations accumulating offshore investment portfolios (see [here](#)). These investment portfolios are now being unwound, and, as a result, the corporate bid for front-end Treasuries and bank debt has disappeared. Microsoft for example used to be a quasi bidder-of-last-resort for front-end Treasuries. Its bid is now gone and has turned into an offer (see Figure 3). As Microsoft and other corporates shrink their offshore portfolios – whether through sales or the [echo-taper](#) – the supply of front-end Treasuries will increase for everyone else. The Treasury is currently adding to that supply by issuing hundreds of billions of bills, which overwhelmed the market. Clearly TBAC and the Debt Management Office of the Treasury ought to dynamically adjust bill issuance strategy to a changing demand-side landscape. Fewer hungry mouths argue for less feed, not more. Corporate tax reform reduced the corporate bid for front-end Treasuries by roughly \$350 billion, which is roughly equivalent to the \$400 billion of bills that the Treasury issued during the first quarter of the year.¹

On the supply side, the changes have been even larger! Change came from four sources: increased issuance from the Federal Home Loan banks (FHLBs) as they became U.S. G-SIBs' preferred source of funding for HQLA portfolios and arbitrage books; QE and liberalizing access to central bank liabilities for non-bank institutional investors; more balance sheet for repo through new entrants and new sources of collateral supply; and last but not least, an increased supply of "synthetic U.S. Treasury bills" via FX swaps.

First, [FHLBs](#) increased their issuance of agency [discount notes](#) and [floating rate notes](#) by \$500 billion since the crisis (see Figure 4). Both instruments are considered to be close substitutes to bills and as such they add to the supply of safe, short-term assets. FHLBs' increased issuance of discount notes and floaters is structural as U.S. G-SIBs have been leaning on them heavily to fund their massive HQLA portfolios in order to meet their [LCR](#) and [NSFR](#) targets. In a growing economy, HQLA needs are expected to increase, and with it U.S. G-SIBs' reliance on the FHLB system for funding. This in turn will ensure that FHLBs will remain a steady and growing source of supply of safe, short-term assets. This is one reason why the Treasury won't have to issue as many bills in the future as it should have issued in the past. The FHLB system helped reduce the safe asset shortage.

Second, QE and liberalizing access to the Fed's balance sheet. By definition, QE creates safe, short-term assets from safe, long-term assets. Buying term Treasuries and MBS and swapping them for cash meant the removal of trillions of dollars of duration from capital markets and the addition of trillions of dollars of ultra-liquid, zero duration assets to money markets in the form of reserves. Reserves are accessible only to banks. When Basel III went live on January 1st, 2015, banks started to optimize balance sheet and forced some reserves and non-operating deposits off their balance sheet so that the [eSLR](#) becomes less binding – J.P. Morgan alone pushed out as much as \$200 billion in non-operating deposits. The deposits of [foreign central banks](#) were among the types of accounts that got pushed out. So that foreign central banks would have a place to deposit their U.S. dollar balances somewhere else the [Fed uncapped the foreign repo pool](#).² The foreign repo pool is an attractive facility: it pays close to the o/n GCF repo rate and returns cash at 8:30 AM, a valuable feature given that sales of securities typically get you cash by 3:00 PM and tri-party repos with primary dealers and the Fed only by 3:30 PM . The allure of the facility was such that Japan's Ministry of Finance alone got rid of most

¹ EM central banks defending their currencies is also contributing to the selling of front-end Treasuries at the moment, but we consider these flows as cyclical, not structural. Our focus in this analysis is purely on structural changes.

² The Fed accommodated these flows by swapping reserves for balances in the foreign repo pool.

of its bills and put its cash in the foreign repo pool instead (see Figure 5). The bills Japan's Ministry of Finance and other official accounts sold became available for asset managers whose non-operating deposits were also pushed out by banks in 2015. Balances in the Fed's foreign repo pool are currently around \$250 billion – steadily. These balances can be considered as another chunk of safe, short-term assets that was not there before and will stay a feature of the financial system for the foreseeable future. The foreign repo pool is yet another reason why Treasury won't have to issue as many bills in the future. The Fed's balance sheet also helped reduce the safe asset shortage.

Third, it's "boomtime" in repo again. Basel III created balance sheet constraints for some, but these constraints were opportunities for others. James Sweeney's comment that the financial ecosystem will find a way around regulations – "life finds a way" – is in full bloom. While U.S. dealers' balance sheets have become more constrained under the U.S. version of Basel III, we've seen foreign banks either grow or move their repo books to their New York branches, where the much lighter global version of Basel III applies. French, Canadian and Japanese dealers have increased their repo books by \$300 billion, and repo dealers are budding even in Oslo (see [here](#)). Demand creates its own supply – matched repo books won't grow just because someone has balance sheet to deploy. You also need someone to lend collateral to trade with. Japan's Ministry of Finance (MoF) has become an important source of collateral that has fueled the recent growth of repo. The MoF has been an aggressive lender of U.S. Treasuries and MBS from its foreign reserves in exchange for Japanese government bonds (JGBs) with Japanese and foreign dealers in Tokyo, with an aim to ease the hedging costs of domestic banks and life insurers.³ While data is hard to come by, anecdotally, the amount of U.S. Treasuries lent by the MoF run in the hundreds of billions. Nomura's rapidly growing repo liabilities are a good example of what the MoF's massive lending of collateral did for the growth of the tri-party repo market in New York (see Figure 6). DNB Bank's rise as a matched-book repo dealer in Oslo also has to do with the MoF's release of collateral. Japanese dealers are doing so much repo with money funds that funds are hitting counterparty risk limits and are turning Japanese dealers away. As one money fund manager recently put it, the Japanese are "*begging*" for repo. And what the Japanese can't get directly anymore, they get indirectly – they continue to tap money funds using DNB as an intermediary.⁴ The MoF lending Treasuries is a functional equivalent of the Department of the Treasury issuing bills. When the MoF releases collateral into the financial system, safe, short-term assets are being created in the repo market and the last thing we need is more bill supply from Treasury. Increased securities lending by the MoF and more balance sheet for repo also helped reduce the shortage of safe assets by at least \$500 billion (see Figure 7). Policymakers shouldn't fear this supply. It isn't like pre-crisis repo where private-label mortgages served as collateral. This bout of supply feeds on pristine Treasury collateral. In an era where the problem is too little, not too much, liquidity, repo is what we need.

Don't crowd it out. Embrace it.

Fourth, the creation of synthetic Treasury bills via FX swaps. Before the crisis, ABCP backed by private collateral served as synthetic bills. Everything was built on AAA-ratings: the ratings of collateral, the ratings of liquidity providers. Intermediation chains were long (see [Pozsar](#), 2008 and [Pozsar et al](#), 2010). Mortgages were sliced and diced, CDOs were held by dealers, SIVs and conduits and funding was done via repo and ABCP. HELOCs were transformed into safe, short-term assets. Synthetic Treasury bills to substitute for the real thing. But the synthetic bills of yore were built on fragile foundations:

³ Dealers took the Treasuries they borrowed from the MoF and pledged it in the o/n repo market in New York and then took the cash and lent it in the FX swap market to meet the hedging needs of life insurers and regional banks.

⁴ DNB's new role as a matched-book intermediary in repo markets is similar to the role of French banks (see [here](#)).

the equity that backed the AAA-rating of mortgage collateral was razor-thin, and the AAA-rating of liquidity providers reflected their credit risk, not their liquidity buffers, which were practically nonexistent! When the music stopped, it all crumbled. Gold became dross.

Synthetic bills today are different. Synthetic bills are being minted not from Ninja loans but from sovereign claims like Japanese government bills, and the liquidity providers to synthetic bills are G-SIBs chock-full of central bank liquidity thanks to QE and Basel III.

Ninja bills beat Ninja loans, and liquidity beats no liquidity.

Synthetic bills these days are even better than the real thing. They involve the lending of dollars via FX swaps and the re-investing of foreign currency cash collateral into foreign bills or repo. Consider for example a \$/¥ FX swap where the lender of dollars receives yen as collateral. Unless the lender of dollars is a bank, it reinvests yen collateral in Japanese government bills or repo. Trades like this are called “JGB repack” trades or “JGB asset swaps”, but these terms confuse, rather than illuminate. These trades are best thought of as synthetic U.S. Treasury bills or simply safe, short-term assets. The lender of dollars has a dollar asset, an FX swap, with virtually no credit, FX or liquidity risk. There is virtually no credit risk because the ultimate borrower of dollars via FX swaps – for example, a life insurer in Japan – is considered a safe counterparty, and because the instruments the yen collateral is invested in are Japanese government bills or repos secured by Japanese government bonds.⁵ There is no FX risk because the instrument the trade revolves around is the world’s instrument of choice to eliminate FX risk. And there is no liquidity risk because the banks whose balance sheets these flows ultimately settle on are chock-full of reserves on both sides with trillions at the Fed and the Bank of Japan.

Synthetic bills yield the FX swap implied cost of dollar funding and these yields are attractive when Libor-OIS is wide and when cross-currency bases to Libor are negative. Currently, three-month synthetic bills yield around 2.5%, which is 50 bps better than the yield on three-month Treasury bills. But the 2.5% yield is on an OIS-OIS basis, meaning that it's available only to those banks that have reserve accounts at the Bank of Japan. For investors further down in the system's hierarchy – banks without branches in Tokyo, broker-dealers, asset managers and hedge funds – yields are somewhat lower because they do not have access to central bank deposits and can only re-invest yen collateral in Japanese government bills or repo, which trade below the central bank's deposit rate. Still, even after taking this reinvestment drag into account, the implied yields on synthetic bills exceed the yield on Treasury bills by about 40 bps. Figure 8 shows these spreads over time. They traded as wide as 150 bps in 2016 and never traded tighter than 50 bps.

Estimating the amount of synthetic bills out there is hard, but to give a sense of the scale of supply we are talking about consider chart IV-3-6 from the Bank of Japan's April 2018 Financial System Review (see Figure 9). The green line, plotted on the left-hand axis shows the hedging needs of Japanese life insurers in the FX swap market. The chart tells us that roughly \$1 trillion of hedges are rolled every three months on Tokyo, which means that \$1 trillion in synthetic Treasury bills are issued every three months in Tokyo alone – about \$400 billion more than just three years ago. When we take Japanese megabanks and regional banks' hedging needs into account, these figures climb to \$1.2 trillion. FX swaps are another significant chunk of safe, short-term assets that were not there before, and, in addition to Tokyo, synthetic bills are being minted in London, Frankfurt, Zurich, Taipei and all over Scandinavia too. Lingonberries and synthetic bills a-plenty...

⁵ That said, never say never. AIG was once a highly rated and well-endowed counterparty too. Until it wasn't. Monitoring the quality of hedged buyers' credit portfolios should be policymakers' main financial stability concern. Shadow banking is being discussed in every context but in the context of FX swaps. Have we learned anything?

Part 2 – Who Has Learned, and Who Hasn’t?

Policymakers in the U.S. have been silent about these structural shifts.

We haven't seen a speech or a paper from either the Federal Reserve Board, FRBNY or the U.S. Department of the Treasury on these topics, or from TBAC for that matter.

Policymakers on the receiving end of these synthetic flows are a whole different matter. Take for example Deputy Governor Nakaso's [fortress Japan speech](#) from January, 2017, and his exposé on policy divergence, FX swaps and the supply of safe, short-term assets. Elsewhere, Deputy Governor Debelle of the RBA has delivered a penetrating [speech](#) at a conference convened by the BIS in May last year in Basel about the cross-currency basis.

In fact, policymakers in Japan and Europe have been so focused on accommodating the creation of synthetic bills that they made adjustments to their asset purchase programs and introduced various repo and securities lending facilities to help non-bank lenders of dollars to park their yen and euro collateral at less negative interest rates. In English, policymakers in Japan and Europe have been proactively trying to reduce the [reinvestment drag](#) for non-bank lenders of dollars in FX swaps. The less the drag, the better the spread of synthetic bills over Treasury bills, the more dollars are being lent via matched FX swap books and the less the pressure on cross-currency bases to Libor.

For example, the Bank of Japan has stopped buying Japanese government bills to increase their availability for the non-bank lenders of dollars in FX swap transactions. It also introduced a fixed-price, full allotment repo facility for quarter-end turns, the purpose of which was to floor how negative repo rates can go – also to help lenders with more assets for their yen collateral. Think of this repo facility as a functional equivalent of the Fed's o/n RRP facility – there to provide an elastic supply of safe, short-term assets.

In Paris, the Banque de France also took action and launched a [securities lending facility](#) with an eye to help the lenders of dollars get better yielding assets for their euro collateral.

Finally, both the Bank of Japan and the European Central Bank (ECB) have uncapped their deposit facilities for foreign central banks, to let them park cash with them directly (see Figure 10). Similar to the Fed's foreign repo pool, foreign central banks gaining access to the balance sheets of the Bank of Japan and the ECB means less pressure Japanese, German and French bills and improve the yield on synthetic bills relative to bills.

The more the yield on synthetic bills, the less the need for Treasury bills.

Treasury bills have been most valuable for those cash pools that were not set up to do repo with dealers or to lend via FX swaps or who had no access to accounts at the Fed.

That's hardly anyone these days.

Money funds don't need more bills. The FHLBs have become large and structural issuers of safe assets. Yankee banks are growing matched repo books everywhere. And the Fed's o/n RRP facility provides safe assets on demand. Government money funds don't need more bills and that after \$800 billion in new assets since money fund reform!

Foreign central banks now have access to something far better than Treasury bills – the foreign repo pool – and SAFE and the RBA have been big buyers of synthetic bills. None of them holds significant amounts of real bills anymore. They've both gone synthetic. If electric sheep dream of androids, smart reserve managers graze on synthetic bills...

Most bond funds and hedge funds too are now electric sheep, grazin' on synthetic bills. They have gone from non-operating deposits to bills and from bills to synthetic bills.

The widening of Libor-OIS and cross-currency bases during prime money fund reform served as an important milestone in money markets. Hundreds of fund managers – ranging from PMs at large asset managers to small hedge funds – saw the opportunities offered by wider cross-currency bases and the yield pickup that synthetic bills offered over Treasury bills. Hundreds of funds changed their bylaws, signed ISDAs and instructed their treasurers to park spare cash in FX swaps. The more they lent via FX swaps, the less interested they became in bills. This secular shift occurred over the course of 2017.

We did not realize cash pools' diminished appetite for bills last year as the Treasury was bound by the debt ceiling – the supply of Treasury bills was dormant all year. The last time the Treasury issued \$400 billion in bills, in late 2015, many funds were not yet set up to buy synthetic bills – many of them did not even know synthetic bills existed – and Microsoft, along with other corporations were there to bid for excess front-end Treasuries.

But by early 2018, everyone became an electric sheep and Microsoft has left the scene!

We don't need more U.S. Treasury bills. The supply of alternatives has gone exponential (see Figure 11). The safe asset shortage has become a safe asset glut. If we stick with the TBAC's recommendations and keep Treasury bill supply on an upward trajectory, o/n repo and fed funds rates will be on course to print outside the Fed's target range.

Mr. Cummins, we need to change tack...

The plan to issue more Treasury bills was appropriate five years ago but is not appropriate in the current environment. We are swimming in safe assets and by adding to the supply by issuing more bills, we are making it more expensive for the rest of the world to buy dollar assets on a hedged basis. As a borrower nation, we need the foreign marginal buyer and we should not make their hedging costs higher than necessary by issuing more bills. Other central banks are opening facilities to incentivize those with dollars to lend more via synthetic bills. The last thing the U.S. Treasury should be doing is going in the opposite direction and lure the lenders of dollars to buy "real" bills instead of synthetic bills. Bill supply is adding to the hedging costs of the marginal buyers of long-term Treasuries, MBS and IG credit. It's hardly a coincidence that hedging costs and long-term yields have both increased by 50 bps this year. The Fed's taper and the deficits are bound to make the yield curve a lot more steep and we don't need to add to that pressure with more bills...

The current bill issuance schedule is making things difficult for the FOMC too.

Bill supply reduced the usage of the Fed's o/n RRP facility to zero and Treasury bill yields became the effective floor for o/n rates. Bill yields pulled o/n tri-party repo rates from trading just above the o/n RRP rate to just under the IOR rate. With o/n tri-party repo being the marginal source of funding for interdealer GCF trades, the o/n GCF repo rate got pushed higher too and it now prints outside the Fed's target range (see Figure 12).

The o/n fed funds (FF) market is also feeling the heat.

Higher o/n repo rates are making the FHLBs to lend more via repo and less via o/n FF. O/n FF volumes have halved since the beginning of the year and lower volumes have pushed the o/n FF rate higher as the borrowers are no longer just about arbitrage: o/n FF transactions are increasingly used by U.S. and foreign banks to settle transactions and more and more foreign banks are booking o/n FF trades as official sector deposits in order to improve their LCR. There is competition here. It's not just arbitrage anymore...

Old rules of thumb no longer hold: reserves-rich banks like J.P Morgan Chase Bank, N.A. no longer police the o/n GCF rate to stay below the IOR rate. And why would they?

Banks police air pockets in interbank markets, not upward shifts in the bottom of the Fed's target range. Not even the Fed can police the current upward shift in o/n rates!

Fiscal policy is messing with monetary policy...

Conclusions – Learn from Copernicus...

Rates strategists will fall into two camps about the right solution to the current situation. Some will say the problem is too few reserves and will argue that the Fed should stop taper and activate the o/n repo (RP) facility to start adding reserves like in the old days.

Some will say the problem is too much collateral.

Those arguing that the problem is a glut of collateral – or a glut of safe assets – are right: the Fed should not be doing anything at the moment to cap rates, for the source of the problem is not an insufficient amount of interbank liquidity, but an excessive amount of bills which are being issued in an environment where the world no longer needs them. The time for activating the o/n RP facility is nearing, but it won't come until the Fed's balance sheet taper accelerates and a tsunami of coupon issuance hits the market.

Spreads tell everything (see Figures 13 and 14).⁶

The spread between o/n GCF and tri-party repo rates tells us whether interbank markets are tight. These spreads have been trading range-bound. Interbank liquidity isn't tight.

The spread between o/n tri-party and o/n RRP rates tells us whether there is too much collateral. These spreads have been trading wider. Treasury bill supply is way too high.

Only the U.S. Treasury can fix this, not the Fed.

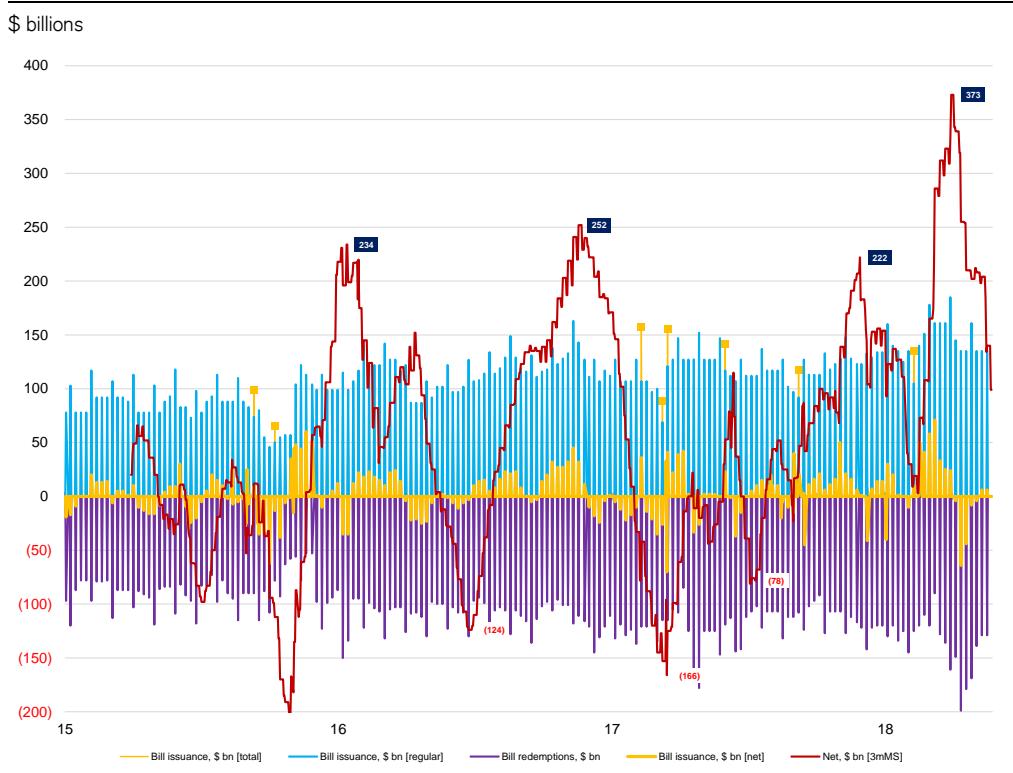
Narrowing the target range for the o/n FF rate from 25 bps to 20 bps won't work. Contrary to expectations, it will make o/n FF print not more within, but outside the band.

One thing is for sure.

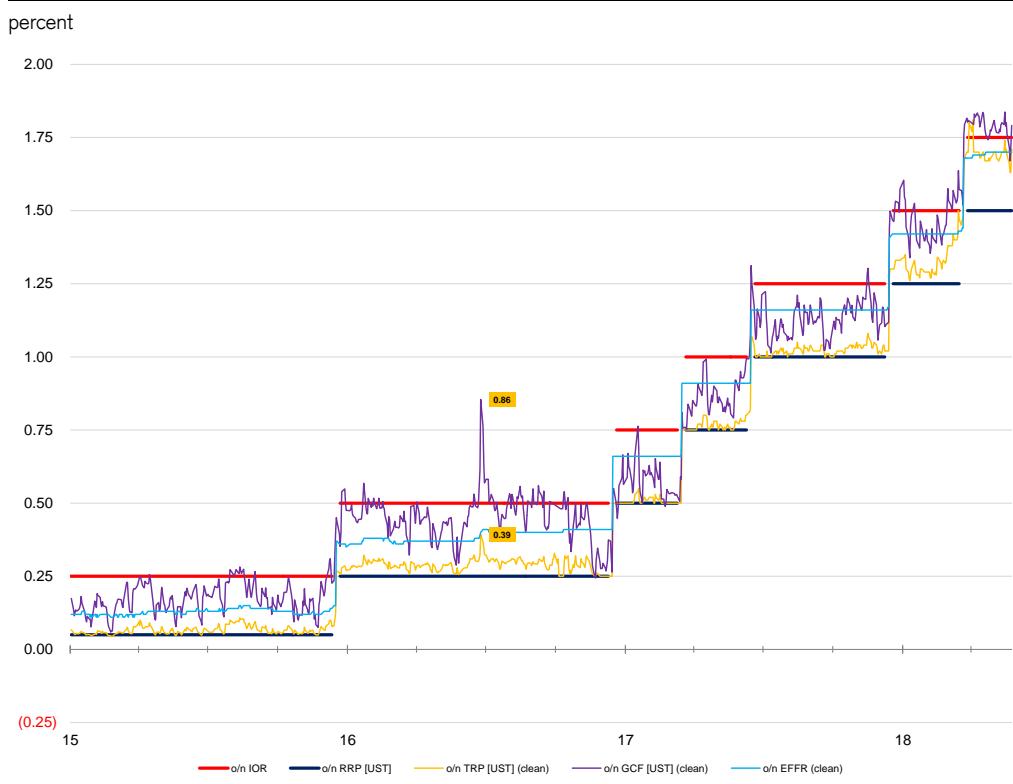
The Earth spins around the Sun and not the other way 'round. The o/n FF rate trades higher in the band because bill yields became the effective lower bound for o/n rates. You can't pin Earth down and make the Sun spin around it. Neither can you pin down the funds rate and push the band around it. If you think so, you shouldn't be a central banker.

Coordinate with the Treasury instead...

⁶ SOFR in this regard does a disservice. By averaging various repo rates, SOFR instills a habit of looking at repo rates in the aggregate. Looking at individual repo market segments and their spreads to other instruments is paramount. SOFR won't tell us whether too little liquidity or too much collateral is the problem, only its individual components do

Figure 1: From Famine to Indigestion

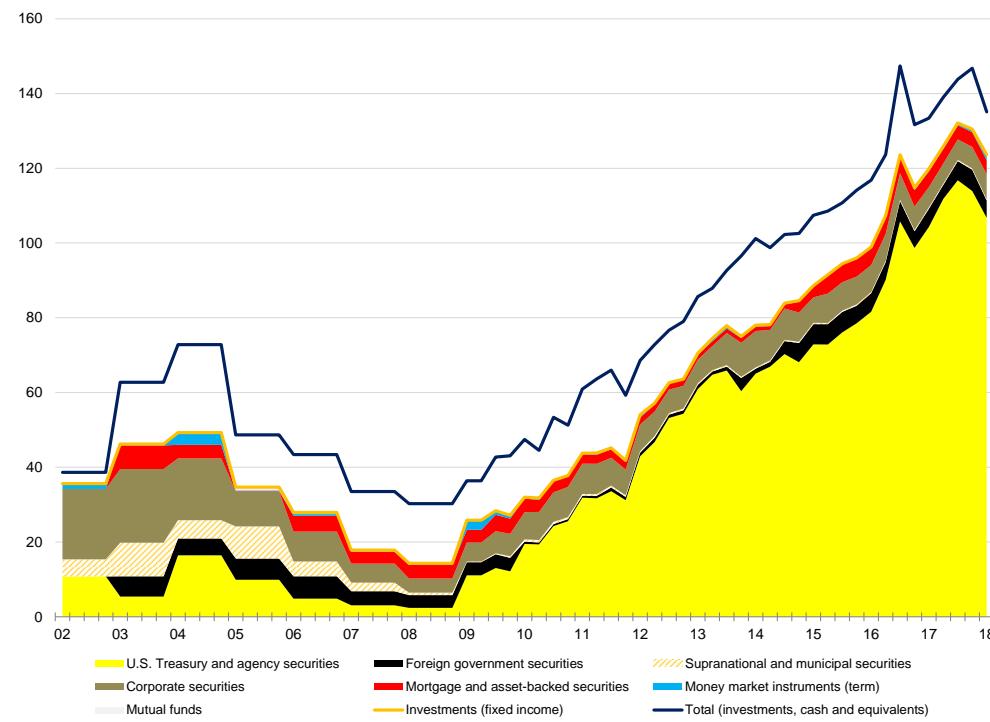
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 2: Kissing the Band Goodbye?

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 3: Bidder-of-Last Resort No More

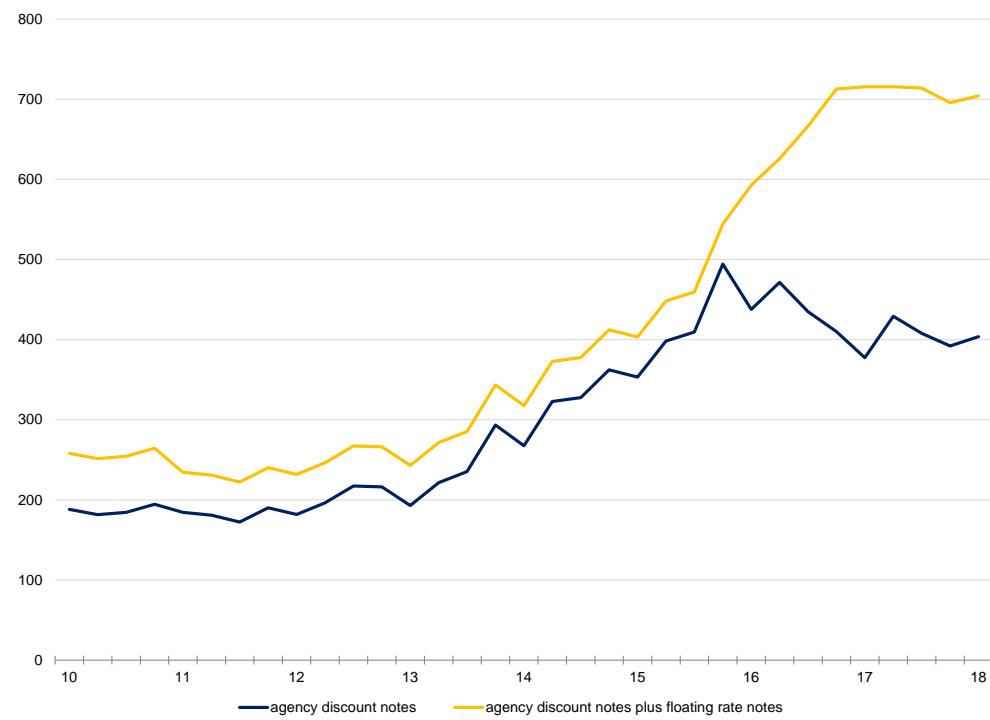
Microsoft Corp.'s offshore investment portfolio, \$ billions



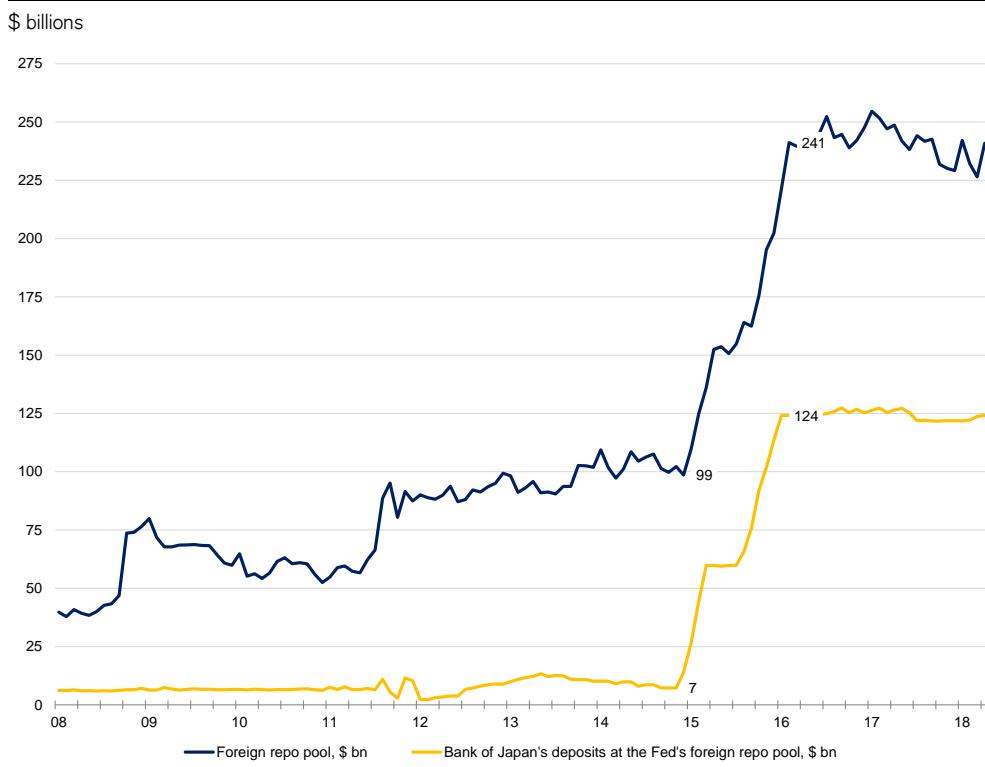
Source: Company filings, Credit Suisse

Figure 4: FHLBs as Providers of Safe, Short-Term Assets

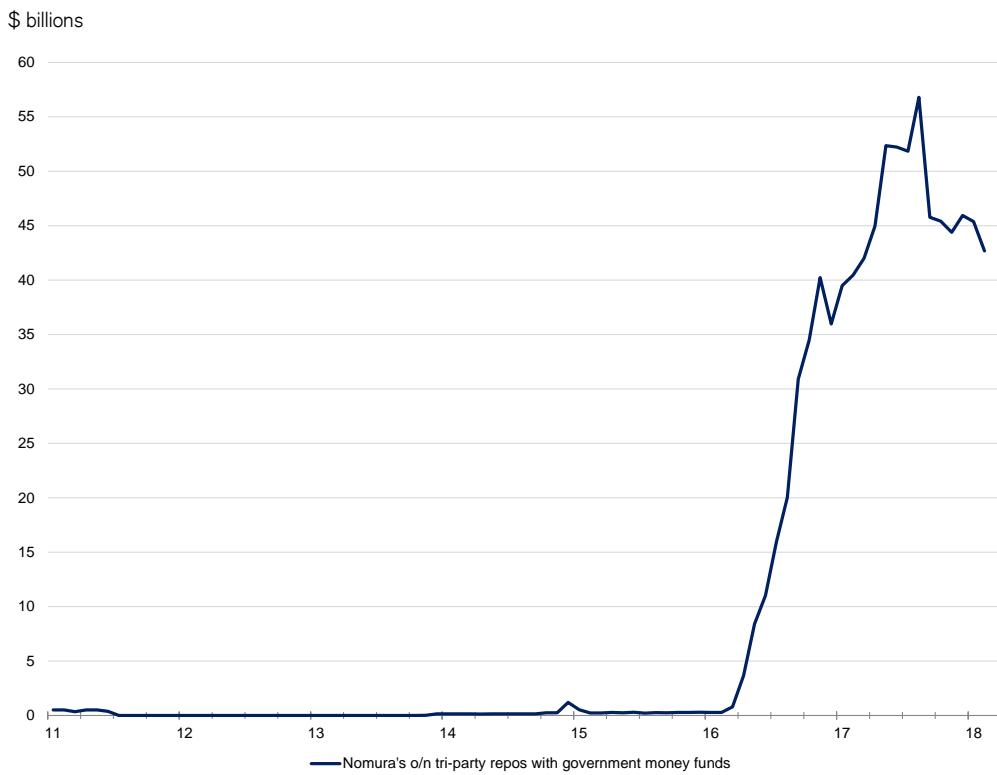
\$ billions



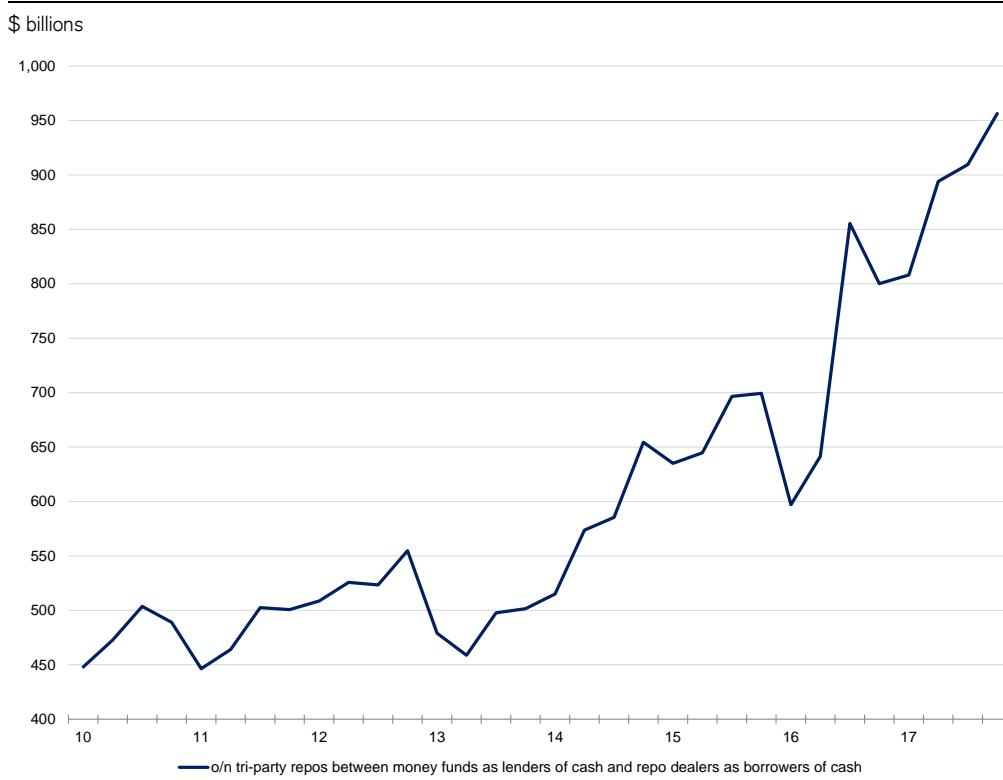
Source: Office of Finance, Credit Suisse

Figure 5: Japan's MoF Loves the Fed's Foreign Repo Pool

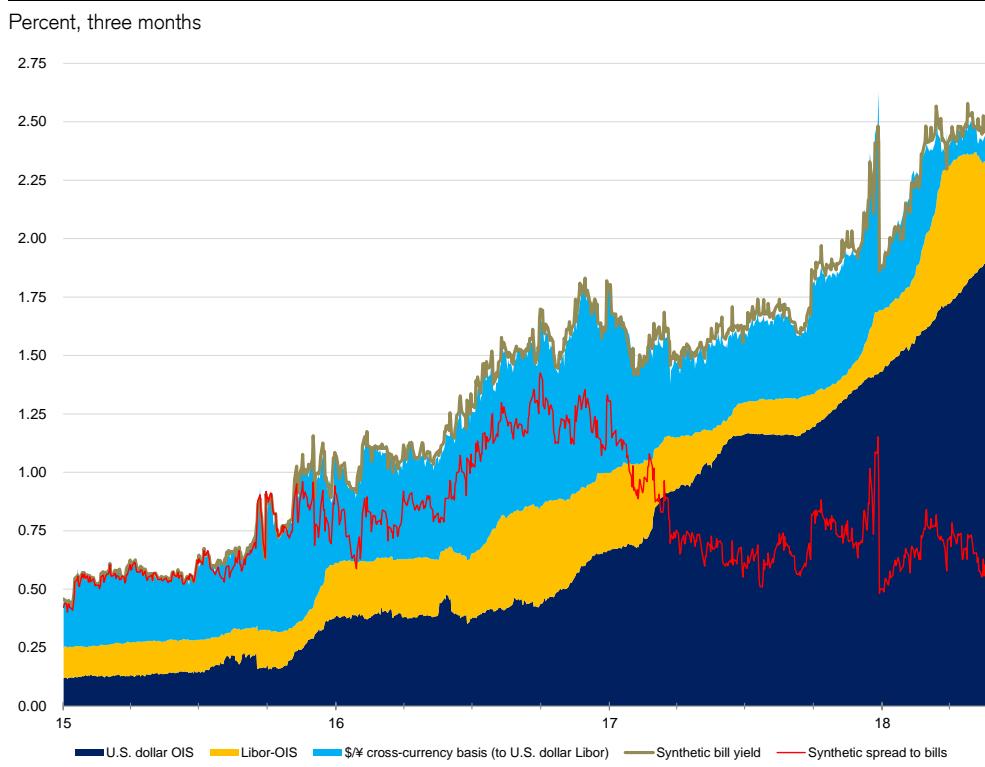
Source: Federal Reserve, Credit Suisse

Figure 6: For Collateral Call 1-800-MoF-Japan

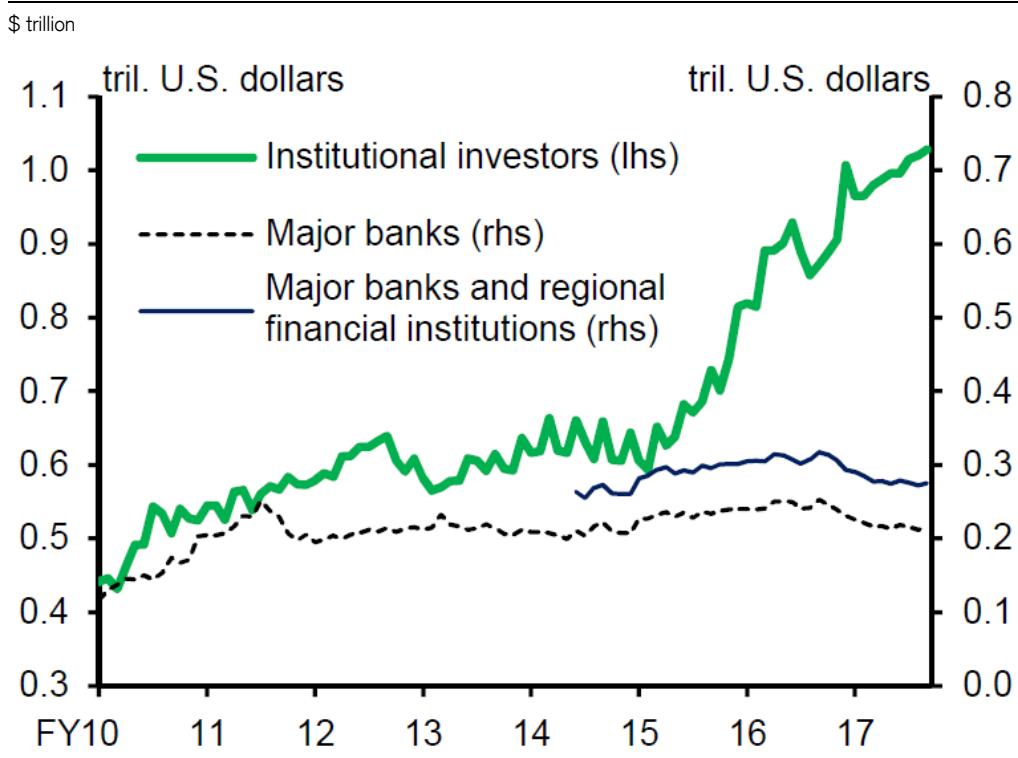
Source: OFR, SEC, Credit Suisse

Figure 7: Repo Thriving Again...

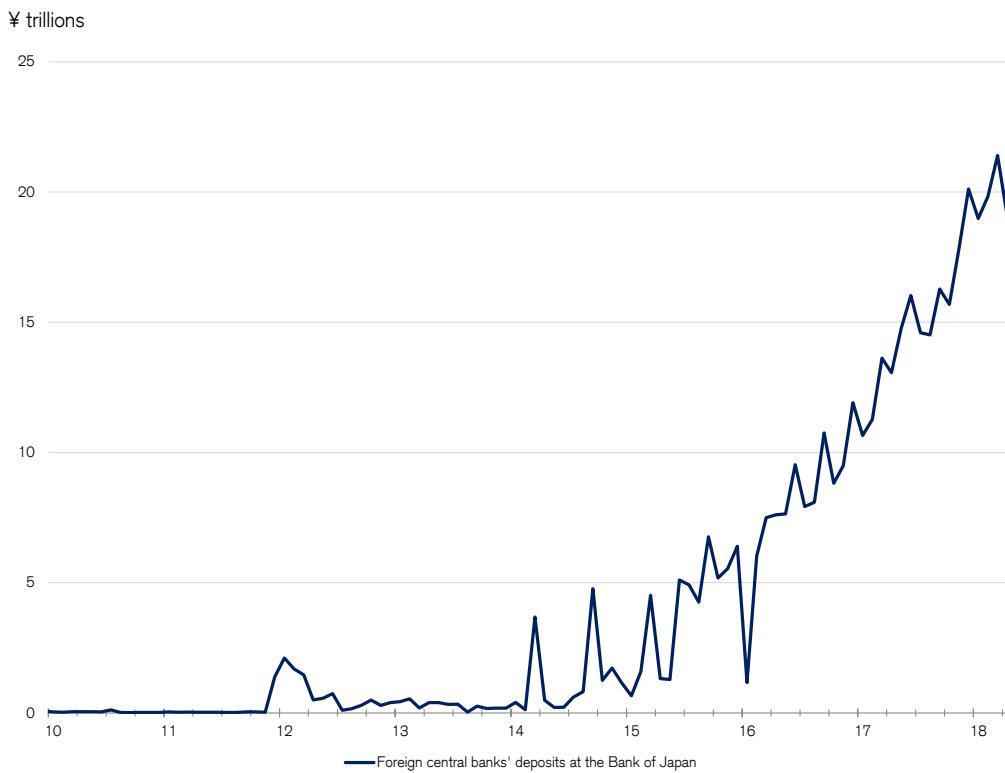
Source: Federal Reserve, Credit Suisse

Figure 8: Real vs. Synthetic Bill Yields

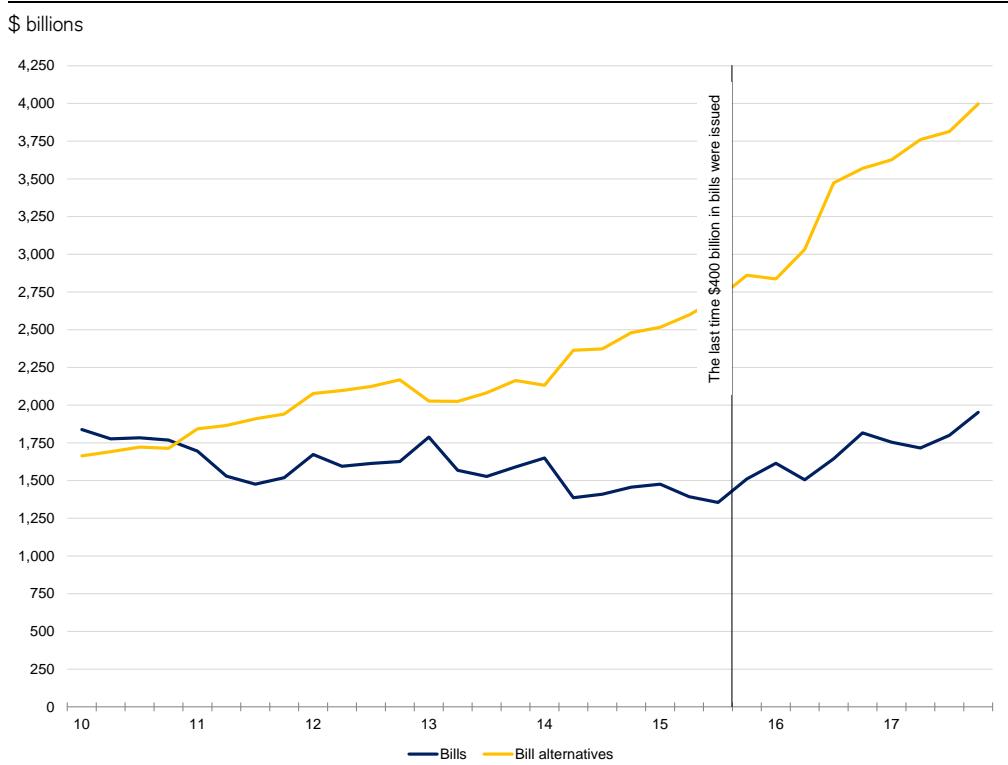
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 9: Synthetic Bill Supply in Tokyo

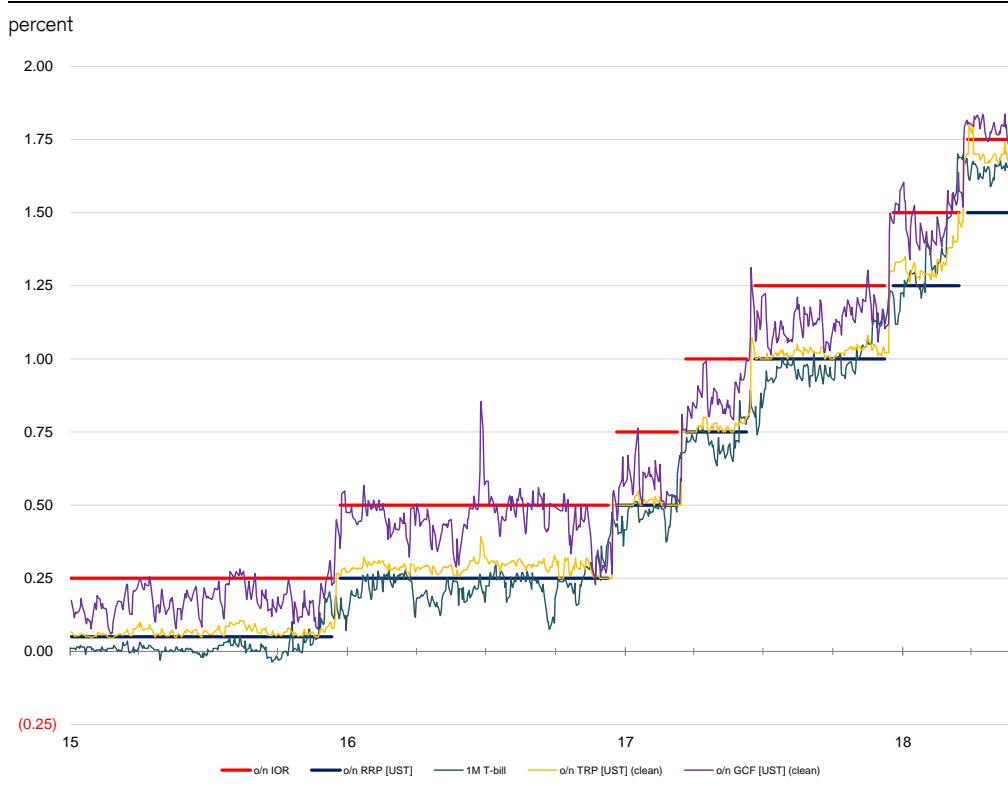
Source: Bank of Japan

Figure 10: A Good Type of Black Hole...

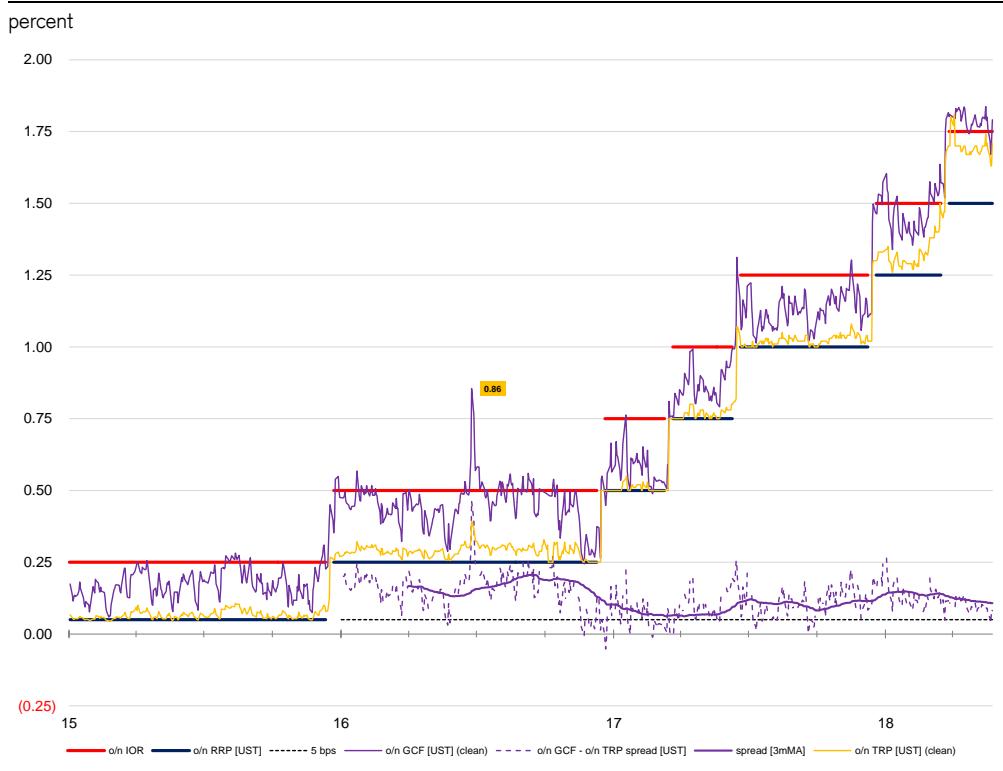
Source: Bank of Japan, Credit Suisse

Figure 11: Who Needs More Bills?

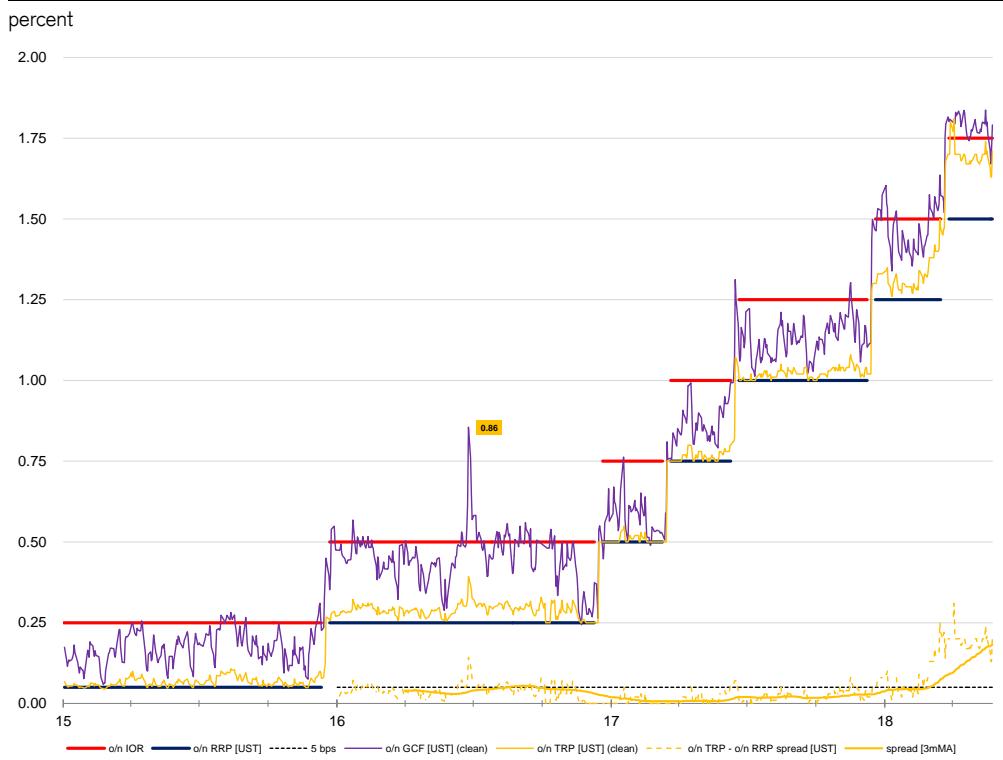
Source: Credit Suisse

Figure 12: From a Leaky Floor to an Escalator

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 13: Interbank Liquidity Isn't Tight

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 14: Bill Supply is Way Too High

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

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Investment Solutions & Products
Global



Credit Suisse Economics

Global Money Notes #15

Monetary Policy with Excess Collateral

The agenda of this year's Jackson Hole Economic Policy Symposium will be "[Changing Market Structure and Implications for Monetary Policy](#)".

The topic couldn't be more timely.

In the previous issue of Global Money Notes, we discussed one important change in market structure: the changing demand for and supply of safe assets and why Treasury's current bill issuance strategy is uncomfortable for the Fed.

Bill supply has *pushed* the floor under o/n rates higher and with it their trading range relative to the top of the Fed's target range for the federal funds rate. But relative to each other, private o/n rates continue to trade fairly range-bound.

Coupon issuance will soon complicate this picture. More change is coming...

Funded buyers are expected to be an important source of bid for coupons, and their bid is expected to *pull* o/n GCF and GC rates away from other o/n rates – initially. But o/n fed funds and tri-party repo rates will follow soon after, and as they do, the Fed will have a hard time enforcing that o/n fed funds stays within the target band. A rethink of the Fed's operating regime will be necessary.

We are transitioning from an environment where reserves are excess to an environment where collateral is excess. The Fed's monetary toolkit has to adapt.

The floor system doesn't need to be replaced with a corridor system, in our view, but could be appended with a fixed price full allotment o/n repo (RP) facility – which is the symmetrical counterpart to the o/n reverse repo (RRP) facility.

The o/n RRP facility was relevant while the system had too many reserves relative to balance sheet capacity and reserves needed to be mopped up.

The o/n RP facility will be relevant when there will be too much collateral relative to balance sheet and collateral will have to be turned into reserves.

In an environment where the sovereign is flexing some serious fiscal muscle – the source of excess collateral – the launch of the o/n RP facility may be nigh.

But as one astute market participant put it, "the political, educational and operational cost of introducing a new facility is such that the Fed won't launch until alternatives have been exhausted and benefits are clear". And if reserves are hard to add, they'll have to be preserved by prematurely ending taper...

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Part 1 – From a Leaky Floor to an Escalator...

The net supply of bills is expected to increase by \$150 billion by September, with more to come during the last two months of the year. The safe asset glut is about to get worse.

Bill yields will likely trade 5-10 basis points (bps) higher on the back of this supply and higher bill yields would soon push the o/n rates complex outside the Fed's target range.

Bill yields were the reason why the o/n RRP rate was called a "leaky floor" in the past. Figure 1 shows that other than the weeks before FOMC rate hikes, one month bill yields typically traded below the administered floor – the o/n RRP rate. But with the recent surge in net bill supply, this pattern has changed. One month bill yields went from trading below the o/n RRP rate to trading well above it, and with that shift, one month bill yields became the effective floor under all private o/n interest rates replacing the o/n RRP rate.

The leaky floor became an escalator...

Figure 2 is a more dynamic representation of the shifting floors idea. The thick blue line plots the effective floor – as opposed to the administered floor – under o/n interest rates. The effective floor is the o/n RRP rate in periods when the o/n RRP rate is higher than the one month bill yield and it is the one month bill yield in periods when the one month bill yield is higher than the o/n RRP rate. The chart clearly shows that by April, the effective floor under o/n rates shifted higher – the o/n RRP rate is currently not binding.

Government money funds are the biggest investors in o/n RRPs and one month bills, and their preference for one month bills if they yield more than o/n RRPs is understandable. Both instruments are a direct claim on the sovereign and are considered liquid assets for regulatory purposes, but bills give access to intraday liquidity whereas o/n RRPs do not.¹ If money funds buy bills for intraday liquidity purposes even when their yield is below the o/n RRP rate, they'll definitely buy them when their yield is higher than the o/n RRP rate.

Figure 3 shows that as one month bill yields traded above the o/n RRP rate, the usage of the o/n RRP facility fell to zero – this is the quantitative proof to the observation that the administered o/n RRP rate currently does not serve as the floor under o/n interest rates.

Government money funds' third investment option next to o/n RRPs and one month bills are o/n tri-party (TRP) repos with primary dealers and foreign banks' New York branches.

Figure 4 shows the one month bill yield and the o/n TRP and o/n RRP rates over time. Money funds' first choice is always bills to cover intraday liquidity needs, followed by o/n TRP repos which offer a spread over o/n RRPs, followed by o/n RRPs as a last resort.

Figure 5 shows the o/n TRP repo rate within the administered band and its spread to the o/n RRP rate. This spread has been around 5 bps in the post-Basel III era. But in April, it quintupled to about 25 bps – a gigantic spread move by the standards of o/n markets. Figure 6 shows, however, that when expressed as a spread to one month bill yields, the o/n TRP repo rate still trades at its typical spread levels – relative to the effective floor.

Now that we've established that the recent bout of *bill supply* pushed the effective floor under o/n TRP rates higher, we can broaden the conversation to other o/n interest rates: the o/n GCF repo rate, the o/n discount note rate and the o/n fed funds (FF) rate.

Figure 7 shows o/n GCF rates relative to o/n TRP rates. Primary dealers' matched repo books typically involve lending to other dealers at the o/n GCF rate or to the buyside at the o/n GCF rate plus a spread, both of which are funded in the o/n TRP repo market.

¹ Maturing bills return cash early in the morning. Proceeds from the sale of bills return cash by 3:00 PM the latest. But maturing o/n RRPs return cash only at 3:30 PM, which makes o/n RRPs the least liquid of all o/n instruments!

Matched book intermediation must involve a positive spread so if the funding leg of the matched book shifts higher, the lending leg must shift higher too. Indeed, the spread between o/n GCF and TRP rates has been mostly unchanged this year.² The only reason why o/n GCF rates have been trading structurally above IOR is that the effective floor to the funding leg of o/n matched books has shifted higher – again, due to *bill supply*.

Figure 8 shows the yield on o/n discount notes relative to the o/n RRP rate. Like bills, o/n discount notes command a liquidity premium relative to o/n RRPs. Discount notes return cash by noon and so they also provide intraday liquidity for money funds, like bills.

In a way, o/n discount notes are even better than bills as they are true o/n instruments in the sense that they have zero price risk while one and three month bills have some. When you sell a bill for intraday liquidity needs, you do not precisely know the price at which you'll sell, but when o/n discount notes mature, you know how much you'll get at noon.

The only problem with o/n discount notes is that there aren't enough of them: Figure 9 shows that their supply is only \$20 billion, which is a drop in the ocean of funding markets. The frequent dips in the yield of o/n discount notes even outside of quarter-ends are a reflection of their superior liquidity coupled with their unpredictable and razor-thin supply.

The liquidity premium of bills and o/n discount notes tend to move in tandem which makes sense given that the two instruments are substitutes. That the liquidity premium of o/n discount notes disappeared in recent months is – once again – due to *bill supply*.

FHLBs issue o/n discount notes to fund arbitrage. Yes, FHLBs are arbitrageurs too...

In a typical arbitrage trade, FHLBs issue o/n discount notes and lend the proceeds in whichever o/n market yields the most. FHLBs conduct these arbitrage activities in order to reduce the periodic negative carry of their liquidity portfolios. Their liquidity portfolios periodically earn a negative carry because, on the asset side, FHLBs are captive lenders in the o/n FF market due to early cash return requirements, but on the funding side, their regulator requires them to fund their liquid assets with three month discount notes.

Figure 10 shows that FHLBs' liquidity portfolios typically bleed money in the run-up to FOMC hikes – that's obviously because o/n markets react to hikes only after the fact, but term funding markets anticipate such hikes in advance. FHLBs' o/n arbitrage trades on any given day serve the purpose of offsetting the negative carry that periodically arises in the run-up to rate hikes. Importantly, whereas in the past, FHLBs' liquidity portfolios went back to earning a positive carry after hikes, in recent months, their liquidity portfolios have been earning a negative carry even after hikes – due to the pressure on FHLBs' three month funding costs from *bill supply*. The \$10 billion increase in daily average o/n discount notes outstanding since late last year – see Figure 9 above – has to do with FHLBs trying to reduce the earnings impact from what once was only a periodic hit to what has become a structural hit to the spreads earned on mandatory liquidity portfolios.

Figure 11 shows what o/n arbitrage options FHLBs have to reduce this earnings hit. Unlike their liquidity portfolios, where cash must go to o/n FF due to early return needs, FHLBs do not care about the timing of cash return from o/n arbitrage trades so they are flexible between o/n FF and o/n repo trades – they'll lend where yields are the highest. In the past, when o/n FF was the highest-yielding arbitrage trade, FHLBs put both their liquidity and arbitrage into o/n FF, which boosted volumes and kept the o/n FF rate steady. But in recent months, volumes declined as arb flowed to repos and o/n FF drifted higher and as in the examples above, the reason for the updrift in the o/n FF rate was *bill supply*.

² The increase in the spread between o/n GCF and o/n TRP repo rates during the year-end turn was partly due to strong demand for collateral upgrade swaps (equities for Treasuries) from some foreign banks' [equity futures desks](#).

Figure 12 shows that the increase in o/n FF volumes during the fourth quarter of last year was driven by the massive widening of the o/n FF – o/n discount note spread. Wider spreads incentivized FHLBs to ramp up arbitrage and o/n discount note issuance.

Figures 13 and 14 show that as one month bill yields pushed o/n discount note yields higher, the o/n FF – o/n discount note spread collapsed and o/n FF volumes fell as FHLBs pulled arbitrage trades from o/n FF and put them in better-yielding repos instead.

Thus the recent decline in o/n FF volumes has to do with FHLBs shifting arbitrage flows away from o/n FF to o/n TRP and o/n GC repos instead. To argue that traded volumes in the o/n FF market will fall from here now that repo rates trade above FF is a stretch.

FHLBs liquidity portfolios are a function of their advance books...

...their liquidity portfolios must be liquid before dawn...

...and only o/n FF trades return cash before dawn.

That was the case. That is the case. And that will be the case for the foreseeable future. Structurally, FHLBs will continue to lend at least \$60 billion in the o/n FF market, but volumes in excess of \$60 billion will depend on where FHLBs direct o/n arbitrage flows.

If the o/n FF rate trades above o/n TRP and GC repo rates, traded o/n FF volumes will increase and the o/n FF rate will go down within the Fed's target band given unchanged demand for o/n FF from banks. But if the o/n FF rate falls below o/n repo rates, the opposite will happen: traded o/n FF volumes will fall and the o/n FF rate will drift higher within the Fed's target band given unchanged demand for o/n FF from banks.³

The ebb and flow impact of FHLBs arbitrage activities on volumes in the o/n FF market is not a part of the market's understanding of how the o/n FF rate trades but it should be. Periodic "high tides" in traded o/n FF volumes can push the FF rate down within the band and periodic "low tides" in traded o/n FF volumes can push the FF rate up within the band.

Figure 15 shows the three most recent episodes of low tides in the o/n FF market and Figure 16 shows that the greater the low tide, the greater the move in the o/n FF rate. When between March 1st and April 24th traded o/n, FF volumes fell by over \$50 billion, the o/n FF rate drifted 4 bps higher within the band, and between June 1st and June 19th when traded o/n FF volumes fell by over \$30 billion, the o/n FF rate drifted 2 bps higher. Furthermore, during low tides the 75th percentile of o/n FF trades tends to "zigzag" more.

This feature of the o/n FF market is useful to know for both banks and hedge funds.

For foreign banks it can give an edge to more effectively fund o/n arbitrage trades between o/n FF and o/n GCF repos and FX forwards and parts of their HQLA portfolios.

For hedge funds, it can give an edge to more effectively forecast the path of o/n FF within the Fed's target band and have a more precise view of the fair value of term OIS.

Figure 17 summarizes our discussion of o/n markets. It clearly shows that relative to each other private o/n rates trade like they did before the surge in *bill supply*. That spreads between private o/n rates are broadly unchanged tells us that interbank and interdealer liquidity is currently *not* tight. Reserves aren't scarce and dollars aren't scarce either.

It also shows that the only thing that changed is that the constellation of o/n rates shifted higher relative to the administered target band, but as we've explained the sole reason for that was the surge in *bill supply*. And the solution to a glut of bills is to undo *bill supply*...

How?

³ Demand for o/n FF is of course changing and is increasing at the moment. But that's a discussion for another day.

Part 2 – How to Shut Down the Escalator?

First, the Debt Management Office of the Treasury could change its issuance strategy. For example, shifting future issuance from bills to notes is one option. Buying back bills and reissuing them as notes is technically also possible but practically it is very unlikely.

Second, the Fed could announce a reverse twist, where they sell coupons from their portfolio and buy bills instead. Doing so would be reserves neutral – a reverse twist is just an asset swap. Doing a reverse twist would pressure bill yields below the o/n RRP rate and help drag the o/n rates complex back down within the target band. The yield curve would steepen, but that's a price worth paying for improving one's control over o/n rates.

Third, the Fed could cut the rate on the foreign RRP facility.⁴ Foreign official and supranational accounts currently keep \$250 billion in the foreign RRP facility, a takeup that has been steady for the past two years (see Figure 18). As we've discussed [before](#), the foreign RRP facility pays around the o/n GC repo rate and so is one of the priciest liabilities of the Fed – recently it may even have paid in excess of IOR (see Figure 19)!

The Fed uncapped this facility sometime during the last months of 2015 to ease what it rightly expected to be a potential shortage of bills triggered by U.S. G-SIBs pushing non-operating deposits off their balance sheet after the global adoption of Basel III, and prime money fund reform pushing trillions of funds from prime to government-only funds. Uncapping the facility was the right response to deal with the anticipated shortage of bills.

But that was then. The world is different today.

Today, the issue is not a shortage of bills but a glut of bills – a large foreign RRP facility is no longer optimal. Clearly, it is bad business for the government as a whole for the Fed to pay a rate on an o/n liability that is meaningfully above the one month bill yield: that makes the effective cost of funding a part of the federal deficit the bill yield and then some.

By cutting the rate it pays on the o/n foreign RRP facility, the Fed could incentivize foreign central banks to go back into the bill market and mop up excess bills that way.

The Fed is in absolute control of the price of its liabilities and in the foreign RRP rate, it has the single most effective lever in dealing with the pressure on o/n interest rates.

It is important to appreciate that both a reverse twist and cutting the foreign RRP rate can happen in conjunction with taper. The reverse twist is just an [asset swap](#) and cutting the foreign RRP rate ultimately amounts to a [liability swap](#) – it would reduce the usage of the foreign RRP facility and increase reserves in the system as reserves get [unsterilized](#). Swapping assets and liabilities does not interfere with shrinking the balance sheet.

But there is a difference between what should happen and what will happen...

The Fed's response to the shift up in the effective floor under o/n rates hasn't been to push the floor back down but instead to lower the ceiling by cutting the IOR rate by 5 bps.

If you had to explain the problem to a three year old, you'd say that the obvious solution to a floor shifting higher is not to lower the ceiling, but to push the floor back down. But lowering the ceiling can work too if it forces market participants to dig a hole in the floor...

...the [effective](#) floor!

That is what the Fed *appears* to be trying to do by cutting the IOR rate.

⁴ Other than cutting the rate on the foreign RRP facility, the Fed could introduce binding counterparty caps like it does with the o/n RRP facility for money funds and other qualified institutional investors that have access to the facility.

Part 3 – A Jackhammer to the Effective Floor

Cutting the IOR rate raises the opportunity cost for banks with lots of reserves. Presumably it aims to make some banks think deep about how many reserves they need – what's true excess in their portfolios and what's not – and trade true excess for bills.

In other words, instead of cleaning up money markets either by buying up excess bills itself or by forcing foreign central banks to buy bills by re-pricing the foreign RRP facility, the Fed's preferred way to mop up excess bills is by incentivizing banks to buy them by re-pricing another Fed liability – reserves – by cutting the rate it pays on them by 5 bps.

In a way, the Fed's experiment is about trying to figure out whether reserves or bills are more excess. If reserves are excess, banks will swap them for bills and the experiment works. If reserves aren't excess – and we've been arguing that they aren't (see [here](#)) – banks won't play ball and the Fed will learn something about the demand for reserves.

Cutting the IOR rate won't push bill yields – and o/n rates – lower for three reasons.

First, by forcing reserves-rich banks to trade reserves for bills, an implicit aim of the Fed is to flatten the distribution of reserves in the banking system such that those with lots of reserves have somewhat less and those with few reserves have somewhat more. That's an interesting idea but as we've shown with our analysis of o/n rates, the issue is not the distribution of reserves within the system but *bill supply* pushing up the effective floor.

Second, cutting IOR is a blunt instrument for the issue at hand. By cutting IOR, the Fed has no control over what point along the Treasury curve banks will buy, if they buy at all. The pressure on o/n rates stems from the one month point of the bill curve and the Fed would have to cut IOR by at least 25 bps to make one month bills attractive to banks.⁵

Indeed, according to the Fed's H.8 [release](#), 5 bps did *not* do the trick. Since the rate cut, banks only bought \$15 billion in Treasuries, and, judging from prices, those weren't bills.

Why?

Figure 20 shows the HQLA frontier for banks and aims to make the point that far from being the center of the universe, the bills-IOR spread is just a point on a broad canvas! Repos and FX swaps have always been much better alternatives to reserves than bills and cuts to IOR will incentivize banks to lend more via repos and FX swaps than buying bills.

Cutting the rate on the foreign RRP facility would be a much more effective tool – a syringe rather than a jackhammer. The Fed could cut its rate so that foreign central banks bid for one month bills until one month bill yields go back down below the o/n RRP rate.

Third, regular readers of Global Money Notes know that J.P. Morgan is by far the most reserves-rich bank in the system, and with its reserves portfolio, it serves as the lender of next-to-last resort in global dollar funding markets (see [here](#)). Their \$350 billion in reserves at the Fed are not behaviorally excess – they are the bedrock of J.P. Morgan's HQLA portfolio (see [here](#)). Pushing J.P. Morgan into giving up reserves for bills will take a lot of cuts in IOR, as the main reason they have so many reserves is to be able to harvest the option value of cash in a post-Basel III world order – to be able to step in and lend into dislocations in funding markets as they arise intra-quarter and on quarter-ends.

⁵ For example, if J.P. Morgan holds reserves intra-quarter so that they can earn an extra 20 bps over IOR by lending in the o/n GC repo market or an extra 100 bps over IOR by lending in the FX swap market on quarter-ends, then, all else equal, bill yields would have to get relatively that high to IOR to make bills attractive to this specific institution

Chances are that if J.P. Morgan gives up reserves for bills, whichever bank gets those reserves won't be as plugged into o/n GCF or FX swap markets as J.P. Morgan and so quarter-end dislocations may worsen if the distribution of reserves is flatter across banks.

Furthermore, J.P. Morgan's reserves-heavy HQLA portfolio is paired with a very large credit portfolio. Indeed, its credit portfolio is [one of the largest](#) in the U.S. banking system. Figure 21 shows the bank's credit barbell, and Figure 22 shows its size over time.

Again, if J.P. Morgan's ends up holding more Treasury bills or, more likely, notes, that will come at the expense of the size of its credit portfolio – if you swap zero duration assets for assets with some duration risk, you are running more risk and if you bump up against your risk limits, you cut your [discretionary](#) credit book and not your [mandatory](#) HQLA book.

Thus, the flipside of forcing banks to swap reserves for bills are worse quarter-ends and wider credit spreads. Far from being an innocent tweak, cuts to IOR can pressure markets.

In the end, the Fed is the master of its fate and the captain of its balance sheet...

...it'll just have to live with the consequences of its actions. And it seems to us that there are more effective and less disruptive ways of dealing with the glut of bills than cutting IOR.

Cutting IOR is too radical a step to deal with the issues that currently beset o/n markets, in our view. At the current juncture, gradualism would be more effective than radicalism.

Cutting IOR has also opened up a can of worms about the evolution of the Fed's operating regime – the whole floor versus corridor debate. Cutting the rate the Fed pays on the foreign RRP facility does not eliminate the need for that conversation, but it buys more time to think deep about it. And thinking needs to be very deep about it indeed for it will be the single most important decision the next Head of Markets will have to take.

According to one view that's gaining traction with market participants, cutting IOR was just a first step in ultimately converging the IOR and o/n RRP rates and returning to the old corridor system. But if we are going to go "back to the future", the market should be cognizant of the fact that in the past, the Fed did both reverse repos and repos to implement the corridor system. Thus, the idea that we will return to a corridor system implies the re-activation of the Fed's o/n [repo](#) facility. The discount window won't cut it as the facility to police the top-end of the corridor, for at 50 bps above the upper-end of the Fed's target range for the o/n FF rate, it is priced too wide to effectively control the range within which o/n rates are supposed to trade, not to mention the stigma of using it.

Thus, if the Fed will indeed converge the IOR rate with the o/n RRP rate and restore the corridor system, it will have to dust off and re-activate the o/n repo (RP) facility – as a [fixed price, full allotment](#) facility, just as it currently administers the o/n RRP facility.

In conversations with clients, we've been arguing that the Fed's [small value exercises](#) with o/n RPs serve the purpose of re-building muscle memory when it comes to using o/n RPs and to ensure that all systems are go if and when the Fed has to step in to cap o/n rates as the cumulative impact of taper and the surge in *coupon issuance* start to pressure rates.

Figure 23 shows what a reinstated corridor system could look like.

But there is a flipside to the corridor view, which is that instead of ending the floor system, the Fed should keep it and build on it – it could activate the o/n RP facility and keep the RRP facility. If the o/n RRP facility is a basement to the floor (IOR), the o/n RP facility is an attic – and basements and attics are both integral parts of a house (see Figure 24).

Basements and attics have well defined uses. Basements are cold and damp and are good for storing pickles and wine. Attics are hot and dusty and are good for storing books and hand-me-downs. Similarly, both o/n repos and reverse repos have well defined uses...

Conclusions – The End of Taper

O/n RRP are useful when collateral is scarce and reserves need to be mopped up. The facility was useful when repo volumes were constrained while large, global banks transitioned to a world under Basel III. But these constraints have since lifted (see [here](#)) and the recent surge in *bill supply* eliminated the need for the facility – for the time being.

But times can change. Crises can revive demand for RRP instantaneously and in size and in President Dudley's sage [words](#) "broad-based, open-ended lender-of-last-resort facilities are more difficult to accommodate in a corridor system because of the need to drain any reserve additions to keep the federal funds rate close to the FOMC's target". President Dudley saw this as an important shortcoming of the pre-crisis corridor regime that "does not get sufficient attention". Those in charge of designing the Fed's future operating regime should take President Dudley's parting remarks to heart, in our view. Converging the IOR rate with the o/n RRP now, only to insert a spread between them at some future point – and there surely will be crises in the future – is kind of pointless.

O/n RP are useful when collateral is in excess supply and reserves need to be added. The facility will be useful at some point as balance sheet taper and *coupon issuance* gradually pull o/n interest outside the band. While balance sheet for repo feels abundant at the moment, leverage (eSLR) and risk-based capital (RWA) constraints still remain. These constraints, coupled with growing collateral supply from taper and *coupon issuance* will soon force the Fed to make one of two choices – activate o/n RP or stop taper...

When?

Probably before the end of this year. As we've been arguing, reserves aren't excess – see [What Excess Reserves?](#) – and there isn't a lot of room to shrink the balance sheet. With half the o/n rates complex already printing outside the Fed's target range, this view is starting to prove spot on. Yes, it is true that the current pressure on o/n rates is due to *bill supply* and not taper, but the flipside of bills is \$400 billion in the Treasury's TGA account which is basically \$400 billion in reserves that've been [sterilized](#).

The fact that the usage of the o/n RRP facility is zero at the moment further underscores our point that reserves are not excess. Conceptually, o/n RRP take-up has always been the unbiased barometer of how much excess reserves there are in the system: o/n RRP are the least liquid o/n instrument and lenders use it only if they have uninvested cash – uninvested in the sense that there was no private bid for it during the business day. No foreign bank to arb o/n FF versus IOR, o/n GCF repo or t/n FX forwards, no dealer to arb o/n TRP versus o/n GCF or GC repo and not the Treasury to boost TGA balances.

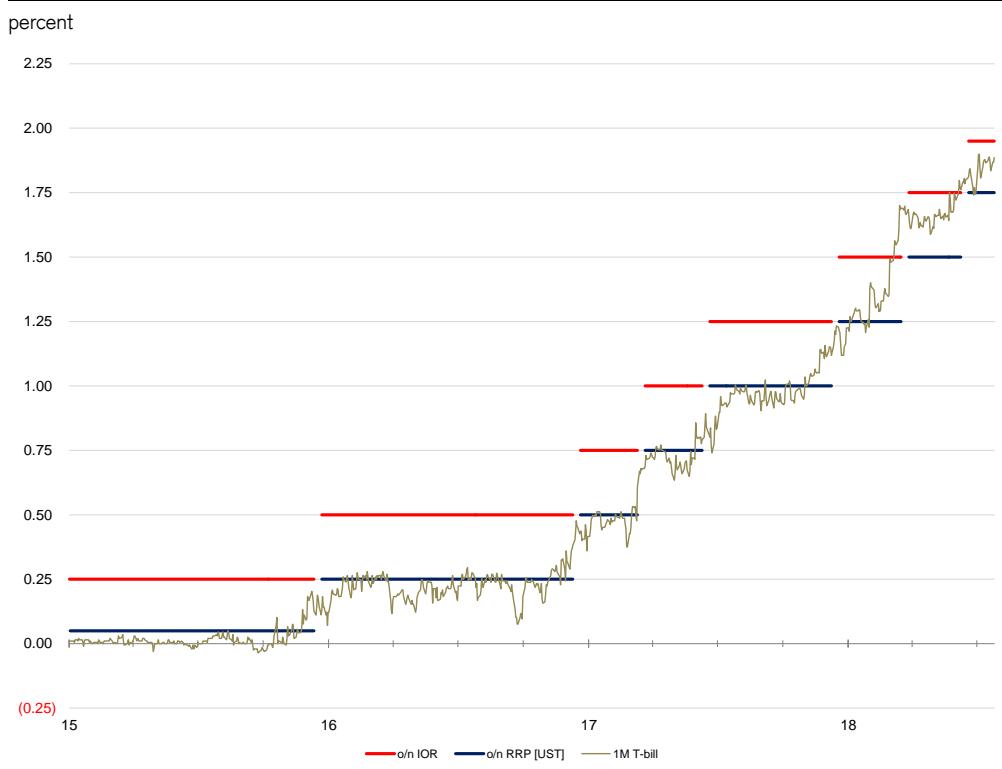
That's not the case any longer.

The fact that the usage of the o/n RRP facility is zero tells us that every penny of reserves is bid and that balance sheet taper from here will cut right into the system's liquidity bone.

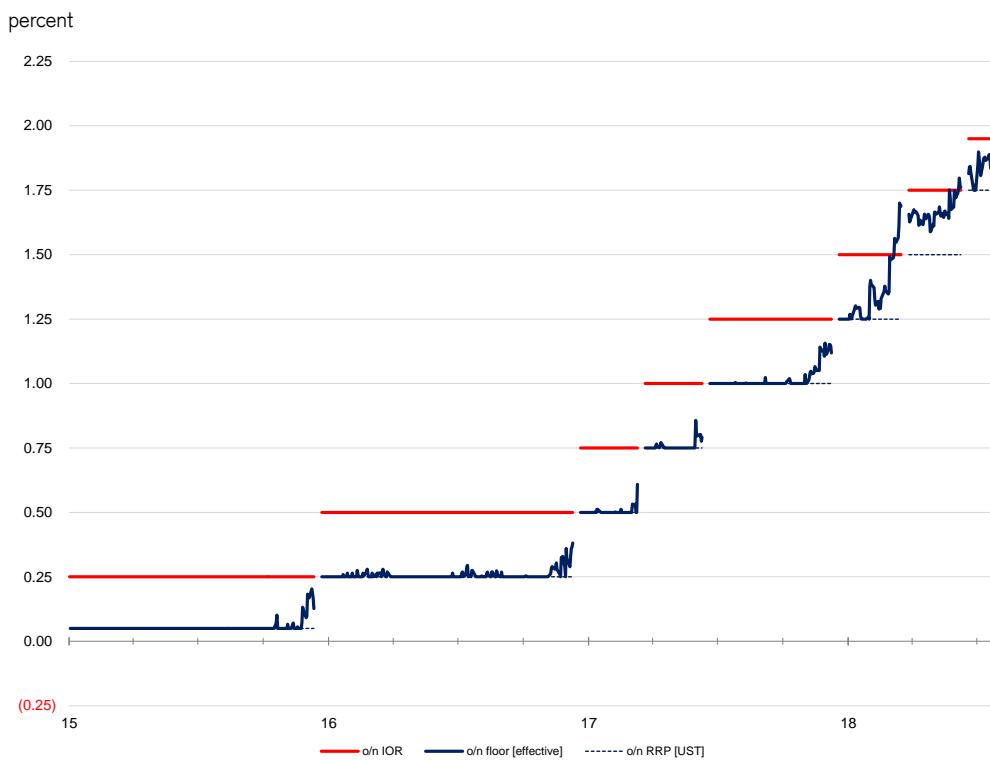
One thing is for sure.

Anyone can buy a bill, but only banks can police how high o/n GCF repo trades – and as we've seen, where o/n GCF repo trades impacts where the o/n FF target rate trades. By cutting IOR, the Fed is forcing banks to use ammo to mop up *bill supply* when that ammo would be much better used to police how high o/n GCF repo trades as taper and *coupon issuance* accelerate. Cutting IOR only brings forward the launch date of o/n RP!

And as one astute market participant put it, "the political, educational and operational cost of introducing a new facility is such that the Fed won't launch until all alternatives have been exhausted and benefits are clear." And, in our view, if reserves are hard to add, they'll have to be preserved by ending taper sooner than many market participants expect...

Figure 1: From a Leaky Floor...

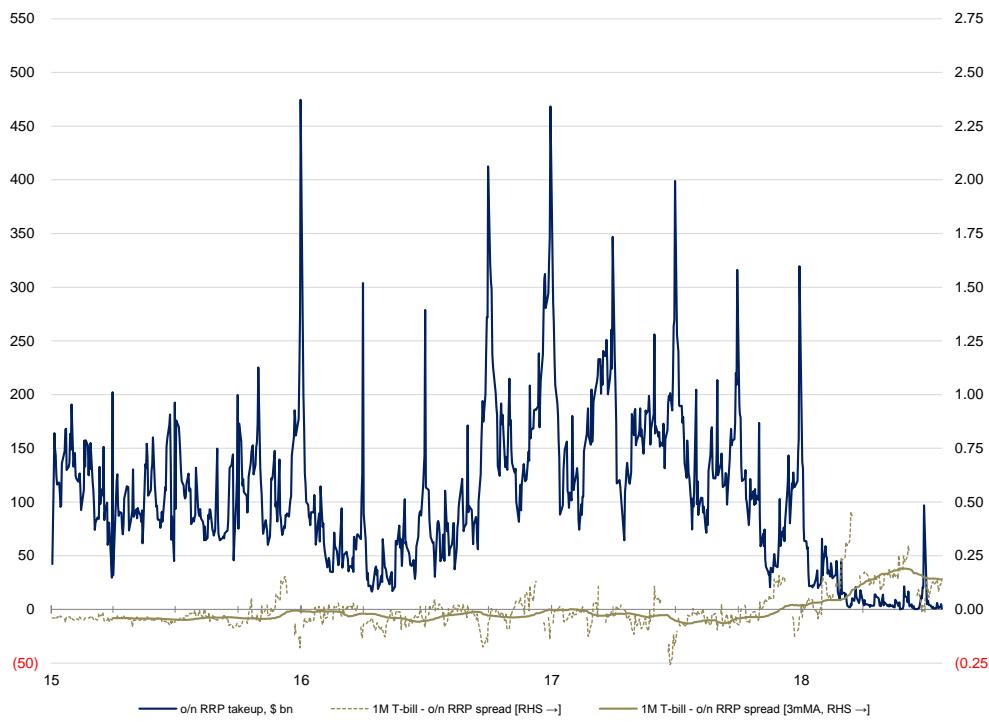
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 2: ...to an Escalator

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 3: The o/n RRP Facility Does Not Currently Function as the Effective Floor

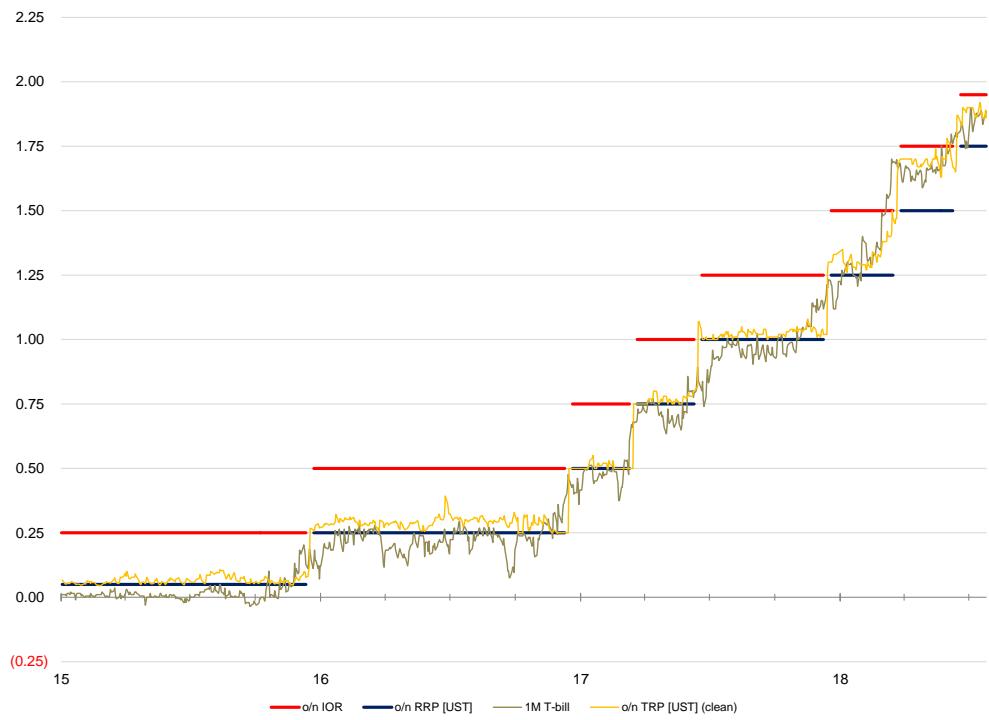
percent (RHS), \$ billions (LHS)



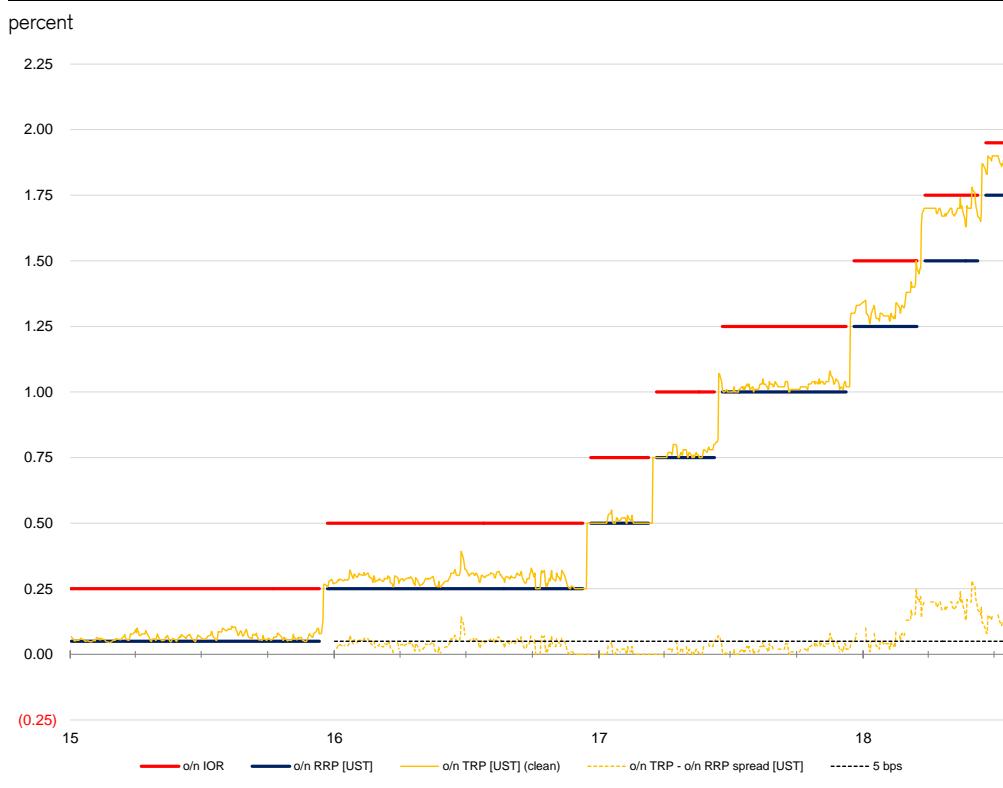
Source: the BLOOMBERG PROFESSIONAL™ service, Federal Reserve, Credit Suisse

Figure 4: Government Money Funds' Liquidity Options

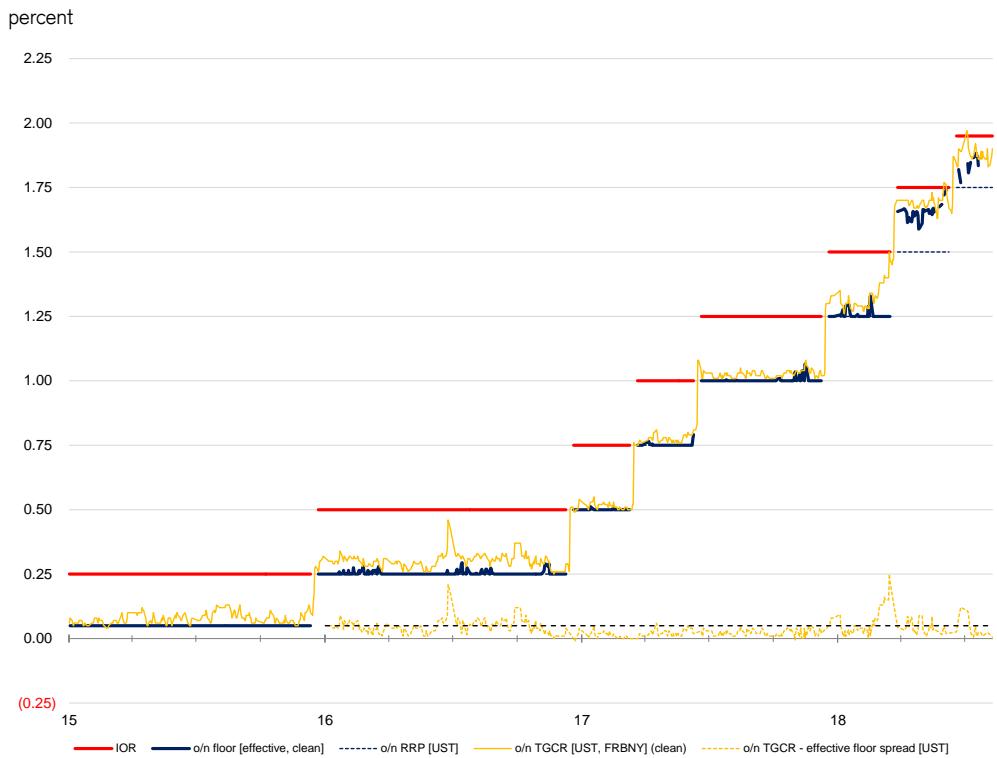
percent



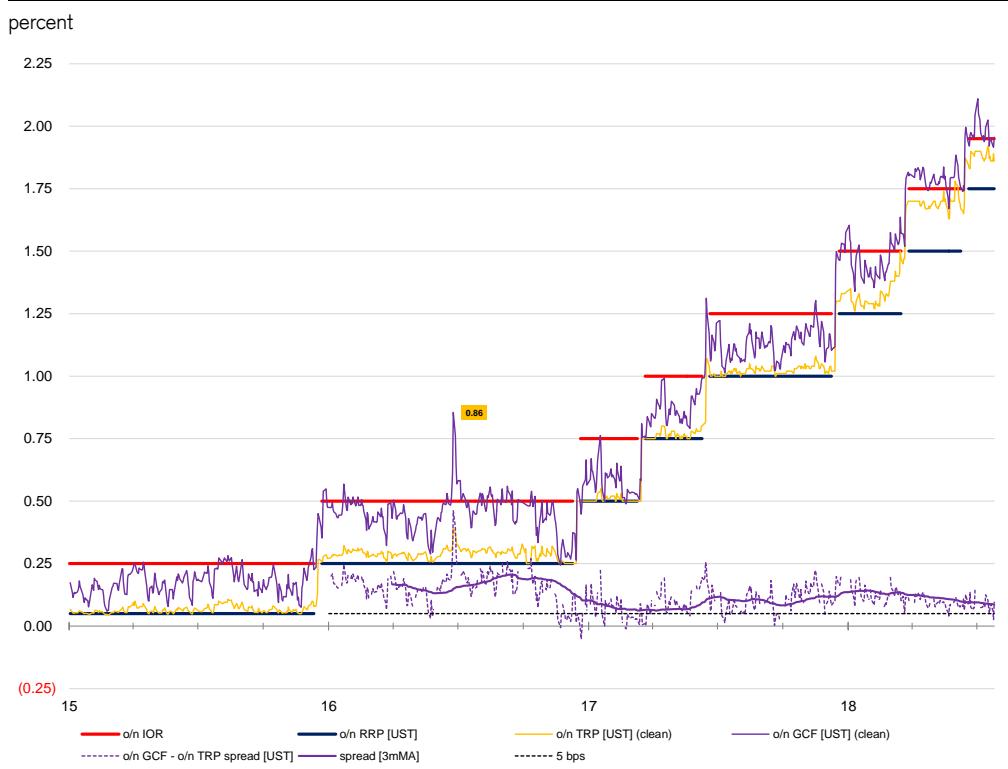
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 5: Wide Spreads Relative to the Administered Floor

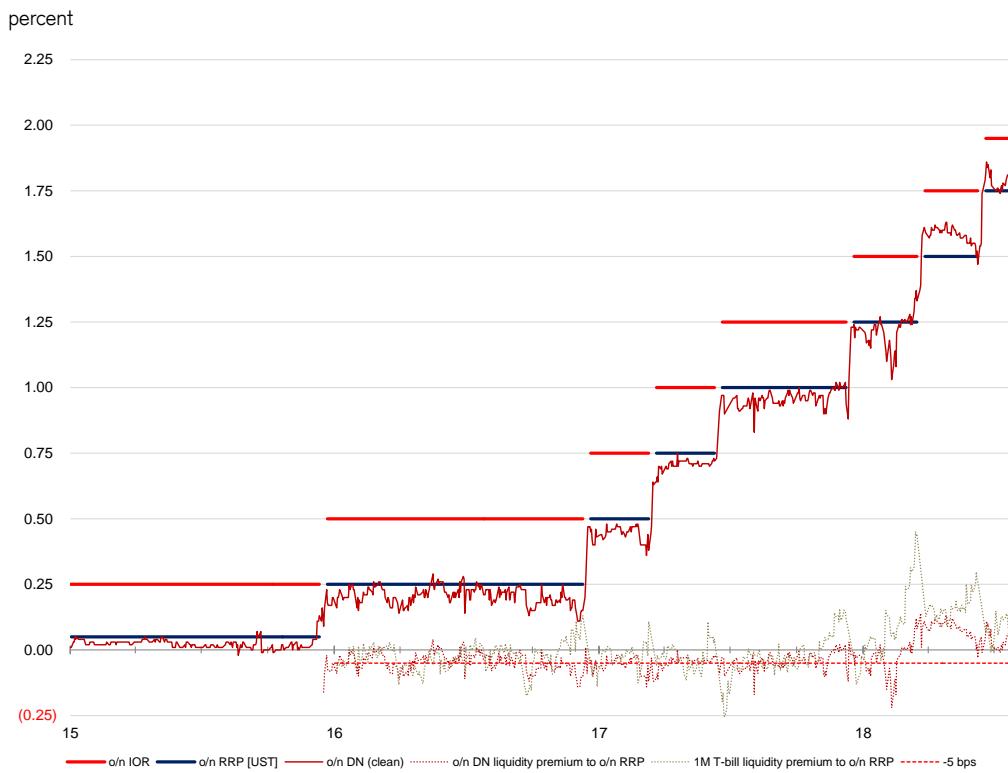
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 6: Normal Spreads Relative to the Effective Floor

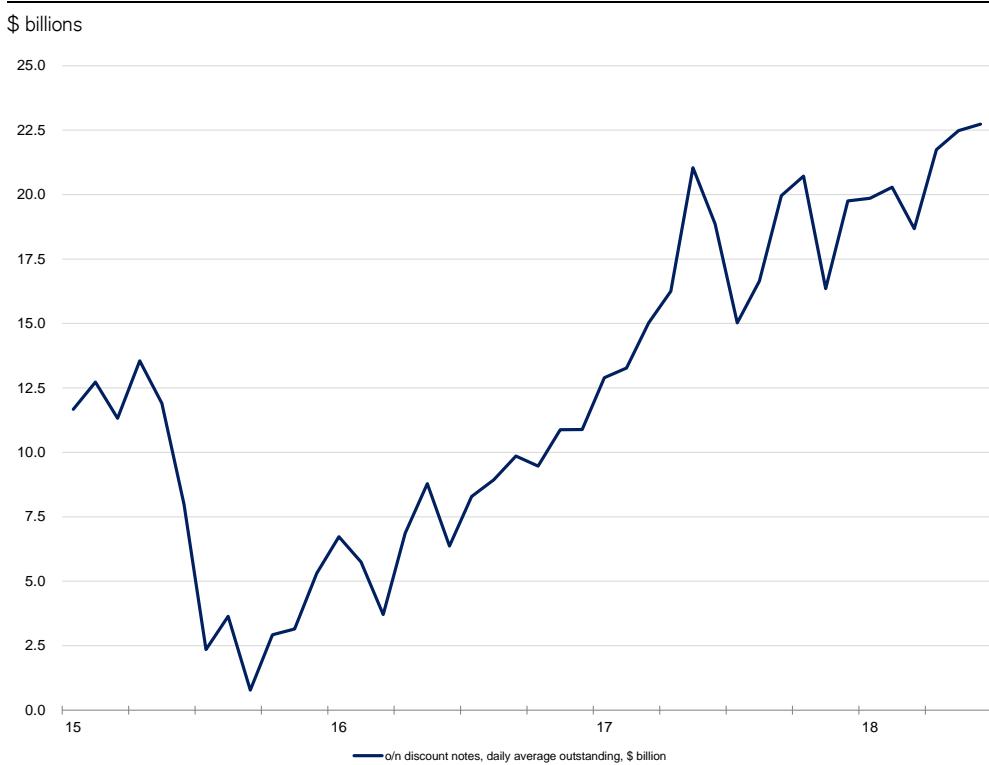
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 7: All Quiet on the Interdealer Front

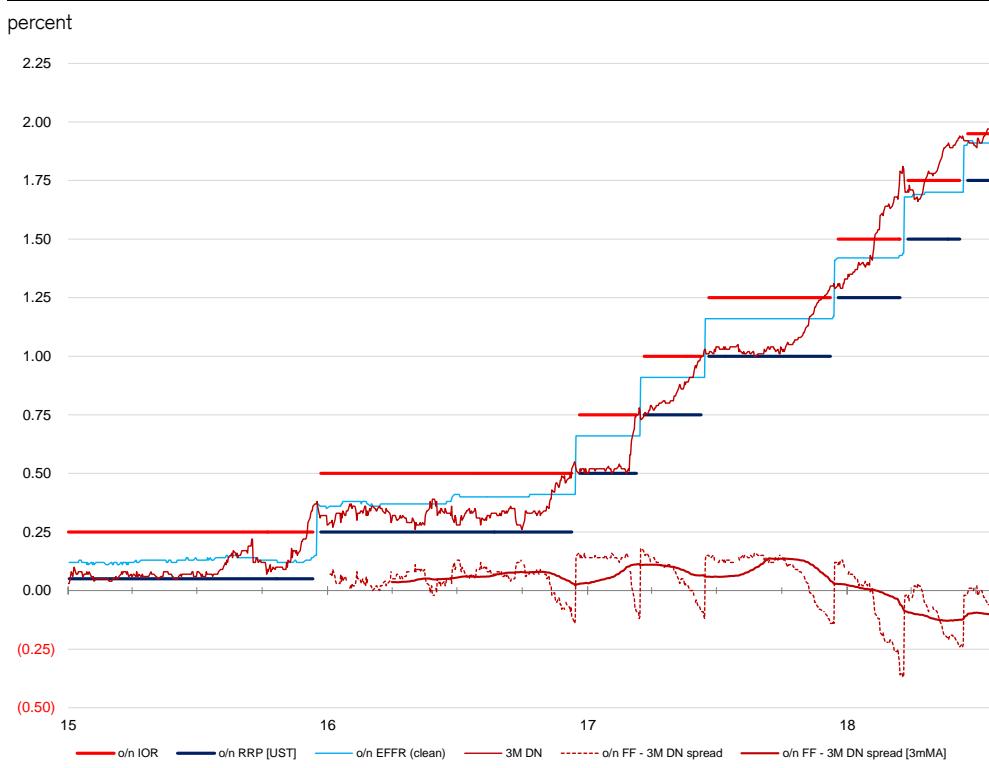
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 8: From a Liquidity Premium to a Collateral Glut

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 9: The Limited Supply of o/n Discount Notes

Source: Office of Finance, Credit Suisse

Figure 10: FHLBs' Liquidity Portfolios Are Hurting

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

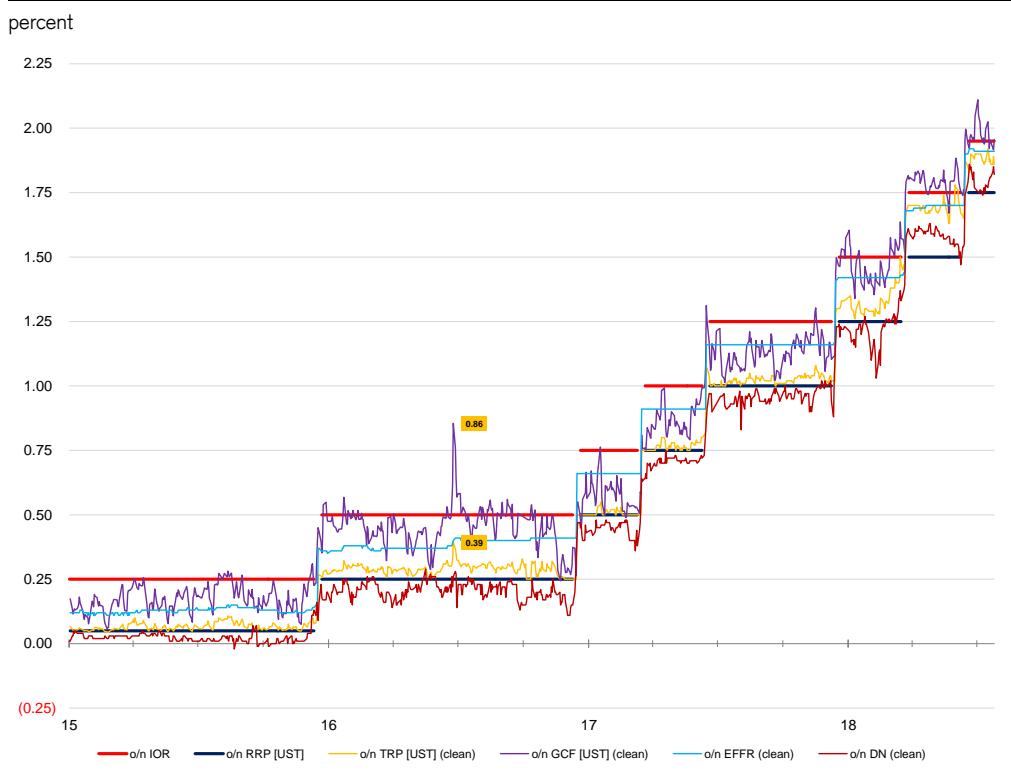
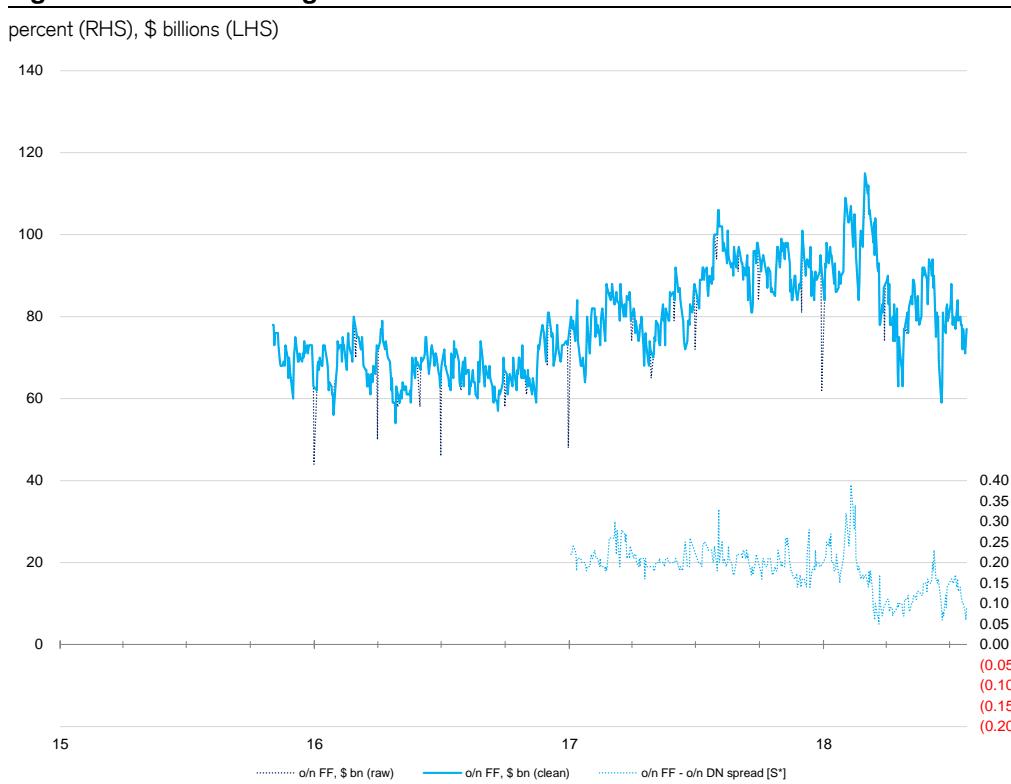
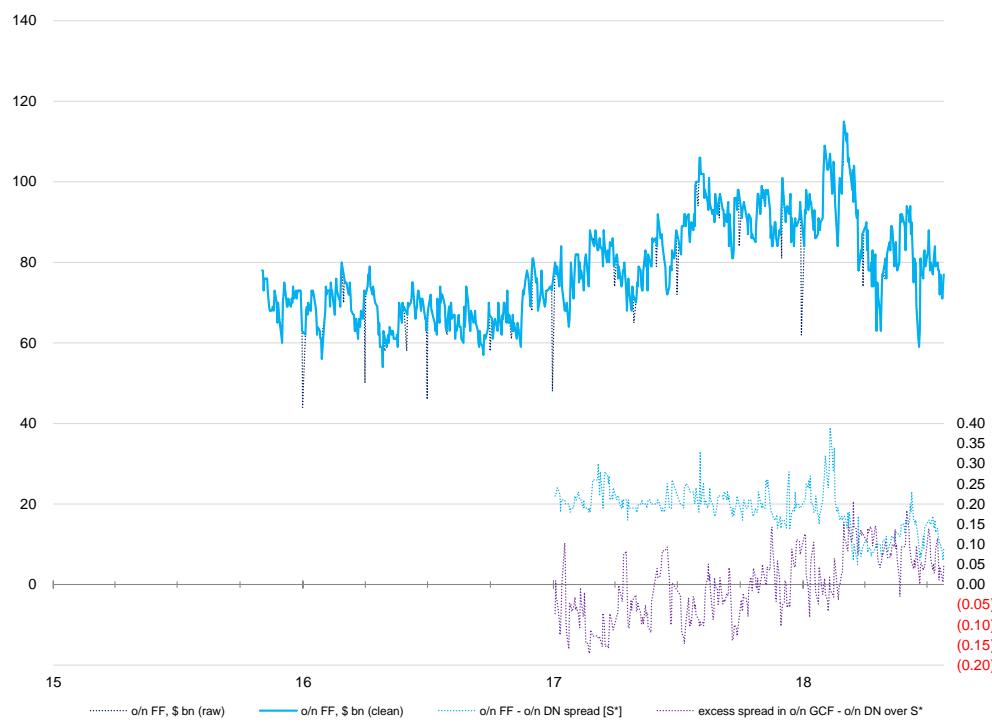
Figure 11: FHLBs' Overnight Arbitrage Options**Figure 12: FHLB Arbitrage Drives o/n FF Volumes**

Figure 13: o/n GC Repo Rates Pull Volume Away from o/n Fed Funds

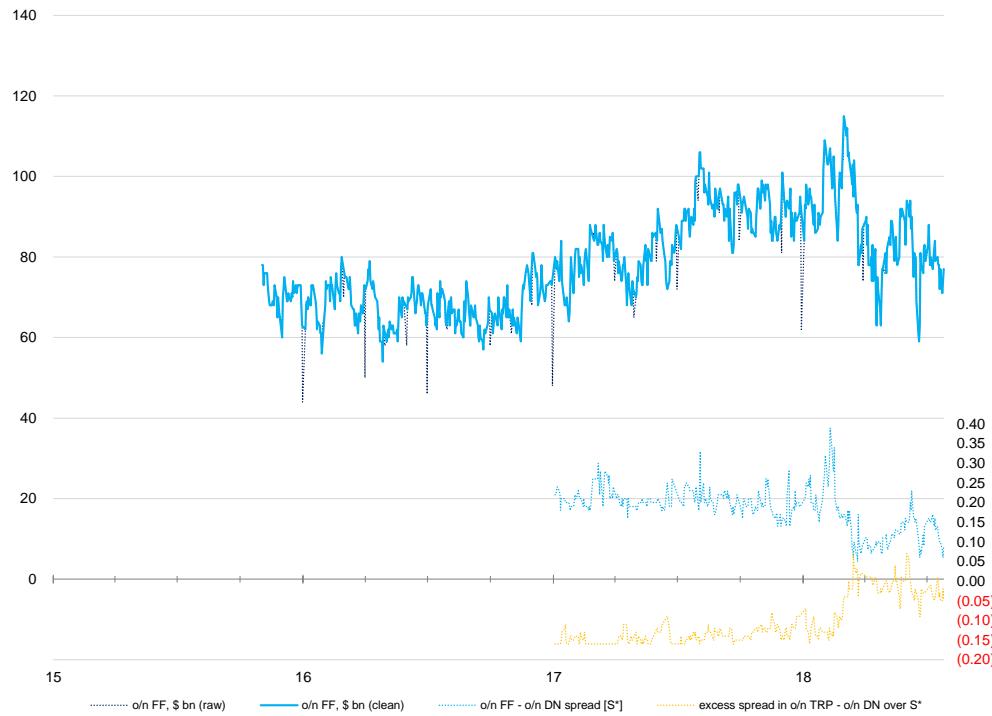
percent (RHS), \$ billions (LHS)



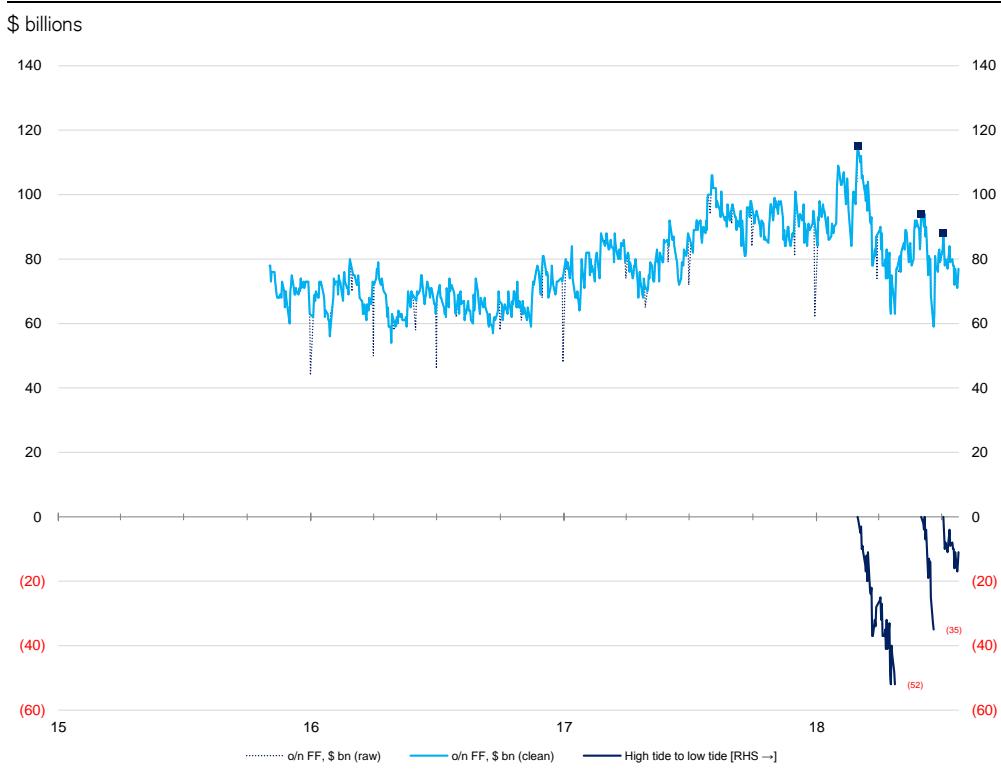
Source: the BLOOMBERG PROFESSIONAL™ service, Federal Reserve, Credit Suisse

Figure 14: o/n TRP Repo Rates Pull Volume Away from o/n Fed Funds

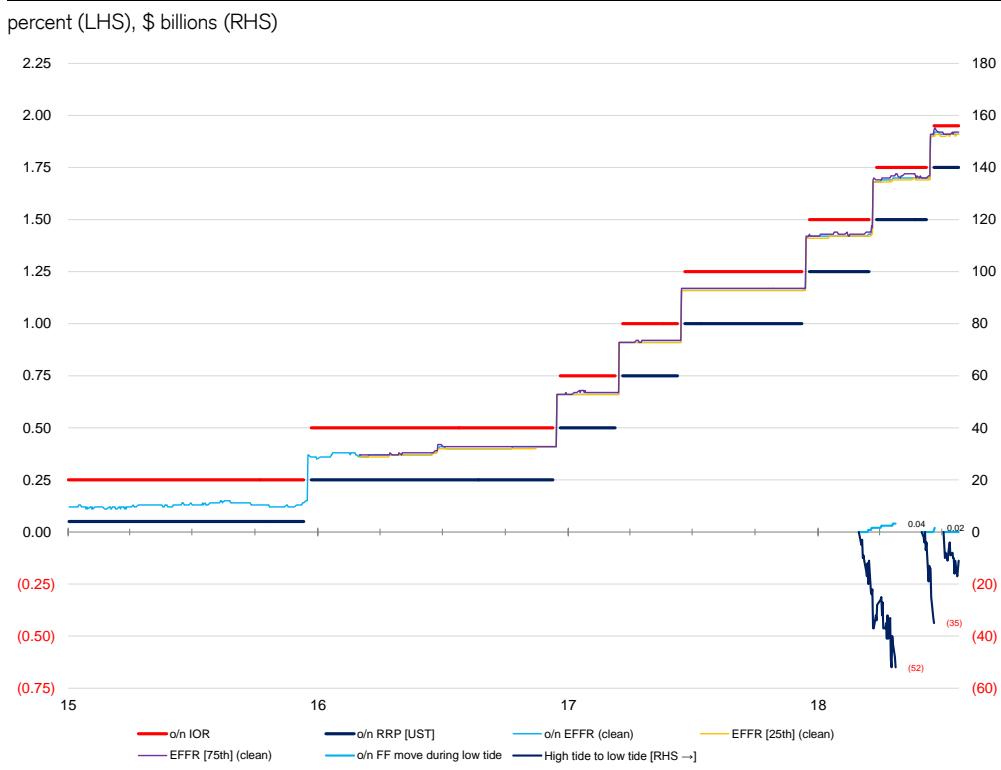
percent (RHS), \$ billions (LHS)



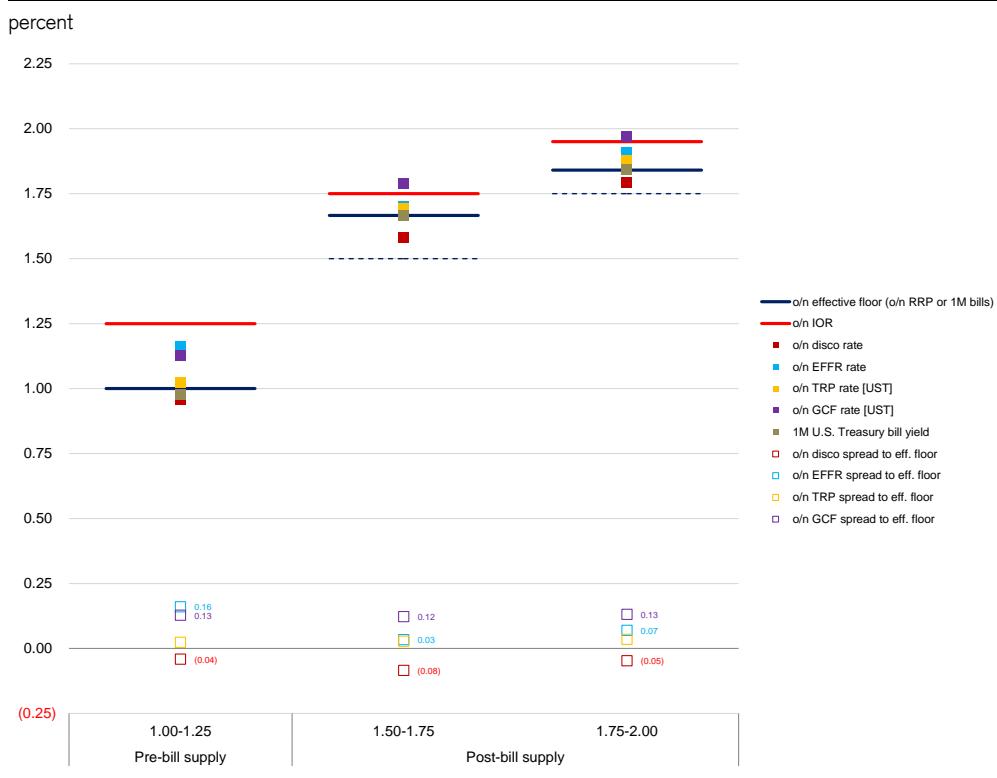
Source: the BLOOMBERG PROFESSIONAL™ service, Federal Reserve, Credit Suisse

Figure 15: Low Tides...

Source: the BLOOMBERG PROFESSIONAL™ service, Federal Reserve, Credit Suisse

Figure 16: ...High Prints

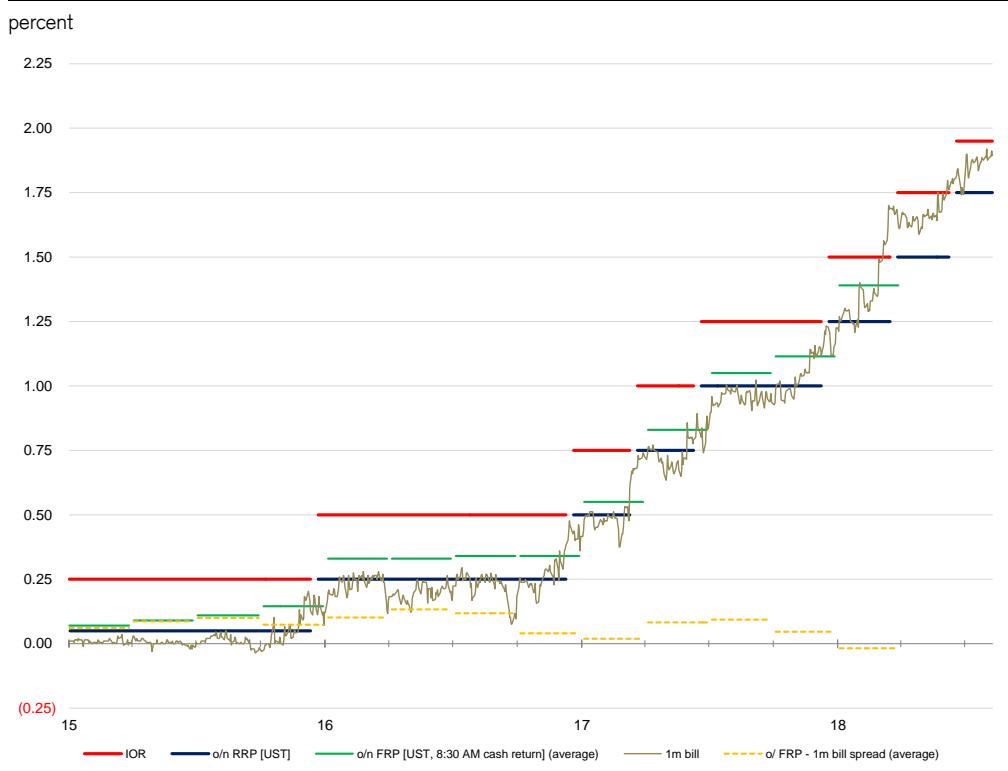
Source: the BLOOMBERG PROFESSIONAL™ service, Federal Reserve, Credit Suisse

Figure 17: Constellation Range-Bound

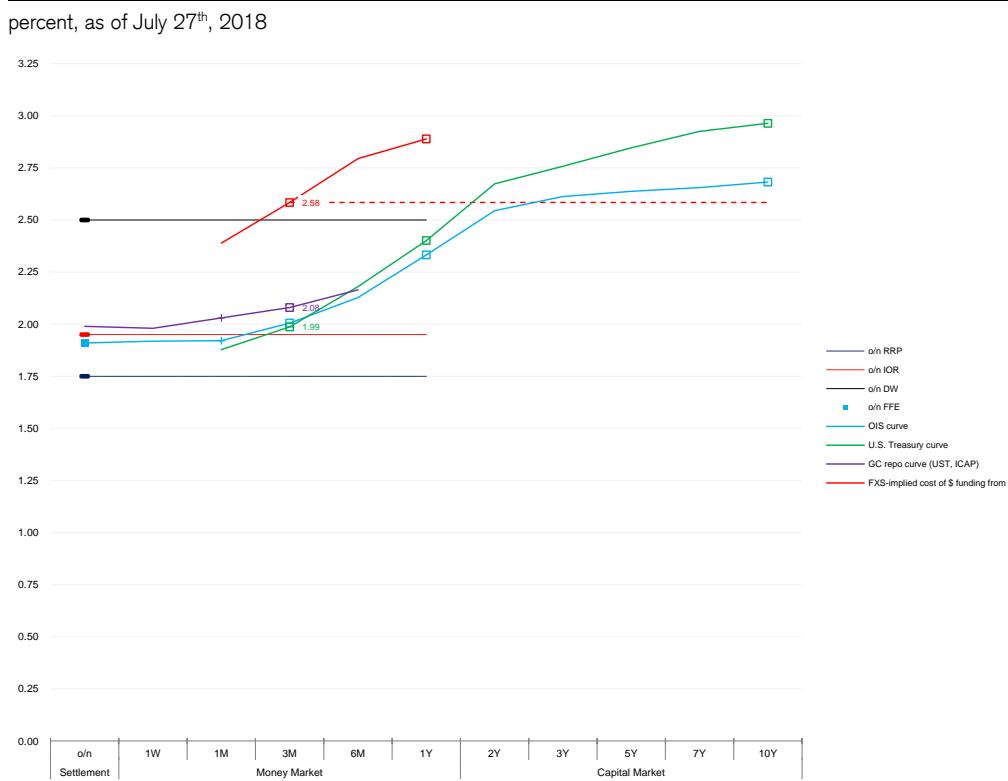
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 18: The Foreign RRP Facility

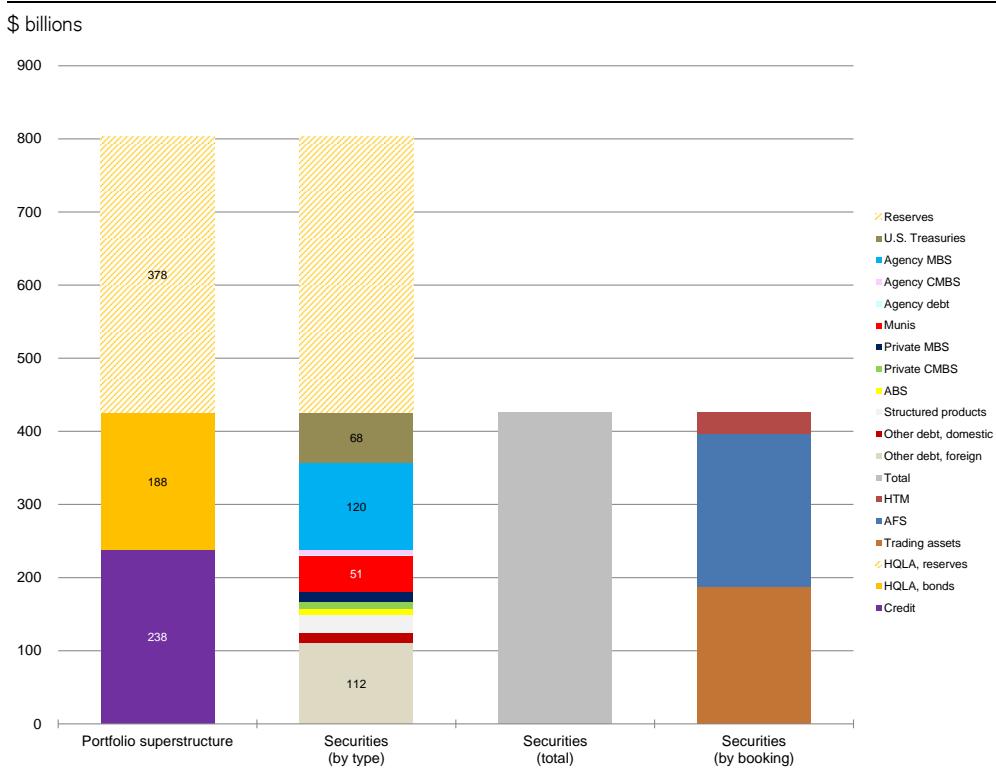
Source: Federal Reserve, Credit Suisse

Figure 19: The Foreign RRP Rate Is Adding to the Government's Funding Cost

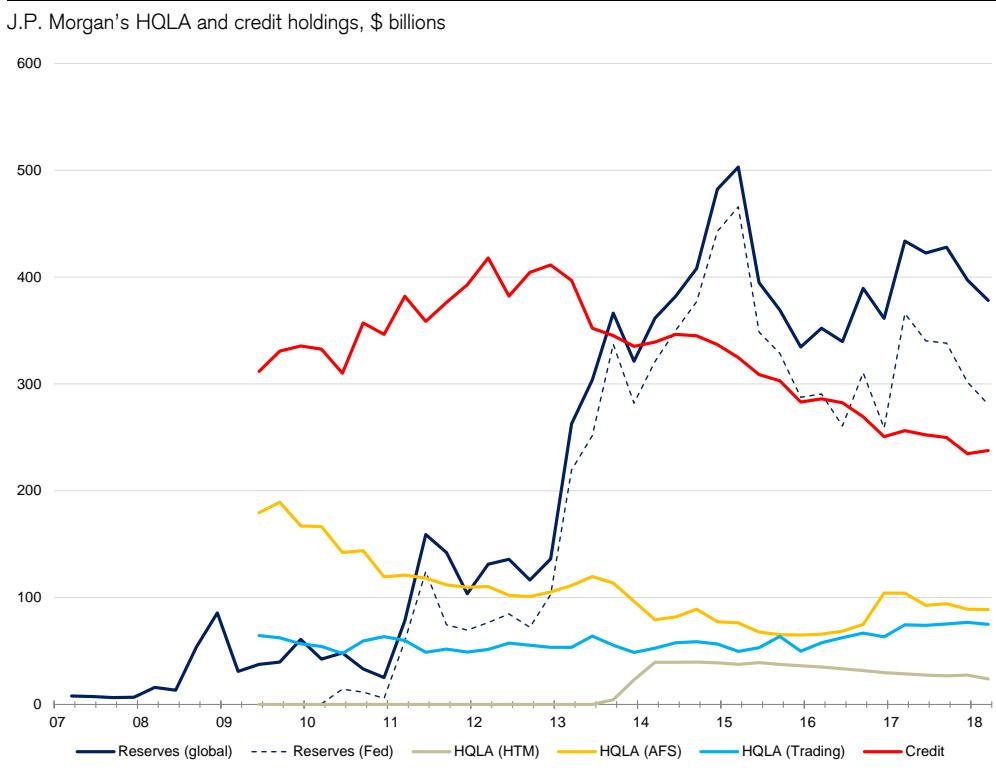
Source: the BLOOMBERG PROFESSIONAL™ service, Federal Reserve, Credit Suisse

Figure 20: The Bills-OIS Spread is Just a Point on a Broad HQLA Canvas

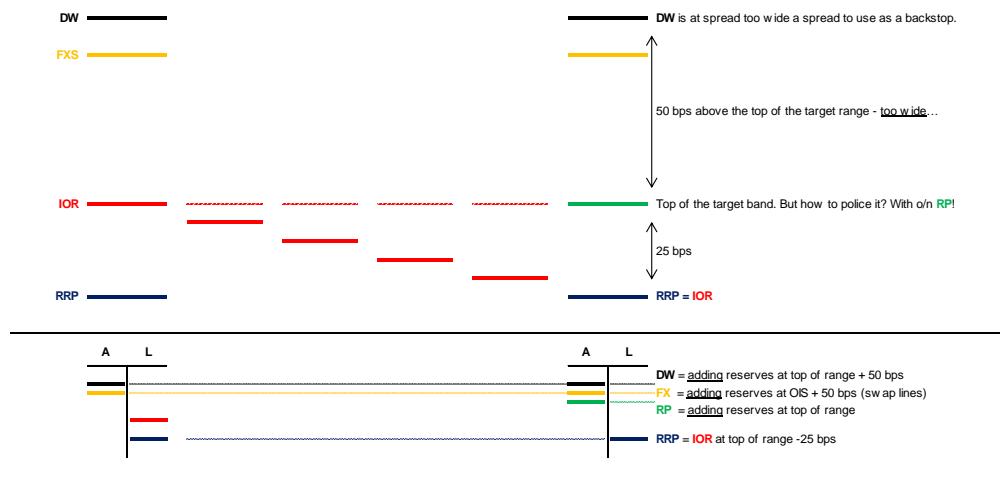
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 21: J.P. Morgan's Credit Barbell

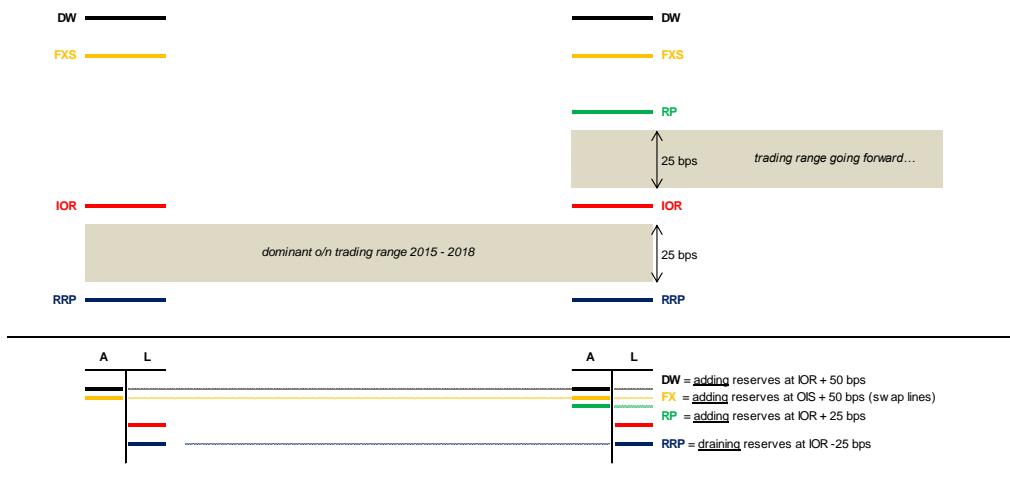
Source: Call reports, Credit Suisse

Figure 22: More Risk Means Less Credit

Source: Call reports, Credit Suisse

Figure 23: The New Corridor System

Source: Credit Suisse

Figure 24: The Enhanced Floor System

Source: Credit Suisse

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13 September 2018
Investment Solutions & Products
Global



Credit Suisse Economics

Global Money Notes #16

Taper and the “Mix-Capacity-Target” Trinity

As we've discussed in our [previous issue](#), collateral supply will soon test the Fed's current operating framework. Changes will soon be necessary to the framework to ensure that o/n rates continue to print within the target band. Were o/n rates to drift outside the band and stay there for a period, the OIS curve would become volatile and steepen, jamming monetary transmission.

This is a risk the Fed will strongly prefer to avoid, in our view.

Taper is a source of collateral supply. Three factors determine the room to taper: the Fed's preferred mix between reserves and bonds in bank's HQLA portfolios; the financial system's capacity for repo intermediation, given the mix above; and where o/n rates will trade relative to the target, given the capacity above.

What will the Fed's preferred mix be? Reserves? Bonds? *Laissez-faire*?

Governor Quarles has yet to put his “brand” on global banks' liquidity portfolios, but even without any additional guidance from the Fed, o/n markets are telling us that reserves are now scarce and that collateral is becoming excess...

Reserves did not become scarce because of \$200 billion of taper to date, but because of the pace of effective taper to date, which is now over \$500 billion. The pace of effective taper is determined by taper plus sterilization, which are large-scale, liability swaps that add to collateral supply indirectly, over and above the amount that enters the system through taper and Treasury issuance directly.

Some o/n rates are already printing outside the Fed's target band.

The Fed has a waterfall of options to ensure that o/n rates remain within target: reverse twist; cut the rate on the foreign RRP facility; lower the IOR rate down to the o/n RRP rate; end taper; launch a fixed-price, full-allotment o/n RP facility. In our view, under the current version of Basel III, launching an o/n RP facility is inevitable – the ultimate solution to what is a problem of excess collateral.

Balance sheets are quantities. Quantities determine prices.

If collateral supply exceeds the system's capacity to create private “repo” money, prices have to adjust to attract more capital for balance sheet. Whether those prices – o/n interest rates – will be consistent with the Fed's target for the funds rate is the trillion dollar question. We think they won't be – we'll need the Fed's balance sheet for that. It's either that or control over o/n interest rates.

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The Fed has consistently stressed two points about balance sheet taper:

- (1) They don't really know what is the end-point of taper.
- (2) They'll look for market signs to know when to stop taper.

Signs from what market? Overnight markets...

Operationally, central banks have two main jobs: to backstop the financial system in a crisis, and to ensure that overnight (o/n) interest rates print within the target band. Lose your ability to control o/n interest rates, and you lose control over monetary conditions. Lose control over monetary conditions, and the OIS curve becomes volatile and steeper.

In a post-Basel III financial order, there are enough problems with monetary transmission. Large and recurring increases in Libor-OIS and Libor-Libor cross-currency bases are jamming the Fed's monetary signals considerably. Consider, for example, the fact that those in need of U.S. dollar funding in London, Frankfurt, Zurich or Tokyo are at times paying three extra rate hikes' worth of premia when they borrow in the FX swap market.

Dollar "singularity" – parity between the price of term dollars onshore and offshore – is already gone (see [here](#)). Volatility around OIS is the last thing we need to add to that. If volatility in Libor-OIS and cross-currency bases is here to stay – and we think that it is – ensuring that to o/n rates stay within the band should take on heightened importance.

We need to understand how the evolution of the Fed's balance sheet taper impacts o/n rates because the Fed never had a hiking cycle like the one we are trading today.

The Fed is engaged in a game of monetary juggling – doing three things at the same time:

- (1) It's hiking, i.e. it is raising the floor under o/n rates.
- (2) It's sterilizing reserves via large-scale liability swaps (see [here](#)).¹
- (3) It's retiring reserves via tapering the balance sheet.

Hikes are flattening the OIS curve. Sterilization widens money market spreads to OIS. Taper widens spreads to OIS too, and it also pressures the Treasury term premium higher.

To make things even more complicated, the U.S. Treasury is also muddying the picture. The regime of safe asset shortages is over. We are now in a safe asset glut regime, where the excess supply of bills keeps the effective floor under o/n interest rates higher than the floor targeted by the Fed with the rate administered through the o/n RRP facility.

How to think about o/n markets and taper? We've organized our analysis into four parts.

Part one reminds that the Fed's preference for reserves over bonds in global banks' HQLA portfolios remains unknown and is a wildcard in the market's big taper debate. It also explains why reserves are special in a regime where balance sheet for repo isn't limitless and why o/n rates will drift outside the target band as collateral supply increases.

Part two discusses taper to date. Having established in part one that reserves are special, part two explains that it's not just taper that matters for o/n rates but any balance sheet operation that swaps reserves for collateral and such operations also include sterilization. The effective pace of taper – collateral injection by the Fed to date – is over \$500 billion.

Part three lists the options the Fed can choose from to defend the top of its target band as increased collateral supply pressures o/n rates higher. Finally, part four concludes.

¹ Large-scale asset swaps (LSLS) refer to the swapping of reserves for other liabilities on the Fed's balance sheet. We have referred to large-scale asset swaps as "sterilization" before (see [here](#)). Large-scale asset swaps are one way to neutralize reserves that have been injected to the system through large-scale asset purchases (LSAP).

Part I – Taper and First Principles

There are three factors that determine the room to taper:

- (1) What should be the mix between reserves versus bonds in HQLA portfolios?
- (2) What is the system's capacity for repo intermediation, given the mix above.
- (3) Where do o/n rates print relative to the Fed's target, given the capacity above.

The mix question ultimately comes down to this: whether banks' dominant liquid asset is reserves or bonds determines how banks fund their outflows. If they have reserves, they just run down their balances at the Fed. One bank's reserves decline, another's go up. Money markets don't feel a thing for these flows all settle on the Fed's balance sheet.

If banks have bonds – Treasuries – the picture is completely different. Banks can't use bonds to settle. They have to turn bonds into reserves to settle. There are two ways, and only two ways to do that – sell bonds or repo them. Both drain liquidity from other banks and drains show up in o/n markets. The greater the drain, the greater the stress and the greater the stress, the greater the pressure on the Fed to step in and lend in o/n markets.

Thus, the reserves-to-bonds mix in HQLA portfolios is a matter of fundamental import. It determines how long before banks call the Fed for liquidity during an episode of stress, and, as we will discuss in more detail below, it also determines how much flexibility banks have in their HQLA portfolios to keep o/n repo rates within the Fed's target band.

The Fed's preference for the mix is a wildcard. If the Fed prefers reserves, taper ends soon. If bonds, taper has more room to go, subject to collateral supply and dealer's repo capacity.

The capacity question comes down to how much balance sheet the financial system has for repo intermediation. Consider that for the past decade – since the financial crisis – banks have been net lenders in the repo market. They haven't been borrowing at all in the repo market because they were flush with reserves and didn't need the extra liquidity.

But if you un-do QE, and take reserves away from banks and give them bonds instead – and, in essence, that's what taper is – you're making bank portfolios less liquid and you're forcing banks to go into the repo market to raise reserves to settle on the margin.

Banks going from repo lenders to repo borrowers, will have a major market impact...

Over the past five years, all the concerns about the lack of repo balance sheet have been coming from hedge funds and asset managers. If banks become net borrowers in the repo market, we will feel that. It took four years to add \$200 billion in tri-party repo capacity, and that was with a significant \$800 billion help from prime money fund reform.

Adding the next \$200 billion won't be that easy. But even if it will be, \$200 billion won't be enough – the quarterly pace of taper is almost as much, not to mention coupon issuance. If the repo market chokes on the reserves-for-bonds swap that the Fed's taper represents, o/n GC repo and tri-party repo rates will drift outside the Fed's target band, in our view.

And that brings us to the target question: would it be acceptable to the Fed if repo rates – including the secured o/n funding rate (SOFR) – printed outside the target band?

Probably not.

While it's true that the Fed doesn't target repo rates – SOFR is a reference rate, not a target rate – repo rates do influence where the fed funds rate, the official target, trades. And if repo rates are headed outside the band, the o/n fed funds rate is headed outside the band too, and the Fed will have to adjust its operating framework to prevent that.

Mix-capacity-target – the “trinity” that ultimately determines the Fed's room to taper...

Part II – Taper and Shadow Taper

Now that we've established why reserves are special and how increased collateral supply in a regime where balance sheet for repo is no longer limitless can come into conflict with the Fed's target range for the fed funds rate and the o/n rates complex more broadly, we next turn to another fundamental question: how much have we tapered to date?

\$200 billion? You're wrong. The effective pace of taper is running at over \$500 billion.

There is a big difference between \$200 billion and \$500 billion and the reason for that difference is sterilization. Sterilization is a fundamental concept that we first discussed in [Sterilization and the Fracking of Reserves](#). It refers to large-scale liability swaps, whereby the Fed lets institutional client flows drive the swapping of reserves into other liabilities like the Treasury General Account (TGA) or the o/n RRP facility with foreign central banks.

Everyone knows that at the system level, taper is just a swap of reserves for bonds (i.e., collateral). So is sterilization...

When the Treasury issues \$400 billion in bills to ramp up its TGA balance at the Fed, in the money market, reserves get swapped for collateral – in this case, Treasury bills.

When foreign central banks move \$250 billion from banks to the foreign RRP facility, in the money market, reserves get swapped for collateral – in this case, Treasury notes, which foreign central banks “reverse in” from the Fed and then lend on to the market.

When reserves are swapped for collateral, reserves get drained – liquidity gets sterilized. EM central banks know exactly what that means – for them, sterilization is a daily exercise. But for the Fed and for most STIR strategists, sterilization is just a sideshow, it seems.

Far from being just some pimple on the Fed's balance sheet, the TGA account and the foreign RRP facility are crucial determinants of how much room there is to taper, and it's \$300 billion less than you believe. Sterilization is far more important than taper.

What's the difference between J.P. Morgan Chase Bank, N.A. keeping \$400 billion in a reserve account at the Fed and Treasury keeping \$400 billion in the TGA at the Fed? J.P. Morgan has traders that will lend those reserves into dislocations in money markets, but Treasury does not. J.P. Morgan's reserves are active – ready to be deployed at the right price. Treasury's are passive – they've been shackled; they've been sterilized...

As reserves get sterilized, markets clear differently.

The difference in the flows generated by a central bank – like the RBA (see [here](#)) – that lends its FX reserves in the FX swap market directly, and one that keeps its FX reserves “under the mattress” in the foreign RRP facility, is this: the former's FX swap trades settle by banks shifting reserves between their accounts at the Fed and the settlement of these FX swap trades have zero impact on o/n markets; the latter's trades sterilize reserves and if the central bank then lends on to the market the Treasuries it reversed in from the Fed, the market will repo those Treasuries to get the cash to lend in the FX swap market. Unlike the first example, the second example has a measurable impact on o/n markets.

You use reserves to settle. You repo bonds to get reserves to settle. Repo rates react...

Figure 1 shows the current run-rates of taper and shadow taper. Sterilization matters!

Taper swaps reserves for collateral directly. Sterilization swaps reserves for other liabilities which adds to collateral supply indirectly. But collateral is collateral whichever way it enters the financial system. Reserves are now scarce. Collateral is becoming excess...

In the next section, we present a list of operational measures that we expect the Fed to take as reserves scarcity becomes more pressing and the top of the target band is tested.

Part III – Operation Waterfall

Overnight markets have been telling us that reserves are becoming increasingly scarce. We haven't seen in years o/n GC rates printing meaningfully above the IOR rate on days when bills and coupons settle. Spikes in the o/n GC rate were limited to quarter-ends, and the fact that settlement days can push o/n GC rates above IOR is the clearest proof of our mantra that reserves are now scarce and collateral is becoming increasingly excess.

Overnight markets will continue to tighten for the remainder of this year, and as they do, the Fed's current operating framework will be tested. The Fed has a waterfall of options:

- (1) reverse twist;
- (2) cut the foreign RRP rate, or cap the foreign RRP facility;
- (3) cut the IOR rate until it converges with the o/n RRP rate;
- (4) end balance sheet taper prematurely; and
- (5) unveil a fixed-price, full-allotment o/n RP facility.

We present the Fed's strategic options in this specific order as we believe these options go from least to most drastic and least to most complex to communicate and implement.

Each one of these options works its way through the financial system differently, and understanding what each does is essential to trade their announcement successfully.

Option one, reverse twist. Twisting is the simplest way to lower the pressure on o/n rates. A reverse twist is just an asset swap, whereby the Fed sells longer-term Treasuries from the SOMA portfolio and buys say one month bills on the open market. The curve would steepen but that's a price worth paying to enhance your ability to control overnight rates. A reverse twist is balance sheet neutral and would leave the Fed's liability mix unchanged.

Option two, cut the foreign RRP rate, or cap the facility by introducing counterparty caps. Like a reverse twist, this option is balance sheet neutral too, but unlike a reverse twist, this option works on the liability side of the Fed's balance sheet. By adjusting the terms of the facility, the Fed could incentivize foreign central banks to go back in the bill market. Bills would get massively bid and as foreign central banks settle their bill purchases, reserves would increase in the banking system – sterilization in reverse, pure and simple...

Figure 2 shows that foreign central banks keep \$250 billion in the foreign RRP facility.

Figure 3 shows that during the second quarter of 2018, it paid 2 bps more than IOR!

\$250 billion flooding back into the bill market would have a meaningful market impact: bill yields would fall, o/n rates would trade more within the target band, and the FOMC would have \$250 billion more room to taper and more time to think about the future. In our view, cutting the rate on the foreign RRP facility or capping the facility would be the most effective way to address the pressure on o/n rates. But the Fed hasn't done it (yet).

Why?

We can only speculate, but one reason could be that the Fed was very hush-hush about uncapping the facility – we have yet to see a release or speech about when it happened – and so it's probably tricky to re-cap the facility. But the Fed can still do it, and, if it does, it'll probably be very hush-hush about it again. Just as we have first learned about the growth of the usage of the foreign RRP facility from the weekly [H.4.1 release](#), we'll probably learn about changes to its terms from a massive decline in its usage through continued vigilance in tracking the H.4.1 release. Fed watching is a respectable job again.

Option three, cut the IOR rate further – the Fed's preferred method of dealing with the pressure on o/n rates. Cutting the IOR rate works through two channels.

First, cutting IOR lowers the spread reserves pay relative to bills, and so incentivizes banks to trade reserves for bills on the margin. Has this happened since the Fed has cut IOR?

No, it has not.

According to the Fed's weekly H.8 release, since the IOR cut in June, banks have bought only \$10 billion in Treasuries. Looking at it on a seasonally adjusted or unadjusted basis does not help; neither does looking at large versus small or foreign versus U.S. banks.

Second, cutting IOR increases the spread o/n GC repos pay relative to reserves, and so incentivizes banks to trade reserves for o/n GC repos, i.e. to lend more in the repo market. Have banks been lending more in the o/n GC repo market since the Fed has cut IOR?

Some, but not a lot.

According to the Fed's H.8 release, since the IOR cut in June, banks increased their lending in the GC repo market by \$35 billion. That's not nothing, like the bills they bought, but it's some. But the o/n GC market is big – \$400 billion, so \$35 billion didn't do much.

Thus, cutting IOR works either by pulling bill yields lower, or pushing o/n GC rates lower. Both are perfectly fine approaches to tackle pressures on the o/n fed funds target rate.

But 5 bps didn't do the trick. More cuts will be necessary...

As the Fed cuts IOR further, what will banks prefer, bills or GC repos? Repos. Why? Because repos yield better and return cash earlier than bills. Bills are a step-down relative to reserves and o/n GC repos are a step up relative to reserves. It's really a no-brainer...

Importantly, whether IOR cuts work through the bill market or the o/n GC repo market, what they effectively do is flatten the distribution of reserves across the banking system – when a bank buys a bill or does repos, it expends reserves and another bank gains them. In this sense, option three is different from option two: option two adds reserves through reverse-sterilization, but option three doesn't; it attempts to re-distribute existing reserves.

What is the potential scale of re-distribution that can be achieved by cutting IOR further? On that front, there is one important detail to consider.

According to FICC's GSD member directory (see [here](#)), there are only 25 banks in the financial system that have a pipe into the o/n GC repo market, and the reserve hoards of these banks determines the maximum scale of re-distribution that can be achieved.² Figure 4 shows that the combined reserve holdings of these banks is about \$900 billion.

Only a fraction of these reserves will move.

J.P. Morgan Chase Bank, N.A. is the patrician of the o/n GC universe, and as we've noted in our [previous issue](#), we have serious doubts that this bank will take part in the re-distribution experiment. Citibank, N.A., is another example – the reserves share of its HQLA portfolio is relatively low, so we wouldn't expect it to reverse in more collateral.

That leaves just under \$600 billion of reserves in the hands of banks that can lend in the o/n GC repo market – at most. How much of this \$600 billion will be lent is up to each of these banks' unique social circumstance. We doubt that more than \$100 billion will move, and in the context of bill supply, coupon issuance and taper, \$100 billion does not seem sufficient to offset the dynamics that will pressures o/n repo rates in the coming months.

² What you are looking for are names with the word "bank" or "branch" in their name with access to the GCF market.

If further IOR cuts won't do the trick, what happens next?

The Fed can go back two steps and re-consider "tsiwting" (reverse twisting) or capping the foreign RRP facility. If it doesn't, limits to the effectiveness of the IOR strategy will reveal a lot about globally active banks' demand for reserves. If banks don't want to take part in redistribution at any price, we'll know that banks' demand curve for reserves is very steep.

Steep means scarce. Scarce means expensive. Expensive means above target...

Even if the Fed goes all in and cuts the IOR rate all the way down to the o/n RRP rate – i.e., it converges the floor rate to the basement rate – the fundamental question of how the Fed intends to police the top of the target range for the o/n fed funds rate remains.

Ultimately, converging IOR with the RRP rate will necessitate the launch of a fixed-price, full-allotment o/n RP facility to police the top of the target range, but as we've argued in our previous issue, the political, educational and operational cost of introducing a new facility is such that the Fed likely won't launch until all alternatives have been exhausted.

Option four is the last alternative before the launch of a fixed-price, full-allotment o/n RP facility, which is to say that if the redistribution strategy doesn't work, the Fed will try preservation – "pickling" reserves for the "collateral winter" by prematurely ending taper...

Option five, launching a fixed-price, full allotment o/n repo (RP) facility is inevitable.

This is the facility that will be necessary to police the top of the Fed's o/n target range if the Fed chooses to converge the IOR rate with the o/n RRP rate, as discussed above.

The o/n RP facility is also the ultimate solution to the problem of excess collateral...

Unlike any of the previous options, the launch of an o/n RP facility would increase the size and also the volatility of the Fed's balance sheet and add new reserves to the system.

Option one was a simple asset swap – a reserves-neutral swap of coupons for bills – that would steepen the curve but on the flipside help the Fed re-gain control over o/n rates.

Option two was a liability swap that added reserves but didn't increase the balance sheet. It would steepen the curve but extra reserves would tighten money market spreads to OIS.

Option three was an attempt to re-distribute and learn about banks' demand for reserves. It would tighten GC repo spreads to OIS and would only impact the curve on the margin.

Option four is a state of "stop, pickle and reconsider" – a massive curve flattener.

Option five is the inevitable – less than four years after the end of taper, the Fed would be increasing its balance sheet once again through the monetization of excess collateral via a fixed-price, full allotment o/n RP facility so that o/n rates stay within the target band.

Basel III increased the safety of the system, but it reduced its balance sheet flexibility.

Balance sheets are quantities.

Quantities determine prices.

If collateral supply exceeds the system's capacity to create private money, prices have to adjust to attract more capital for balance sheet for repos. Whether those prices – o/n interest rates – are consistent with the Fed's target range is the trillion dollar question.

If private balance sheets can't monetize collateral at rates consistent with the Fed's target band for o/n interest rates, the Fed's public balance sheet will have to do that.

If it doesn't, the market loses confidence in the Fed's ability to control monetary conditions – the OIS curve becomes volatile and steeper, making monetary transmission noisier...

Conclusions

In a growing economy, a banking system that's subject to the current version of Basel III has to hold more and more HQLA over time. More lending, more outflows, more HQLA. Paraphrasing Chairman Bernanke, over time, the economy's and households' currency needs will "grow into" the Fed's balance sheet, reducing the need for shrinkage.

Households' currency needs are not the only force driving the ecosystem to grow into the Fed's balance sheet. Banks' reserve needs for HQLA purposes represent a similar need.

Currency is money for people. Reserves are money for banks. Under Basel III, bank's demand for reserves, and the Fed's balance sheet are rising. The bigger the economy, the bigger the banking system. The bigger the banking system, the bigger its outflows. The bigger its outflows, the bigger its HQLA needs. The bigger its HQLA needs, the bigger its reserve needs. The bigger its reserve needs, the bigger the Fed's balance sheet.

As we've said before, over time, central banks under Basel III are "pre-ordained" to add lots of reserves periodically through permanent open market operations (POMOs). If they wouldn't add reserves for a decade, reserves would shrink as a share of global banks' HQLA portfolios, which would get bond-heavy relative to outflows, even without taper.

To have an informed debate about the end-point of taper, we need clarity on the Fed's preferred mix of reserves versus bonds in large, globally-active banks' HQLA portfolios.

Here is what our analysis implies for the mix, and hence, the room to taper.

Collateral is not money.

It used to be, in a financial system built around just-in-time liquidity, but the essential pre-requisite of just-in-time liquidity provision are limitless balance sheets in o/n markets.

If collateral isn't money, then bond-heavy HQLA portfolios cannot be palatable from the perspective of the liquidity and soundness of a dollar-based, global banking system.

Collateral does go up in value in a crisis, and collateral-rich banks can sell their holdings, but unless the Fed is the buyer of collateral, sales will drain liquidity from another bank.

Collateral velocity is picking up, yes, but increased velocity is tightening, not easing, financial conditions! Financial conditions are measured by o/n rates, the price of money, not velocity, and increased collateral supply and velocity are why markets are tightening.

A system of just-in-time liquidity provision, where balance sheet for repo is limitless and collateral is money once again is not in sight unless Treasuries are exempt from the eSLR or centrally cleared repo becomes a reality. None of these are likely in the near term.

If that remains the case, option five is inevitable.

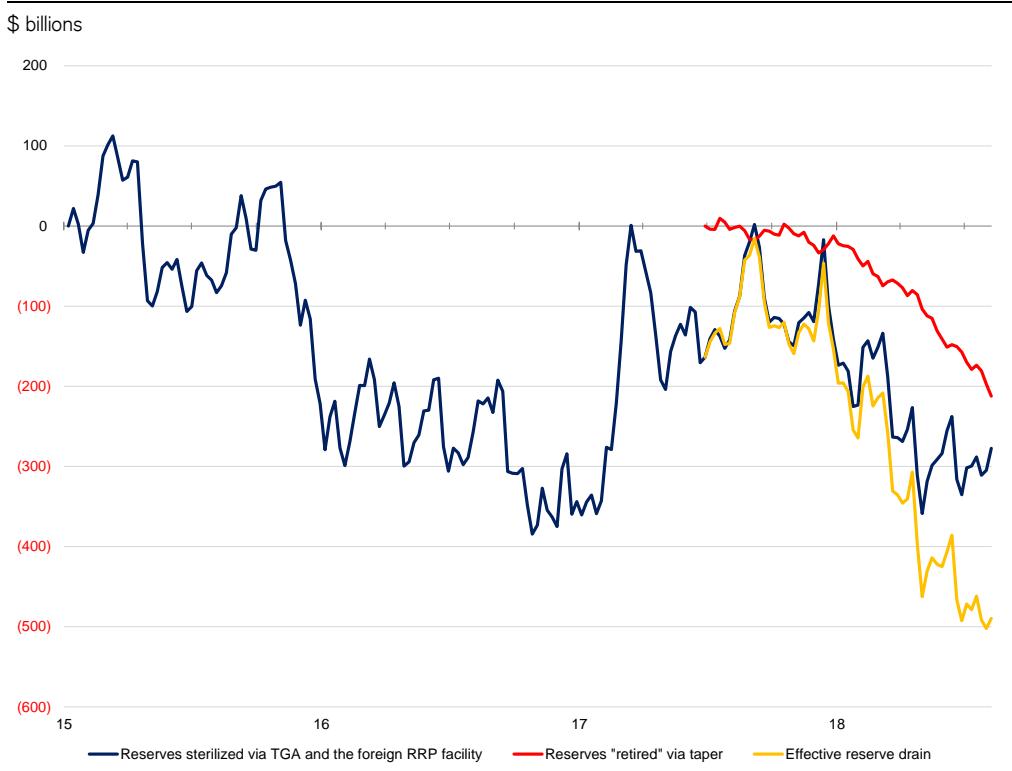
Deficits, sterilization, and taper are all additions of collateral and the removal of reserves that bring forward the day of reckoning: the coming of the Fed... as an o/n repo lender.

We now know the motto of the American West:

"...trust everyone, but brand your cattle".

What is the Fed's philosophy about global banks liquidity portfolios? Reserves? Bonds? Laissez-faire? We still don't know, and clarity on that question is essential, in our view. And if we don't know, we cannot have strong views about the end-point of taper either.

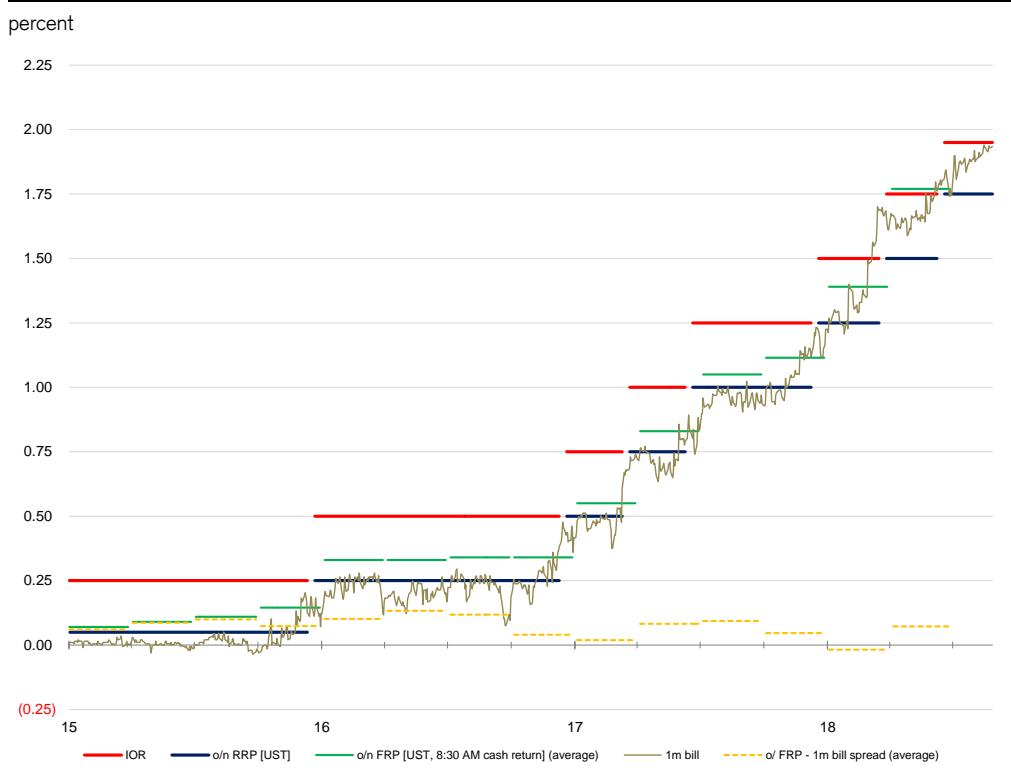
The Fed's "brand" of liquidity will be a key factor determining the path of repo rates and the end-point of taper. Even if the Fed doesn't require banks to shift liquidity from bonds to reserves, capacity constraints in repo markets will force an earlier end to taper than the market expects. If the Fed prefers more HQLA in reserves, taper ends even sooner...

Figure 1: Taper and Shadow Taper

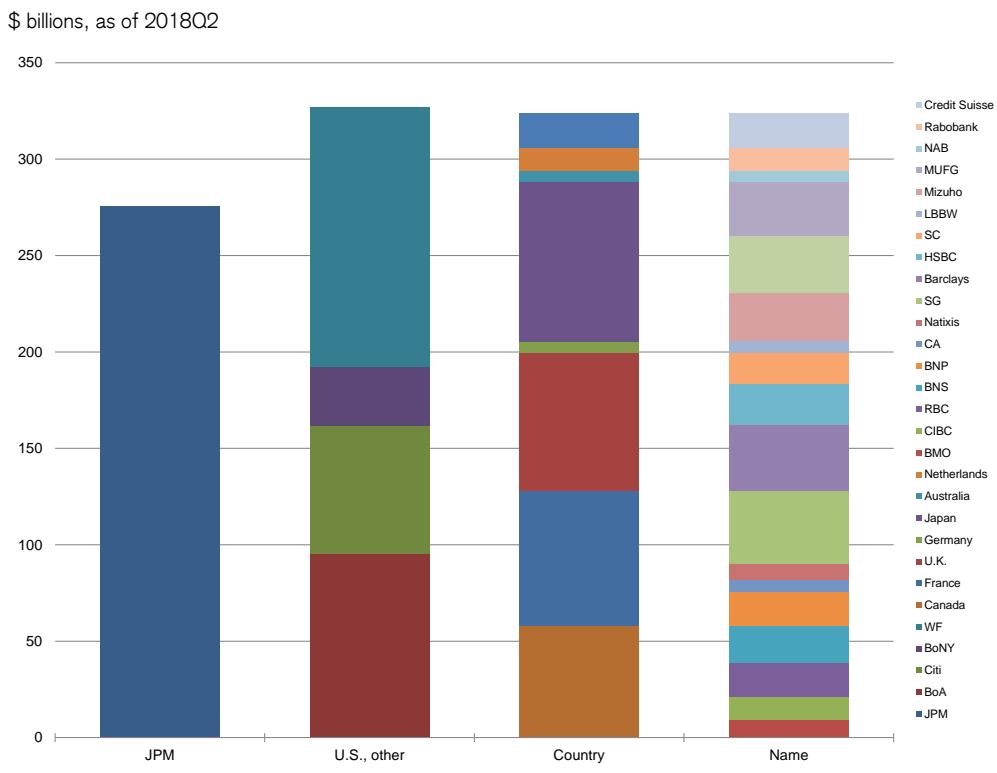
Source: Federal Reserve, Credit Suisse

Figure 2: The Usage of the o/n RRP Facility of Foreign Central Banks at the Fed

Source: Federal Reserve, Credit Suisse

Figure 3: The RRP Facility of Foreign Central Banks is an Expensive Liability

Source: Federal Reserve, Credit Suisse

Figure 4: Reserve Balances of Banks That Can Lend in the o/n GC Repo Market

Source: Call reports, Credit Suisse

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Investment Solutions & Products
Global



Credit Suisse Economics

Global Money Notes #17

The Crapo Act and the Target Rate

The o/n fed funds (FF) rate is at risk of a spike this quarter-end or year-end, and these spikes will continue and may get bigger in the foreseeable future.

Futures are not priced for that...

The growth of the sponsored repo market and the passage of the Crapo Act have established an arbitrage-relationship between the o/n FF and repo rates, and this relationship is the primary driver of the potential quarter-end spikes.

The sponsored repo market has seen tremendous growth since 2017 – it has grown from zero to \$50 billion. Sponsored repo isn't for everyone. It's the exclusive domain of custodian banks – Bank of New York and State Street.

Sponsored repo enables the two custodian banks to run matched repo books without those books hurting their leverage ratios (SLR). Sponsored repo is thus a totally balance sheet neutral activity for custodians – a rarity under Basel III.

Unlike matched repo books, repo loans opportunistically funded in the o/n FF market are not balance sheet neutral, but the Crapo Act's exemption of reserves from the calculation of the leverage ratios of the two custodian banks makes such trades effectively balance sheet neutral too for the time being.

Unlike other repo dealers, custodian banks can borrow in the o/n FF market on scale, and have an incentive to do so when the o/n FF rate trades below the o/n tri-party repo rate – the usual o/n funding rate of matched repo books.

Unfortunately, the Federal Home Loan banks that are the main lenders in the o/n FF market do the opposite: they lend more in the o/n tri-party repo market precisely when the o/n FF rate trades well below the o/n tri-party repo rate.

A push and a pull on the o/n FF rate at the same time cannot be good...

...and pushes and pulls will intensify as we're tumbling down the rabbit hole of the world of excess collateral. As repo rates drift higher, the FF rate will follow.

In an environment where collateral supply is swelling, the Crapo Act complicates things for the Fed: Senator Crapo's law is influencing monetary conditions and "Governor Crapo" is the most important FOMC member you've never heard of.

That's not a problem. It's just a sign of the times that we live in. Times when lawmakers and regulators can influence rates just as much as central bankers.

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In this issue of Global Money Notes, we continue our deep dive into the mysteries of overnight funding markets. Our focus is on the growing sponsored repo market and how it is changing the way overnight (o/n) markets trade intra-quarter and on quarter-ends.

Our aim is to highlight the risk of a spike in the o/n fed funds (FF) rate this quarter-end, and that these spikes will continue and may get bigger in the foreseeable future.

Futures are not priced for that...

Sponsored repo is an important milestone in the evolution of money markets post-Basel III, as it establishes a firm bond between the o/n tri-party repo rate and the o/n FF rate.

This issue of Global Money Notes has four parts to it.

Part one describes the dynamics of the o/n repo market since the introduction of Basel III. Part two describes how sponsored repo is changing the dynamics of the o/n repo market. Part three describes how sponsored repo impacts price action in the o/n FF market, and how it can lead to spikes in the o/n FF rate going forward. Finally, part four concludes.

Part I – Repo Under Basel III

Repo dealers' balance sheet is a marketplace where cash lenders and cash borrowers come together: in a typical o/n matched-book transaction, a repo dealer borrows in the tri-party repo market and lends in the interdealer GC repo market or the bilateral, customer-to-dealer repo market. Thus, from the perspective of a typical repo dealer, the tri-party repo rate is a borrowing rate, and the GC and bilateral repo rates are lending rates.

Figure 1 shows these rates on a repo dealer's balance sheet.

Figure 2 shows the same rates expressed as spreads. Thus, the o/n tri-party repo rate trades as a spread to the Fed's o/n RRP rate; the o/n GC repo rate trades as a spread to the o/n tri-party repo rate; and the o/n bilateral repo rate trades as a spread to the o/n GC repo rate. Expressing repo rates as spreads shows the hierarchical nature of repo.

Figure 3 shows the o/n tri-party and GC repo rates over time, excluding quarter-ends.¹

Figure 4 shows that corresponding to the hierarchy of repo rates, there is a hierarchy of market participants. Thus, money funds and other cash lenders with tri-party repo access are at the bottom of the hierarchy – they earn the lowest of all repo rates. On the flipside, repo dealers with access to tri-party repos borrow at the lowest of all repo rates. Typically, only primary dealers have access to tri-party repos. Non-primary dealers only have access to the GC repo market and so they have to pay a spread to primary dealers for funding. The buyside has access to bilateral repos only and has to pay a spread over GC repos.

The hierarchy of repo market participants does not stop here – there is also a hierarchy to primary dealers (see Figure 5). Primary dealers reside either in broker-dealer or bank legal entities. Both ultimately lend in either in the GC or the bilateral repo market, but for a repo dealer that resides in a broker-dealer legal entity, the only marginal funding point is tri-party repo, whereas for a dealer that resides in a bank legal entity, marginal funds can come from o/n tri-party repos or o/n FF, depending on which of the two rates is cheaper.

French and Canadian dealers are the most prominent examples of dealers that reside in bank legal entities (branches). All other repo dealers reside in broker-dealer legal entities.

¹ The GCF® repo rate is the representative volume-weighted average rate on a subset of interdealer GC repo trades. The tri-party repo rate is a volume-weighted median rate. Data on bilateral ("GC + a spread") rates are not available.

Market making in repo markets is dominated by foreign-owned primary dealers and most foreign-owned dealers are subject to quarter-end balance sheet reporting requirements. In turn, quarter-end reporting means that repo books need to shrink on quarter-ends.

Balance sheets can shrink two ways: by turning off repo market making completely, or by changing the funding leg of market making activities so that some trades can be netted. Balance sheets shrink mostly through netting, not through a complete shutdown of books.

In the U.S., repo is nettable only if both sides of a matched book are executed with the same counterparty. Only centrally cleared trades meet this requirement and, in the U.S., the only central repo counterparty is the Fixed Income Clearing Corporation (or FICC). In the figures above, only o/n GC repo transactions are FICC-cleared, but as we've noted, o/n GC repo transactions are funded mostly via tri-party repos which aren't FICC cleared.

To make o/n GC repo loans nettable, dealers need to replace o/n tri-party funding with o/n GC funding on quarter-ends. The associated surge in dealers' need for GC funding is met by banks that lend reserves from their HQLA portfolios, for which they charge a hefty premium – see the massive spikes in the o/n GC repo rate on quarter-ends in Figure 6.

Banks' lending via GC repo on quarter-ends introduces yet another level in the hierarchy, which we can highlight through who wins and who loses on quarter-ends (see Figure 7).

Money funds lose as they are forced to trade down: because dealers don't take their cash on quarter-ends, money funds are forced to invest with the Fed at the o/n RRP rate.

Primary dealers lose too as they are forced to pay up: because they have to net, they have to temporarily fund at the higher o/n GC rate, not the lower o/n tri-party rate.

Banks win as they go from earning the IOR rate to earning a hefty spread over IOR. Banks always earn a spread – their precondition to lend via GC repos is a spread to IOR.

Only 25 banks can lend in the GC repo market globally (see Figure 8 and footnote 2), and the flexibility of these 25 banks to switch between reserves and o/n GC repos in their HQLA portfolios determines how much money can flow into o/n GC repo on the margin.²

It takes a minnow to catch a barracuda, a barracuda to catch a shark...

Not all quarter-ends are created equal: some quarter-ends are fairly calm; some can be quite a bit stormy. Quarter-ends that are calm can be backstopped by a handful of banks – typically foreign banks that have reserves well in excess of their dollar HQLA needs and so are ready to lend into o/n GC repo even for a spread of a basis point or two over IOR.

These are the minnows of the o/n GC repo market.

Quarter-ends that are stormy need more flows from more banks. Once the liquidity "cups" of the minnows are empty, flows get kicked higher up in the hierarchy to bigger banks. These bigger banks have the extra reserves the system needs, but they may not be as flexible to lend these reserves in the o/n GC market because their liquidity is less excess. Because their dollar liquidity is less excess, they will only lend for a wider spread over IOR.

These are the barracudas of the o/n GC repo market.

Quarter-ends that are rough kick the flows all the way up to large U.S. banks (G-SIBs). U.S. G-SIBs control the most amount of reserves, but their balance sheets are the most expensive so they lend at wider spreads to IOR than foreign minnows and barracudas. U.S. G-SIBs – the sharks – top the hierarchy of private repo intermediaries (see Figure 9).

How does sponsored repo change this hierarchy?

² See the FICC's GSD member directory [here](#). Look for GCF lenders with the word "bank" or "branch" in their names.

Part II – Sponsored Repo

Sponsored repo flattens the hierarchy of intermediaries.

Sponsored repo enables “well capitalized bank-members” of the FICC to sponsor in both cash lenders and cash borrowers to become FICC netting members. Cash lenders include money funds and cash borrowers include all stripes of fixed income and hedge funds.

FICC has lots of members, but most of those members are broker-dealers, not banks, and only bank-members can sponsor in new counterparties, not dealers. Bank-members often correspond to foreign bank’s New York branches, not capitalized bank subsidiaries, and so like broker-dealers, foreign banks cannot sponsor in new counterparties either. That leaves the large U.S. banks, but most of these suffer from high G-SIB surcharges and sponsoring in new counterparties would only increase their G-SIB surcharges further.

G-SIB surcharges are an issue for all U.S. banks except for the Bank of New York and State Street – the two custodians that are the champions of the sponsored repo concept.³

Sponsored repo means that at the end of the day, custodian banks can novate to FICC both tri-party trades with sponsored lenders and bilateral trades with sponsored borrowers such that matched repo books – o/n GC - tri-party or o/n bilateral - tri-party – do not hit custodian banks’ enhanced supplementary leverage ratios (or eSLR; more on this below). To emphasize, sponsored repo books do not hit custodian banks’ eSLR – sponsored repo is a totally balance sheet neutral activity. In a system subject to Basel III that is a rarity.⁴

As we speak, most money funds are sponsored cash lenders, and the fixed income funds of all major asset managers are sponsored cash borrowers as are some hedge funds.⁵

Cash lenders and cash borrowers benefit from sponsored repo primarily through counterparty diversification, and the sponsoring banks – the two major custodian banks – benefit from taking their repo market share from zero to about \$50 billion (see Figure 10). That’s a lot – it’s as if some French or Canadian repo dealers doubled their books. Indeed, the takeoff of sponsored repo corresponds to the period during the second half of 2017, when several clients noted a surprising increase in the availability of balance sheet for repo.

Sponsored repo may have been the genesis of that...

Beyond adding two additional repo market makers, and hence capacity to repo markets, sponsored repo disrupts some established price-patterns in o/n markets. To explain how, we first compare the balance sheet aspects of custodian’s banks sponsored repo books to the balance sheet aspects of primary dealers’ “ordinary” repo books (see Figure 11).

Thus, primary dealers’ repo books and custodian banks’ sponsored repo books both have the o/n tri-party rate on the borrowing side and the o/n GC and o/n bilateral rates on the lending side. Correspondingly, both primary dealers and custodians banks intermediate between the same groups of entities: large money funds on the lending side and non-primary dealers, large asset managers and hedge funds on the borrowing side.

Primary dealers’ matched GC - tri-party books are unconstrained intra-quarter, but are leverage constrained on quarter-ends. As discussed above, primary dealers deal with

³ See the FSB’s G-SIB list [here](#). J.P Morgan’s G-SIB surcharge is 2.5%. Citibank’s and Bank of America’s is 2.0%. The G-SIB surcharges of custodian banks – Bank of New York and State Street – are much lower at a mere 1.0%.

⁴ To be very precise repos with GCF netting members funding via GC repos are also balance sheet neutral, but those are GC - GC trades earning a bid-ask spread. GC - tri-party trades are SLR neutral only in a sponsored repo setting.

⁵ See the FICC sponsored member listing [here](#).

these constraints through netting, where they swap tri-party repos for nettable GC repos, which banks provide for a hefty spread over IOR, while money funds are left in the dust.

Custodian banks matched GC - tri-party books are never subject to leverage constrains. Not intra-quarter and not on quarter-ends. Never, period. Because tri-party borrowings are novated to FICC, custodian banks' o/n GC - tri-party books are always nettable as both sides of the matched book are with the same counterparty – the FICC.

Sponsored repo flattens the hierarchy of intermediaries because the old dynamics of “money funds trade down” (from tri-party repos with dealers to o/n RRP with the Fed) and “banks trade up” (earning IOR on reserves to earning IOR plus a spread on GC repos) are changed by the fact that custodian banks as sponsored repo dealers do not turn o/n tri-party cash away from money funds on quarter-ends, but continue to take it and lend it on via o/n GC repos to foreign dealers so that foreign dealers can net their books.

Foreign primary dealers are netting like they did before, but the enablers of netting aren't banks at a spread over IOR, but rather custodians at a spread over the o/n tri-party rate; the books that enable netting aren't HQLA books but custodians' sponsored repo books!

Money funds win, because on quarter-ends they don't trade down from tri-party repos to o/n RRP with the Fed like in the past, but continue to earn a spread over the RRP rate.

Banks lose, because they are no longer the only intermediaries that can enable dealers to net down their repo books on quarter-ends – custodians took market share from them. Specifically, custodians gained market share in the GC repo market because they enable netting for primary dealers at lower rates than banks, as the rates at which they lend via o/n GC repo isn't a spread over the IOR rate, but a spread over the lower o/n tri-party rate.

Figure 12 shows the place of sponsored repo books in the hierarchy.

Figure 13 shows that since the growth of sponsored repo took off, quarter-end spikes started to show up in the o/n tri-party rate. This means that some of the netting pressures that drove the by-now-familiar quarter-end spikes in the o/n GC rate are shifting over to the o/n tri-party rate. In turn, this means that banks' position as o/n GC lenders on quarter-ends is weakening, and custodians' position as o/n GC lenders is strengthening. Going forward, we expect smaller GC spikes and bigger tri-party spikes on quarter-ends.

Sponsored repo is a game changer in the bilateral market as well (see Figure 11 again).

Primary dealers can only net GC - tri-party matched books on quarter-ends, but not bilateral - tri-party books. They cannot, because bilateral repos with the buyside are not centrally cleared, so switching from o/n tri-party funding to o/n GC funding doesn't help.

Custodian banks can net bilateral - tri-party books as well! This naturally follows from the fact that trades with sponsored borrowers and sponsored lenders are both novated to FICC and are nettable such that sponsored bilateral - tri-party books don't hit one's eSLR. Only custodian banks' sponsored repo books can do that; “ordinary” repo books cannot. If you're a hedge fund that can't get balance sheet on quarter-ends, you should consider joining the ranks of sponsored repo borrowers. Otherwise you are missing out...

Since the netting benefits of sponsored repo are present not only in GC - tri-party books but also in bilateral - tri-party books, it is reasonable to expect the quarter-end spikes in o/n tri-party repo rates to increase as more hedge funds sign up as sponsored borrowers.

Of course, even if sponsored repo books get around the eSLR, sponsored bilateral repos do add to risk-weighted assets (RWA) and so hit custodian banks' RWA-based ratios. Thus, unlike boosting their GC market share, there are capital limits to how much custodians can boost their bilateral market share. But boost they can, and that will lead to more balance sheet for repo and growing spikes in the o/n tri-party rate on quarter-ends.

Part III – Sponsored Repo and Fed Funds

Custodian banks' sponsored repo books thus flatten the hierarchy of repo in the sense that bank HQLA portfolios are less powerful in the GC repo market than they used to be.

Custodians' sponsored repo books also expand the variety of repo dealers. In part one of our analysis, we noted that repo dealers either reside in broker-dealer or bank legal entities. We can now distinguish between two distinct types of bank legal entities that can be hosts to repo books: these are foreign banks' New York branches and custodian banks.

Repo dealers that reside in a broker-dealer legal entity can only tap the o/n tri-party repo market for funding. Dealers that reside in a bank legal entity can tap the o/n tri-party repo market or the o/n FF market, depending on which one is cheaper. Thus, bank-based dealers have funding options not available to dealer-based dealers. But branch-based dealers' access to o/n FF is not as deep as custodian-based dealers' (see Figure 14).

Our regular readers know that at present, the Federal Home Loan Banks (FHLBs) are the only lenders in the FF market and that the FHLBs face strict ratings (AA or A-rated) and country-based lending limits when it comes to unsecured o/n and term FF lending.

As a rule of thumb, an FHLB can lend as much as 15% of its capital to AA-rated banks in an o/n or term FF trade, but only a much smaller 5% of its capital to A-rated banks.

As a rule of thumb, an FHLB also has strict limits that precisely stipulate how much banks from a certain country can borrow in the aggregate. Such limits don't apply to U.S. banks.

Currently, foreign banks' New York branches are the biggest borrowers in the FF market.

Swedish, Australian and German banks' branches account for roughly one half of the borrowing in the o/n FF market, and none of these banks actively play in the repo market. For them, borrowing in the o/n FF market is about arbitraging the o/n FF and IOR rates.

On the other hand, foreign banks from Canada, France, Norway, the Netherlands and Japan do dabble in the repo market and can toggle between o/n tri-party repo and o/n FF as their marginal sources of funding for o/n GC and o/n bilateral trades – but not a lot.

Some of the constraints on how much foreign branch-based dealers can shift between o/n tri-party repos and o/n FF stems from the country-limits in FHLBs' unsecured books.

For example, if the New York branches of four banks from say the Republic of France borrow in the o/n FF market – three to arbitrage o/n FF - IOR and the fourth to fund its repo book in the o/n FF market because o/n FF is cheaper than o/n tri-party repos – given the country limits FHLBs are subject to, the repo-motivated borrower's capacity to borrow in the o/n FF market is limited by the o/n FF borrowings of the other three banks.

Thus, because of country limits, foreign bank-based repo dealers are not in a position to freely toggle – based purely on price – between o/n tri-party and FF funding on scale, and so their repo books cannot exert a particularly strong pull-force on the o/n FF rate during periods when the o/n tri-party repo rate trades measurably above the o/n FF rate.

That's not the case with custodian banks' sponsored repo books...

Country limits do not apply to o/n FF trades with U.S. banks and that's one reason why custodians' sponsored repo books are a game changer for how the o/n FF market trades.

Ratings-based counterparty exposure limits still apply, but given that from the perspective of the FHLB system, the two custodian banks are the only two AA-rated U.S. banks, the entire system of FHLBs can lend a significant, 15% of their capital base to custodians through o/n FF trades, which, in our rough estimate, can amount to as much as \$40 billion.

\$40 billion in the context of the size of the o/n FF market is a lot. Quite a lot...

By parsing the quarterly financial reports issued by the FHLB system's Office of Finance, we know the ratings of all U.S. and foreign banks that borrow in the o/n FF market (see Figure 15). As such, we can track how much AA-rated U.S. banks borrowed in the o/n FF market over time, and cross-reference these numbers with the amounts that the two custodians banks disclose in their call reports about how much they have borrowed.

Figure 16 shows the results.

Since volumes in the sponsored repo market took off in the third quarter of 2017, the Bank of New York's presence in the o/n FF market skyrocketed. Bank of New York is now the single largest borrower in the o/n FF market among all major U.S. banks.

Unlike GC - tri-party books or bilateral - tri-party books, GC - FF and bilateral - FF books aren't nettable, as only the sponsored GC and bilateral legs clear with FICC, not the FF leg.

As such, repos funded in the o/n FF market use balance sheet, which could limit the extent to which the custodian would lean on o/n FF if it was cheaper than tri-party repos.

Here is where the significance of the [Crapo Act](#) comes in.

The passage of the Crapo Act on May 22nd changed the way custodian banks calculate their eSLR by excluding reserves from the numerator of the ratio. For the two custodians, this freed up a combined \$60 billion in balance sheet for repo trades effective May 23rd, and so the Crapo Act removed all obstacles for the moment for the custodian banks to freely toggle – based purely on price – between o/n tri-party and o/n FF funding [on scale](#).

The Crapo Act relieved the custodians from eSLR constraints for the foreseeable future and with that, the Act established a strong bond between o/n tri-party and o/n FF rates that's enforced by the custodian banks: custodians can now run repo books funded in the o/n tri-party repo market without an impact on their eSLR, and, similarly, they can also run repo books funded in the o/n FF market without impacting their eSLR. Thus, for as long as custodians are far from their eSLR limits, they will always prefer to fund their o/n GC and o/n bilateral repo loans via o/n FF every time o/n tri-party repo rates trade above the o/n FF rate, and, given the relatively large volumes they can borrow in the FF market, this arbitrage will exert a considerable pull-force on o/n FF for the foreseeable future.

Like the bond of a happy marriage, o/n tri-party and FF rates are now inextricably linked.

Figure 17 shows the price action in o/n FF since 2015. The noteworthy developments are that the o/n FF rate drifted higher relative to IOR and that the month-end dips disappeared. The first development is due to the fact that more foreign banks are using o/n FF borrowings to improve their LCR. The second development is due to the fact that U.S. banks are starting to use o/n FF borrowings for the same, but mostly on quarter-ends.

Thus, o/n FF trades are no longer just about arbitrage, but about banks upping their LCR. For that, banks are willing to pay a slight premium over the volume-weighted median rate.

We can add a third driver to these dynamics – custodians' arbitrage of repo funding costs.

Figure 18 shows the o/n FF rate alongside the o/n tri-party repo rate since 2015. Up until March 20th, 2018, the o/n tri-party repo rate traded well below the o/n FF rate, so it did not occur to anyone to fund GC or bilateral repos with anything but tri-party repo.

But now that we are in an environment of a [safe asset glut](#) where collateral is becoming increasingly excess, o/n tri-party repo rates occasionally drift above the o/n FF rate, and shifting between the two rates depending on which one is cheaper is now relevant.

When o/n tri-party repo first traded above o/n FF on March 15th, the o/n FF rate drifted 2 bps higher. Then again, through the March 31st quarter-end turn, as o/n tri-party repo continued to trade above o/n FF, the o/n FF rate drifted another 3 bps higher. Finally,

as we approached the June 30th quarter-end turn, o/n FF drifted another 2 bps higher, just days ahead of the largest quarter-end spike in the o/n tri-party repo rate to date.

Figure 19 shows that days before that turn, the 75th percentile of o/n FF trades printed at 1.94%, just a bp below IOR. Anecdotally, it was custodians that pushed o/n FF that high.

Now you know why...

...presumably to hoard some reserves to get in position to lend into the quarter-end spike in o/n GC rates. Opportunistically funding these in the o/n FF market yields a better spread than being a matched-book dealer funding at the tri-party rate that's also spiking.⁶

Finally, to link up this analysis with an earlier issue of Global Money Notes (see [here](#)), the difference between the o/n FF rate and the o/n tri-party rate matters not only due to custodian banks' preference to borrow at the cheaper of the two rates on the margin, but FHLBs' preference to lend at the richer of the two rates on the margin. In English, this practically means that the FHLBs will lend less in the o/n FF market every time the o/n tri-party rate is above the o/n FF rate, which happens precisely when the custodians want to borrow more in the o/n FF market to cheapen the funding of their repo books.

A push and a pull on the o/n FF rate at the same time cannot be good...

...and pushes and pulls will only intensify as we're tumbling down the rabbit hole of the world of excess collateral. As collateral supply increases and o/n GC - tri-party spreads widen, tri-party repo rates will get pulled away from the o/n FF rate and then o/n FF will play catch up. This will be one reason why o/n rates will soon drift outside the target band.

Conclusions

Sponsored repo is one thing; the Crapo Act codifying a strong arbitrage-relationship between repo rates and the Fed's target rate is another. In an environment where collateral supply is bound to increase, the Crapo Act makes monetary policy a lot trickier.

Senator Crapo's Act is influencing monetary conditions, and "Governor Crapo" may be the most important FOMC member you've never heard of...

Sponsored repo has added repo capacity to the system, but is not a systemic solution to what will soon be a problem of excess collateral. From the perspective of cash lenders, custodians are just another counterparty, not a be-all-end-all counterparty. This will be the ultimate limit to how much custodian banks' sponsored repo books will be able to grow.

Sponsored repo's impact on the o/n fed funds rate is the key takeaway from our analysis.

The o/n FF rate used to dip on month-ends. That was when banks used to borrow o/n FF to fund reserves at the Fed as part of their discretionary arbitrage portfolios.

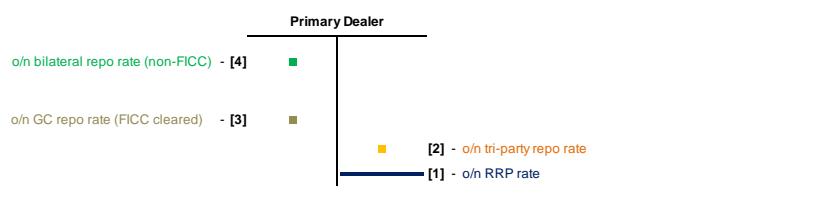
The o/n FF rate now prints flat on month-ends. That means that banks want to hold on to the reserves funded via o/n FF to meet their LCR. Unlike arbitrage, LCRs are mandatory.

The o/n FF rate will next spike on month-ends. Some banks will scramble for reserves, maybe as the custodians opportunistically fund o/n GC trades as others boost their LCR.

Dip, flat, spike...

It's just a matter of time. It's not rocket science. Yet futures don't price for any of this. You should take the other side of that and receive the spikes before they hit the market.

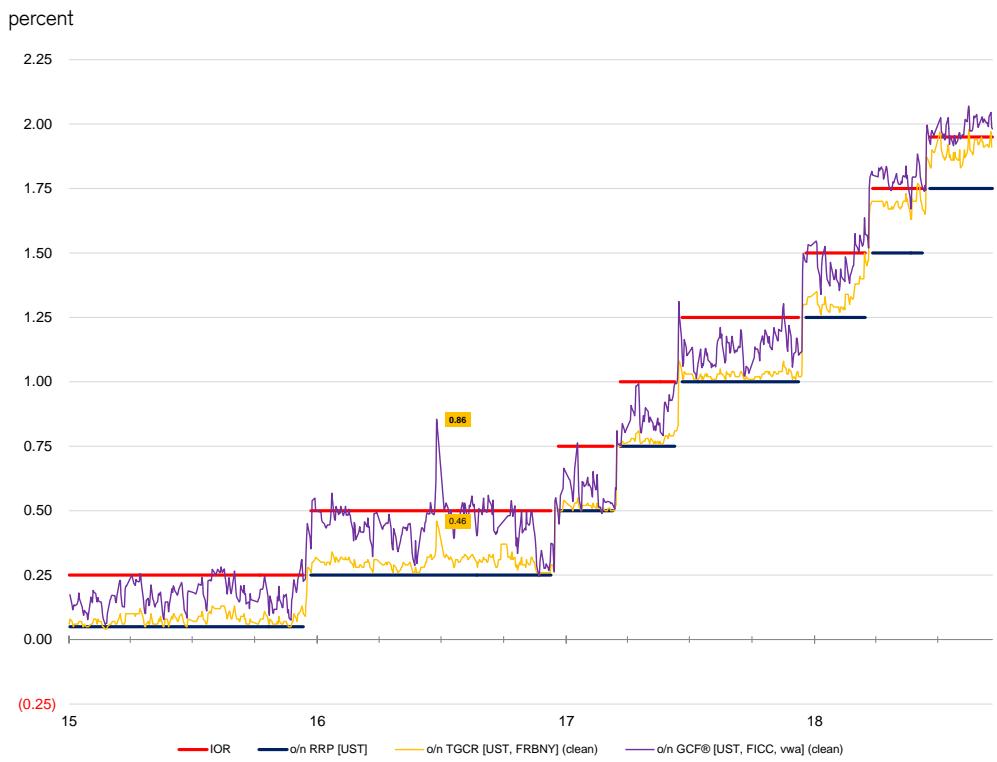
⁶ A polite inquiry from your regulator as to "why you're bidding so aggressively for o/n FF" can halt these opportunistic trades. That said, such polite inquiries may succeed at halting trades at small spreads, but perhaps not big spreads.

Figure 1: The Basic o/n Repo Rates

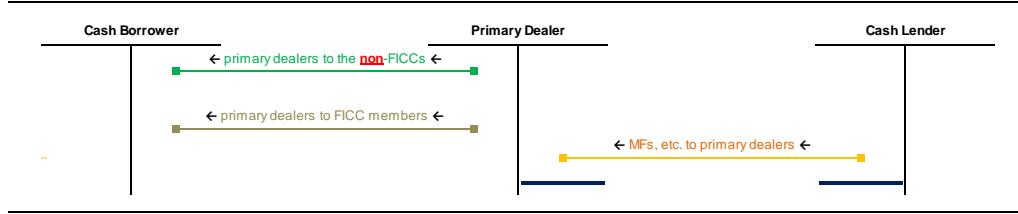
Source: Credit Suisse

Figure 2: The Hierarchy of Repo Rates

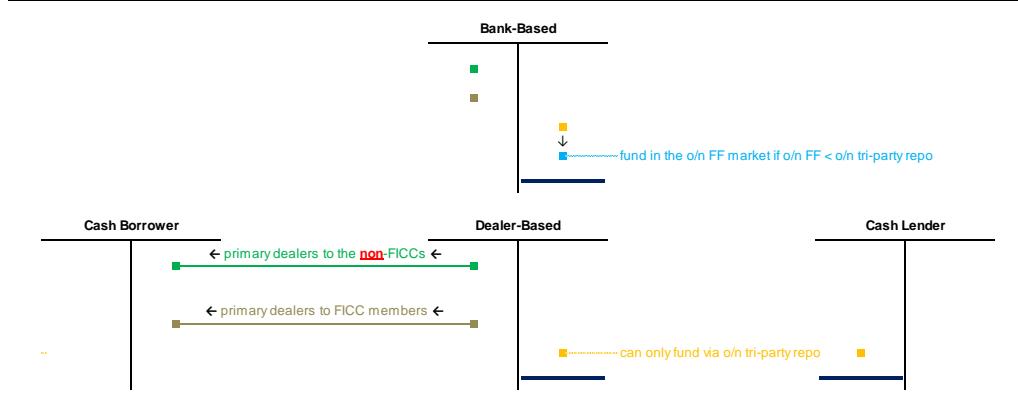
Source: Credit Suisse

Figure 3: Repo Rates Under Basel III

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 4: The Hierarchy of Repo Market Participants

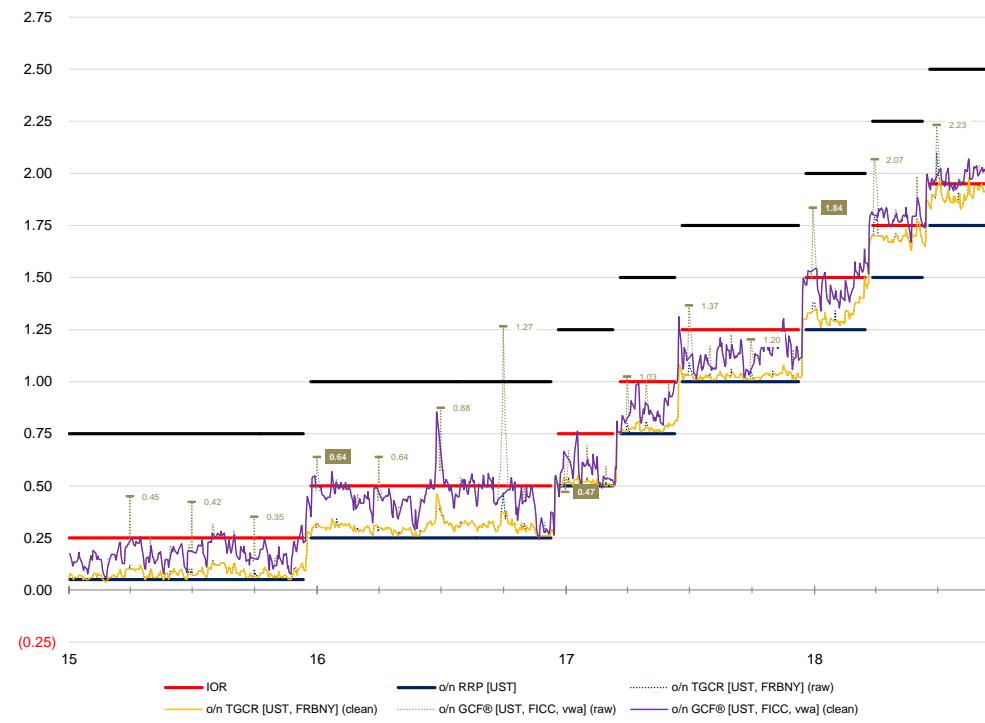
Source: Credit Suisse

Figure 5: The Hierarchy of Repo Dealers (1) – Funding Options

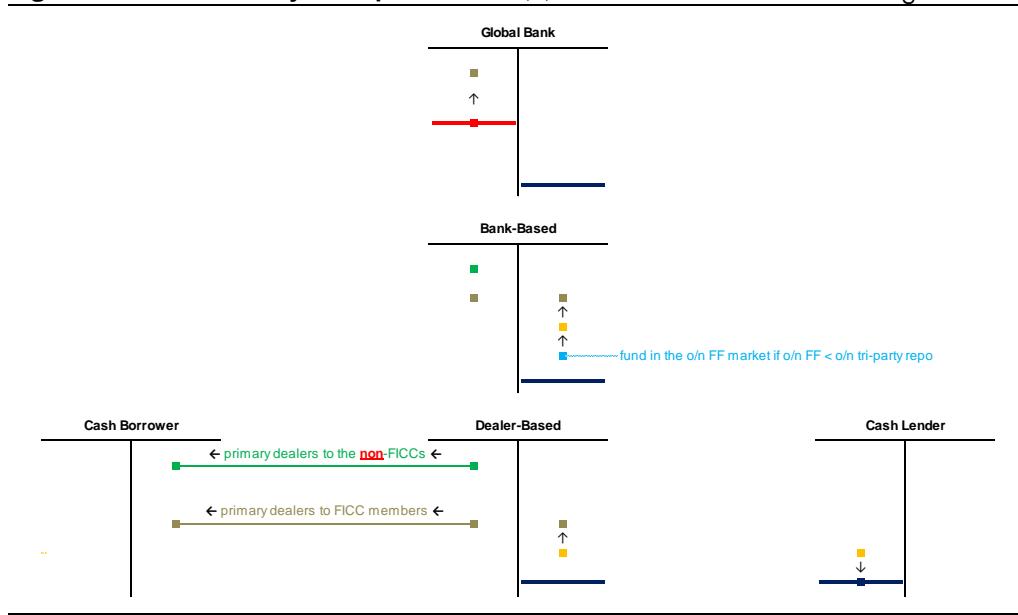
Source: Credit Suisse

Figure 6: o/n GC Repo Spikes Under Basel III

percent



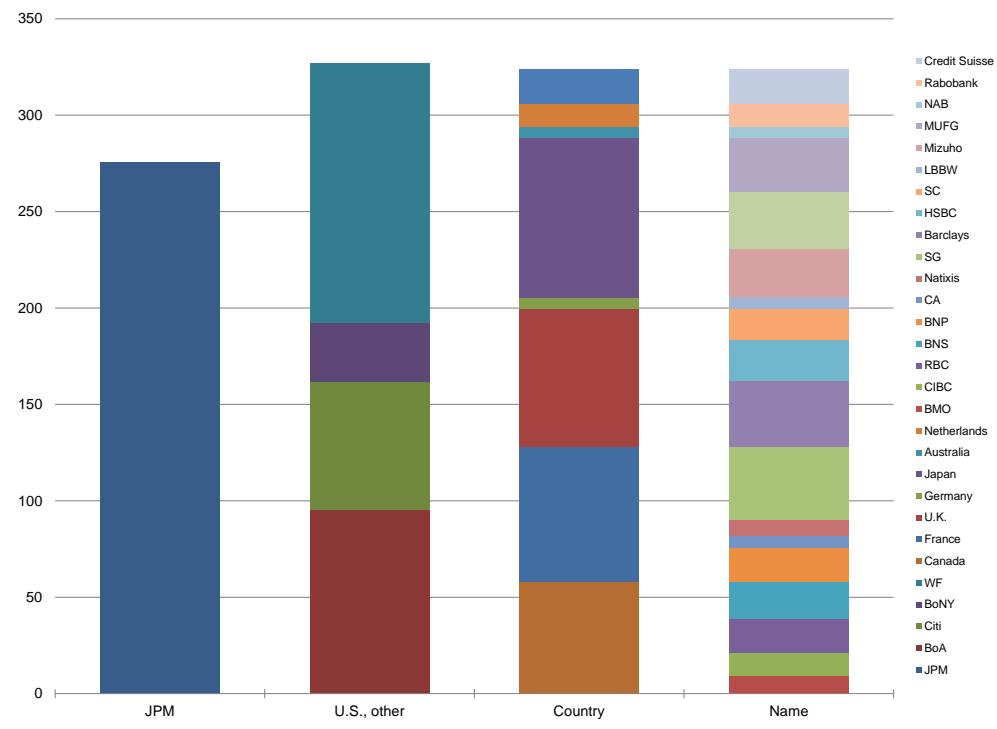
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 7: The Hierarchy of Repo Dealers (2) – Banks as Enablers of Netting

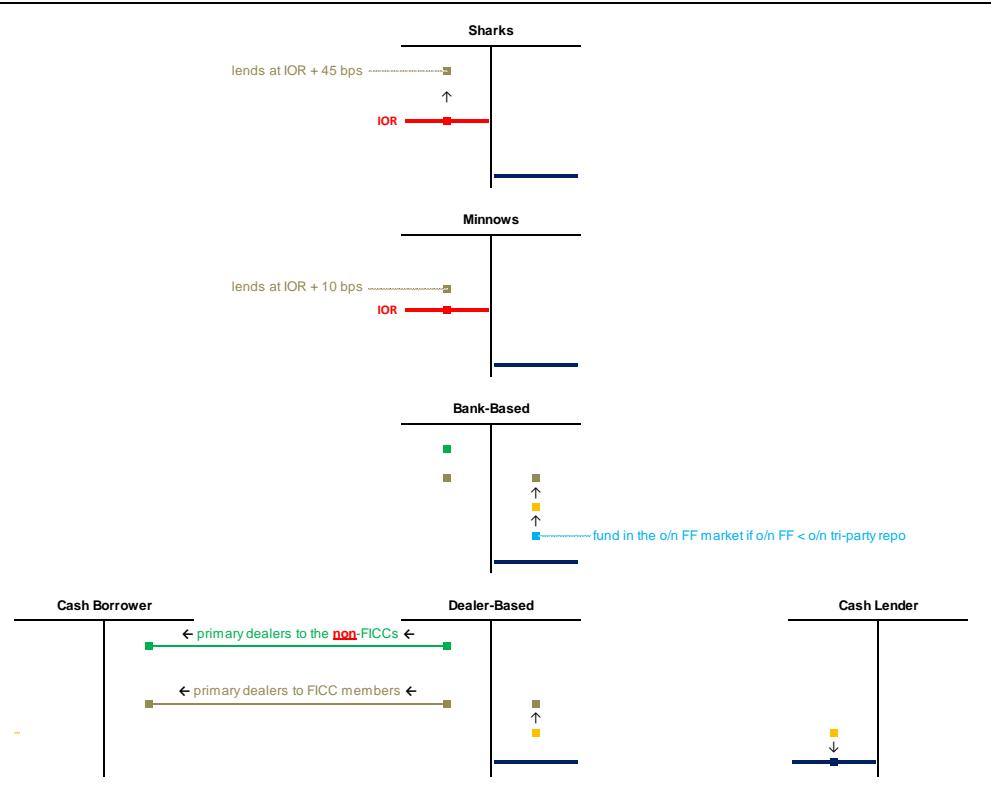
Source: Credit Suisse

Figure 8: The Liquidity “Cups” that Lend in the o/n GC Repo Market

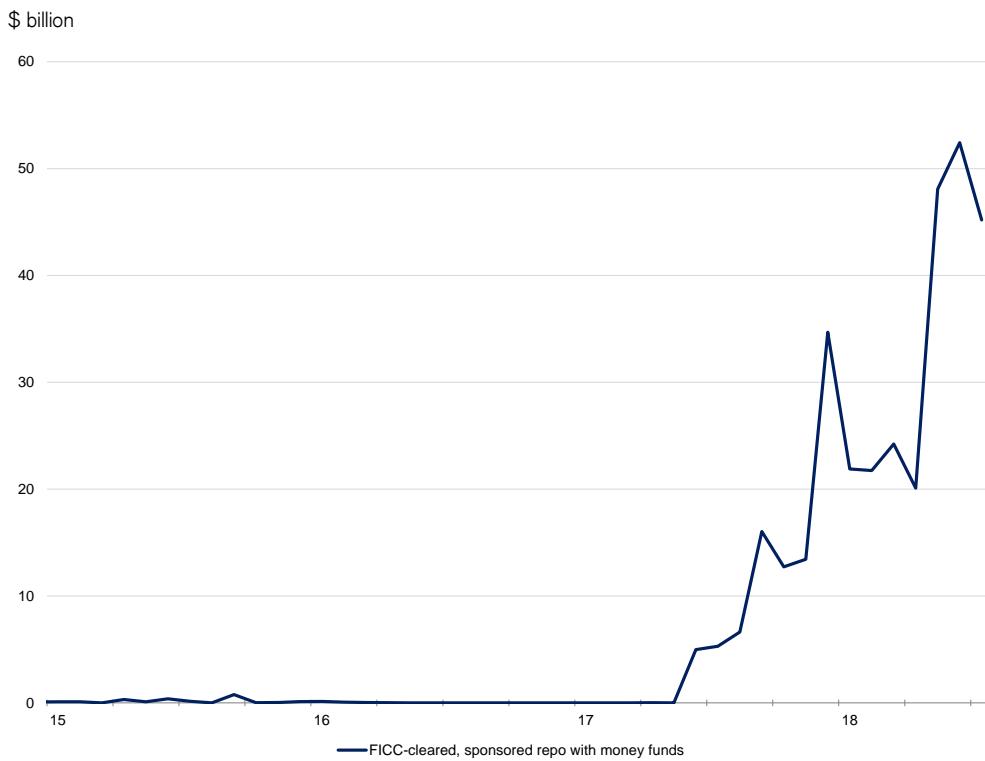
\$ billion, as of 2018Q2



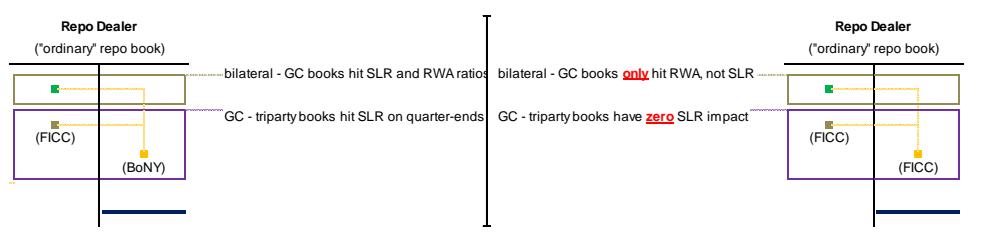
Source: FFIEC 031, FFIEC 002, Credit Suisse

Figure 9: The Hierarchy of Repo Dealers (3) – Minnows, Barracudas and Sharks

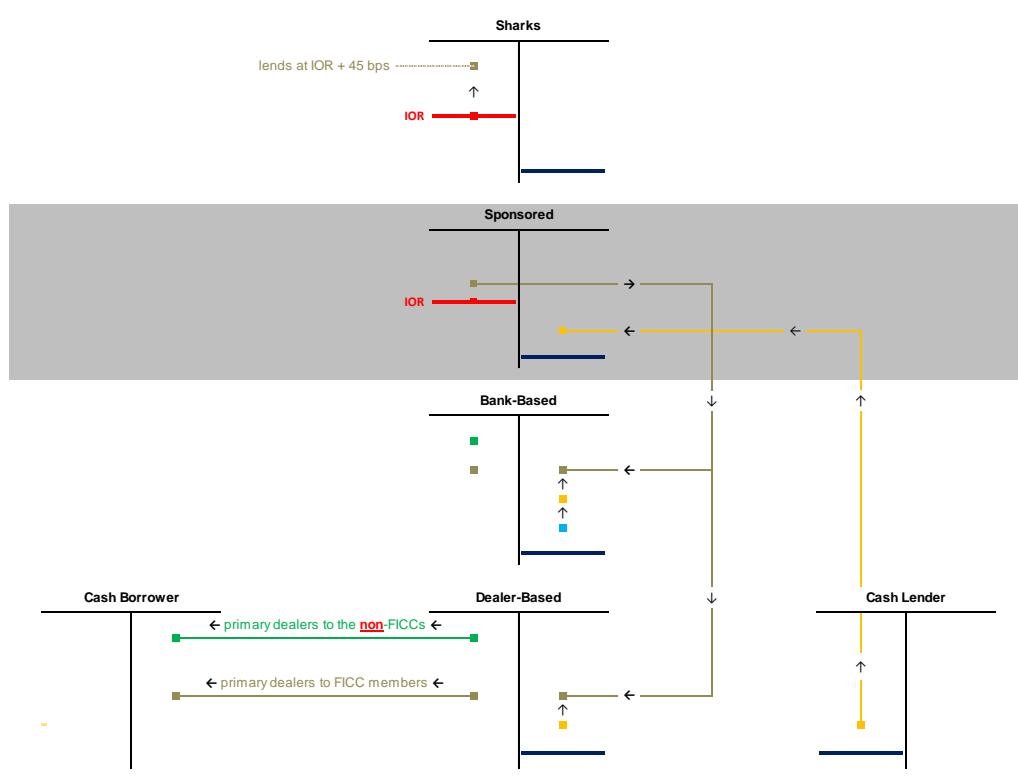
Source: Credit Suisse

Figure 10: Sponsored Repo

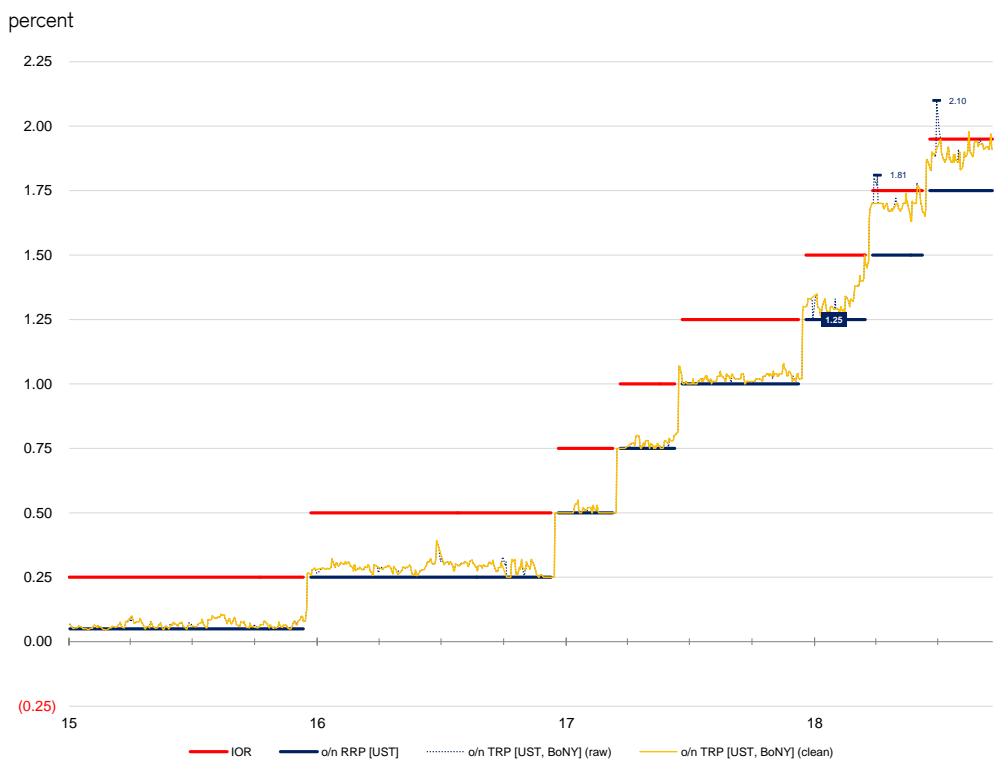
Source: OFR, SEC, Credit Suisse

Figure 11: Sponsored Repo's Balance Sheet Impact

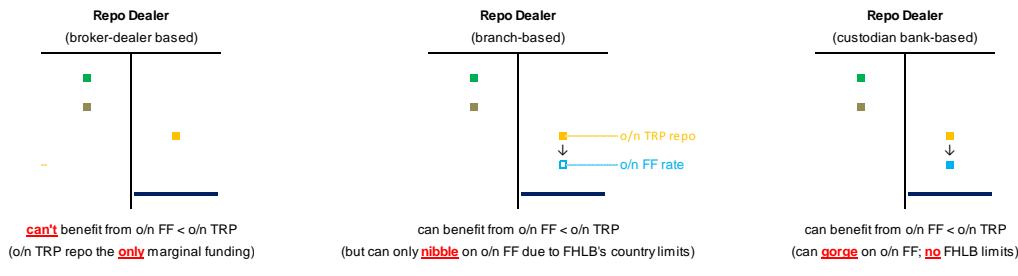
Source: Credit Suisse

Figure 12: The Hierarchy of Repo Dealers (4) – Sponsored Repo Dealers

Source: Credit Suisse

Figure 13: o/n Tri-Party Repo Spikes Under Sponsored Repo

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 14: Three Repo Dealers, Three Funding Options

Source: Credit Suisse

Figure 15: FHLBs' o/n Fed Funds Exposure

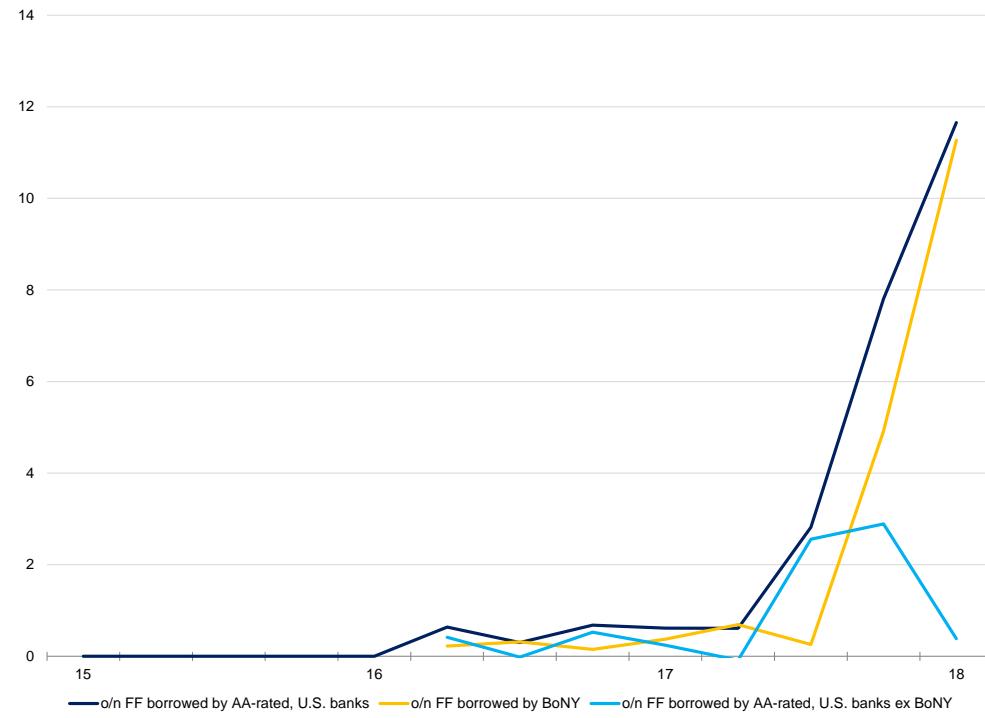
\$ millions, as of 2018Q2

Carrying Value(2)	Investment Grade					Total
	Double-A	Single-A	Triple-B	Unrated	Total	
Domestic	\$ 7,290	\$ 18,698	\$ 1,414	\$ 146	\$ 27,548	
U.S. subsidiaries of foreign commercial banks	500	300	—	—	800	
Total domestic and U.S. subsidiaries of foreign commercial banks	7,790	18,998	1,414	146	28,348	
U.S. branches and agency offices of foreign commercial banks						
Canada	950	18,243	—	—	19,193	
Sweden	14,657	2,530	—	—	17,187	
Australia	11,300	—	—	—	11,300	
Netherlands	—	7,117	—	—	7,117	
Germany	400	6,375	—	—	6,775	
Norway	—	5,380	—	—	5,380	
France	—	3,985	—	—	3,985	
Austria	—	1,226	—	—	1,226	
Singapore	1,200	—	—	—	1,200	
Japan	—	965	—	—	965	
Switzerland	—	535	—	—	535	
Belgium	—	300	—	—	300	
Chile	—	300	—	—	300	
Total U.S. branches and agency offices of foreign commercial banks	28,507	46,956	—	—	75,463	
Total unsecured investment credit exposure	\$ 36,297	\$ 65,954	\$ 1,414	\$ 146	\$ 103,811	

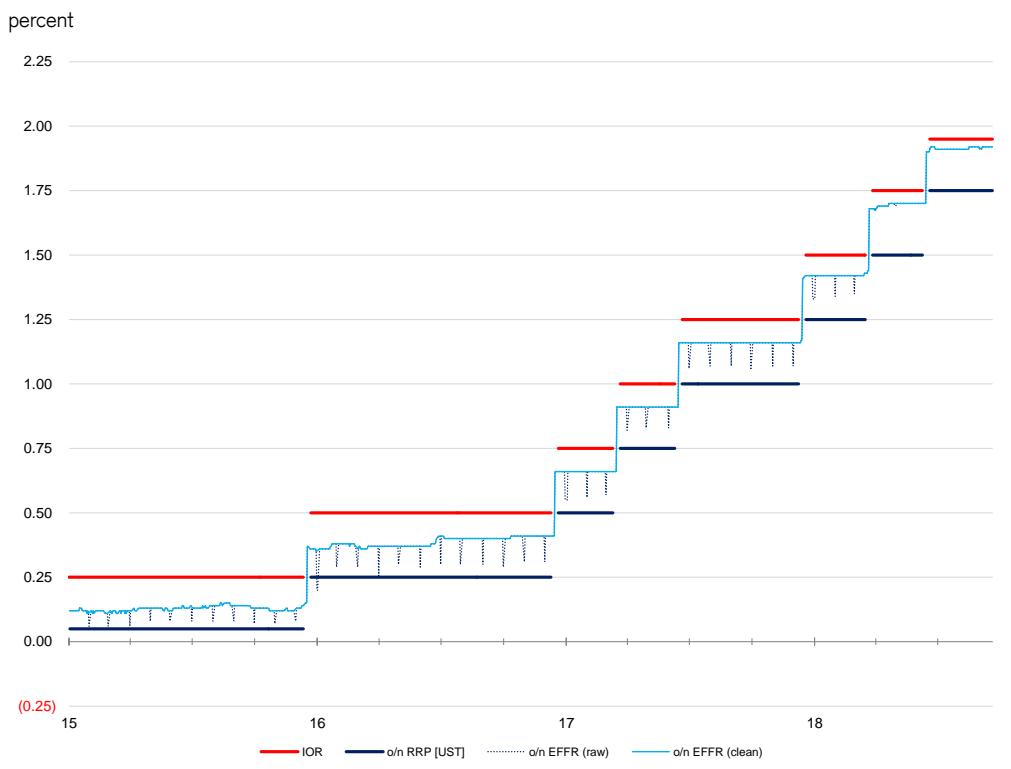
Source: Office of Finance

Figure 16: Custodian Banks' Presence in the Fed Funds Market

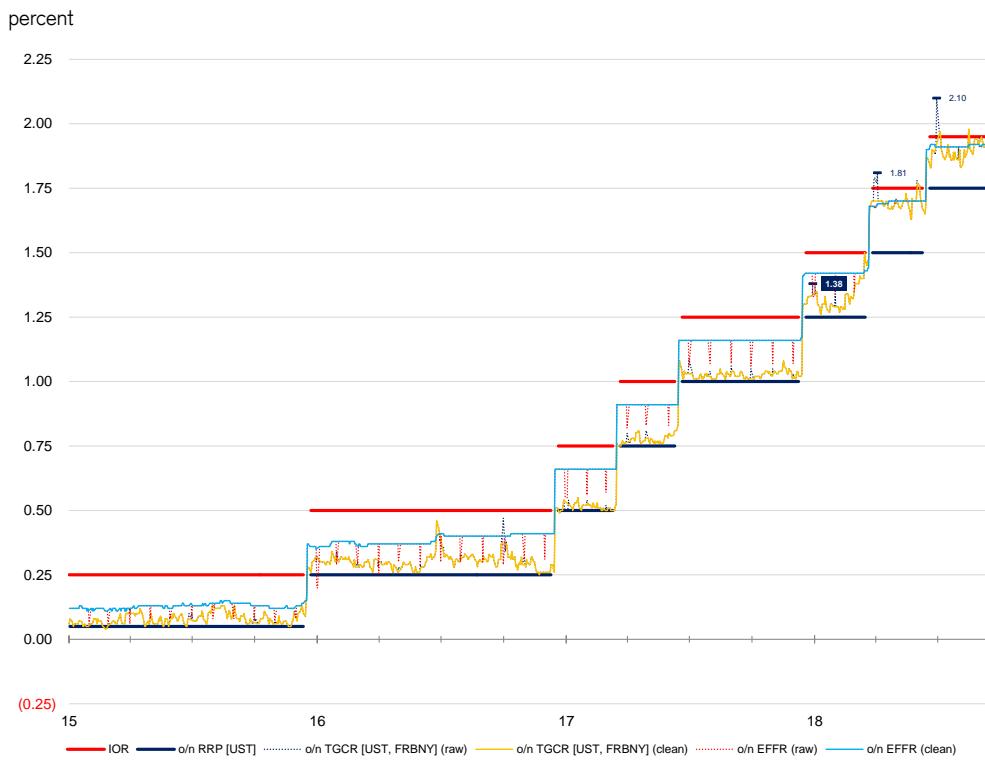
\$ billions



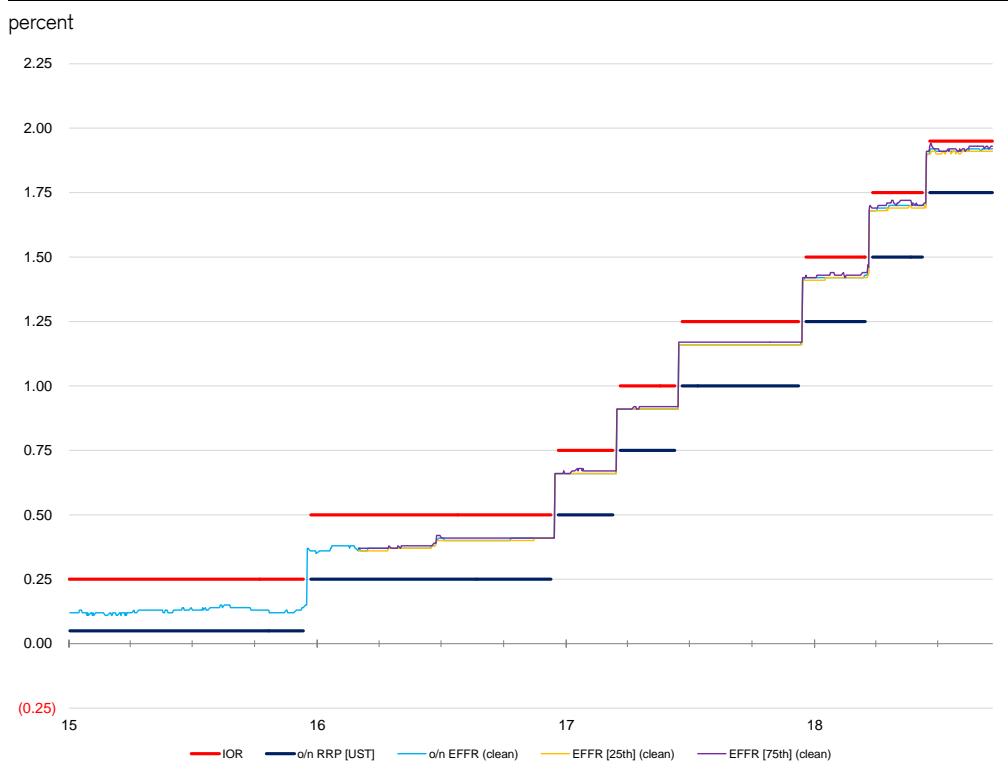
Source: Office of Finance, FFIEC031, Credit Suisse

Figure 17: No More Dips

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 18: Spot the Bond

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 19: Spot Custodians' Bid

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

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Credit Suisse Economics

Global Money Notes #18

Fed Funds and the Market for Intraday Liquidity

Our overnight monitors have been missing a brand new interbank market – a market that trades 10 basis points (bps) above IOR and 5 bps outside the Fed's target range for the o/n fed funds (FF) rate. The new market is a market for intraday liquidity and it exists between U.S. G-SIBs and the FHLB system, and its instrument is interest bearing deposit accounts (IBDAs). Anecdotally, the volume of IBDAs was roughly \$15 billion in August, up from nil a year ago.

The genesis of this new market is U.S. G-SIBs' resolution liquidity needs, which prompted the U.S. G-SIBs to start optimizing intraday payment flows so that their intraday liquidity exposures are reduced. Because IBDAs lock up reserves for the entire day, they help reduce banks' intraday liquidity exposures.

IBDAs represent an important milestone in the evolution of the interbank market that exists between FHLBs as lenders and private banks as borrowers.

First, o/n FF trades were driven by arbitraging the IOR rate by foreign banks that had free balance sheet to play with and were not constrained by liquidity.

Next, super-regional and regional banks constrained by end-of-day liquidity started to borrow o/n FF around month-end to boost their spot LCR metrics.

More recently, all major U.S. G-SIBs constrained by intraday liquidity started to borrow via IBDAs to meet resolution liquidity needs – a higher form of LCR.

IBDAs are great, save for the fact that their growth is about to decimate the supply of o/n FF from the FHLBs, precisely at a time when the demand for o/n FF is growing rapidly – more and more banks borrow o/n FF for more diverse reasons which now include arbitraging rates that trade above IOR, settlement needs, and managing to daily and month-end LCR needs.

A growing demand for o/n FF, coupled with the growth of IBDAs that are set to decimate the supply of o/n FF suggests an increase in the daily volatility of the o/n FF rate from here, the potential for o/n FF to spike as much as 50 bps on month-ends and the risk that o/n FF jumps outside the target band one day and then never looks back. The solution here will be a premature end to taper and fixed-price, full allotment o/n repos, not IOR cuts or that the Fed switches to SOFR as the target rate. Regarding the last point, be careful. If the Fed's target rates is also a reference rate, we won't have lots of spreads left to trade.

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In recent issues of Global Money Notes, we've highlighted the influence that repo rates can have on the overnight fed funds (FF) rate. In a nutshell, our main points were that in their arbitrage books, the Federal Home Loan Banks (FHLBs) can freely toggle between o/n FF and o/n repos, depending on which one yields better, but in their liquidity books, the FHLBs are captive lenders in the o/n FF market because they need cash back early.¹

Our working assumption has been that for the foreseeable future, lending volumes in the o/n FF market won't fall below \$60 billion, and that volumes above that will depend on where o/n FF trade relative to repos and so where the FHLBs direct their arbitrage flows.

Given this framework for the supply of fed funds, our assumption was that the forces that will determine the o/n FF rate will come from changes on the demand side of the market: a growing number of borrowers, which now include U.S. banks alongside foreign banks, and the rising share of o/n FF trades that are motivated not by arbitraging the IOR rate, but by arbitraging various other o/n rates, settling payments and improving LCR metrics.

In the remainder of this issue of Global Money Notes, we make an important adjustment to the framework that guides our assumption about the supply side of the o/n FF market, and analyze the changing nature of the demand side of the o/n FF market. Combined, the changes we see increase our confidence that the o/n FF rate will trade outside the target band by year-end, and that the volatility of the o/n FF rate will increase from here, with implications for the volatility and slope of the OIS curve and the Fed's room to taper.

Part one describes the growing "IBDA" market, which is cannibalizing the o/n FF market. Part two describes the changing nature of the demand side of the o/n FF market. Finally, part three concludes that a jump risk in the o/n FF rate is a clear and present danger.

Part I – IBDA and the Market for Intraday Liquidity

Three themes have featured prominently in our recent conversations with the treasurers of the globally systemically important U.S. banks (U.S. G-SIBs). These themes were:

- (1) resolution liquidity is the new binding constraint;
- (2) banks are looking more closely at intraday liquidity;
- (3) and a cryptic observation that "flows are changing".

Resolution liquidity is a complex subject, but for our present purposes, the key point to appreciate about it is that it increases G-SIBs' liquidity requirements, i.e., the quantum of high-quality liquid assets (HQLA) G-SIBs need to hold. Liquidity coverage ratios (LCR) are based on end-of day balance sheet snapshots, but resolution liquidity takes into account intraday liquidity needs as well. Thus, resolution liquidity is why banks are looking more closely at intraday liquidity, i.e. why they've started to optimize their payment flows.

If resolution liquidity is the new binding constraint, then G-SIBs have to make adjustments on the margin such that resolution liquidity needs are met. These adjustments can come either from banks reducing their intraday liquidity exposure, or from banks boosting the amount of HQLA they hold – and more precisely, the amount of reserves they hold, as reserves are the only type of HQLA that provides liquidity throughout the day, i.e. intraday.

As a result of these changes, there is a brand new interbank market developing, where G-SIBs are sourcing reserves in a way that helps reduce their intraday liquidity exposure.

¹ See "From a Leaky Floor to an Escalator..." in [Global Money Notes #15](#) – Monetary Policy with Excess Collateral.

The market is an overnight market between G-SIBs as borrowers and FHLBs as lenders, and the market's instrument of choice are interest-bearing deposit accounts (or "IBDAs").

IBDAs function as interest-bearing checking accounts for the FHLBs and effectively provide round-the-clock liquidity. In the following paragraphs, we explain why IBDAs are superior to o/n FF for everyone involved – for FHLBs as lenders and banks as borrowers.

The FHLBs only have access to non-interest bearing accounts at the Fed, which, as their name suggests, earn zero interest irrespective of where the Fed sets its policy rate. That's why the FHLBs have been lending their cash in the o/n FF market in recent years – to earn some interest. These o/n FF trades work well if the borrowing banks' aim is to arbitrage IOR or to window-dress LCR metrics on month-ends. The former trade exploits the fact that the bank – typically a foreign bank – isn't bound by the leverage ratio (SLR) intra-quarter, and also has some ancillary LCR benefits to it.² The latter trade exploits the fact that the bank – typically a super-regional or regional, non-GSIB U.S. bank – can satisfy its LCR by boosting its end-of-day reserve balances at the Fed on month-ends.

In an o/n FF trade, a bank borrows funds from the FHLBs with an understanding that the bank will return the funds early next day – as early as 5:30 or 6:00 am New York time. Typically, these trades are renewed by noon, and the liquidity goes back to the banks until early next day, when it is returned again to the FHLBs for a few hours just as before.

Early cash return works if you're running arbitrage or if you are managing to end-of-day liquidity metrics (LCR), but not when your aim is to manage your intraday liquidity needs.

Why?

Because when a bank returns cash to the FHLBs from a maturing o/n FF trade for a few hours, the bank increases its exposure to intraday liquidity for those few hours, and for resolution liquidity, it's your cumulative peak intraday liquidity needs that matters. In English, that means that every minute spent depleting one's reserve account counts, and so banks are incentivized to lock up for the day as much of their reserves as they can.

IBDAs do precisely that. IBDAs are an account that enable the FHLBs to keep their liquidity at U.S. G-SIBs round the clock. Like o/n FF trades, IBDAs give the FHLBs access to liquidity early in the day if they need it, and, if not, the U.S. G-SIB retain access to that liquidity intraday, which, in turn, helps them reduce their intraday liquidity exposure. Of course, the FHLBs' won't draw on their liquidity reserves unless there is a crisis, so the FHLBs typically stay in their IBDAs with U.S. G-SIBs for the entire business day.³

Everybody wins.

FHLBs win because operationally, IBDAs are superior to o/n FF trades. That's because when o/n FF trades mature, banks wire reserves from their reserve accounts at the Fed to the FHLBs' checking account at the Fed, where those funds earn zero interest for a few hours until the same banks re-borrow the funds and the FHLBs wire the funds back.

Time is money, and the FHLBs are keen to minimize the time their funds spend earning zero at the Fed – that's why they are keen to get cash out the door everyday by noon. If there was a way to eliminate the time spent earning zero altogether, that's even better. IBDAs do precisely that – earning a return round the clock without the need for FHLBs to wire funds to and from their checking accounts and banks' reserve accounts at the Fed.

² Foreign banks initially did the o/n FF - IOR trade for a spread and later they realized that there is an LCR benefit too.

³ Not to spoil the concept, but banks' intraday liquidity needs typically surge in a crisis and the FHLBs typically tap their liquidity buffers in a crisis, such that IBDAs will be withdrawn precisely when the G-SIBs need them the most. That's something for everyone to think about – GSIBs and the Fed, and the FHLBs and their regulator, the FHFA.

U.S. G-SIBs win too because they have a new source of funding for liquidity purposes, funding that satisfies both end-of-day LCR needs and intra-day resolution liquidity needs.

Importantly, our discussion shows some important milestones in the evolution of the interbank market that exists between the FHLBs and private banks both foreign and U.S. and G-SIB and non-G-SIB. First, o/n FF trades were driven by arbitraging the IOR rate by banks that had free balance sheet to deploy and were not constrained by liquidity. Next, banks constrained by the LCR started to borrow o/n FF to up end-of-day liquidity. More recently, G-SIBs constrained by resolution liquidity needs – a higher form of LCR – started to borrow through IBDA to boost their intraday liquidity. From arbitrage, i.e. playing with excess liquidity, to boosting end-of day liquidity to boosting intraday liquidity...

...that's a clear pattern and a good way to think about whether reserves are still excess!

IBDAs have been increasing in volume (see Figure 1). IBDAs were practically nonexistent a few years ago, but anecdotally, by August of this year their daily average volume was \$15 billion. Given that the cousin of the IBDA market, the o/n FF market, is \$50 billion, \$15 billion is quite a lot. And now, the important detail of the rate at which IBDAs trade...

...which, anecdotally, is about 8-10 basis points above IOR!

Those spreads shock the underlying assumption of just about everything we thought we knew about o/n markets. We've all been looking at our overnight monitors tracking how all o/n rates are drifting higher in the band and how all rates but the o/n GCF repo rate are still within the band and so everything is "kind-of" fine, when in fact the IBDA market – where banks source intraday liquidity on the margin – is trading well outside the band!

Reflect for a moment about the significance of that (see Figure 2)!

The IBDA market trades above IOR by a margin sufficient enough to suggest that intraday liquidity needs are now a growing focus for U.S. G-SIBs. That's partly due to G-SIBs' resolution liquidity needs, but also because Treasury collateral is becoming excess, which is changing payment flows such that intraday liquidity is becoming more valuable.

How?

Because as the Treasury is boosting its cash balances at the Fed and the Fed tapers, whether it's banks or their customers absorbing the additional supply of Treasury collateral, banks are losing reserves – which is the only type of HQLA that provides intraday liquidity. As the system loses intraday liquidity to the Fed's balance sheet taper, banks are trying to re-gain through funding markets some of the intraday liquidity they've lost – in our view, that's what one bank's treasurer probably meant when he noted that "flows are changing".

Mind you, it's not like this particular treasurer is running low on reserves. Far-far from it. But even with ample reserves, he is tapping the IBDA market with gusto to top up his reserve balances for resolution liquidity needs. This brings us to a comment by another bank treasurer on the conflicting goals of the operational and regulatory arms of the Fed:

"The markets folks in New York are cutting IOR because they want us to lend our reserves, and the regulatory folks in D.C. are incentivizing us to top up and hold on to our reserves."

That the Fed is tapering its balance sheet precisely when banks are starting to hoard reserves for resolution liquidity purposes is unfortunate, and is one reason why attempts to flatten the distribution of reserves across the system by cutting the IOR rate won't work.

In a recent speech, Simon Potter, the manager of the System Open Market Account, noted the following (the underlines are our emphases):

"At this point, I see no evidence that we are at, or close to, the "steep" portion of the demand curve [for reserves]. Let's run through some places where evidence of such a

possibility might be found. To begin with, if we were closing in on the “steep” part, I might have expected to see more above-IOR lending in the unsecured overnight markets, as at least some banks each day found themselves short of reserves and had to borrow them from another bank. In fact, the amount of such above-IOR lending remains fairly low as a share of the overnight bank funding market [...]. I might also have expected to see shifts in bank payments behavior — for example, more daylight overdrafts or more effort by banks to “optimize” their payment flows — but I have not seen this either.”

As market participants, our judgements are only as good as the scope of our surveys, our monitors and our contacts. Respectfully, the FR2420 survey does not capture the fast-growing IBDA market, which is currently the frontier of o/n funding markets – that's where the marginal trades are and where price action is saying important things...

...that there is a now fast-growing interbank market for intraday liquidity where funds trade 10 bps above IOR and that banks have started to optimize their payments flows.

In addition, at a recent conference on money markets at Columbia University, one presenter argued that one sign of reserves scarcity will be an increase in the fraction of payments (or “Fedwire values settled”) that are made late in the day (see Figure 3).

To that, we would respectfully submit the following observation: in a world without Basel III and all sorts of intra-day and end-of day liquidity needs, reserves scarcity may indeed show up as an increase in the fraction of payments made late in the day; but in a world bound by Basel III, resolution liquidity and intraday liquidity needs, it is questionable whether banks will ever again let their reserve balances fall so low that they'll be incentivized to make payments late in the day. Waiting for reserves scarcity to show up in the deciles of Fedwire values settled throughout the day may not be the place to look...

...the size of IBDA volumes and the spreads that IBDAs pay over IOR is the place to look!

As a superior investment to o/n FF, the IBDA market presents a real threat to the depth of the o/n FF market. Our prior assumption that o/n FF cannot go below \$60 billion is now stale – growth in the IBDA market can seriously decimate o/n FF volumes from here.

In fact, the volume of o/n FF trades is currently at a post Basel III low (see Figure 4) – volumes are now below \$60 billion, and will soon fall below \$50 billion and then less as IBDAs continue to grow. The main determinant of FHLBs unsecured lending is the size of their liquidity book. Going forward, those liquidity books will hold more IBDAs than o/n FF.

Over time, as taper progresses and as foreign banks' intermediate holding companies (IHCs) will be required to manage to resolution liquidity targets like U.S. G-SIBs, we expect the market for intraday liquidity to grow and for IBDAs to crowd out most of the o/n FF market. O/n FF trades had their time while liquidity was excess and while banks managed to end-of day liquidity (LCR). Those days are over. IBDAs are the next big thing.

We are not saying that o/n FF volumes will crash to zero: due to the intraday liquidity that IBDAs provide, they are more expensive than o/n FF. There will be some banks that will continue to manage for end-of-day liquidity and these banks will continue to bid for o/n FF.

But the problem is that from the perspective of the FHLBs, IBDAs are superior to o/n FF – they yield better and are more user-friendly – and so FHLBs liquidity portfolios will gradually rotate away from o/n FF and toward IBDAs, which will make life tougher for all those who wish to bid for o/n FF. And the list of banks who wish to borrow o/n FF is growing and the reason why these banks borrow o/n FF is getting more and more diverse.

We next discuss changes in the demand side of the o/n FF market, and why these changes, together with the growth of the IBDA market will soon push the o/n FF rate outside the Fed's target band, and why further cuts to IOR are unlikely to fix that.

Part II – Fed Funds Beyond Arbitrage

Just as the supply of o/n FF is bound to shrink due to the growth of the IBDA market, the demand for o/n FF is growing rapidly. There are more and more borrowers in the o/n FF market, who are borrowing for more diverse reasons which now span arbitrage, settlement needs, the currency matching of HQLA portfolios and improving LCR metrics.

Until March of this year, the dominant borrowers in the o/n FF market were foreign banks that played the o/n FF - IOR arbitrage game. The o/n FF rate was stable except for month-ends, when banks turned off arbitrage. These dynamics drove the month-end dips in the o/n FF rate and the quarter-end dips in o/n FF volumes (see Figures 5 and 6).

But by March of this year, the o/n FF market's dynamics have changed.

The month-end dips in the o/n FF rate disappeared, and so did the quarter-end dips in o/n FF volumes. Importantly, o/n FF volumes started to spike on both month-ends and quarter-ends. The spikes at the end of August and September of this year were small, but the size of spikes is less important than their meaning: that the o/n FF market is no longer about arbitrage. If it were, o/n FF volumes would fall, not increase on month-ends.

Currently, some \$55 billion of o/n FF transactions trade right at IOR, which make it abundantly clear that o/n FF borrows are no longer motivated by arbitraging o/n FF - IOR. To the best of our knowledge, there are four motivations across foreign and U.S. banks, G-SIBs and non-G-SIBs that drive demand for o/n FF today. These motivations are:

- (1) Foreign banks borrowing o/n FF occasionally to be able to make payments.
- (2) Foreign banks borrowing o/n FF daily in order to currency match their LCR.
- (3) U.S. banks borrowing o/n FF around month-ends to boost their LCRs.
- (4) Banks borrowing o/n FF opportunistically to arbitrage o/n GC and other rates.

First, more and more foreign banks occasionally borrow in the o/n FF market to settle large-scale outflows in U.S. dollars. Foreign banks settle their dollar payments from their reserve accounts at the Fed, and sometimes the amount of reserves they have isn't sufficient to cover their payments. In these instances, funds have to be raised on the margin either by repoing bonds (HQLA) or by borrowing reserves in the o/n FF market. We know of at least one foreign bank that had to close on a \$20 billion deal but had only \$18 billion in reserves at the Fed on settlement day and had to borrow the rest by tapping the o/n FF market. In a regime where the U.S. Treasury is sitting on roughly \$350 billion of reserves at the Fed, the banking system has \$350 billion less in reserves and so banks are more prone to tap o/n funding markets on the margin to be able to make payments. If we look at the FHLBs' disclosures about the domicile of the foreign banks that borrow in the o/n FF market, over the past four quarters, we have seen banks from Austria, Singapore, Belgium and even Chile enter the o/n FF market as borrowers. It seems to us that Chilean banks are mostly likely not in the o/n FF market to arbitrage the IOR rate – rather they are in the market to get dollars to cover outflows, which they had to do less of until Treasury sterilized \$350 billion of reserves. Sterilization has real funding impacts!

Importantly, if more and more foreign banks' presence in the o/n FF market is driven mostly by U.S. dollar payment needs, then the o/n FF rate can trade above the IOR rate.

Second, about two years ago, the foreign banks that did the o/n FF - IOR arbitrage daily have started to book their o/n FF borrows as official sector deposits to improve their LCR. The bid for o/n FF from these banks became marginally stronger on January 1st, 2018, as all European banks now have to currency-match their HQLA portfolios with outflows. Thus, foreign banks' bid in the o/n FF market today has less to do with arbitrage IOR and more with managing LCRs daily, and dynamically currency matching HQLA with outflows.

Like in the previous case, if more and more foreign banks' presence in the o/n FF market is driven by daily LCR management needs, then the o/n FF rate can trade above IOR.

Third, super-regional and regional U.S. banks have learned about how foreign banks are booking o/n FF trades as official sector deposits to improve LCRs and now do the same on month-ends. The foreign and U.S. super-regional and regional bid for o/n FF on month-ends explains why the dips in the o/n FF rates are gone and why o/n FF volumes now exhibit baby-spikes on month-ends. The FHLBs' unsecured lending to U.S. banks is bound by the same ratings-based constraints that govern their lending to foreign banks – lend only to AA or A-rated banks, but nothing worse. Figure 7 below shows the universe of U.S. banks (all non-G-SIBs) that are highly-rated enough to be able to borrow from the FHLBs in the o/n FF market. Currently, only six of these regional banks actively borrow in the o/n FF market. As the other banks learn about the LCR benefits of o/n FF trades – and your correspondent is traveling to see all of them to spread the word – the bid for o/n FF will increase, pulling the o/n FF rate higher and higher especially on month-ends.

Like in the previous examples, if more and more banks' presence in the o/n FF market is driven by managing to month-end LCR needs, then the o/n FF rate can trade above IOR.

Fourth, in the previous issue of Global Money Notes, we highlighted that custodian banks opportunistically tap the o/n FF market to fund imbalances in their sponsored repo books. We would add to that that the same custodian banks and most larger foreign banks can also tap the o/n FF market to lend into the tomorrow-next (or t/n) FX forwards market.⁴ In recent months, o/n GC repos and t/n FX forwards (particularly the €/\$ and \$/¥ pairs) have been trading at spreads of around 5 bps and 15 bps over the IOR rate, respectively.

One final time, if more and more banks presence in the o/n FF market is driven by arbitraging rates that structurally trade above IOR, then o/n FF can also trade above IOR.

IOR is no longer relevant for where the o/n FF rate trades. With the o/n FF rate at IOR, the era of IOR serving as a magnet, metaphysically levitating the o/n FF rate is now over. We are now in a regime where the drivers of where the o/n FF rate trades relative to IOR include banks' dollar payment needs, LCR needs, and market making in o/n GC repos and t/n FX forwards, and how fast IBDAs are pulling funding away from these needs.

Thus, we have a new set of "magnets" to the o/n FF rate:

- (1) IBDAs and intra-day liquidity needs crowding out the supply of o/n FF daily.
- (2) Occasional bids for o/n FF to cover dollar payment needs.
- (3) Daily bids for o/n FF to dynamically currency match LCRs.
- (4) Month-end bids for o/n FF to window-dress LCRs.
- (5) Opportunistic bids for o/n FF to fund market making.

Liberty Street, we have a problem!

The first four of these drivers of o/n FF are price-agnostic – where IOR is set is irrelevant. U.S. G-SIBs have to pass resolution liquidity and they'll pay for IBDAs above IOR for that; foreign banks have to meet their dollar outflows and they'll pay above IOR to meet them; regionals have to meet their LCR on month-ends and will pay above IOR to meet them; and custodians and foreign banks don't care if they have to pay above IOR for o/n FF if the rates they are arbitraging – o/n GC and t/n FX forwards – trade measurably above IOR.

⁴ Tomorrow-next (t/n) is a short-term FX transaction where a currency is bought and sold over two separate days, those being tomorrow (one business day) and the following day (two business days) from today – the spot date. It is the most liquid point of the FX forward market, much like the o/n point is the most liquid point of the repo market.

Conclusions – A “M-o/n-etary” Whack-a-Mole

There are four implications of our analysis for the volatility and slope of the OIS curve.

First, now that the o/n FF rate trades on top of IOR, whatever arbitrage o/n FF trades will fund from here will involve market rates, not administered rates – and that's important. The IOR rate is a stable rate and for as long as the bulk of borrows in the o/n FF market was motivated by arbitraging IOR, the stability of the rate being arbitrated bled through to the rate that was being used to fund arbitrage. The next rates in the hierarchy to arbitrage – o/n GC repo and t/n FX forwards – are market rates, not administered rates and so are inherently more volatile than IOR, and their volatility will bleed through to the o/n FF rate.

That's one reason why the daily volatility of o/n FF will increase from here.

Second, given that more foreign banks are tapping the o/n FF market occasionally to settle payments and to dynamically currency match their LCR daily, there will be days when o/n FF will be more volatile than what the arbitrage relationship above would imply.

Volatility will thus increase, but some business days will be more volatile than others.

Third, given that more regional and super-regional banks are bidding for o/n FF around month-ends for LCR, the month-end volatility of the o/n FF rate will get super-charged. These dynamics are already in train, but to date, the increase in regional banks' bid for o/n FF on month-ends was more-or less offset by less bid for o/n FF by those banks that turn off arbitrage on month-ends. But that's changing. Regionals' bids for o/n FF is now driving spikes on month-ends and they are now competing with U.S. G-SIBs' IBDAs.

Volatility on month-ends will thus be worse than volatility on regular days.

Fourth, given that custodian banks and foreign banks can use the o/n FF market to fund imbalances in their repo and FX forward books, quarter-end dislocations in those markets will bleed through to the o/n FF rate with force – especially if the typical funding leg of these arbitrage trades, the o/n tri-party repo rate, trades well above the o/n FF rate.

Volatility on quarter-ends will thus be far worse than volatility on month-ends.

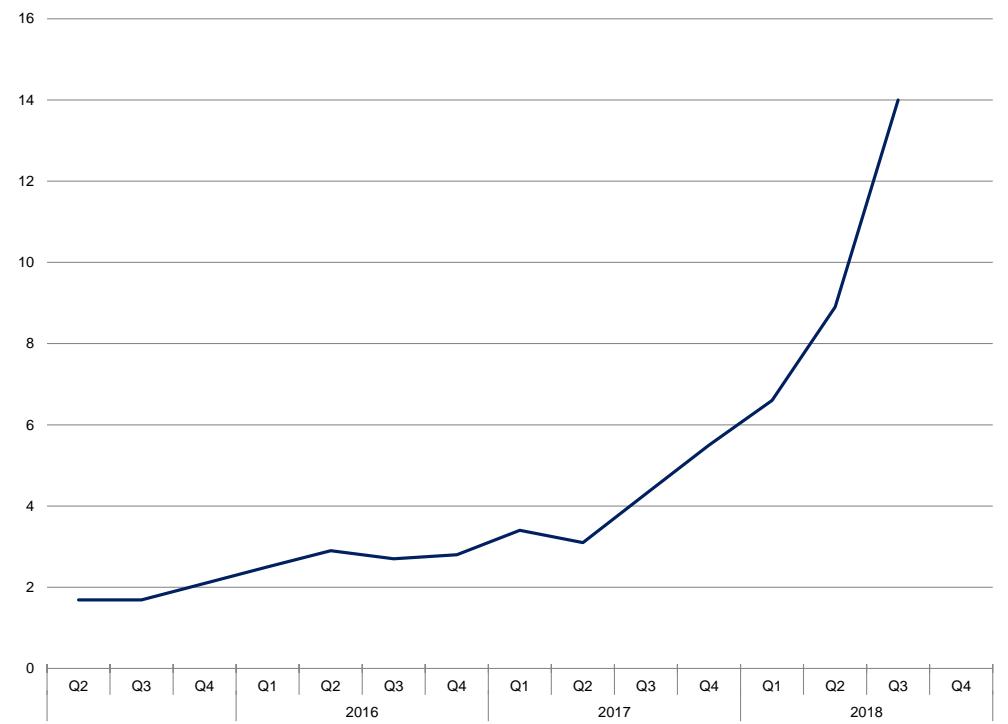
The degree of month-end volatility can be big – very big. To imagine how big, think of the quarter-end spikes in the o/n GCF® repo rate at their worse and then some, which can mean spreads of at least 50 bps over IOR and rates above the discount window rate. Figure 8 shows that such prints for the o/n GCF® rate were not uncommon in the past, during periods where the frontier of o/n markets was foreign-owned dealers figuring out how to net down their balance sheet for SLR compliance. The frontier today is regional U.S. banks figuring out that they can use o/n FF to meet month-end LCR compliance. Compliance is compliance and whether your binding constraint is the SLR or the LCR, you are price insensitive: you pay whatever to comply or there's regulatory scrutiny to pay.

We must add that while U.S. G-SIBs lending in the o/n GCF® market to foreign dealers is an SLR and LCR neutral HQLA “transmutation” trade – basically lending reserves and reversing in collateral – U.S. G-SIBs lending in the o/n FF market is neither SLR or LCR neutral. O/n FF trades are unsecured interbank trades that are not considered HQLA, and that means that its quarter-end spikes can easily eclipse the worst o/n GCF® spikes!

Finally, there is a distinct risk that as IBDAs decimate the depth of the o/n FF market, bids from the banks that are in the o/n FF market to settle outflows and currency-match their LCRs will cause a jump in the o/n FF rate to the lower of where IBDAs trade, where o/n GC repos trade or where implied yields in t/n FX forwards trade. In English, there is a risk that o/n FF trades within the band today, but then jumps outside tomorrow and never looks back. We're not sure that further cuts to IOR will solve any of that, and we are quite sure that markets have not priced for any of that – so buckle your seat belts.

Figure 1: The Market for Intraday Liquidity is Growing

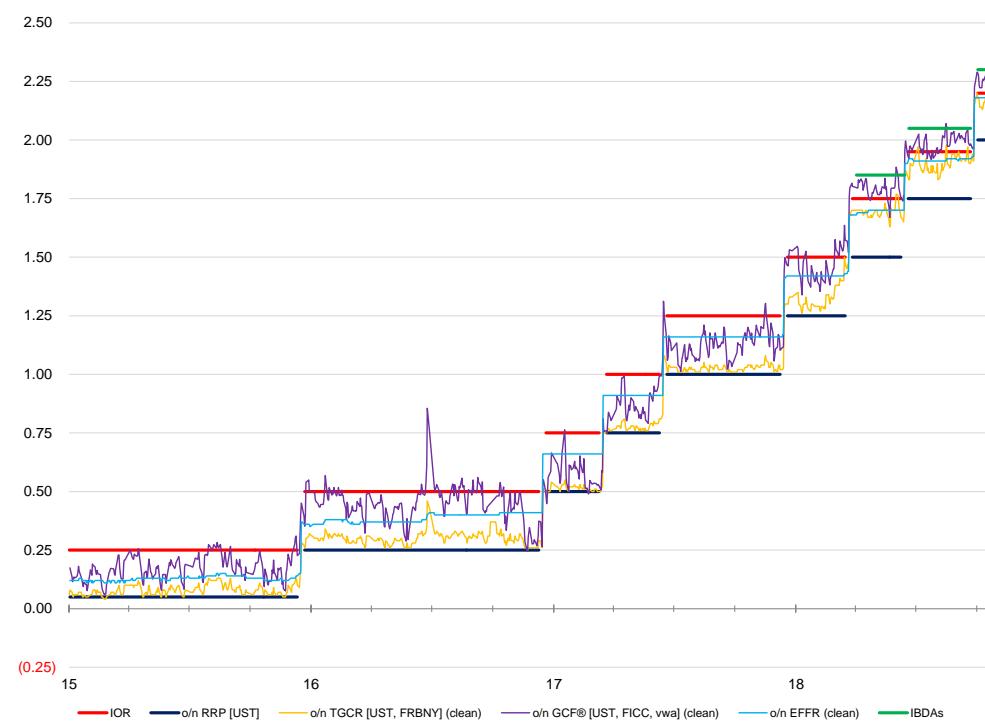
Interest-bearing deposit accounts (IBDAs) offered by U.S. G-SIBs to FHLBs



Source: Office of Finance, Credit Suisse

Figure 2: The Price of Intraday Liquidity is Outside the Fed's Target Band

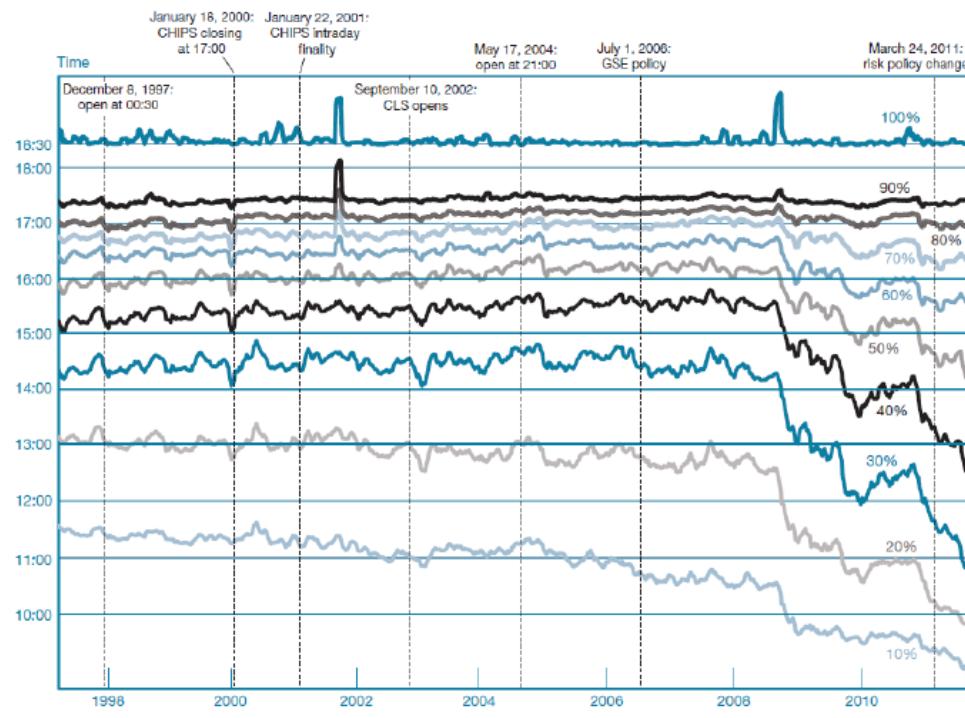
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Office of Finance, Credit Suisse

Figure 3: Under Basel III Banks Won't Ever Throttle Payments Late in the Day

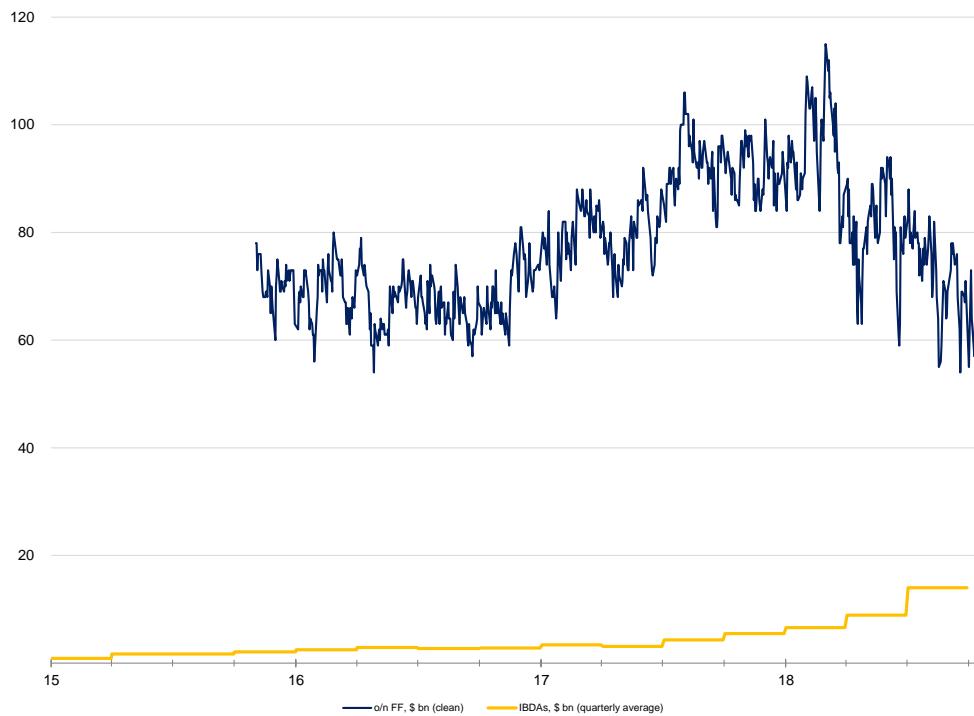
Deciles of Fedwire values settled throughout the payment day, deciles of Fedwire value time distribution



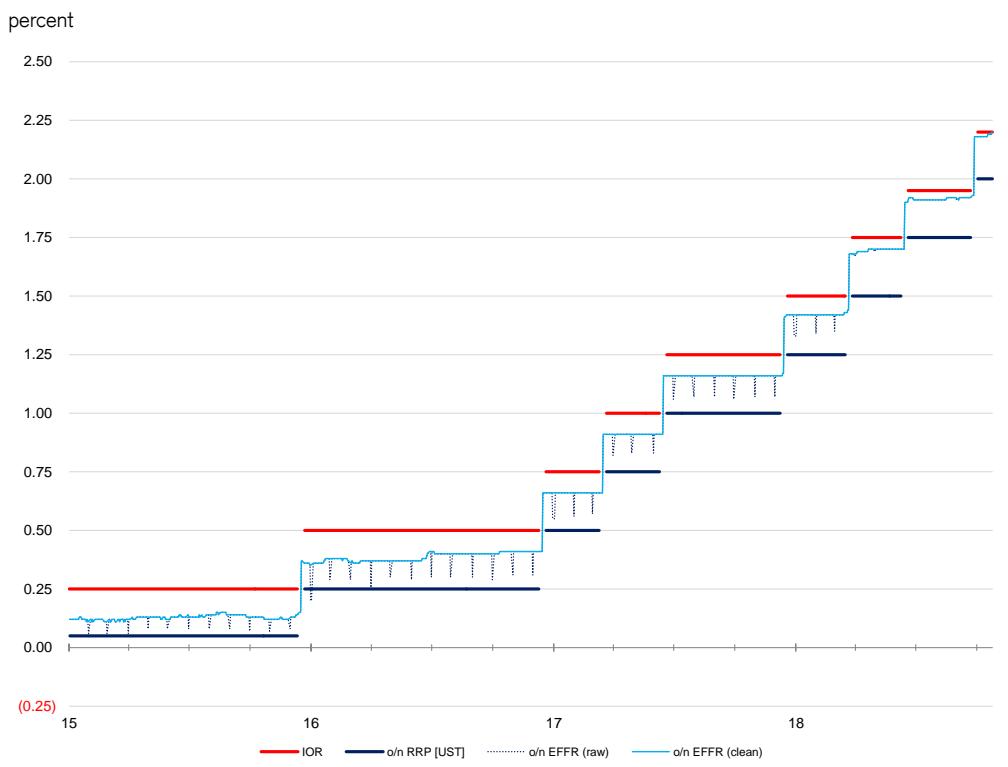
Source: FRBNY

Figure 4: IBDAs Will Cannibalize Fed Funds Fast

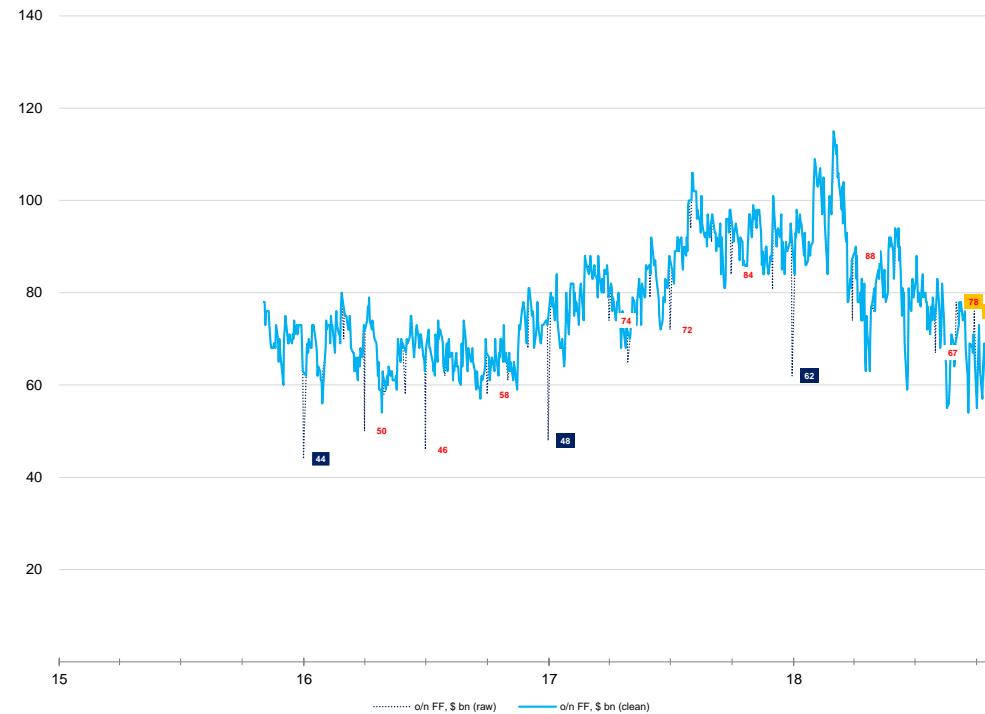
\$ billion



Source: the BLOOMBERG PROFESSIONAL™ service, Office of Finance, Credit Suisse

Figure 5: o/n FF Demand is No Longer Driven by Arbitrage (1)

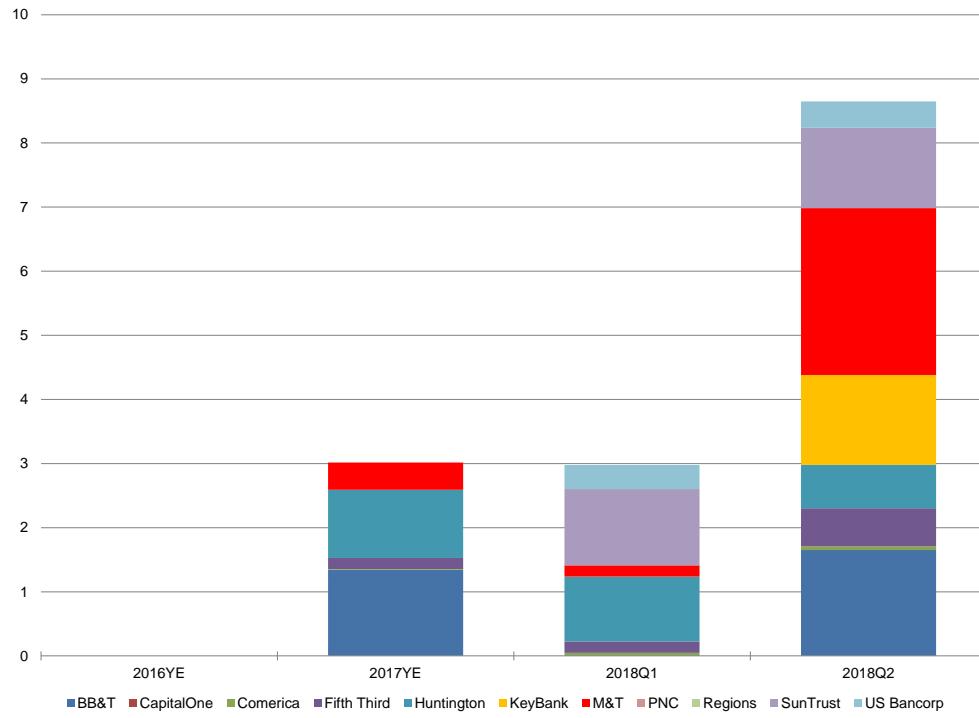
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 6: o/n FF Demand is No Longer Driven by Arbitrage (2)\$ billions; dark blue numbers denote year-end dips, red numbers denote month-end dips; orange denotes spikes

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 7: More and More U.S. Are Waking Up to the LCR Benefits of o/n FF

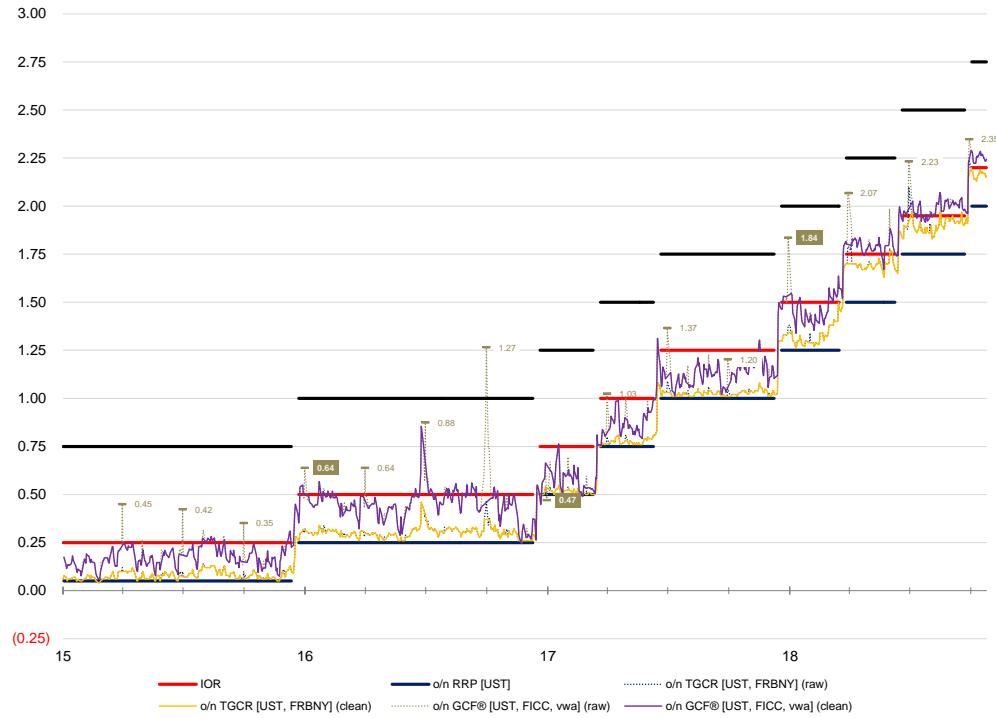
U.S. regional and super-regional banks' borrowing in the o/n FF market, \$ billion



Source: Credit Suisse

Figure 8: o/n FF Spikes Can Be as Bad as o/n GCF® Spikes Once Were

percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

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Investment Solutions & Products
Global



Credit Suisse Economics

Global Money Notes #19

Libor-OIS: A Morbidity Review

Libor-OIS is widening again, up by close to 20 bps since October. It can widen another 20 bps at most until it gets to 50 bps, at which point crossover investors—intermediate and unconstrained bond funds – should provide a backstop bid.

But there are three caveats to this forecast, all of which have to do with the stock market...

First, a market selloff can weaken demand for CD and CP from seclenders' cash collateral reinvestment accounts, which can pressure Libor-OIS wider.

Second, a stock market selloff can also prompt cash-rich corporate treasurers to sell front-end bank debt from their offshore investment portfolios, which, in turn, could pressure higher the spreads at which the backstop bid is triggered.

Third, given how large the flows generated by the sales of corporate treasurers, a backup in dealers' IG inventories can lead to a deterioration of LCR metrics, which would have to be remedied through CD and CP issuance into year-end – these prints can push Libor-OIS wider, as it they did around March 31, 2018.

If stocks post a massive rally before year-end, then the opposite would happen – risks to our call for Libor-OIS to peak at 50 bps would be to the downside.

Our forecast is derived from a careful analysis of the big Libor-OIS move of 2017-18. Part one of our analysis, provides a “morbidity review” of that move, analyzing all the primary and secondary market drivers that contributed to it.

One lesson from part one of our analysis is that STIR traders and strategists focus too much on markets that are adjacent to the three-month Libor point – such as bills, repo, FX forwards – and the term structure of the Libor curve, to the neglect of stock market dynamics and the dynamics of the IG market.

Part two of our analysis, provides an analysis of who backstops Libor-OIS moves and at what spreads. Here, we find that post-corporate tax reform, intermediate bond funds are the backstop bid for bigger Libor-OIS dislocations.

Because intermediate bond funds typically invest at the 2-3 year segment of the IG credit curve, they would only backstop Libor-OIS dislocations if spreads at the tree-month point get flat relative to spreads at the 2-3 year segment. As such, the slope of the IG curve relative to the three-month Libor point is what ultimately determines how wide Libor-OIS can go during an episode of stress.

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Part I – Libor-OIS: A Morbidity Review

Former Secretary of the Treasury Tim Geithner once remarked in an [interview](#) that the “medical profession does some things that economists don’t do that well; for example, they have [...] weekly morbidity and mortality reviews where they go over past mistakes”.

STIR professionals would benefit from regular morbidity reviews as well...

Views about what drove the Libor-OIS move earlier this year have become dogmatic and letting dogmatism get in the way of pragmatism may come at the cost of future returns. Two views dominate the debate about what drove the Libor-OIS move earlier this year: bill supply and repatriation. While both were prominent drivers, they weren’t the only ones.

In retrospect, we count six distinct drivers of the Libor-OIS move. In chronological order these are: U.S. banks’ G-SIB surcharges, repatriation, and bill supply in primary markets, and the equity market selloff of mid-February, Japanese fiscal year-end rebalancing, and the resulting increase in broker-dealers’ IG credit inventories in secondary markets.

Several of these drivers are “live” again, driving the Libor move that started in October. The more we understand these drivers, the more informed we’ll be about how much wider Libor-OIS can go; what group of investors will provide a backstop bid (if needed); and, what is the minimum that Libor-OIS has to widen before the backstop bid finally arrives...

Driver I: U.S. banks’ G-SIB surcharges and “hand-off”.

G-SIB surcharges refer to the extra capital that globally systemically important banks (G-SIBs) have to hold in future periods based on their balance sheet profile today. In order to avoid higher surcharges, U.S. banks started to adjust their balance sheets in mid-November of 2017, which was the initial catalyst to the widening of Libor-OIS. This happened well before either repatriation or bill supply started to impact the front-end!

The link between Libor-OIS and U.S. banks managing their G-SIB surcharges is complex.

All global bank’s G-SIB surcharge is determined by its G-SIB score; G-SIB scores are determined by the bank’s balance sheet attributes; and balance sheet attributes are determined by the bank’s funding profile and its day-to-day activities as a market maker.

G-SIB surcharges are important because they influence the cost of bank balance sheets and balance sheet costs have a strong influence on a bank’s position as a market maker – more capital means a more expensive balance sheet; a more expensive balance sheet means less competitive pricing; less competitive pricing means a diminished ability to print trades and provide liquidity for clients. In short, G-SIB surcharges impact a bank’s profits.

U.S. banks are particularly sensitive to their G-SIB surcharges as their surcharges are the highest globally (see [here](#)). Given their relatively high surcharges, when U.S. banks reach G-SIB scores that would push them to an even higher surcharge bucket, managements tend to clamp down on balance sheet usage aggressively, typically in the market making parts of the bank. According to their FR Y-15 filings from the third quarter of 2017, J.P. Morgan, Bank of America and Citibank were only a few points away from falling into the next higher surcharge bucket (see Figure 1), which, in several cases, prompted management to shrink market making activities, from mid-November to year-end of 2017.

The link between Libor-OIS and U.S. banks shrinking market making activities to control their G-SIB scores occurs through what we can refer to as “hand-off” as explained below.

Market making involves both matched-book intermediation and bridging imbalances in order flows through arbitrage – borrowing in one market segment and lending in another.

U.S. banks typically fund arbitrage activities either via retail deposits or advances from the Federal Home Loan Banks (FHLBs). For example, if borrowers in the FX swap market

need more dollars than the amount flowing through matched FX swap books, banks would tap retail deposits or FHLB advances for additional dollars to lend. Ditto [equity futures](#). The key point here is that tapping either of these funding sources has no impact on Libor.

When U.S. banks step away from market making to manage down their G-SIB scores, end-users' dollar needs don't change, and other market makers step in to cater to end-users' dollar needs instead. But these other market makers are foreign banks without access to retail deposits or FHLB advances. Their main access to funding are the CD and CP markets, and tapping these markets does have an impact on Libor fixings.¹

Thus, "hand-off" refers to U.S. banks stepping away as market makers and foreign banks stepping in as market makers instead of them, and the main link between Libor-OIS and U.S. banks managing their G-SIB surcharges at year-ends is the shift in the funding leg of arbitrage transactions away from retail deposits and advances to CD and CP markets.

Canadian banks are particularly well positioned to temporarily step in as market makers for large U.S. banks for two simple, yet powerful reasons:

- (1) Of the five main Canadian banks only one, the Royal Bank of Canada, is a G-SIB, and its surcharge is the lowest possible and half the size of U.S. banks'.
- (2) Of all global banks, Canadian banks are unique in their regulatory reporting cycle: their year-end is October 31st, while year-end is December 31st for other banks.

Canadian banks' unique reporting cycle means that when U.S. and other foreign banks are shrinking their balance sheet due to year-end balance sheet reporting constraints, Canadian banks are practically unconstrained to substitute for them as market makers.

In other words, the global financial system does not feel it one bit when it's year-end for the Canadian banking system, but when it's year-end for the global financial system, Canadian banks are "there for the world". That Canadian banks step in as market makers at the right time and without having to worry about what a temporary expansion of their balance sheet means for their G-SIB scores puts them in a strong competitive position around year-ends, and, in a conscious effort to monetize this position, Canadian banks' bid for unsecured U.S. dollar funding is typically quite aggressive around year-end turns.

Canadian banks' bid for unsecured dollar funding was particularly strong last December in the o/n and term fed funds market, and also the three-month CD and CP markets. Clients with access to DTCC data can see that last year-end, Canadian banks stood out in terms of the amount of CD and CP funding they bid for, and the rates that they paid. Most of the U.S. dollars raised by Canadian banks were lent in the FX forwards and equity futures markets, where implied yields at the three-month point traded at spreads as wide as 80 and 100 bps to U.S. dollar Libor, respectively, going into the end of 2017.

Talking to cash lenders in the money market – prime money funds and other cash funds – one thing you learn early on is that if a "pack" of foreign banks starts to pay above Libor, cash lenders will expect all other foreign banks to do the same on the grounds that "the market is where the marginal trade just printed". In our conversations with practically all major bank treasurers globally, we've encountered only one who has been able to print at sub-Libor levels both during prime money fund reform and the recent episode of stress.

The temporary shift in market making to Canadian banks triggered by U.S. banks managing their G-SIB surcharges around year-end added 15 bps to the Libor-OIS spread between mid-November and December 31st. The move was expected to be temporary, but it wasn't, and it wasn't because corporate tax reform became law around Christmas.

¹ Foreign banks can tap repo markets too to conduct arbitrage.

Driver II: corporate tax reform and repatriation.

Initially, some STIR strategists dismissed the potential impact that corporate tax reform and repatriation will have on the front-end – including yours truly. That view was wrong. Those who expected an impact on the front-end were right, but for the wrong reasons...

Those who expected a front-end impact assumed that as corporations move their balances from deposits and money funds offshore to government money funds onshore, foreign banks will have to replace dollar funding by tapping funding markets in the U.S. – prime money funds through the CD and CP markets and U.S. banks through FX swaps.

But these financial flows didn't show up in the data, and there is a good reason why: in [Repatriation, the Echo-Taper and the €/\\$ Basis](#), we provided a detailed overview of the offshore investment portfolios of the most cash-rich corporations, and showed that their holdings are concentrated in medium-term sovereign, bank and other investment-grade (IG) debt, and not in offshore deposits, offshore money funds or short-term debt. Furthermore, our report showed that while the offshore balances of smaller corporations appear sizeable in the aggregate, they are unlikely to be repatriated as they represent a genuine liquidity need offshore, and not excess liquidity that's free to be moved around.

While we were right on the first-order impacts of repatriation, we completely missed its second-order impacts – especially the defensive posture that repatriation would trigger at foreign banks' funding desks, and paradoxically, highly-rated banks' funding desks...

Why would bank funding desks turn defensive due to repatriation?

Foreign bank treasurers knew full well that cash-rich corporate treasurers have been prominent buyers of front-end – that is, 1-3 year – bank debt, and corporate tax reform made it abundantly clear to them that corporate treasurers won't be the marginal buyer of their debt going forward. The questions of who will buy instead and at what spread became top of mind, and many banks expected their funding costs to go up significantly.

Foreign banks expected their funding costs to go up because they understood that corporate treasurers were ratings-driven buyers of bank debt, and ratings-driven buyers typically buy bank bonds at much tighter spreads than unconstrained, yield-driven buyers.

Corporations were ratings-driven buyers of bank debt because they were prolific issuers of their own debt to fund stock buybacks and to pay dividends. To protect their ratings and avoid downgrades, they invested only in top-rated debt — that's why Treasuries and the bonds of highly-rated banks dominated their investments.

Thus, in essence, the ratings agencies turned corporate treasurers into "captive" buyers of bank debt, much like the Chinese central bank was once a captive buyer of Treasuries. Banks were fortunate to have cash-rich corporates as relationship buyers of their debt – getting Basel III compliant would have been a lot more expensive without their steady bid.

Corporate tax reform basically meant the end of this multi-year funding honeymoon, and bank treasurers knew that there is only one way for funding costs to go from here, which is up. Hence their defensive funding posture coming into the first months of 2018.

Under Basel III, the 1-3 year segment of the unsecured funding market is particularly valuable for banks. Banks fund their LCR compliance with one-year debt, and NSFR with 2-3 year debt. Given that the funding of their regulatory metrics are at stake, many foreign bank treasurers chose not to take chances and started to pre-fund their metrics.

But with corporate treasurers gone, the 1-3 year segment of the funding market was shut, and banks had to barbell their issuance, mixing five-year funding with three-month funding. Figure 2 shows the total volume of U.S. dollar funding raised by foreign banks by term during the first quarter of 2018 and Figure 3 shows also through the first quarter of 2018

prime money funds' assets under management (AuM). Combined, the two charts show how increased CD and CP supply at the three-month point during the first quarter hit the wall of inelastic demand as prime money funds' AuM was flat during the entire period.

Increased issuance at the three-month point driven by the defensive pre-funding of several foreign banks exacerbated the dynamics that started with U.S. banks' G-SIB surcharges. Canadian issuance into year-end set the tone in unsecured markets, and foreign banks' defensive posture coming into the new year maintained the pressure through January, preventing Libor-OIS from mean-reverting, as many had expected...

Driver III: the resolution of the debt ceiling and Treasury bill supply.

The \$400 billion of bills issued following the resolution of the debt ceiling in February pushed three-month bill yields from 10 bps below to 10 bps above OIS by mid-March – bills went from trading at a negative scarcity premium to a positive abundance discount, and this 20 bps swing pushed the floor under all private rates higher by a similar amount.

In addition, the supply of bills also took away the scarcity premium of short-end assets and that meant that CD and CP issued by banks started to trade at wider spreads to bills – i.e., while a shortage of bills crowded in CD and CP issuance, keeping spreads tight, the surge in bill supply and the resulting safe asset glut started to crowd out CDs and CP.

Figure 4 shows Libor-OIS expressed as the sum of the bills-OIS and Libor-bills spreads. It shows well how the initial Libor-OIS move from mid-November to December 31st, 2017 was driven mostly by Libor widening to bills as foreign banks ramped up CD and CP issuance amidst inelastic demand to take over from U.S. G-SIBs as market makers. January was a lull. February and March were the months of the big moves when bill supply pushed the floor under everything by about 20 bps higher – the bills-OIS move – and crowded out banks trying to pre-fund, which pushed the Libor-bills spread 35 bps wider.

But there is an important caveat to the Libor-bills angle, which is that it matters greatly whether large chunks of bill supply coincide with banks raising large chunks of funding.

If yes, crowding out can drive Libor-bills spreads wider.

If not, bill supply doesn't matter too much for Libor-bills.

We've seen this caveat in action during July and August of this year, when bill supply didn't do much to Libor-bill spreads as banks had already pre-funded and didn't issue.

Context thus matters – the Libor-OIS impact of Treasury competing with banks for funding is not the same as Treasury not competing with banks for funding. That bill supply during the first quarter coincided with foreign banks defensive funding posture due to repatriation was important, and it made the market impact of bill supply worse than it otherwise would have been. In addition, the Treasury competing with banks for funding in primary markets can also be complicated by dynamics in secondary markets. We discuss these drivers next.

Driver IV: the equity sell-off of mid-February and late March, buybacks and seclenders.

The 10% correction in equity markets of February prompted several corporations to raise cash for buybacks by selling bank debt from their portfolios. We've all heard anecdotes about cash-rich corporations putting out BWICs for bank debt during February, and the quarterly financials of these cash-rich names corroborate these anecdotes (see Figure 5). According to the cash-flow statements of the top ten most cash-rich corporations, the equity market sell-off prompted the sale of \$40 billion in IG debt – most of it bank debt – and record volumes of stock buybacks during the first quarters of 2018 (see Figure 6).

Corporate treasurers' outright selling of bank debt in February did not make life easier for foreign bank treasurers trying to pre-fund. If you're a prime money fund or other cash fund

and see cash-rich corporate treasurers selling one-year bank debt in the secondary market, you won't buy three-month new issue paper – CDs and CP – at lower-yields from banks. Increased secondary market offering of bank debt was yet another pressure point on three-month Libor-OIS – banks weren't competing only with bills but also secondary flows.

In particular, just as banks were barbelling their issuance around the 1-3 year segment by mixing three-month with five-year funding, prime money funds and other cash funds were barbelling their investments by buying some one-year paper that was on offer in secondary markets mixed with o/n investments to keep WAM and WAL metrics in check. The three-month funding point thus became "orphaned" – banks wanted to issue there but cash lenders did not want to buy there, and so three-month spreads had to catch-up with one-year spreads for three-month paper to be attractive to investors again. Importantly, keep in mind that demand is weak at this time as prime funds' AuMs are flat.

To make things worse, AuMs at some important, yet under-appreciated funding providers – securities lenders' cash collateral reinvestment accounts (henceforth seclenders) – started to stall, also due to the stock market selloff (see Figure 7). When stocks fall, seclenders typically post cash collateral to short sellers that are increasingly in the money on their positions, and as cash is moving away, they turn defensive with reinvestments and invest cash at shortening maturities, unwilling to lend beyond a month – yet another factor why there was no backstop to the three-month point from money market investors.

Some market participants still hold the view that repatriation could not have been a driver of Libor-OIS as the amount of bank debt sold by corporate treasurers has been small (see Figure 6), and whatever's been sold was term debt and not short-term CD and CP.

This line of thinking misses the point.

Corporate treasurers don't have to sell bank debt for repatriation to have an impact – it's sufficient if they stop buying, and banks start to defensively pre-fund. And, if they sell, the selling need not be big to move spreads around in a market that's thin on the margin – and with prime money funds and seclenders' AuM flat to down during the first quarter, the market for CDs, CP and one-year bank debt was quite thin on the margin indeed, and so primary and secondary market flows didn't have to be big to move Libor around a lot.

Driver V: Japanese fiscal year-end re-balancing going into the March 31 calendar turn.

Japanese banks and life insurers have been important buyers of IG credit in recent years, mostly on an FX-hedged basis. The Japanese bid has been strongest in the 5-7 year segment of the IG credit curve and spanned not only bank names but also industrials.

Japanese accounts re-balance their credit portfolios as Japanese year-end approaches, which involves selling bonds that have rolled down the curve and became shorter than 5-years, and buying new 5-7 year bonds. In the past, cash-rich corporate treasurers were the buyers of these bonds, but due to repatriation, they were absent this time around.

Thus, corporate tax reform ended not only a multi-year funding honeymoon between corporate treasurers and foreign banks, but also the "partnership" that existed between corporate treasurers and Japanese credit investors whereby corporate treasurers were reliable partners for Japanese accounts to re-balance their portfolios around year-ends. Like the buyback-related selling of front-end, 1-3 year bank debt by corporate treasurers, re-balancing-related selling of 3-5 year IG debt also increased secondary market supply.

Now we are dealing with something bigger than "just" bill supply – the market dynamics include three-month bills competing with three-month CD and CP in primary markets; three-month CD and CP competing with some one-year bank debt in secondary markets; and one-year bank debt competing with 3-5 year IG debt also in secondary markets.

Prime money funds would decide between three-month CD and CP and one-year debt, seclenders would normally consider debt out to two years, but not this time around, and less constrained investors such as enhanced cash funds and intermediate bond funds would consider IG debt out to five years. Where three-month Libor would ultimately peak came down to where yields in the 1-5 year segment would stabilize (more on this below).

Driver VI: an increase in dealer's IG credit inventory and last-minute fixes to LCRs.

Rates trading is purely price driven whereas credit trading is mostly relationship driven, partly because the dealers that help bring IG and other bonds to the market are bound by a gentleman's agreement to provide secondary market liquidity for what they underwrote.

Whether the selling pressure is coming from cash-rich corporate treasurers turning from net buyers to net sellers of bank debt due to tax reform, or from Japanese accounts rebalancing portfolios around Japanese year-end (that is the March 31st calendar turn), dealers that underwrote the bonds being sold are now on the hook to provide liquidity – that is, to buy them for their inventory temporarily until they find a buyer to offload to later.

When a dealer steps in to buy IG credit that corporate treasurers and Japanese accounts are selling, the dealer pays with reserves which hurts its LCR metrics. That's because the IG bonds bought aren't HQLA, but the reserves that paid for them were. Given that the drivers of expanding IG inventories – the equity selloff of mid-February and late March, and the Japanese year-end portfolio rebalancing in the run-up to the March 31st turn – both happened in the run-up to a routine quarter-end when Basel III metrics are binding, banks that stepped in to support their IG franchise at the expense of their LCR metrics had to top up their HQLA and did so by tapping three-month unsecured funding markets – that is, the CDs and CP markets – at whatever cost. Three-month because for reserves to qualify as HQLA they must be funded longer than 30 days; not longer than three-months because inventories were expected to clear relatively quickly after the quarter-end turn; and unsecured because HQLA cannot be encumbered and so must be funded unsecured.

It's important to appreciate that, the way IG markets traded came to an inflection point during the first quarter of 2018, which had a profound implication for dealers' inventories and Basel III metrics. In specific, for as long as corporate treasurers were buyers of credit and partners in helping Japanese accounts re-balance around Japanese year-ends, dealers bought and sold credit quickly – inventory turnover was fast – and their parents' reserve accounts at the Fed depleted and replenished quickly so that by the March 31st reporting date, liquidity metrics were back on target. But when corporate treasurers went from buyers to sellers and stopped being partners to Japanese year-end rebalancing, dealers' inventory turnover slowed down dramatically. Dealers got "double-stuck" with IG inventory, having to absorb the flow from a group of accounts – corporate treasurers – that never sold before, and having to absorb the Japanese year-end rebalancing flows that were routinely absorbed by cash-rich corporate treasurers before (see Figure 8).

We are not sure anyone foresaw this inflection point in the dynamics of credit markets and so when some dealers' IG franchises were protected at the expense of LCR metrics, no one really foresaw the aggressive bid for three-month funding around the March 31st turn to remedy the hit to LCR metrics. Those bids for unsecured three-month funding in primary markets drove some rather aggressive moves in Libor in an environment where few expected that Libor-OIS could possibly get any wider. Importantly, these bids in primary markets were driven by secondary market flows, bringing together the seemingly disparate themes of pre-funding, bills, buybacks and Japanese year-end re-balancing.

These last-minute CD and CP prints to fix LCRs were the icing on the Libor-OIS cake, and clients with access to DTCC data can see who printed how much and at what rates just days before the March 31st calendar turn. On April 1st, Libor-OIS stopped widening.

Part II – Libor-OIS: Backstop

Out of close to 400 client meetings this year, only two clients have asked the following questions:

- (1) How do you know the “fair value” of Libor-OIS when its widening?
- (2) How wide can Libor-OIS go and what is the ultimate backstop?

The first is not the right way to think about Libor-OIS – Libor-OIS widening has nothing to do with fair value and everything to do with technicals. The second one is a fundamental question that the STIR market should prioritize, but only one of 400 clients has asked.

To get a handle on Libor-OIS, most STIR traders look at supply and demand dynamics at the three-month Libor point and everything that happens around it in adjacent markets like bills, repo or FX forwards and color these views with the term structure of the Libor curve.

But then consider that according to our analysis, Libor-OIS earlier this year was driven by:

- (1) increased primary CD/CP supply due to “hand-off” amidst inelastic demand;
- (2) increased primary CD/CP supply due to pre-funding amidst inelastic demand;
- (3) increased primary CD/CP supply crowded out by increased bill supply;
- (4) increased primary CD/CP supply crowded out by secondary 1-3 year IG supply;
- (5) increased primary CD/CP supply crowded out by secondary 3-5 year IG supply;
- (6) increased primary CD/CP supply due to secondary IG supply (inventories/LCR).

...the last three of which have absolutely nothing to do with cross-market dynamics at the three-month point, but secondary market dynamics farther out the bank funding curve.

Importantly, in an environment where the “backstop” buyer of CD/CP is a crossover buyer that can buy anything between three-months and five years, where bank debt trades out to one, three or five-years has a huge implication for how far three-month Libor can go.

Before Basel III, the backstop buyers during CD/CP dislocations were banks and dealers. Under Basel III, they are no longer backstops as CD/CP do not qualify as HQLA assets.

During money fund reform, the backstop buyers of dislocation were corporate treasurers, but tax reform and repatriation made them a central part of the problem this time around – not only were they absent as buyers into the CD/CP dislocation, they made it worse by selling some of their bank debt holdings as they needed to raise liquidity for buybacks.

Similarly, during money fund reform the stock market was performing well and seclenders had cash collateral coming in which helped backstop the CD/CP dislocation back then. But with stocks down this time around, seclenders lost cash and couldn't serve as a backstop.

Intermediate bonds funds that typically live on the 2-5 year segment of the IG curve became the backstop this time around and these investors waited for three-month Libor to flatten relative to their usual habitat before they came in to backstop the CD/CP market.

They backstopped the three-year point when it became flat relative to the five-year point. They backstopped the one-year point when it became flat relative to the three-year point. They backstopped the three-month point when it got flat relative to the one-year point.

Figures 9, 10 and 11 show the flattening of the entire the bank funding curve between November 1st, 2017 and March 31st of 2018 – which was the end of the Libor-OIS move.

Calibrating how much Libor-OIS can widen during specific episodes of stress ultimately comes down to the typical habitat of the crossover investor that's “next in line” to backstop the Libor-OIS move – i.e., where relative to the three-month Libor point this investor typically invests and the steepness of the IG curve relative to the three-month Libor point. If the IG curve is steep, Libor moves a lot. If it's flat, Libor moves a lot less...

Conclusions – Libor-OIS: Into Year-End and Beyond

Libor-OIS is on the move again as we approach the year-end turn. How much will it widen and will it tighten as soon as the year-end turn is behind us? Or will it keep on widening? Our morbidity review of the Libor-OIS move of 2017-18 year suggests the following.

First, U.S. banks G-SIB surcharges and “hand-off” are live drivers again.

History shows that G-SIB surcharges and “hand-off” have been drivers of Libor-OIS at every year-end since 2015. They drove a 10 bps move heading into year-end 2015, and they probably drove a similar move heading into year-end 2016, but that was masked by prime money fund reform which drove a massive dislocation beforehand. Then, they drove a 15 bps move in Libor-OIS heading into year-end 2017 – bigger than the 2015 move as some U.S. G-SIBs were caught off-guard about how close they got to falling into a higher G-SIB bucket and so they clamped down on their market-making activities more aggressively, which drove bigger “hand-off” flows. This year, the Libor-OIS move started about a month sooner – in late October, as opposed to late November like last year – as all U.S. G-SIBs are more careful about their G-SIB scores heading into the year-end turn.

Second, while defensive pre-funding due to repatriation isn’t a live driver this time around, bill supply is, and bills will compete with “hand-off” related funding going into year-end (this will show up mostly in three-month bills trading at a growing abundance discount).

Third, unlike during the second and third quarters of this year, when prime money funds’ AuMs were growing, prime money funds’ AuMs have been flat since late September and so the bid for CD and CP is thin on the margin once again – whatever issuance will have to get done between now and year-end will depend on crossover buyers to get printed...

Taken together, G-SIB surcharges, bill supply and flat prime fund AuMs between now and year-end are likely to drive three-month Libor-OIS 40 bps at most, i.e. Libor-OIS can widen out to about 50 bps by year-end at most, in our view. That’s 50 bps and not a bp more because if three-month Libor-OIS gets to 50, then funding spreads will get 50 bps flat from three-months out to two-years, at which point bond funds will step in as backstop buyers, selling two-year debt and buying three-month paper (see Figure 12).

Now the caveats...

...both of which have to do with secondary markets.

The recent stock market weakness has started to impact Libor-OIS through two channels: through outflows from securities lenders’ cash collateral reinvestment accounts, and through corporate treasurers selling their CD, CP and front-end bank debt holdings.

First, as stocks are falling, seclenders have to post cash collateral back to short sellers who are increasingly in the money, and seclenders fund these flows by drawing on their balances in institutional-class prime money funds – this is the genesis of the \$20 billion in outflows that we’ve seen from institutional-class prime money funds since September. If stocks keep falling into year-end, outflows can intensify from here and so pressures on CD/CP rates and Libor-OIS can increase. If the market rallies, the opposite can happen.

Second, a falling stock market can trigger another round of sales of front-end bank debt by corporate treasurers, which can complicate banks’ year-end funding plans, especially if sales push spreads at the 1-3 year segment of the bank funding curve measurably higher – to say 70 bps, from the current 50 bps – so that Libor-OIS has to widen 20 bps more before the curve gets flat and the backstop from crossover buyers arrives (see Figure 13).

Third, depending on the size of secondary market flows on the back of the factors above, dealer inventories of IG debt can back up again hurting dealers’ LCR metrics, which can once again trigger last-minute prints in CD and CP markets to fix LCRs just like in March.

We are no forecasters of the stock market, but our message for STIR traders is that the performance of the stock market is a wildcard that can impact how Libor-OIS trades.

Since Basel III went live on January 1st, 2015 the stock market was going only one way: which was up. But the stock market came to an inflection point this year, recording a correction in mid-February and March and then again in late-September and October.²

STIR traders did not have to worry much about inflection points in the stock market and what these would mean for the AuM of seclenders' cash collateral reinvestments accounts.

But now they do.

Furthermore, for the better part of the past decade, corporate treasurers were funding their buybacks with debt issuance. But corporate tax reform changed that – treasurers now fund buybacks through the active liquidation of their offshore investment portfolios.

Both seclenders' cash collateral flows and corporate treasurers' portfolio decisions now have an impact on three-month Libor-OIS, and both are driven by how stocks perform.

If stocks are down, seclenders pull cash from prime funds and shorten their duration which hurts demand for CD and CP in primary markets, and corporate treasurers sell front-end debt which also hurts demand for CD and CP through secondary markets...

... a double whammy.

If stocks are up, it's the exact opposite.

Our discussion of how stocks can impact Libor-OIS is relevant on two time horizons: between now and December 31st, 2018, and between January 1st and March 31st, 2019.

First, our forecast for Libor-OIS to widen out to 50 bps can be off if there is a large equity market correction or rally between now and year-end – for whatever macro reason.

Second, what Libor-OIS does after the December 31st turn will also depend on stocks. Japanese year-end rebalancing flows typically start around mid-February and the impact that that will have on three-month Libor-OIS are clear and obvious – wider, not tighter.

But whether widening starts before mid-February – and, correspondingly, whether the current episode of widening will extend into next year – is up to how stocks do from here.

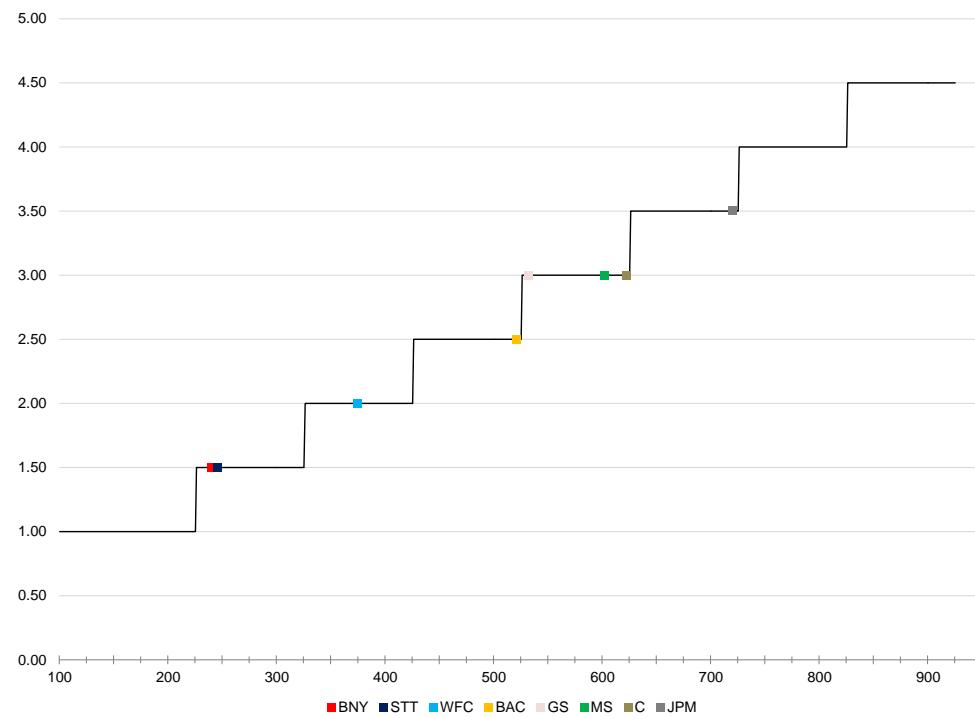
Stock market dynamics are now relevant for STIR markets – they were not relevant before.

Stock market dynamics constitute a change in the rules of the game – beware of that.

² Early 2016 has seen a stock market correction as well, but back then prime money funds were still a deep source of liquidity for the CD and CP markets and temporary pullbacks by seclenders had much less of an impact on Libor.

Figure 1: Borderline

U.S. G-SIB's scores (horizontal axis, unitless) and surcharge buckets (vertical axis, %) as of 17Q3



Source: FR Y-15, Credit Suisse

Figure 2: Foreign Bank Issuance

\$ billion

ALL CURRENCIES BY COUNTRY OF RISK

Issue Date	Total	CA	JP	DE	FR	SE	AU	GB	NL	HK	NO	Others
2018 Quarter 1	424,754,086,925	58,958,799,971	41,698,356,054	35,470,310,520	49,364,891,488	30,623,581,400	41,560,119,126	52,776,738,690	24,696,321,224	7,509,833,200	11,727,126,450	70,368,008,802
2017 Quarter 4	317,818,620,476	48,646,742,287	45,127,153,579	23,103,437,403	27,084,165,616	21,175,362,795	22,319,697,593	28,239,591,910	9,153,187,838	14,696,788,385	9,584,709,393	68,687,783,677
2017 Quarter 3	301,248,994,903	65,208,210,550	54,848,204,170	20,674,360,990	14,350,841,874	16,303,938,700	26,642,571,565	21,331,294,600	11,476,197,890	7,090,855,180	4,488,034,284	58,834,485,100
2017 Quarter 2	295,803,121,372	47,708,176,226	35,415,598,811	29,363,271,796	31,542,143,653	25,708,151,550	17,447,469,760	29,197,839,320	10,287,148,711	6,687,004,350	4,059,012,025	58,387,305,170
2017 Quarter 1	382,021,668,690	69,489,830,320	45,418,224,567	38,710,549,972	35,784,191,917	24,168,896,900	33,968,623,847	37,173,143,705	26,818,482,000	4,620,957,493	11,062,053,090	54,806,714,879

ALL CURRENCIES BY CURRENCY OF ISSUANCE

Issue Date	Total	USD	EUR	NOK	GBP	AUD	JPY	HKD	SEK	CAD	CHF	Others
2018 Quarter 1	424,754,086,925	198,124,340,000	155,914,748,076	3,136,720,000	30,736,335,700	12,179,328,260	6,415,004,140	2,727,366,766	2,010,729,500	9,007,672,875	2,166,524,250	2,335,317,358
2017 Quarter 4	317,818,620,476	162,201,621,000	95,443,353,634	2,775,554,525	14,135,501,550	10,651,454,700	10,282,524,672	4,247,584,333	6,167,091,950	8,030,782,755	2,696,064,750	1,187,086,607
2017 Quarter 3	301,248,994,903	161,305,533,000	81,886,993,642	3,469,017,484	13,332,906,640	13,885,925,240	11,204,079,687	3,186,502,654	187,218,500	8,885,519,350	1,036,942,540	2,868,356,166
2017 Quarter 2	295,803,121,372	146,827,518,000	95,510,759,574	8,839,603,075	12,603,130,500	4,527,863,934	9,386,031,424	2,624,431,940	1,915,590,450	8,813,510,266	1,762,767,000	2,991,915,209
2017 Quarter 1	382,021,668,690	197,775,100,000	123,514,250,092	3,078,380,296	14,736,695,140	13,221,587,554	12,680,016,787	1,717,067,869	3,505,730,400	7,390,810,220	1,664,977,980	2,737,052,353

ALL CURRENCIES BY PAYMENT RANK

Issue Date	Total	Sr Unsecured	Secured	Subordinated Unsecured	Jr Subordinated Unsecured	1st Lien Secured
2018 Quarter 1	424,754,086,925	316,504,879,620	77,314,106,370	19,502,954,935	11,432,146,000	
2017 Quarter 4	317,818,620,476	238,016,223,808	55,153,255,648	9,848,267,880	14,435,715,140	365,158,000
2017 Quarter 3	301,248,994,903	236,699,312,864	37,342,058,400	14,361,149,939	12,275,488,700	570,985,000
2017 Quarter 2	295,803,121,372	224,824,694,670	41,908,486,490	15,651,858,750	13,268,091,400	149,990,063
2017 Quarter 1	382,021,668,690	293,485,430,513	61,992,697,050	18,474,464,627	7,853,404,500	215,672,000

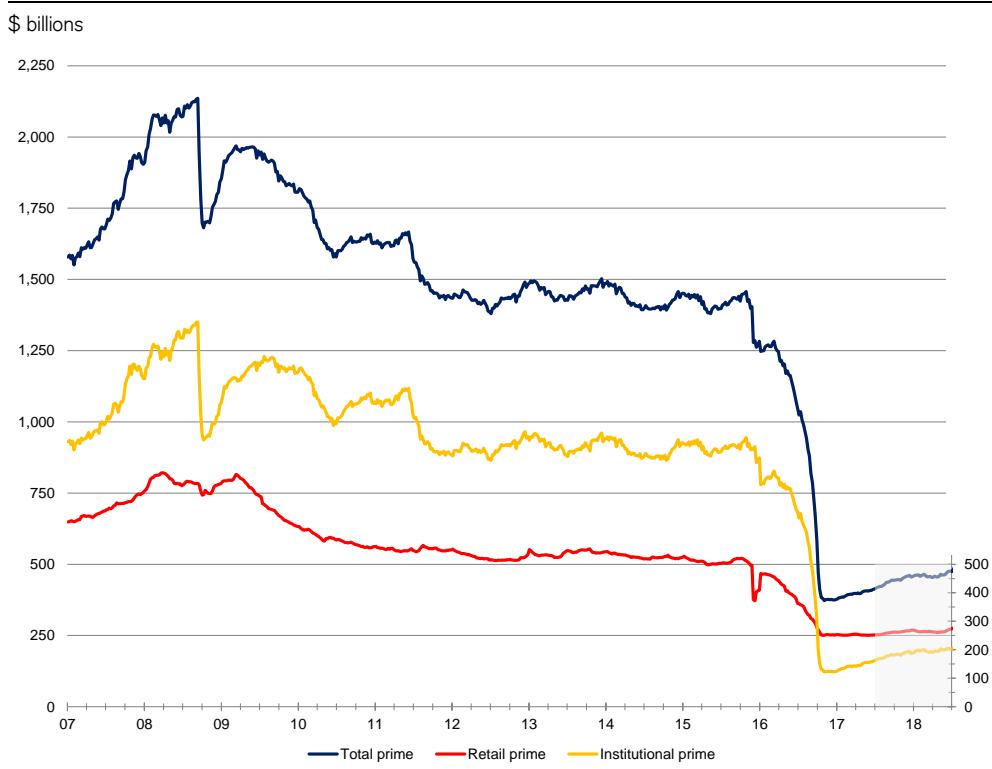
ALL CURRENCIES BY ORIGINAL MATURITY (YEARS)

Issue Date	Total	0 TO 0.33	0.33 TO 0.67	0.67 TO 1.33	1.33 TO 2.33	2.33 TO 3.33	3.33 TO 5.33	5.33 TO 7.33	7.33 TO 10.33	10.33 TO 15.33	Others
2018 Quarter 1	424,754,086,925	7,532,942,372	82,631,344,600	51,486,350,435	20,704,675,580	34,841,174,862	80,752,205,881	43,583,150,287	58,969,387,887	20,029,669,190	24,223,185,830
2017 Quarter 4	317,818,620,476	11,786,362,727	65,849,422,692	39,822,729,535	13,548,093,200	26,567,340,532	52,296,047,833	41,900,629,576	34,275,367,437	14,049,919,686	17,722,707,258
2017 Quarter 3	301,248,994,903	4,099,185,890	67,262,892,470	53,788,814,540	20,054,009,950	26,561,460,596	54,067,169,344	18,632,850,574	24,426,605,439	11,677,984,900	20,678,021,200
2017 Quarter 2	295,803,121,372	5,040,405,956	62,291,128,570	34,520,085,805	18,344,318,469	25,053,983,398	51,486,384,880	33,824,984,062	29,751,020,653	14,068,751,930	21,422,057,650
2017 Quarter 1	382,021,668,690	5,416,062,810	67,218,301,060	43,201,282,226	27,232,230,774	28,607,618,173	95,830,806,515	32,773,934,698	43,388,466,529	18,410,282,550	19,942,683,355

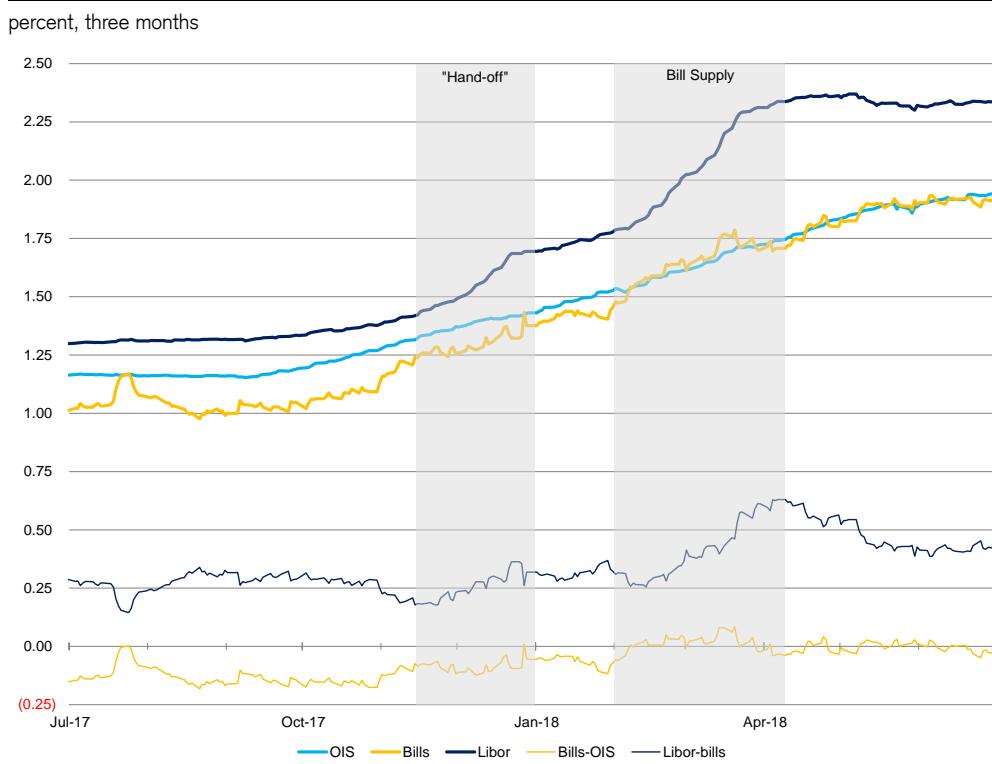
USD ONLY BY ORIGINAL MATURITY (YEARS)

Issue Date	Total	0 TO 0.33	0.33 TO 0.67	0.67 TO 1.33	1.33 TO 2.33	2.33 TO 3.33	3.33 TO 5.33	5.33 TO 7.33	7.33 TO 10.33	10.33 TO 15.33	Others
2018 Quarter 1	198,124,340,000	6,472,600,000	83,788,170,000	33,416,800,000	5,553,870,000	16,857,900,000	15,450,000,000	8,085,000,000	9,650,000,000	4,635,000,000	16,215,000,000
2017 Quarter 4	162,201,621,000	7,595,600,000	62,139,820,000	31,338,333,000	9,075,800,000	15,363,868,000	7,638,000,000	8,570,000,000	5,407,200,000	8,000,000,000	7,073,000,000
2017 Quarter 3	161,305,533,000	2,440,800,000	64,510,850,000	40,282,541,000	12,005,429,000	11,444,113,000	17,855,000,000		6,900,000,000	419,800,000	5,447,000,000

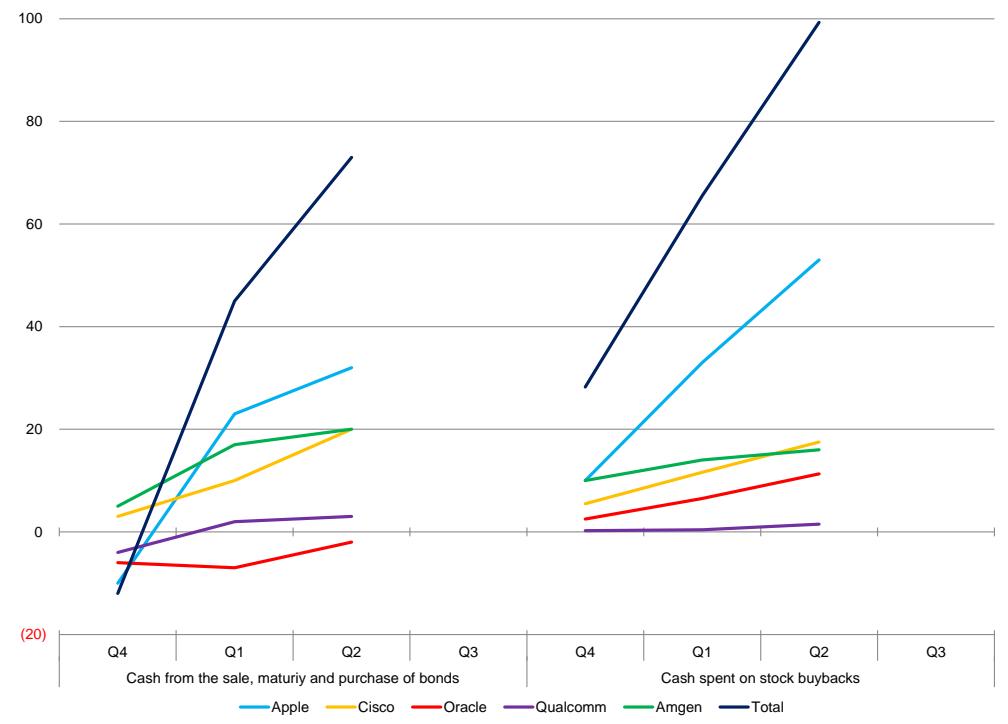
Source: Credit Suisse

Figure 3: No Inflows Into Prime Funds During the First Half of 2018

Source: ICI, Credit Suisse

Figure 4: Bills Crowd Out Unsecured Bank Funding

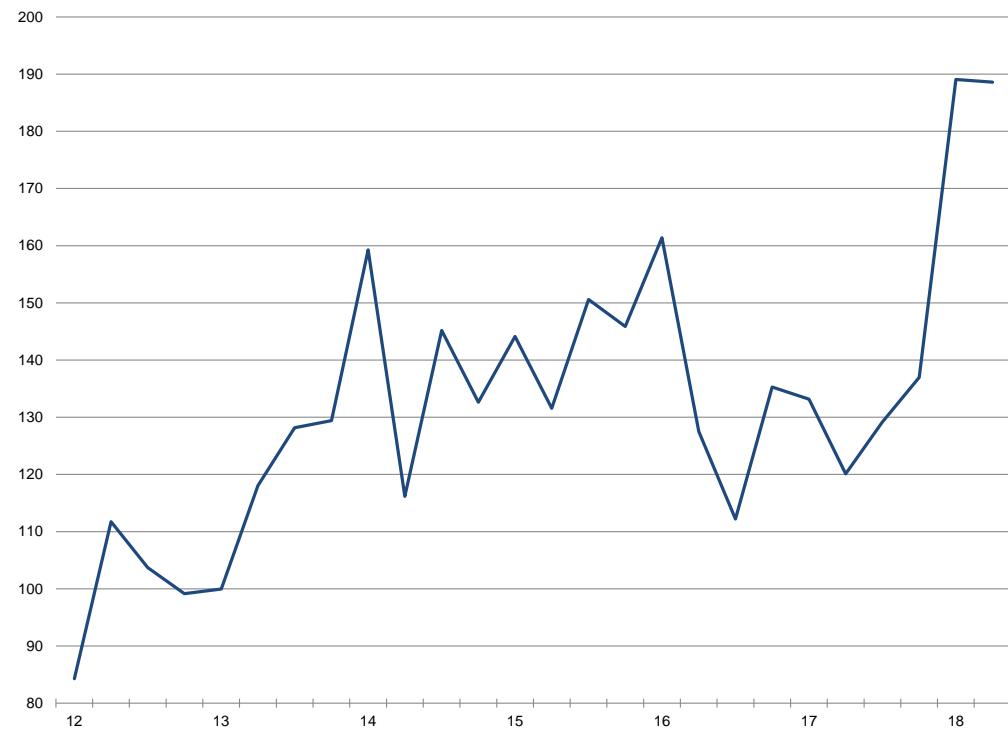
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 5: Cash Raised from Investing Activities and Buybacks\$ billion, nine months ending June 30th, 2018

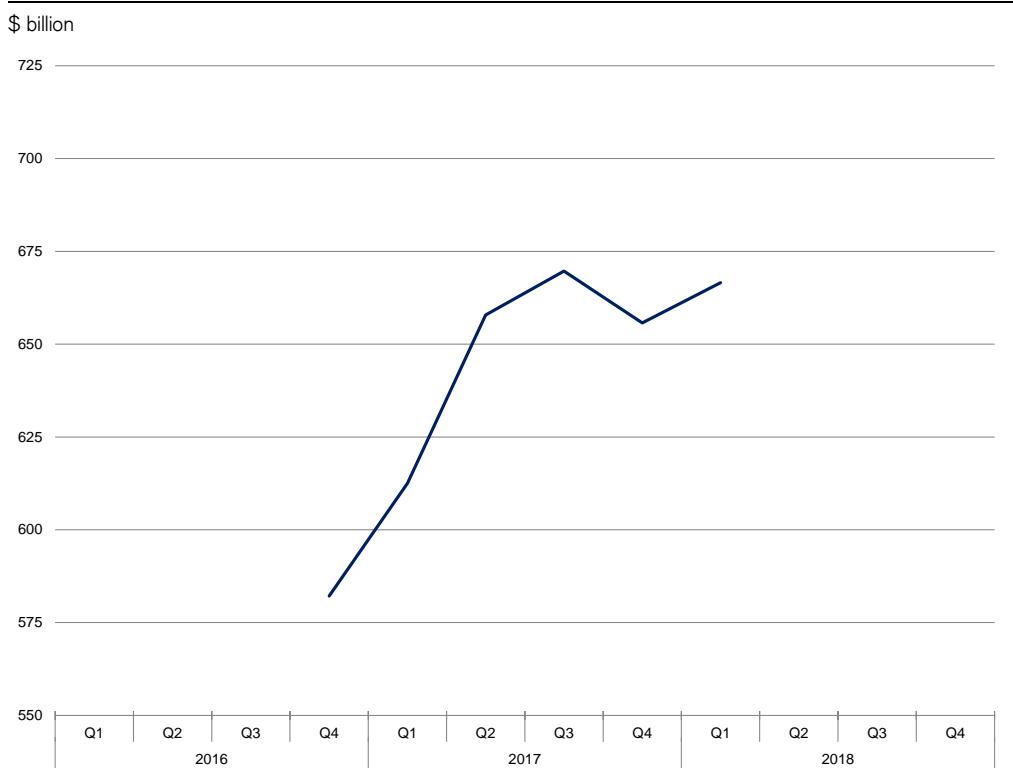
Source: Company reports, Credit Suisse

Figure 6: Buybacks Are at a Record

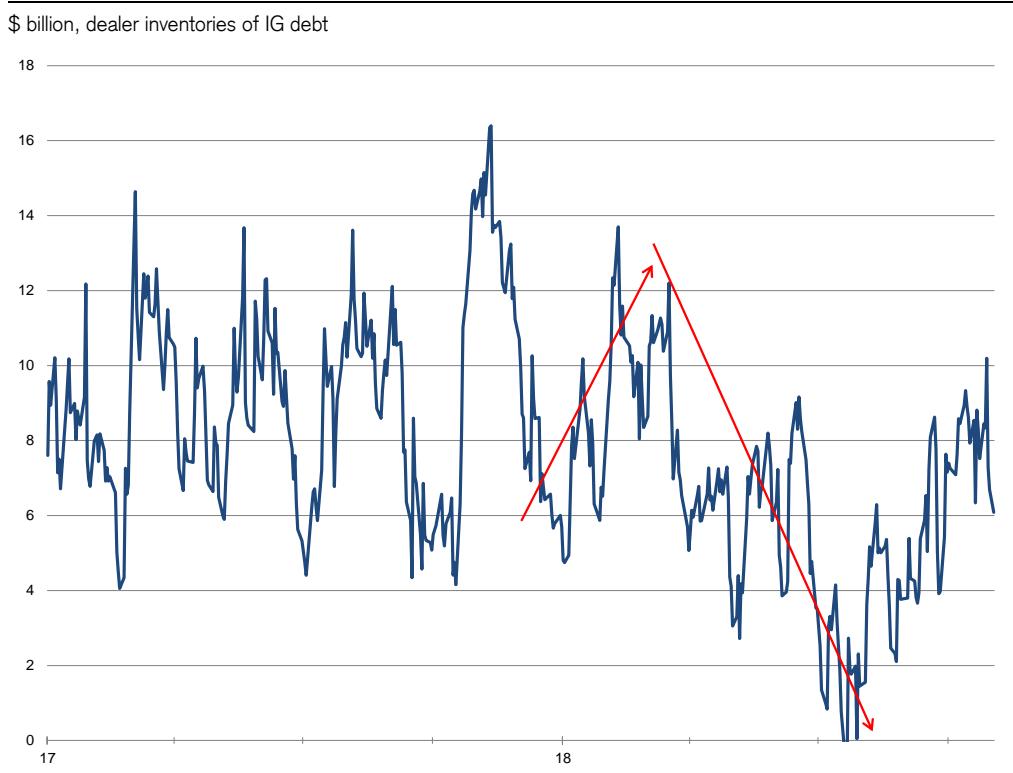
\$ billion, S&P500 corporations



Source: Credit Suisse

Figure 7: Seclenders' Cash Collateral Reinvestment Volumes Stall

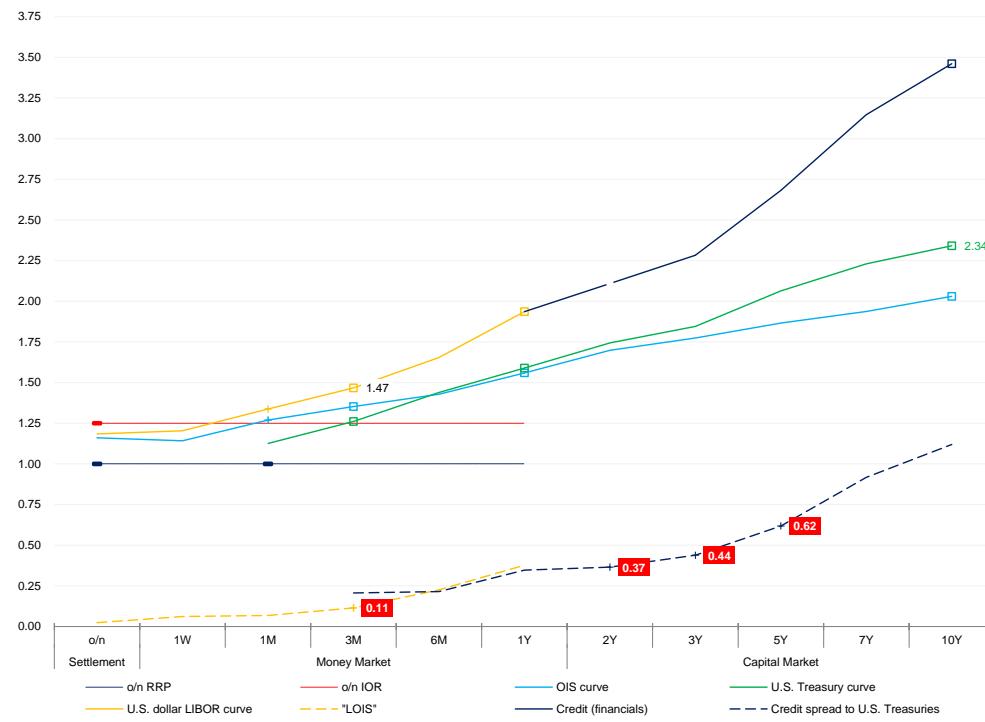
Source: RMA, Credit Suisse

Figure 8: Dealers' IG Inventories Increase

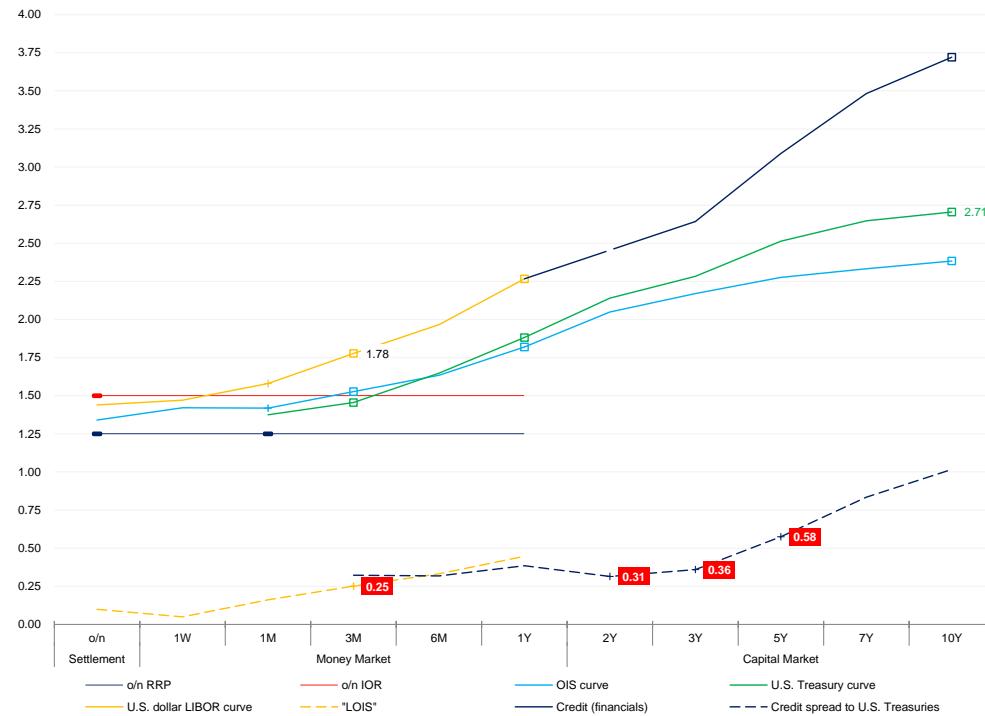
Source: Credit Suisse

Figure 9: The Calm Before the Storm

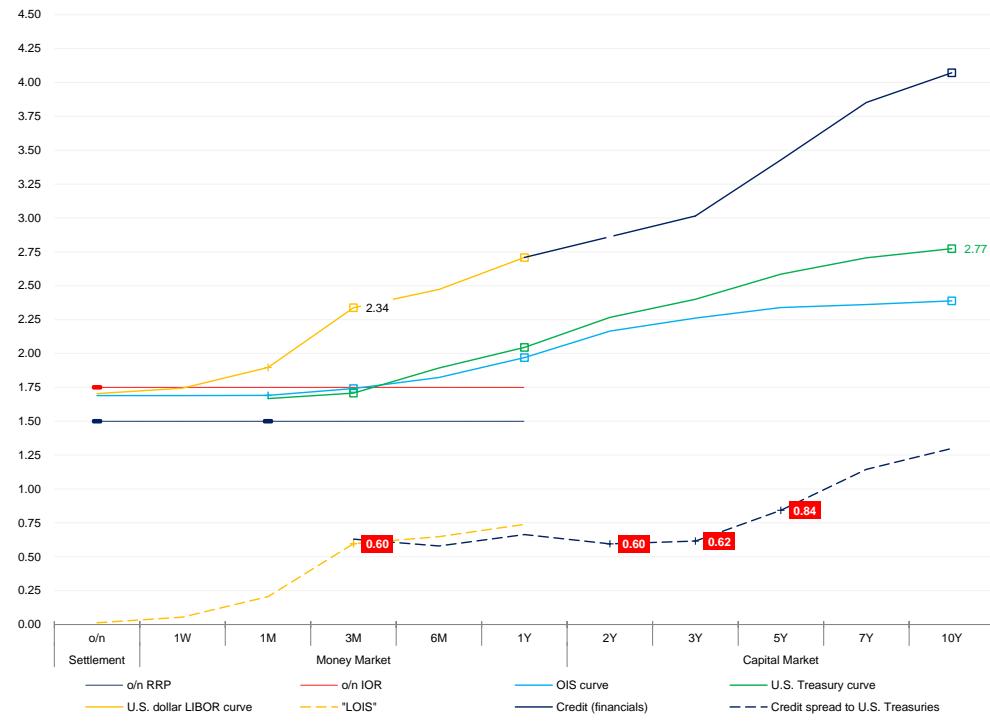
percent, as of late November, 2017, just before the Libor-OIS move started



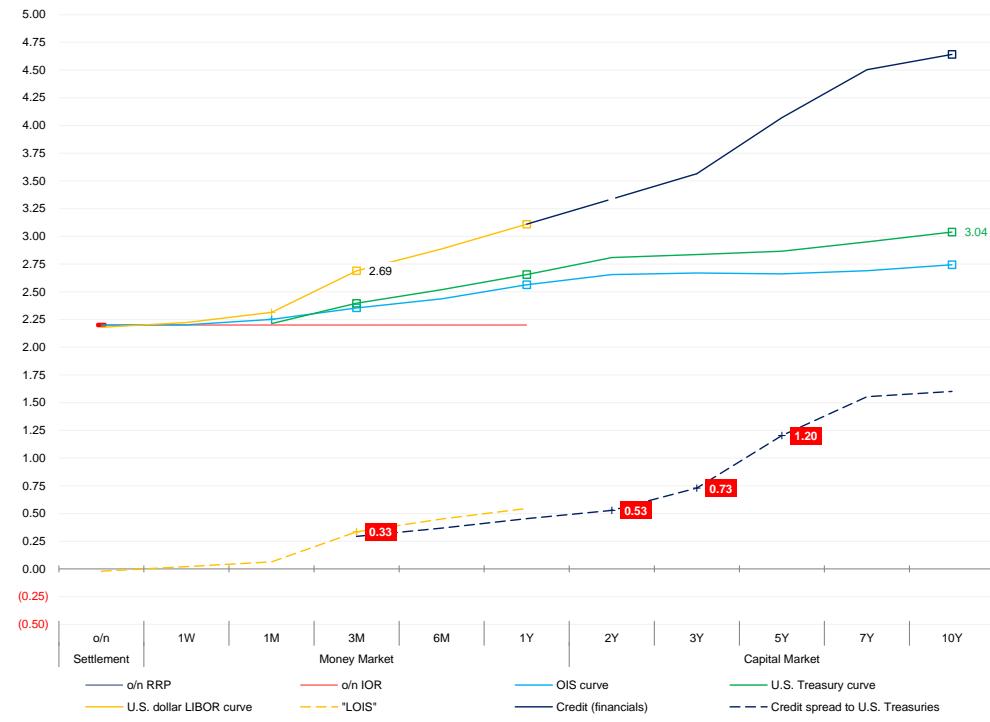
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 10: The Damage of “Hand-Off” and Defensive Pre-Fundingpercent, as of January 31st, 2018, just before bill supply and secondary flows of IG debt start to hit Libor-OIS

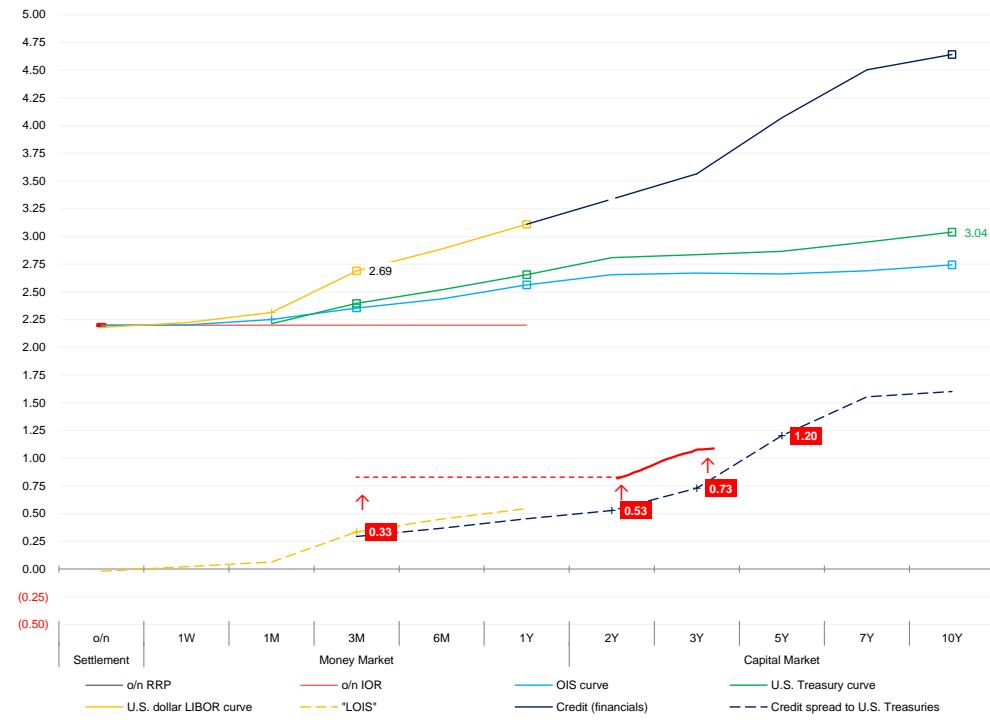
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 11: Spreads Flatten, Libor-OIS Stops Wideningpercent, as of April 6th, 2018, the day three-month Libor-OIS peaked

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 12: Libor-OIS Is Widening Againpercent, as of November 23rd, 2018

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 13: Risks to the Backstop Bidpercent, as of November 23rd, 2018

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

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Global Money Notes #20

Lost in Transmission

There's something wrong with prices in funding and bond markets currently.

The net supply of U.S. Treasuries will increase by over \$1 trillion this year, and foreign FX hedged buyers will have to buy a large portion of this supply. But the curve is currently inverted relative to hedging costs, and foreigners won't increase purchases unless the curve re-steepens relative to FX hedging costs.

The required adjustments are huge – at least 100 bps.

For the 10-year to be attractive relative to other G7 bonds on a hedged basis, yields would have to back up to at least 3.5% and more realistically to 4.0%; alternatively, three-month FX hedging costs would have to come down to 2.0%, either through positive cross-currency bases, much lower bill yields or rate cuts.

Yet markets do not expect any of this for 2019.

First, the market expects the 10-year yield to stay roughly at its current level; second, the market expects core cross-currency bases to widen, not tighten; third, the market expects Libor-OIS spreads to tighten, but only marginally; and fourth, the market does not expect either a reverse twist or rate cuts by the Fed.

If none of this will happen, the curve won't re-strengthen relative to funding costs, primary dealers will continue to struggle with growing Treasury inventories and lean heavily on the o/n GC repo market to fund their inventories, which in turn will push large U.S. banks' reserve balances to the limits of their flexibility – the Fed would have to end taper prematurely and launch an o/n repo facility.

But the market does not expect that either! Something just does not add up...

We expect the Treasury curve to re-strengthen relative to hedging costs this year mostly through adjustments in funding markets: through cross-currency bases trading positive, Libor-OIS reaching post-Basel III tights at 10 bps by June, and bill yields trading well below OIS – not as much due to changes in supply, but due to increased demand that will come from positive cross-currency bases.

These adjustments can of course happen without any help from the Fed. However, if the Fed chooses to aid these adjustments so it can taper for longer, the moves could be even bigger – Libor-OIS could even go negative by June.

Either way, this can be the year when the Fed, after a decade of absence, gets active in money markets again – either as a buyer of bills or a repo lender.

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The U.S. fixed income market will have to deal with four uncomfortable facts in 2019:

- (1) The net supply of U.S. Treasuries will increase by over \$1 trillion...
- (2) ...and the U.S. needs foreign investors to buy a share of new supply. But...
- (3) ...foreign official buyers are no longer voracious buyers of Treasuries, and...
- (4) ...foreign private buyers are unlikely to buy either due to FX hedging costs.

Foreign investors are still important buyers of Treasuries on the margin, but the switch from foreign official accounts to foreign private accounts as dominant marginal buyers has changed the economics of funding the U.S.'s twin federal and current account deficits.

Foreign official accounts managed FX pegs and bought Treasuries to manage those pegs – at whatever cost. Because foreign official accounts were in the business of absorbing FX risk, they didn't hedge their Treasury portfolio and so didn't care about hedging costs.

Foreign private accounts are a completely different story. Foreign private accounts' mandates do not allow for much of any FX risk and so hedging costs have a big impact on whether foreign private investors buy U.S. Treasuries or other bonds available globally.

Foreign official accounts were price insensitive – it took no effort to keep them.

Foreign private accounts are price sensitive – it will take an effort to keep them.

Just as a global bank's treasurer constantly calibrates a bank's funding profile to adjust to changes in the fabric of global funding markets – whether due to money fund reform or corporate tax reform – the U.S. government should now focus more carefully on how to entice price sensitive foreign investors to fund the growing federal deficit on the margin.

New global funding arrangements suggest that the U.S. Treasury should now tweak its debt management practices and the Fed should consider new factors when setting rates: the optimal mix between bills and coupons at auctions and in the Fed's SOMA portfolio; the impact that rate hikes have on FX hedging costs and the slope of the Treasury curve relative to the slope of other core government curves globally should be taken into account when thinking about the U.S.'s funding needs – at least to some degree (also see [here](#)).¹

But currently they aren't, and because they aren't, flows are changing. Foreign investors and even some U.S. investors have started to leave the Treasury market on the margin!

Everything that will transpire in global funding and rates markets in 2019 will come down to how long-term U.S. Treasury yields and FX hedging costs will adjust from here, such that foreign investors up their funding of the U.S.'s growing federal deficits again.

Depending on whether the adjustment comes from much higher long-term Treasury yields or much lower hedging costs means different things for risk assets and funding markets.

Sharply higher Treasury yields mean nothing good for equities and credit or the outlook.

Sharply lower hedging costs are good for risk assets, but imply a trading regime for funding markets that's very different from the trading regime of the past four years – one where cross-currency (XCCY) bases are positive, not negative, and where Libor-OIS trades tight, not wide, with a risk that Libor-OIS spreads may even go negative this year.

¹ That TBAC and the Debt Management Office of the U.S. Treasury should care about all this is clear and obvious. Whether the Fed should care about the government's funding costs and if that's consistent with its mandate is a more complex question, but we think the answer is a definite yes. We'll discuss this later, in Part IV of our analysis.

These changes would of course change banks' global issuance patterns dramatically – less issuance in dollars and more issuance in yen, euros, sterling and other currencies.

They would also re-draw the pattern of global portfolio flows – foreign investors would re-direct their flows toward the U.S. once again, at the expense of German and French government bonds, as well as Australian government bonds and Danish covered bonds.

Importantly, we do not expect spot FX rates to absorb any of the needed re-alignments, as in a world where flows are increasingly hedged on the margin, adjustments are borne by forward FX rates. That said, similar to how the spot FX rate would have to weaken for a country that needs to attract foreign buyers on the margin, in a world of hedged flows, her forward FX rates would have to weaken – and that's what positive XCCY bases mean!

This issue of Global Money Notes has five parts to it.

Part one explains why the U.S. used to be a magnet for global portfolio flows until 2017, and why the Fed's rate hikes changed that – why hikes drove capital away from the U.S., and how this flip-flop in flows changed global funding market dynamics in recent quarters.

Part two explains why traditional measures of Treasury curve inversion are meaningless in a post-Basel III world, and shows that the curve has been inverted for the past six months.

Part three explains why the Treasury curve has to re-strengthen and asks whether markets should be left alone to adjust or if Treasury or the Fed should play a role in the process.

Part four explains why it's consistent with the Fed's normalization principles to help the curve re-strengthen either through a reverse twist or by capping the foreign repo pool.

Part five concludes by explaining why positive cross-currency bases to U.S. dollar Libor are the most likely avenue through which the inversion will be fixed, and how structurally positive cross-currency bases would impact funding and rates market dynamics globally.

Part I – Rate Hikes and Capital Flows

Just two years ago, Japanese banks and life insurers were the main buyers of Treasuries, alongside real money accounts from other negative rate jurisdictions such as Germany, France, the Netherlands, Switzerland and a handful of smaller countries in Scandinavia.

Due to these accounts' persistent bid for Treasuries, Treasury auctions always went well, and, because their mandate did not allow for FX risks, these accounts bought Treasuries on a hedged basis.² As such, post-auction funding pressures typically showed up in the FX swap market – three-month cross-currency bases between the U.S. dollar and the yen, euro, Swiss franc and Scandinavian currencies were drifting more negative as the stock of Treasuries held by foreign investors grew and the associated stock of hedges that had to be rolled every three months grew too. For example, Japanese life insurers' stock of dollar hedges doubled since 2015 and rose to \$1 trillion by 2017 (see Figure 1).

Widening cross-currency bases were symptomatic of a global dollar funding market where demand for dollars via FX swaps was greater than the supply of dollars via FX swaps, and the dominant arbitrage trade of the day was banks raising dollars in other funding markets on the margin to bridge that imbalance. These arbitrage trades initially pressured spreads in term unsecured markets, with three-month U.S. dollar Libor moving around the most, but after money fund reform, the funding of arbitrage trades shifted over to repo markets and collateral upgrade swaps became the main channel to source U.S. dollars (see [here](#)).

² Some accounts could take some FX risk, but as a rule of thumb, most foreign investors hedged most of their FX risk.

As cross-currency bases widened, more and more lenders of dollars in money markets were attracted by the spread that lending dollars via FX swaps offered over Treasury bills: several central banks and treasurers at hedge funds and asset managers changed their portfolio guidelines so they could lend dollars via FX swaps to earn this spread (see [here](#)).

This extra supply of dollars in the FX swap market brought supply more in line with demand, and as the flows became more matched, cross-currency bases stopped widening and started to tighten. Global banks' and dealers' need to bridge imbalances in order flows via arbitrage diminished, and with that came less pressure on U.S. dollar Libor and repo rates.

Figure 2 shows the three-month \$/¥ cross-currency basis over time.

Like most other cross-currency bases, the three-month \$/¥ basis has been grinding more and more negative during 2015 and 2016, just as Japanese real money investors' stock of hedging needs rose. It then turned sharply less negative coming into 2017, as flows in the FX swap market became more matched and the funding of arbitrage trades post-money fund reform shifted from unsecured markets to the cheaper o/n repo market.

Importantly, the backdrop to widening cross-currency bases – which lasted until 2017 – was a steep Treasury curve. Figure 3 shows that the spread between 10-year notes and three-month bills (henceforth 3s/10s) was a steep 250 basis points (bps) back in 2015 – and with that slope, the Treasury curve was the steepest core government curve globally: 3s10s spreads were 50 bps in Japan and slightly over 100 bps in Germany and France.

The Treasury curve was steep relative to all other G7 government curves and beyond: Figure 4 shows that spreads in Canada and the U.K. were 50 and 150 bps, respectively, and Figure 5 shows that 3s/10s spreads in Switzerland and Scandinavian countries were about 50 and 150 bps, respectively. The Treasury curve remained the steepest curve globally until the Fed began to accelerate rate hikes in early 2017 (more on this below).

With the Treasury curve 100-200 bps steeper than other core government curves, foreign buyers' appetite for U.S. Treasuries was understandable and, as a rule of thumb, how negative cross-currency bases traded was a good barometer of how desperate foreign investors were to dump their local currency to buy dollar assets on a hedged basis – the flatter the local curve was, the more eager local investors were to swap the low-yielding local currency for dollars, the more negative the cross-currency basis would go.

For example, with the Japanese government curve being the flattest core curve in 2015, the \$/¥ basis was the most negative cross-currency basis in 2015, meaning that the desire to lend the local currency and buy dollars was strongest in Japan (see Figure 6).

German and French curves were a bit steeper than the Japanese government curve, so the €/\$ basis was trading at less negative spreads than the \$/¥ basis – while Europeans were desperate to get rid of euros, they were relatively less desperate than the Japanese.

The U.K. curve was steeper than either of the above curves, and correspondingly, the £/\$ basis was the least negative among the core cross-currency bases back in 2015.

The acceleration of the Fed's interest rate hikes starting in 2017 changed everything.

The Fed hiked interest rates eight times for a cumulative 200 bps, which wiped out the global "slope" advantage of the Treasury curve and dramatically increased hedging costs – while in the beginning of 2017, the Treasury curve was still the steepest curve globally, by the end of 2018, it became the flattest curve globally (see Figures 3, 4 and 5 above).

Figure 7 shows the Fed's impact on FX hedging costs.³

³ FX Hedging costs are not uniform across currencies. We use yen-based hedging costs as a benchmark example.

Money markets are like a cake – sponge, cream, sponge, cream...

Hedging costs are the sum of three distinct funding market components: U.S. dollar OIS, the U.S. dollar Libor-OIS spread, and the cross-currency basis to U.S. dollar Libor.⁴

During 2015 and 2016, the “frontier” in funding markets was the cross-currency basis, and, as discussed above, the widening of cross-currency bases routinely bled through to wider Libor-OIS spreads as banks tapped unsecured markets to arbitrage imbalances in the FX swap market. These “add-on” spreads – Libor-OIS and cross-currency bases – on top of U.S. dollar OIS were the dominant component of FX hedging costs back then.

During 2017 and 2018, the dynamics changed. OIS started to rise dramatically as the Fed accelerated the pace of rate hikes, and OIS became the dominant component of hedging costs. The add-on spreads had to shrink in a relative sense, as a dramatically flatter Treasury curve didn’t leave much room for foreign investors to pay up for hedges.

As the Fed’s interest rate hikes piled up the OIS component of hedging costs rose, the U.S. Treasury curve flattened, and, when adding hedging spreads on top of OIS (Libor-OIS and cross-currency bases to Libor), hedging costs practically converged with, and, by the end of 2018, even exceeded the 10-year Treasury yield – Treasury yields, on a hedge-adjusted basis got flat to negative relative to the abysmal local yields that Japanese and European portfolio investors have been trying to escape in the first place!

Once convergence occurred, foreign portfolio investors had no choice but to go down the global rates, credit and liquidity spectrum – they bought IG credit and CLOs in the U.S., and, to diversify away from credit, they started to buy safe, steep and cheaper to hedge core government bond curves elsewhere (for example Germany, France and Spain), but also safe, steep, and cheaper to hedge but relatively illiquid curves on the periphery (for example Australian government bonds and Danish and Swedish covered bonds).⁵

Sticking with Japanese portfolio investors as our benchmark example, Figures 8 and 9 shows the dramatic change in Japanese portfolio flows since the Fed started to hike rates. The net impact of these changing flows has been an inflection point in the global demand for dollars in the FX swap market: less demand, not more, relative to 2015 and 2016.

Thus, just as the financial system was getting more efficient at providing dollars to the FX swap market to feed the hedging needs of foreign investors, the acceleration of hikes from 2017 onwards started to sap foreign portfolio investors’ demand for dollar assets and associated dollar hedging needs. This explains why – apart from year-end turns – the \$/¥ and €/\$ bases have been steadily grinding tighter during the Fed’s hiking cycle.

One lesson from our analysis so far is that the relative slope of core curves matters and that hedging costs matter too. Rate hikes can push the U.S. rates market in a corner if they flatten the curve and if hedging costs deter, rather than attract foreign capital flows!

One “dirty” downside of the Fed’s current hiking cycle to date is that hikes have been pushing foreign portfolio flows away from the U.S. on the margin – not attracting them.

The Treasury curve going from the steepest government curve to the flattest globally had a drastic impact on the demand for Treasuries at auction and how funding markets trade.

In a remarkable contrast to two years ago, foreign buyers are routinely absent from Treasury auctions, and primary dealers are routinely stuck with Treasuries after auction, which take considerable time and effort to work through and distribute to end-investors.

⁴ We can ignore the local currency funding bit of hedging costs currently, as they are static and negligible everywhere.

⁵ European investors stayed home to buy local curves and Japanese investors bought European bonds using hedges.

Importantly, just as foreign investors are staging a buyer's strike, the size of auctions is getting bigger for two reasons: growing federal deficits and the Fed's balance sheet taper.

In 2018, primary dealers' inventories of Treasuries expanded by about \$150 billion – which was \$150 billion that the rest of the world used to buy, but currently couldn't due to hedging costs. Some of these Treasuries came from net new Treasury issuance and some from balance sheet taper. When we include the taper of the agency MBS portfolio, there is an additional \$50 billion increase in dealer inventories from taper (see Figure 10).

Thus, primary dealers' inventories of Treasuries and agency MBS increased by roughly \$200 billion last year, because foreign buyers, in sharp contrast to the recent past, can no longer buy these assets on a hedged basis. Primary dealers getting routinely stuck with new supply of Treasuries and agency MBS in turn changed funding market dynamics.

Two years ago, when foreign private buyers took down the bulk of Treasuries at auction, funding pressures showed up in the FX swap markets and related arbitrage activities as foreign buyers had to hedge their Treasuries back to yen, euro and other currencies.

Today, when primary dealers get routinely stuck with the bulk of Treasuries after auction, funding pressures show up in the repo market as dealers scramble to fund inventories.

This pendulum swing from Treasuries ending up mostly with end-investors funding at the three-month point in the FX swap market to Treasuries getting stuck in inventory with dealers having to fund them in the repo market is what's behind the shift in funding market dynamics in recent quarters. While it may seem odd that cross-currency bases are "asleep" while the repo market is trading stressed occasionally, that's no more odd than the Northern hemisphere braving a polar vortex while Australia is fighting serious wildfires.

What climate change is to weather patterns, curve slopes are to funding patterns...

The arbitrage trades banks are engaged in are also different from the previous regime.

Two years ago, global banks were busy deploying reserves in their HQLA portfolios to harvest deeply negative cross-currency bases, or, alternatively they tapped unsecured and secured markets to raise dollars to lend in the FX swap market on the margin (see [here](#)).

Today, global banks are busy deploying reserves from their HQLA portfolios to harvest o/n GC repo rates trading above the IOR rate as dealers scramble to fund their inventories.

Figure 11 shows a massive increase in large banks lending their excess reserves in the o/n GC repo market during the final months of 2018, which is precisely when whatever residual steepness there was left in the Treasury curve suddenly collapsed, hedging costs eclipsed the entire Treasury curve, the foreign marginal bid completely vanished, and dealers' inventories of Treasuries started to pile up as dealers became the marginal buyer.

Figure 11 is the conceptual equivalent of Figure 1 – both show surging funding needs, or more precisely, the surging funding needs of the marginal buyer of U.S. Treasuries.

Two years ago, the marginal buyer was a foreign hedged buyer whose funding needs pressured the three-month point in the FX swap market on the margin (see Figure 12).

Today, the marginal buyer is a primary dealer whose funding needs pressure the o/n point in the GC repo market on the margin. Figures 11 and 12 explain everything you need to know to understand why repo is trading stressed while cross-currency bases are "asleep".

In two years, the U.S. has gone from having the steepest government curve to having the flattest government curve; from attracting foreign portfolio flows to deflecting foreign flows; from the dollar being scarce in global funding markets, to the world swimming in dollars; from end-investors buying Treasuries at auction, to Treasuries getting stuck with dealers.

We went from a system that "flew", to a system that stalled...

Part II – Measures of Inversion

Planes stall when their nose is pulled too high – i.e., when the body of the plane “inverts”.

We haven’t mentioned inversion in the prior section explicitly, but a key point we’ve made implicitly is that the Treasury curve outright inverted during the final months of 2018 – relative to foreign investors’ FX hedging costs. So much for the market’s obsession of waiting for when the curve will invert, and what that inversion will mean for the outlook.

A far more important question is what inversions mean for the flow of Treasury collateral – do auctions go well or do they “stall”. All else follows from there, as we will explain below.

Historically, inversions were measured by tracking the 3s/10s spread, but recently the market started to track inversions using the 2s/10s spread instead – the spread between 2-year and 10-year Treasuries. But this measure is flawed and misleading, in our view.

Historically, tracking inversions using 3s/10s had meaning to them because funding rates – Libor, repo and hedging costs – all traded at fairly tight spreads to three-month bills, and so the three-month bill yield was a reasonable proxy for investors’ funding costs. In a post-Basel III financial order, however, such comparisons are largely meaningless, as effective funding costs can at times be much higher than bill yields, as shown above.

But switching from 3s/10s to 2s/10s is not a reasonable solution as no one funds at the 2-year Treasury yield, and 2s/10s says nothing about foreign demand for Treasuries, and as we’ve explained in the previous section, given that the U.S. is a borrower country, flows from foreign investors are imperative for the U.S. to fund its growing twin deficits.

More precisely, with foreign official demand on the wane, foreign private demand is now an important part of funding the deficits, and foreign private demand comes only on an FX hedged basis, and only if yields are right relative to FX hedging costs on the margin!

Inversions – defined as three-month hedging costs trading above the 10-year yields (henceforth “3FXs/10s”) – imply that hedging costs and yields are grossly misaligned. Figure 13 shows the traditional, the new and our preferred measures of inversion, that is, 3s/10s, 2s/10s and 3FXs/10s (based on both yen and euro) spreads, respectively: while the traditional and new spread measures suggest that inversion has yet to occur, our measures show that we’ve been living with a curve inversion for the past four months!

The rest of this section describes how misaligned U.S. funding and capital markets currently are, and how unattractive the Treasury curve is relative to other curves globally.

Figure 14 shows the anchors of U.S. rates markets – the o/n RRP rate, the IOR rate and the top of the Fed’s target range for the overnight rates complex. These anchors have gone from practically zero at the end of 2016 to as high as 2.25% - 2.50% as of today.

Figure 15 shows the OIS curve and the Treasury curve. Both curves are extremely flat – as discussed above, the Treasury curve is currently the flattest core curve globally!¹⁶

Figure 16 shows money market (that is, funding) curves relative to capital market curves: the GC repo curve and the U.S. dollar Libor curve. The position of these curves relative to the Treasury curve actually makes traditional measures of curve flatness look even worse.

Figure 17 brings three-month FX hedging costs into the picture.

The red square shows the hedging cost of investors that swaps yen for U.S. dollars, and the blue square shows the hedging cost of investors that swaps euros for U.S. dollars.

¹⁶ For the sake of completeness, Figure A1 in the appendix shows the swap curve alongside the Treasury curve and the asset swap curve. No matter how one looks at it, the curve is very flat in both an absolute and a relative sense.

Hedging costs are the highest for yen-based portfolio investors: at close to 3.0%, yen-based hedging costs are above the 10-year yield – the inversion we've noted above. Hedging costs are somewhat lower for euro-based portfolio investors, but only marginally.

Figure 18 draws a straight line at the current levels of three month GC repo, unsecured and yen and euro-based hedging costs across the entire term structure to show where funding costs are relative to the 10-year yield. In the lower right area, we show spreads earned by various investors that buy the 10-year and fund at various three-month points:

- (1) for an asset manager forgoing the three-month bill yield the spread is 35 bps;
- (2) for a bank funding at the three-month Libor rate, the spread is nil;
- (3) for an investor hedging euros for dollars for three months, the spread is -5 bps;
- (4) for an investor hedging yen for dollars for three months, the spread is -15 bps.

These spreads show very clearly how painfully flat the Treasury curve currently is, why no one will buy Treasuries unless the curve steepens relative to funding costs, why Treasury auctions are going so bad, and why dealers get routinely stuck with Treasuries.

First, at 35 bps, asset managers are better off buying three-month CD and CP as these instruments earn the same spread over three-month bills as the 10-year Treasury note – choosing the same amount of spread for a lot less duration risk is an absolute no-brainer.

Second, with three-month U.S. dollar Libor trading in line with the 10-year Treasury yield, its uneconomic for banks to buy Treasuries at any maturity as HQLA – this is the flipside of the case of asset managers, who currently prefer to fund banks over the government.

Third, at hedge-adjusted yields of -15 bps and -5 bps, neither yen-based, nor euro-based portfolio investors have any incentive to buy Treasuries as they earn better yields at home.

Figure 19 puts the hedge-adjusted yields of euro and yen-based investors into context.

The red line shows that by staying home in Japan, a yen-based portfolio investor buying 10-year Japanese government bonds makes 25 bps over three month Japanese bills – a Japanese investor would not buy Treasuries unless FX hedged spreads exceed 25 bps.

The blue line shows that by staying home, a euro-based portfolio investor buying the 10-year German bund can make 75 bps over three-month German government bills – this investor would not buy Treasuries unless FX hedged spreads exceed 75 bps. Using the French curve as the basis, hedged yields would have to exceed 100 bps (not shown).

But importantly, similar spread targets apply to large U.S. banks and asset managers.

Given the flatness of the Treasury curve, large U.S. banks and large asset managers' unconstrained, absolute return funds with global mandates are now doing precisely what Japanese investors have been doing for the past five years – lending the local currency, in this case the U.S. dollar, and buying European government bonds on a hedged basis!

The spread over 10-year Treasuries earned by U.S. banks and asset managers by swapping dollars for euros at the three month point and then buying 10-year bunds or French government bonds is 100 bps and 125 bps, respectively, which are 25 bps higher than the minimum spread target of euro-based investors to buy Treasuries on the margin.

These examples make it clear that given the \$1 trillion in net Treasury supply this year, prohibitively high hedging costs, and more attractive core government curves elsewhere, the Treasury curve must steepen by at least 100 bps relative to funding costs for foreign and some types of domestic accounts to start buying Treasuries on the margin again.

If it doesn't, auctions could continue to go bad, dealers inventories will continue to grow, and the Fed could soon have to end taper – which we believe it just does not want to do.

Part III – The Invisible Hand

Required moves of at least 100 bps are huge in both funding and fixed income markets – they would eclipse the size of the largest Libor-OIS moves we have seen since 2015, and they would also count as one of the largest moves in the 10-year yield seen since 2015.

So we could be in for some big moves in fixed income markets in 2019...

...and perhaps moves that are bigger than that. Hedging costs or the 10-year yield moving 100 bps does not leave much margin for error: foreign inflows would stage a “sudden stop” again for a few bps less. For foreign portfolio flows to structurally “stick”, hedging costs and the 10-year yield would have to adjust by more like 100 to 150 bps.

How can the curve re-strengthen from here relative to hedging costs?

Within the confines of U.S. funding and fixed income markets, the required steepening can come from two and only two sources: higher Treasury yields or lower hedging costs. In turn, these adjustments can happen either through markets adjusting themselves – “the invisible hand” – or markets adjusting with some help from the U.S. government.

In this part of our analysis, we consider the scenario where markets do the adjustment, and in the next part of our analysis, we consider the scenario where the government helps.

Let's first consider how the adjustment could come from higher 10-year yields.

Figure 20 shows that the 10-year Treasury yield would have to be at least 3.50% for FX hedged buyers from Japan and Europe to consider 10-year Treasuries to be attractive relative to government bond yields available locally, given no change in FX hedging costs; the minimum yield target of large U.S. banks and funds to stay are also about the same.

As noted above, these are minimum yield targets with no room for error, and so for foreign investors and for U.S. banks and asset managers to steadily buy on the margin, the 10-year yield would have to be around 4.00% – a level it hasn't reached since 2007.

If the 10-year trades above 4.00% it probably won't mean anything good for either equities, credit or the economic outlook. The technical reasons why yields could gradually grind toward 4.00% we have discussed in the previous sections: more supply due to growing deficits and the Fed's balance sheet taper; foreign investors' buyers strike; banks unwilling to buy Treasuries outright or an asset swap at current yields for HQLA; banks buying foreign bonds on an FX hedged basis to earn a spread over Treasuries; and asset managers' current incentives to fund banks rather than the U.S. government and also to fund foreign governments on an FX hedged basis rather than the U.S. government.

In addition, primary dealers trying to move Treasuries off their books will also pressure yields higher as they cut the price of Treasuries to make room for future auctions, where they'll likely bid for paper at higher coupons to protect themselves from repo rates rising.⁷

There are also some macro reasons why the 10-year yields can move higher from here: assuming that the current IP slump bottoms during the second quarter (see [here](#)), improved indicator flows and risk sentiment can prompt the market to expect hikes again, and the Fed can turn hawkish again with a turn in risk sentiment, as the year progresses.

To be clear, we are not saying that the 10-year yield is going to 4.00%, only that forces both technical and macro could easily force it in that direction as the year progresses.

⁷ Term and even o/n GC repo rates imply no to minimal carry on the inventory of Treasuries that primary dealers are currently stuck with. By bidding for Treasuries at higher coupons, dealers would protect themselves by improving the carry on their inventory given the risks that repo rates can back up and they'll have to cut prices to clear inventory.

Let's now consider the case where markets still adjust alone, but the adjustment comes not from a higher 10-year Treasury yield, but rather, lower three-month hedging costs.

Figure 21 shows that three-month FX hedging costs can be at most 2.00% for FX hedged buyers from Japan and Europe to consider 10-year Treasuries to be attractive relative to government bond yields available locally, given no change in the 10-year yield; the minimum yield limit on the dollar-lending leg of U.S. banks and asset managers that lend dollars for euros and then invest in French government bonds is also the same.

As noted above, these are maximum hedging costs with no room for error, and so for foreign investors to be back and for U.S. banks and asset managers to structurally stay, hedging costs would have to be below 2.00% – i.e., well below the Fed's target range.

If the Fed doesn't cut rates, how could hedging costs fall below the Fed's target range?

Through the cross-currency basis going positive.

There are three distinct flows can push cross-currency bases to go positive this year.

First, foreign portfolio investors' demand for dollar assets on a hedged basis has peaked, and with less demand for dollars come less negative bases (see part one above). Reduced demand comes from both less foreign inflows into dollar assets on the margin, and foreign investors selling dollar assets and buying back dollar hedges on the margin.

Second, despite the diminished demand for dollars in the FX swap market on the margin, supply remains robust as lenders of dollars care about spreads over bills, which for some types accounts – namely global banks and foreign central banks – remain significant. This ongoing lending of U.S. dollars in the face of shrinking demand has pushed the core cross-currency bases all the way to zero – with some now trading positive (see Figure 22).

Third, what can tip some bases to trade more positive from here is if the lending of dollars accelerates as U.S. banks and large asset managers lend more in the FX swap market as described above – i.e., if U.S. accounts, like Japanese banks and insurers in recent years, go from lending the local currency, in this case the dollar, on the margin to dumping it and start borrowing euros to buy steeper government curves in Europe and even Japan.

Figure 23 shows how such flows would re-shape the dynamics in the FX swap market. Thus, in 2015-2016 the backdrop was an excess demand for U.S. dollars via FX swaps which banks arbitrated by borrowing U.S. dollars secured and unsecured on the margin.

Then, in 2017-2018 the dominant theme was less demand and more lending, and so more balanced flows – a market that increasingly cleared through matched books, where banks did not have to arbitrage as much, which freed up balance sheet for repos.

Next, 2019 could be the year where U.S. banks and asset managers dumping dollars in the FX swap market to get around the flat Treasury curve tip the market to the point where there is an excess supply of U.S. dollars – the opposite of flows in 2015-2016.

If cross-currency bases go positive, arbitrage trades will be very different.

Instead of borrowing dollars in the CD and CP markets to lend into the FX swap market on the margin, banks will be borrowing in euro, yen, sterling and Swiss francs and then lend these currencies and borrow the excess U.S. dollars floating in the FX swap market.

Positive cross-currency bases would thus gradually pressure Libor-OIS to trade tighter, and as the borrowers of excess dollars look for places to invest, stressed repo markets and an excess supply of Treasury bills trading above OIS will be natural places to invest.

30 bps from positive cross-currency bases, 30 bps from a tight Libor-OIS spread and 30 bps from bill yields below OIS as arbitrageurs buy bills to invest excess U.S. dollars – these are the forces that together can easily push hedging costs 100 bps lower this year.

Part IV – Inversion and the Room to Taper

Clearly, markets are able to adjust on their own, and some of these "healing" flows are already in train: cross-currency bases are breaking through the zero line with some trading positive already; three-month U.S. dollar Libor-OIS spreads have come in on the margin; persistent flows from Japan and lately also from the U.S. have been pushing the yield on 10-year French government bonds lower; and large U.K. banks harvesting a positive sterling cross-currency basis have been lending into the stressed repo market in the U.S. as a part of a trade where they soak up excess U.S. dollars in the sterling swap market.

Figure 24 shows the constellation of curves when misalignments were at the peak.

Figure 25 shows the constellation of curves today – the market is adjusting as we speak.

So far so good, but which of the two scenarios will dominate the remainder of the year?

Of the two macro scenarios discussed above, it's better for risk assets and the outlook if hedging costs trade down to 2.0% than if the 10-year Treasury yield trades up to 4.0% – it is better if the curve bull steepens rather than bear steepens relative to hedging costs.

Why a macro investor should care about which of these scenarios will dominate is clear, but should the U.S. government – either the Treasury, or the Fed, or both – also care?

We think the answer is yes.

First, Treasury should prefer funding strategies that lower the government's funding costs, and in the current environment issuing fewer bills and more coupons would do just that: it would steepen the curve relative to hedging costs and raise the odds that the curve re-steepens the right way from the perspective of the Treasury – i.e., that the adjustment would come mostly from lower FX hedging costs, rather than higher long-term yields.

Historically, bill yields always traded about 30 bps below OIS, but recently they've been trading north of OIS. This is due to the massive supply of bills that was issued in 2018 under the assumption that we still suffer from a bill shortage. This assumption is wrong: the world now suffers from a glut of bills (see [here](#)), which contributes to hedging costs being much higher than necessary and the curve being inverted relative to hedging costs. Lower bill yields from less issuance would mean more lending in the FX swap market on the margin, which would help push cross-currency bases trade positive (see above).

Why the sovereign should shift issuance away from bills toward coupons is thus obvious: if she doesn't, the flatness of the curve will worsen and funding can get more expensive.

Second, the Fed should also care about the flatness of the Treasury curve for it affects how much room it has to taper and how soon it will have to launch an o/n repo facility.

As discussed in part one of our analysis, primary dealers' inventories have increased by \$200 billion since mid-2018, due to increased federal deficits and taper (see Figure 10).

Most of this increase in dealer inventories was funded by large U.S. banks swapping reserves for o/n repos in HQLA portfolios on the margin, and at rates well north of IOR.

According to their fourth quarter financials, J.P Morgan Chase Bank and Bank of America were the only two banks that lent into dealers' increased funding needs on the margin, which shows that the repo market currently relies on two banks to clear (see Figure 26).

This is important to appreciate because it implies that there is a fine balance between the size of primary dealer's inventories of Treasuries and these two banks reserve balances – once these two banks lose their flexibility to toggle between reserves and o/n repo freely, the repo market could lose its lenders of next-to-last resort, primary dealers would scramble to fund their inventories and o/n rates would drift outside the Fed's target band.

The Fed would have no choice but to suddenly end taper and launch an o/n repo facility – which we believe it doesn't want to.

The Fed should thus care about the slope of the curve as it impacts the room to taper.

A flat curve means no interest in Treasuries, growing inventories, growing repo pressures, and large U.S. banks' reserve balances being pushed to the limits of their flexibility.

A steep curve means that auctions go well, dealer inventories clear and that pressures in o/n markets – the markets which ultimately determine the room to taper – disappear.

What can the Fed do to maximize the scope of balance sheet taper and delay the launch of a fixed-price, full-allotment o/n repo facility? What a pilot does when a airplane stalls.

When an airplane stalls you push its nose down...

...so that the airplane goes faster and more air flows over the wings which helps create enough lift for the plane to start flying again. The same with the flow of Treasury collateral.

Like with an airplane in deep stall, the best course of action for the Fed is to push down the nose of the U.S. rates complex – three-month funding rates – and push it down hard.

The Fed can do one of three adjustments, in our view:

- (1) reverse twist the SOMA portfolio,
- (2) cap the foreign RRP facility, or
- (3) cut interest rates.

First, a reverse twist would steepen the curve and enhance the flow of Treasury collateral similar to the way Treasury issuing fewer bills and more coupons would (see above). Lower bill yields from a reverse twist would mean more lending in the FX swap market on the margin, which would help push cross-currency bases trade positive (see above).

Second, capping the foreign RRP facility would force \$250 billion worth of FX reserves currently on deposit at the Fed to flood into the bill market and/or the FX swap market – flows that big would push cross-currency bases go very positive, very fast, which would accelerate the adjustment process we discussed in the previous section (see Figure 27).

Why the Fed should seriously consider options number one and two if it does not want to cut rates is clear: implicit in our analysis is that whatever force keeps the yield curve flat, from a plumbing perspective, the Fed overdid the hiking cycle by about two or three hikes!

The nose of the plane got pulled too high.

The plane stalled.

The plane stalled, because the importance effective funding rates like FX hedging costs and spreads to OIS were ignored – see [From Exorbitant Privilege to Existential Trilemma](#) – as was the shift from funding the U.S with price insensitive to price sensitive buyers.

To be clear, we are not saying that the amount of rate hikes to date was incorrect – they are wholly consistent with the performance of the economy and the dual mandate.

What we're saying is that from a plumbing perspective, hikes led to an aerodynamic stall: rate hikes pushed hedging costs too high and flattened the Treasury curve too much relative to other core curves. From a plumbing perspective the Fed hiked a little too much.

The system is constantly evolving and central banks must evolve too.

Some of the new things the Fed should consider when setting rates are these very topics. Balancing rate hikes, politics and the dual mandate was never easy, but it was necessary. Balancing taper versus global curve slopes won't be easy either, but it will be necessary.

Conclusions – The Path of Least Resistance

What will be the most likely path of adjustment?

Despite the arguments in our analysis as for why Treasury should adjust its approach to debt management and why the Fed should reverse twist and cap the foreign repo facility, we do not expect either Treasury or the Fed to announce any changes on these fronts.

The reason why we do not expect any change from either institution is because bill supply will be down during the first half of 2019, which should drive yields marginally lower, cross-currency bases marginally more positive, and Libor-OIS marginally tighter. Both the Treasury and the Fed are slow-moving institutions that like to wait and see, and they will wait and see how the marginal reduction in bill supply works its way through the system.

This means that during the first half of the year, the bulk of the adjustments will have to come either from higher yields or cross-currency bases to U.S. dollar Libor going positive.

Higher yields are unlikely as the global IP cycle will trough during the second quarter, which means the market won't discount rate hikes and the Fed won't turn more hawkish before the second half of 2019, in our view (see our House View on interest rates [here](#)).

That leaves positive cross-currency bases as the path of least resistance...

The three-month €/\$ cross-currency basis trading positive this year will be a key piece of the puzzle of how the U.S. Treasury curve will re-steeperen relative to European curves.

Just as a negative cross-currency basis served as the "equalizer" of global curve slopes when the Treasury curve was the steepest curve globally (see part one of our analysis), a positive basis will serve as the equalizer now that it is curve is the flattest globally.

Positive cross-currency bases are not unicorns...

...the £/\$ basis has been trading positive since 2018 and the Swiss franc/\$ basis has recently turned positive too. More and more bases going positive means more issuance in sterling, Swiss franc and euro and less issuance in dollars, which means less pressure on U.S. dollar Libor-OIS spreads. If we are right, and the Treasury curve will re-steeperen mostly through cross-currency bases going positive, then U.S. dollar Libor-OIS spreads can go as tight as 10 bps by June, which is 15 bps tighter than what the market expects.

Positive cross-currency bases and tighter Libor-OIS spreads come with lower bill yields as the borrowers of excess supply of dollars in the FX swap market look for a place to invest, much like the borrowers of excess yen and euro looked for places to invest two years ago.

Whether these adjustments will lower hedging costs by the required 100 bps fast enough for primary dealer inventories to clear as Treasury supply gathers pace is the big question.

If they don't, o/n repo rates could continue to trade stressed and the Fed will be forced to end taper early and will soon have to launch a fixed-price, full allotment o/n repo facility.

If the Fed doesn't want that, it will have to accelerate these adjustments and push the "nose of the plane down" – either via a reverse twist or by capping the foreign repo pool. Either would push bill yields much lower, cross-currency bases much more positive and Libor-OIS much tighter than before – under this scenario our Libor-OIS target is -5 bps.

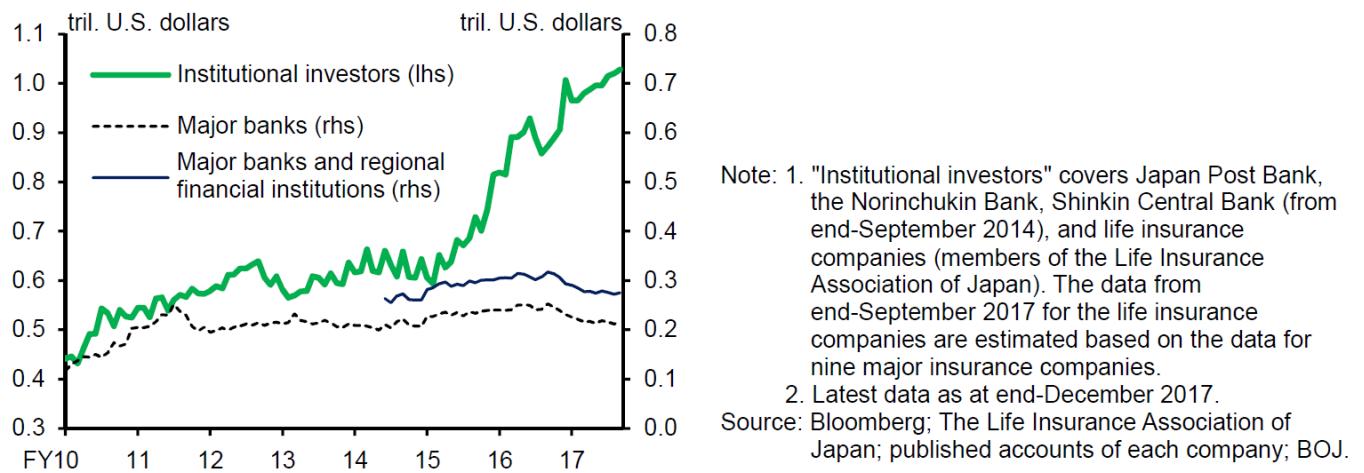
Either of these outcomes suggests that after a decade of absence, this is the year when the Fed will become an active lender in o/n repo markets and/or an active buyer of bills.

And what a difference a decade makes...

...we went from a Fed that had to buy Treasuries on the long-end to support risk assets, to a Fed that now has to buy bills on the front-end to support Treasuries on the long end.

Figure 1: Japanese Investors' Stock of U.S. Dollar FX Hedges

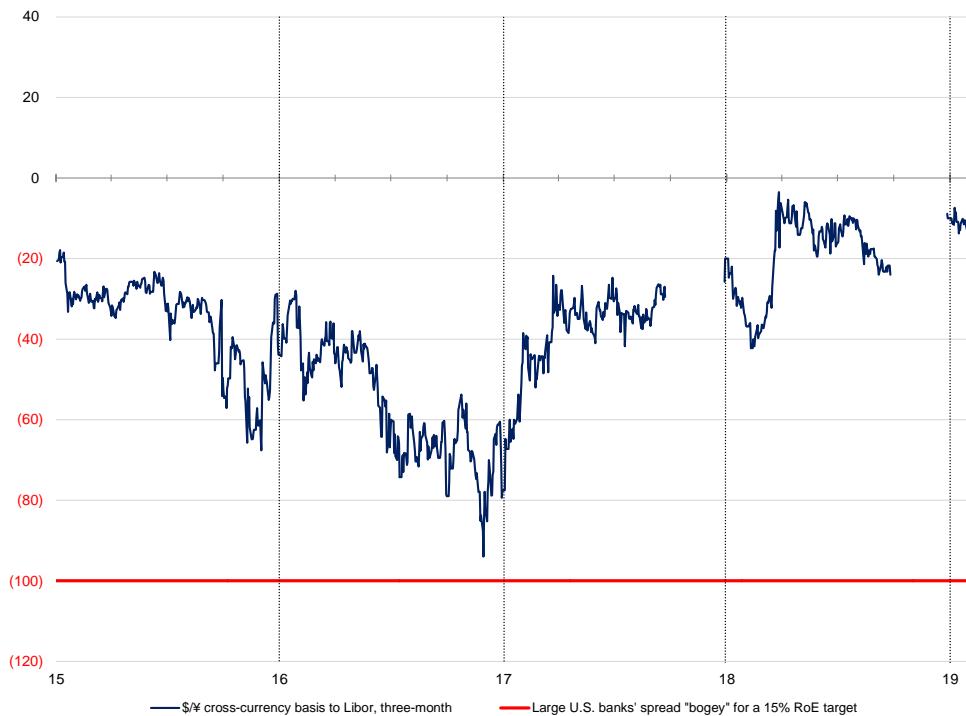
\$ trillions, data through September 30, 2017



Source: Bank of Japan

Figure 2: From Imbalanced Flows to More Balanced Flows

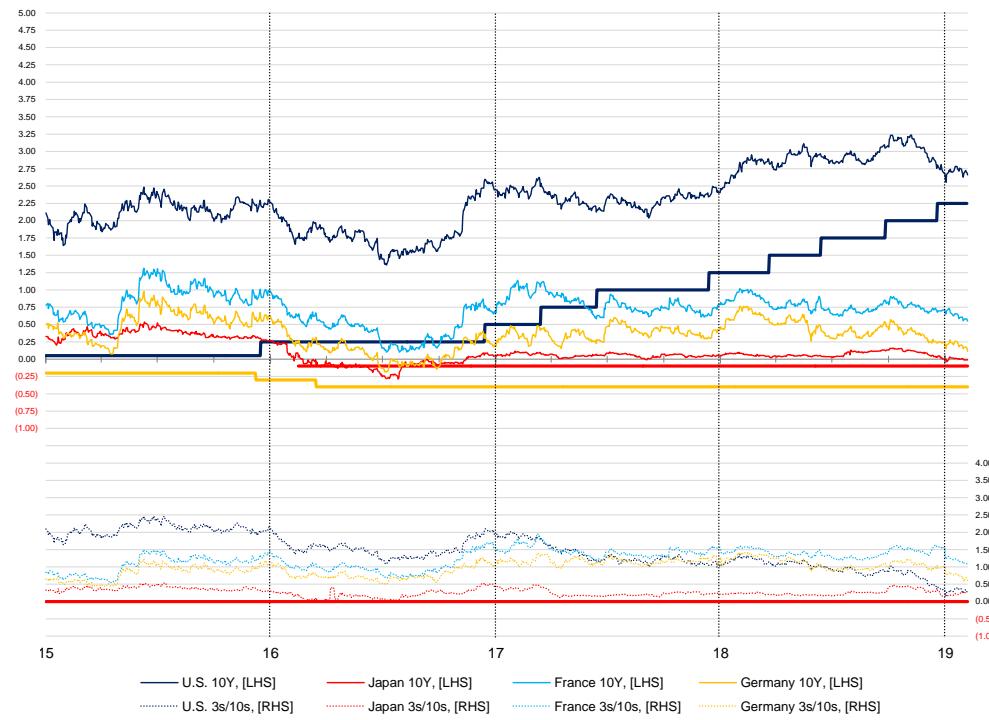
Basis points, excluding the 2017 and 2018 year-end turns to emphasize trends



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 3: The Relative Slope of Treasuries vs. Core G7 Curves

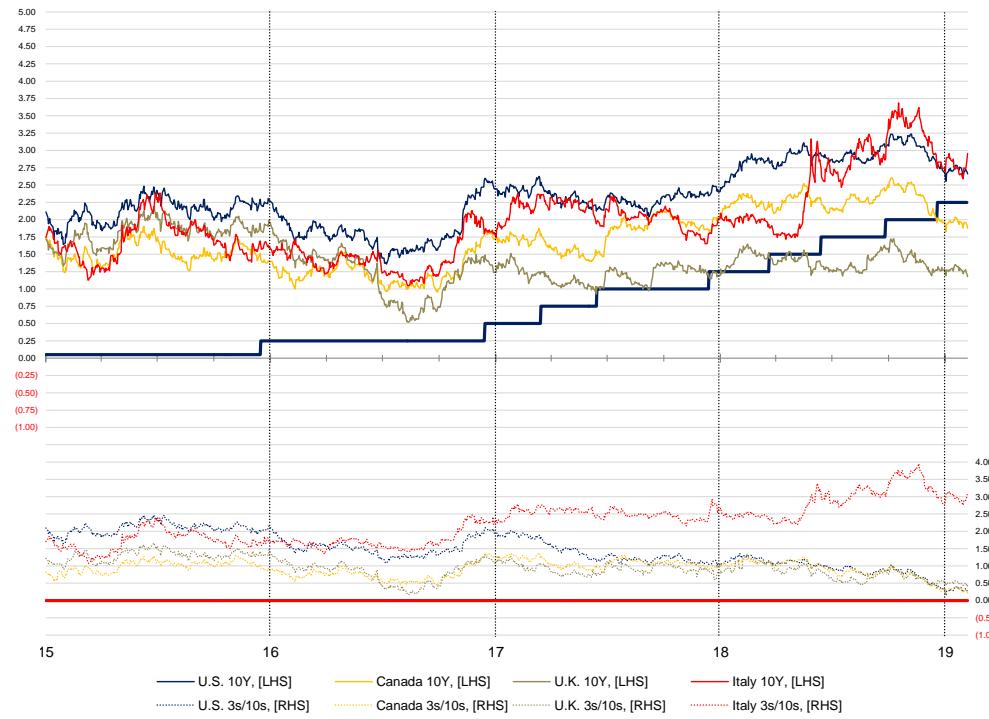
percent



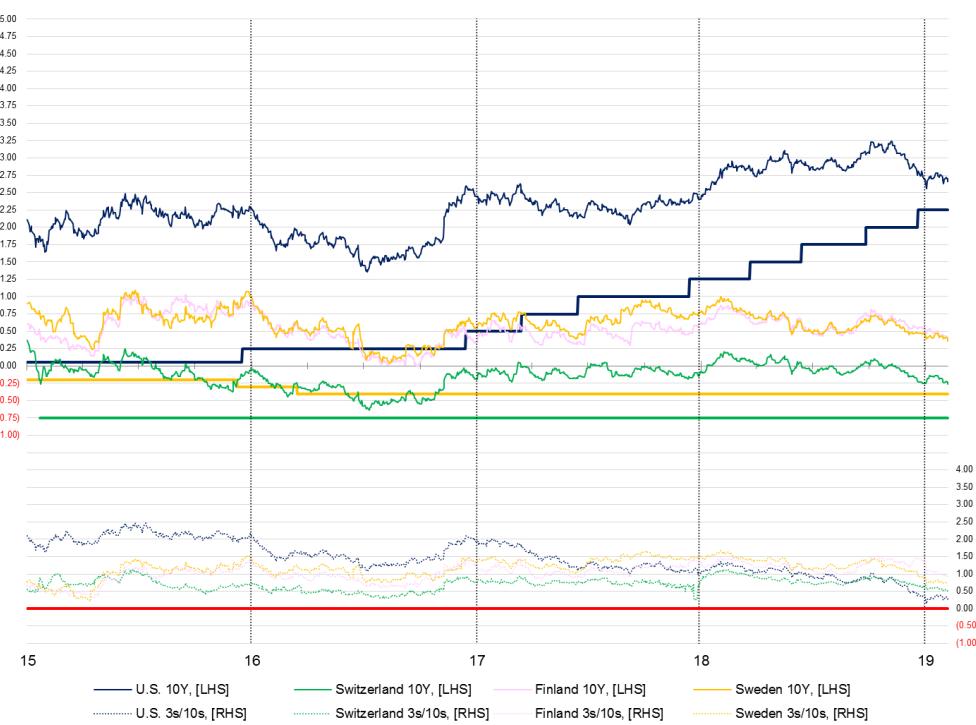
Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 4: The Relative Slope of Treasuries vs. “Peripheral” G7 Curves

percent



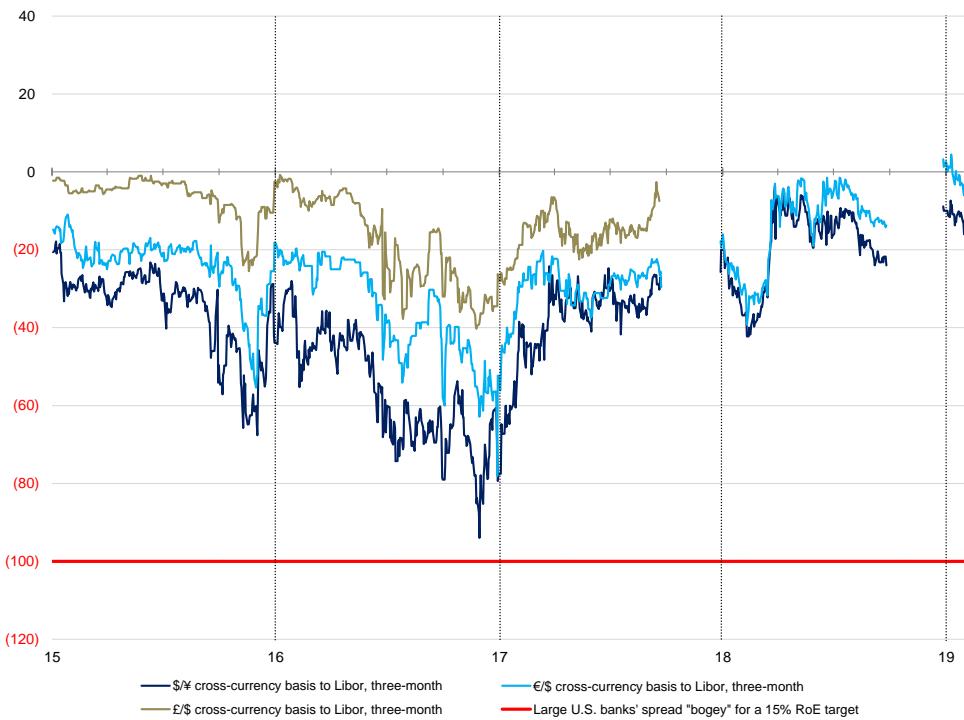
Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 5: The Relative Slope of Treasuries Beyond G7 Curves

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 6: The Flatter the Curve, the Wider the Basis

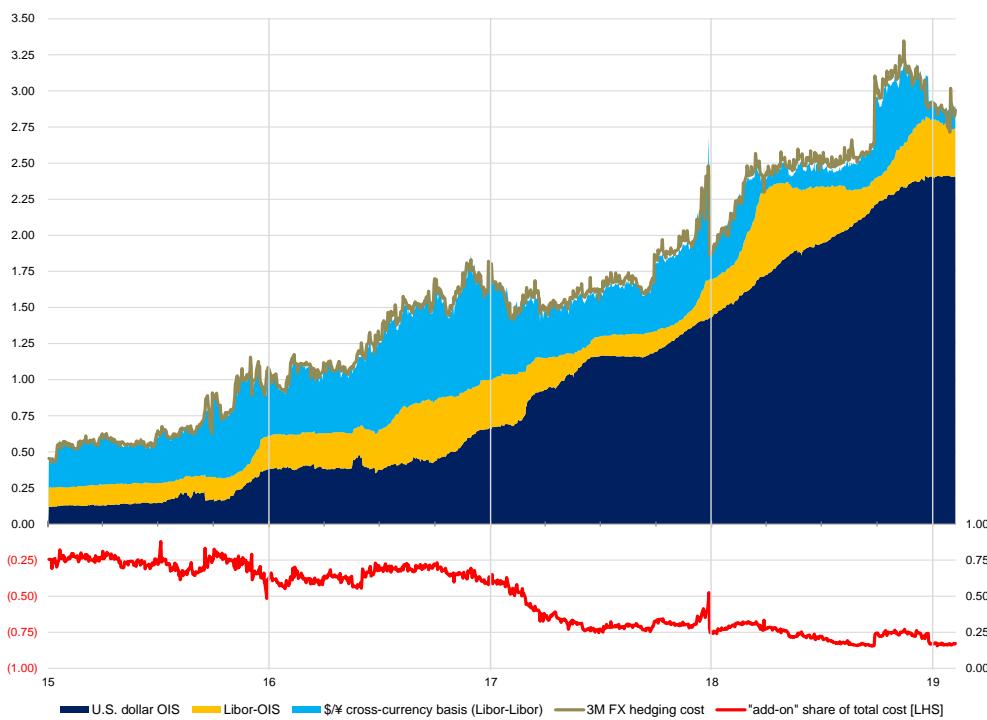
Basis points, excluding the 2017 and 2018 year-end turns to emphasize trends



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 7: Money Markets are Like a Cake

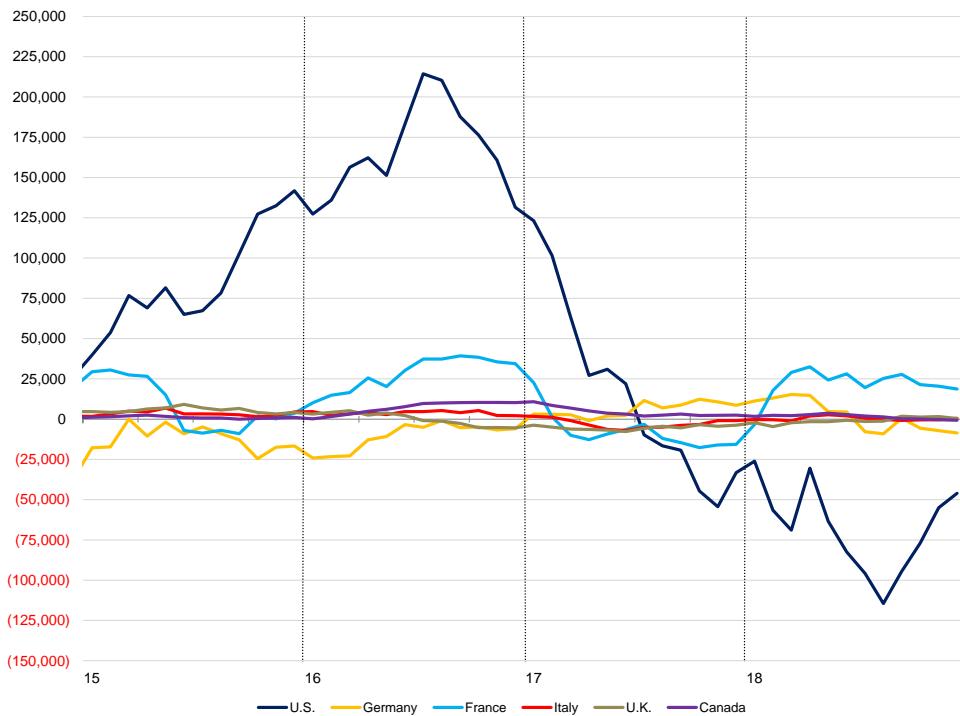
Percent [LHS], percent share [RHS]



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 8: Relative Curve Slopes Drive Portfolio Flows (1)

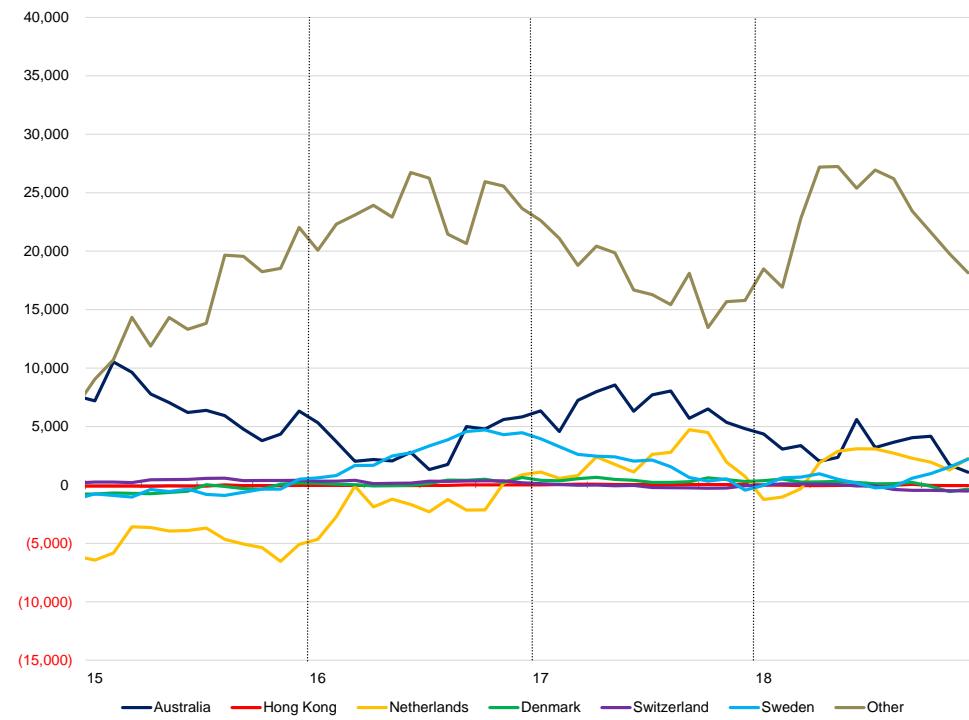
¥ 100 millions, 12-month moving sum, sovereign bond investments only



Source: Credit Suisse, Ministry of Finance of Japan, the BLOOMBERG PROFESSIONAL™ service

Figure 9: Relative Curve Slopes Drive Portfolio Flows (2)

¥ 100 millions, 12-month moving sum, sovereign bond investments only

**Figure 10: The Collateral Chokehold**

\$ billions

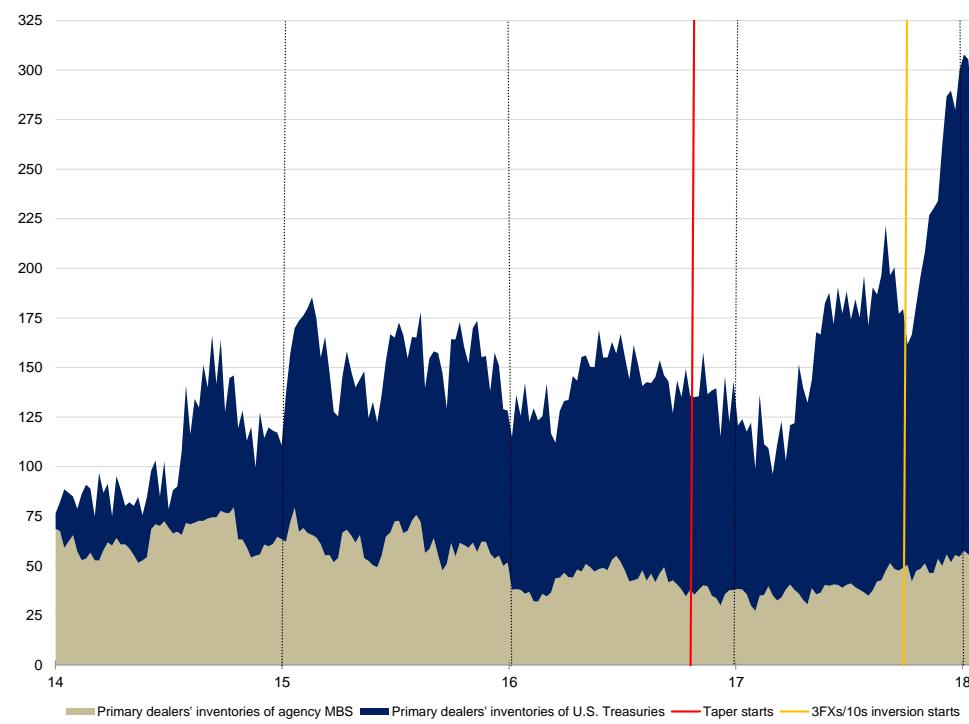
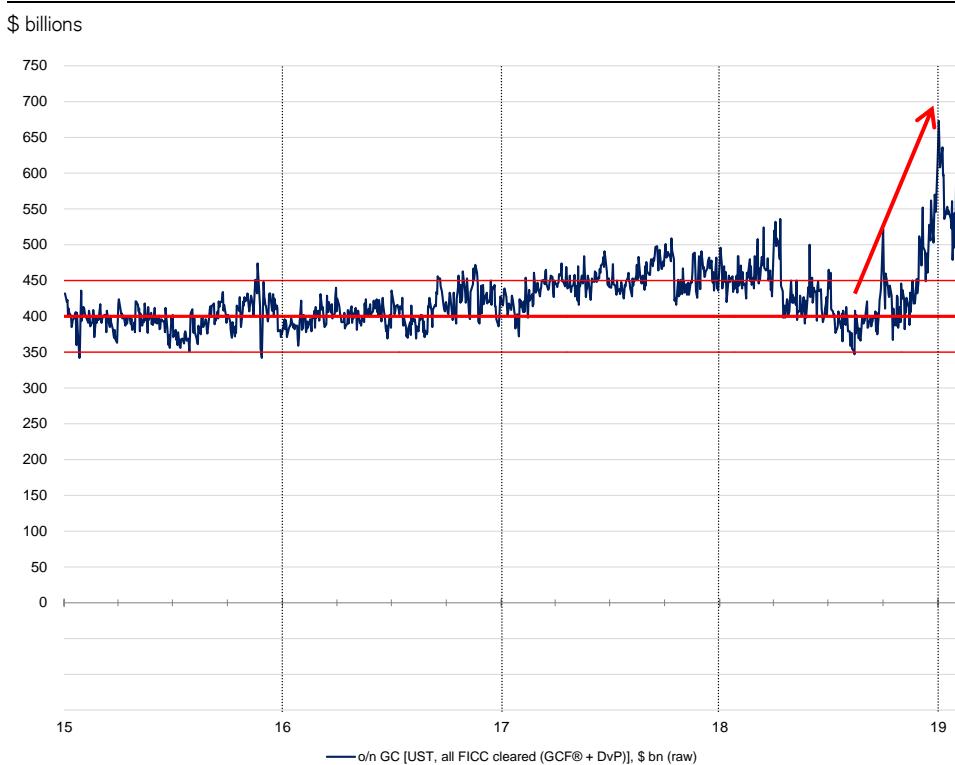
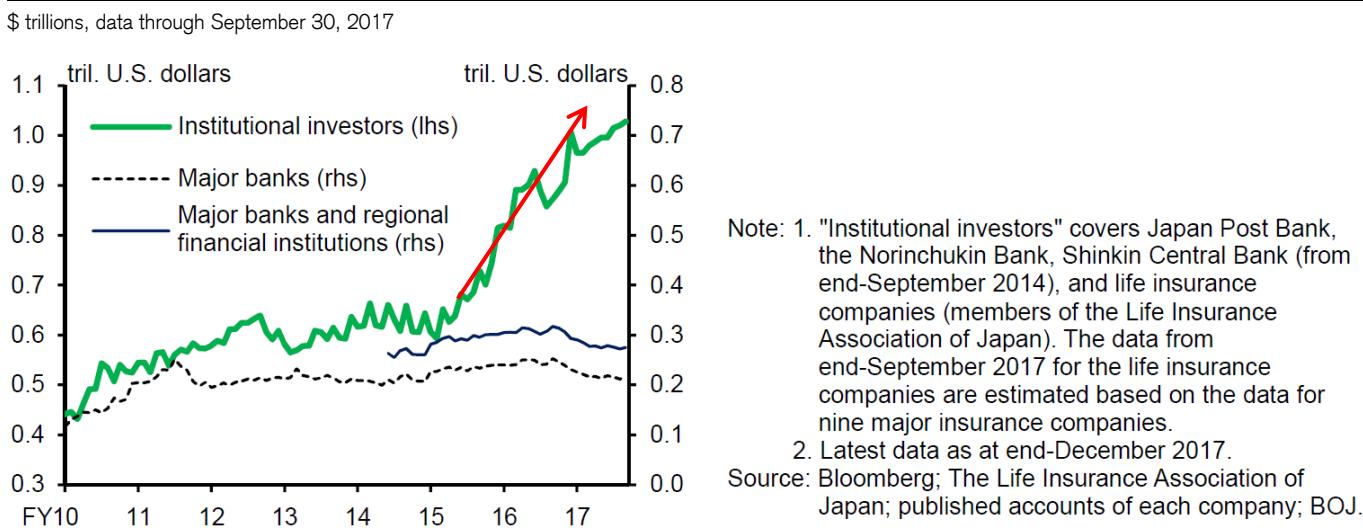
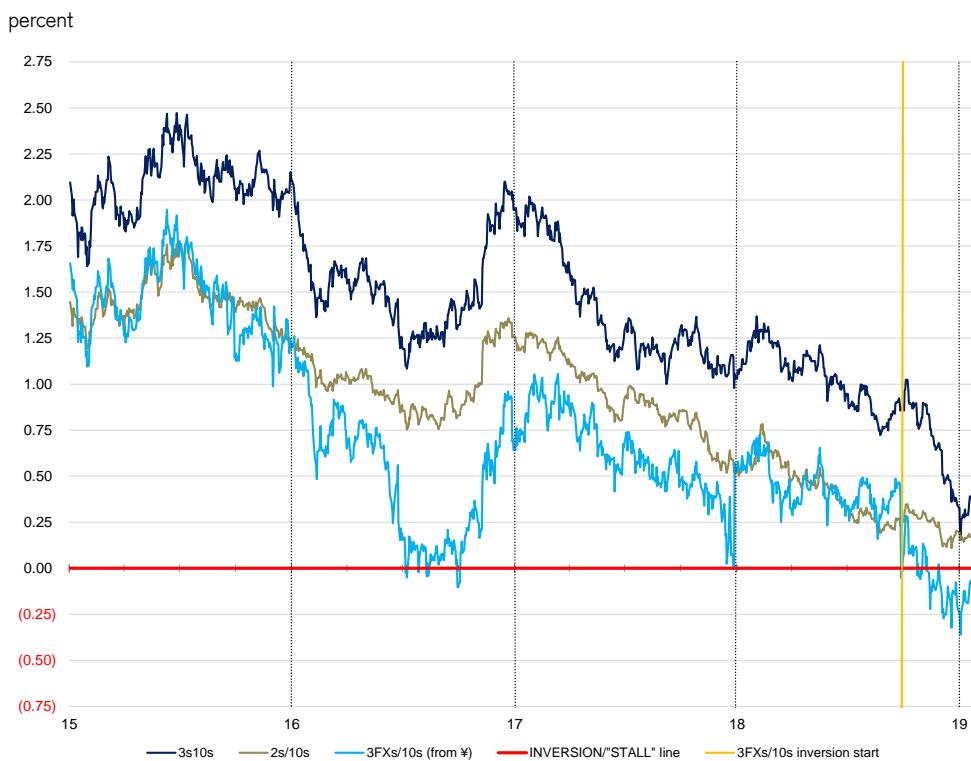


Figure 11: Large U.S. Banks Fill Primary Dealers' Funding Needs

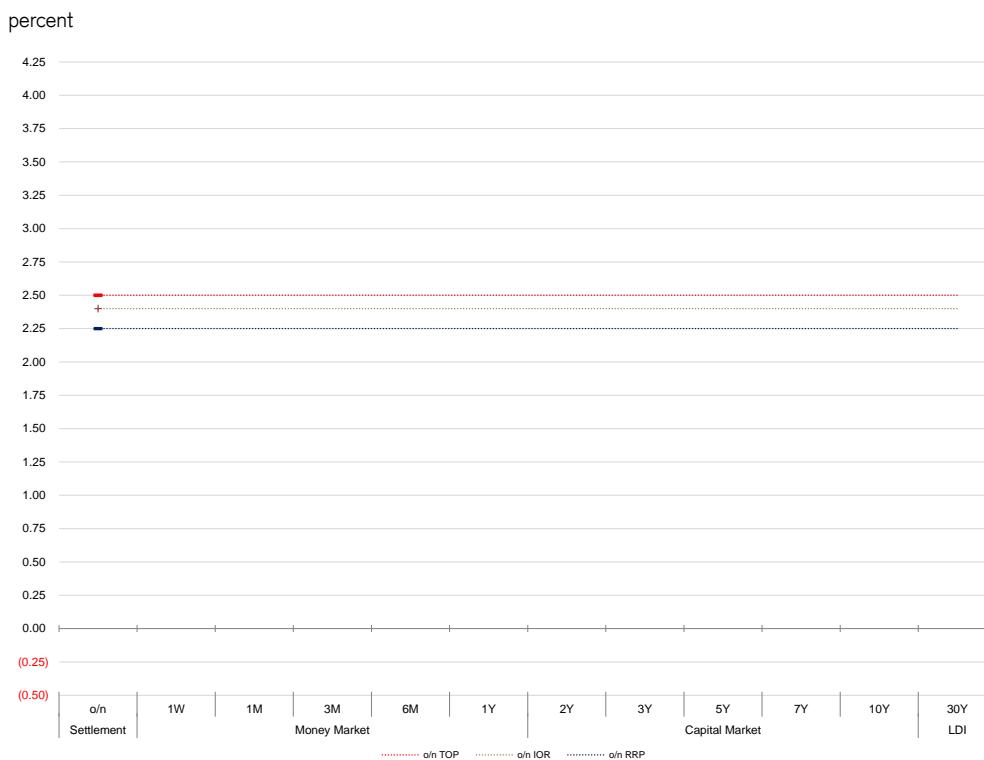
Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 12: From Term FX Swaps to o/n GC Repos

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 13: The Curve Has Inverted

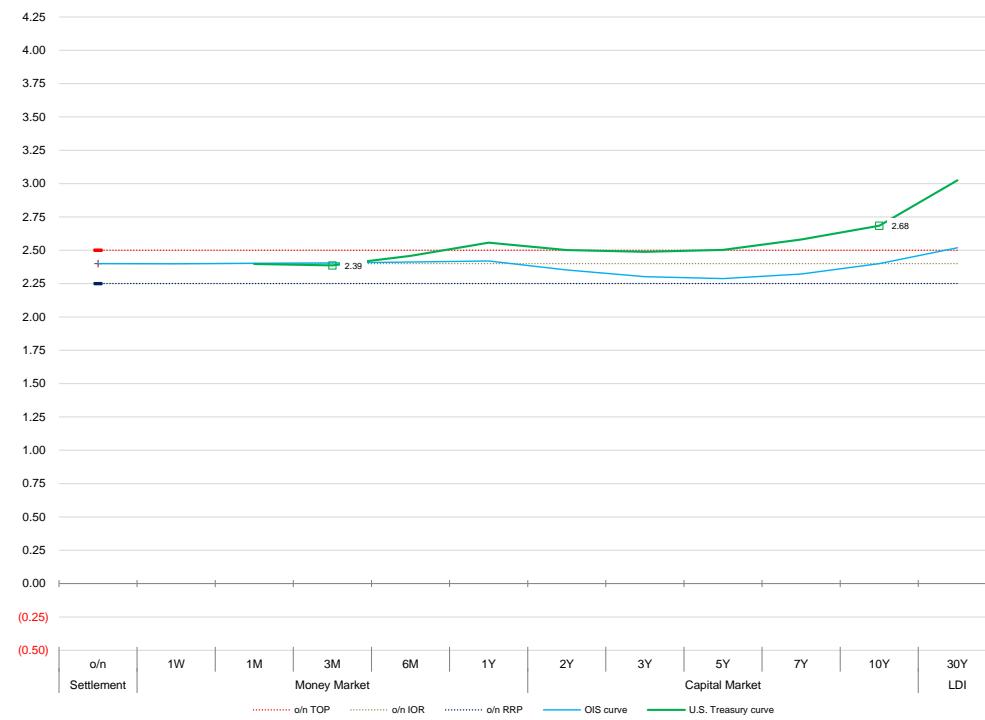
Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 14: The Anchors

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 15: The Curve Is Flat

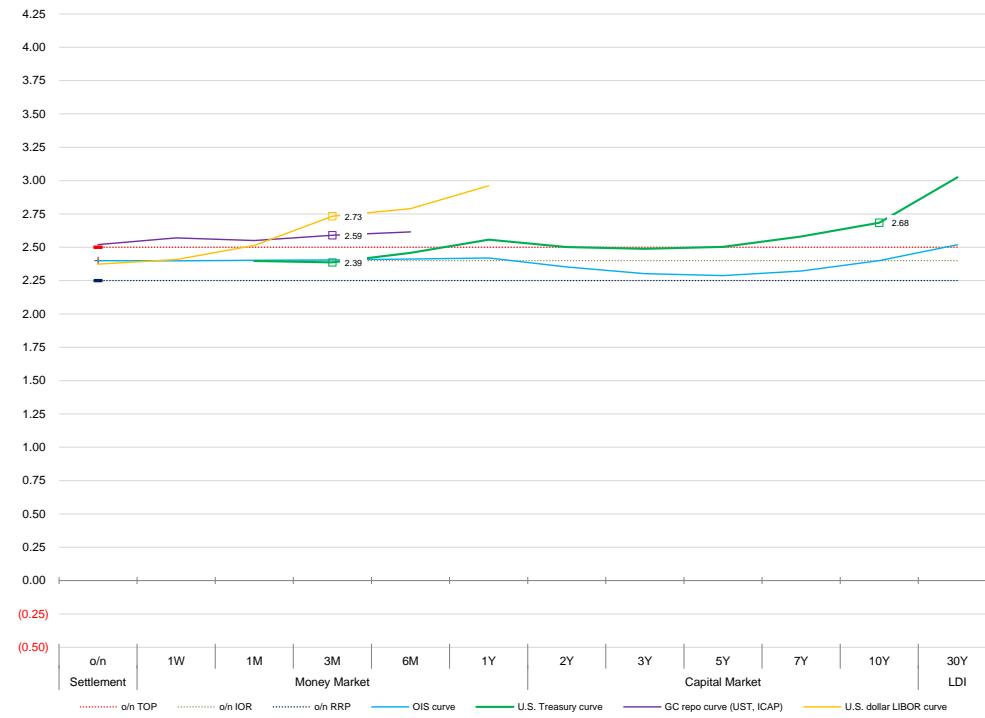
percent



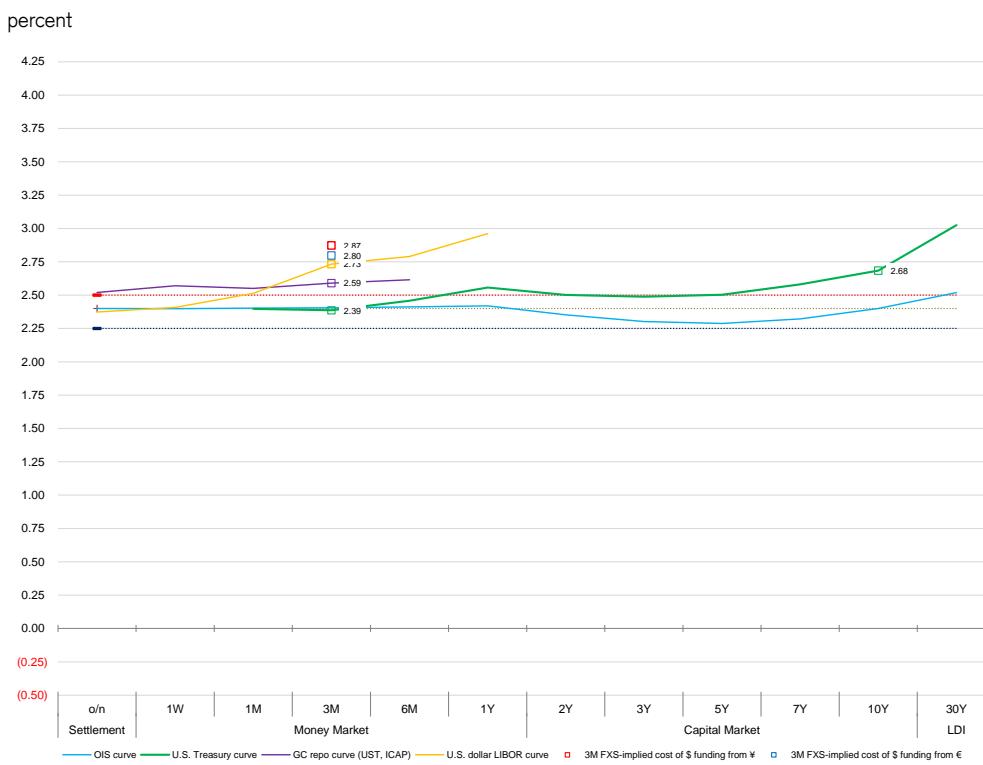
Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 16: The Curve Is Even Flatter Relative to Funding Costs

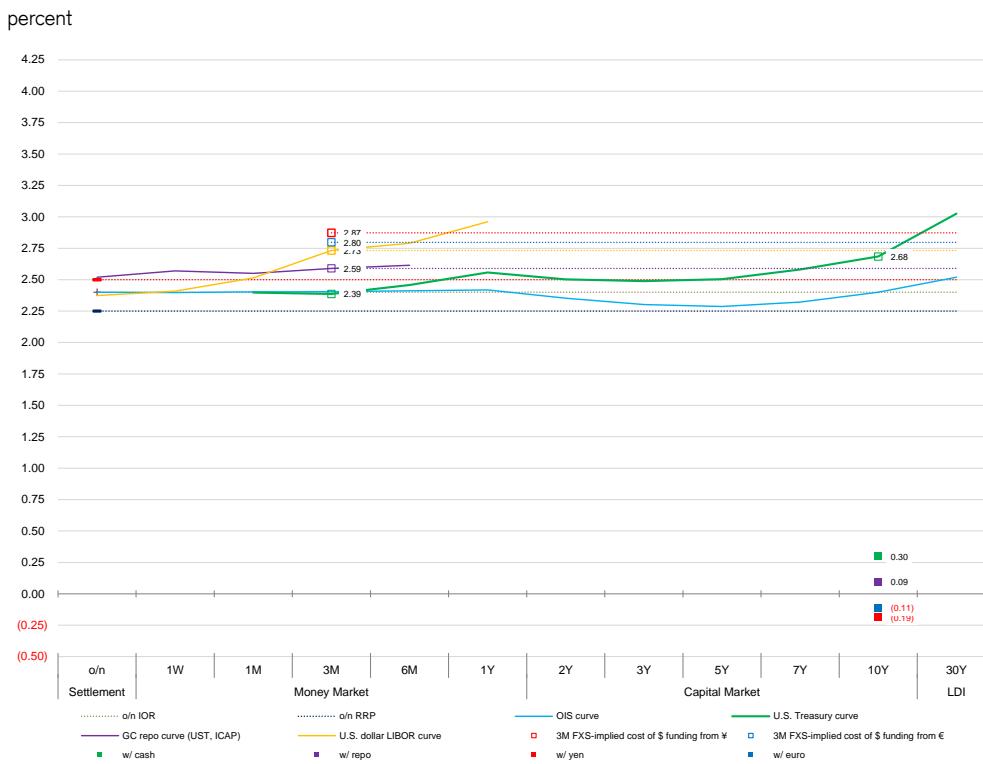
percent



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 17: Prohibitive FX Hedging Costs

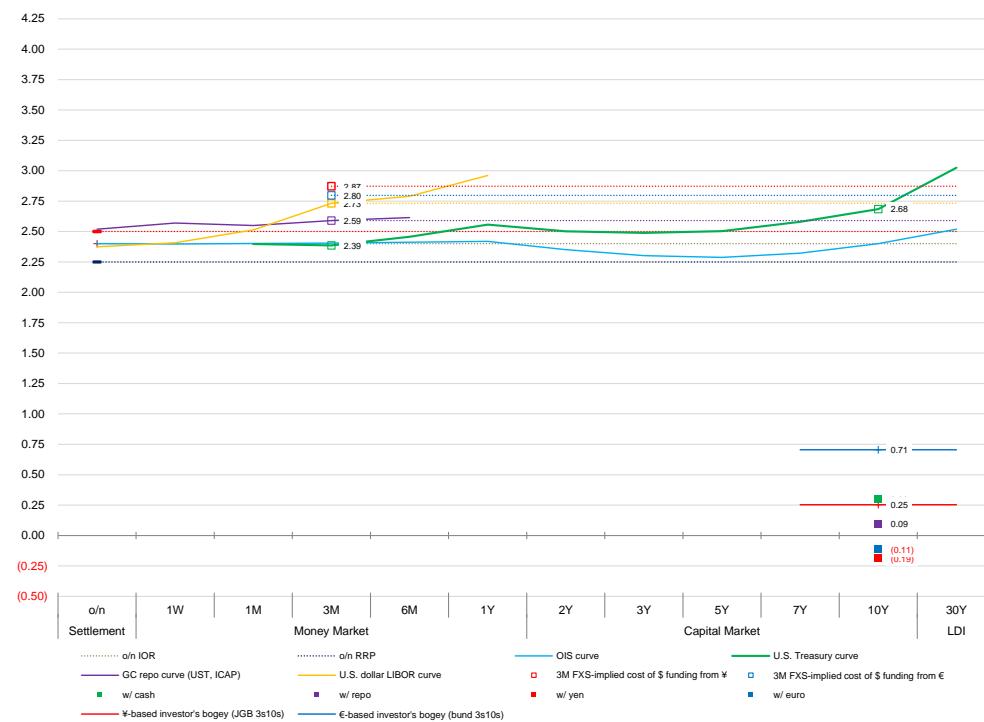
Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 18: Carry Makes the World Go ‘Round – Or Not...

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 19: Foreign Hedged Investors' Minimum Spread Targets

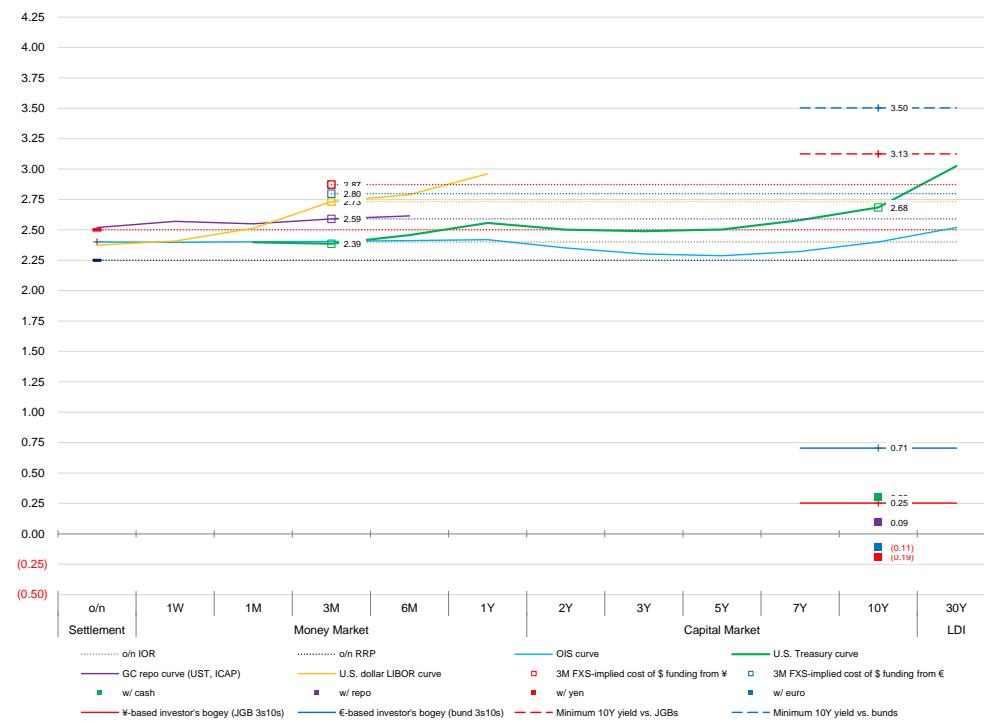
percent



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 20: The Minimum Yield Target

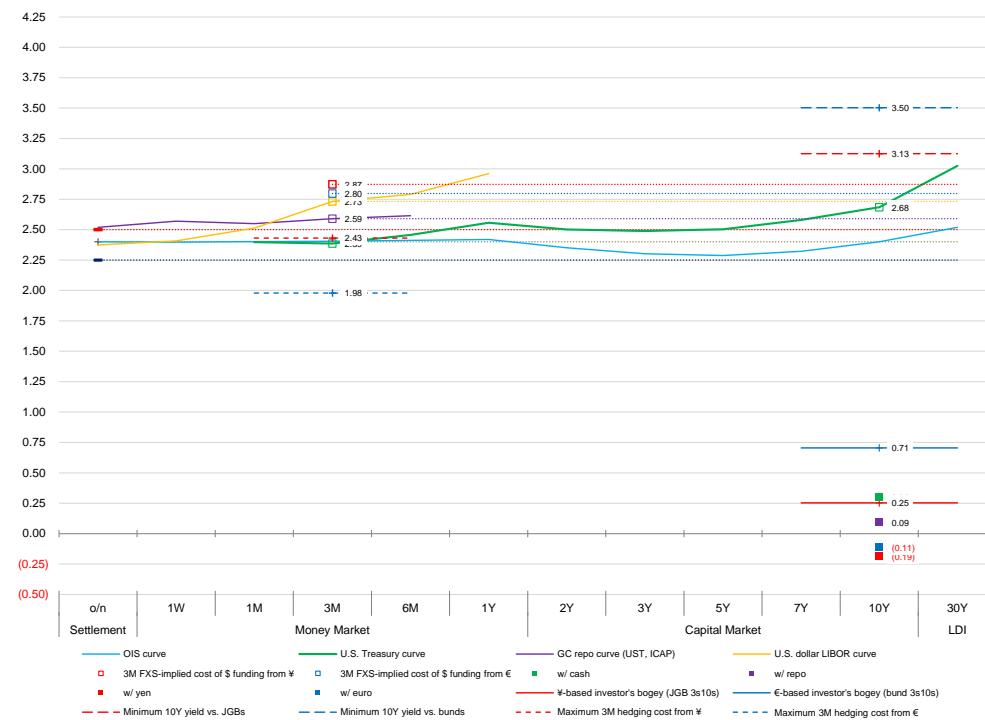
percent



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 21: The Maximum Hedging Cost

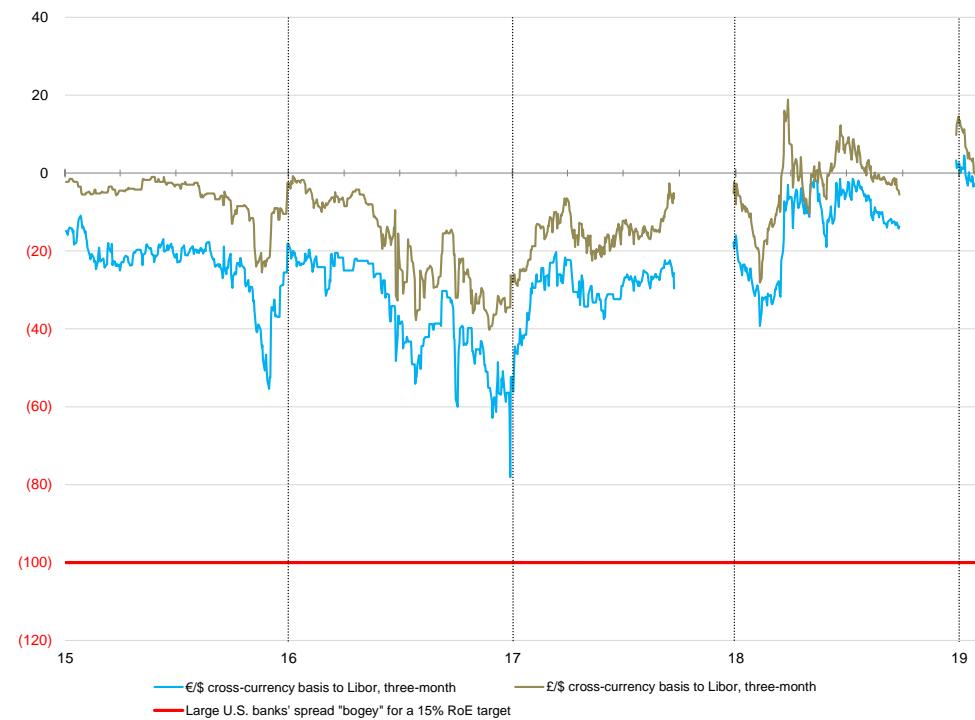
percent



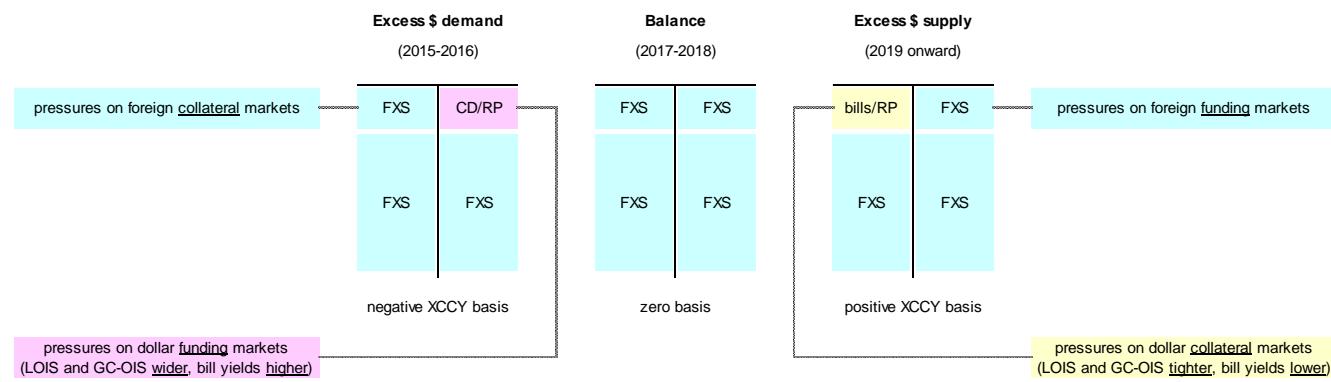
Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 22: Do You Believe in Unicorns?

Basis points, excluding the 2017 and 2018 year-end turns to emphasize trends



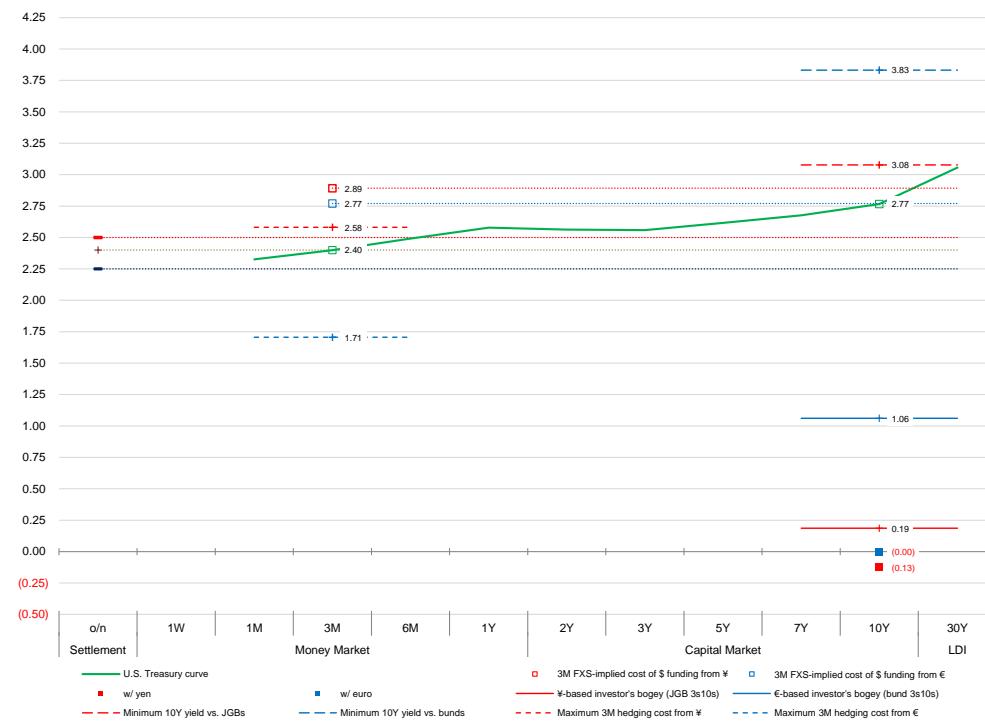
Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 23: Tipping the Balance

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 24: Peak “Stall”

Percent, as of December 27th, 2018

**Figure 25: The Market Is Adjusting Already**

Percent, as of February 7th, 2019

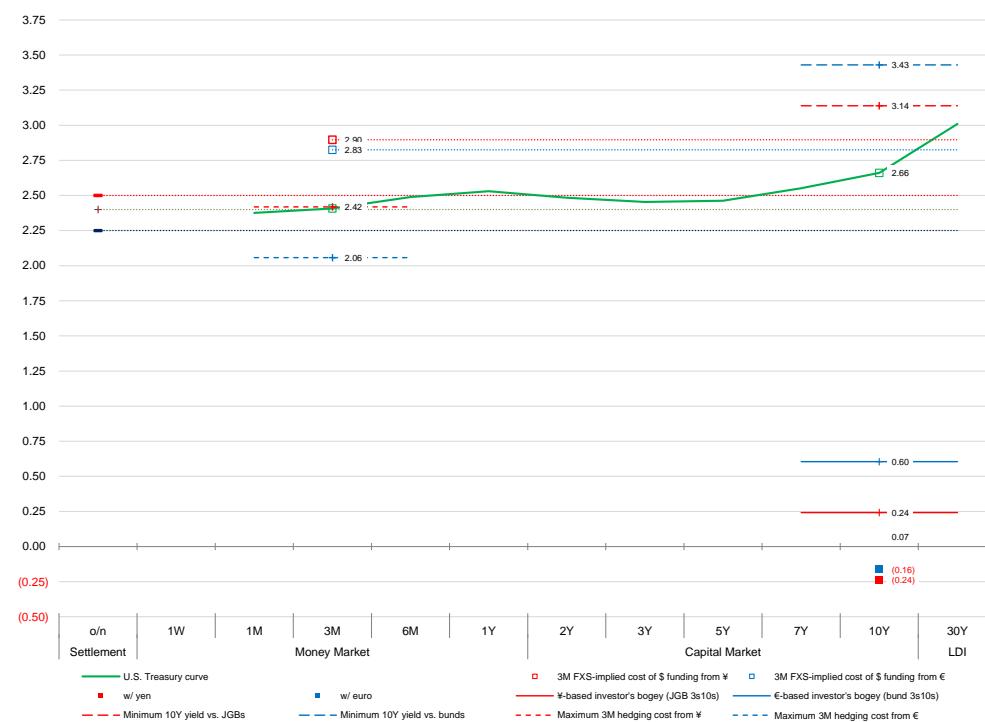
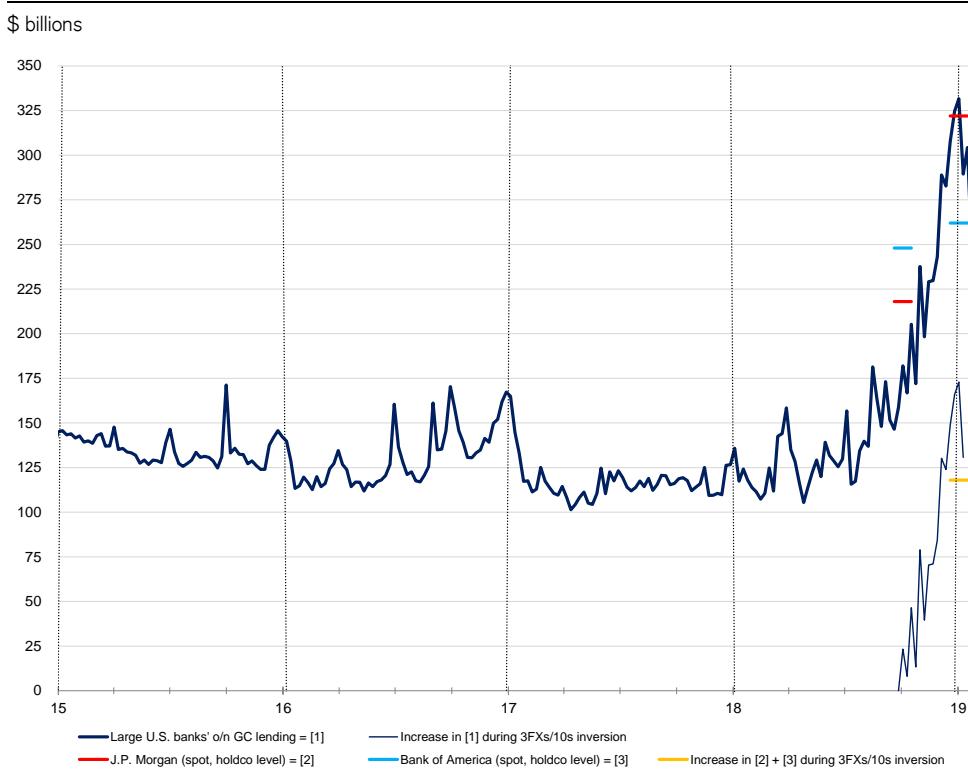
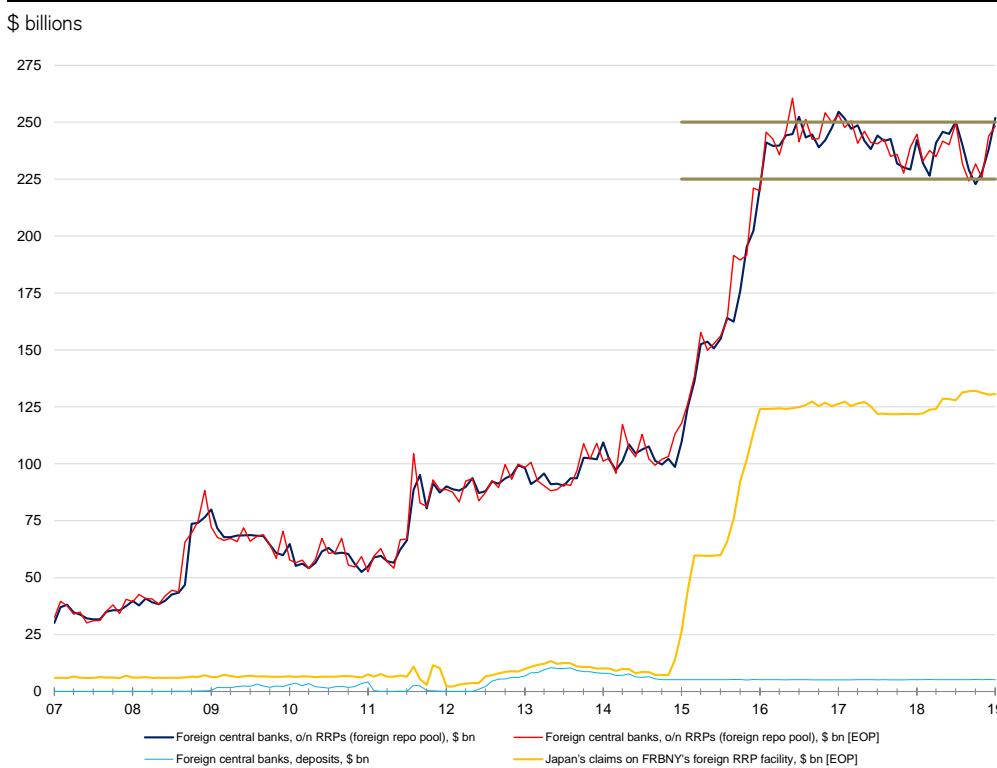


Figure 26: Meet the o/n GC Market's Lenders of Next-to-Last Resort

Source: Credit Suisse, Company data, the BLOOMBERG PROFESSIONAL™ service

Figure 27: The Usage of FRBNY's Foreign RRP Facility

Source: Credit Suisse, Ministry of Finance of Japan, the BLOOMBERG PROFESSIONAL™ service

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25 March 2019
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Credit Suisse Economics

Global Money Notes #21

It's Time to Use the Exorbitant Privilege

The Fed and the market converged to our views that the end of taper is nigh, and a revised operating framework and a repo facility will soon be necessary: although it seems like taper won't end by Easter, its pace will slow from May, and while we didn't get a repo facility by year-end, it would have been handy...

Tapering the pace of taper and working on a new o/n repo facility is progress, but it won't help now – and help is needed now. Taper will continue to destroy reserves and worsen the banking system's intraday liquidity profile, when in fact the December 31st turn in repo markets told us that on some days intraday liquidity is already a severe binding constraint, and an o/n repo facility will take time to design and communicate. The Fed is in a race against time!

Time is money...

...and sometimes money buys time. Capping the foreign RRP facility would inject \$200 billion worth of reserves into the banking system and these reserves would improve the intraday liquidity profile of banks, ease quarter-end pressures, and buy precious time for the Fed to work on getting the new repo facility right.

In addition, capping the foreign RRP facility would help ease the safe asset glut that keeps the yield curve inverted – both outright and relative to funding costs: capping the foreign RRP facility would increase central banks' demand for bills and would also lead to more lending of U.S. dollars in the FX swap market, helping to bring about the adjustments that we discussed in our [previous issue](#).

Keeping the foreign RRP facility uncapped is indefensible, in our view.

It is hard to understand why the Fed is reluctant to use this facility to ease the safe asset glut, given that it used it to ease a safe asset shortage back in 2015.

Public debate about re-capping foreign RRP facility is necessary, in our view.

In close to 150 client meetings year-to-date, the only argument we have heard former Fed hands say about why the Fed will never re-cap the facility is that:

"They don't want to upset foreign central banks."

Really? [Valéry Giscard d'Estaing](#) would have enjoyed that one...

It's now time to use the [exorbitant privilege](#) and re-cap the foreign RRP facility.

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"There is nothing more expensive than something free."

proverb

Nothing that provides intraday liquidity should be as expensive as the [foreign RRP facility](#).

The New York Fed's foreign RRP facility has been around for a long time – so long in fact that it pre-dates the tri-party repo market. Because it pre-dates the tri-party market, RRPs between the New York Fed and foreign central banks and supranational institutions settle on a bilateral basis. In a post-Basel III financial order, bilateral repos are valuable because they return cash at 8:30 am, not 3:30 pm as is the case with tri-party repos.

The foreign RRP facility thus provides [intraday liquidity](#) services.

The foreign RRP facility always paid the market interest rate, because the New York Fed did not want to influence the market through the interest rate that it paid on this facility.

Historically, the Fed paid “yesterday’s” repo rates on reverse repos that matured “today”. That practice remains unchanged today, but the process that determines that rate paid became more formal: in the past, the rate paid was derived through an informal survey; today, the rate is derived from the formal exercise that generates the daily SOFR fixings.

The interest rate paid on the foreign RRP facility is not public information, but the Fed's unaudited quarterly financial [statements](#) provide some information on what that rate may be (more on this below). Based on these statements, it appears that the facility pays either the o/n bilateral GC rate or the SOFR rate, or some slightly adjusted version of these two.

The foreign RRP facility thus provides intraday liquidity at [market prices](#).

The foreign RRP facility was capped historically, meaning that foreign central banks could only place limited amounts in it. Limited amounts went hand-in-hand with the market rate paid by the facility: quantity limits ensured that the facility does not influence the market, just as paying the market repo rate ensured that the facility doesn't influence the market.

The foreign RRP facility provided intraday liquidity at market prices and in [limited amounts](#) – historically. Because its usage was limited, the facility was an afterthought in markets.

The foreign RRP facility was uncapped sometime in early 2015 and with that change, it went from an afterthought to the most important policy tool you never heard of (see [here](#)).

The date the foreign RRP facility was uncapped is unknown because the public isn't privy to the terms of the facility. Similar to how the terms of an account between a bank and its corporate and institutional customers are private, the terms of the foreign RRP facility between the New York Fed and its foreign central bank customers are a private matter too.

The reason why we know the facility was uncapped is because the Fed's H.4.1 release revealed a \$150 billion increase in the usage of the facility during the course of 2015 (see Figure 1). The money that was put into the foreign RRP facility that year “nested” – the usage of the facility has been remarkably stable around \$250 billion ever since.

Why did the Fed uncap the foreign RRP facility in 2015?

We do not know for sure, but the following line of arguments could provide the answer.

Since the introduction of Basel III in 2015, globally systemically important banks (G-SIBs) had a problem to solve each year: in 2015, the problem was leverage (SLR) constraints; in 2016, the problem was liquidity (LCR) constraints and prime money market fund reform; in 2017, the problem was [unearthing collateral](#) to get dollars post-money fund reform; and in 2018, the problem was intraday liquidity needs and resolution planning constraints.

Part I – “Liftoff” and the Safe Asset Shortage

The “meme” of the 2015 constraint was large U.S. banks’ efforts to push \$200 billion of non-operating deposits off their balance sheets and onto someone else’s balance sheet.

Because G-SIBs’ binding constraint back in 2015 was the [SLR](#), the issue was not that G-SIBs did not have enough reserves against non-operating deposits, but that they didn’t have the balance sheet to carry these deposits and the reserves needed to back them.

In 2015, G-SIBs needed to shed balance sheet.

Shedding balance sheet is “easy”, especially if you are chock-full of reserves: all you need to do is to drop the rate on the non-operating deposits you aim to shed below the market, and the account holders will react – as they move away, you lose deposits and reserves in equal amounts on both sides of your balance sheet and *voilà* your SLR just improved.

Shedding \$200 billion of balance sheet is a lot, and 2015 was a particularly sensitive year: the FOMC was getting ready for the first hike of the current interest-rate cycle and the operational folks of the New York Fed were busy priming the o/n RRP facility to ensure that “liftoff” was a success (see [here](#)). Two forces were pushing in opposite direction:

- (1) the New York Fed was working on establishing a floor to o/n interest rates by opening up its balance sheet to non-bank counterparties like money funds, and
- (2) G-SIBs were working on closing off their balance sheet to certain depositors, an essential part of which was to cut deposit rates below o/n market rates.

This was the first time – but not the last time – when the operational and regulatory arms of the Fed pushed the financial system into opposite directions (see [here](#), [here](#) and [here](#)).

Shedding \$200 billion of balance sheet in 2015 was ill-timed not only because of “liftoff” but also because of money fund reform, which was expected to lead to a surging demand for Treasury bills, in addition to the demand from the “exile” of non-operating deposits.

In 2015, the Debt Management Office of the U.S. Treasury did not yet have the sign-off to run its cash balances up to \$400 billion or structurally harvest negative bill-OIS spreads, and so the system didn’t yet have a mechanism to address bouts of safe asset shortages.

Ensuring that “liftoff” was a success was paramount...

...and uncapping the foreign RRP facility was the path of least resistance.

Some of the \$200 billion of “exiled” deposits was hedge fund and asset manager money, but some belonged to foreign central banks. Uncapping the foreign RRP facility helped reduce the looming bill shortage by absorbing the central bank deposits that would have pressured the bill market – and with that, the risks that a bill shortage posed to o/n rates printing outside the Fed’s target range on the day of “liftoff” were drastically reduced.

Uncapping the foreign RRP facility reduced a \$200 billion problem into a much smaller, \$50 billion problem.¹ Uncapping the foreign RRP facility reduced the bill shortage by \$150 billion. Uncapping the foreign RRP facility helped ensure that “liftoff” was a success.

Uncapping the foreign RRP facility was a policy move we were told was not (see [here](#)) – but post-Basel III, a facility with unlimited intraday liquidity at market rates is a policy tool.

That was 2015.

Today is different.

¹ During the relevant period, the usage of the foreign RRP facility increased by \$150 billion.

Part II – Exacerbating the Safe Asset Glut

Today is different because the issue is not a looming safe asset shortage; the issue is a safe asset glut. Today is different because G-SIBs aren't leverage (SLR) constrained; they are constrained by intraday liquidity needs and a scarcity of reserves on certain days.

Today is not the time for an uncapped foreign RRP facility.

Defending an uncapped foreign RRP facility is hard in the current market environment for at least four reasons.

First, in a regime where Treasury is increasing issuance, and collateral, not reserves is what's excess, o/n GC rates and SOFR will always trade north of Treasury bill yields. Linking the pricing of the foreign RRP facility to market repo rates distorts incentives: it incentivizes foreign central banks to not buy bills that are shorter than three months. Euthanizing foreign central banks' bid for bills by paying them a spread over bills is a bad "deal" for the taxpayer. On a notional amount of \$250 billion, even basis points matter: in recent quarters, the foreign RRP facility paid around 10 bps more than one-month bills, which translates into \$250 million in extra interest expenses per annum (see Figure 2).

An uncapped foreign RRP facility keeps the U.S.'s funding costs higher than necessary.

Second, any facility that provides intraday liquidity services typically pays a rate that's below the market rate. Paying a rate above the market rate is plain bad business and violates the hierarchy of money markets. Hiding behind some historical pricing practices – "paying the market rate so as not to influence the market" – are hard to justify in a world where intraday liquidity has a distinct and growing price to it. Continuing with the facility's historical pricing practices while the facility remains uncapped is plain impossible to justify.

An uncapped foreign RRP facility distorts money markets, in our view.

Third, the foreign RRP facility became the most expensive liability of the Fed last year, putting it at the top of the Fed's account pricing "hierarchy" (see Figure 2 again). According to this hierarchy, Treasury and the GSEs get paid zero on their Fed balances; money funds get the RRP rate, which is currently 2.25%; banks get paid the IOR rate, which is currently 2.40%; and foreign central banks and supranationals get a market rate which currently trades over IOR and is set to go higher still as collateral supply increases. If Congress had an issue with the Fed paying foreign banks the IOR rate, it should have an even bigger issue with the Fed paying foreign central banks a spread over the IOR rate.

An uncapped foreign RRP facility can get political.

Fourth, we think it is bad policy to force the largest of U.S. banks through cuts to IOR to lend more in the o/n GC repo market and, implicitly, to give up scarce intraday liquidity, while letting foreign central banks spend not one penny of their excess intraday liquidity.

The Fed's aim with IOR cuts was to incentivize the largest U.S. banks to lend more in the o/n GC market to ensure that the constellation of o/n rates remains within the target band.

That approach didn't work, for it didn't attack the root cause of the pressure on o/n rates, which stemmed from bill supply and the foreign RRP facility exacerbating that supply. Higher bill yields pushed o/n rates up relative to the band and pouring liquidity on these pressures by forcing banks through IOR cuts to cap o/n GC rates was a band-aid solution.

But there was a twist: by forcing banks to spend their reserves to police the o/n GC rate on average days, they were less liquid and less able to help others net on reporting days – and on December 31st, 2018, we had the worst-ever year-end turn in repo markets.

Cuts to IOR thus traded intra-quarter stability for reporting-date instability in repo markets and did not address the root-cause of problems – bill supply and the foreign RRP facility.

Part III – Cleaning Up the Safe Asset Glut

Today, the case to re-cap the foreign RRP facility is stronger than ever:

- (1) the December 31st turn showed us that the repo market relies on two U.S. banks to clear and these banks only have \$200 billion of “excess” reserves (see [here](#)).
- (2) the growth of the IBDA market tells us that the hunt for intraday liquidity is on, with official accounts being banks’ preferred source of intraday liquidity (see [here](#)).
- (3) the yield curve has inverted (outright and relative to funding costs) and we need a steeper curve to absorb the massive supply of Treasuries this year (see [here](#)).

Capping the foreign RRP facility would address each of the above points:

- (1) if the foreign RRP facility is re-capped, reserves would go up in the system, and banks would have more intraday liquidity to work with on reporting dates.
- (2) if the foreign RRP facility is re-capped, banks with intraday liquidity constraints could lure foreign central bank cash through IBDAAs, like they lure FHLBs’ cash.
- (3) if the foreign RRP facility is re-capped, foreign central banks would go either in the bill market or the FX swap market, which would help re-strengthen the curve.

The case to cap the foreign RRP facility is thus clear, with benefits in three policy domains: debt management (lower funding costs); bank supervision (more intraday liquidity); and financial stability (smoother quarter-ends). Three birds, not two, with one piece of stone.

But most importantly, capping the foreign RRP facility would buy the Fed precious time to communicate, design and implement a fixed-price, full allotment o/n RP facility (see [here](#)).

The Fed is currently working on this facility, and is under pressure to implement it sooner, rather than later. Communicating, designing and implementing the o/n RRP facility took years and there was no particular rush. In contrast, there is an urgency to launch the o/n RP facility, but its launch cannot be rushed because onboarding new counterparties and building new pipes “naturally” takes time to negotiate, document, and communicate.

Before the Fed is ready to inject reserves through an o/n PR facility, it could buy time by injecting reserves through “reverse-[sterilization](#)” – by capping the foreign RRP facility.

Let’s assume the Fed re-caps the foreign RRP facility. How will we know they did it?

There won’t be a speech, just like there was no speech about uncapping the facility. There won’t be a note on the Fed’s website either, for the new terms of the facility will be announced only to those official institutions who have access to the foreign repo facility.

STIR traders will be in the dark.

The only data source we will have to track these flows – if they happen – is the Fed’s [weekly H.4.1 release](#). Here, watch for the size of the foreign RRP facility break its trend and brake below the \$225 billion mark and then rapidly fall to the \$100 billion mark.

The other, more real-time way of tracking these flows is to have a line into traders that make a market in deposits for central banks. If you are one of those market makers and see a reserve manager from a foreign central bank ask you to make him a market for \$1 billion in deposits one day, another \$1 billion the next day and then \$5 billion and then \$10 billion, you know the foreign RRP facility has been capped and that you should step away from the *tsunami* that’s about to hit rather than absorb it. You’ll [deflect](#) these flows by dropping the prices on your deposits – way below bill yields to send a clear message:

latch on to bills, not my balance sheet...

...and so the flows will begin. Pushing \$200 billion back into the bill market would have a massive impact on bill yields, and through bill yields the FX swap market: lower bill yields would increase the spread between bills and FX swap implied yields which in turn would prompt more lending in the FX swap market, pushing cross-currency bases to go tighter.

But this \$200 billion leaving the foreign RRP facility could find its way to the FX swap market more directly. Foreign central banks – and the RBA in particular (see [here](#)) – are avid lenders of dollar reserves in the swap market. In a way, bills are “so yesterday”.

\$200 billion hitting the FX swap market indirectly or directly is a lot, especially when cross-currency bases are barely negative (on a Libor-Libor basis). Barely negative bases mean that the €/\$ and \$/¥ markets are pretty much clearing through matched books, and so a marginal \$200 billion of new lending could tip the basis quite positive, quite fast – that’s the scenario where Libor-OIS goes negative (re-read page 13 [here](#), s-l-o-w-l-y).

Sometimes, when you come in to work, weird stuff just happens. The SNB ending the Swiss franc’s peg to the € was one of those days. It sent spot FX flying (see Figure 3).

If the Fed re-caps the foreign RRP facility, we could have another one of those days: a day when the FX swap market realizes the amount of flow that’s about to hit directly or indirectly and traders re-price forward dollars to discount an abundance of dollar supply.

Figure 4 shows what that day could look like on your screens...

...similar to the day when the franc’s peg ended, but different in that the big move was in the spot FX rate back then, whereas the big move would be in forward FX rates today.

Conclusions

The case for re-capping the foreign RRP facility is clear, and debate about it is necessary.

It’s hard to understand why the Fed is not using the foreign RRP facility as a tool with the same degree of enthusiasm it did at the eve of the hiking cycle. The problem back then was a shortage of safe assets and balance sheets so they created safe assets through the foreign RRP facility and sterilized reserves to ease banks’ balance sheet constraints.

Now the problem is a glut of safe assets and a shortage of intraday liquidity so the Fed needs to undo some safe assets by re-capping the foreign RRP facility to ease the glut, which would also increase the amount of reserves and hence intraday liquidity in the system.

Same tool, different circumstances. If the Fed used it then, why don’t they use it now?

Market making is simple in concept – the essence is to constantly adjust the prices on the two sides of your book to either absorb or deflect flows. Basel III makes this a bit more difficult in that the size, composition and funding of your book is subject to constraints, but the essence of the game is still the same: absorb or deflect within your constraints.

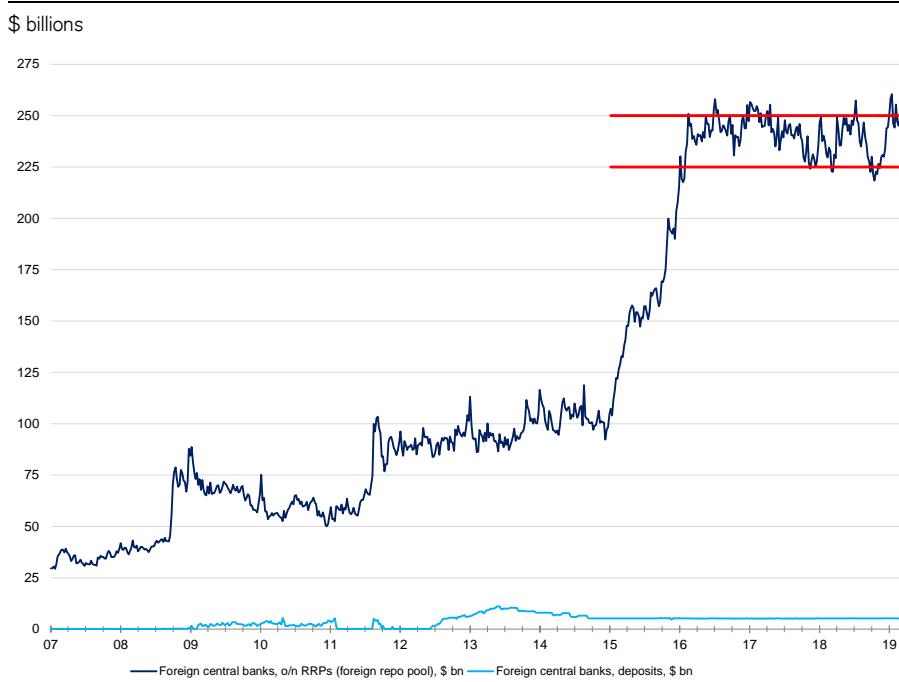
In 2015, banks deflected non-operating deposits by dropping deposit rates below the market rate. The Fed absorbed those deposits by uncapping the foreign RRP facility. Now it’s time for the Fed to deflect the same deposits and push them back to banks and then for banks to deflect these deposits and push them into the bill and FX swap markets.

In closing, we’d note that in close to 150 client meetings year-to-date, the only argument we heard former Fed hands say about why the foreign RRP facility won’t be capped was:

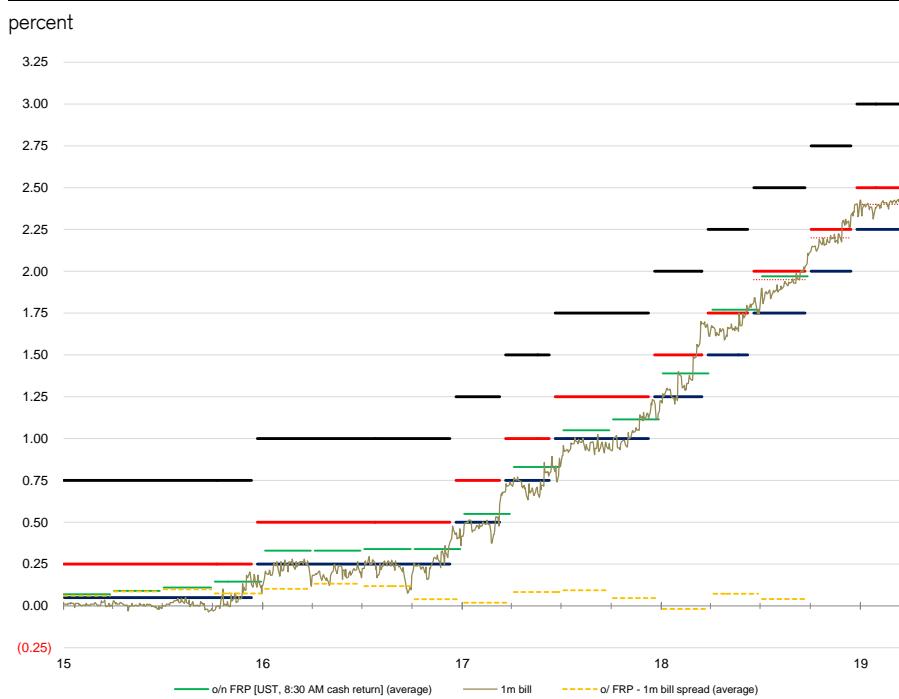
“They don’t want to upset foreign central banks.”

Really? [Valéry Giscard d'Estaing](#) would have enjoyed that one...

It’s now time to use the [exorbitant privilege](#) and re-cap the foreign RRP facility.

Figure 1: The Foreign RRP Facility's Usage

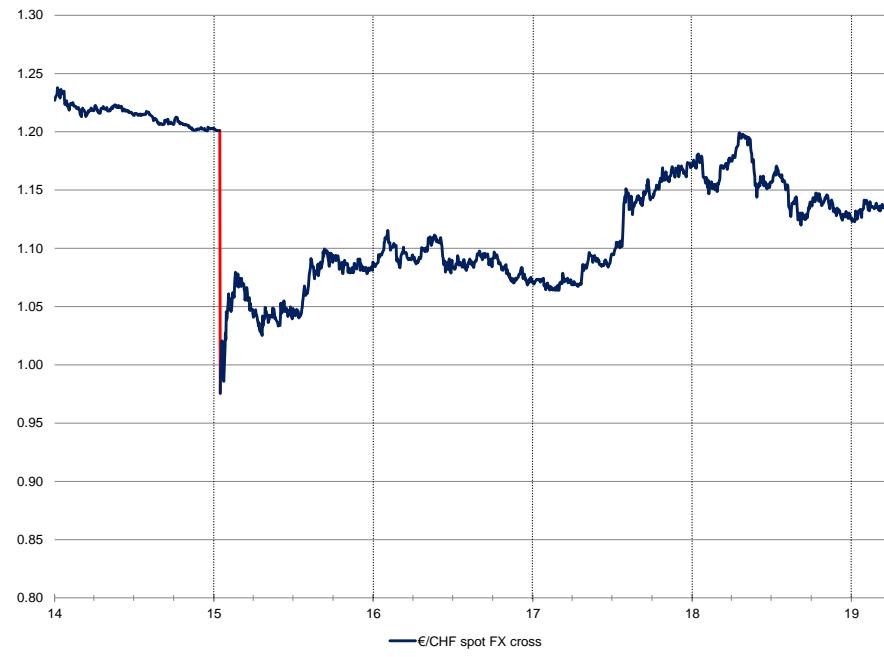
Source: the BLOOMBERG PROFESSIONAL™ service, Federal Reserve, Credit Suisse

Figure 2: The Foreign RRP Facility's Pricing

Source: the BLOOMBERG PROFESSIONAL™ service, Federal Reserve, Credit Suisse

Figure 3: When the Unexpected Happens in Spot FX Markets

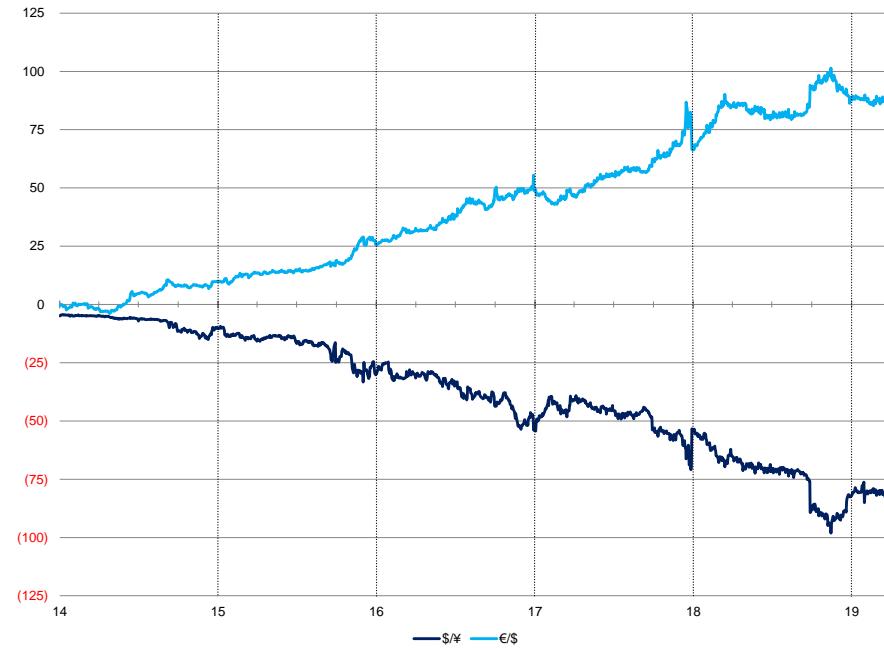
€/CHF spot FX rate



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 4: When the Unexpected Happens in Forward FX Markets

Forward points, three-month (red lines indicate hypothetical forecast if the foreign RRP facility is capped)



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

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31 May 2019
Investment Solutions & Products
Global



Credit Suisse Economics

Global Money Notes #22

Collateral Supply and o/n Rates

In this edition of Global Money Notes, we explain, in never-before-seen detail, the mechanics of intra-day Fed balance sheet operations. These mechanics show why reserves can be scarce enough on some days to create volatility and problems even after trillions of dollars in quantitative easing. We study the detail of how balance sheet reduction (colloquially referred to as "taper") has worked.

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Reserves are scarce...

...and this scarcity now feeds through to daily volatility in the o/n fed funds rate.

The volatility of the o/n FF rate is driven by the supply of Treasury collateral and some banks' increased reliance on daylight overdrafts on settlement days.

The flipside of daylight overdrafts are temporary daylight reserves which banks have to pay back to the Fed everyday by sunset, and these payments are funded by borrowing "permanent" reserves during the day through the o/n FF market.

The days when some clearing banks need to fund in the o/n FF market to settle daylight overdrafts at the Fed typically coincide with the days when bank HQLA portfolios couldn't lend enough reserves in the o/n GC market...

...typically because they hit their intraday liquidity limits.

When those limits are reached arbitrage flows kick in where foreign banks fund in the o/n FF market and lend in the o/n GC market and when arbitrage flows aren't enough, clearing banks bid hard to pay daylight overdrafts at the Fed.

Those are the tough days when the right tail of the distribution of o/n FF trades gets fatter, that is, the days when the volatility in the o/n FF rate picks up, and the effective o/n FF rate drifts higher within the Fed's target band.

Relative to the "ocean" of the o/n GC market, the o/n FF market is a "pond" and so it doesn't take much collateral supply at all to dislocate the latter.

Bill supply will fall between now and the fourth quarter, which should ease pressures on o/n rates. But the curve remains inverted and the trade war with China is getting out of hand and that's a near-term risk for collateral supply before we issue another round of \$300 billion in bills in the fourth quarter.

[Insurance cuts](#) would ease the pressure on o/n rates and it wouldn't be wise to enter the fourth quarter without a mechanism in place to absorb excess bills.

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"This financial plan is an outrageous demand and its too many damn pages for any man to understand."

Thomas Jefferson to Alexander Hamilton in the song "Cabinet Battle #1" in Hamilton

Watching paint dry is not the same as understanding the chemistry of how paint dries...

Paints are a mixture called a colloid. Paints are basically pigments suspended in a solution, which is the mix of a solvent and a binding medium. When paint dries, the solvent portion of the solution evaporates, leaving the pigment stuck in the binding medium in a hard layer.

When we are watching paint dry in the context of taper, Treasuries are like pigments, reserves are like a solvent and intraday liquidity needs are like a binding medium.

When there is too much collateral relative to the supply of reserves, the paint has too many pigments and not enough solvent and is hard to spread – the paint job looks messy, and on your screens the o/n GC rate trades outside the band, pulling the funds rate with it.

When you spread a pigment-heavy mixture on a hot summer day, the solvent evaporates quickly and you end up with hardened chunks of pigment that punctuate the surface – those are the tough days when intraday liquidity needs bind and the o/n GC rate spikes.

Our current issue has seven parts, each of which is a three-page essay supported by a set of maps showing *hour-by-hour* flows involved in taper intraday and overnight, and a detailed deck of *fifty slides* that systematically track the impact of collateral supply – coming from both taper and the deficits – on the o/n GC repo and o/n fed funds rates.

Part one uses taper as our analytical entry point to answer the bigger picture question of how collateral supply drives the constellation of o/n rates. It shows how dealers and the Bank of New York facilitate taper intraday, maps the channels through which collateral can be absorbed as the Fed tapers, and highlights how increased supervisory focus on intraday liquidity increased banks' demand for reserves just as taper was destroying them.

Part two maps what happens on the days when taper is not funded, but financed intraday, i.e., how daylight overdrafts provided by BoNY and the Fed help the system clear on some days and how the occasional use of overdrafts impacts the way o/n markets trade.

Part three takes the accounting framework presented in the first two parts and uses it to track who absorbed how much of the Treasury collateral that entered the system via taper and how these flows were financed. It explains how the curve inversion that began in October, 2018 drove stresses in the o/n GC repo market and finds that taper effectively forced the Treasury to fund \$300 billion of supply overnight, in the o/n GC repo market!

Part four puts taper into a bigger context. It compares collateral supply coming from taper to supply coming from deficits, and shows how the balance between reserves and collateral evolved over time. It finds that the "free float" of reserves that's available to be lent into the o/n GC repo market on the margin is \$200 billion and that taper should stop now.

Part five looks at how collateral supply has been driving the demand for reserves via daylight overdrafts and overnight GC repos and overnight fed funds. It shows that, collateral supply coming from taper and growing deficits was ill-timed from the beginning, as it coincided with the exhaustion of excess reserves outside the banking system and so it pressured excess reserves inside the banking system which has stressed o/n rates.

Part six shows how collateral supply and demand for reserves drove the price of reserves and concludes that the o/n GC repo rate is the system's core funding rate and that the o/n fed funds rate is a lagging and low-beta indicator of collateral-related stresses and so it should be demoted to be a peripheral funding rate. Finally, part seven concludes.

Part I – Taper and Intraday Flows

According to the Fed, taper is a simple affair (see [here](#)): it's a swap of reserves for bonds, where either banks or non-banks buy the bonds that the Fed no longer buys. Yes, but:

- (1) How dealers underwrite and sometimes fund the process of taper matters.
- (2) How the Bank of New York settles every single taper-related flow matters.
- (3) How the pace of taper interacts with banks' demand for reserves matters.

First, taper doesn't just happen – primary dealers underwrite the process of taper.

Primary dealers underwrite newly issued Treasuries on settlement days in the morning and distribute them to various types of ultimate bank and non-bank buyers in the afternoon.

The map at the bottom of the page shows the Fed's conceptual framework of taper, where markets "magically" clear and bonds always flow to ultimate buyers post-taper – Scenarios 1 and 2 show non-banks and banks as ultimate buyers of bonds, respectively.

But ultimate buyers don't always buy. Banks and non-banks are price sensitive buyers – they only buy if it makes sense to buy. Rate hikes, curve slopes, and term premia determine if it makes sense to buy Treasuries, and, if the answer is no, primary dealers still have to, because hell or high water, the Primary Dealers Act of 1988 requires them to.

Since the fourth quarter of last year, it made no sense to buy Treasuries on the margin...

...because the yield curve inverted relative to all the relevant funding costs that matter – repo, Libor and FX hedging costs – and so ultimate buyers didn't gorge on Treasuries.

But primary dealers had to, and as they did, their inventories swelled (see Figure 1).

Primary dealers are not banks and their bread-and-butter marginal funding source is repo: the funding needs associated with expanding Treasury inventories drove the demand for o/n repo funding and pushed rates over the top of the target band (see Figures 2 and 3).

The map on the top of the next page shows how the slope of the Treasury yield curve can mess with the Fed's framework when it forces ultimate buyers to go on a buyers strike – Scenarios 3 and 4 show dealers as intermediate buyers when they are stuck with bonds.

Figure 4 tracks the volume of flows that went through some of these scenarios since the beginning of taper. It shows that large banks didn't buy that many Treasuries outright, but rather reversed them in via o/n GC repo from dealers as dealers leaned into banks to finance growing inventories – that's Scenario 4, which the Fed's framework didn't consider.

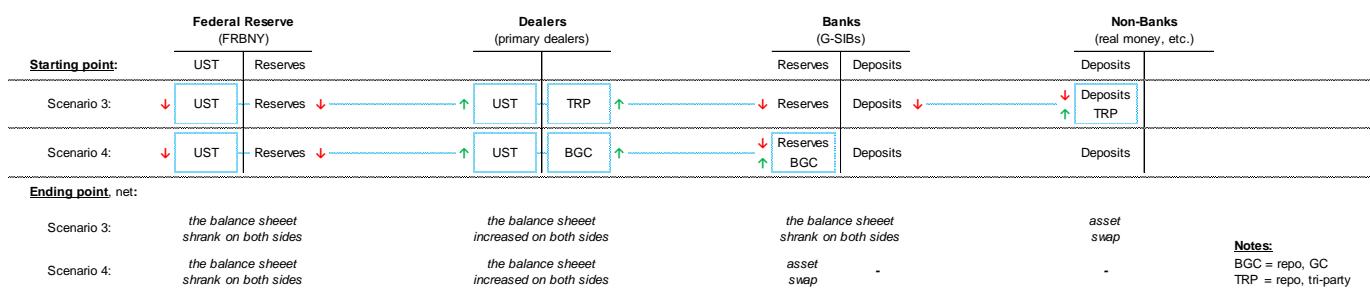
Inversions thus influence whether the Treasuries that enter the system via taper end up with ultimate buyers or intermediate buyers – i.e., primary dealers – and, because the two buyers fund in different money market segments, whether term or o/n rates are stressed.

Balance Sheet Taper Without Dealers

Federal Reserve (FRBNY)		Banks (G-SIBs)		Non-Banks (real money, etc.)	
Starting point:		Reserves	Deposits	Deposits	
Scenario 1:	↓ UST	Reserves ↓	"MAGIC" by Arrow-Debreau	↓ Reserves	Deposits ↓
Scenario 2:	↓ UST	Reserves ↓	"MAGIC" by Arrow-Debreau	↓ Reserves UST	Deposits
<u>Ending point, net:</u>					
Scenario 1:	the balance sheet shrank on both sides		the balance sheet shrank on both sides		asset swap
Scenario 2:	the balance sheet shrank on both sides		asset swap		-

Source: Credit Suisse

Balance Sheet Taper With Dealers



Source: Credit Suisse

Second, the Bank of New York (BoNY) settles every single penny of taper-related flows – it collects reserves from banks in the U.S. and delivers them to the Fed for “shredding”.

To understand how a clearing bank settles taper-related payment flows between banks, non-banks and Treasury, we first need to understand how dealers settle their payments.

Primary dealers aren’t banks and because they aren’t, they do not have reserve accounts and so cannot settle their payments using reserves. Instead, they settle their payments by drawing on their clearing accounts at BoNY – the sole clearing bank of every dealer.¹

Primary dealers’ settlement dynamics and BoNY are both ignored in the Fed’s framework, but the four maps on the next two pages fix this omission and list the intraday flows that happen in the process of taper by building on the dealer-centric map atop this page. Thus:

- (1) Dealers buy bonds and deplete their clearing accounts at 9:00 am [step 1A], and Treasury issues bonds and ups its general account balance (TGA) [step 1B].
- (2) BoNY settles these flows by wiring reserves from its account at the Fed [step 2A], which deplete BoNY’s account and increase the Treasury’s account [step 2B].
- (3) Treasury uses its balances to redeem maturing bonds at 9:30 am [step 3]...
- (4) ...and the Fed’s balance sheet shrinks on both sides [step 4]; taper accomplished, and the Fed’s framework conveniently ends here, but the process continues.
- (5) Dealers sell the bonds and “re-fill” their clearing accounts by 3:30 pm [step 5A]; buyers buy the bonds outright or through repo and pay with deposits [step 5B]...
- (6) ...and these flows settle by buyers instructing their banks to wire money to the dealers’ clearing accounts, which settle through reserves flowing from banks’ reserve accounts to BoNY’s reserve account at the Fed [steps 6A, 6B and 6C].

There is an order and “rhythm” to these flows – odd steps denote security flows and even steps denote reserve flows; securities get added and reserves get destroyed; BoNY is omnipresent, delivering reserves to Treasury for “shredding” in the morning and collecting reserves from banks in the afternoon for a new delivery at Treasury tomorrow.

The flows on each of the expanded maps are the same up through 9:30 – the red line – that is, up to the point where the Treasury redeems maturing Treasuries held by the Fed,

¹ Dealers used to have two clearing banks, J.P. Morgan Chase and BoNY, but today only BoNY clears for dealers. J.P. Morgan was effectively forced out of clearing for dealers by Basel III, as the accord’s G-SIB framework deemed J.P. Morgan as the most complex and interconnected bank globally, which had major capital surcharge consequences (see [here](#)). In order to reduce its surcharges, J.P. Morgan decided to exit some businesses, like clearing for dealers.

Balance Sheet Taper With Dealers and Intraday Flows – Non-Banks as Ultimate Buyers (Scenario 1)

	Federal Reserve (FRBNY)		Dealers (Credit Suisse Securities LLC)		Banks (Citibank, N.A.)		Non-Banks (real money, etc.)	
7:00 AM	UST	Reserves _B _{oNY} Reserves _C _{rl} TGA	Deposits		Reserves _C	Deposits	Deposits	
9:00 AM		Reserves _B ↓ [2B] TGA ↑	[1A] ↓ Deposits ↑ UST					
9:30 AM	↓ UST	TGA ↓ [4]						
3:30 PM		Reserves _C ↓ [6C] Reserves _B ↑	[5A] ↓ UST ↑ Deposits		↓ Reserves _C	Deposits ↓ [6A]	[5B] ↓ Deposits ↑ UST	
Scenario 1, net:	↓ UST	Reserves _C ↓			↓ Reserves _C	Deposits ↓	↓ Deposits ↑ UST	
End-of-day, net:	the balance sheet shrank on both sides		the balance sheet shrank on both sides		asset swap			
Intraday:			Deposits (↓/↑)	Reserves _C Deposits (↓) (↓)				

	Treasury (Debt Management Office)		Clearing Bank (BoNY)					
7:00 AM	TGA	UST	Reserves _B	Deposits				
9:00 AM	↑ TGA	UST ↑ [1B]	[2A] ↓ Reserves _B	Deposits ↓				
9:30 AM	↓ TGA	UST ↓ [3]						
3:30 PM			↑ Reserves _B	Deposits ↑ [6B]				
Scenario 1, net:	-	-	-	-				
End-of-day, net:	-	-	-	-				
Intraday:			Reserves _B (↓/↑)	Deposits (↓/↑)				

Source: Credit Suisse

Balance Sheet Taper With Dealers and Intraday Flows – Banks as Ultimate Buyers (Scenario 2)

	Federal Reserve (FRBNY)		Dealers (Credit Suisse Securities LLC)		Banks (Citibank, N.A.)		Non-Banks (real money, etc.)	
7:00 AM	UST	Reserves _B _{oNY} Reserves _C _{rl} TGA	Deposits		Reserves _C	Deposits	Deposits	
9:00 AM		Reserves _B ↓ [2B] TGA ↑	[1A] ↓ Deposits ↑ UST					
9:30 AM	↓ UST	TGA ↓ [4]						
3:30 PM		Reserves _C ↓ [6C] Reserves _B ↑	[5A] ↓ UST ↑ Deposits		[5B, 6A] ↓ Reserves _C ↑ UST	Deposits	Deposits	
Scenario 2, net:	↓ UST	Reserves _C ↓			↓ Reserves _C ↑ UST	Deposits	Deposits	
End-of-day, net:	the balance sheet shrank on both sides		asset swap		-		-	
Intraday:			Deposits (↓/↑)					

	Treasury (Debt Management Office)		Clearing Bank (BoNY)					
7:00 AM	TGA	UST	Reserves _B	Deposits				
9:00 AM	↑ TGA	UST ↑ [1B]	[2A] ↓ Reserves _B	Deposits ↓				
9:30 AM	↓ TGA	UST ↓ [3]						
3:30 PM			↑ Reserves _B	Deposits ↑ [6B]				
Scenario 2, net:	-	-	-	-				
End-of-day, net:	-	-	-	-				
Intraday:			Reserves _B (↓/↑)	Deposits (↓/↑)				

Source: Credit Suisse

Balance Sheet Taper With Dealers and Intraday Flows – Dealers as Intermediate Buyers (Scenario 3)

	Federal Reserve (FRBNY)		Dealers (Credit Suisse Securities LLC)		Banks (Citibank, N.A.)		Non-Banks (real money, etc.)			
7:00 AM	UST	Reserves _B NY Reserves _C NY TGA	Deposits		Reserves _C	Deposits	Deposits			
9:00 AM		Reserves _B ↓ [2B] TGA ↑	[1A] ↓ Deposits ↑ UST							
9:30 AM	↓ UST	TGA ↓ [4]								
3:30 PM		Reserves _C ↓ [6C] Reserves _B ↑ [5A] ↑ Deposits	TRP ↑		↓ Reserves _C	Deposits ↓ [6A]	[5B] ↓ Deposits ↑ TRP			
Scenario 3, net:	↓ UST	Reserves _C ↓	↑ UST	TRP ↑	↓ Reserves _C	Deposits ↓	↓ Deposits ↑ TRP			
End-of-day, net:	the balance sheet shrank on both sides		the balance sheet increased on both sides		the balance sheet shrank on both sides		asset swap			
Intraday:			Deposits (↓/↑)		Reserves _C (↓)	Deposits (↓)				
	Treasury (Debt Management Office)		Clearing Bank (BoNY)							
7:00 AM	TGA	UST	Reserves _B	Deposits						
9:00 AM	↑ TGA	UST ↑ [1B]	[2A] ↓ Reserves _B	Deposits ↓						
9:30 AM	↓ TGA	UST ↓ [3]								
3:30 PM			↑ Reserves _B	Deposits ↑ [6B]						
Scenario 3, net:	-	-	-	-						
End-of-day, net:	-	-	-	-						
Intraday:			Reserves _B (↓/↑)	Deposits (↓/↑)						
								Notes: TRP = repo, tri-party		

Source: Credit Suisse

Balance Sheet Taper With Dealers and Intraday Flows – Dealers as Intermediate Buyers (Scenario 4)

	Federal Reserve (FRBNY)		Dealers (Credit Suisse Securities LLC)		Banks (Citibank, N.A.)		Non-Banks (real money, etc.)	
7:00 AM	UST	Reserves _B NY Reserves _C NY TGA	Deposits		Reserves _C	Deposits	Deposits	
9:00 AM		Reserves _B ↓ [2B] TGA ↑	[1A] ↓ Deposits ↑ UST					
9:30 AM	↓ UST	TGA ↓ [4]						
3:30 PM		Reserves _C ↓ [6C] Reserves _B ↑ [5A] ↑ Deposits	BGC ↑		[5B, 6A] ↓ Reserves _C ↑ BGC	Deposits	Deposits	
Scenario 4, net:	↓ UST	Reserves _C ↓	↑ UST	BGC ↑	↓ Reserves _C ↑ BGC	Deposits	Deposits	
End-of-day, net:	the balance sheet shrank on both sides		the balance sheet increased on both sides		asset swap	-	-	
Intraday:			Deposits (↓/↑)					
	Treasury (Debt Management Office)		Clearing Bank (BoNY)					
7:00 AM	TGA	UST	Reserves _B	Deposits				
9:00 AM	↑ TGA	UST ↑ [1B]	[2A] ↓ Reserves _B	Deposits ↓				
9:30 AM	↓ TGA	UST ↓ [3]						
3:30 PM			↑ Reserves _B	Deposits ↑ [6B]				
Scenario 4, net:	-	-	-	-				
End-of-day, net:	-	-	-	-				
Intraday:			Reserves _B (↓/↑)	Deposits (↓/↑)				
								Notes: BGC = repo, GC

Source: Credit Suisse

which is where the Fed's framework ends. But the flows after 9:30 differ on each map, each showing a different way of dealers re-filling their clearing accounts by 3:30 pm, which is something dealers have to do every day so they have cash to trade with next day.

The first and second maps show dealers re-filling their clearing accounts by selling bonds. The third and fourth maps show dealers re-filling their clearing accounts by repoing bonds.

The main difference between the two sets of maps is that in the first set, ultimate buyers are ready to buy bonds and dealers can sell bonds, but in the second set, ultimate buyers are on a buyers strike, and the dealers are stuck with the bonds and need to fund them – more precisely they have to repo the bonds to raise cash to re-fill their clearing accounts.

The balance sheet entries in the cream-colored areas on each map are derived by netting all the balance sheet entries that were logged throughout the day; at the end of netting, we arrive at the four balance sheet scenarios we plotted on the simple maps at the outset.

Even though the clearing balances of primary dealers and the reserve balances of BoNY end the day flat, that is, unchanged, the fact that that they go through an intraday swing – see the blue areas in the maps above – has implications for banks' demand for reserves.

This brings us to our third discussion point: the impact that the accelerating pace of taper has on intraday liquidity risks and resolution liquidity adequacy and positioning (RLAP), at all banks with institutional clients and a primary dealer arm in the U.S. as well as BoNY.

Most readers of Global Money Notes are familiar with the liquidity coverage ratio (LCR), which requires banks to pre-fund 30-day outflows and invest the proceeds in HQLA, which include reserves or Treasuries bought outright or reversed in via reverse repos. Importantly, the LCR is based on end-of-day balance sheet snapshots, which means that intraday balance sheet dynamics do not impact how much HQLA banks need to hold.

RLAP supersedes the LCR, because it...

...forces large banks to hold HQLA over and above the quantum required by the LCR in order to ensure that banks are able to meet their intraday outflows as "gone concerns".

From the perspective of intraday payment flows, the main difference between a bank as a "going concern" and a bank as a "gone concern" is that if a bank is a "going concern", its outflows in the morning will come back as inflows in the afternoon, but if it becomes a "gone concern" at noon, there won't be any forthcoming inflows in the afternoon and it will end up short reserves for its LCR and hence breach one of its key Basel III metrics.

Banks with primary dealer arms and BoNY have large outflows of reserves in the morning and large inflows of reserves in the afternoon, and RLAP protects LCRs at these banks in a resolution setting by forcing them to pre-fund their intraday outflows (see Figure 5).

Importantly, because RLAP is all about intraday payment flows and intraday liquidity risks and because reserves are the only instrument that provide intraday liquidity for banks, the only way banks can become RLAP compliant is by holding more reserves at the Fed.

The accelerating pace of taper and increased supervisory focus on intraday liquidity risks and RLAP thus increases large banks' demand for reserves, as shown in Figure 6.

The left-hand panel in Figure 6 shows that as taper accelerates and settlement days grow, dealers draw on their clearing accounts more heavily and the intraday swings get bigger.

The middle panel shows how larger swings in dealers' clearing balances symmetrically drive larger intraday swings in BoNY's reserve balances at the Fed during the day.

The right-hand panel shows how bigger peak intraday outflows drive RLAP requirements and increase the demand for reserves at both primary dealers' parent banks and BoNY.

Part II – Taper and Daylight Overdrafts

Taper can get even more complicated...

...as sometimes primary dealers do not have enough money in their clearing accounts to take delivery of all the bonds that the Treasury puts into the system on settlement days.

Those are the “tough” days when some primary dealers incur daylight overdrafts at BoNY – the days when taper is not funded, but financed intraday.

In the examples discussed on the previous page, primary dealers had more than enough cash in their clearing accounts to take down more and more bonds due to faster taper, and faster taper mattered only because they increased dealers’ peak intraday outflows which increased the amount of reserves parent banks and BoNY had to hold for RLAP.

Figure 7 shows what happens when dealers don’t have enough cash to take the bonds.

The left-hand panel shows dealers incurring daylight overdrafts in their clearing accounts, that is, dealers taking intraday credit from BoNY. In turn, the middle panel shows that BoNY finances dealers’ daylight overdrafts by incurring daylight overdrafts at the Fed, that is, by taking intraday credit from the Fed. As Professor Perry Mehrling would say...

...the payments system is a credit system, which is why interbank payments never bounce, even if the actors that need to pay do not have the money to pay when they have to pay.

Daylight overdrafts are no joke – they are expensive and can be reputationally damaging.

Daylight overdrafts at BoNY cost 60 bps per annum per minute for less than \$5 billion, and 120 bps per annum per minute for amounts greater than \$5 billion – all collateralized.

Daylight overdrafts at the Fed cost 50 bps per annum per minute when uncollateralized, and are free when collateralized (see [here](#)). Currently all daylight overdrafts at the Fed are taken on a collateralized basis; uncollateralized overdrafts are negligible (see [here](#)).

Daylight overdrafts at BoNY turn into o/n GC repo if they are not paid back by “sunset” – repo literally happens at night, that is, after sunset; that’s why repo is “shadow banking”.

Daylight overdrafts at the Fed turn into a discount window loan if unpaid by “sunset” – that’s a reputational risk as under Dodd-Frank the Fed has to disclose who couldn’t pay.

The pricing of and reputational risk around daylight overdrafts are a strong deterrent for dealers and BoNY to use overdrafts frequently and liberally on settlement days. That said, market making is an art, not a science and tough days and daylight overdrafts do happen.

When they do, dealers learn about it “T+2” when they receive their account statements from BoNY with all their negative balances and corresponding charges listed – per minute; dealers then go to their treasurers to present the bill and because the bill is so expensive, the treasurer will “seed” the dealer’s clearing account with more cash the next morning.

Money does not grow on trees...

...and if dealers require more cash in their clearing accounts at BoNY, their parent banks will have fewer reserves at the Fed to cover their own intraday needs – which is a no-go; thus, to avoid overdrafts at BoNY, parent banks have no choice but to hold more reserves, and if parents have more reserves and can seed dealers with more cash in the morning, then BoNY’s risk of incurring daylight overdrafts at the Fed is also lower (see Figure 8).

But calibrating the right level of reserves in real time is hard – overdrafts are unavoidable; the map overleaf shows how the settlement process of taper changes when we include daylight overdrafts. The map starts where the map depicting Scenario 4 on page 6 ends, and highlights the daylight overdraft-related extra balance sheet logs in light brown color.

Balance Sheet Taper With Daylight Overdrafts – Scenario (4) with Dealer Settlement Bottleneck at 9:00 AM

	Federal Reserve (FRBNY)		Dealers (Credit Suisse Securities LLC)		Banks (Citibank, N.A.)		Non-Banks (real money, etc.)							
7:00 AM	UST	Reserves _B Reserves _C TGA	Deposits		Reserves _C	Deposits	Deposits							
9:00 AM		Reserves _B ↓ [2B] +\$20bn ↑ Overdraft TGA ↑	[1A] ↓ Deposits +\$20bn ↑ UST											
9:30 AM		↓ UST -\$20bn ↓ UST	TGA ↓ [4] TGA ↓ -\$20bn											
3:30 PM		Reserves _B ↓ [6C] Reserves _B ↑ -\$20bn ↓ Overdraft	[5A] ↑ Deposits -\$20bn ↓ BGC	[5B, 6A] ↓ Reserves _C Overdraft ↓ -\$20bn BGC ↑ +\$20bn	Deposits	Deposits	Deposits							
Scenario 4, net:	↓ UST -\$20bn	Reserves_C -\$20bn	UST +\$20bn	BGC +\$20bn	↓ Reserves_C ↑ BGC	Deposits	Deposits	Deposits						
End-of-day, net:	<i>the balance sheet shrank by \$20bn more</i>		<i>the balance sheet increased by \$20bn more</i>		<i>asset swap of \$20bn more</i>		-							
Intraday, normal:	Deposits (↓/↑)													
Intraday, with daylight overdrafts:	Deposits Overdrafts (↓/↑) (↑/↓)													

	Treasury (Debt Management Office)		Clearing Bank (BoNY)					
7:00 AM	TGA	UST	Reserves _B	Deposits				
9:00 AM	↑ TGA +\$20bn ↑ TGA	UST ↑ [1B] UST ↑ +\$20bn	[2A] ↓ Reserves _B +\$20bn ↑ Overdraft	Deposits ↓ Overdraft ↑ +\$20bn				
9:30 AM	↓ TGA -\$20bn ↓ TGA	UST ↓ [3] UST ↓ -\$20bn						
3:30 PM		↑ Reserves _B -\$20bn ↓ Overdraft	Deposits ↑ [6B] Overdraft ↓ -\$20bn					
Scenario 4, net:	-	-	-	-				
End-of-day, net:	-	-	-	-				
Intraday, normal:	Reserves _B (↓/↑)							
Intraday, with daylight overdrafts:	Overdrafts (↑/↓)							
	Notes: BGC = repo, GC							

Source: Credit Suisse

Thus, every step gets \$20 billion bigger and the problems start at 9:00 am with step 1A – the dealer has to take down \$120 in bonds but only has \$100 in its clearing account.

Treasury can still issue the bonds and increase its general account by \$120 in step 1B – it's the credit nature of the payment system that ensures that the settlement doesn't fail.

BoNY helps the dealer out with the missing \$20 by extending an intraday credit of \$20, and BoNY funds this credit extension by borrowing \$20 intraday from the Fed in step 2A.

The Fed effectively funds the 9:00 am settlement bottleneck by letting its balance sheet expand on both sides intraday – BoNY's overdraft funds larger TGA balances in step 2B.

Larger TGA balances enable Treasury to redeem \$20 more in Treasuries at 9:30 am, and these larger redemptions shrink the Fed's bond holdings \$20 more in steps 3 and 4.

In addition to "re-filling" its clearing account at BoNY by 3:30 pm, the dealer also has to scramble to replace its intraday funding at BoNY – the charges are piling every minute – and bids for an additional \$20 in o/n repos which a bank will provide in steps 5A and 5B.

The bank wires an additional \$20 to the dealer's clearing account, which settles through BoNY receiving an additional \$20 in its reserve account from banks, which BoNY uses to pay its overdraft at the Fed, and the Fed's balance sheet shrinks \$20 more in step 6.

Taper that's financed intraday thus always involves stresses in the GC repo market in the morning. The driver of these stresses is always a dealer that's scrambling to pay off its daylight overdraft at BoNY which is ticking at 60-120 bps per annum per minute, and the solution to these stresses is typically a reserves-rich bank that swaps its reserves for repo.

But sometimes reserves-rich banks cannot lend more because they hit their limit – whatever reserves they have they need to cover their intraday liquidity risks and RLAP.

The map below shows the scenario where banks cannot lend an additional \$20 to dealers through o/n repos and so dealers have a settlement bottleneck with BoNY at 3:30 PM – the settlement bottleneck with the Treasury at 9:00 am becomes a settlement bottleneck with BoNY at 3:30 pm, effectively because reserves get scarce in banks' HQLA portfolios.

The map is identical to the prior map except for the cells highlighted with light purple color, which show the new funding arrangement dealers have to find to pay off their overdrafts.

Thus, instead of borrowing an extra \$20 from a bank HQLA portfolio through o/n repos, dealers have to roll their daylight overdrafts into o/n repos with BoNY in step 5A and 5B.

That's a problem for BoNY, because unlike the previous example, it receives no inflows from banks to pay off its daylight overdraft at the Fed – BoNY has to fund on the margin in the fed funds market to fund dealers and to pay back the Fed in steps 6A, 6B and 6C.

Daylight Overdrafts Turn into Overnight Funding – Scenario (4) with Dealer Settlement Bottleneck at 3:30 PM

Federal Reserve (FRBNY)		Dealers (Credit Suisse Securities LLC)		Banks (Citibank, N.A.)		Non-Banks (real money, etc.)	
7:00 AM	UST	Reserves _B NY Reserves _C ai TGA	Deposits		Reserves _C Deposits		Deposits
9:00 AM		Reserves _B ↓ [2B] +\$20bn ↑ Overdraft	[1A] ↓ Deposits TGA ↑ +\$20bn TGA ↑ +\$20bn +\$20bn ↑ UST	Overdraft ↑ +\$20bn			
9:30 AM	↓ UST -\$20bn ↓ UST	TGA ↓ [4] TGA ↓ -\$20bn					
3:30 PM		Reserves _C ↓ [6C] Reserves _B ↑ [5A] ↑ Deposits Reserves _F ↓ -\$20bn	BGC _C ↑ Overdraft ↓ -\$20bn BGC _B ↑ +\$20bn	↓ Reserves _C ↑ BGC _C	Deposits	Deposits	
Scenario 4, net:	↓ UST -\$20bn	Reserves _F ↓ -\$20bn ↓	UST +\$20bn	BGC _B +\$20bn			
End-of-day, net:	the balance sheet shrank by \$20bn more		the balance sheet increased by \$20bn more		-	-	-
Intraday, normal:	Deposits (↓/↑)						
Intraday, with daylight overdrafts:	Deposits Overdrafts (↓/↑) (↑/↓)						
Treasury (Debt Management Office)		Clearing Bank (BoNY)					
7:00 AM	TGA	UST	Reserves _B	Deposits			
9:00 AM	↑ TGA +\$20bn ↑	UST ↑ [1B] UST ↑ +\$20bn TGA	[2A] ↓ Reserves _B +\$20bn ↑ Overdraft	Deposits ↓ Overdraft ↑ +\$20bn			
9:30 AM	↓ TGA -\$20bn ↓	UST ↓ [3] UST ↓ -\$20bn					
3:30 PM			[5B] ↑ Reserves _B -\$20bn ↓ Overdraft +\$20bn ↑ BGC _B	Deposits ↑ [6B] Overdraft ↓ -\$20bn FF? ↑ +\$20bn			
Scenario 4, net:	-	-	BGC _B +\$20bn	FF +\$20bn ↑ ?			
End-of-day, net:	-	-	the balance sheet increased by \$20bn				
Intraday, normal:	Reserves _B Deposits (↓/↑) (↓/↑)						
Intraday, with daylight overdrafts:	Overdrafts Overdrafts (↑/↓) (↑/↓)				Notes: BGC = repo, GC		

Source: Credit Suisse

Readers that pay attention will naturally ask the next question – who lends to BoNY in the fed funds market and where will the reserves come from so BoNY can pay back the Fed?

The map below continues where the previous map left off and highlights with light green all the steps that happen earlier in the day that enable BoNY to bid fed funds away from someone else at the end of the day. It includes two new entities that didn't feature before – the New York branches of foreign banks that arbitrage fed funds and some other rate, and the Federal Home Loan Banks which account for all lending in the fed funds market.

Thus, well before 9:00 am, foreign banks repay their fed funds loans to the FHLBs, which reduces foreign banks' reserve accounts and increases FHLBs' deposit accounts at the Fed. Normally the FHLBs will roll the same amount with the same foreign banks, unless there was a tough day and dealers and BoNY struggle with settlement bottlenecks.

On a typical tough day dealers roll their daylight overdrafts into o/n GC repos at BoNY and BoNY pays its overdrafts at the Fed with borrowing in the o/n fed funds market. BoNY's motivation is to settle with the Fed, which trumps foreign banks arbitrage needs and so BoNY's bid for fed funds will be more aggressive. BoNY's settlement needs crowd out arbitrage needs, and we just had a day when the fed funds rate printed higher!

Settlement Needs Crowd Out Arbitrage Needs – Scenario (4) with Crowding Out in the o/n Fed Funds Market

	Federal Reserve (FRBNY)	Dealers (Credit Suisse Securities LLC)	Large U.S. Banks (Citibank, N.A.)	Non-Banks (real money, etc.)
7:00 AM	UST Reserves _B Reserves _C Reserves _D TGA	Deposits	Reserves _C Deposits	Deposits
9:00 AM	Reserves _B ↓ [2B] +\$20bn ↑ Overdraft	[1A] ↓ Deposits TGA ↑ +\$20bn Reserves _D ↓ -\$20bn Deposits ↑ +\$20bn	Overdraft ↑ +\$20bn	
9:30 AM	↓ UST -\$20bn ↓ UST	TGA ↓ [4] TGA ↓ -\$20bn		
3:30 PM	Reserves _C ↓ [6C] Reserves _B ↑ [5A] ↑ Deposits -\$20bn ↓ Overdraft	BGC _C ↑ Overdraft ↓ -\$20bn BGC _B ↑ +\$20bn	↓ Reserves _C BGC _C	Deposits Deposits
Scenario 4, net:	↓ UST -\$20bn	Reserves _D ↓ UST +\$20bn	BGC _B +\$20bn	
End-of-day, net:	the balance sheet shrank by \$20bn more	the balance sheet increased by \$20bn more	-	-
Intraday, normal:		Deposits (↓/↑)		
Intraday, with daylight overdrafts:		Deposits Overdrafts (↓/↑) (↑/↓)		

	Treasury (Debt Management Office)	Clearing Bank (BoNY)	Foreign Banks (DNB Bank NY branch)	Federal Home Loan Banks (FHLBNY)
7:00 AM	TGA UST	Reserves _B Deposits	Reserves _D FF _{DNB}	FF _{DNB}
9:00 AM	↑ TGA +\$20bn ↑ TGA	UST ↑ [1B] UST ↑ +\$20bn +\$20bn ↑ Overdraft	[2A] ↓ Reserves _B Deposits ↓ Overdraft ↑ +\$20bn	-\$20bn ↓ Reserves _D FF _{DNB} ↓ -\$20bn -\$20bn ↓ FF _{DNB} +\$20bn ↑ Deposits
9:30 AM	↓ TGA -\$20bn ↓ TGA	UST ↓ [3] UST ↓ -\$20bn		
3:30 PM		[5B] ↑ Reserves _B -\$20bn ↓ Overdraft +\$20bn ↑ BGC _B	[6B] ↑ Deposits Overdraft ↓ -\$20bn FF _{BONY} ↑ +\$20bn	-\$20bn ↓ Deposits +\$20bn ↑ FF _{BONY}
Scenario 4, net:	-	BGC _B +\$20bn	Deposits ↓ FF _{DNB} ↓ FF _{BONY} ↑	
End-of-day, net:	-	the balance sheet increased by \$20bn	the balance sheet shrank by \$20bn	asset swap
Intraday, normal:		Reserves _B Deposits (↓/↑) (↓/↑)		
Intraday, with daylight overdrafts:		Overdrafts Overdrafts (↑/↓) (↑/↓)		Notes: BGC = repo, GC

Source: Credit Suisse

Part III – Taper and the Curve Inversion

We now know all the moving parts that influence funding markets as taper progresses: we can now chart taper-related flows within our Flow of Funds and Collateral framework.

Figure 9 shows that since the beginning of taper in October, 2017, the Fed “shredded” over \$500 billion in reserves, which means that banks have \$500 billion fewer reserves to settle payments. \$300 billion was lost due to the taper of the Fed’s Treasury portfolio, and a smaller \$200 billion was lost due to the taper of the Fed’s agency MBS portfolio.

To understand how the changing mix between reserves and Treasury collateral impacts o/n GC repo rates, we first have to understand how the Fed controls the pace of taper.

Figure 10 shows that the headline pace of Treasury taper has two distinct components: the notes in the Fed’s portfolio are maturing a bit faster than the pace of Treasury taper, and the Fed slows this pace by buying bills, which Treasury issues outside of auctions; this way, as reserves get shredded a bit faster than the target pace due to note maturities, the Fed adds reserves by purchasing just enough bills to keep taper at its target pace.

Importantly, Treasury supply is shaped by the pace of decline of the Fed’s notes portfolio, as that’s the amount of collateral the market has to absorb at auctions; we will use this as the base to check what type of investor absorbed how much collateral since taper began.

But first, let’s take a look at the general fixed income market backdrop to taper, that is, the shape and slope of the U.S. Treasury curve and how it impacts the flow of collateral.

Thus, the beginning of the fourth quarter of 2018 marked a special event – that’s when the curve inverted relative to all the actual term funding costs that matter for carry traders.

Under Basel III, curve inversions shouldn’t be tracked by points along the Treasury curve: measures such as 3s/10s spreads used to have meaning to them before Basel III, because most money market spreads traded quite tight relative to three-month bill yields, and 3s10s spreads were a pretty good proxy for the carry earned by most carry traders.

Under Basel III, 3s10s spreads are meaningless, because carry traders fund at sizeable spreads over three-month bill yields: three month GC repo, Libor and FX hedging costs can at times be more than 50 bps above bill yields, and it’s these actual funding costs that the 10-year Treasury yield should be compared against to track the curve inversion – for more on inversions see [here](#) and also our interview on Bloomberg’s Odd Lots [podcast](#).

Figure 11 shows that relative to actual FX hedging costs, the Treasury curve has been inverted since October 2018, and at around -25 bps, that inversion has been material; comparing the 10-year yield to U.S. dollar Libor and term GC repo yield inversions too, but less negative ones. Fed officials are on the record saying that one should worry about inversions if they show persistence, “meaning they last for months, not weeks” (see [here](#)).

Well, according to our measures the curve has been inverted for eight months now – that’s months, not weeks – and so it’s time to worry, if for no other reason than the fact that inversion is making taper counterproductive by pushing o/n rates outside the band!

Here is how...

Figure 12 shows that when the Treasury curve inverted – see the vertical orange line – ultimate non-bank buyers stopped absorbing Treasuries that entered the system via taper; these flows correspond to Scenario 1 on the simple map showing the Fed’s framework.

Ultimate non-bank buyers include domestic real money accounts with dollars to spend, hedge funds that borrow dollars through repo, and also the foreign real money accounts who swap local currency for dollars – i.e., who FX hedge – through the FX swap market.

Figure 13 shows the flipside of ultimate non-bank buyers strike as discussed in Part I – primary dealers' inventories absorbed \$150 billion of Treasuries as the curve inverted and carry traders – FX hedged buyers and hedge funds – stopped buying Treasuries.

Foreign real money accounts fund in the term FX swap market and hedge funds fund in the term repo market and when the curve inverts and dealers have to buy instead of them, they fund with o/n repos because they are in the moving business, not the carry business.

In English, when the curve inverts, funding pressures go from term funding markets to o/n funding markets – from three-month cross-currency bases and U.S. dollar Libor, to o/n GC repo and tomorrow-next (t/n) cross-currency bases and by extension spot dollars.

Indeed the curve inversion has been the most extreme relative to o/n GC repo rates.

Banks are largely immune from inversions relative to o/n and even term funding rates as they have cheap deposits to fund with – this advantage is greatest for U.S. banks.

Figure 14 shows how much of the Treasury collateral that entered the system via taper was absorbed by ultimate bank buyers, which include banks and foreign central banks – these flows correspond to Scenario 2 on the simple map showing the Fed's framework.

Banks absorbed \$30 billion of the supply from taper until the end of September, 2018, and then bought \$70 billion during the fourth quarter of 2018, after the curve inverted – banks thus absorbed \$100 billion of \$300 billion of Treasuries since the start of taper.

Figure 15 shows that foreign banks' New York branches absorbed about a half of this, largely before the curve inversion, and large U.S. banks – mostly the G-SIBs – absorbed the other half after the curve inversion as ultimate non-bank buyers turned into net sellers; Figure 16 shows that J.P. Morgan bought three-fifths of the notes bought by U.S. banks.

Foreign central banks' purchases – proxied by FRBNY's custody holdings of Treasuries – were quite unimpressive. Their trend is flat, with a bout of purchases during early 2018, then nothing for the rest of 2018, and then some modest purchases again in early 2019.

Foreign central banks did not absorb much of the Treasury supply that entered via taper.

Ultimate non-bank buyers resumed their Treasury purchases at the beginning of this year, as fixed income markets started to price in expectations for a Fed rate cut later this year, and these flows helped primary dealers' reduce their Treasury inventories on the margin.

However, these purchases are driven mostly by domestic carry traders, i.e. hedge funds, and for their trade to work, the Fed will indeed have to cut interest rates later this year – if it does, repo rates get lower and current negative carry becomes future positive carry; if not, hedge funds may have to sell and some parts of the Treasury curve can sell-off.

Figure 17 shows a summary of the previous charts. It highlights the deterioration of the balance between reserves and collateral supply in the o/n GC repo market on the margin – the supply of Treasury collateral increased by \$300 due to taper and reserves declined by a much bigger \$500 billion. The worsening mix between reserves and collateral in the repo market is being made worse by the rising demand for repo from two groups – primary dealers and relative value hedge funds, which are shown in red and purple areas.

Figure 18 shows beautifully how large U.S. banks lending in the o/n GC repo market lines up with primary dealers' needs to fund their growing Treasury inventories, and also how hedge funds' funding needs since the beginning of 2019 were also filled by large banks, – these flows correspond to Scenario 4 on the simple map that shows taper with dealers.

From our previous work we know that one bank accounts for the bulk of this marginal lending in the o/n GC market, which is the same bank that bought the most Treasuries...

...J.P. Morgan Chase Bank, N.A. (see [here](#)).

Figure 19 shows the amount of reserves held by each major U.S. and foreign bank with a direct pipe into the GC repo market as of June 30, 2018 – before the bid for repo began.

The first column shows J.P. Morgan as an entity unto its own – the reserves slice of its bank's balance sheet is the “bastion” of global money markets, which enables it to function as the system's lender of next-to-last resort in whichever market trades stressed.

The second and third columns show that no other U.S. bank or no group of foreign banks come close to J.P. Morgan's singular firepower in money markets. The fourth column shows foreign banks by name and the fifth shows Japan's consolidated claims on FRBNY – the amount of money the Japanese Ministry of Finance keeps at the foreign repo pool plus the amount of reserves the three largest Japanese banks keep in their Fed accounts.²

Figure 20 shows the same entities' reserve balances as of December 31st, 2018, which was the day when the repo market struggled to clear and printed as high as 6.5%.

What stands out is that J.P. Morgan's reserve balances shrank dramatically. Importantly, the \$150 billion in reserves J.P. Morgan held on December 31st, 2018 likely represents the amount of reserves it held for intraday liquidity needs (RLAP) as discussed above – otherwise it would have lent more in the o/n repo market to chase stratospheric yields.

What also stands out is that Japanese banks – and only Japanese banks – increased their reserve holdings at the Fed by about \$30 billion, which, when combined with the Japanese Ministry of Finance's deposits at the foreign repo pool, puts “Japan Inc.'s” consolidated claims on FRBNY at close to \$250 billion. Japan is thus the new “bastion” of global money markets, and just as J.P. Morgan was the solution to the repo market's stresses last year, the liquidity in the foreign repo pool could have solved current stresses.

We've made our case for capping the foreign repo pool [here](#), and our current analysis provides further support to our case. It's incomprehensible that the Fed is forcing a redistribution of reserves among banks while turning a blind eye to accumulation elsewhere.

Figure 21 shows the change in reserves between the second and fourth quarters of 2018 and Figure 22 shows the uses of reserves. It shows how the entities in each column spent their reserves, that is, whether they used reserves to buy Treasuries outright or if they reversed them in through repos. The numbers here correspond to our earlier points: that banks spent their reserves mostly by lending in the repo market to primary dealers; that banks spent a relatively small share of their “excess” reserves on Treasuries; and that J.P. Morgan was the dominant lender in the o/n GC repo market at the end of 2018.

Data aren't yet available for the first quarter of 2019, but our weekly taper-tracking charts suggest not much change from the status quo presented in Figure 20: large banks' holdings of Treasuries and presence in the o/n GC repo market are broadly unchanged.

Thus, the picture that emerges is that taper effectively makes Treasury fund its deficits in o/n markets on the margin where funding is coming from one bank, which is J.P. Morgan.

That's not a viable funding strategy, in our view.

The broad message from this part of our analysis is that the Fed should not taper into a curve inversion, because the marginal buyers of Treasuries in such an environment are dealers and hedge funds. Dealers buy because they have to, not because they want to, and hedge funds buy because they think the Fed will soon cut rates. It is their funding needs that pressure o/n repo rates and the o/n fed funds rate outside the target band, and if rate cuts do not materialize, pressures can ricochet to the long-end of the curve.

² We proxy the Ministry of Finance's deposits in the foreign repo pool using public disclosures (see [here](#) and [here](#)).

Part IV – Taper and Collateral Supply

Let's next broaden our perspective and examine how balance sheet taper compares to broader market trends, such as the growing supply of Treasuries due to rising deficits.

Figure 23 shows that the net supply of Treasuries has increased materially during 2018, primarily due to the growing federal deficits. The dashed lines show the portion of supply that came from taper, and are identical to the dashed lines we plotted on previous charts.

The taper-related supply of notes is thus relatively small, but because such supply destroys reserves on the margin, it has an outsized impact on o/n markets on settlement days.

Treasury supply falls into three categories:

- (1) Supply that destroys reserves.
- (2) Supply that sterilizes reserves.
- (3) Supply that circulates reserves.

Supply that destroys and sterilizes reserves are functionally equivalent and so both have an outsized impact on o/n money markets on settlement days – tearing up dollar bills is the same as putting them under the mattress, and shredding reserves is the same as the U.S. Treasury raising reserves but not spending them, which is why we've referred to sterilization as "shadow taper" in the past (see [here](#)). Taper, combined with shadow taper, has a current run-rate of \$800 billion, faster than the run-rate of taper at \$500 billion.

Supply that circulates reserves is more benign from the perspective of funding markets, as the reserves raised by the Treasury are spent right away and so the banking system does not lose reserves to settle with. Supply that circulates effectively drains reserves from BoNY and dealers' parent banks in the morning, but then sends them right back to the banks as the private sector receives payments from the government in the afternoon.

Readers that wish to practice mapping out the reserve and collateral flows generated by the three types of supply can do so by using the template map provided in the Appendix.

Regardless of which type of Treasury supply we map, several "universal" rules emerge: primary dealers are central to the underwriting and distribution of all three types of supply; BoNY is also central to the movement of reserves involved under all three types of supply; primary dealers' clearing balances have an intraday swing under all three types of supply; and, regardless of the type of supply, primary dealers will do everything they can to ensure that their clearing balances at BoNY end the day flat, that is, unchanged, and so will work hard during the day to outright sell or repo the Treasuries that they absorbed on inventory.

Furthermore, similar to how the accelerating pace of taper leads to bigger auction days, bigger settlement days, bigger intraday outflows and more collateral supply on the margin, growing deficits do the same and hence lead to more demand for reserves under RLAP.

Where things are different under the three scenarios is that under circulation supply, banks don't lose reserves and day-end liquidity that funds unsold inventory doesn't suffer, but under taper and sterilization supply, banks lose reserves and day-end liquidity suffers.

Let's next examine how the three types of supply evolved over time.

Figure 24 shows the net supply of Treasuries each year since Basel III went live in 2015, the net amount of reserves that were "shredded" and sterilized each year since then, and how the "shredding" and sterilization of reserves shaped the stock of reserves over time.

Thus, Treasury supply increased by about \$500 billion each year and by \$1 trillion in 2018; the supply of reserves was broadly unchanged in 2015; fell by about \$400 billion toward the end of 2016 due to sterilization – a \$200 billion increase in Treasury's cash balances;

increased by about \$100 billion during 2017; and then fell by over \$500 billion in 2018 – due to a combination of about \$200 billion in sterilization and about \$300 billion in taper.

Thus, the mix between reserves and Treasury collateral has been worsening on the margin every year since the rollout of Basel III – because the net supply of Treasuries has been increasing relentlessly and the supply of reserves has been either flat or down considerably.

Who cares you say – the stock of reserves remain elevated in the banking system and so there is plenty of liquidity around to underwrite and fund net issuance on settlement days; settlement days are seldom bigger than \$50 billion and only a portion of supply is funded on repo and the top line in Figure 24 suggests the system has plenty of liquidity at hand.

Not so fast...

Figure 25 shows the effective supply of reserves to grease Treasury supply on the margin, and effective supply is now alarmingly close to zero. What follows isn't a precise exercise, but rather a "guesstimation" that's useful to frame the current state of funding markets.

To arrive at the effective supply of reserves, we subtract from the total amount of reserves the amount of reserves banks hold due to reserve requirement as per the [H.3 release](#); reserves held to satisfy reserve requirement are not available for trading in repo markets.

Next, we subtract \$300 billion from the previous subtotal, and do this from 2018 onwards, when supervisory focus on resolution liquidity began. This \$300 billion is our estimate of the amount of reserves that large U.S. banks have to hold so they are RLAP compliant; \$300 billion is realistic, as it appears that J.P. Morgan's intraday needs are \$150 billion – see our discussion above – and other G-SIBs likely have a similar need in the aggregate.

Next, we subtract from the previous subtotal all of the reserves held by foreign banks; we do this because in the previous section we've shown that foreign banks did not lend a lot into the o/n GC repo market when o/n GC rates were trading stressed last year-end – presumably because large foreign banks keep these reserves for "internal" stress tests.

Foreign banks' holdings of reserves for internal stress tests are similar to U.S. banks' holdings for intraday stress tests: foreign banks operate not only in the U.S. but also in their home jurisdiction, where they are major providers of U.S. dollar liquidity. Fedwire, the Fed's payments system, is open for nearly 24 hours which means that for foreign banks, reserves held at the Fed provide dollar liquidity during Tokyo hours and London hours – i.e. intraday in offshore jurisdictions. Were foreign banks to lend their reserves during New York hours in the o/n GC repo market to fund dealers' inventories, they would lose liquidity during Tokyo and London hours and expose their internal operations to stresses.

Finally, we subtract from the previous subtotal – the light blue line – the amount of reserves that large U.S. banks have already deployed in the GC repo market to fund dealers and hedge funds as discussed above, which show up as borrowed reserves at other banks.

The bottom line – the orange line – is our estimate of the effective supply of reserves that's available to fund collateral supply on the margin. Call this the "free float" of reserves or whatever you want to, but the point is that this is the amount of "excess" reserves in the system, i.e. the amount that stands between o/n rates printing within vs. outside the Fed's target band – the amount that serves as the Fed's operational margin of safety.

Figure 26 shows how the stock of excess reserves compares to the current pace of collateral supply: the two are practically in line, which, in an environment where dealer inventories are elevated and are likely to grow more due to the ongoing curve inversion, means that losing reserves on the margin can have a big impact on o/n GC repo rates.

The recent experience with U.S. tax payments – which sterilized \$200 billion of reserves – also points to the same conclusion: reserves are now tight, with no margin of safety left.

Part V – Collateral Supply and Demand for o/n Funding

Let's next switch into a higher-gear and switch from weekly frequency to daily frequency and track how collateral supply drives daily demand for o/n GC repos and o/n fed funds.

Our discussion will frequently refer back to the concepts introduced in the previous parts:

- (1) How primary dealers and BoNY are central to the process of taper and how the pace of taper interacts with intraday liquidity risks and banks' demand for reserves.
- (2) How daylight overdrafts provided by BoNY and the Fed help out on some days, and how such days are usually characterized by stresses in o/n funding markets.
- (3) How curve inversion impairs the flow of collateral and bloats dealers' inventories, and how one large U.S. bank funds dealer's bloated inventories on the margin.
- (4) How growing federal deficits supercharge the system's intraday liquidity risks and hence demand for reserves and how this cuts into the "free float" of reserves.

We'll start our analysis of how Treasury supply drives demand for o/n funding by dividing supply into its parts, which are bills, notes and bonds, and taper and non-taper supply. Figure 27 shows bills, notes and bonds supply alongside the volume of total supply, and Figure 28 breaks notes supply down into its taper and non-taper-related subcomponents.

We'll analyze the impact of bill and coupon supply separately, starting with bill supply.

The first thing to note about bill supply is that it's the most volatile part of Treasury supply, and this volatility can easily overwhelm the "free float" of reserves as shown in Figure 26. For example, the \$300 billion increase in bill supply that occurred at the start of 2018 would completely overwhelm the "free float" of reserves in bank HQLA portfolios today.

The second thing to note about bill supply is that it's the most important driver of demand for o/n GC repo on the margin and also government money market mutual funds' use of the Fed's o/n RRP facility outside of quarter-end turns. Historically, when bill supply fell, the use of the facility went up, and when bill supply increased, the use of the facility fell.

Treasury's issuance of over \$300 billion of bills and sterilization of \$100 billion of reserves during the first quarter of 2018 pushed the use of the o/n RRP facility all the way to zero – we highlight this period with the two vertical thin red lines in Figures 29 and 30.

Functionally, the flows absorbed by the o/n RRP facility provide a home for the reserves that clearing banks don't want to retain, and banks or primary dealers don't want to borrow either due to a lack of balance sheet, available collateral or arbitrage opportunities, and so the usage of the o/n RRP facility falling to zero was an important milestone – it basically told us that the amount of reserves unwanted by intermediaries reached zero.

In English, the Fed's o/n RRP facility is the system's true barometer of excess reserves outside the banking system: the reserves that flow into the RRP facility are funds that money funds couldn't place with banks at reasonable rates because they weren't needed, and conversely, when reserves stop flowing into the RRP facility and its usage is zero, every penny of reserves is bid as they are needed by U.S. and foreign banks and dealers.

By this metric, excess reserves outside the banking system were thus nil by early 2018...

...and so collateral supply – due to the accelerating pace of taper and growing deficits – was going to lean heavily on excess reserves inside the banking system. Excess reserves inside the banking system refer to the amount of reserves banks hold in HQLA portfolios over and above the amount they need to cover their intraday liquidity needs and RLAP.

Taper was thus shredding "inside" liquidity, not "outside" liquidity from the very beginning, and so we expected stresses in o/n markets to soon follow on a daily basis (see [here](#)).

Figure 31 shows bills-only and total net supply of Treasury securities on settlement days, with the horizontal red lines marking the \$25 billion and \$50 billion amounts respectively, to help separate average settlement days from chunky settlement days, where we define chunky settlement days as days when net supply of bills or coupons exceeds \$25 billion.

It shows that as taper and federal deficits grew in 2018, settlement days got bigger, and days when net supply exceeded \$25 billion or even \$50 billion became more frequent. Supply was initially concentrated in bills, but as 2018 wore on, supply got coupon-heavy, largely due to increased note supply due to the faster pace of taper as discussed above.

We'll use the daily net supply data from this chart to track the impact that collateral supply has had on the demand for o/n GC repos, fed funds and daylight overdrafts at the Fed; furthermore, all charts from here on forward will include thin lines that mark quarter-ends to make it easier to identify on the charts the intra-quarter trends we refer to in the text.

Figure 32 shows the daily net supply of bills-only and total Treasury collateral at the bottom and o/n GC repo volumes on top. Repo volumes include both bilateral and GCF® trades and come from the Fed's daily SOFR release. The yellow squares along the repo series mark chunky bill supply days, i.e., days when bill supply was greater than \$25 billion.

It shows that o/n GC repo volumes trend higher during periods when bill supply is heavy: bill supply pulled o/n GC volumes above \$450 billion during the first quarter of 2018, and when supply fell during the second quarter, repo volumes fell to around \$400 billion; bill supply was flat during the third quarter and then rose again early in the fourth quarter, which pushed volumes toward \$450 billion. Dynamics then changed as discussed below.

The relationship between bill supply and demand for o/n GC repo is simple and intuitive: more bills mean less lending by money market funds in the tri-party repo market, which dealers need to replace with GC repos by borrowing from banks' HQLA portfolios.

Figure 33 shows chunky coupon supply days, that is days when net coupon supply – non-taper and taper-related note supply and bond supply – exceeded \$25 billion. Compared to net bill supply, which drives demand for o/n GC repos around its trend, chunky coupon supply days tend to drive episodic spikes in o/n GC repo volumes.

Figure 34 shows the orange squares and red squares lumped together to show the “trends vs. extremes” theme in one place. It also shows that the fourth quarter of 2018 was an exception to the “trends vs. extremes” rule of chunky bill and chunky coupon days.

What made the fourth quarter unusual was the inversion which bloated dealer inventories, as discussed in Part III: as inventories increased by \$150 billion, demand for GC repos increased too, and during a quarter with three days when net coupon supply was above \$50 billion it wasn't difficult for inventories and hence GC demand to leap by \$150 billion, the bulk of which was met by J.P. Morgan deploying reserves from its HQLA portfolio.

Let's next examine how chunky days drive demand for daylight overdrafts and demand for o/n fed funds (FF). Like before, we examine the impact of bills and coupons separately.

Figure 35 shows the volume of peak collateralized daylight overdrafts at the Fed and the volume of o/n FF borrowed by U.S. banks – i.e., excluding borrowing by foreign banks. Like before, the orange squares mark chunky bill supply days and like with GC volumes, we see chunky bill supply days driving trends in demand for daylight overdrafts and o/n FF.

The first quarter of 2018 was quite a remarkable episode in overnight funding markets – as discussed above that's the quarter when Treasury issued \$300 billion of bills and sterilized \$100 billion of reserves, which completely exhausted excess “outside” reserves.

The chart shows beautifully how the disappearance of excess “outside” reserves triggered an increase in the demand for daylight overdrafts at the Fed – as discussed in Part II,

the flipside of daylight overdrafts are injections of temporary daylight reserves by the Fed, which banks have to pay back by the end of the day by borrowing in the o/n FF market; as one would expect, demand for daylight overdrafts and o/n FF move closely together.

The co-movement of daylight overdrafts and o/n FF is strongest during periods when bill supply is extremely chunky for several weeks – like the first quarter of 2018 when out of a total of \$300 billion in net new bills, \$200 billion were issued over a four week period.

Bill supply has been a lot more manageable since the first quarter of 2018 so the impact of chunky bill supply days wasn't as pronounced on the demand for daylight overdrafts and o/n FF as it was back then, but the relationship that we described above still holds.

Figure 36 shows the impact that chunky coupon supply days have on the demand for daylight overdrafts and o/n FF; like in the case of o/n GC repos, chunky coupon days, tend to drive extremes, rather than trends or inflection points in the demand for o/n FF.

Figure 37 shows total versus collateralized peak daylight overdrafts: as noted in Part II, currently, nearly all daylight overdrafts at the Fed have been taken on a collateralized basis, i.e., they are being extended for free as per the Fed's pricing policy of daylight overdrafts.

The fact that most overdrafts are collateralized tell us that banks use them to get through the tough days discussed in Part II – when taper is not funded, but financed intraday, or when the system goes through a regime shift like when excess “outside” reserves disappear and dealers and banks have to change their daily funding and lending routines.

Who was driving the demand for collateralized overdrafts during the first quarter of 2018? If the framework we presented in Parts I and II of our analysis is correct, it must be that:

- (1) If peak collateralized overdrafts correspond to chunky Treasury settlement days, it must be that BoNY was running a matched book of overdrafts during the period.
- (2) It must also be that if BoNY was running overdrafts at the Fed it did so because it let primary dealers run overdrafts in their clearing accounts – the matched book – and so BoNY had to borrow in the o/n FF market to pay back the Fed at day-end.

Indeed, Figure 38 shows a huge increase in BoNY's borrowing of o/n FF at the end of the first quarter of 2018, in line with the use of collateralized daylight overdrafts at the Fed; the data are from BoNY's call reports and refer to borrowings on spot quarter-end dates.

The big increase in BoNY's borrowing of o/n FF at the end of the first quarter of 2018 is actually an understatement. The spot amount of o/n FF that U.S. banks borrowed was \$20 billion on March 31st, 2018, compared to a peak of \$30 billion a week before – see Figure 35 above. BoNY's presence in the o/n FF market was thus \$10 billion larger than what's shown in its call reports, that is, it peaked around \$20 billion, not \$10 billion!

In English, it appears that all of the \$20 billion increase in U.S. banks borrowing in the o/n FF market during the first quarter of 2018 was driven by just one large bank – BoNY.

Demand for daylight overdrafts at the Fed and BoNY's presence in the o/n FF market fell sharply in subsequent quarters. It was particularly low during the third quarter of 2018, which corresponds to the fairly slow pace of collateral supply during the summer months.

BoNY's borrowings in the o/n FF market then jumped \$5 billion during the fourth quarter, and, like before, that level likely understates its presence in the market during the quarter.

BoNY's borrowing in the o/n FF market is not yet available for the first quarter of 2019, but Figure 39 shows some familiar patterns – a spike in peak daylight overdrafts early in the first quarter of 2019, which corresponded to a sizeable spike in demand for o/n FF, which in turn corresponded to a \$30 billion increase in primary dealers' inventories of bills – an inversion-related build from \$150 billion of supply during the quarter (see Figure 40).

Part VI – Collateral Supply and o/n Rates

Let's finally take a look at how demand for o/n funding impacts o/n interest rates.

Since the launch of the Fed's SOFR release, we can track repo stresses quite precisely as we know the rates associated with the 99th and 75th percentile of o/n GC repo trades. Such granular data however starts from the second quarter of 2018 and so doesn't cover the period when bill supply stressed out funding markets during the first quarter of 2018.

As a solution, we'll analyze o/n repo rates in two steps: first, we use o/n GCF® rates to show trends stretching back to the first quarter of 2018, and then we use SOFR rates to show repo stresses at a more granular level from the second quarter of 2018 onwards.

Thus, Figure 41 shows the o/n GCF® repo rate relative to the target band for o/n rates: it shows that the o/n GCF® rate structurally drifted outside the band around the end of the first quarter of 2018, and it never went back. The line around the horizontal axis shows the o/n GCF®-IOR spread, and how it went from trading structurally negative, to trading structurally positive also sometime around the end of the first quarter of 2018.

Figure 42 shows the o/n GCF® rate with the familiar orange and red markers to mark the chunky bill and coupon days. As one would expect, chunky days correspond to higher repo rates, and, like before, bill supply drives trends and coupon supply causes spikes.

Figure 43 shows the more granular SOFR data from the second quarter of 2018 onward: the 99th and 75th percentile of o/n GC trades have been printing at a structurally positive spread to IOR, and these spreads went from 5 bps during the second and third quarters to around 15 bps by the fourth quarter of 2018 and have been trading there ever since.

The obvious candidate that explains why o/n GC rates have been trading more stressed since the fourth quarter of 2018 is the inversion and related backup of dealer inventories, and the fact that one bank serves as the GC repo market's lender of next-to-last resort.

Figure 44 adds the orange and red markers to show the usual "trends vs. spikes" pattern.

These four charts support the theme that has featured throughout our entire analysis – that the increasing supply of Treasury collateral, the declining stock of reserves, the exhaustion of excess "outside" reserves and the low level of "free floating" reserves, that is, excess "inside" reserves, is driving repo rates farther and farther outside the band.

One can see this from o/n GCF® rates going from trading at structurally negative to structurally positive spreads to IOR, and from the 99th and 75th percentile of trades printing at ever wider spreads to IOR, not to mention the growing frequency of spikes in chunky coupon days and the growing size of spikes since the start of the curve inversion.

Let's next see how stresses in o/n GC rates bleed through to the o/n FF rate.

Figure 45 shows day-to-day changes in the interest rates paid on the 75th percentile of o/n FF trades with the usual markers. Increases tend to correspond to chunky days, but less frequently than in the case of o/n GC rates. That's because the o/n FF market is driven by things other than collateral supply and also because the o/n FF market is small, and inflows and outflows can and do influence the o/n FF rate on the margin (see [here](#)).

There are two links between stressed o/n GC trades and stressed o/n FF trades – the days when primary dealers roll daylight overdrafts at BoNY into o/n GC repos, and BoNY has to pay its daylight overdrafts at the Fed by borrowing in the o/n FF market; these are the days when BoNY outbids foreign bank arbitrageurs in the o/n FF market.

The second link is established by foreign arbitrageurs on days when BoNY does not have to bid for o/n FF to cover daylight overdrafts at the Fed. These arbitrage trades involve borrowing reserves in the o/n FF market and lending them in the GC repo market

– a process that enables dealers to pay their daylight overdrafts at BoNY, and BoNY to pay its daylight overdrafts at the Fed. This arbitrage link flows from the map at the end of Part II, and readers who wish to map it out may use the template map in the Appendix.

In essence, foreign bank arbitrageurs are the buffer between very stressed and stressed days in the o/n FF market – that is, days when BoNY has to scramble to get o/n FF to pay the Fed because primary dealers could not get enough reserves from other banks via o/n GC repos and so couldn't pay BoNY, and days when arbitrageurs lent dealers enough reserves via o/n GC repos so that BoNY can pay all its overdrafts at the Fed.

Figure 46 shows the total volume of o/n FF-GC arbitrage trades by foreign banks; the orange and red markers start from the second quarter of 2018 as that is when the o/n FF-GC trade replaced the o/n FF-IOR trade as the dominant o/n arbitrage trade.

Figure 47 shows how the o/n FF-GC trade took over from the o/n FF-IOR trade as the dominant o/n arbitrage trade. Thus, until about the end of the first quarter of 2018, average spreads on o/n FF-IOR trades were better than spreads on o/n FF-GC trades, with a bonus spike on month-ends. Then, starting around the second quarter of 2018, the spreads flipped: o/n FF-IOR started to shrink and hit zero by the third quarter of 2018, and went negative by the second quarter of 2019, and contrariwise, o/n FF-GC spreads started to widen and averaged better than o/n FF-IOR spreads thanks in large part to periodic spikes on chunky bill and coupon days, which often corresponded to month-ends.

Figure 48 shows the same themes but not with the volume-weighted median SOFR rate, but with the more elevated rates on the 99th and 75th percentile of o/n GC repo trades.

Collateral and o/n GC rates are thus the new “magnet” to o/n rates.

O/n markets are now trading on the other side of the previous magnet – the IOR rate – and so IOR is now pushing money away into the o/n GC repo market, not attracting it, like it used to, and this process is also aided by the Fed's repeated cuts to the IOR rate.

Figure 49 shows the day-to-day changes in the effective o/n fed funds rate (EFFR) – which is everyone's favorite o/n rate and the Fed's target rate. It shows that relative to day-to-day changes on the 75th percentile of trades, up days are less frequent for EFFR, which means that EFFR is a lagging and low-beta indicator of collateral-related stresses.

Figure 50 shows in red the updrift of EFFR in bps during each quarter since 2018, and the cumulative updrift of EFFR since 2018 in orange. What you see is a tradeoff where a \$1.5 trillion of collateral has pushed the “core” of the constellation of o/n rates – EFFR – up by 10 bps within the target band since the beginning of 2018, but has already pushed the “periphery” of the constellation of o/n rates – o/n GC repo rates – outside the band.

And then you wonder – is the periphery the core or is the core the periphery?

Our analysis has shown that collateral supply is the main driver of o/n rates on the margin, and that the first “point of contact” between collateral supply and money markets is the o/n GC repo market. The o/n GC repo market is typically able to absorb collateral supply, but the balance between the “free float” of reserves and collateral supply is deteriorating.

When that balance is out of whack, the system taps the Fed for daylight overdrafts on chunky settlement days, and the need to pay back daylight overdrafts is what drives the o/n FF rate. But relative to the \$650 billion “ocean” that's the o/n GC repo market, the o/n FF market is a \$65 billion “pond” that can be easily squeezed by collateral supply.

And then what? How will the Fed police the effective funds rate? Directly or indirectly? If indirectly, will it do so with a fixed price, full allotment o/n repo facility, and if so, will it switch from adding temporary daylight reserves to temporary overnight reserves? In turn, will that facility elevate the periphery into the core and demote the core into the periphery?

Conclusions

How does the balance between collateral supply and the free float of inside reserves drive the price of reserves? What's the price of overnight reserves and how to measure it?

These are the two fundamental questions we need to understand before we get into the discussion of how the Fed should administer additional reserves when the time comes.

This issue of Global Money Notes answered the first two questions and concluded that taper is a bit more complex than watching paint dry...

We believe taper was ill timed from the very beginning...

...because it coincided with the exhaustion of excess reserves outside the banking system and so taper was shredding excess reserves inside the banking system from the get go.

Taper should have stopped the moment the curve inverted...

...because the inversion impeded the flow of collateral to ultimate buyers and forced dealers to absorb collateral as intermediate buyers, which pressured o/n GC rates higher; through taper, the Fed effectively forced Treasury to fund \$300 billion of supply overnight.

Taper is not the only thing that has been worsening the "collateral vs. reserves" mix...

...sterilization – or shadow taper – has been equally damaging, mainly through Treasury issuing bills to fund a \$300 billion increase in its balances at the Fed since taper began.

Taper, combined with growing deficits and RLAP are also worsening the above mix...

...because bigger auctions increase intraday liquidity risks and hence demand for reserves, while taper is destroying reserves. In essence, growing deficits make taper worse than its headline pace. That's because for every dollar of reserves destroyed through taper, a dime gets "locked down" for RLAP, and as the deficits grow, dimes turn into quarters.

Taper destroys reserves and IOR cuts aim to redistribute reserves...

...but redistribution has its limits as the one bank that's the marginal lender of reserves in the o/n GC repo market appears to have reached its limits, and the marginal lenders in the o/n FF are small fish. We need central banks, not private banks as marginal lenders.

Redistribution has one last shot...

...the capping of the foreign repo pool, but the New York Fed seems undisturbed by the fact that some are hoarding reserves while redistribution among banks reached its limits.

Redistribution is achieved through taxation...

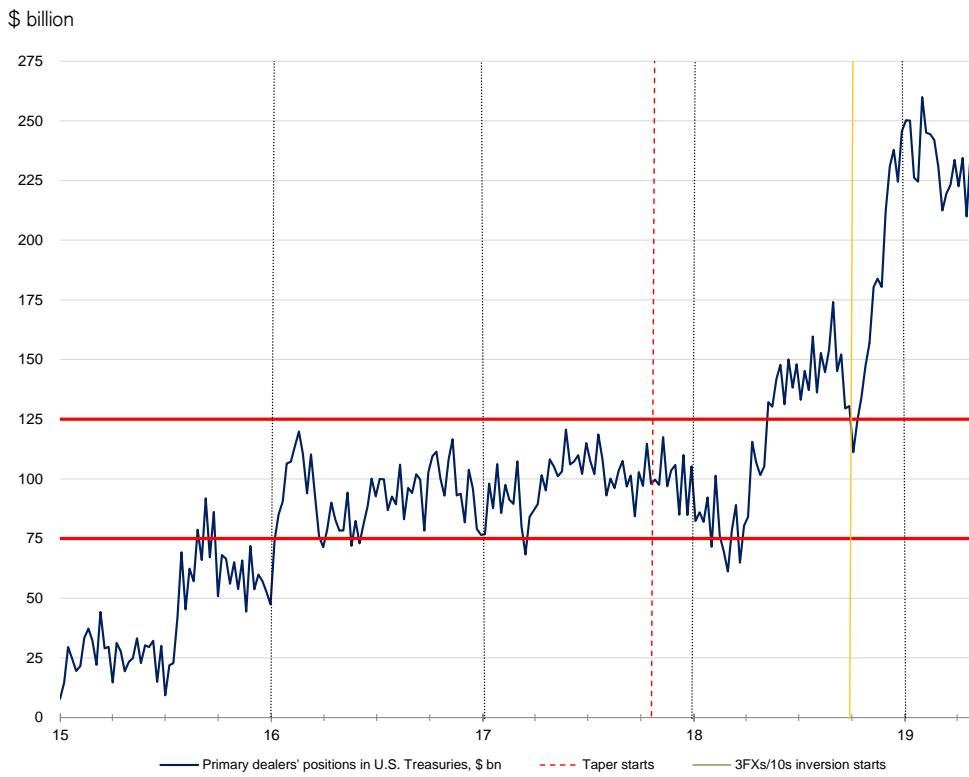
...and who should the Fed tax – banks or sovereigns? If banks hold reserves for regulatory and not for relative-value reasons, further IOR cuts will only tax bank earnings without delivering an improvement in where o/n interest rate rates print relative to the target band.

Don't be fooled by the stock of reserves...

...dollar funding markets suffer from the disease of "macro liquidity and micro illiquidity" – the money that's there isn't really there because intraday and internal liquidity needs impede their free movement. Capital controls impede the flow of money across borders and liquidity rules impede the flow of reserves across various money market segments.

Dealer of Last Resort is nigh...

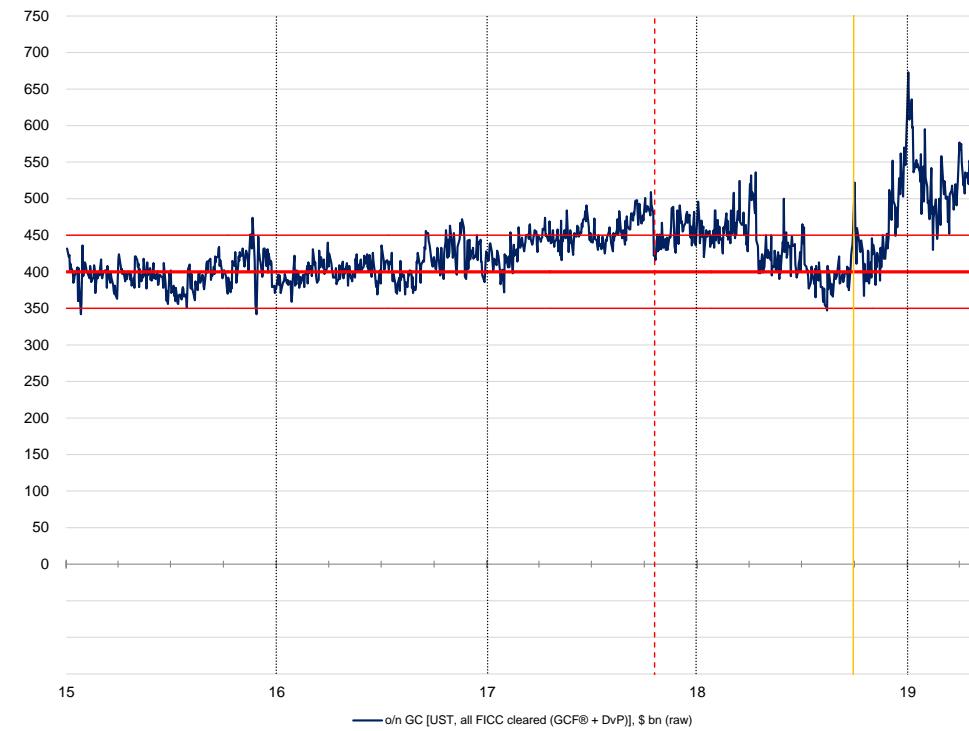
...and a fixed price, full allotment o/n repo facility or a framework to administer mini-QEs better be ready by the fourth quarter when the summer collateral reprieve is over and the Treasury will once again flood the market with another round of \$300 billion of bills.

Figure 1: Dealer Inventories and the Curve Inversion

Source: Federal Reserve, Credit Suisse

Figure 2: Demand or o/n GC Repo and the Curve Inversion

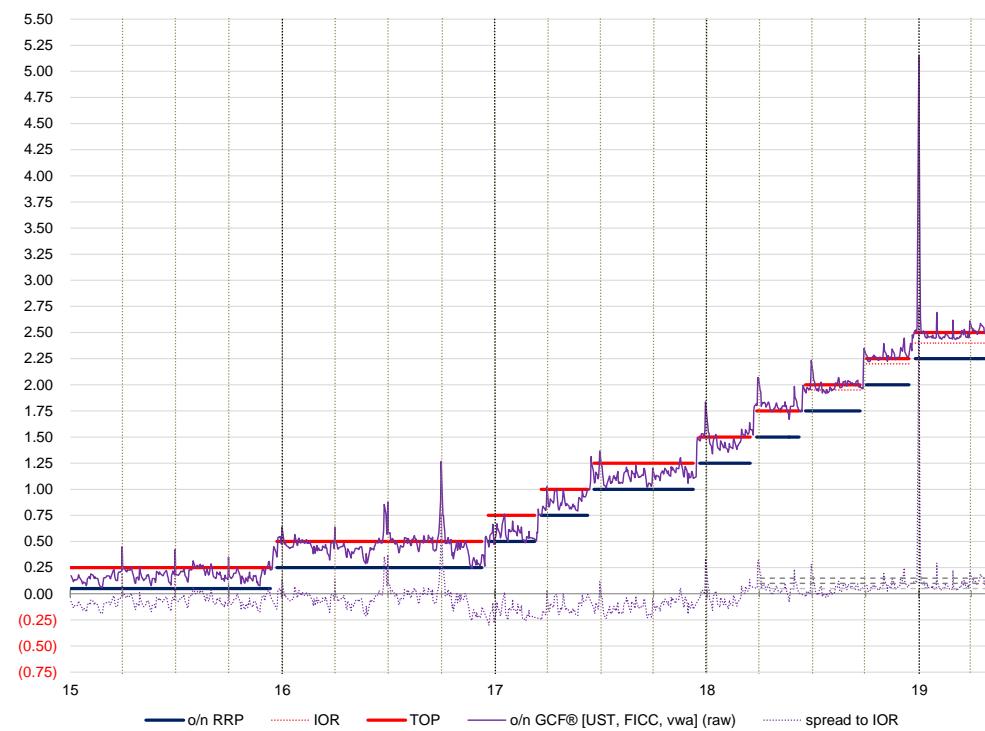
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, Credit Suisse

Figure 3: The “Super-Spike” that Sealed the Fate of Taper

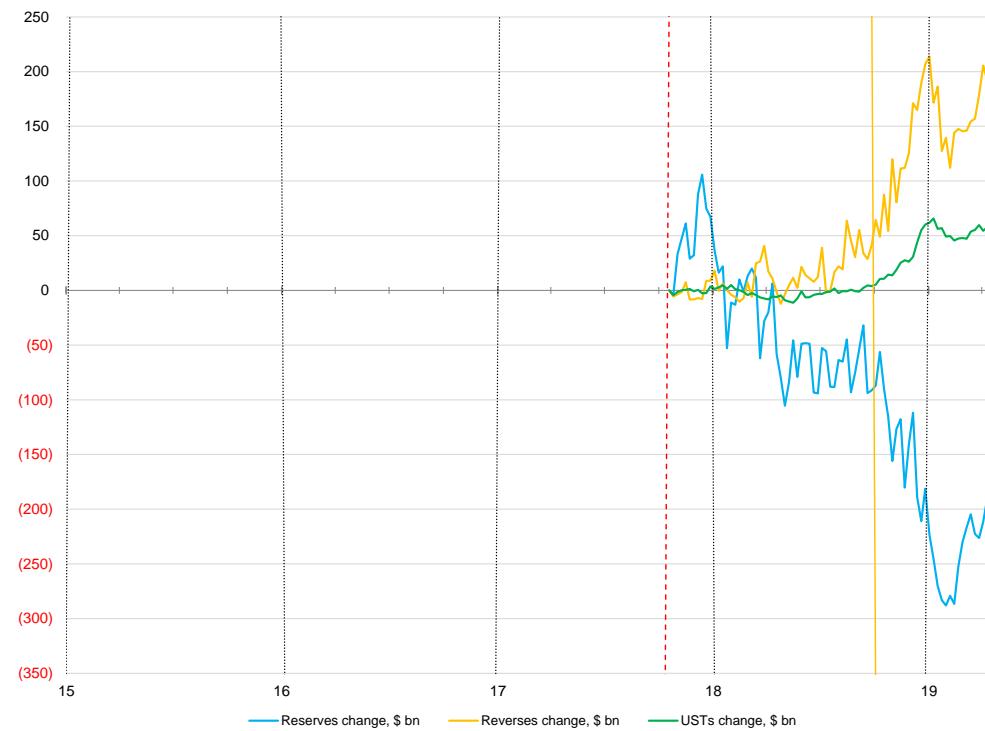
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 4: Inversion Impedes the Flow of Collateral to Ultimate Buyers

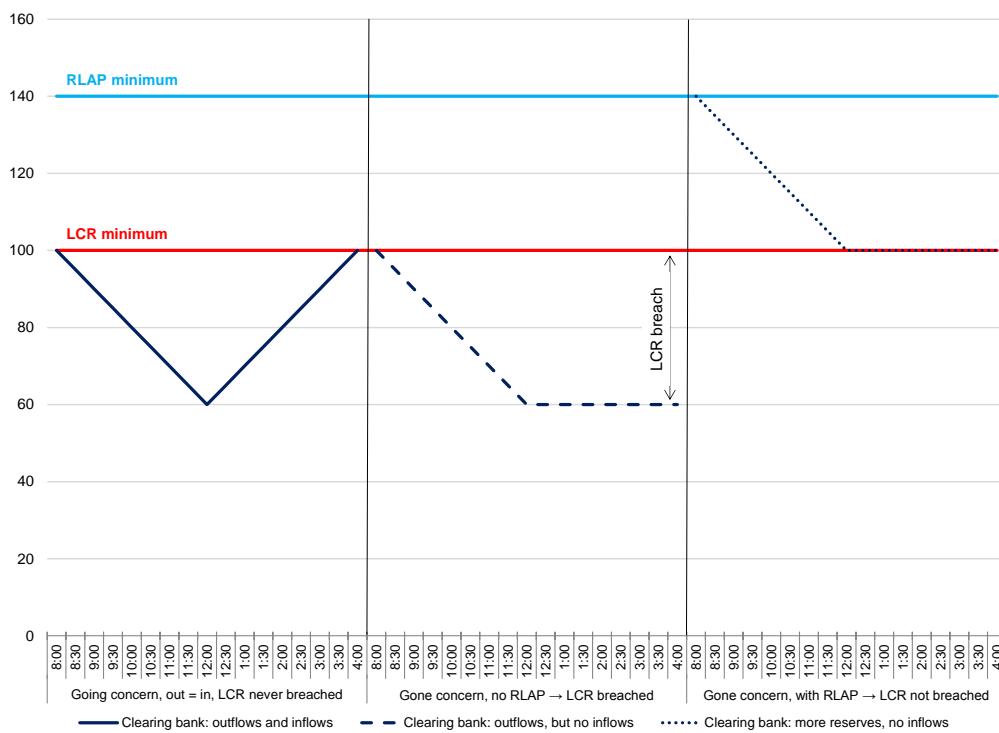
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, Credit Suisse

Figure 5: How RLAP Protects LCRs

\$ billions, stylized

**Figure 6: The Faster the Pace of Taper, the Higher Banks' Reserve Needs!**

\$ billions, stylized

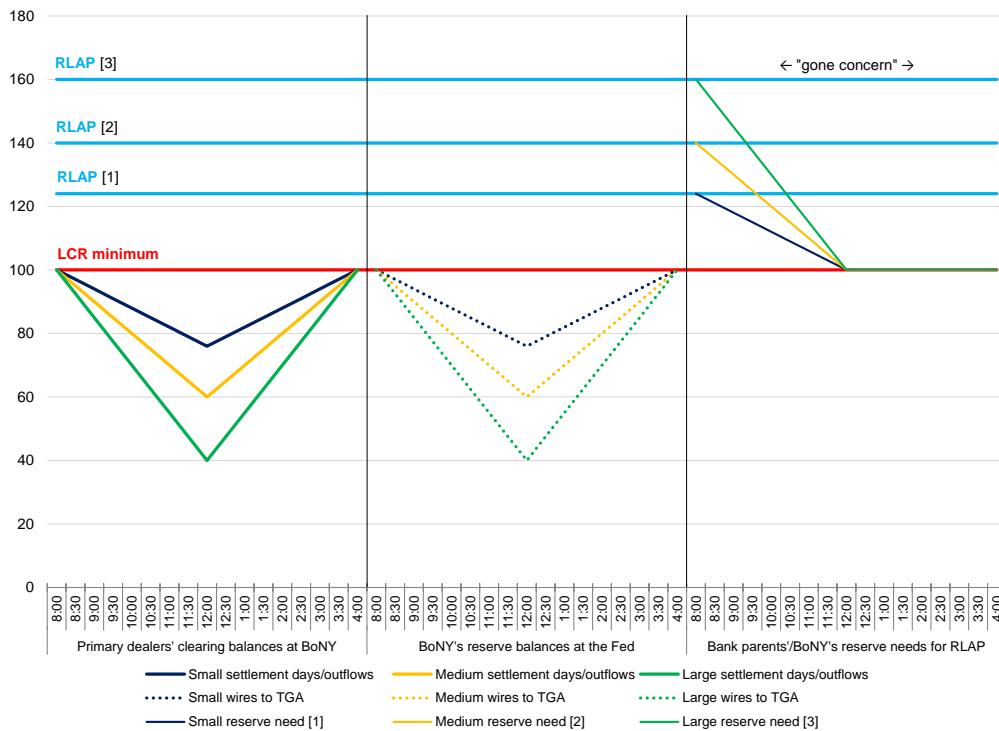
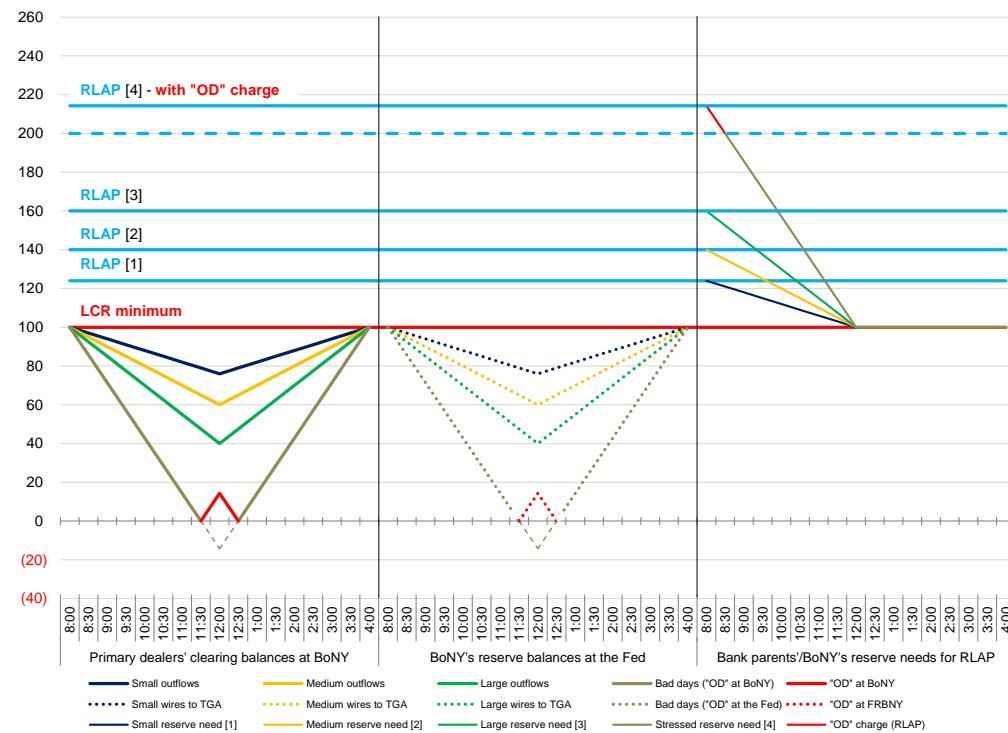


Figure 7: Daylight Overdrafts

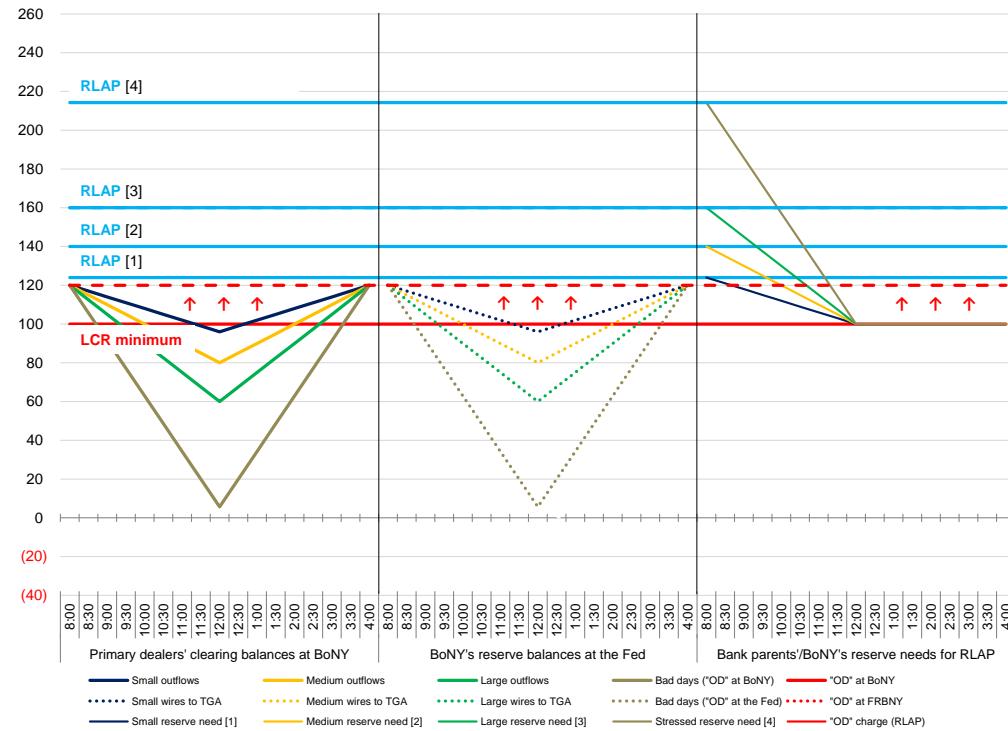
\$ billions, stylized



Source: Credit Suisse

Figure 8: Avoiding Daylight Overdrafts by Holding More Reserves

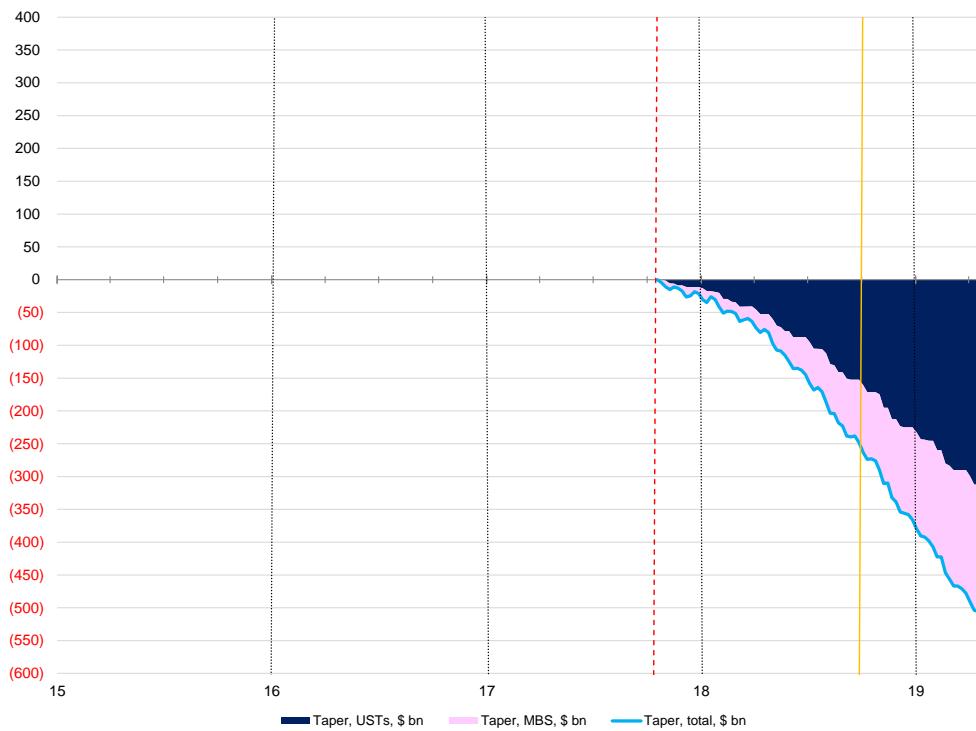
\$ billions, stylized



Source: Credit Suisse

Figure 9: Reserves Destroyed and Collateral Added via Taper

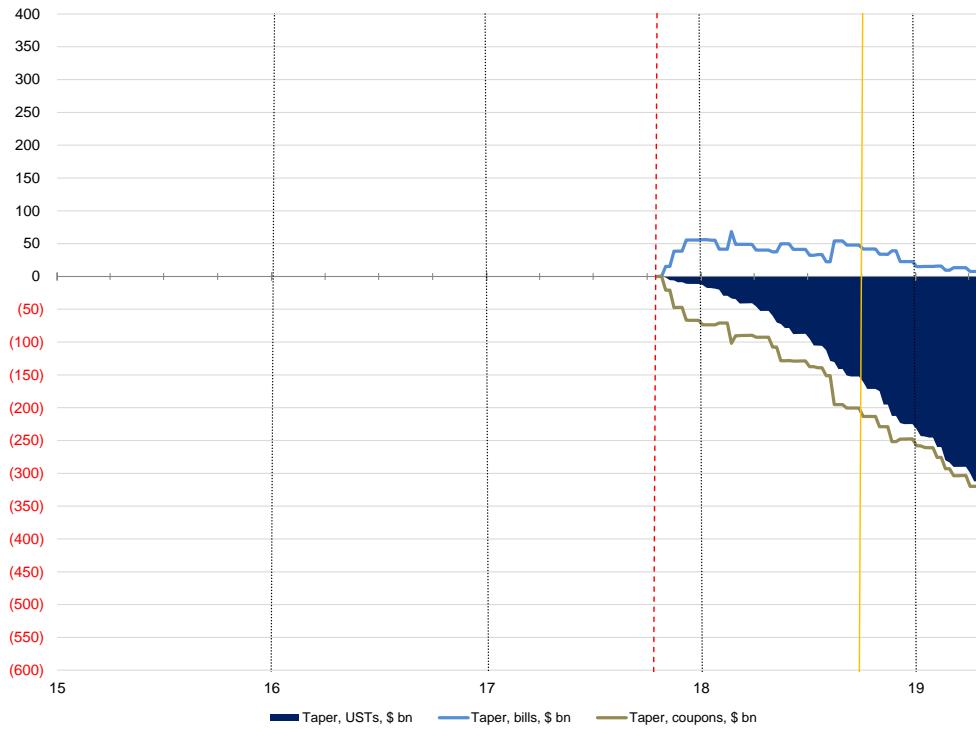
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, Credit Suisse

Figure 10: How the Fed Controls the Pace of Treasury Taper

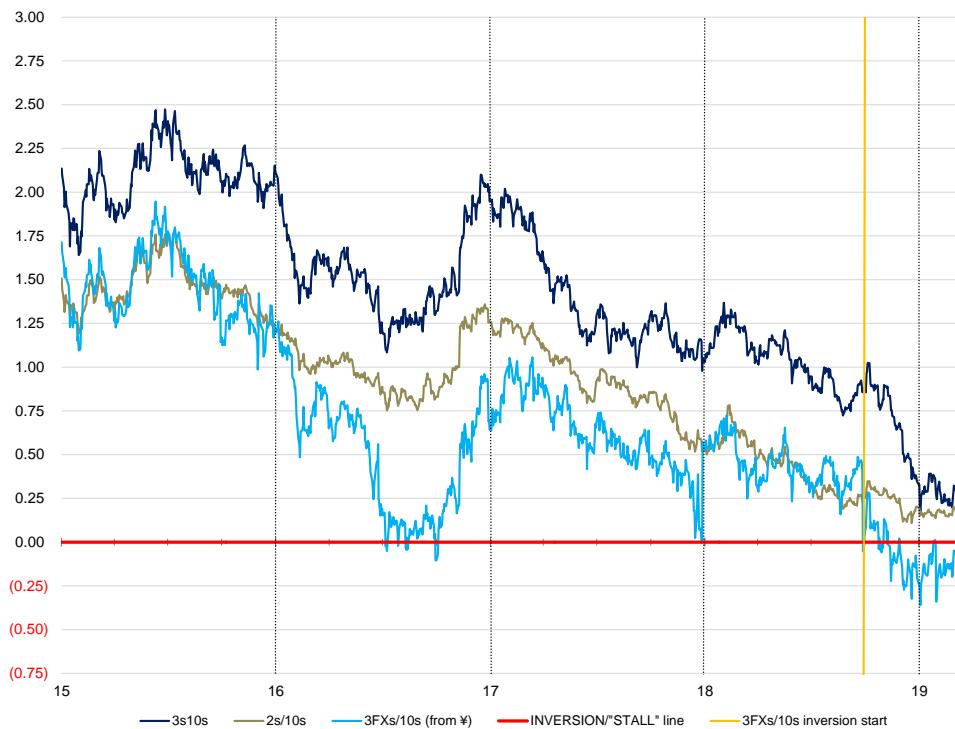
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, Credit Suisse

Figure 11: The Treasury Curve Has Been Inverted Since Last October

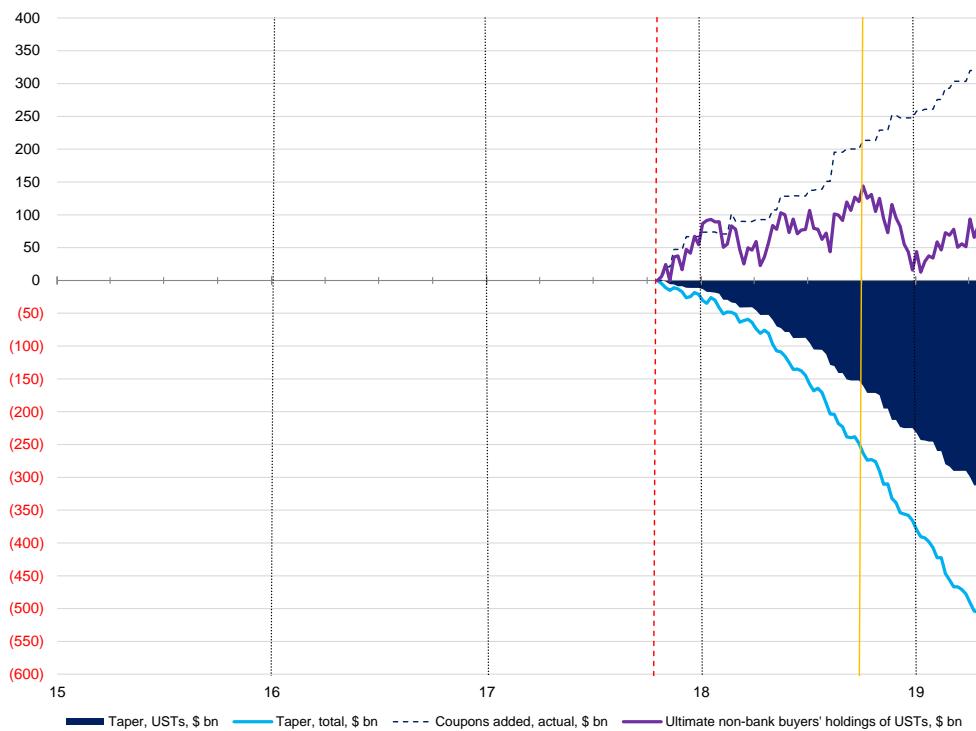
percent, orange line marks the start of the curve inversion relative to FX hedging costs



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 12: The Inversion and Ultimate Investors' Buyers Strike

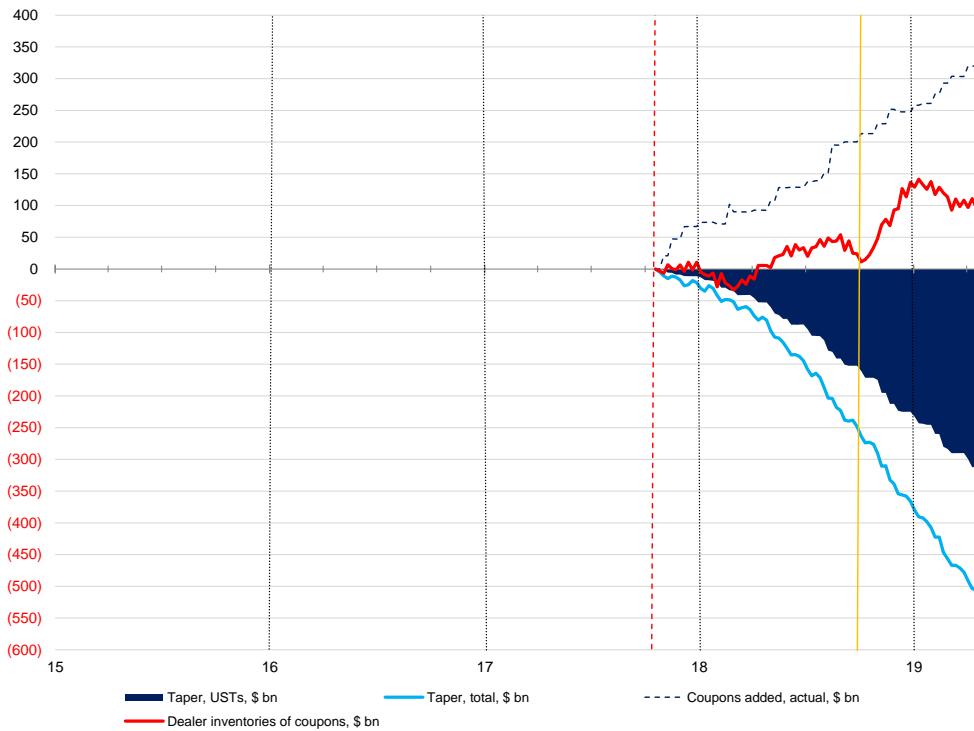
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, Credit Suisse

Figure 13: The Inversion and Dealer Inventories

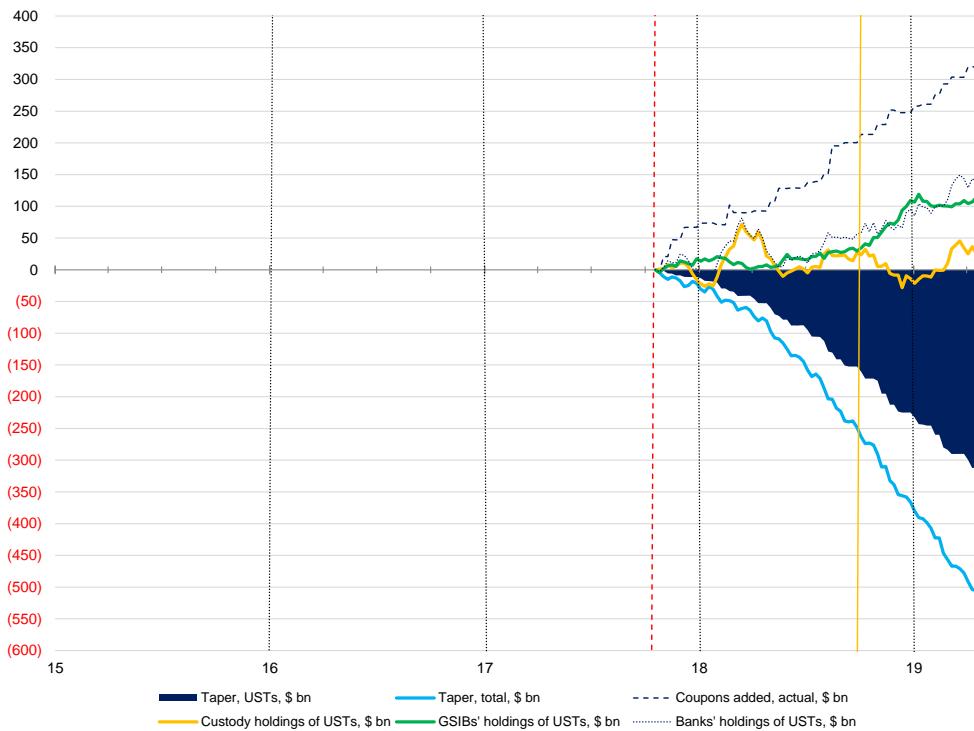
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, Credit Suisse

Figure 14: The Inversion and the Banks' Bid for Treasuries

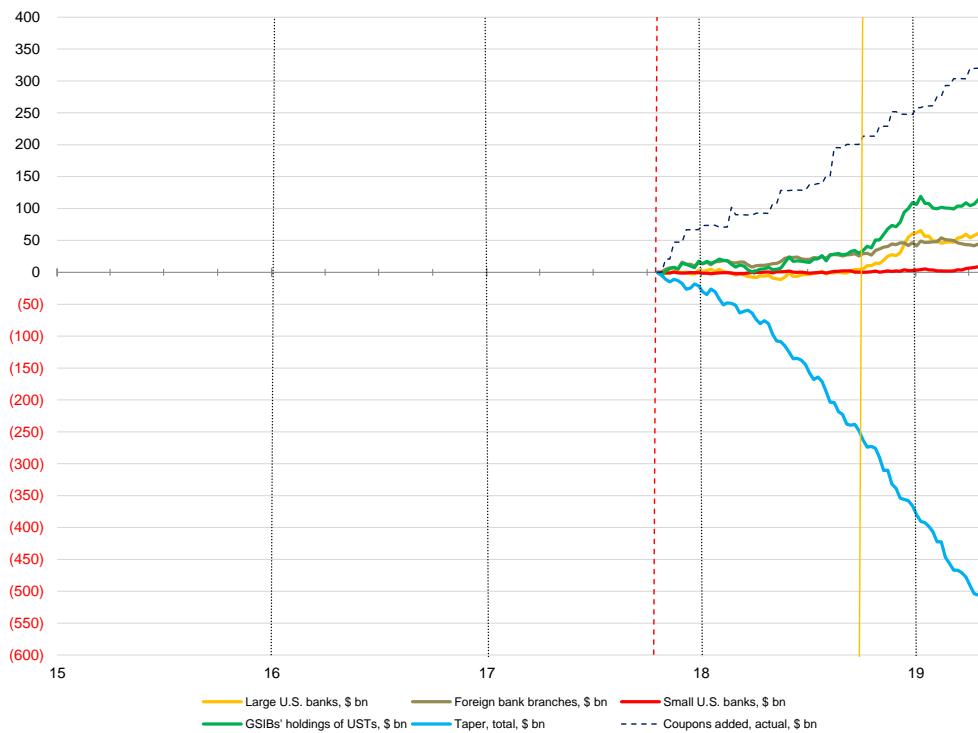
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, Credit Suisse

Figure 15: U.S. Banks Bought Most of the Treasuries Since Taper Began

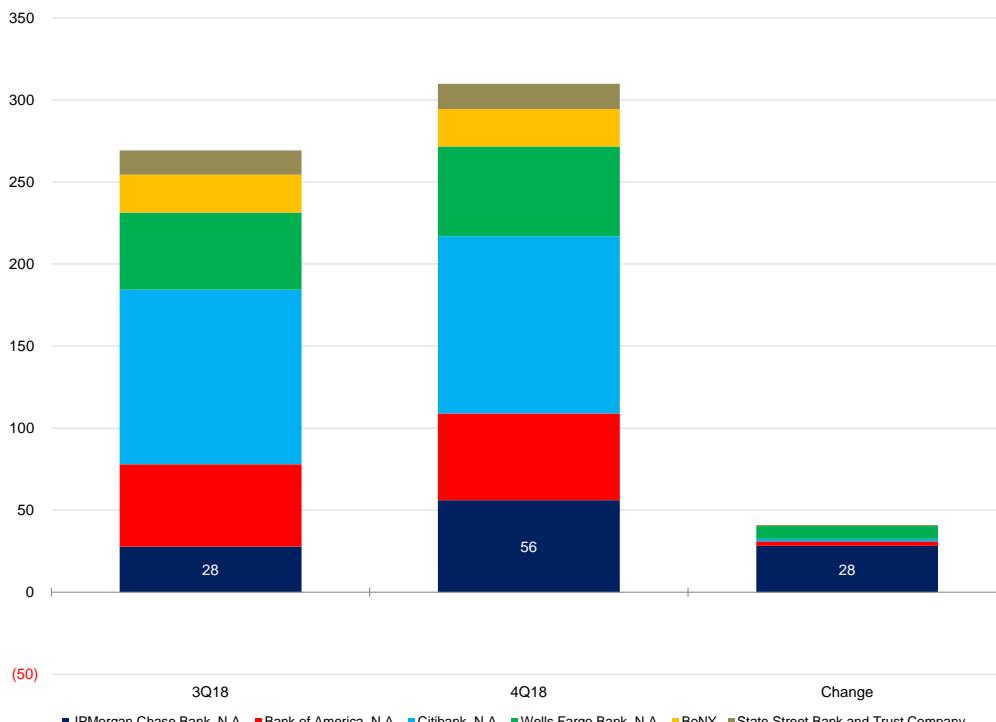
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, Credit Suisse

Figure 16: J.P. Morgan Chase Bank, N.A. Bought Most of the Treasuries Since Taper Began

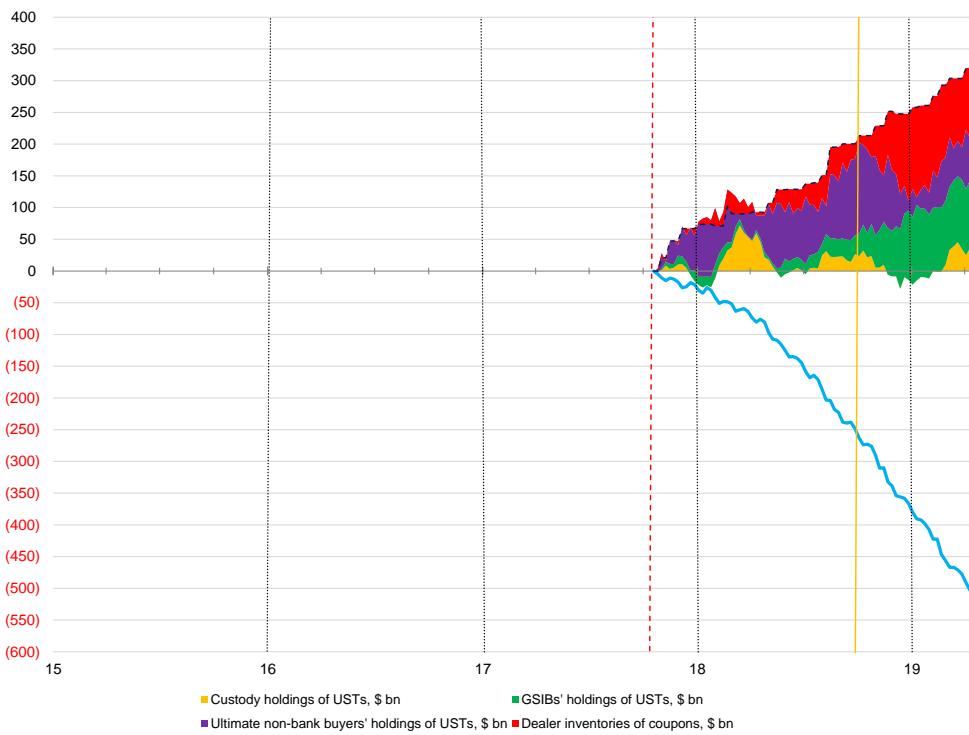
\$ billion



Source: Call reports, Credit Suisse

Figure 17: More Demand for o/n GC Repo and Fewer Reserves to Fund It

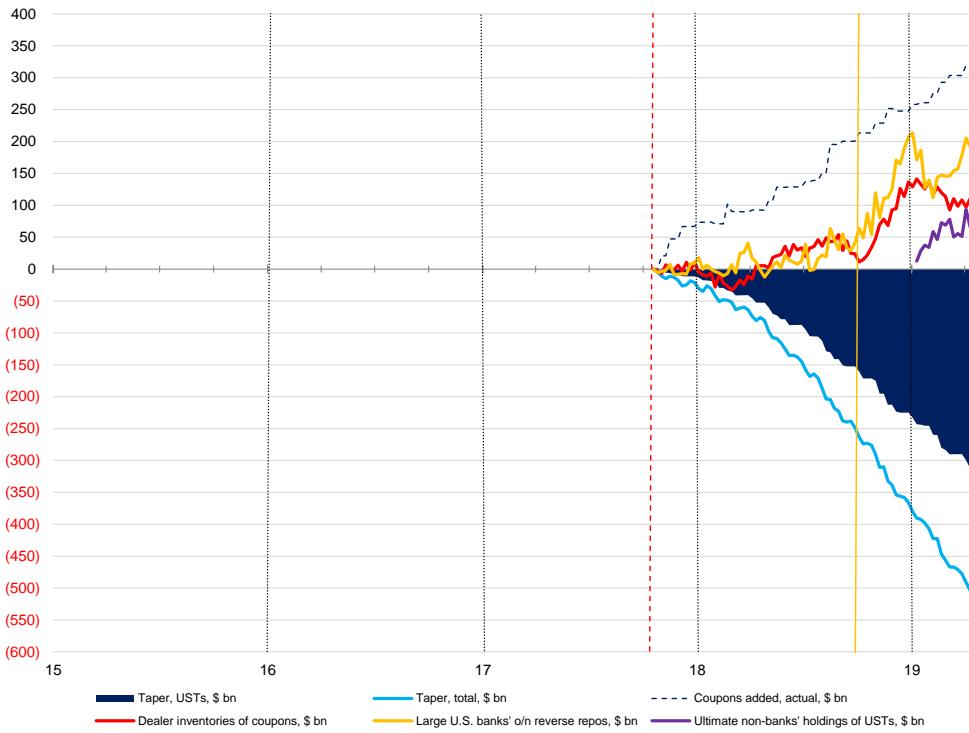
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, Credit Suisse

Figure 18: Large U.S. Banks Funded Dealers' and Hedge Funds Repo Needs

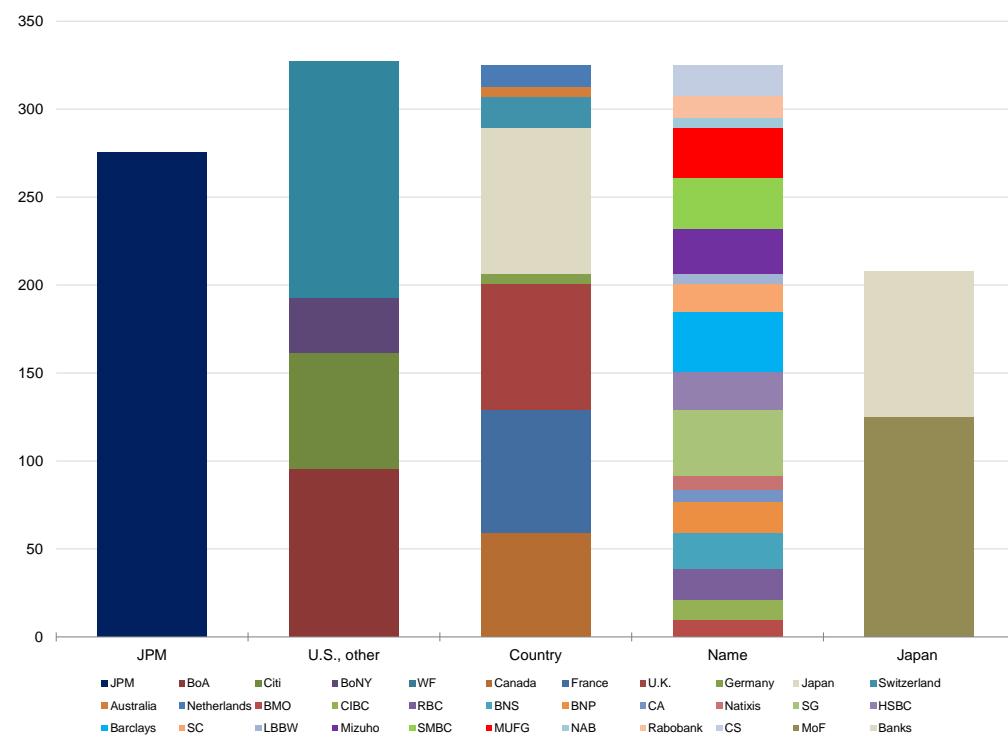
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, Credit Suisse

Figure 19: The Reserve Pools that Backstop the o/n GC Market (1)

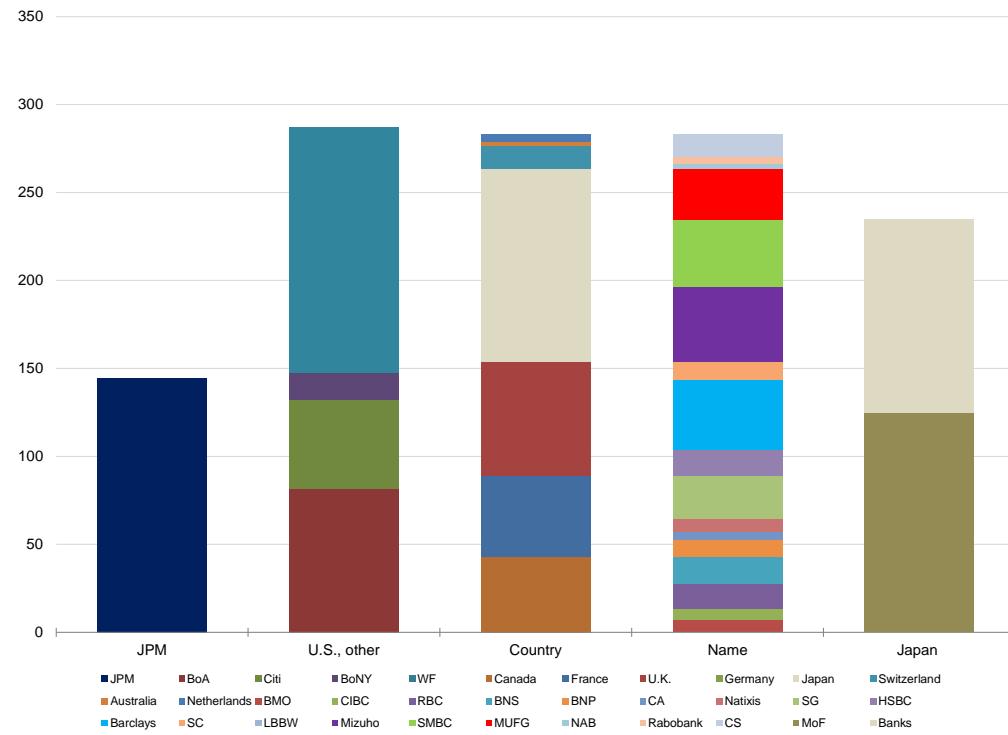
\$ billion, as of 2018Q2



Source: Call reports, Japan's Ministry of Finance, Credit Suisse

Figure 20: The Reserve Pools that Backstop the o/n GC Market (2)

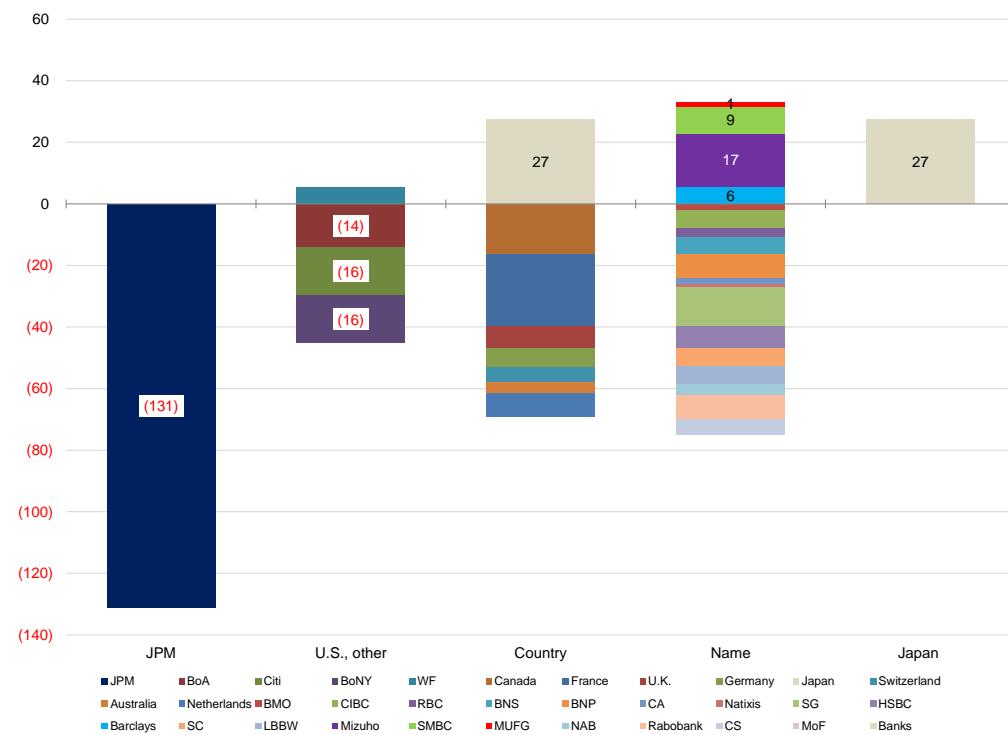
\$ billions, as of 2018Q4



Source: Call reports, Japan's Ministry of Finance, Credit Suisse

Figure 21: The Reserve Pools that Backstop the o/n GC Market (3)

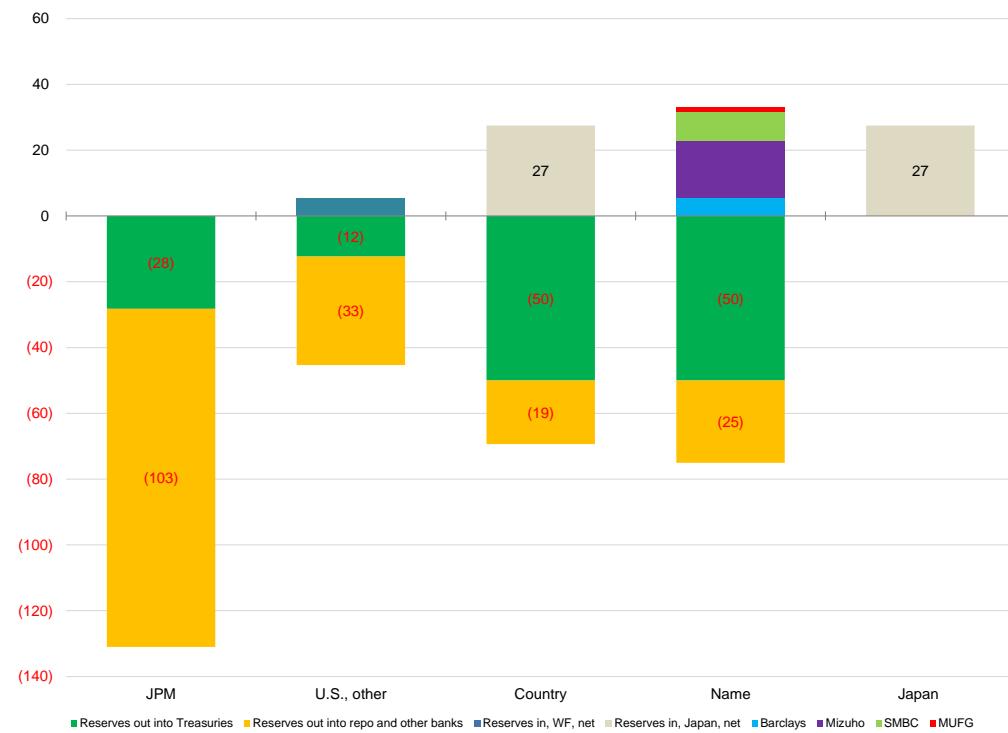
\$ billion, change between 2018Q2 and 2018Q4



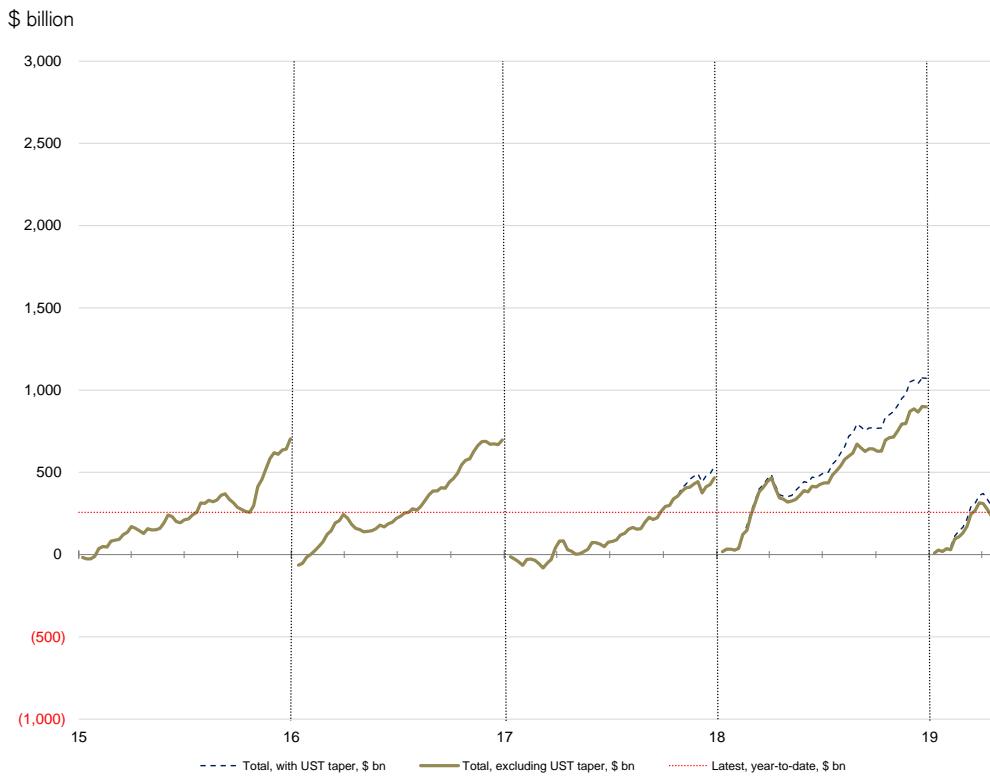
Source: Call reports, Japan's Ministry of Finance, Credit Suisse

Figure 22: The Reserve Pools that Backstop the o/n GC Market (3)

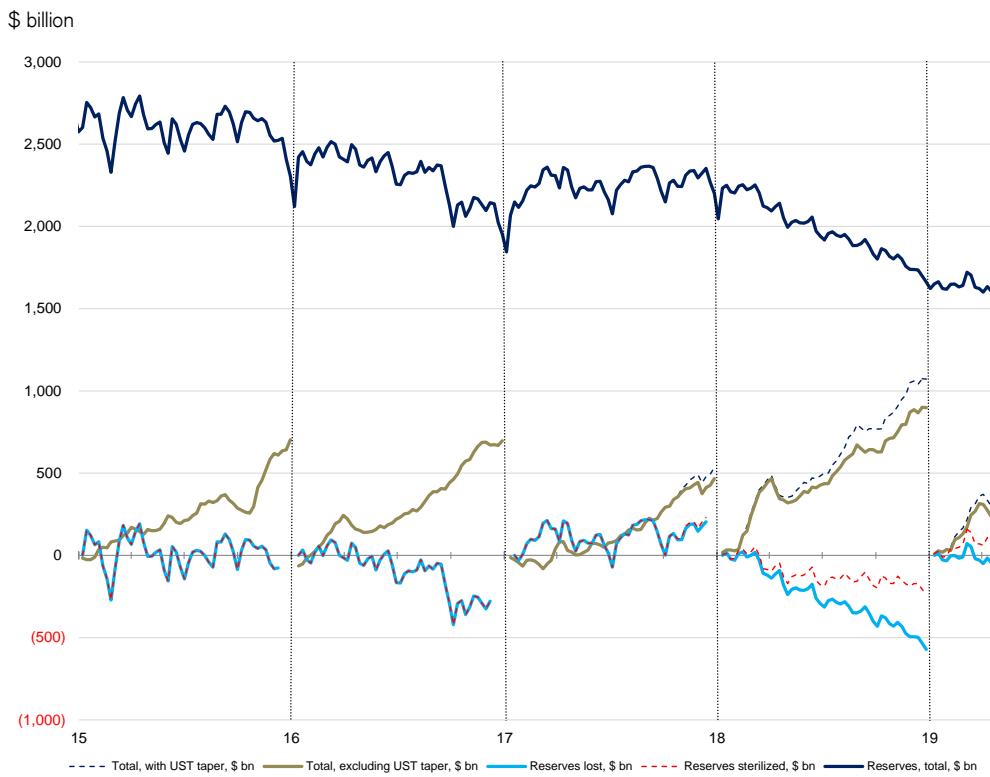
\$ billion, uses of reserves, change between 2018Q2 and 2018Q4



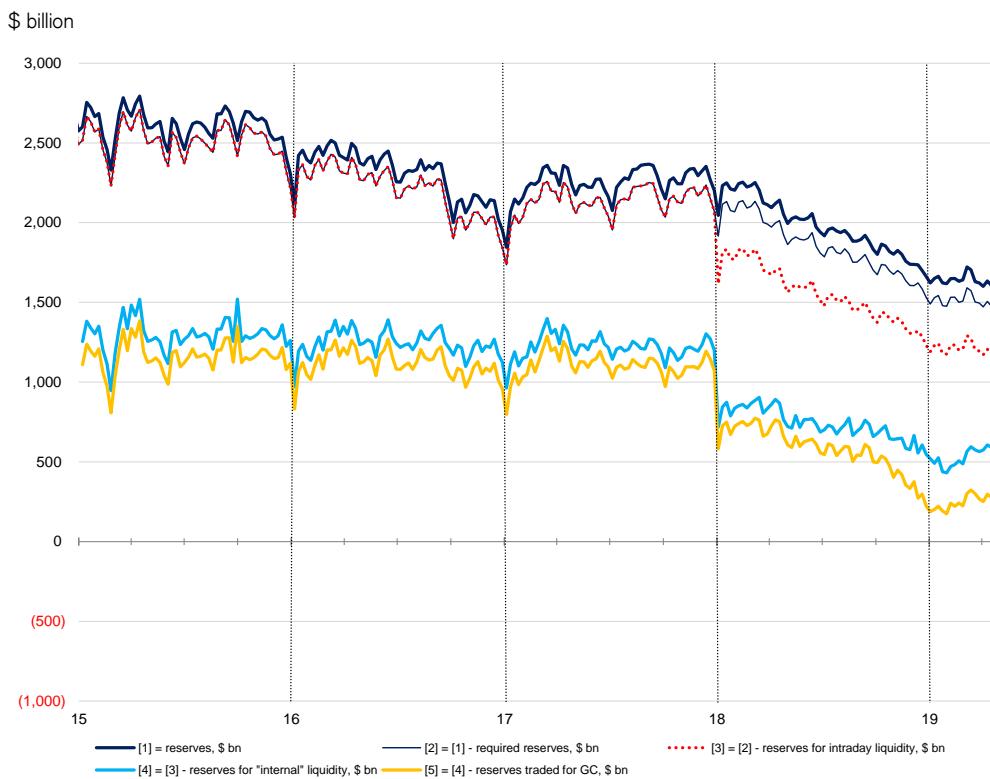
Source: Call reports, Japan's Ministry of Finance, Credit Suisse

Figure 23: Taper and the Bigger Picture

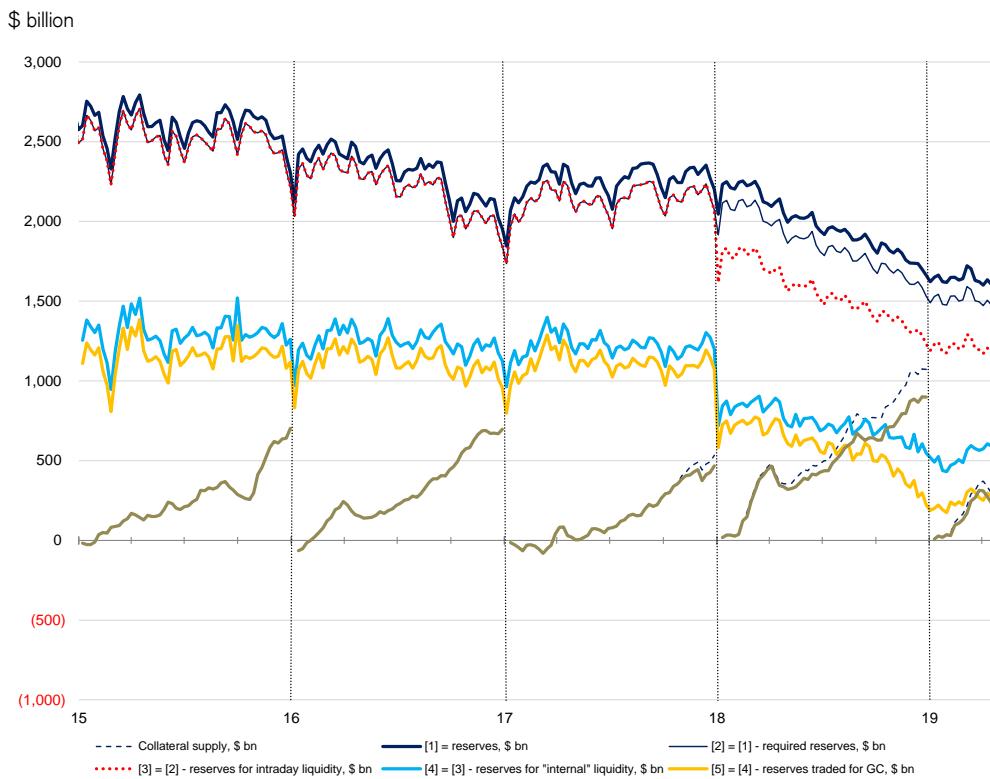
Source: U.S. Treasury, Federal Reserve, Credit Suisse

Figure 24: Taper and Sterilization vs. Collateral Supply

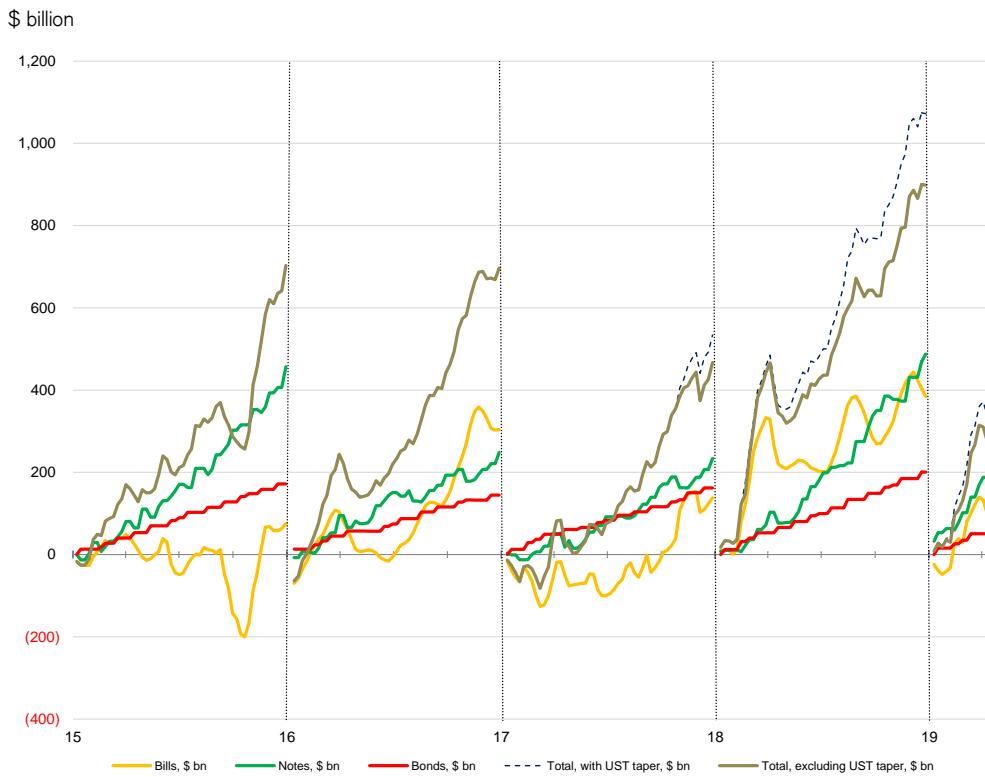
Source: U.S. Treasury, Federal Reserve, Credit Suisse

Figure 25: The “Free Float” of Reserves

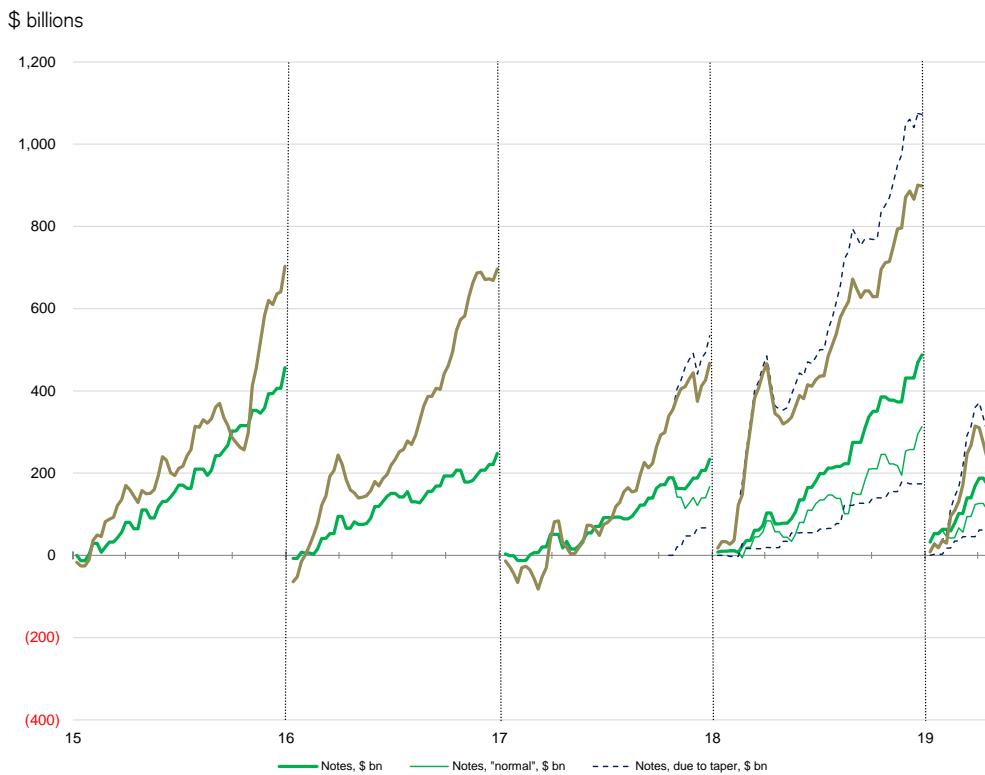
Source: Federal Reserve, Credit Suisse

Figure 26: There Is No Margin for Error Left!

Source: U.S. Treasury, Federal Reserve, Credit Suisse

Figure 27: Treasury Supply and Its Components

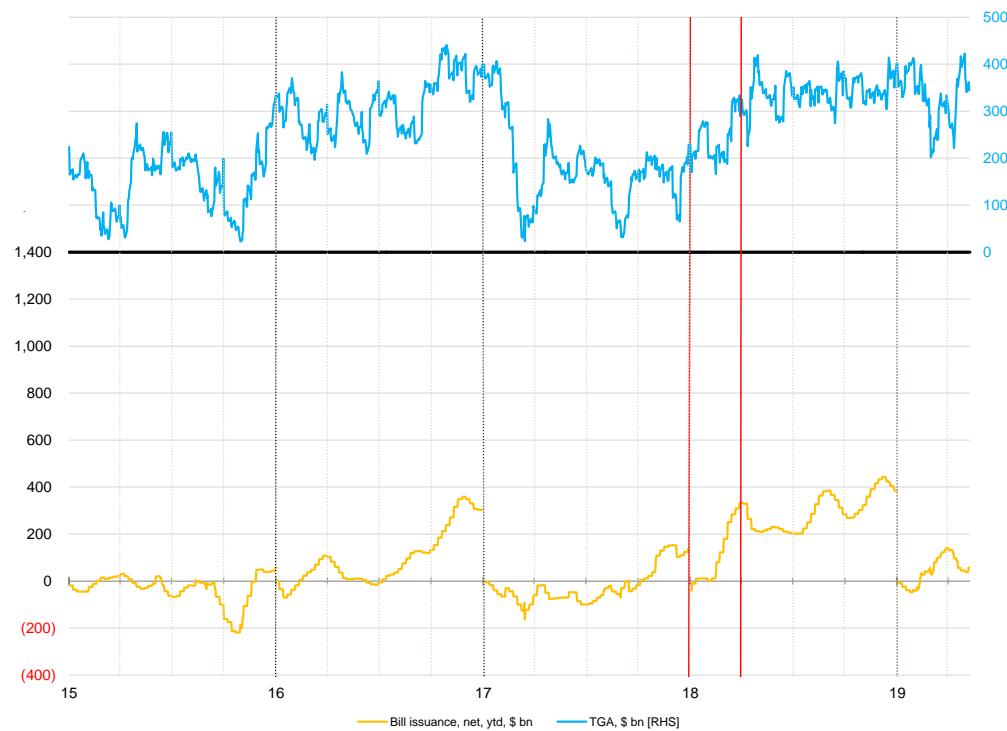
Source: U.S. Treasury, Federal Reserve, Credit Suisse

Figure 28: Non-Taper and Taper-Related Note Supply

Source: U.S. Treasury, Federal Reserve, Credit Suisse

Figure 29: Sterilization and the Volatility of Bill Supply

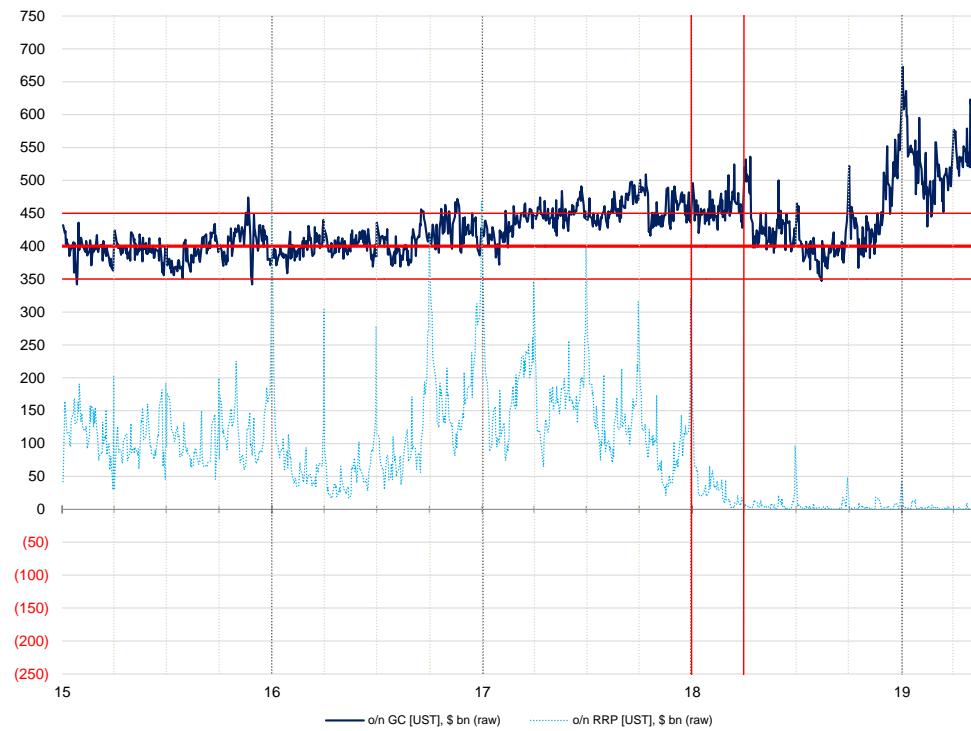
\$ billion



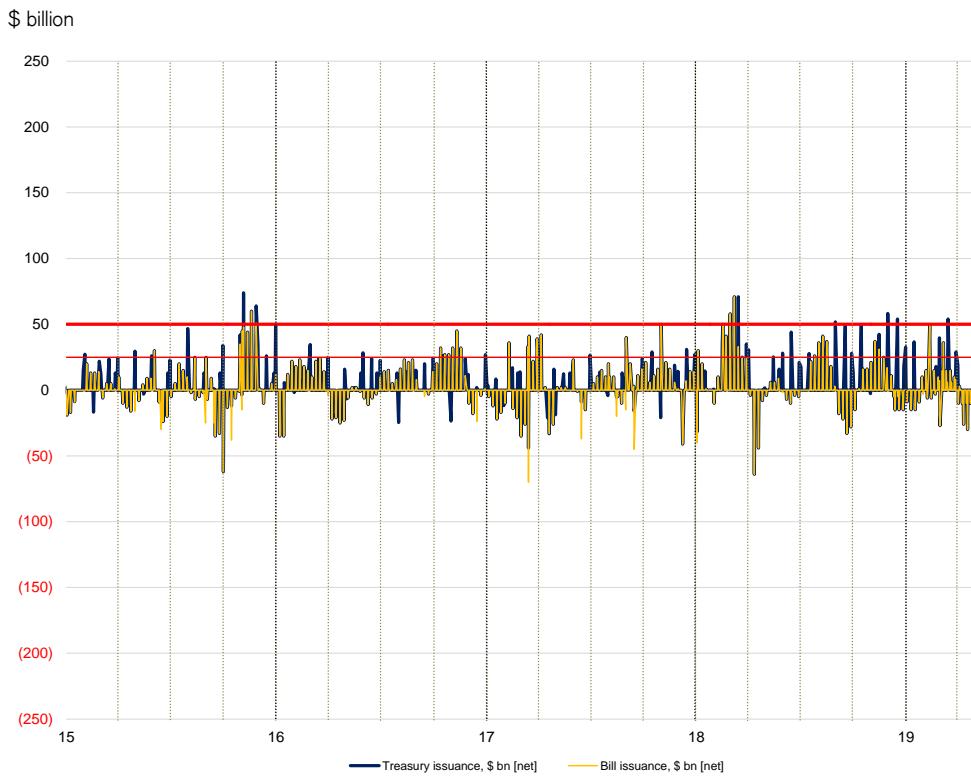
Source: U.S. Treasury, Credit Suisse

Figure 30: Excess “Outside” Reserves Go to Zero

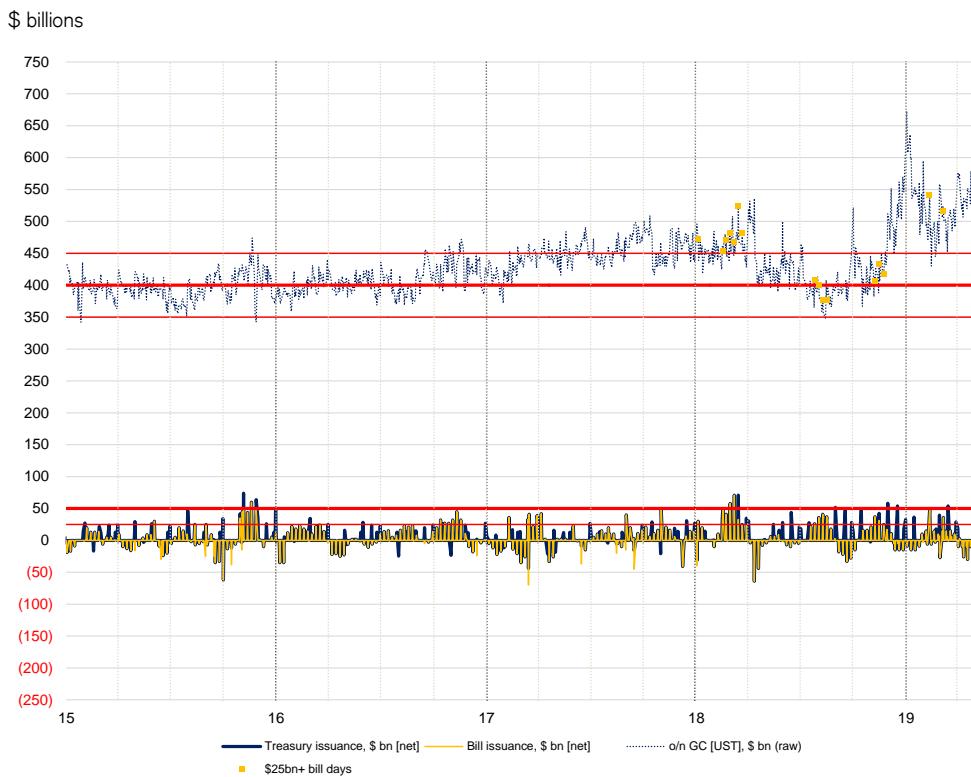
\$ billion



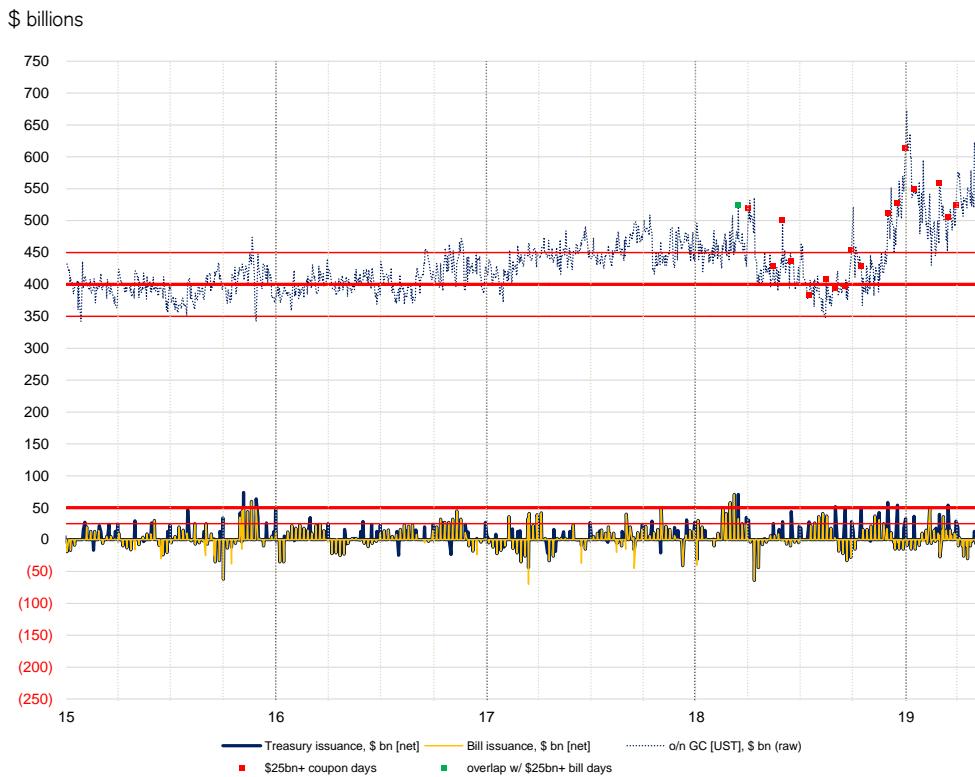
Source: Federal Reserve, Credit Suisse

Figure 31: Daily Treasury Supply

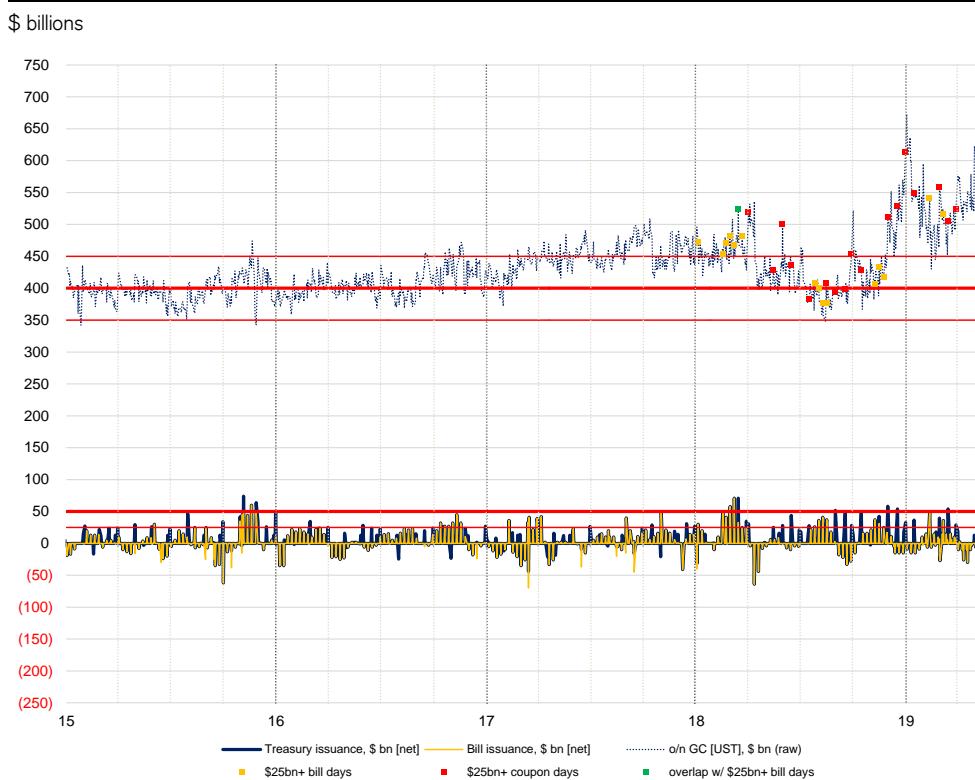
Source: U.S. Treasury, Credit Suisse

Figure 32: Chunky Bill Settlement Days and Demand for o/n GC Repo

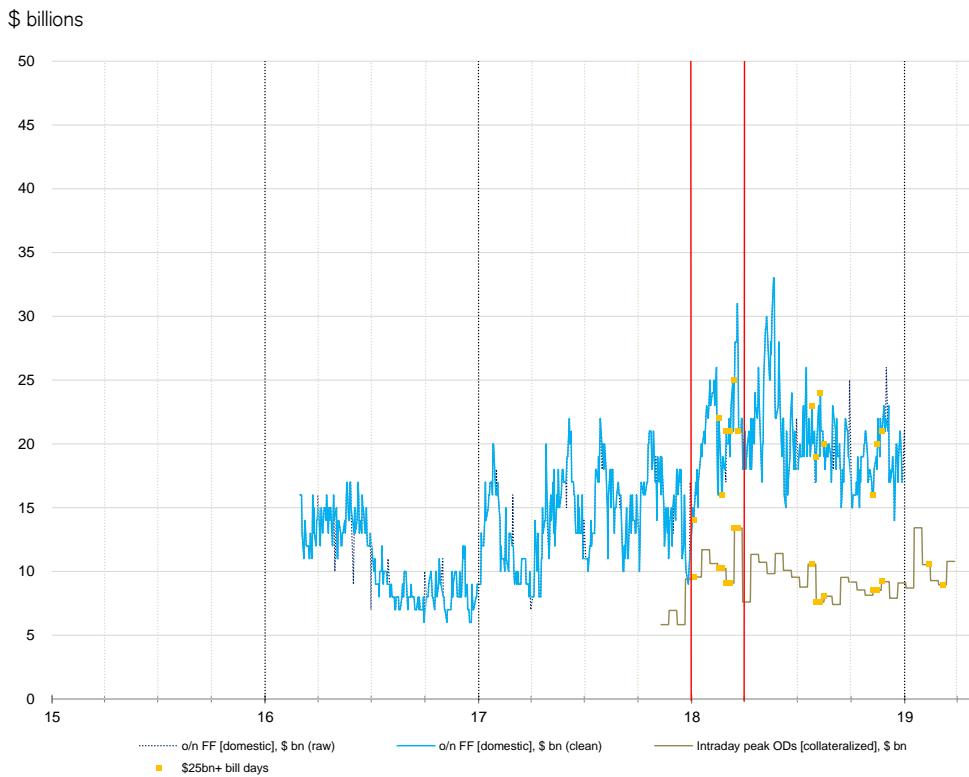
Source: U.S. Treasury, Federal Reserve, Credit Suisse

Figure 33: Chunky Coupon Settlement Days and Demand for o/n GC Repo

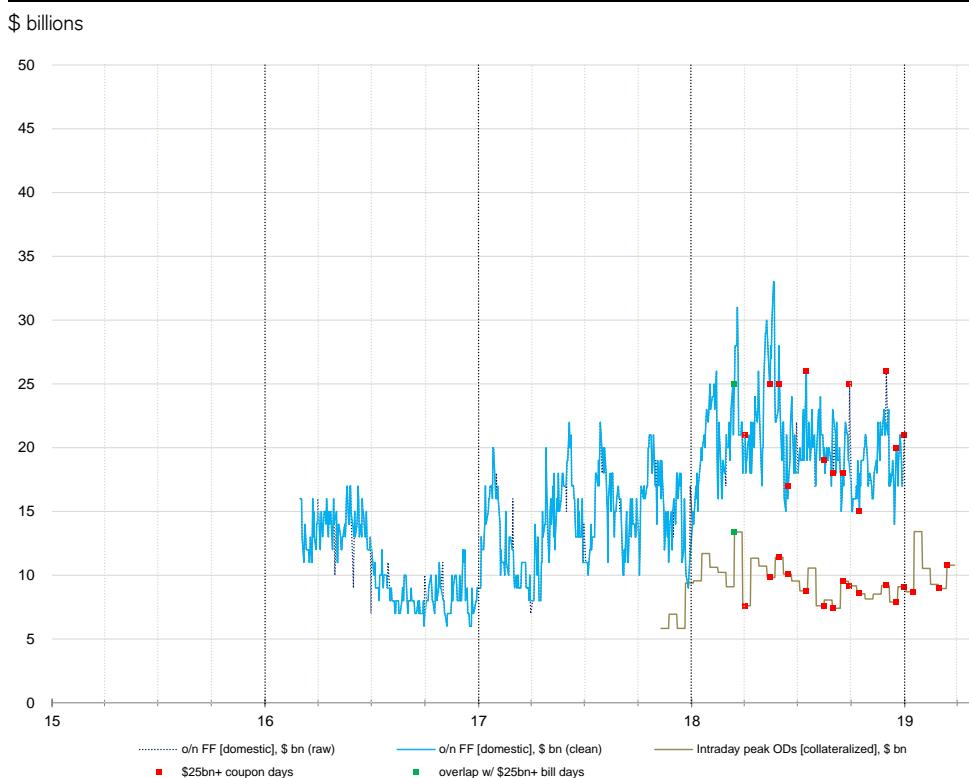
Source: U.S. Treasury, Federal Reserve, Credit Suisse

Figure 34: “Trends vs. Extremes”

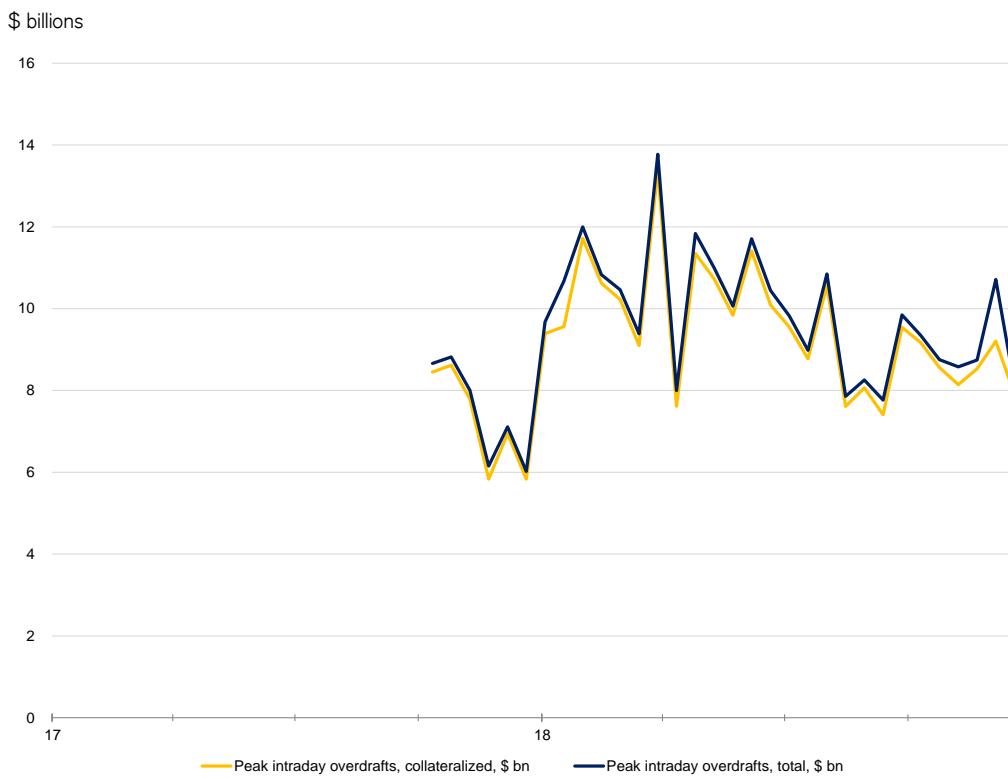
Source: U.S. Treasury, Federal Reserve, Credit Suisse

Figure 35: Chunky Bill Days, Daylight Overdrafts and U.S. Banks' Demand for o/n FF

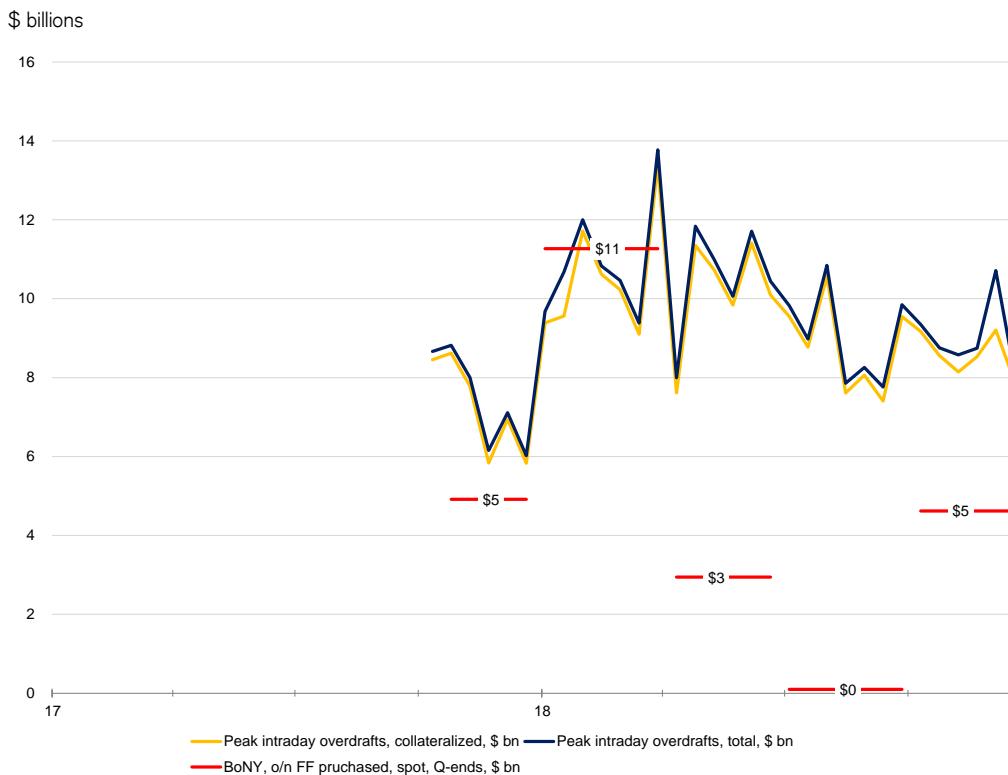
Source: Federal Reserve, Credit Suisse

Figure 36: Chunky Coupon Days, Daylight Overdrafts and U.S. Banks' Demand for o/n FF

Source: Federal Reserve, Credit Suisse

Figure 37: Daylight Overdrafts

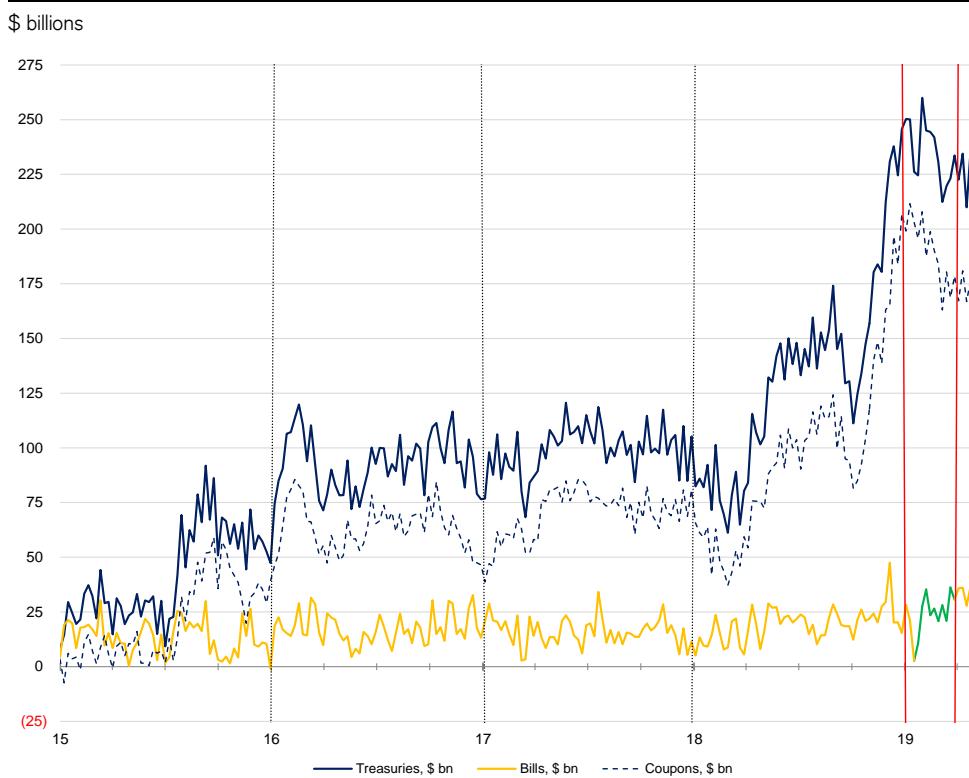
Source: Federal Reserve, Credit Suisse

Figure 38: Daylight Overdrafts and BoNY's Presence in the o/n FF Market

Source: Federal Reserve, BoNY's call reports, Credit Suisse

Figure 39: “Trends vs. Extremes”

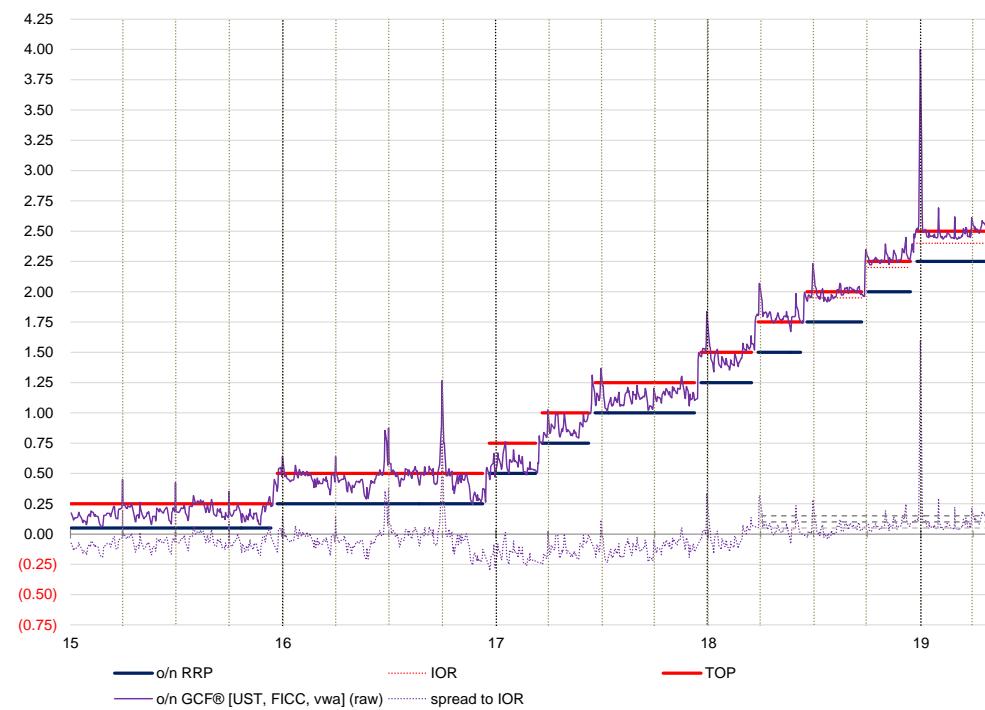
Source: Federal Reserve, U.S. Treasury, Credit Suisse

Figure 40: Bill Inventories Drove Recent Demand for Daylight Overdrafts

Source: Federal Reserve, Credit Suisse

Figure 41: o/n GCF® Repo Rates

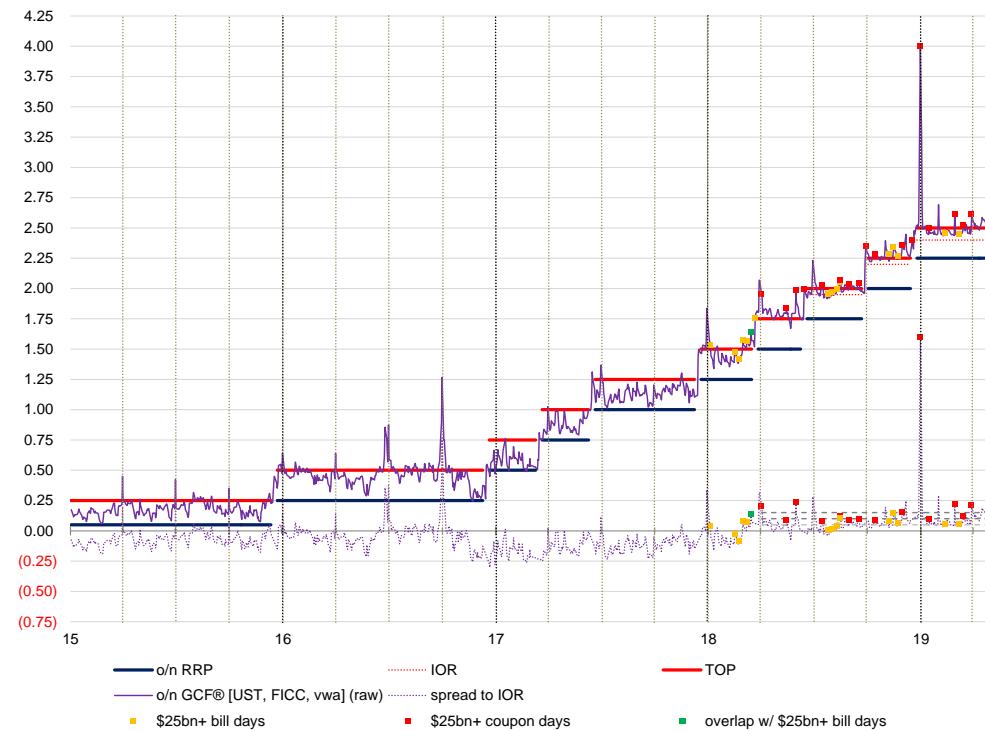
percent



Source: the BLOOMBERG PROFESSIONAL™ service, U.S. Treasury, Credit Suisse

Figure 42: o/n GCF® Repo Rates on Chunky Settlement Days

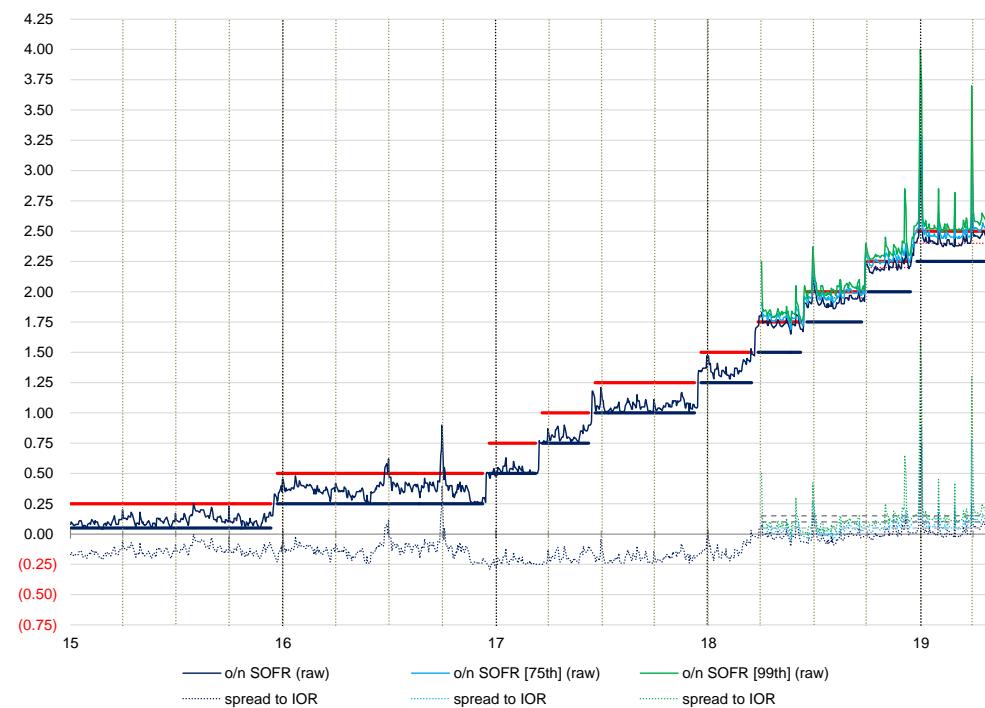
percent



Source: the BLOOMBERG PROFESSIONAL™ service, U.S. Treasury, Credit Suisse

Figure 43: Top Percentile SOFR Rates

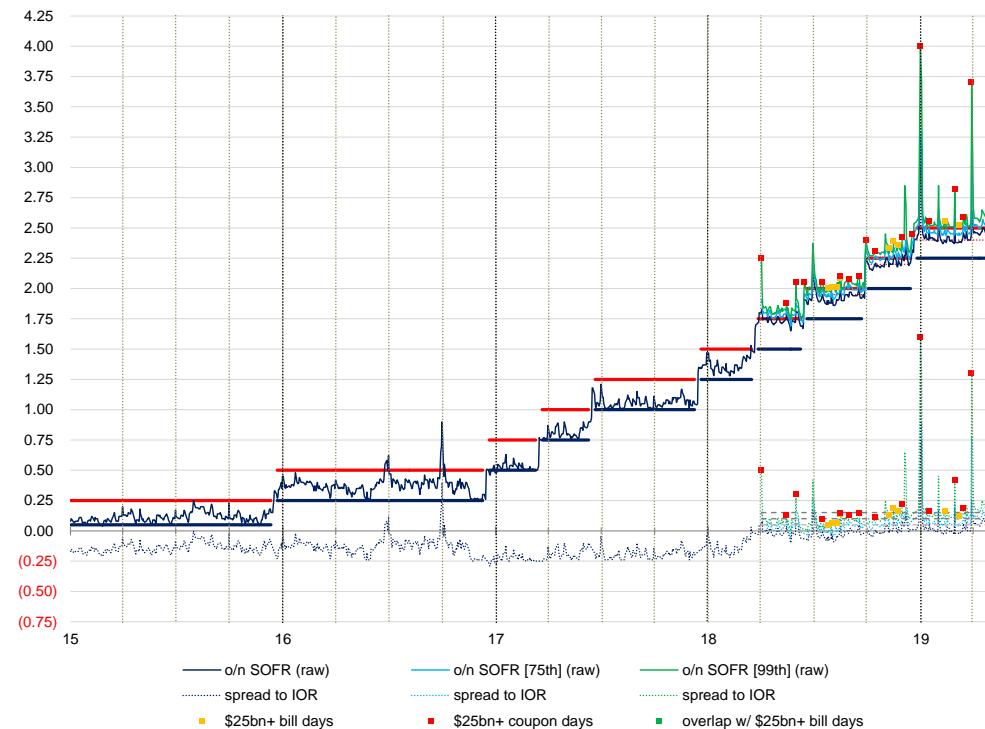
percent



Source: the BLOOMBERG PROFESSIONAL™ service, U.S. Treasury, Credit Suisse

Figure 44: Top Percentile SOFR Rates on Chunky Settlement Days

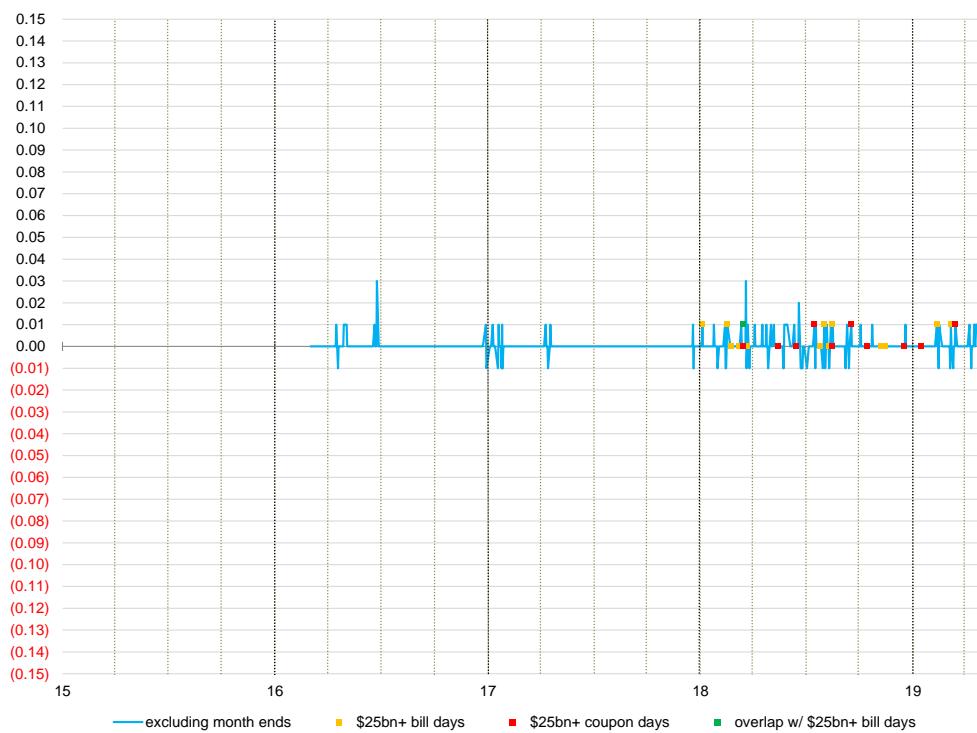
percent



Source: the BLOOMBERG PROFESSIONAL™ service, U.S. Treasury, Credit Suisse

Figure 45: Top Percentile o/n FF Rates

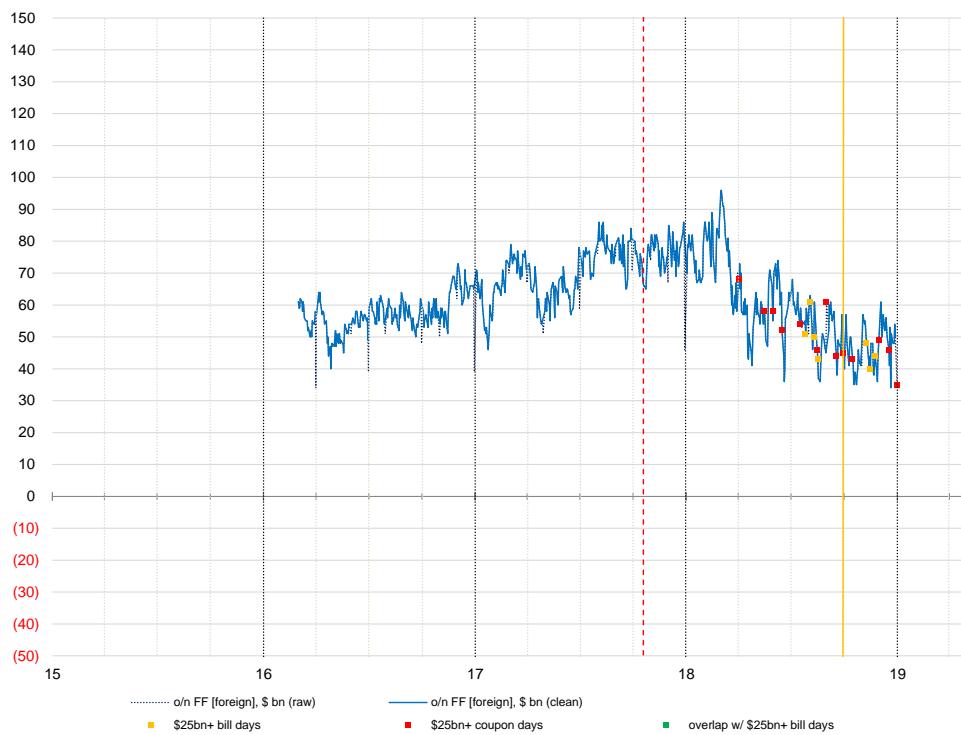
basis points



Source: the BLOOMBERG PROFESSIONAL™ service, U.S. Treasury, Credit Suisse

Figure 46: Chunky Settlement Days Drive Foreign Banks' Arbitrage-Related Demand for o/n FF

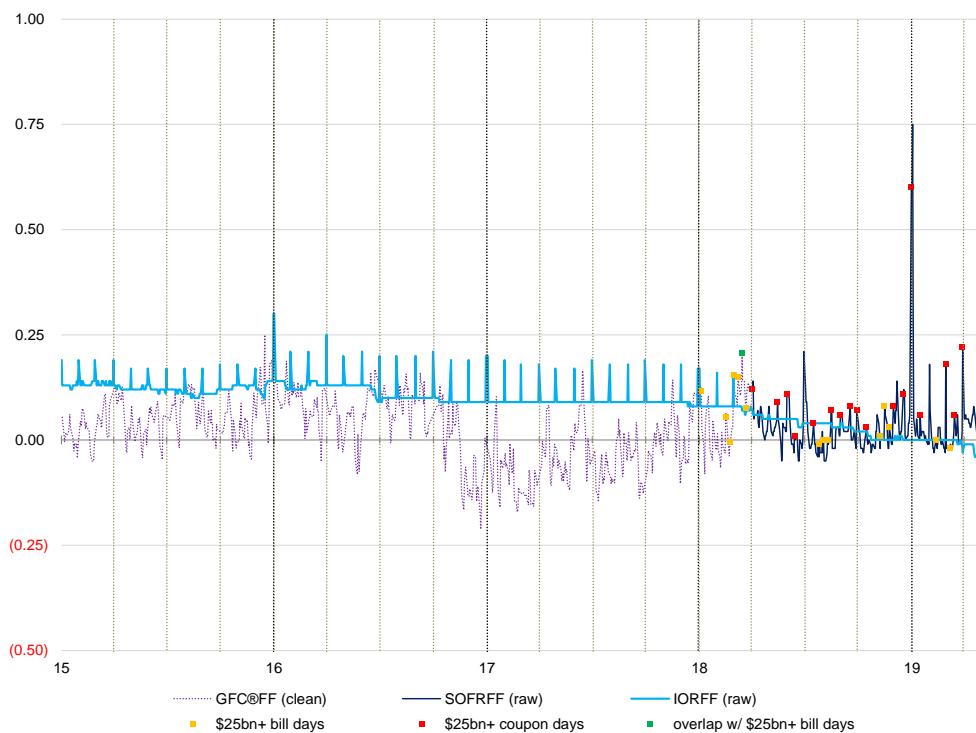
\$ billion, dashed red line marks the start of taper and the orange line marks the start of the curve inversion relative to FX hedging costs



Source: Federal Reserve, U.S. Treasury, Credit Suisse

Figure 47: The Old vs. the New Arbitrage Trade

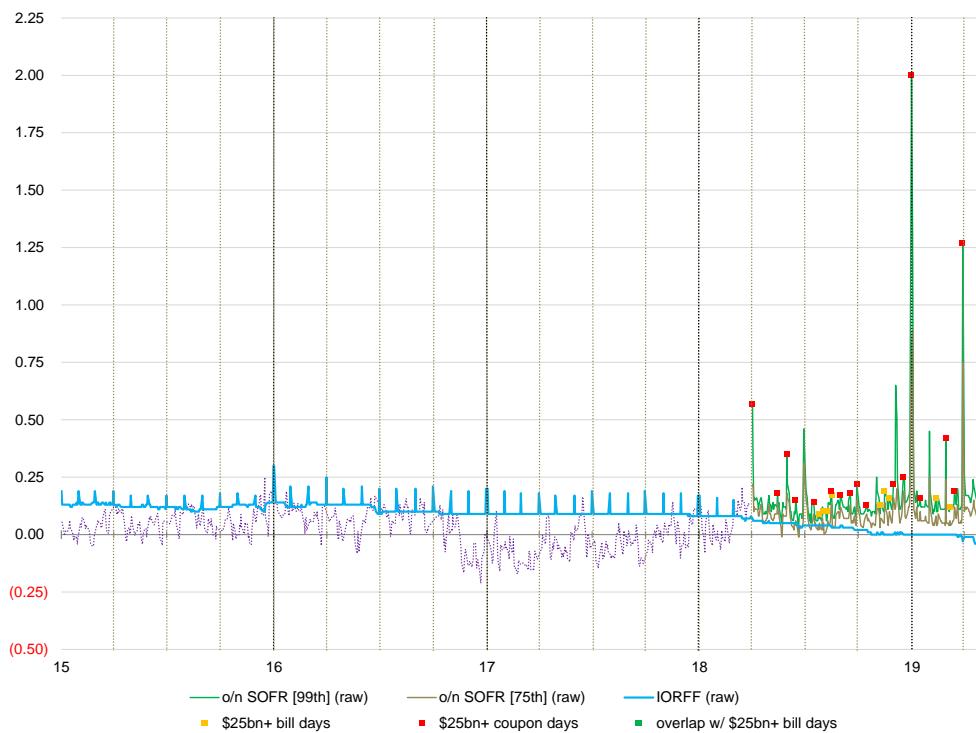
percent



Source: the BLOOMBERG PROFESSIONAL™ service, U.S. Treasury, Credit Suisse

Figure 48: The “Super” Arbitrage Trade at the Fringes

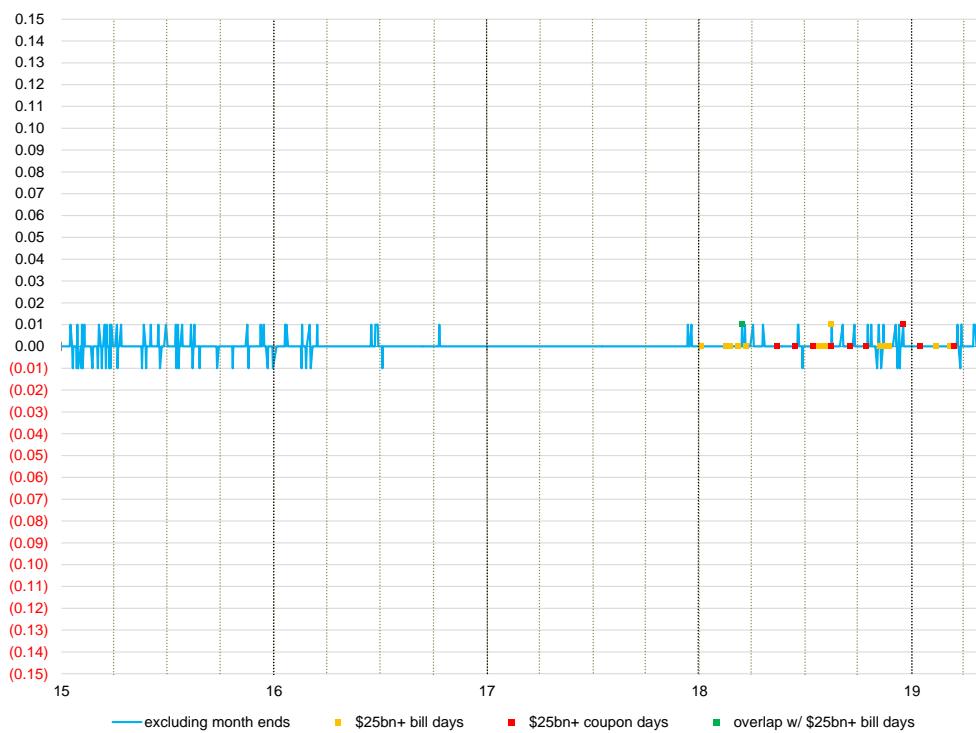
percent



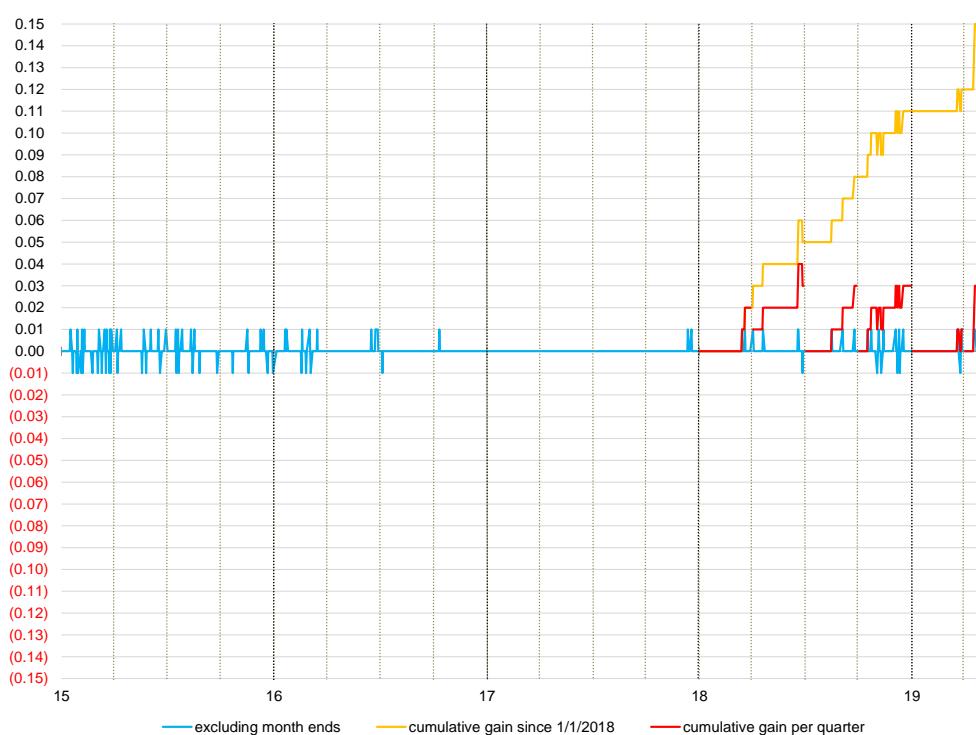
Source: the BLOOMBERG PROFESSIONAL™ service, U.S. Treasury, Credit Suisse

Figure 49: The Lagging and Low-Beta Indicator of Collateral-Related Stresses

percent

**Figure 50: “Vol is Baaack” – at Least in the o/n FF Market**

percent



Appendix

	Federal Reserve (FRBNY)		Dealers (Credit Suisse Securities LLC)		Large U.S. Banks (Citibank, N.A.)		Non-Banks (real money, etc.)	
7:00 AM	UST	Reserves _B _{oNY} Reserves _{Citi} Reserves _{DNB} TGA	Deposits		Reserves _C	Deposits	Deposits	
9:00 AM								
9:30 AM								
3:30 PM								
Scenario , net:								
End-of-day , net:								
Intraday , normal:								
Intraday , with daylight overdrafts:								
	Treasury (Debt Management Office)		Clearing Bank (BoNY)		Foreign Banks (DNB Bank NY branch)		Federal Home Loan Banks (FHLBNY)	
7:00 AM	TGA	UST	Reserves _B	Deposits	Reserves _D	FF _{DNB}	FF _{DNB}	
9:00 AM								
9:30 AM								
3:30 PM								
Scenario , net:								
End-of-day , net:								
Intraday , normal:								
Intraday , with daylight overdrafts:								

Source: Credit Suisse

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12 August 2019
Investment Solutions & Products
Global



Credit Suisse Economics

Global Money Notes #23

The Revenge of the Plumbing

In this edition of Global Money Notes, we highlight why front-end technicals argue for more aggressive rate cuts later this year.

Due to the earlier-than-expected resolution of the debt ceiling, the Treasury will issue over \$800 billion in net new debt and increase its cash balances at the Fed by \$200 billion by the end of the year. Supply this big will lead to acute funding stresses – a “fiscal dominance” of money markets – in our view.

Front-end technicals look horrid, and supply couldn’t come at a worse time: the curve remains deeply inverted relative to actual funding costs that matter; dealer inventories are at a record; and banks that fund dealer inventories are at their intraday liquidity limits. Supply won’t be well received given the inversion; dealers only have \$300 billion in balance sheet left before leverage ratios bind; and \$200 billion in extra cash at Treasury will hit banks’ intraday liquidity profile.

The Fed appears to sense these mounting pressures – in our view, the Fed’s concern of the coming fiscal dominance is why it ended taper two months early.

But cutting taper short by about \$60 billion is a drop compared to \$800 billion – a nice gesture, but not a solution. Solutions like asset purchases (“mini-QEs”) or a standing repo facility are unlikely to be ready any time soon as they take time to design, test and communicate – and fiscal dominance starts “tomorrow”.

If these solutions aren’t ready soon, money markets will suffer acute indigestion: o/n rates will print outside the Fed’s target band and Libor-OIS will widen – fiscal dominance will effectively deliver a rate hike, offsetting the July 31st cut.

Absent a technical bazooka, stresses will leave one option left: more rate cuts. Cuts that are aggressive enough to re-steepen the Treasury curve such that dealer inventories can clear and inventories don’t drive funding market stresses.

We recognize that the Fed doesn’t bend to the circumstances of dealers and carry traders, but we’d also note that we never had this much Treasury supply during a curve inversion on top of record inventories with leverage constraints!

Furthermore, launching mini-QEs or a standing repo facility is not a good idea during an inversion, unless the Fed wants to absorb most of the coming supply. In our view, more aggressive cuts are an easier “sell” politically and optically than outright asset purchases in an environment of record Treasury issuance.

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Part I – Inventories: Bloated and Concentrated

Primary dealers' inventories of Treasuries have been on a relentless rise since 2018, going from \$75 billion to near \$300 billion by the second quarter of 2019 (see Figure 1).

The consensus attributes this increase in inventories to a record net supply of Treasuries, but that fails to explain why a doubling of supply would cause a quadrupling of inventories.

The picture is more complex. Demand has also been falling for at least four reasons:

- (1) the Fed shrinking its portfolio holdings of Treasuries, colloquially known as taper, which started on October 13th, 2017 (the vertical red dashed line);
- (2) the echo-taper, or corporate treasurers shrinking their offshore Treasury holdings which started on January 1st, 2018 (the first vertical orange line);
- (3) the inversion of the Treasury curve relative to foreign investors' hedging costs, which started on October 1st, 2018 (the second vertical orange line);
- (4) the inversion of the Treasury curve in the classic sense – the 3s/10s inversion – which started on April 1st, 2018 (the third vertical orange line).

These events mark the sequential “fading” of one marginal buyer after another:

- (1) taper sapped demand by \$400 billion to date; taper has been slow initially, sapping demand by \$100 billion by the summer of 2018 and has sped up since;
- (2) the echo-taper sapped demand by circa \$50 billion; unlike taper, the echo-taper was front-loaded, with most of its hit to demand over by the summer of 2018;¹
- (3) the “foreign” inversion sapped demand by at least \$200 billion, as proxied by foreign FX hedged buyers’ recent purchases relative to their pre-inversion trend;²
- (4) the “classic” inversion sapped demand for Treasuries by at least \$150 billion, as proxied by recent inflows into institutional-class government money funds.

These changes in demand were huge – around \$800 billion – and that “only” \$200 billion of Treasuries ended up in inventory and \$600 could rotate to new buyers is quite a feat.³

Bloated inventories make for a unique case study not only because of their record size, but also because this is the first accumulation of the Basel III era where inventories count toward banks’ leverage ratios (SLR), and because the accumulation is very concentrated.

Of the twenty-four primary dealers that contribute to the survey that tracks inventories, three account for all of the increase. The three dealers are: J.P. Morgan Securities LLC, Bank of America Securities, Inc. and Citigroup Global Markets, Inc., whose inventories, as proxied by their trading assets as shown in their quarterly earnings supplements have risen by \$115 billion, \$50 billion and \$40 billion, respectively over the period examined.

Dealer inventories have pushed demand for o/n GC repos to a record high (see Figure 2), and this “hunt” for funding was the primary driver of money market dynamics this year.

Our interpretation of why inventories rose stems from a new way of measuring inversions.

Under Basel III, inversions must be reimaged...

¹ See “[Finding Ireland in the U.S. Balance of Payments Data](#)” by Brad Setser on the reverse corporate savings glut.

² Foreign buyers purchases halved relative to the pre inversion trend (see [Lost in Transmission](#) from February, 2019).

³ Large U.S. banks’ portfolios absorbed about \$400 billion of the \$600 billion, with the rest absorbed by non-banks.

Part II – Inversions Reimagined

Under Basel III, traditional measures of curve inversion like 3s/10s are meaningless, because no one funds at rates around the three-month Treasury bill yield. Pre-Basel III, these spreads were negligible and bill yields were a reasonable proxy for funding costs.

The hierarchy of money markets was flat.

Post-Basel III, balance sheets are constrained, arbitrage opportunities remain unexploited, and covered interest parity (CIP) – a near-physical law of the pre-Basel III financial order – no longer holds. Money market curves no longer trade at par, but are “spread” apart.

The hierarchy of money markets is now steep...

...and your cost of funding as a carry trader depends on your place in the hierarchy. Spreads over bills routinely as wide as 50 bps and sometimes as wide as 100 bps in turn mean that long before the curve inverts according to the “classic” 3s/10s measure, some carry trader will already have stepped away from buying Treasuries on the margin.

Figure 3 shows that relative to yen and euro-based investors’ three-month hedging costs, the curve inverted on October 1st, 2018 and relative to three-month U.S. dollar Libor, the curve inverted on January 1st, 2019. In contrast, the “classic” 3/10s inversion commenced only in May. Thus, long before the start of the “classic” inversion, some foreign investors that fund in the FX swap market and foreign banks that fund at Libor have already reduced their purchases of Treasuries as we have shown [here](#) and [here](#).

Why do inversions matter?

Treasury supply is not always absorbed by real-money buyers such as index funds, pension funds or official accounts in real-time. This “time-inconsistency” is usually bridged by carry traders that borrow short and lend long, that is, who borrow to buy the bonds that there is no final demand for from real-money accounts right now. Carry traders include relative value hedge funds that fund using repos, foreign banks that fund at Libor, and foreign real-money accounts that hedge Treasuries back to euros, francs and yen.

Sometimes carry traders aren’t just marginal buyers – there are times when they are just as important as real-money buyers, as it’s been the case with foreign hedged buyers, who have been trying to avoid negative rates in their home jurisdictions in recent years.

Inversions disrupt these dynamics and turn the workings of the system upside down.

Carry traders buy Treasuries if it makes sense to buy – i.e., if they earn a positive spread after funding costs. Inversions turn positive carry into negative carry and force carry traders to seek out other alternatives – and as they do, primary dealers are left holding the bag.

Primary dealers buy Treasuries because they have to – by law, primary dealers have to provide a bid to the market when there is none and when demand from investors is short.

Carry traders fund around the three-month point because they’re in the “carry” business. Primary dealers fund much shorter, often o/n, because they’re in the “moving” business.

Thus, a hallmark feature of curve inversions is a pendulum-swing away from pressures at the three-month point to pressures at the ultra front-end of money markets in the o/n repo market and by extension the tomorrow-next (t/n) points in the FX swap market.

Figure 4 shows that the inversion is the most extreme relative to o/n and t/n rates – according to this measure, the current curve inversion is an unusually deep minus 75 bps.

Basel III changed not only how banks fund...

...but also how inversions should be measured!

Part III – Fixing Inversions

Based on our measures, we've been living with inversion for the past six to nine months, which makes the duration of this episode comparable to those of 1989, 2000 and 2006.

When measured relative to three-month funding costs, the depth of the current inversion at minus 50 bps is also comparable to past inversions, and when measured relative to o/n and t/n funding costs at minus 75 bps the current inversion is the deepest on record – not only that, but this is the first time the curve inverted relative to the ultra front-end.

Historically, inversions have been “fixed” by a series of rates cuts by the Fed.

In the first two editions of Global Money Notes this year, we tried to imagine how the Fed could fix the inversion with technical moves like capping the foreign repo facility. We said:

“Why the Fed should seriously consider [capping the facility] if it does not want to cut rates is clear: implicit in our analysis is that whatever force keeps the yield curve flat, from a plumbing perspective, the Fed overdid the hiking cycle by about two or three hikes!”

Bound by a macro backdrop that didn't justify rate cuts back in January, we expected the curve to re-strengthen through the front-end spread complex drifting down relative to OIS.

A central part of this forecast was the expectation that Libor-OIS spreads would compress and that cross-currency bases versus Libor would flip positive, helped by the Fed pushing foreign central banks out of the foreign repo facility and into the bill and FX swap markets.

Libor-OIS did tighten by 25 bps during the first half of 2019 – worth a full rate cut – but further tightening remained elusive as the cross-currency basis didn't go positive. It didn't because the Fed didn't cap the foreign repo facility as we expected it would, and because the funding needs of bloated dealer inventories pushed t/n cross-currency bases wider.

The spread complex did shift lower relative to OIS, but not enough to fix the inversion.

President Trump's mid-May trade war tweet shook up the global macro backdrop and [rate cuts got on the table](#). What the spreads complex shifting around OIS couldn't deliver, cuts to OIS may. The next questions are how many cuts, in what increments and how fast.

As a thought experiment, abstract from President Trump, the trade war and the data – abstract from “macro” in general – and take a look at Figure 5. What Figure 5 shows is that every money market curve – repo, Libor and FX swap implied curves from € and ¥ – trade north of the entire Treasury curve by between 50 bps to 100 bps! This is what curve inversions look like when we plot the entire term structure and not just the spreads.

Figure 5 makes it obvious why the carry trader cannot buy anything and why real-money accounts won't buy Treasuries on the margin and why dealers struggle with inventories – money markets offer rates that are 50 to 100 bps better depending on where you lend.

Figure 5 suggests the rates market needs around 100 bps of cuts! But there is a catch...

...the Fed cares about “macro” – the data and the outlook – and not about the plumbing, the orderly flow of collateral or the “social circumstances” of carry traders and dealers.

That means that in principle the path of short-term rates is determined by the data and is agnostic to the technicals of money markets. Or more precisely, if the Fed does care about front-end technicals, it will address them with operational measures like IOR cuts, launching an o/n repo facility or launching an asset purchase facility – but not rate cuts.

But this time may be different – more cuts may be necessary to fix front-end pressures...

Part IV – Inversions and Collateral Supply

Overnight rates are especially important from the perspective of central banks because one of their mandates is to ensure that overnight rates print within the target range.

Collateral supply is the single most important driver of overnight money markets currently – a topic we explored with surgical detail in our [previous edition](#). The key takeaways were:

- (1) Inversion and the associated increase in dealer inventories has been keeping demand for o/n GC funding and o/n GC rates elevated and increasingly “spiky”;
- (2) Banks are the marginal lenders in the o/n GC market and their ability to lend is a function of how close they are to their intraday liquidity limits;
- (3) Collateral supply will continue to increase during the second half of the year and given the inversion, inventories and the pressure on o/n GC rates will get worse.

The resolution of the debt ceiling and Treasury's recent quarterly refunding [statement](#) provide the contours of the amount of collateral supply the system will have to digest: during the third and fourth quarters, the Treasury will issue \$850 billion in net new debt!

That's double the expected amount. That's a “fiscal dominance” of money markets.

The coming deluge of collateral is going to impact o/n rates through three channels:

- (1) Bill supply will push bill yields back into the middle of the target band such that o/n rates trade not at a spread to o/n RRP but at a spread to bills (see Figure 6);
- (2) Coupon supply – given the curve inversion – will likely bloat inventories further, which will pull o/n GC rates outside the band and drive spikes (see Figure 7);
- (3) The [foreign repo pool](#) will worsen the collateral supply, as an uncapped facility paying the o/n GC rate will “suck” funds away from the bill market (see Figure 8).

Treasury will also increase its cash balances from \$200 billion currently to \$350 billion by the end of September and \$410 billion by the end of December, which will worsen banks' intraday liquidity profiles and their ability to lend into the o/n GC market on the margin.

Collateral supply will likely push o/n rates through the top of the Fed's target range, which is a development that the Fed will feel impelled to respond to. Here are its options:

- (1) Further cuts to IOR;
- (2) Launching an asset purchase facility (“mini-QEs”);
- (3) Launching a fixed-price, full-allotment o/n repo facility.

Each of these measures would help ease the pressure on o/n rates coming from the inversion and the associated buildup of dealer inventories: IOR cuts push reserve-rich banks to lend more in the o/n GC market and help primary dealers fund their inventories; an asset purchase facility would effectively help dealers push their inventory onto the Fed; and a repo facility would help dealers fund their inventory at rates cheaper than with banks.

But the problem is that the Fed won't be able to launch mini-QEs or an o/n repo facility before bill supply hits. The “fiscal dominance” of money markets starts basically now and the Fed is [woefully behind the curve](#) on launching either of these operational measures.

That leaves IOR cuts, but there are only 10 bps more to go before the IOR and RRP rates converge and if you cut IOR below the o/n RRP rate that's effectively another rate cut...

...so it's easy to see which way these technical adjustments are pointing: more rate cuts to deliver slope to the Treasury curve and thereby help dealers clear their inventories and reduce pressure on the o/n rates complex so that rates print within the Fed's target band.

Conclusions

Taper, the echo-taper and inversions are the cause. Dealer inventories are the problem. Banks funding dealer inventories is the private solution, but that private solution has a limit:
...intraday liquidity constraints.

Hit those constraints and funds stop flowing in the repo market on the margin and rates print outside the Fed's target band. The public solution for that is the Fed's balance sheet:
...mini-QEs and/or a fixed-price, full allotment o/n repo facility.

Both would add reserves and thereby ease the system's intraday liquidity constraints and help primary dealers ease the funding pressures associated with their bloated inventories.

But mini-QEs and a standing repo facility take time to design, test and communicate, and the early resolution to the debt ceiling and the coming "fiscal dominance" of o/n markets in its wake suggests that the Fed has no time. That leaves more rate cuts as the solution...

...rate cuts that are aggressive enough to re-steepen the curve so that dealer inventories can clear – cuts that are deep enough that would incent real-money investors to lend long, not short and that would enable carry traders to borrow short and lend long again.

How many cuts are needed to keep funding stresses at bay? Three more cuts will do – that's what the plumbing suggests we need for inventories to clear. But there is a catch...

...the Fed cares more about the data than the plumbing, unless of the plumbing acts out and acute pressures on overnight rates spark more rate cuts as a means of intervention.

Under fiscal dominance, o/n markets will come under tremendous pressure, in our view, and the Fed knows that – that's why they stopped taper two months earlier than planned! If mini-QEs and a standing repo facility aren't in the cards later this year, more rate cuts are the only option the Fed will have left to manage pressures on the o/n rates complex.

Macro typically trumps the plumbing, but this time the plumbing may trump macro...

...and may hold the key to how many rate cuts we should expect.

As one astute market participant recently put it, there are two types of macro traders: "*those who follow trends and those who recognize when the Fed gets itself into a corner and has to pay – [by cutting interest rates] – to get out*". This may be one of those times.

As we noted in our [first edition](#) of the year, the Fed got itself in a corner:

"the Fed hiked a little too much and ignored the importance of effective funding rates like FX hedging costs and spreads to OIS and the shift from price insensitive to price sensitive foreign buyers as a key group of marginal buyers that fund the growing U.S. deficits."

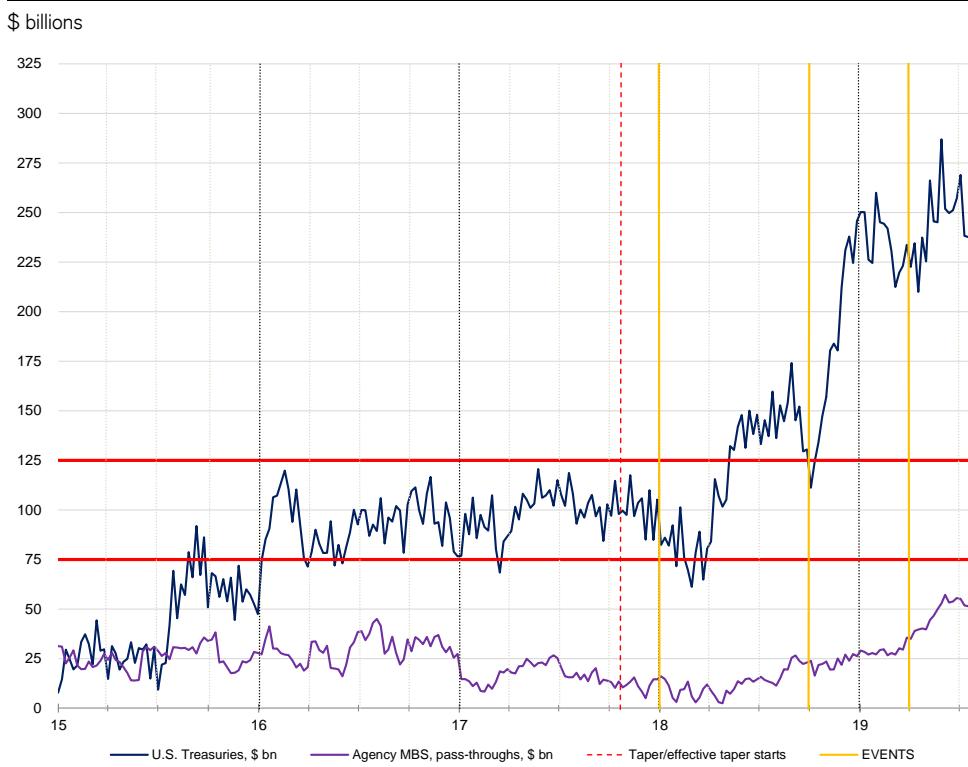
Whatever number of hikes were justified by the macro backdrop, those should have been adjusted due to the persistence and occasional flare-up of funding spreads under Basel III – after all, inversions are a product of both excessive hikes and money market spreads.

Now the opposite is true.

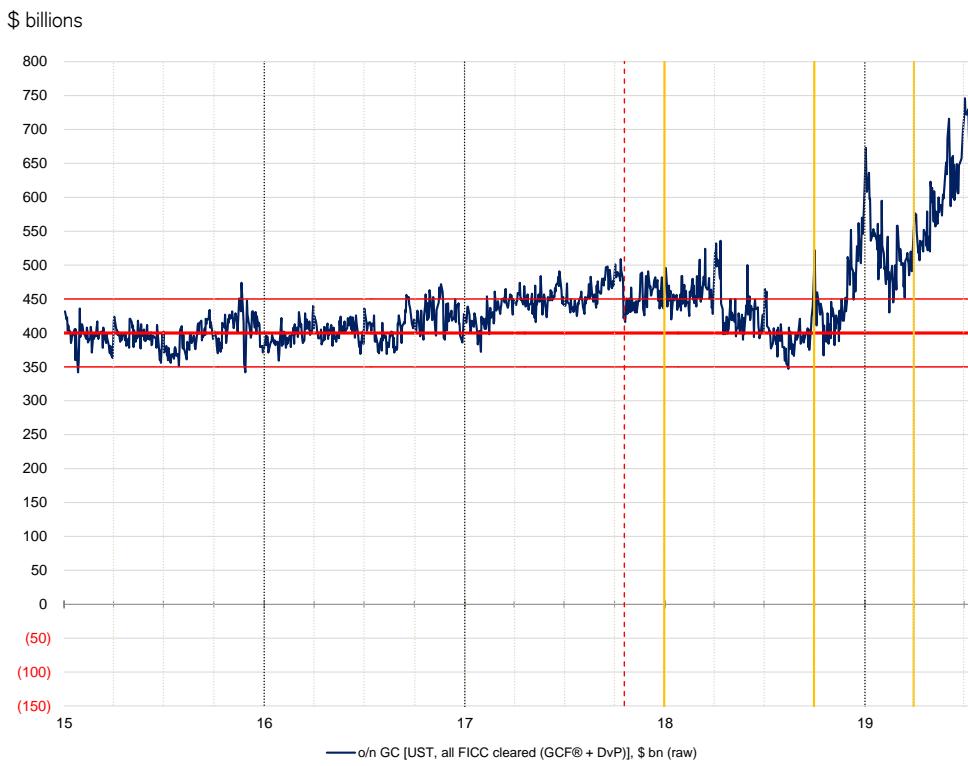
Whatever number of cuts are justified by the macro backdrop, those should be adjusted to take into account the curve inversion, dealer inventories and the pressures they are putting on the o/n rates complex, given a Fed that's operationally way behind the curve.

The Fed of course will never admit to over-hiking and inverting the curve...

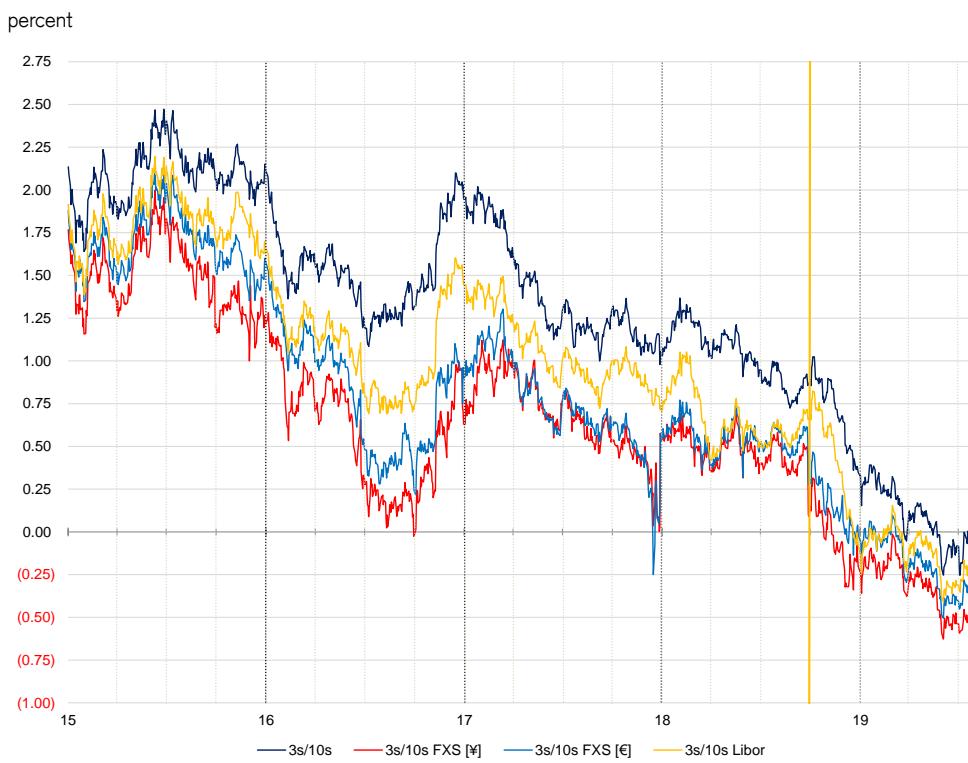
...they'll need a macro fig leaf for cuts: trade wars, the IP cycle, undershooting inflation – take a pick. But beware the acute need for additional cuts from a plumbing perspective, for it may make the Fed more dovish in a macro environment that is not all that bad...

Figure 1: Bloated Inventories

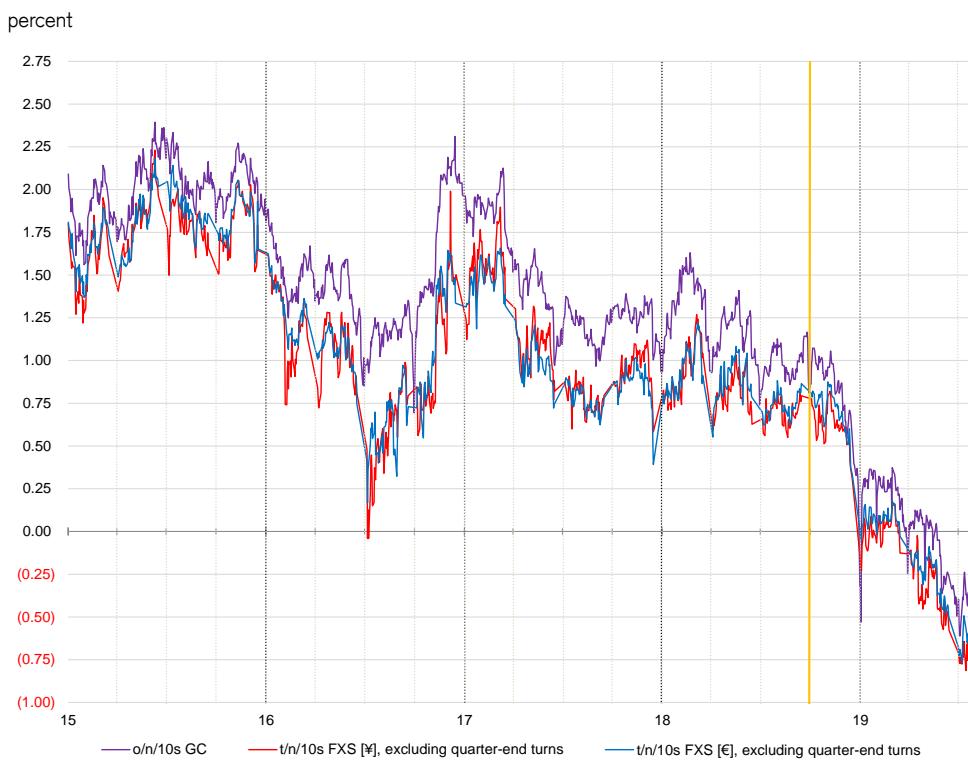
Source: Federal Reserve, Credit Suisse

Figure 2: Soaring Funding Needs

Source: Federal Reserve, Credit Suisse

Figure 3: Inversions Reimagined

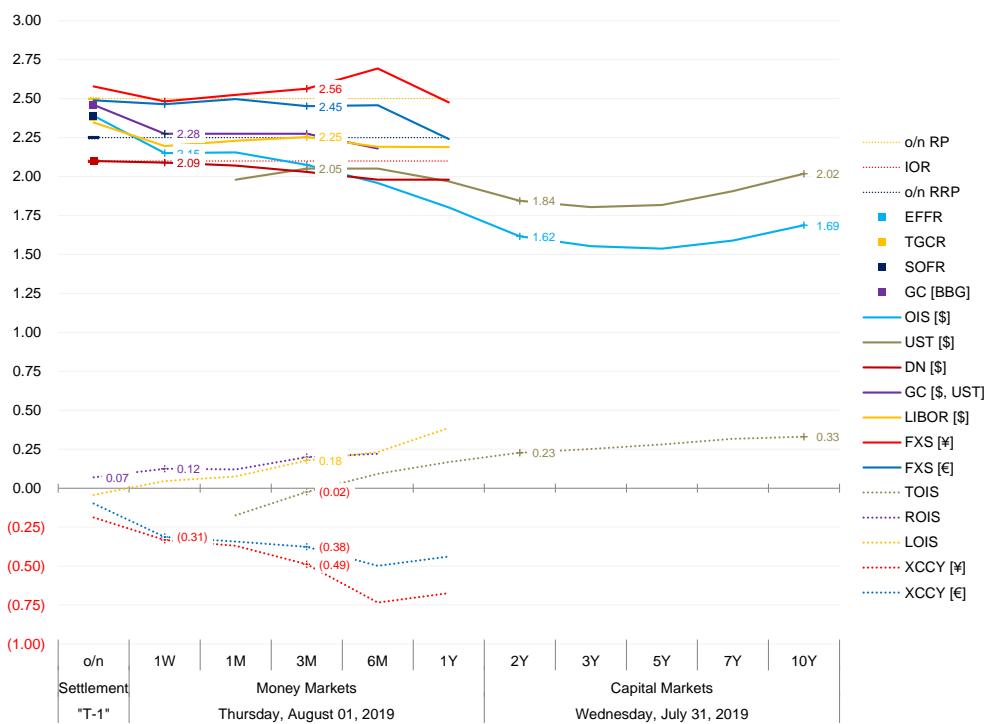
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 4: Inversion at the Ultra Front-End

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 5: “Carry Makes the World Go ‘Round” – But Not Now...

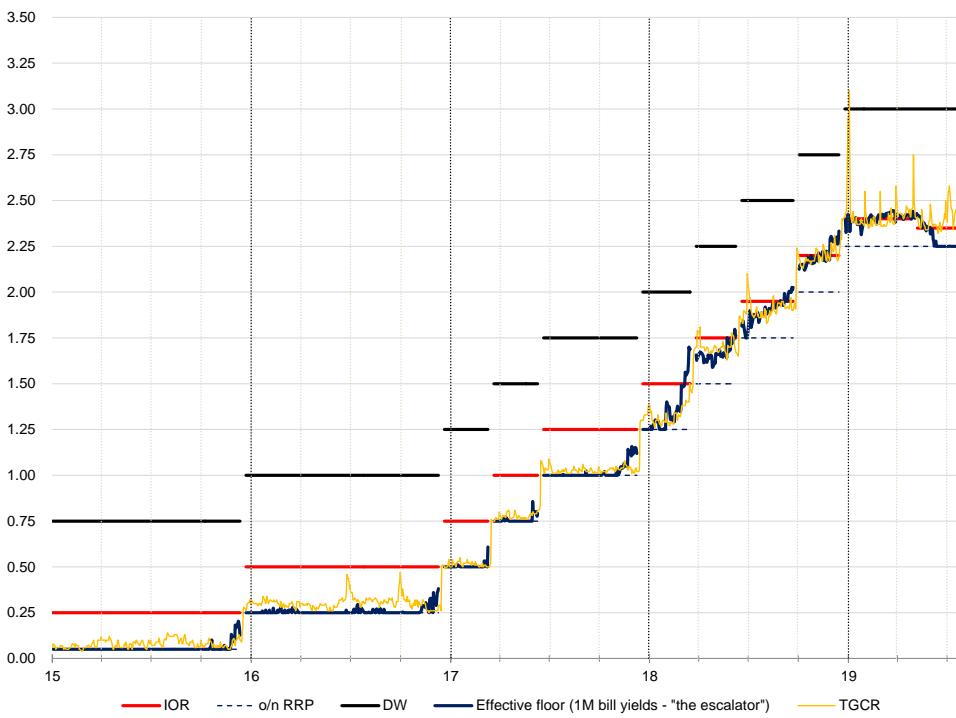
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 6: From a Leaky Floor to an Escalator

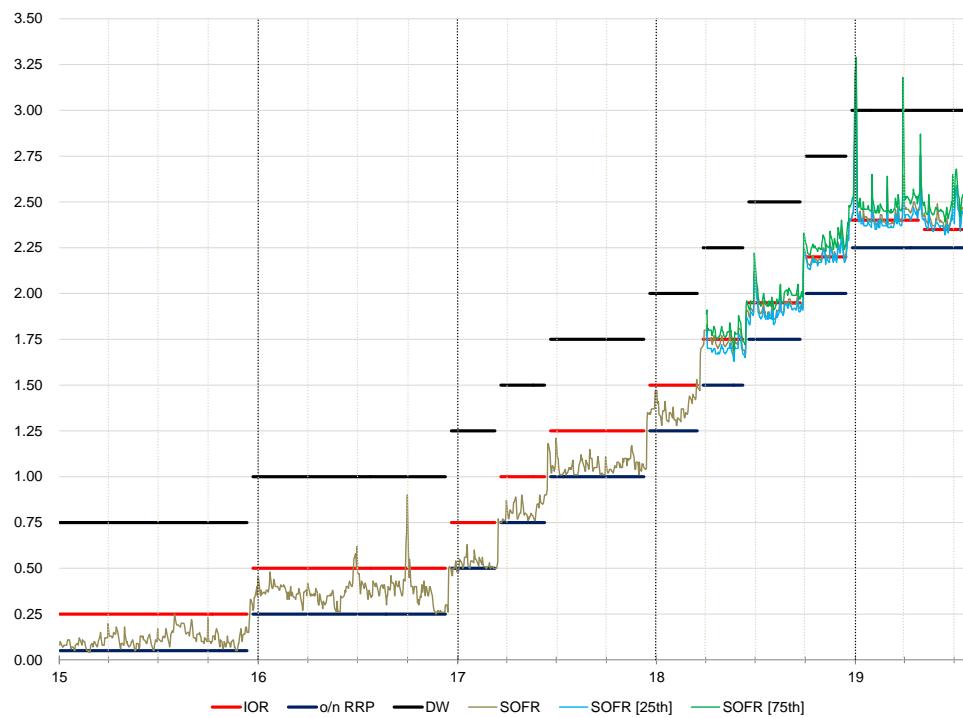
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 7: Piercing the Top of the Band – Where is the Limit?

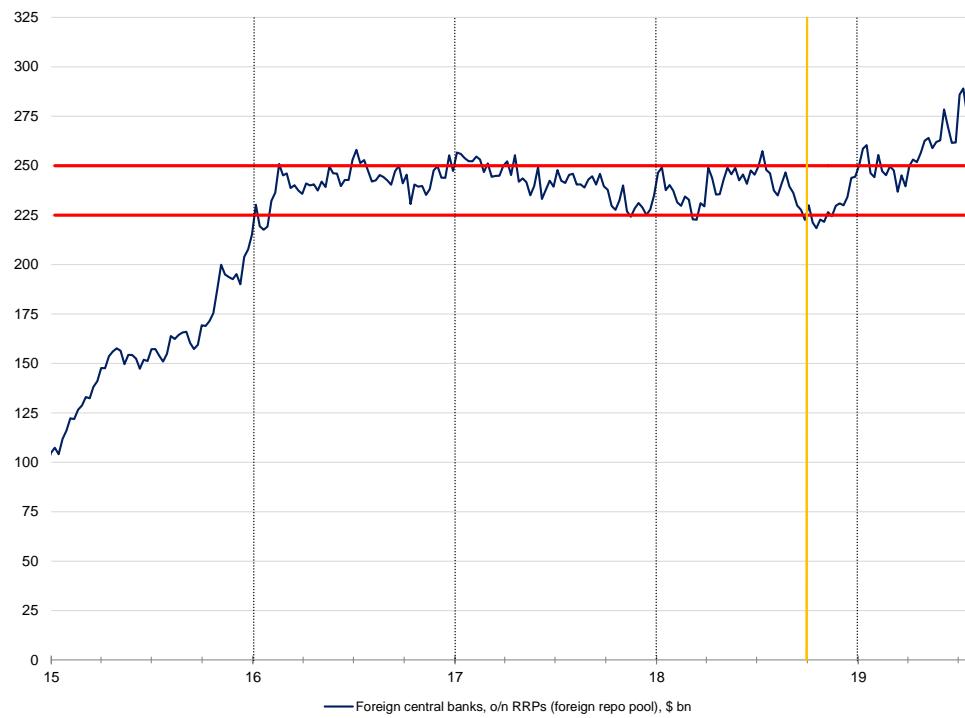
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 8: The Funds that aren't in the Bill Market – But Should Be...

\$ billions



Source: Federal Reserve, Credit Suisse

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Global Money Notes #24

Sagittarius A*

"Sagittarius A (pronounced "Sagittarius A-Star") is a bright and very compact astronomical radio source at the center of the Milky Way galaxy. It is likely the location of a supermassive black hole, similar to those generally accepted to be at the centers of most, if not all spiral and elliptical galaxies in the universe..."*

Wikipedia

The FOMC should forget about r^* for the moment and focus on Sagittarius A* – the supermassive black hole at the center of global dollar funding markets.

The black hole is the foreign RRP facility, which has seen close to \$100 billion of inflows since the beginning of the year. The driver of these inflows is the curve inversion, and the longer the inversion persists the more inflows will follow.

The trade war is also contributing to the inflows – given the inversion, as foreign central banks weaken their currencies they “buy” the foreign RRP facility and not Treasuries like in the past. Foreign central banks are rate shopping...

...and an uncapped foreign RRP facility is what enables that.

Like the matter that enters a black hole, the reserves that are sterilized by the foreign RRP facility are gone for good – like the reserves “shredded” via taper.

Even if the Fed stopped taper cold on August 1st, taper will effectively continue for as long as an uncapped foreign RRP facility attracts inflows – and given the inversion, we think inflows will continue and eclipse \$200 billion by year-end.

In English, that means that collateral supply between now and year-end will be \$1 trillion – \$800 billion from primary issuance and \$200 billion from sterilization.

We maintain our view that given the inversion, the solution to this supply problem should not be a technical fix through a standing repo facility or asset purchases – if the Fed opens up its balance sheet to collateral supply during an inversion, it will end up monetizing way more Treasuries than it may feel comfortable with.

Furthermore, adding reserves through a standing repo facility or asset purchases while having an uncapped foreign RRP facility sterilizing reserves would be odd.

The Fed overdid the hiking cycle and it priced Treasury supply out of the market – that’s what the FX-hedged yield of Treasuries relative to JGB yields tells us, and what inflows into a foreign RRP facility paying elevated o/n rates tells us.

For that fundamental problem, rate cuts, not technical fixes, are the solution...

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Recent inflows into the Fed's foreign RRP facility have come from official accounts other than Japan's Ministry of Finance (see Figure 1). Regular readers of Global Money Notes know that inflows from Japan's Ministry of Finance drove the growth of the facility in 2015, a period that corresponds to banks cleansing their balance sheets of non-operating deposits and concerns about a shortage of bills complicating the Fed's "maiden" interest rate hike.

Without an official explanation from the Fed, our interpretation of what happened to the usage of the foreign RRP facility in 2015 remains that the Fed, deeply concerned that it won't be able to enforce a floor underneath o/n interest rates as it tries to exit ZIRP, uncapped the facility to help banks shed balance sheet by luring foreign central banks away from banks and into the foreign RRP facility, and to help ease the bill shortage in money markets by luring foreign central banks out of bills and into the foreign RRP facility.

Public data on Japan's reserve holdings tend to suggest that Japan's Ministry of Finance responded the most to these incentives, as the "deposits with foreign central banks/BIS" component of its reserves surged a lot. By 2016 – the eve of the Fed's first rate hike – Japan's Ministry of Finance was the largest account holder of the foreign RRP facility, accounting for one half of the facility's usage and practically all of its inflows during 2015.

The inflows so far this year are a different story...

...for all the new money is coming from accounts other than Japan's Ministry of Finance and for reasons that are very different from those the market had to deal with in 2015.

The problems these days are not balance sheet constraints and a collateral shortage, but intraday liquidity constraints and a collateral surplus – that is, the safe asset glut.

Because inflows into the facility sterilize reserves and add collateral to the financial system, they worsen the collateral surplus. But don't blame the foreign central banks placing cash into the facility, for they do what a rational person would do when offered something that has value – take as much of the stuff as they can, while they can.

Foreign central banks are rate shopping...

...and front-end rate shopping shifts into higher gear during yield curve inversions.

In our previous edition, we explained why traditional measures of yield curve inversion, such as the spread between 10-year notes and three-month bills ("3s/10s") is irrelevant, and why inversions should be measured relative to carry traders' actual funding costs. We also showed that the current inversion is the most extreme relative to o/n repo rates, and that historically this is the first time that the curve inverted relative to o/n repo rates.

Now consider that...

...foreign central banks respond to yield curve inversions like most other investors would – sell long-term notes, buy short-term bills – and when given access to a facility that pays a market o/n GC repo rate and returns cash at 8:30 am in unlimited quantities, the response function becomes sell long-term notes, buy the foreign RRP facility, not bills.

Foreign central banks are rotating their FX reserves...

...and the worse the inversion gets the more dollars they'll put at the foreign RRP facility.

It gets even worse...

...as it used to be that when foreign central banks intervened to weaken their currency, they bought dollars which were invested in Treasuries. However, it appears that the recent EM currency weakness sparked by the PBoC's move to nudge the renminbi lower – following President Trump's recent tariff tweet – was orchestrated through interventions where dollars were not invested in solely in Treasuries but also the foreign RRP facility.

Foreign central banks are trying to keep the relative competitiveness of their currencies...

...and if the trade war worsens they may put more dollars in the foreign RRP facility.

Liberty Street, we have a problem.

An uncapped foreign RRP facility during a curve inversion is counterproductive...

...because inflows into the facility sterilize reserves and inject collateral into the system – on top of the \$800 billion that Treasury is scheduled to issue between now and year-end.

An uncapped foreign RRP facility during a curve inversion means...

...that foreign central banks have a preference to reverse in collateral from the Fed, as opposed buy collateral outright at auctions – that won't help primary dealer inventories.¹

An uncapped foreign RRP facility when banks are at their intraday liquidity limits means...

...that every penny that flows into the facility makes it harder for banks to fund dealers, whose inventories are growing partly due to the foreign RRP facility. Yes, this is circular...

...economists would refer to the above dynamics as pro-cyclical: more collateral supply, higher repo rates, more inflows into the foreign RRP facility, even more collateral supply.

Like Sagittarius-A*, an uncapped foreign RRP facility gorges on the matter – reserves – it sucks in, and the more reserves it sucks in, the worse the collateral supply will get; as we have stressed previously, now is not the time for an uncapped foreign RRP facility.

Yes, foreign central banks have "*preferences to maintain robust dollar liquidity buffers*" (see [here](#)), but those liquidity needs arise when local currencies need to be defended, not when local currencies are proactively being weakened by foreign central banks.

Like it has done with banks, the Fed should politely suggest to foreign central banks to see what share of the balance they keep in the facility is there for genuine liquidity needs – we have a strong suspicion that it is significantly less than the total usage of the facility.

We have heard two arguments as to why the Fed won't cap the foreign RRP facility or change the pricing of it. These were:

- (1) other central banks don't cap their equivalent facilities either;
- (2) equivalent facilities also pay rates better than local bill yields;

Indeed, Figure 2 shows that the deposit facilities for foreign central banks have been rising elsewhere as well, so we see why the optics of the Fed capping the facility would be bad.

That said, the Fed's facility paying a rate better than local bill yields is logically indefensible, even if the Bank of Japan and the European Central Bank do the same. Here is why...

Given a global financial system that's short dollars – the negative cross-currency basis – the question is always where to get the marginal dollars to "feed" the system's demand.

STIR traders remember well that a persistent problem in recent years has been that those with dollars to lend couldn't always lend dollars in the FX swap market as bill shortages in Japan and Europe meant deeply negative reinvestment yields, which have weighed heavily on the spread over U.S. Treasury bills one could earn on the dollar leg of the transaction.²

¹ We care about inventories because the funding needs associated with these inventories are driving the rotation in bank HQLA portfolios away from reserves into repos. That rotation has a limit beyond which funding stresses emerge.

² In an FX swap transaction, the lender of dollars receives yen or euro as collateral. The FX swap trade has two parts: the dollar lending leg and the collateral reinvestment leg. The sum of the two has to be better than Treasury bill yields.

To encourage the lending of more dollars in the FX swap market, the BoJ and the ECB have been working hard to make bills more available in their respective financial systems, and uncapped deposit facilities for foreign central banks paying better than local bill yields were a key part of that strategy – as foreign central banks gradually rotated out of bills and into these facilities, the pressure on local bill yields abated, FX swap implied yields for the lenders of dollars improved and dollars flowed easier across the financial system.

But the Fed should not be doing the same thing...

...for if it does, it's causing dollar funding markets' equivalent of the "paradox of thrift".

The simple idea behind the paradox of thrift is that everyone can't save at the same time, for reasons well understood. In the case of central banks' facilities for other central banks, the idea is that every central bank cannot pull funds away from local collateral markets at the same time. If the global financial system's problem is a shortage of U.S. dollars, it makes sense for foreign central banks to pull funds away from their local bill markets to help improve the reinvestment returns of dollar lenders and hence ease the flow of dollars, but it makes no sense for the Fed to do the same – if it does, it hurts the flow of dollars.

Here is how...

If the Fed offers a rate above Treasury bill yields on an uncapped the foreign RRP facility, it will attract inflows. Inflows sterilize reserves and increase collateral supply on the margin – instead of buying Treasury bills at auctions, the facility incentivizes foreign central banks to deposit cash at the Fed. These dynamics put an upward pressure on local bill yields, and higher local bill yields reduce the allure lending dollars in the FX swap market – the flow of dollars suffers and the Fed is pushing against the efforts of other central banks.³

If the Fed doesn't change the pricing of the foreign RRP facility, we have a problem.

In our [previous edition](#), we highlighted the risks of severe funding market pressures as the Treasury goes ahead with the issuance of \$800 billion Treasuries into a curve inversion.

We have also noted that the U.S., as a net borrower and current account deficit country, has a funding problem on the margin, as after taking hedging costs into account, Treasuries aren't attractive for foreign private accounts on a global relative value basis.

We have shown above that these problems extend to foreign official accounts as well – given the curve inversion and an uncapped foreign RRP facility, foreign central banks are incentivized to reverse Treasuries in from the Fed and not to buy them outright at auctions.

With foreign investors – both official and private – not incentivized to buy U.S. Treasuries on the margin, given collateral supply between now and year-end, dealer inventories will continue to grow over the coming months, and this ongoing inventory accumulation will stress banks' ability to fund dealers in the o/n GC repo market (see Figures 3 and 4).

J.P. Morgan can no longer serve as the system's lender of next-to-last resort...

...which should be of concern as well. As the most liquid G-SIB of the banking system, J.P. Morgan used to underwrite past waves of bill supply and it used to lend into past quarter-end and year-end turns. But it spent all its excess cash on buying Treasuries and funding primary dealers inventories, as have all other major G-SIBs (see Figures 5 and 6).

³ Another way of looking at the distortions caused by the foreign RRP facility is that it reduces the incentives of foreign central banks to lend in the FX swap market directly. Instead of lending their dollars in the FX swap market and thereby helping the flow of dollars globally, foreign central banks put their reserves at the Fed and so withdraw dollars from circulation. In other words, inflows to the foreign RRP facility sterilize dollars and hurt global dollar liquidity.

Who will absorb the wave of issuance between now and year-end?

If our previous edition made you worried about funding markets, our current edition should add to your list of worries for we just identified another source of collateral supply – the foreign RRP facility – which can potentially add \$100 to \$200 billion of supply on top of the \$800 billion that's coming from primary issuance. The picture isn't pretty...

...and the longer the foreign RRP facility stays uncapped, the uglier things can get.

The funding pressures we are forecasting include o/n GC repo rates drifting outside the Fed's target band, pulling the o/n fed funds target rate with it by early October. These pressures will bleed through to implied yields in front-end FX forwards and as these pressures persist they will bleed through to term cross-currency bases and Libor-OIS.

But on October 1st the market will also start to price for the year-end calendar turn, and these turns routinely push foreign investors FX hedging cost at least 50 bps higher – and when that happens the inversion relative to hedging costs will deepen (see Figure 7), dealer inventories will worsen and the associated funding pressures will push o/n rates further outside the Fed's target band as we've described in detail [here](#), [here](#) and [here](#).

More and more market participants assume that the solution to the "collateral tsunami" is a technical response from the Fed – either a standing repo facility or asset purchases.

We would argue that the worse the inversion gets, the more careful the Fed should be about opening up its balance sheet through these measures – if the Fed commits to reversing in collateral through a standing repo facility or buying Treasuries outright during an inversion, it may end up monetizing more collateral than it feels comfortable with – and monetizing record deficits is likely not what this FOMC wants to be remembered for.

Inflows into the foreign RRP facility are a case in point.

Just as an inversion is forcing foreign central banks to latch on to the Fed for collateral, an inversion would force primary dealers and banks to latch on to the Fed for reserves, as weak demand for Treasuries from ultimate investors drives growing dealer inventories.

The optics of what we just described are odd...

...as they imply the conflicted existence of two uncapped facilities: a foreign RRP facility that sterilizes reserves and adds to collateral supply and a standing repo facility or an asset purchase facility built to add reserves and absorb collateral. That makes no sense...

...it has to be one or the other.

If the standing o/n repo facility or an asset purchase facility (or "mini-QEs") are the future, an uncapped foreign RRP facility must be the past.

Whether the Fed provides a technical fix with or without an uncapped foreign RRP facility, we don't think a technical fix is the right solution for the problems caused by the inversion.

All this brings us back to the rationale for more rate cuts – a series of rate cuts (see [here](#)).

Figure 8 shows the slope of the core G7 curves as measured by 3s/10s spreads – the Japanese, French and German curves are flat, but the Treasury curve is inverted. Figure 9 shows the global relative value landscape from the Japanese perspective – relative to hedging costs, the Treasury curve is deeply inverted and French and German curves are "only" moderately inverted. Relative to either Treasuries, OATs or bunds, JGBs are now the global high yield option – when curves invert, flat is the new steep.

That puts the Fed's target range for o/n rates into an uncomfortable perspective...

It cannot be that the country that has to issue the most has the least attractive curve, and it cannot be that a country that runs twin deficits doesn't have foreign portfolio investors – private or official – as marginal buyers of its rapidly growing stock of government debt.

It appears that the Fed, by hiking too much, priced the coming wave of Treasury supply out of the market – that's what the FX-hedged yield of Treasuries relative to JGBs tell us, and what inflows into an uncapped foreign RRP facility paying eye-popping rates tells us.

Figure 10 does not suggest that the Fed is pricing the front-end correctly, does it?

It follows that if the Fed priced supply out of the market, it should be extra careful with quantitative fixes to the collateral supply problem and should consider rate cuts instead...

...rate cuts that are aggressive enough to re-steepen the curve so that dealer inventories can clear – cuts deep enough to incent real-money investors to lend long, not short and foreign investors to buy Treasuries on an FX hedged basis on scale again (see [here](#)).

The rates market feels fragile...

...for collateral supply has been and will be absorbed by primary dealers on the margin, and dealers have been and will be funded o/n by a handful of large banks on the margin.

In English, that means that the Treasury is funding the federal deficits o/n on the margin.

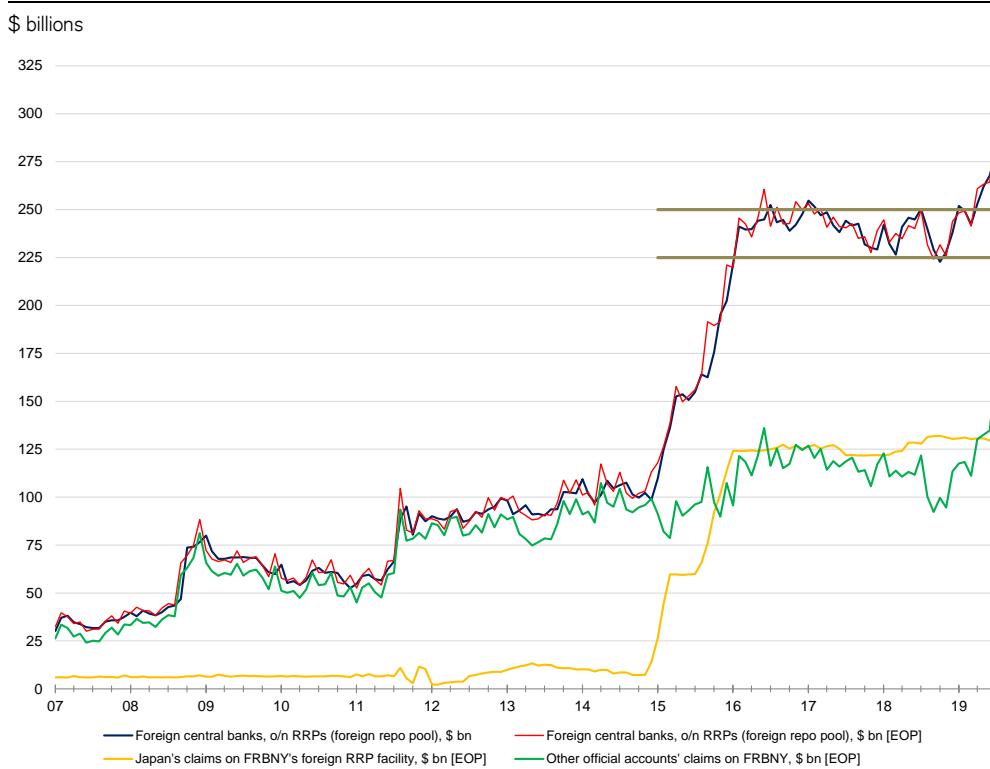
How the Fed will respond to these problems is uncertain.

Technical measures from the Fed will likely lead to a large monetization of Treasuries – which, depending on your perspective, will be an "MMT" dream or nightmare come true.

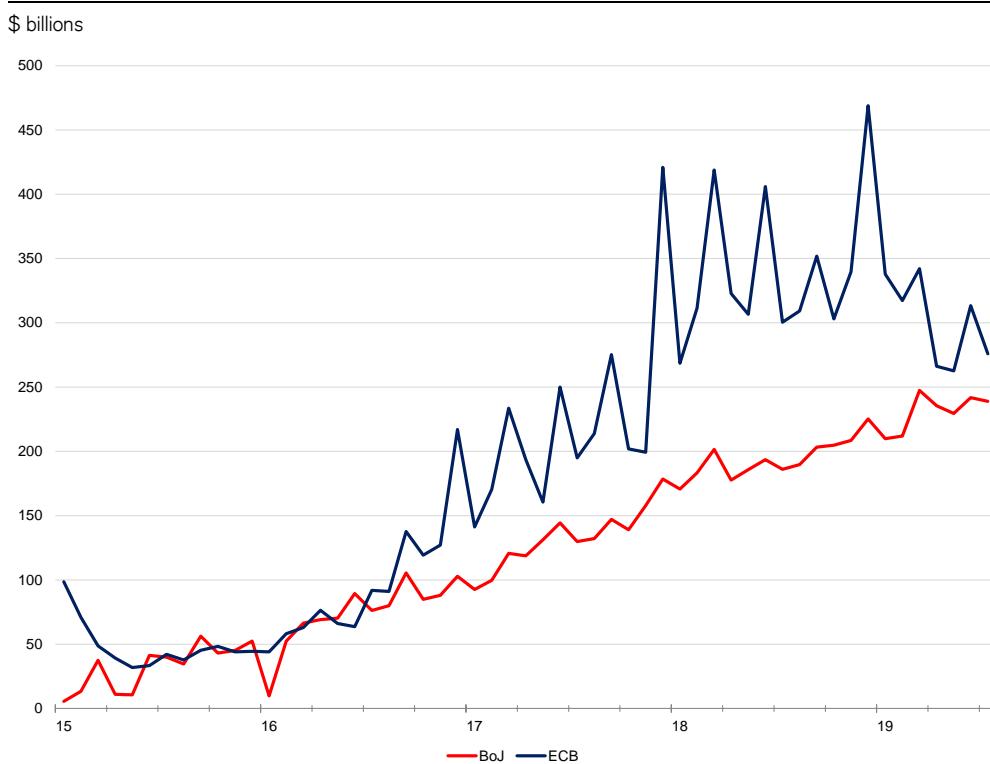
Fundamental measures like rate cuts are what we need, in our view, but whether the Fed will deliver them is far from certain. Maybe we'll get a little bit of this and a little bit of that.

But one thing is for sure...

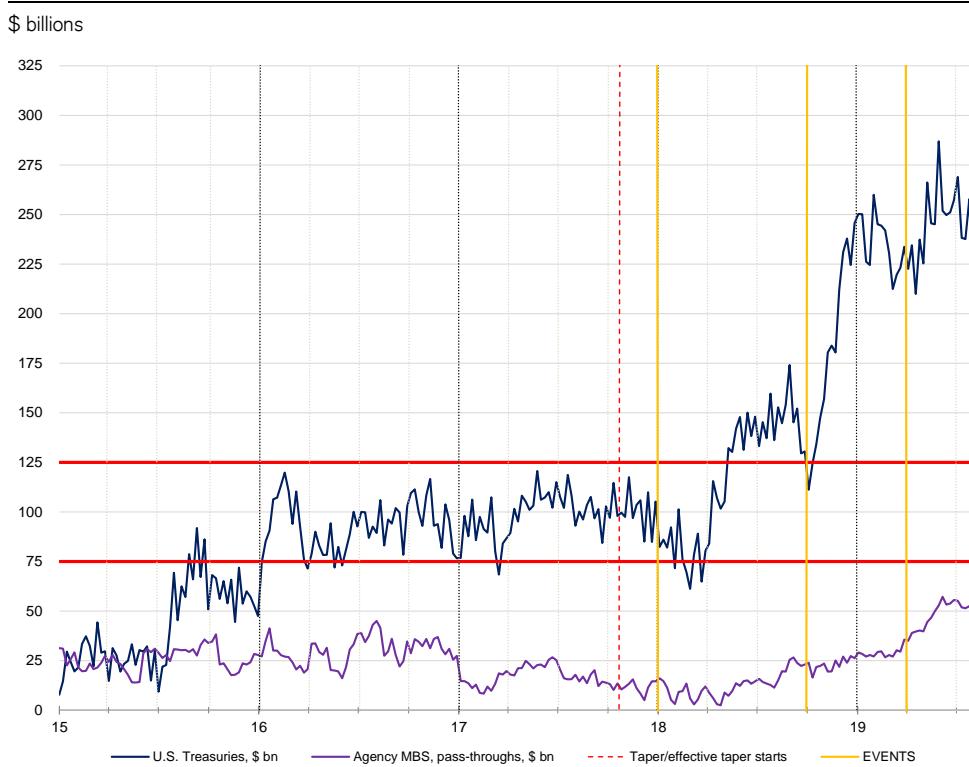
...this weekend's Jackson Hole meeting will likely be the most significant in a decade, with Chair Powell's speech potentially as important as [that](#) speech by Chair Bernanke.

Figure 1: Sagittarius-A*

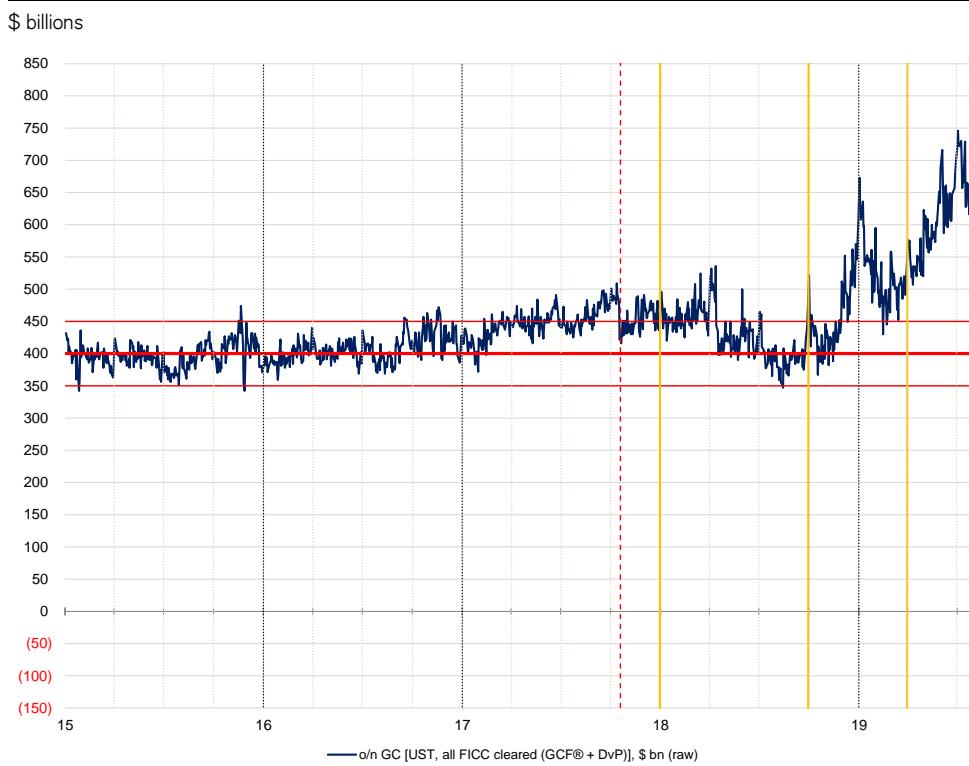
Source: Federal Reserve, Ministry of Finance, Credit Suisse

Figure 2: Foreign Central Banks' Deposits at the ECB and the BoJ

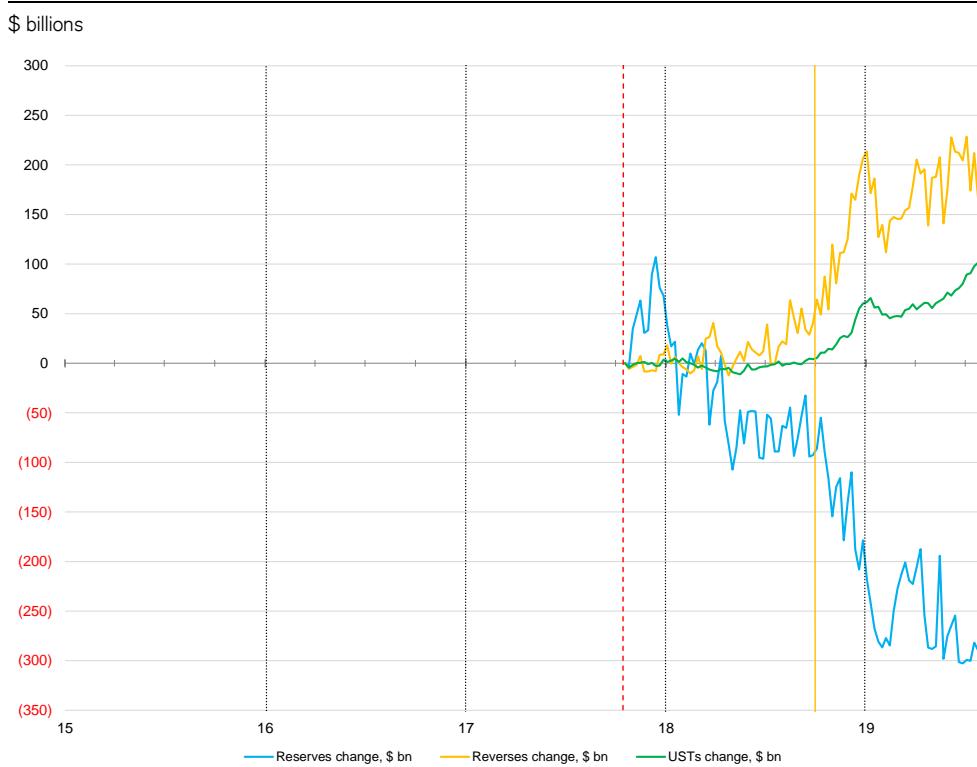
Source: European Central Bank, Bank of Japan, Credit Suisse

Figure 3: Dealer Inventories are Rising

Source: Federal Reserve, Credit Suisse

Figure 4: Dealer Funding Needs are Rising

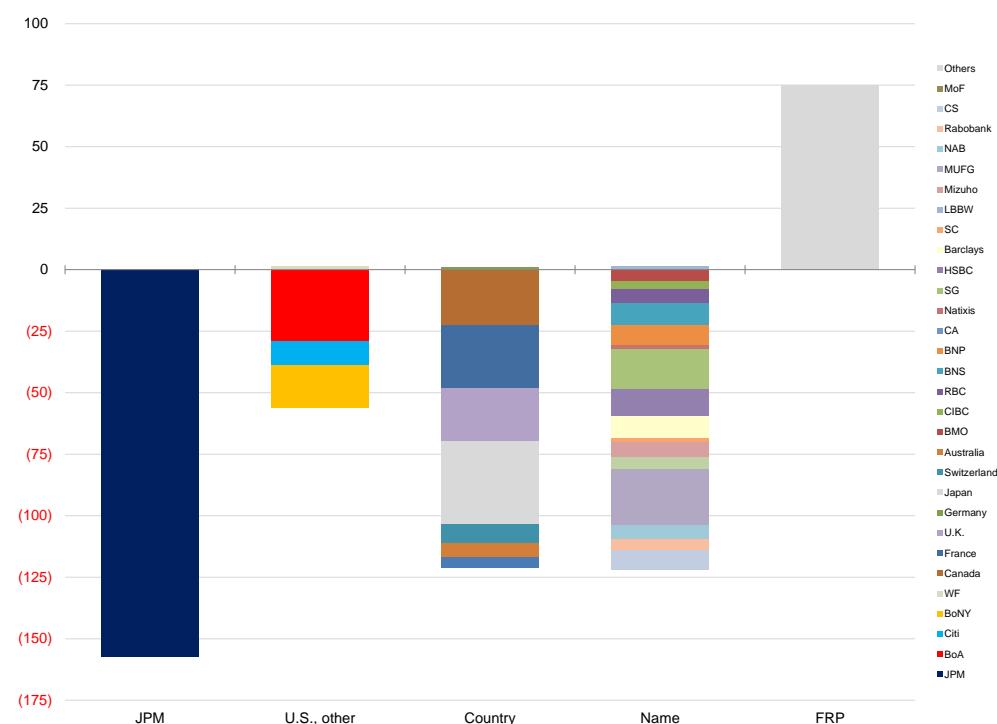
Source: Federal Reserve, Credit Suisse

Figure 5: Bank HQLA Portfolios are Funding Dealers

Source: Federal Reserve, Credit Suisse

Figure 6: Lender of Next-to-Last Resort No More

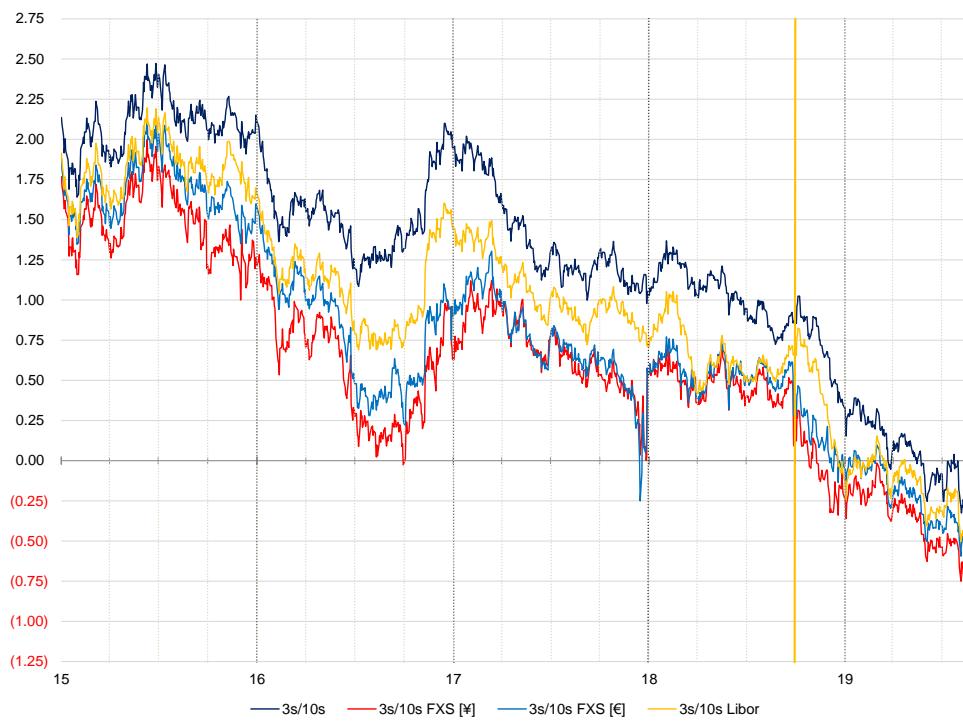
change in reserve/foreign RRP (FRP) balances between 2018Q2 and 2019Q2, \$ billions



Source: Call reports, Federal Reserve, Credit Suisse

Figure 7: The Inversion Will Get Worse on October 1st

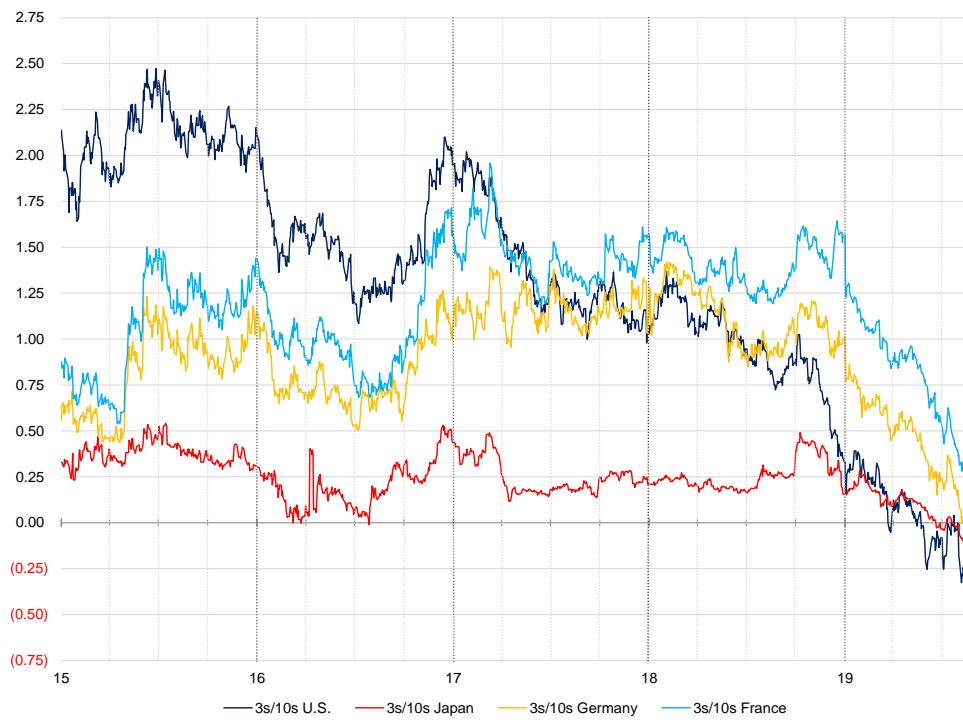
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 8: Flat is the New Steep

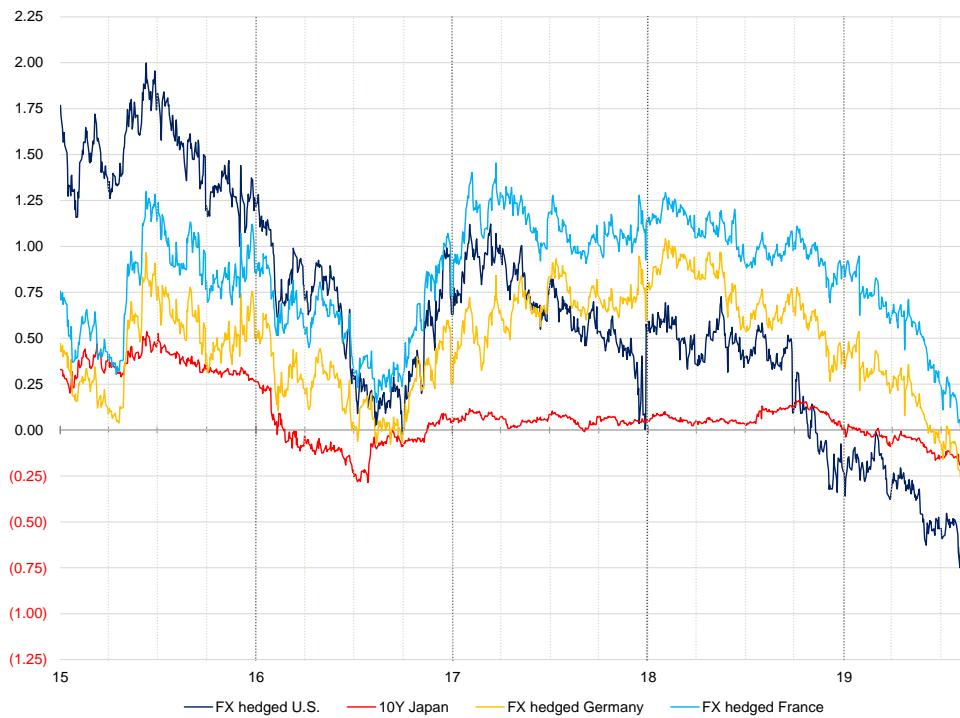
percent



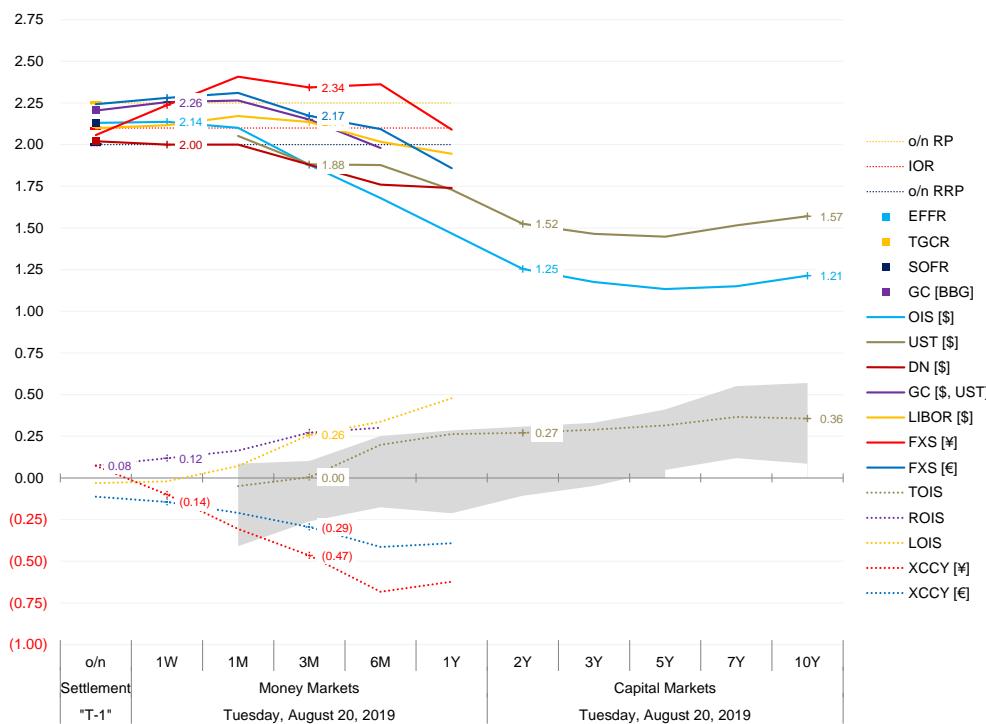
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 9: Priced Out

10-year sovereign debt hedged back to yen on a rolling three-month basis, percent

**Figure 10: We Need a Fundamental Fix, Not Technical Solutions**

percent



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9 September 2019
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Credit Suisse Economics

Global Money Notes #25

Design Options for an o/n Repo Facility

While we don't think the Fed will launch a standing repo facility anytime soon, in this edition of Global Money Notes we explain the optimal design features of such a facility. Our target audience is central bankers and STIR traders, but macro and bank equity investors are encouraged to read our report as well.

The fundamental problem the Fed will soon have to reckon with is that it has an operating framework where the target range for the o/n rates complex is policed only at the bottom – with an o/n reverse repo facility – but not at the top.

The solution to that problem should be an o/n repo facility priced 25 bps above the o/n reverse repo rate that's open without stigma to large global banks, with the explicit aim to make collateral and reserves equal – the “equalizer” bazooka.

Such a bazooka would have a “*Draghi-esque*” quality to it...

...for it would have a major market impact without the market actually using it.

That's because the facility would work through freeing up precautionary reserves that banks currently hold for intraday liquidity purposes, mostly because the monetization of bonds is uncertain during a crisis. But if a standing repo facility makes monetization easy and guaranteed, precautionary reserves aren't needed: banks could sell their reserves and wouldn't tap the Fed unless there is a crisis.

The facility would offer the best of both worlds...

...easier funding conditions without an expansion of the Fed's balance sheet.

If such a facility is in the making, the trade is to receive cross-currency bases; the looming funding market stresses we recently warned about [here](#) and [here](#) would cease to be a concern, and the Fed wouldn't have to take into account front-end technicals when setting rates – the Fed could focus purely on macro.

But an equalizer bazooka may not be ready anytime soon, if ever.

Nevermind the time required to design, test and communicate such a facility: the green-light for it isn't a New York Fed decision but a supervisory decision, and Vice Chair Quarles seems to [prefer](#) reserves in HQLA portfolios, not bonds.

We don't think the market appreciates that piece of the puzzle...

...and absent an equalizer bazooka, we're back to the [need for more rate cuts](#) as other designs would risk monetizing too many Treasuries during an inversion.

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Designing a standing repo facility is fiendishly complicated...

...and that's one reason why the Fed still does not have a standing repo facility in place.

Designing a facility takes time because the institutional details of the o/n repo market are complex and navigating these complexities slows down the design process. Some of these institutional details include the hierarchy of lenders, borrowers and intermediaries, and the changing set of constraints that bind intermediaries. Then there is the question of why we need a facility in the first place – to address balance sheet or liquidity constraints, or for something as basic as policing the top of the Fed's target range for o/n rates?

Our current edition has four parts.

Part one starts with a detailed discussion of the institutional setup of the o/n repo market, and how matched repo books balance imbalances across various repo market segments.

Part two explains how the repo market deals with imbalances involving excess reserves and excess collateral and how banks and ultimately the Fed absorb these imbalances.

Part three discusses two pricing and three design options for a standing repo facility, and why a repo facility designed for banks to equalize collateral and reserves would work best.

Finally, part four concludes with a discussion of the likely market impact of such a facility and why asset purchases should be considered a complement to it, not a rival alternative.

Part I – Hierarchy at the Core

The map below shows collateral providers on the left, cash lenders on the right and dealers in the middle – in line with how most market participants think about the o/n repo market.

But we also show additional details – details that emphasize the repo market's hierarchy.

First, that both collateral providers and cash lenders fall into two categories: those that are members of the Fixed Income Clearing Corporation (FICC) and those that aren't members.

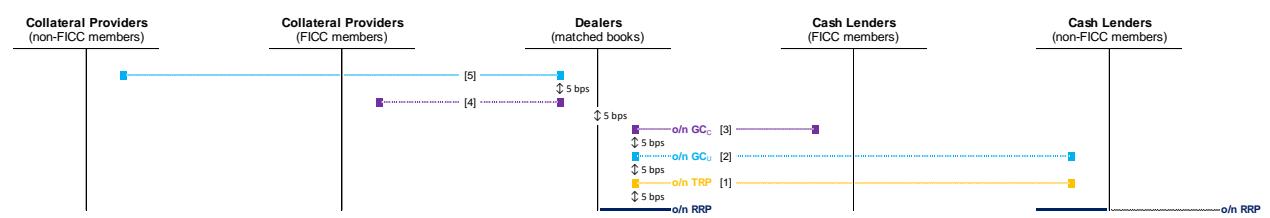
Second, that the repo market isn't really one market with one rate that clears the market, but a collection of several market segments matched up through dealer balance sheets, where each segment trades at a different rate, the rates are subject to a strict hierarchy, and the rate at which you lend or borrow depends on your place in the system's hierarchy.

Let's start our discussion of the hierarchy with cash lenders on the right hand side.

Cash lenders that are not FICC members include money market funds and hedge funds.

Money funds have access to the Fed's **o/n reverse repo facility** (the thick dark blue line), which sets the floor underneath all private repo rates – no money market fund will lend and no repo dealer will borrow at rates below the rate offered by the o/n reverse repo facility.

Hierarchy at the Core



Source: Credit Suisse

Money funds also lend to repo dealers at a spread over the Fed's o/n RRP rate at the **o/n tri-party repo rate** (the thin orange line marked [1]). Let's assume that this spread – as all other spreads that we'll discuss later – is usually 5 bps. The o/n tri-party repo rate is always the lowest of all private repo rates because money funds are long-only accounts that are captive lenders in the repo market who don't trade much, which means that there is no point in dealers paying up for their cash in hopes of winning more trading business.

Hedge funds are a different matter. Hedge funds lend to repo dealers at a spread over the o/n tri-party repo rate at the **o/n GC repo rate** (the thin light blue line marked [2]). The o/n GC repo rate is always higher than the o/n tri-party repo rate and that's because hedge funds are more profitable accounts to cover than money funds – they leverage up, go long and short and trade frequently – and one way for dealers to win more business from hedge funds is to pay them a better rate on their cash than they pay to money funds.

Let's next turn to cash lenders that are FICC members.

There are many types of FICC members including primary and non-primary dealers, commercial banks, the New York branches of foreign banks, some of the GSEs, custodian banks and trust banks. We'll discuss dealers and banks later in our analysis and for now we'll focus on the GSEs with FICC access – Fannie Mae and Freddie Mac – and custodian and trust banks that lend cash on behalf of clients via omnibus accounts.¹

These accounts lend at a spread over the o/n GC repo rate at the **cleared o/n GC rate** (the thin purple line marked [3]). The cleared o/n GC rate is higher than the o/n GC rate because if a dealer finds another FICC member it can lend to, that transaction is nettable – which means that it does not use balance sheet. The netting benefits thus make dealers pay up for cash they borrow through cleared repos and, on the flipside, cash lenders benefit from getting an o/n rate that's better than the rates in the other market segments.

The hierarchy of o/n repo rates from the perspective of cash lenders thus looks like this:

- (1) o/n reverse repos (RRPs) with the Fed pay the least
- (2) **o/n tri-party repos** pay a spread over o/n RRPs
- (3) **o/n GC repos that aren't cleared** with FICC pay a spread over o/n tri-party repos
- (4) **o/n GC repos that are cleared** with FICC pay a spread over uncleared GC repos

Money market funds typically lend at the first two rates, hedge funds on the third rate and FICC members – Fannie and Freddie and custodian and trust banks on behalf of clients – lend at the fourth rate, with access to progressively better o/n rates governed by each account's wallet share and potential for netting from the perspective of repo dealers.

The Federal Home Loan Banks (FHLBs) are a special case as they are the only GSEs without FICC access, which constrains them to lending either at the **o/n tri-party rate** or the **uncleared o/n GC rate** where the choice between the two usually comes down to the operational risk appetite and trading background of a particular FHLB's cash manager.

Let's next turn to collateral providers on the left side of the above map.

Collateral providers, like cash lenders, also fall into two categories: FICC members and non-FICC members. Collateral providers that are FICC members include the same custodians and trust banks like before, but here as borrowers of cash on behalf of clients – clients which are different from the ones whose cash they've lent in the prior example.

¹ An omnibus account is an account in which the transactions of two or more accounts are combined and carried in the name of the originating broker – in this case custodian banks and trust banks – rather than designated separately.

In addition to custodians and trust banks, foreign banks like the Norinchukin Bank are some of the biggest collateral providers in FICC. Figure 1 shows the balance sheet of Norinchukin at various points in time and the dominance of repo on its funding side – the shrinking of Norinchukin's balance sheet over time has to do with the [curve inversion](#) and the erosion of the attractiveness of U.S. Treasuries on a global relative value basis.

FICC members borrow cash at the bid side of the cleared o/n GC repo market at the [cleared o/n GC rate](#) (the purple line marked [4]). The bid side of the cleared GC market trades at a spread over the offered side of the market – where FICC members lend cash – and this spread is there to compensate dealers for taking on liquidity risks that stem from lining up lenders and borrowers of cash – that is, being a market maker – during the day.

Collateral providers that are not FICC members include mostly hedge funds which borrow at a spread over the bid side of the cleared o/n GC rate at the [uncleared o/n GC rate](#) (the thin blue line marked [5]). Like before, how wide a spread a hedge fund has to pay comes down to its wallet share at a given dealer – big fish pay less, small fish pay more – and whether it has offsetting trades with the same dealer which make the trades nettable.

The hierarchy of repo rates from the perspective of [collateral providers](#) thus looks like this:

- (1) [o/n GC repos](#) that are cleared with FICC cost the least
- (2) [o/n GC repos](#) that aren't cleared cost a spread over cleared o/n GC repos

FICC members – mostly custodians and trust banks on behalf of institutional clients – borrow at the first rate and hedge funds – small and large – borrow at the second rate, with access to progressively lower rates and at best zero spread to cleared rates governed by each account's wallet share and potential for netting from the perspective of dealers.

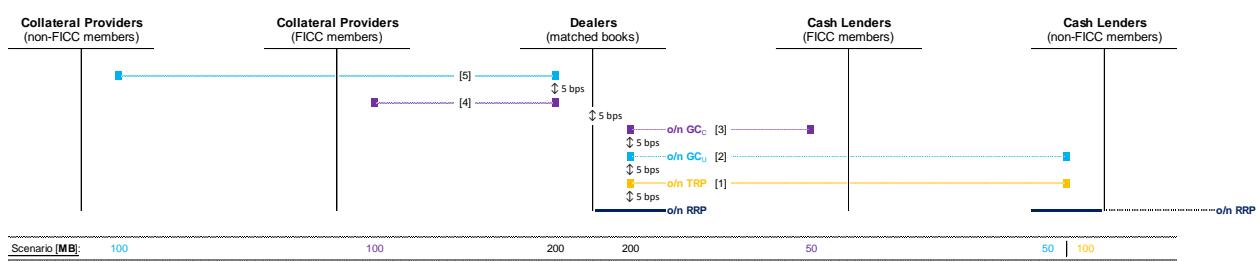
We now know the major categories of cash lenders and cash borrowers in the repo market, which particular repo rates they have access to, and the business reasons that maintain a [strict](#) hierarchy between these repo rates. We next turn to an analysis of the dealers that sit between cash lenders and cash borrowers and whose balance sheets clear the market.

There are two particular talking points around dealers:

- (1) How dealers clear the repo market through matched repo books.
- (2) How different dealers specialize in different repo market segments.

The bottom of the map below shows a concrete numerical example of how matched books typically clear the repo market – all other details of the map are the same as previously. Thus, going from left to right, imagine that hedge funds need \$100 billion of funding and FICC members need another \$100 billion, and, on the other side, FICC members lend \$50 billion, hedge funds lend another \$50 billion and money funds lend \$100 billion; the repo dealers in the middle borrow and lend \$200 billion and run a matched repo book.

How Matched Books Balance Imbalances



Source: Credit Suisse

Importantly, dealers' matched books balance the imbalances in various market segments: for example, the repo market between hedge funds is imbalanced as is the FICC market, as in both instances borrowers seek \$100 billion, but lenders only have \$50 billion to lend.

Dealers bridge these imbalances by tapping money funds for the missing \$100 billion, \$50 billion of which balances the imbalance in the hedge fund segment of the market, and the other \$50 billion balances the imbalance in the FICC segment of the market.

Before turning to a discussion of the specialization that takes place among repo dealers, we need to discuss two other markets that exist on the extreme ends of matched books.

These are the **repo market for specials** and **the FX swap market** shown on the map below.

Rates in the repo market for specials trade at a spread below the o/n RRP rate and hence the o/n tri-party and GC repo rates because in the specials market cash lenders' aim is to secure specific pieces of securities, for which they are willing to give up yield.

Implied rates in the FX swap market – which is a natural extension of the repo market – trade at a spread over the uncleared o/n GC repo rate because in the FX swap market dealers lend dollars versus other currencies which they invest in foreign collateral markets.

Whereas in the repo market involving matched books spreads between market segments are generally around 5 bps, repo rates in the specials market can trade deeply below the o/n RRP rate, and implied yields in the FX swap market can trade sharply above the uncleared o/n GC rate. For example, implied yields in tomorrow-next swaps of dollars for yen or euros can trade 50 bps over the o/n GC rate and at times hundreds of bps over!

In other words, dealers can earn the biggest spreads between specials and FX swaps, but in the world of matched repo books spreads usually don't trade wider than 20 bps – which is the best spread a dealer can get if it borrows at the tri-party rate and lends at the uncleared GC rate assuming that all market segments in-between trade 5 bps apart.

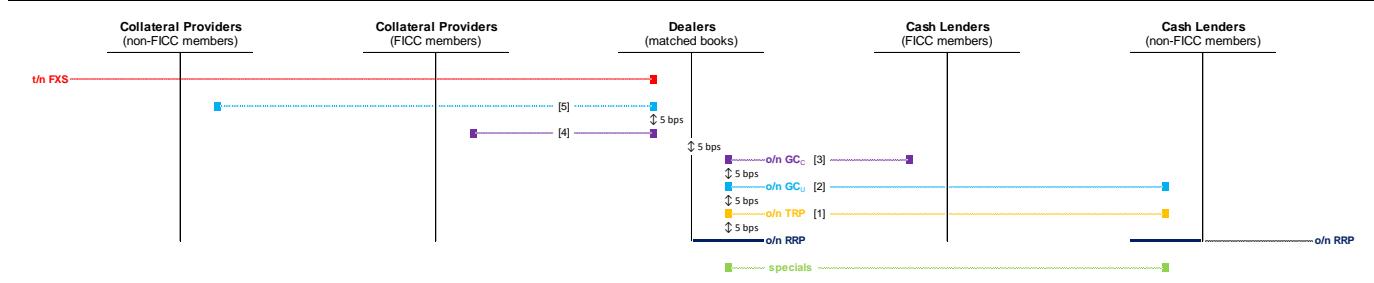
We are now ready to discuss how and why dealers specialize in various market segments.

U.S. primary dealers bound by high leverage ratios (SLR) and daily balance sheet reporting specialize in high margin **specials-to-FX swap** trades and in nettable trades that don't use balance sheet like **FICC-to-FICC** cleared o/n GC trades. Dealers with low leverage ratios and quarter-end balance sheet reporting like French dealers specialize in low margin trades where they borrow at the **o/n tri-party repo rate** and lend at either o/n GC rate.

Finally, dealers that do not have to comply with Basel III – so called **non-primary** dealers – specialize in **cleared-to-uncleared** GC trades, as they don't have access to tri-party repos which is the domain of large and diverse primary dealers, not small non-primary dealers.

Figure 2 shows these and other groups of **primary dealers** according to their specialization, and the Appendix describes how **sponsored repo** is changing the hierarchy on the margin.

The Extreme Ends of Matched Books



Source: Credit Suisse

Part II – Imbalances and Backstops

In the previous section, we discussed imbalances in various repo market sub-segments and how these imbalances are bridged by primary dealers through matched repo books.

But matched books seldom, if ever, clear the market. The repo market, like any market, is always moving away from or closer toward balance, but it's never in a state of balance.

There are two types of imbalances in the repo market:

- (1) imbalances that involve excess reserves, and
- (2) imbalances that involve excess collateral.

The questions are always: which of these imbalances dominate at any given moment; whether we are headed deeper into either imbalance or away from one and into the other; and who and at what price provides a backstop at the extreme ends of either imbalance.

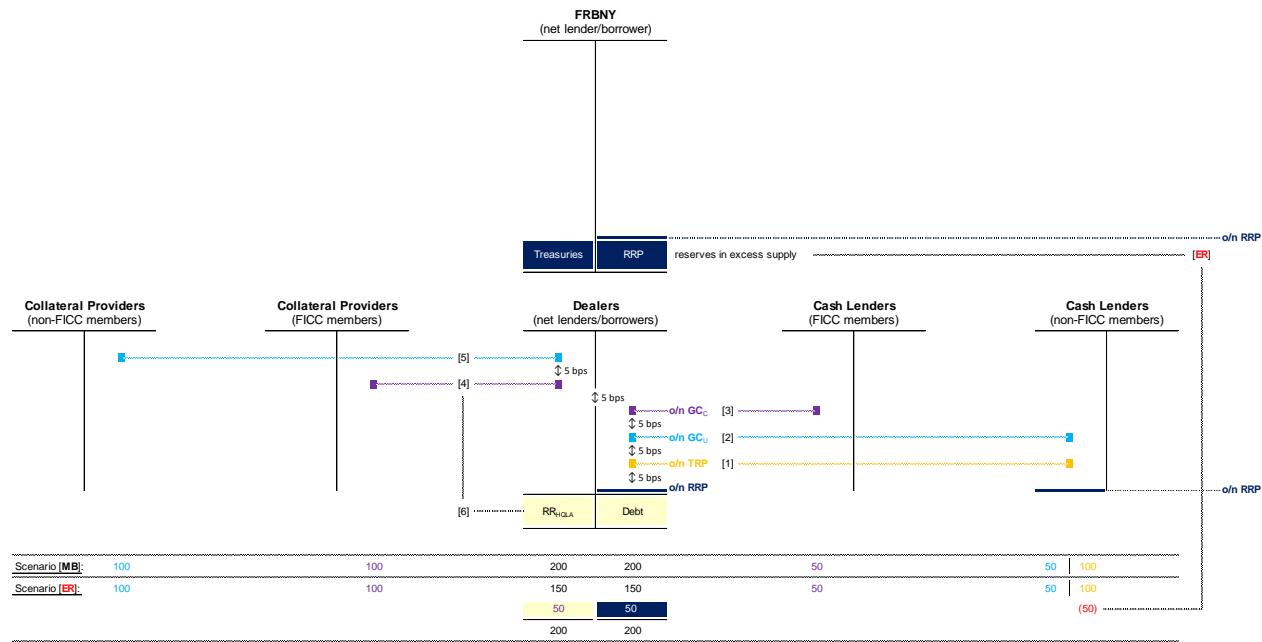
The map below shows how the repo market deals with excess reserves.

We use the matched book example from page four as our starting point and add to it a high-quality liquid asset (HQLA) portfolio for dealers and another balance sheet – the Fed's.

We highlight the HQLA portfolio on dealers' balance sheet with a shade of cream color. HQLA portfolios must be funded unsecured at terms that are longer than 30 days, and HQLA include reserves and Treasuries where Treasuries can be held either outright or "reversed in" through cleared o/n GC repos. However, because dealers are not banks, they do not have access to reserve accounts at the Fed and so for primary dealers the shortest and most liquid form of HQLA are cleared o/n GC repos. Every dealer will have some of its HQLA invested in cleared o/n GC repos and these investments will cause imbalances relative to the matched book examples that we have discussed previously; the numbers at the bottom of the map show how the repo market clears these imbalances.

Thus, before the dealer starts building a matched book for the day, it lends \$50 billion in the

Imbalance [1]: Excess Reserves and the Fed's o/n RRP Facility



Source: Credit Suisse

cleared o/n GC repo market from its own HQLA portfolio (the thin black line marked [6]). Borrowers will get the remaining \$150 billion they need through matched repo books, which the repo dealer builds by borrowing a combined \$150 billion from cash lenders – \$50 billion from FICC members and non-member hedge funds and money funds each.

But money funds have \$100 billion to invest and dealers bidding for only \$50 billion leaves money funds with \$50 billion of uninvested cash – and the system with \$50 billion of excess reserves. The entity that ends up absorbing these excess reserves is the Fed, through its o/n RRP facility (see the thin black line marked **[ER]** for “excess reserves”).

Relative to the matched book example discussed at the outset, the repo market cleared through a more complicated process. The size of the repo market is still \$200 billion, but matched books intermediate only \$150 billion of the \$200 billion, and the rest of the market is “one-sided” – cash borrowers get \$50 billion from a one-sided lender which is an HQLA portfolio and cash lenders lend \$50 billion to a one-sided borrower which is the Fed.

Both the HQLA portfolio and the Fed have a one-sided presence in the o/n repo market in the sense that the cash they lend or borrow isn’t sourced from the o/n repo market, as in the case of matched books – HQLA portfolios borrow in term unsecured markets, not in the o/n repo market, and the collateral the Fed lends through the o/n RRP facility comes from its outright holdings of Treasuries and isn’t sourced in the o/n repo market.

In essence, the market clears through two matched books – a \$150 billion matched book on dealer balance sheets and a \$50 billion “scrapbook” where the left side of the book is a dealer’s HQLA portfolio and the right side of the book is the Fed’s o/n RRP facility (we highlight the two sides of the scrapbook with light cream and dark blue, respectively).

Figure 3 shows the usage of the o/n RRP facility over time. We can see that the era of excess reserves is now over – the facility has not been used since the beginning of 2018.

The era we are trading in currently is the era of excess collateral (see [here](#) and [here](#)).

The map overleaf shows how the repo market deals with excess collateral.

We use the map from the previous page as the starting point and add more things to it, starting with an inventory of Treasuries which dealers fund with o/n repos on the margin, which we highlight in light blue color. We now have three states a dealer can operate in:

- (1) long cash, which the dealer deploys in the repo market (cream color);
- (2) balance, where the dealer runs a matched repo book (white color); and
- (3) short cash, which the dealer raises in the repo market (light blue color).

Short cash positions and elevated dealer inventories of Treasuries go hand in hand as the reason why dealers end up short cash is because they spend their clearing balances on Treasuries and so give up their liquidity (see [here](#)). Effectively, growing Treasury inventories force a rotation in HQLA portfolios away from cash and hence o/n repos to Treasuries. To remedy their liquidity position, dealers repo their Treasuries on inventory to increase their clearing balances, which turns dealers into net borrowers in the o/n repo market – the opposite of the prior example where the dealer was a net lender in the repo market.

The numbers at the bottom of the map show how the market clears with excess collateral, where the source of excess collateral is bloated inventories of Treasuries (see [here](#)). Thus, before the dealer starts building its matched book for the day, it raises \$75 billion of funding in the repo market to fund its own inventories, that is, to up its clearing balances (the thin black line marked [7]). That leaves \$125 billion of cash for other borrowers, which the dealer lends via matched repo books. But borrowers still need \$200 billion and so are short \$75 billion of funding – and the system is long \$75 billion of excess collateral

(see the thin black line marked [EC] for “excess collateral”). Like before, matched books couldn’t balance the repo market, and so someone else will have to step in to balance it.

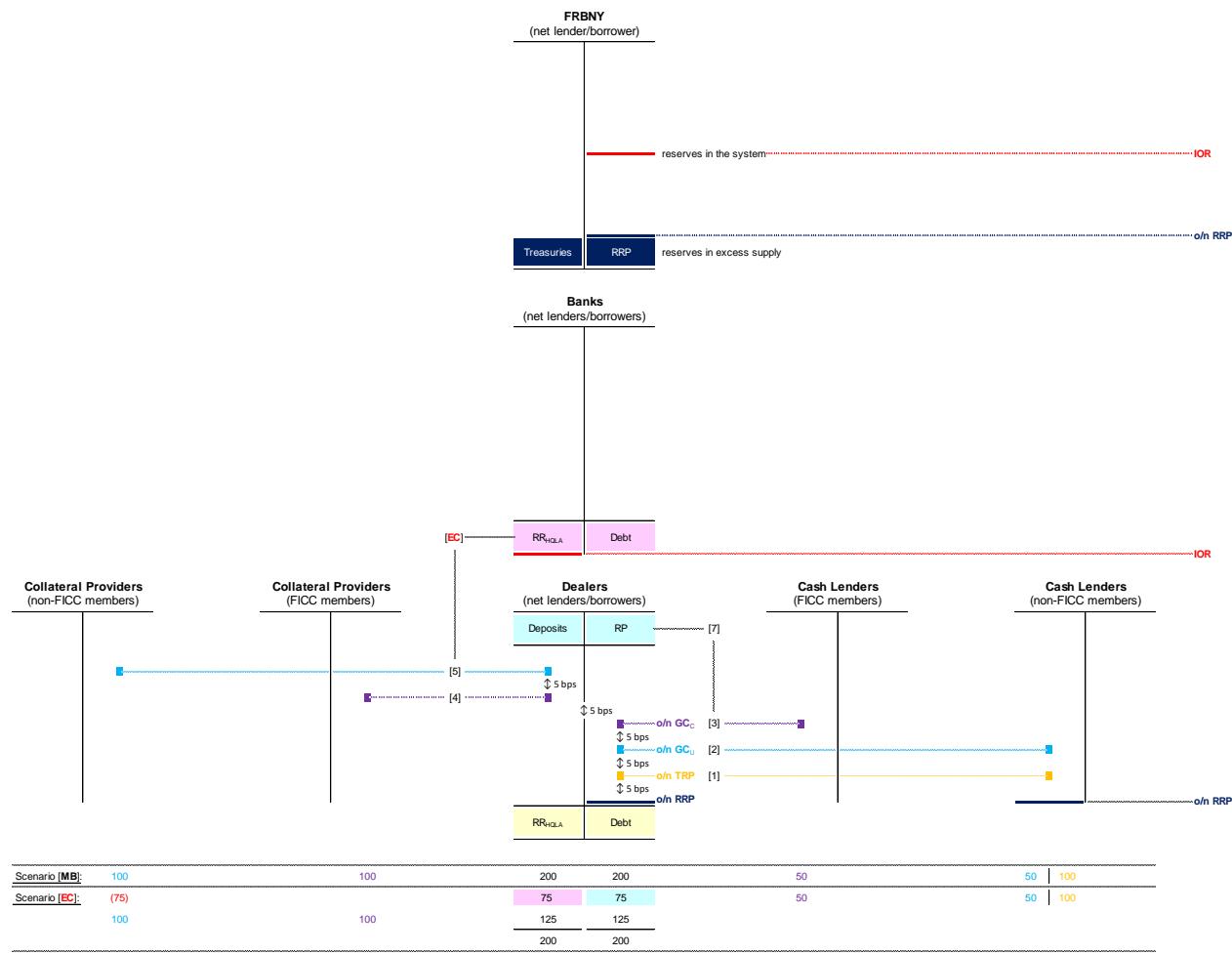
That someone else is a bank which sits above dealers in the repo market’s hierarchy.

Like dealers, large banks also have to maintain HQLA portfolios, but unlike dealers, banks have reserve accounts at the Fed which pay the interest on reserves rate, or IOR. We highlight banks’ HQLA portfolios with a different color (pink) than what we used for dealer’s HQLA portfolios because the economics of banks’ HQLA portfolios are different.

Because dealers do not have access to reserve accounts at the Fed, they’ll always invest their liquidity in the cleared GC repo market regardless of where the cleared o/n GC rate prints relative to IOR. The same is not true for banks: because banks earn the IOR rate as the base case, they will lend in the repo market only if the GC rate trades above IOR (see the thick red line at the bottom of banks’ HQLA portfolios indicating a hurdle rate).

As in the excess reserves example before, here too, the repo market clears through two matched books – a \$125 billion matched book on dealer balance sheets and a smaller, \$75 billion “scrapbook” where the right side of the book reflects dealer funding needs due to rising inventories and the left side of the book is a large bank’s HQLA portfolio (we highlight the two sides of the scrapbook with light blue and pink color, respectively).

Imbalance [2]: Excess Collateral and Bank HQLA Portfolios



Source: Credit Suisse

Figure 4 shows all the banks that have a direct pipe into the cleared o/n GC repo market – these are the banks that can absorb excess collateral in the o/n repo market on scale.

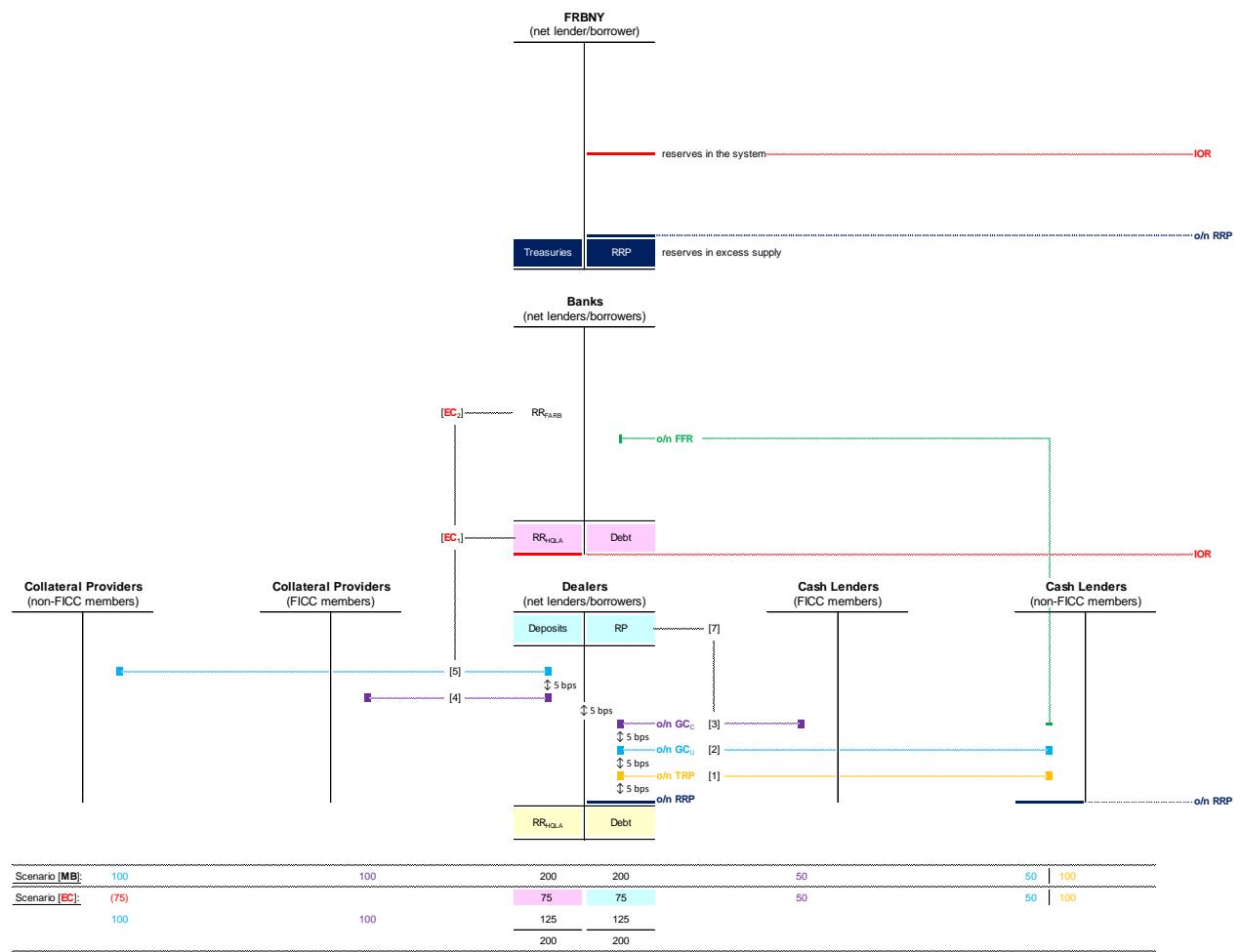
These banks are different from the custodian and trust banks we discussed previously – custodian and trust banks lend on behalf of customers that are non-banks who lend in the GC market regardless of where GC trades relative to IOR. The banks in Figure 4 lend their own money, and will only lend in the o/n GC repo market if GC rates print above IOR.

These banks' HQLA portfolios represent the largest pools of dollar liquidity that can absorb large amounts of excess collateral in the system – but they are not the only ones.

The map below shows o/n fed funds – GC repo arbitrage trades available for all banks that aren't balance sheet constrained intra-quarter. The map is the exact same as before, but it includes two extra pipes: a green line between banks and non-FICC cash lenders to denote the flow of money from FHLBs to banks through the o/n fed funds (FF) market, and a thin black line marked [EC₂] to show how the reserves raised in the o/n FF market are lent in the cleared o/n GC repo market to help absorb excess collateral in the system.

Both arbitrage and bank HQLA portfolios have their limits, and when those limits are reached flows get kicked further up the hierarchy – to the Fed. The map overleaf shows what happens

Imbalance [3]: Excess Collateral and the o/n Fed Funds Market



Source: Credit Suisse

when dealers' funding needs increase further due to a further increase of collateral supply and bank HQLA portfolios and arbitrage flows cannot absorb additional excess collateral.

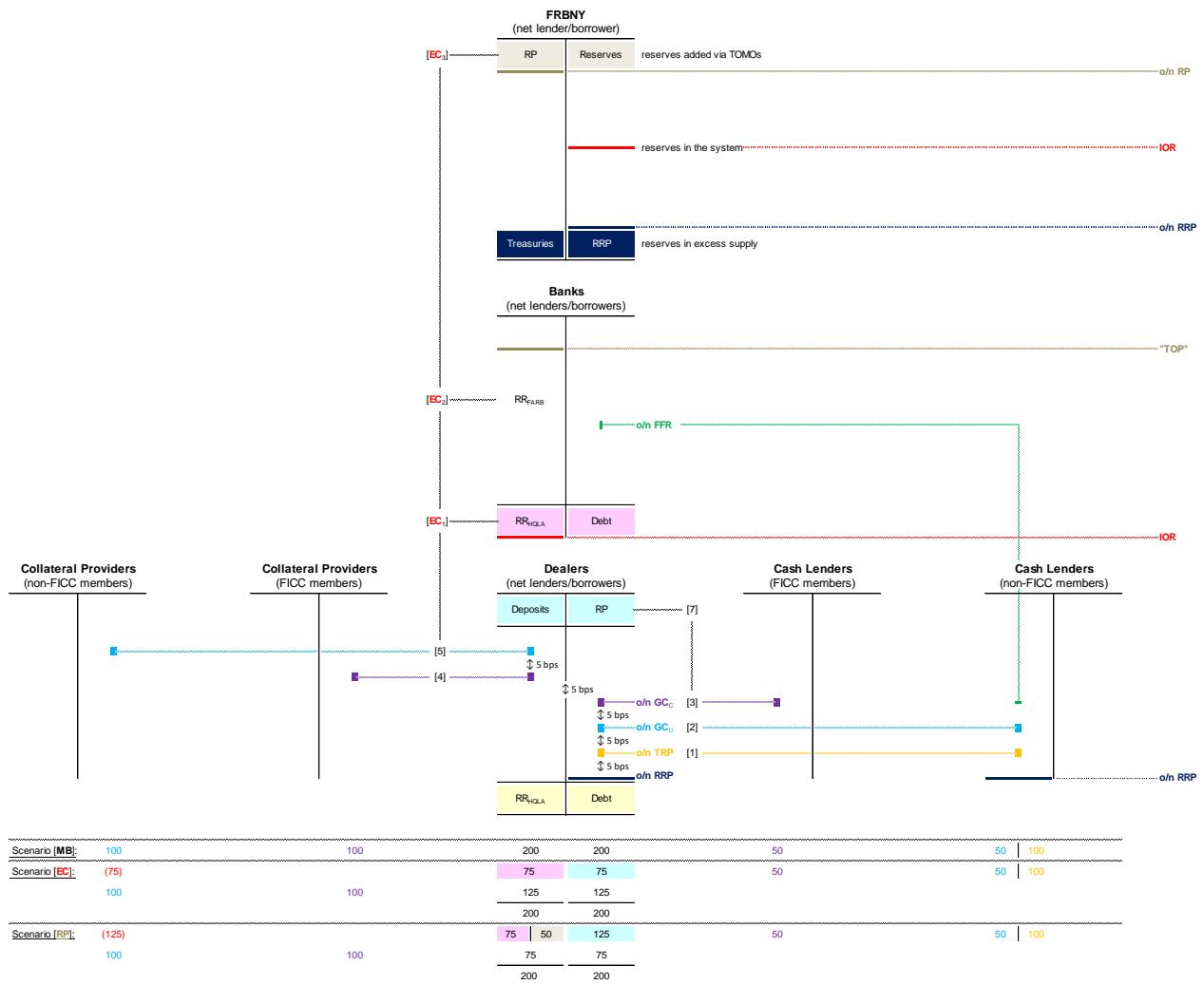
The numbers at the bottom of the map show an additional \$50 billion increase in dealers' funding needs, which reduces the funds available for matched books to \$75 billion and increases the market's funding gap – and the amount of excess collateral – to \$125 billion.

While banks were able to absorb \$75 billion of excess collateral before, absorbing the next \$50 billion may not be that simple. One reason why banks may struggle to reverse in an additional \$50 billion of collateral is because they are at their intraday liquidity limits – whatever reserves they have left they need for regulatory reasons and can't do more repos.

Similarly, given the relative size of the o/n FF and o/n GC markets, an aggressive bid for o/n FF from arbitrageurs may have eliminated the spread between o/n FF and GC rates, closing off an additional channel through which excess collateral was absorbed previously.

As bank HQLA portfolios reach intraday liquidity limits and arbitrage opportunities fade, o/n GC rates start to gap higher until they blow through the top of the Fed's target range and the Fed has to backstop the market with a fixed-price, full-allotment o/n repo facility.

Imbalance [4]: Excess Collateral and an o/n Repo Facility



Source: Credit Suisse

We show these developments by adding a brown shaded area to the Fed's balance sheet and marking the bottom of the shaded area with a thick brown line to indicate that the Fed would only lend through the o/n repo facility if cleared GC rates are above the target (see the black line marked **EC₃** that merges into pipes **EC₁** and **EC₂** on the previous page).

As in the examples above, here too, the repo market clears through two matched books – a \$75 billion matched book on dealer balance sheets and a \$125 billion “scrapbook” where the right side of the book reflects dealer funding needs due to inventories and the left side of the book is comes partly from bank HQLA portfolios and partly from the Fed (we highlight the left side of the scrapbook with light pink and brown colors, respectively).

We now have a pretty clear understanding of how the repo market clears.

The map on the previous page shows in one place three basic states of the repo market – long cash, balance, short cash – and how the Fed and banks fit into the bigger picture:

- (1) how excess reserves in the system are absorbed by the Fed via o/n RRP
- (2) how balanced books, i.e. matched books, circulate reserves through the system
- (3) how excess collateral is absorbed by banks and ultimately the Fed via o/n RP

The map also shows how these three states of the repo market line up versus the Fed's target range for the o/n rates complex and where flows kick in from various entities:

- (1) how the o/n RRP rate – to bottom of the range – is a floor to o/n repo rates
- (2) how banks don't lend in the repo market unless o/n repo rates trade above IOR
- (3) how the o/n RP rate – the top of the range – is a ceiling to o/n repo rates

The map also shows how the Fed serves as a dealer of last resort in the repo market – how the Fed deals with the long cash, balance and short cash states of the repo market:

- (1) long cash states correspond to excess reserves which the Fed needs to sterilize using the o/n RRP facility so that o/n rates do not print below the target range
- (2) balanced states correspond to o/n rates printing within the Fed's target range – the Fed's “matched book” state where reserves float freely between accounts
- (3) short cash states correspond to excess collateral which the Fed has to monetize, – turn into reserves – using the o/n RP facility so o/n rates stay within the band.

Let's next put some numbers behind our framework.

Figure 5 shows the o/n tri-party rate and the cleared GC rate relative to the target band. It shows that since the beginning of 2018, the o/n tri-party repo rate went from trading at the bottom of the target band, to trading near the top of the target band, and from trading below the IOR rate to trading above it. Figure 6 shows the top percentiles of GC trades, which tell a similar story – collateral supply is pushing repo rates outside the target band, with more and more of the lending done at rates above the IOR rate coming from banks.

Figure 7 shows the demand for cash via o/n cleared GC repos – note the lack of trends until 2018, and the sharply rising trend afterwards driven by a series of demand shocks and curve inversions marked by the vertical orange lines that lead to growing dealer inventories and associated funding needs (see [here](#)). Figure 8 shows the supply of cash through o/n tri-party repos and through sponsored repos, and the light blue line shows the balance between demand and supply and how the o/n repo market has been drifting from an excess reserves regime pre-2018 to an excess collateral regime post-2018.

If we are right, as collateral supply snowballs between now and year-end the light blue line will drift deep into negative territory and drive stresses in o/n funding markets (see [here](#)).

Part III – The Design Menace

Implicit in our discussion of imbalances is another aspect of the repo market's hierarchy which is that dealers' needs always come first, and clients' needs always come second.²

In the excess reserves example we saw how primary dealers deploy their own liquidity first; the customer – money funds – came second, and the Fed had to clean up the imbalance – as a dealer of last resort, it had to sterilize excess reserves with the o/n RRP facility.

In the excess collateral example we saw how dealers fund their own inventories first; the customer – carry traders – came second, and the Fed had to clean up the imbalance – as a dealer of last resort, it had to monetize excess collateral with the o/n RP facility.

In both examples, the periphery of the shadow banking system (see [here](#), [here](#) and [here](#)) comes up short and it falls on the Fed to trade with the periphery to clean up imbalances.

To deal with the problem of excess reserves, the Fed had to open up its balance sheet to counterparties it didn't trade with before – like money funds. Similarly, to deal with the problem of excess collateral, the Fed will have to expand the scope of accounts it trades with further, and open up its balance sheet to all carry traders that are FICC members – that's what the logic of our analysis of imbalances implies and what the market expects.

Remarkably simple and remarkably symmetric...

...but there is a catch!

From Fed's perspective, it's simpler to open up the balance sheet to new counterparties to deal with an excess reserves problem than it is to deal with an excess collateral problem – the supply of excess reserves is finite and their sterilization through an o/n RRP facility doesn't inflate the Fed's balance sheet; in contrast, the supply of excess collateral is infinite and their monetization through an o/n RP facility inflates the Fed's balance sheet...

...potentially without a limit.

Put differently, excess reserves are a byproduct of the Fed's own balance sheet actions and the o/n RRP facility absorbs the byproduct that banks – given leverage constraints – would only bid for at rates below the o/n RRP rate, that is, below the Fed's target range.

The Fed is in control...

...of its balance sheet size and the bottom of the target range, but not its liability mix.

In contrast, excess collateral is a byproduct of fiscal policy and demand for Treasuries and the o/n RP facility absorbs collateral that banks – given intraday liquidity constraints – would only bid for at rates above the o/n RP rate, that is, above the Fed's target range.

The Fed is in control...

...of the top of the target range, but not its balance sheet size.

It's either a control of prices or quantities, but not both – and from the Fed's perspective, it is easier to give up control over its liability mix by opening its balance sheet to money funds than it is to give up control over its balance sheet size by opening up to all FICC members.

Given the Fed's sensitivity to the size of its balance sheet, in an excess collateral regime, the Fed needs to be careful about two aspects of an o/n repo facility – pricing and access.

² In crisis times, this hierarchy is turned on its head: customers run from the dealers as their own liquidity comes first, and dealers' needs come second. For real-life examples of these dynamics see [Too Big to Fail](#) by Andrew Ross Sorkin.

The pricing aspect of a fixed-price, full-allotment o/n repo facility revolves around a still outstanding question, which is: what is the Fed trying to achieve with a repo facility?

- (1) To put bounds on funding market stresses around calendar-turns?
- (2) To enforce the top of the target range for the o/n rates complex?

If it is the former, the facility should be priced 50 bps over the top of the target range – that would eliminate painful calendar turns like the one we had on December 31st, 2018, and at the same time let o/n markets deal with more manageable episodes of stress.

If it is the latter, the facility should be priced 25 bps over the o/n RRP rate – that would ensure that o/n rates do not print over the top of the target range, just like the o/n RRP facility ensures that o/n rates do not print below the bottom of the target range.

Figure 9 shows the o/n repo facility priced at 50 bps over the top of the target range and how that pricing strategy would eliminate not all, but only the worst of calendar turns.³

Figure 10 shows the o/n repo facility priced at 25 bps over the o/n RRP rate and how that pricing strategy would eliminate all prints above the top of the target band – whether they have to do with calendar turns or imbalances on regular funding days.

Which one should/will the Fed choose?

In our view, the fundamental problem the Fed will soon have to reckon with is that it has an operating framework where the target range for the o/n rates complex is policed only at the bottom, but not at the top. While the Fed has an o/n RRP facility that ensures that rates do not fall below the bottom of the target range, it does not have an o/n repo facility that ensures that rates do not go above the top of the target range, and a facility that's priced to deal with bad calendar turns won't help in policing the top of the target range.

From the Fed's perspective, o/n rates printing outside the target range on average days is worse than o/n rates printing outside the target range on days when the calendar turns – however bad calendar turns may be, they only last a few days, but they do not persist.

In contrast, o/n rates printing outside the target range can persist and if they do persist, the Fed has a problem – it loses control over financial conditions in the ultra front-end.

That leaves pricing the o/n repo facility at the top of the target range – that is, 25 bps over the o/n RRP facility – as the solution, and if its priced there, the question of who the Fed gives access to that facility becomes extremely sensitive and extremely important.⁴

Consider for example the logical conclusion regarding access that flowed from our analysis of how imbalances involving excess collateral should be resolved by the Fed...

...by giving all FICC members of access to the o/n repo facility.

But if the facility is priced at the top of the target range, giving access to FICC members at large is a definite no-go, for it may cost the Fed control over the size of its balance sheet.

Therefore, access must be carefully calibrated.

In the remainder of this section we discuss three design options for an o/n repo facility, with access available to all FICC members, primary dealers only and banks (G-SIBs) only.

³ Had we had a facility priced at 50 bps over the top in place historically, it would have calmed only two calendar turns.

⁴ Maybe the Fed does not view the "what are we solving for" and "how to price an o/n repo facility" questions as a binary choice between managing calendar turns and policing the top of the band, respectively. Maybe the Fed will opt for a facility priced to deal with calendar turns first, and when enforcing the top of the target band becomes an issue they'll cut the pricing of the facility from 50 bps over the top to "top" to deal with enforcing the top of the target band.

The map below shows *Design #1* where FICC members – both outright and sponsored – tap overnight liquidity from the Fed at a price of o/n RRP plus 25 bps through pipe [4], and then lend that liquidity in the tomorrow-next (t/n) FX swap market through pipe [8].

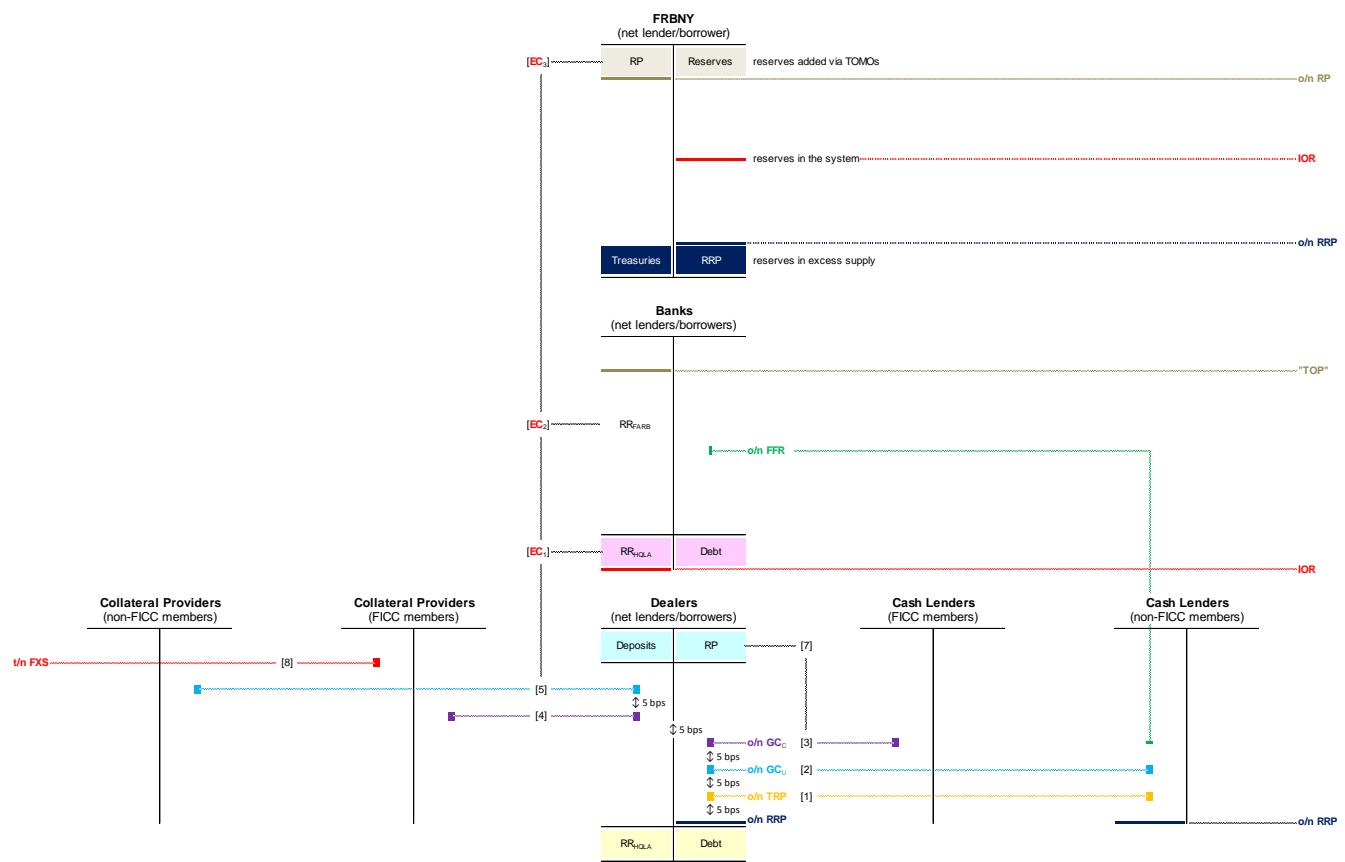
Figures 11 and 12 show implied yields in t/n swaps of dollars for ¥ and €, respectively; the thick brown line shows the price of the o/n repo facility and the charts suggests that sponsored members could borrow from the Fed at the thick brown line and lend at the orange and blue lines to harvest t/n bases that typically trade 50 bps above the brown line.

This scenario is not unlikely, given that sponsored members of FICC already include a dozen hedge funds and hundreds of bond funds at large asset managers (see [here](#)), and that these funds have no balance sheet constraints that would hold them back from conducting arbitrage. These accounts would presumably post a lot of collateral at the Fed to raise cash to conduct either riskless arbitrage trades in the FX swap market at best, or riskier trades in other markets where the facility is used as a funding vehicle at worst.

Thus, optically, a fixed-price, full-allotment o/n repo facility accessible to FICC members, has a whiff of moral hazard to it and reminds us of [TALF](#) – TALF was actually better, as under TALF borrowers could only do pre-specified trades with the funds they borrowed.

Yet another issue with the Fed lending into FICC at large is that from a legal perspective, it is unlikely that the Fed will be content with being a *pari passu* lender in a clearinghouse – the Fed likes to be super-senior in its dealings, which in the case of lending into FICC would involve subordinating other members of FICC which is a major coordination problem.

Design [1]: Fed Lends into FICC, o/n Repo Facility Priced at the Top of the Target Range



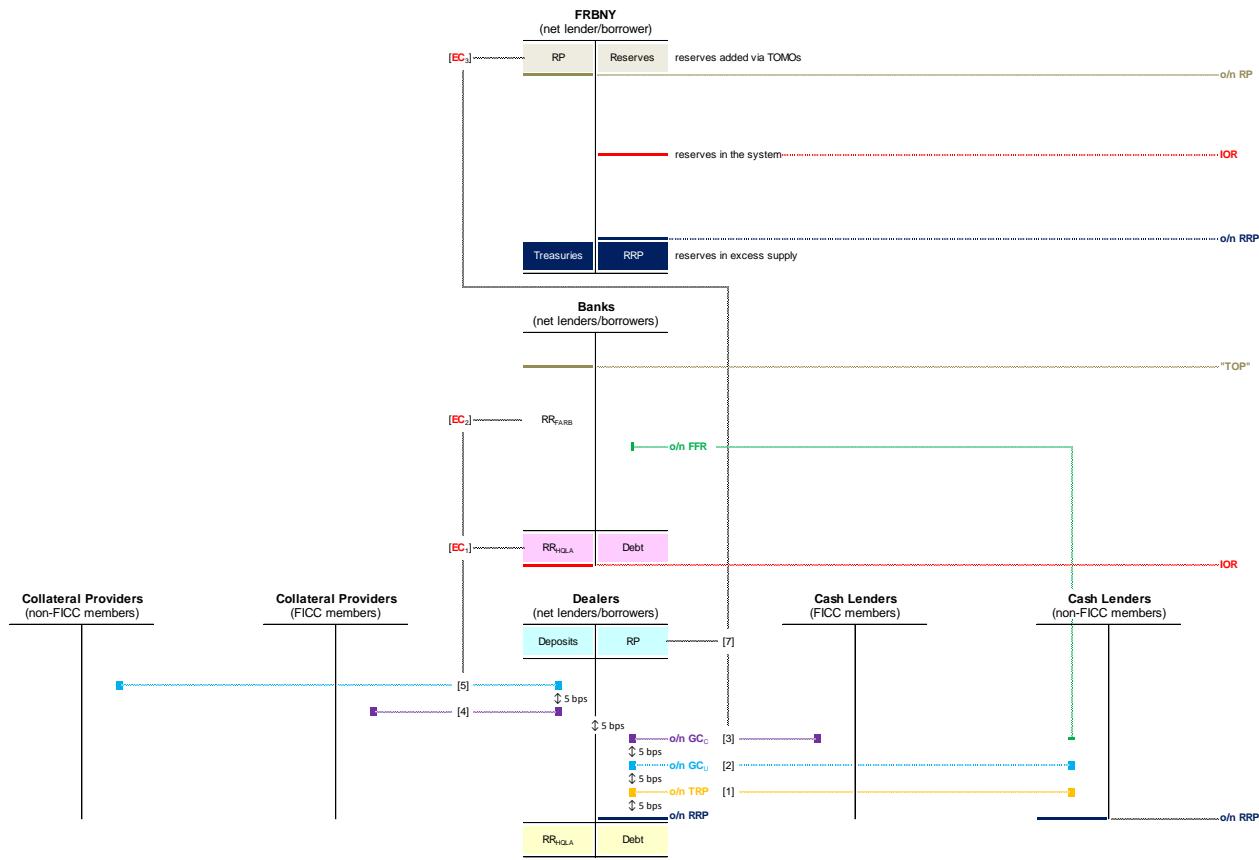
Source: Credit Suisse

If lending into FICC at large is too broad and too risky for the Fed's taste, the Fed could narrow the list of eligible counterparties to primary dealers only as shown on the map below – this is *Design #2*. The Fed is on more familiar ground, as traditionally it has conducted temporary open market operations (TOMOs) with primary dealers and in that sense a fixed-price, full-allotment o/n repo facility for dealers is like a “back to the future” moment.

The principal difference between the map below and the map on the previous page is that the pipe labeled [EC₃] does not lead into FICC at large, but rather, to a specific subgroup of FICC members – primary dealers. In the context of our discussion of excess collateral, an o/n repo facility would help primary dealers fund their growing Treasury inventories, and ensure that the rate at which dealers fund is never above the top of the target range.

This mechanism would ensure that as primary dealers' own funding needs crowd out matched repo books, the “funding gap” on the offered side of the matched book is filled by the Fed as discussed in Part III. But there is one major problem with this approach, which is that the group of primary dealers is not a homogenous bunch: three of the twenty-four primary dealers aren't subject to Basel III, which means that some dealers represent more counterparty risk for the Fed than others. Furthermore, there are basic issues of “fairness” – why should dealers that are not subject to Basel III but that happen to be primary dealers have access to the facility while dealers that are subject to Basel III that do not happen to be primary dealers do not. Finally, if the Fed chooses to go beyond primary dealers to include all Basel III compliant dealers, is it fair to exclude smaller dealers when the list of primary dealers already includes some that are not Basel III compliant? In a politically charged setting, these questions can't be ignored and are hard to manage.

Design [2]: Fed Lends to Dealers, o/n Repo Facility Priced at the Top of the Target Range



Source: Credit Suisse

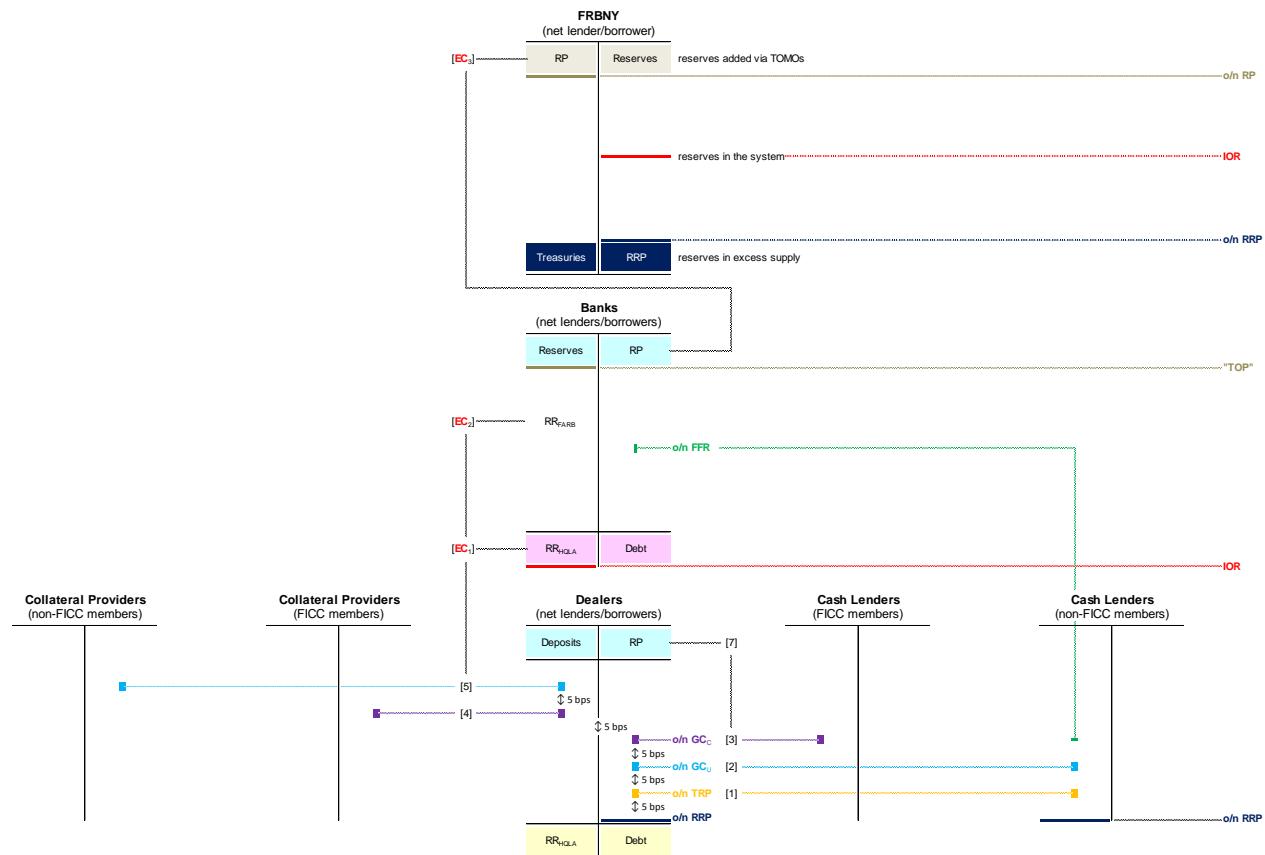
Thus, lending too broadly – into FICC at large – has moral hazard and legal issues, and lending too “clubby” – to primary dealers only – has counterparty risk and fairness issues.

This brings us to *Design #3*, which is to give access to the facility to large banks only.

The map below shows how this approach would work. Thus, the pipe labeled [EC₃] goes from the Fed to banks only, and would improve the flow of reserves by effectively freeing banks from their intraday liquidity constraints. Recall that in an excess collateral regime, the first group of entities to step in to absorb imbalances are banks, not the Fed, and that the Fed steps in only when banks reach a point where they can't lend any more reserves and can't reverse in any more collateral. That's typically the point where banks are bound by intraday liquidity constraints. Intraday liquidity constraints exist because the Fed forces banks to hold liquidity in the form of reserves because it is well understood that Treasuries – no matter how liquid in a relative sense – may be hard to monetize during crises. In English, banks cannot hold all their HQLA in the form of bonds, because all the banks won't be able to sell all their bonds at the same time in a stressed market environment; reserves and only reserves can provide round-the-clock liquidity during episodes of stress.

The o/n repo facility could get around that problem. If pitched as a facility that would equalize collateral and reserves, it would change the monetizability assumption of bonds during crisis times so that the Fed would allow large banks trade reserves for collateral, which in turn would allow banks to lend more freely in the repo market and effectively run their reserve balances down to the amount of required reserves, which would free up around \$500 billion of reserves that currently cannot float freely in the system (see [here](#)).

Design [3]: Fed Lends to Banks, o/n Repo Facility Priced at the Top of the Target Range



Source: Credit Suisse

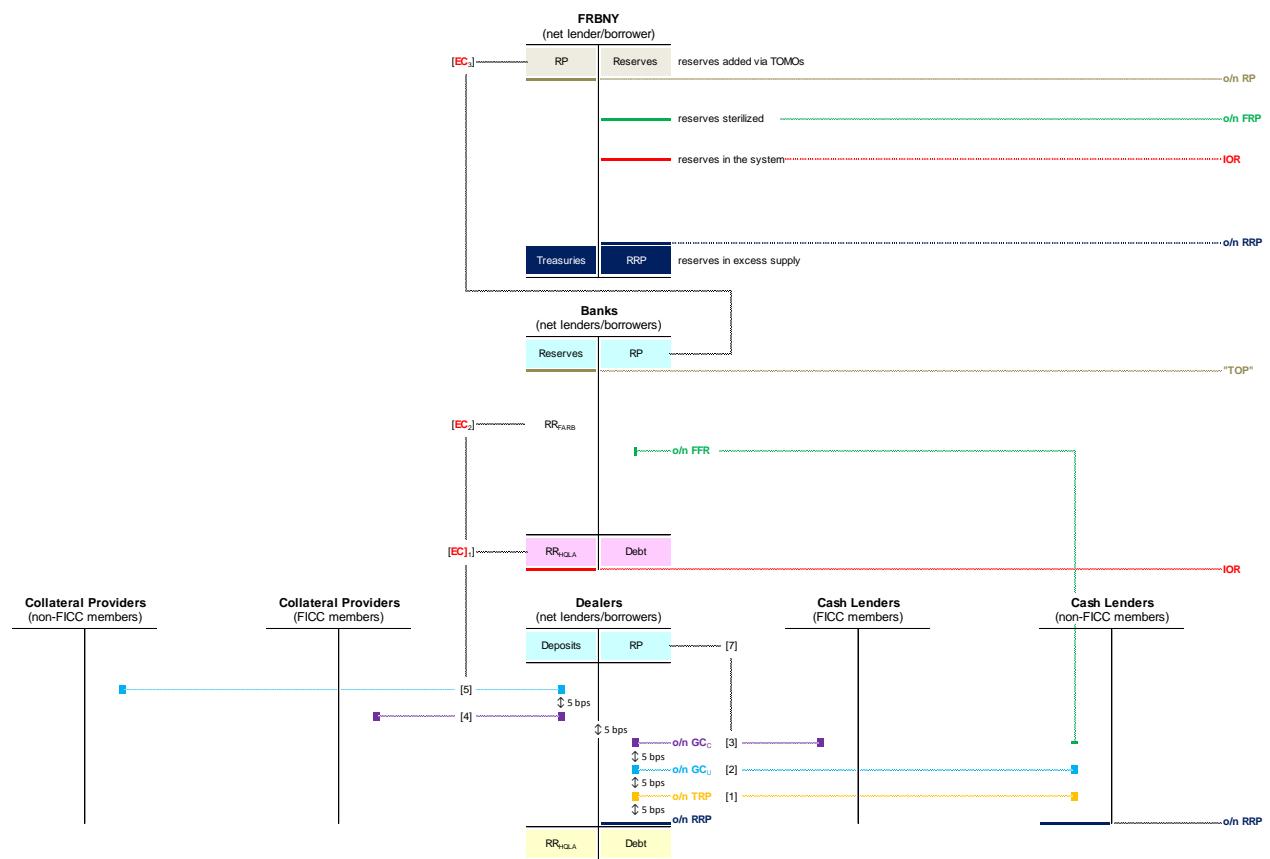
A fixed-price, full-allotment o/n repo facility, priced at the top of the target range, designed for banks only and pitched as a tool to basically equalize collateral and reserves, is the best design option, in our view, one that would also go around the moral hazard, counterparty risk and fairness issues that came up in thinking through the other alternatives.

Given that most reserves in the system are held by G-SIBs and that it's also predominantly G-SIBs that have a pipe into the cleared o/n GC repo market, it would be sufficient for the Fed to open this facility to G-SIBs only. This approach would also be free of any counterparty risk and fairness issues as all G-SIBs are Basel III compliant, and where Basel III doesn't equalize banks from a counterparty risk perspective, G-SIB surcharges do.

Everyone is familiar with the experience of being served bread with butter in a restaurant. Sometimes, the butter that's served is cold and is hard – even impossible – to spread. Sometimes, the butter that's served is just the right temperature and is easy to spread. Treasuries are hard to spread and reserves are easy to spread, and the idea here is to heat up the butter and make it easier to spread – to equalize collateral with reserves. Butter that's served at just the right temperature is the domain of fine dining restaurants, and fine dining is limited to a fortunate few. Similarly, fine dining in collateral markets should also be limited to a fortunate few – to G-SIBs. If the repo market is hierarchical, access to the Fed's fixed-price, full-allotment o/n repo facility should be hierarchical too.

That brings us to the end of our discussion of the repo market and the map below shows the complete hierarchy of the repo market with the Fed sitting atop as the system's dealer of last resort – a state the Fed will finally attain once it launches an o/n repo facility.

Dealer of Last Resort



Source: Credit Suisse

Part IV – Market Impact and Conclusions

In the current edition of Global Money Notes, we discussed all the reasons why designing a standing repo facility is so hard and identified a design that we think would work best, which is a fixed-price, full-allotment o/n repo facility open without stigma to large banks, with the goal of equalizing collateral and reserves – which we call the equalizer bazooka.

The market impact of such a facility would be big, front-end bases would compress a lot; if we get such a facility before year-end, the trade is to receive core cross-currency bases.

The facility would have a “*Draghi-esque*” quality to it...

...as it wouldn’t have to be used for it to have an impact and so the Fed’s balance sheet wouldn’t even increase. The mere existence of the facility would embolden large banks to trade their reserves for repos or Treasuries – redistribution would shift into higher gear.

That’s because the aim of the facility is to free up the precautionary reserves banks hold because the monetization of bonds is uncertain during crises. But if an o/n repo facility makes monetization easy and guaranteed, precautionary reserves are no longer needed, and banks won’t call on the Fed to monetize bonds right away – unless there is a crisis.

The standing repo facility would thus not inflate the Fed’s balance sheet in good times, only in bad times. The standing repo facility would effectively free up banks’ idle reserves, and it wouldn’t add new reserves to the system off the bat. Here is how it would work...

...banks like J.P. Morgan trade out of reserves and buy Treasuries outright or via repos, which would eliminate the risk of front-end funding pressures we discussed [here](#) and [here](#); the reserves formerly held by J.P. Morgan would flow either to the central liquidity desks of asset managers or primary dealers – or more precisely, their respective clearing banks; asset managers and primary dealers would deploy this liquidity either by lending to banks with balance sheet for cross-currency arbitrage trades or do these trades themselves.

Reserves went from sitting idle, satisfying intraday liquidity metrics, to floating more freely; intraday liquidity constraints went from binding to non-binding; and funding markets got more efficient – barring SLR constraints, front-end spreads should compress considerably.

But we don’t know if, we don’t know when and we don’t know how FRBNY will act...

...not to mention a major structural obstacle which is that the green-light for the bazooka is a supervisory decision and not a FRBNY decision and that as recently as February 25th, Vice Chair Quarles still appeared to favor [reserves](#) over bonds in bank HQLA portfolios.

The impact of [asset purchases](#) (“mini-QEs”) would be similar, but less efficient.

Market participants generally perceive repo-based forms of liquidity injection more efficient than those based on asset purchases, so they generally frown when they hear “mini-QEs”.

In our view, the Fed should not be thinking about a standing repo facility and “mini-QEs” as either/or options, but as co-existing tools to deal with reserves scarcity in the future.

Open market operations are not rocket science – it’s either TOMOs or POMOs.

TOMOs, or temporary open market operations should always be the Fed’s first defense – the standing repo facility – and if the usage of TOMOs is too large, too frequent and too disintermediating, it’s a sign to do permanent open market operations, or POMOs, instead. The signal coming from banks’ uptake of a standing repo facility will always speak louder and more accurately than a million surveys trying to gauge banks’ need for reserves.

Plumbing is primitive...

...and the last thing the Fed should do is to turn it into a survey-based pseudo-science.

Appendix – Sponsored Repo and the Hierarchy

Part I of our analysis has shown that the **cleared o/n GC rate** is a “special” repo rate – it’s special from the perspective of cash lenders, as it’s the highest rate one can earn; it’s special from the perspective of cash borrowers, as it’s the lowest rate one can pay; and it’s special from the perspective of dealers as cleared trades don’t use balance sheet, which makes the spread between the bid and offered side of the market “free” money.

Think of cleared repo as the “sun” of the repo universe – a rate around which everything else revolves. We can express lending rates as a spread to the bid side of the market, borrowing rates as a spread to the offered side of the market, and the spread between the bid and offered sides of the market as the value that dealers place on intraday liquidity.

Every ecosystem is subject to evolution and the repo market is no different.

Sponsored repo is the most significant development to impact the repo market since the introduction of Basel III, for sponsored repo flattens the hierarchy of the o/n repo market.

The map below shows how.

Sponsored repo allows “*well capitalized bank members*” of FICC to sponsor cash lenders and cash borrowers to become sponsored members of FICC. In English, this means that money funds and hedge funds that until now could only lend at the **o/n tri-party rate** and the **uncleared o/n GC rate** can now lend at the **higher cleared o/n GC rate**, and that hedge funds that until now could only borrow at the **uncleared o/n GC rate** can now borrow at the **lower cleared o/n GC rate**. The net effect of sponsored repo is that the o/n repo complex trades at **tighter** spreads to the center of the universe – that is, sponsored lenders and borrowers are emancipated as they get to trade at “screen levels”.

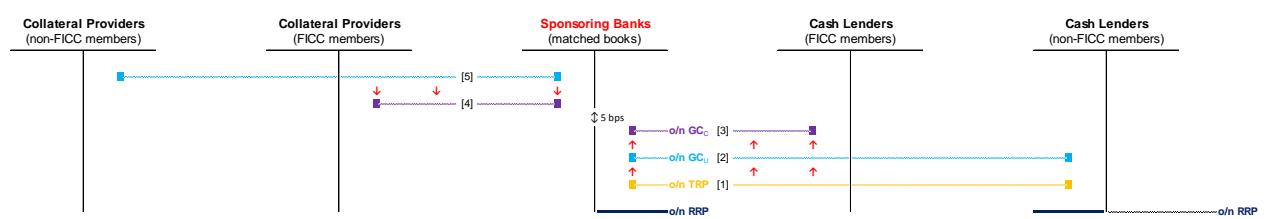
Naturally, dealers loathe emancipation and a flatter hierarchy as those erode their livelihood – the spreads discussed in the prior section. The growth of sponsored repo to date has been driven by entities that are not dealers, but banks – and three banks in particular: The Bank of New York Mellon, State Street Bank and J.P. Morgan Chase Bank, N.A..

Sponsored repo revolves around the idea of matched books as the idea for these banks – subject to high leverage ratios and daily balance sheet reporting – is to intermediate in the repo market in a way that does not use their balance sheet, which is only possible if they intermediate between “outright” or sponsored members of the FICC (see [here](#)).

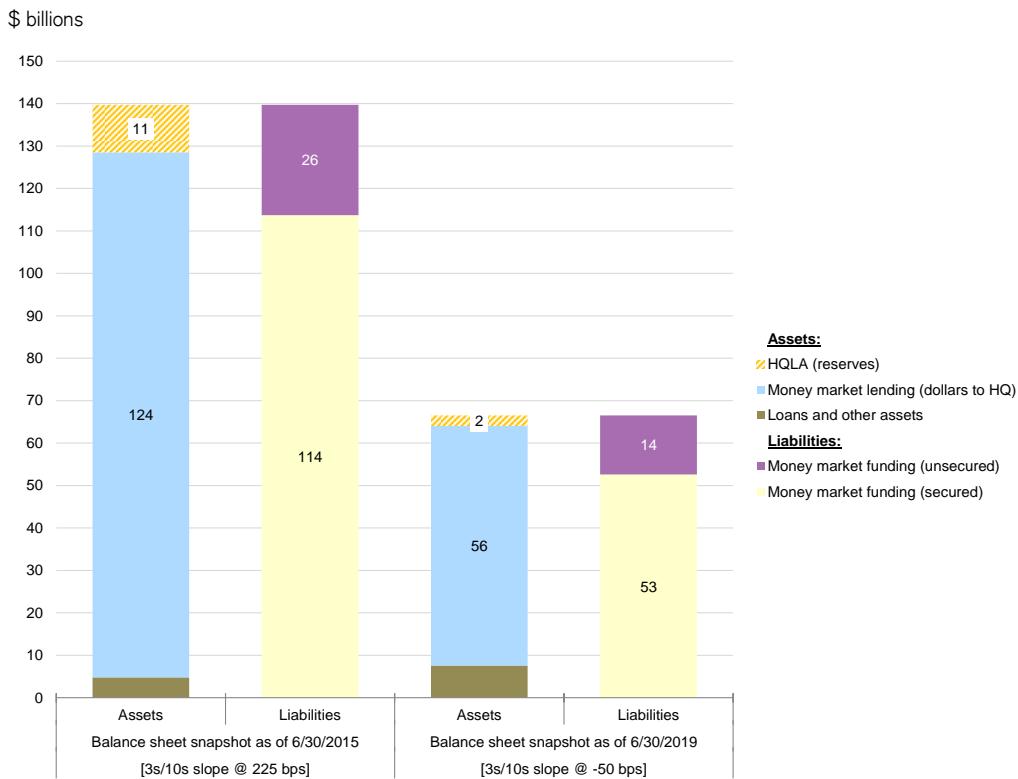
Hundreds of bond funds of large asset managers, just over a dozen hedge funds and two dozen money funds are already sponsored members of FICC. Money funds currently lend about \$200 billion in the sponsored repo market, and according to a recent [article](#), hedge funds and the bond funds of large asset managers lend an additional \$50 billion.

Because sponsored repo only works in a matched book context, it offers no help in dealing with imbalances in the repo market. Prices always gap because of imbalances, and imbalances are dealt with by banks and the Fed higher up in the system’s hierarchy.

Sponsored Repo Compresses Spreads



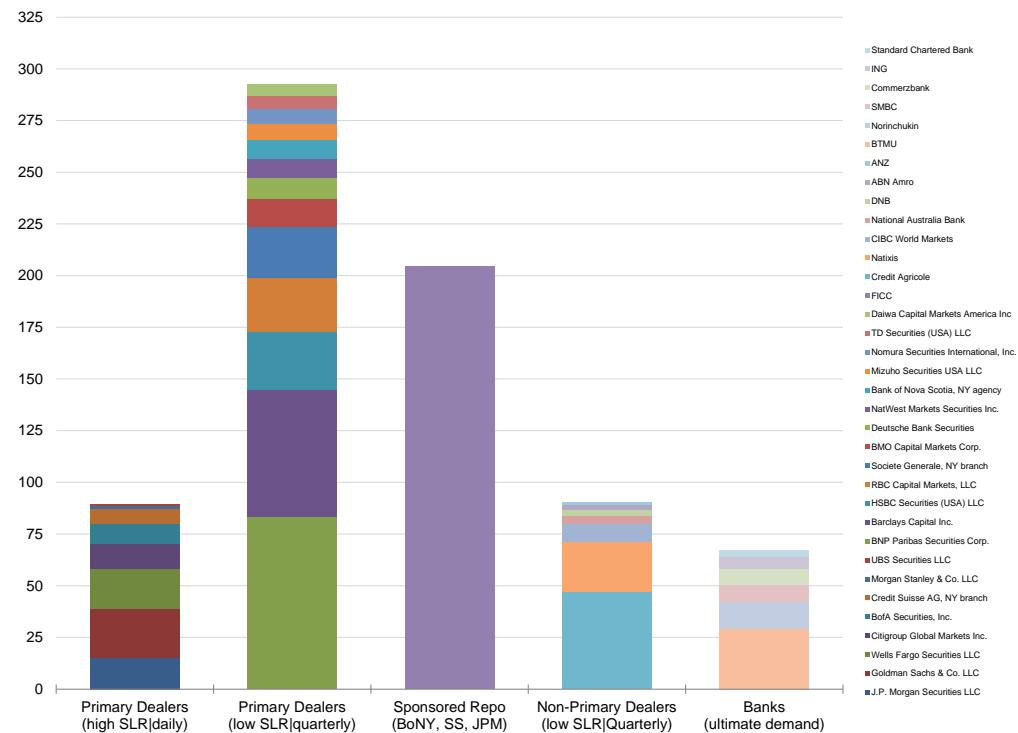
Source: Credit Suisse

Figure 1: The Norinchukin Bank's Repo Needs

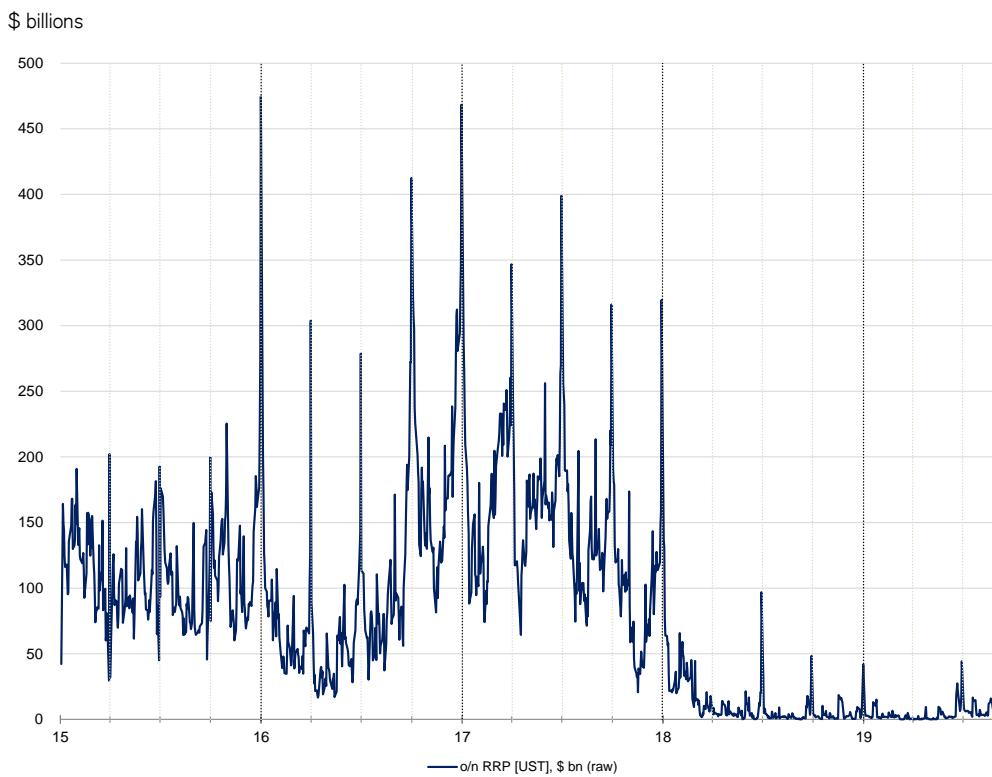
Source: the BLOOMBERG PROFESSIONAL™ service, call reports, Credit Suisse

Figure 2: Demand for o/n Tri-Party Repos

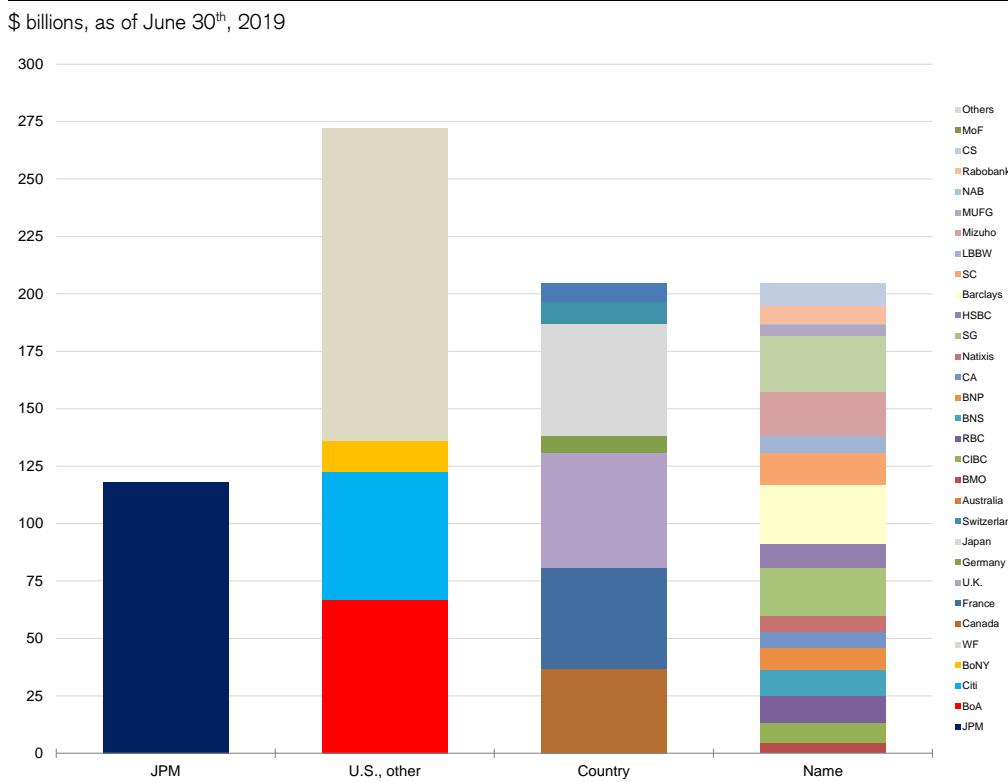
\$ billions as of July 31st, 2019; we adjusted J.P. Morgan's numbers down to its pre-inversion trend to exclude inventory-related funding needs (see [here](#)).



Source: Office of Financial Research, Credit Suisse

Figure 3: The Era of Excess Reserves is Over

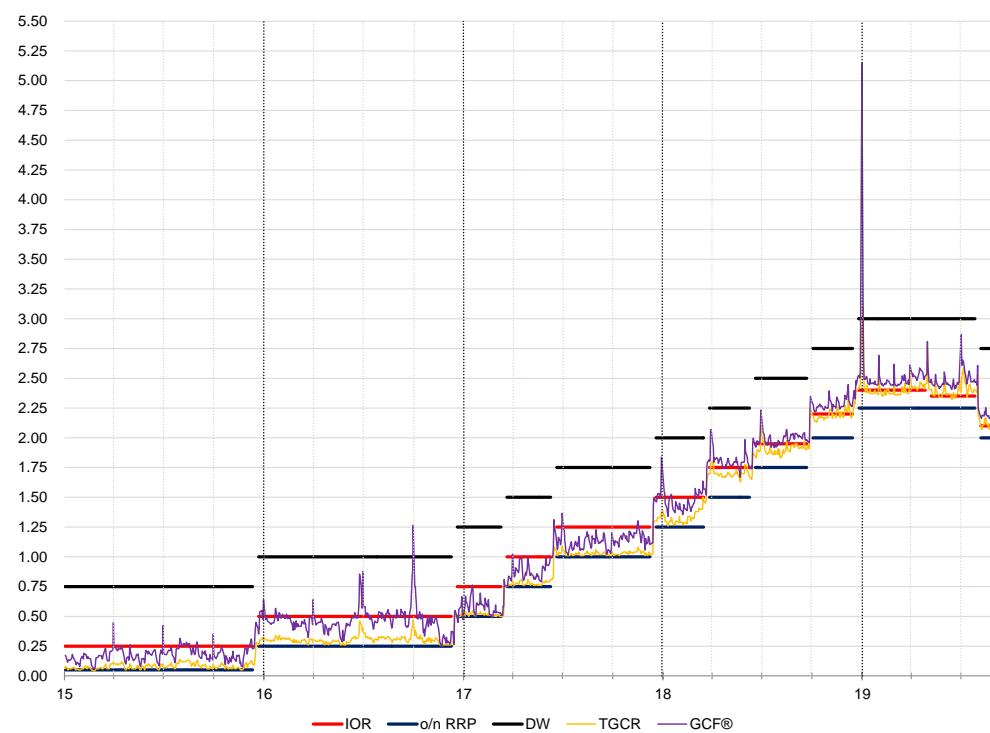
Source: FRBNY, Credit Suisse

Figure 4: Reserves at Banks with a Direct Pipe into the o/n GC Repo Market

Source: Call reports, Credit Suisse

Figure 5: Repo Rates Relative to the Target Band [1]

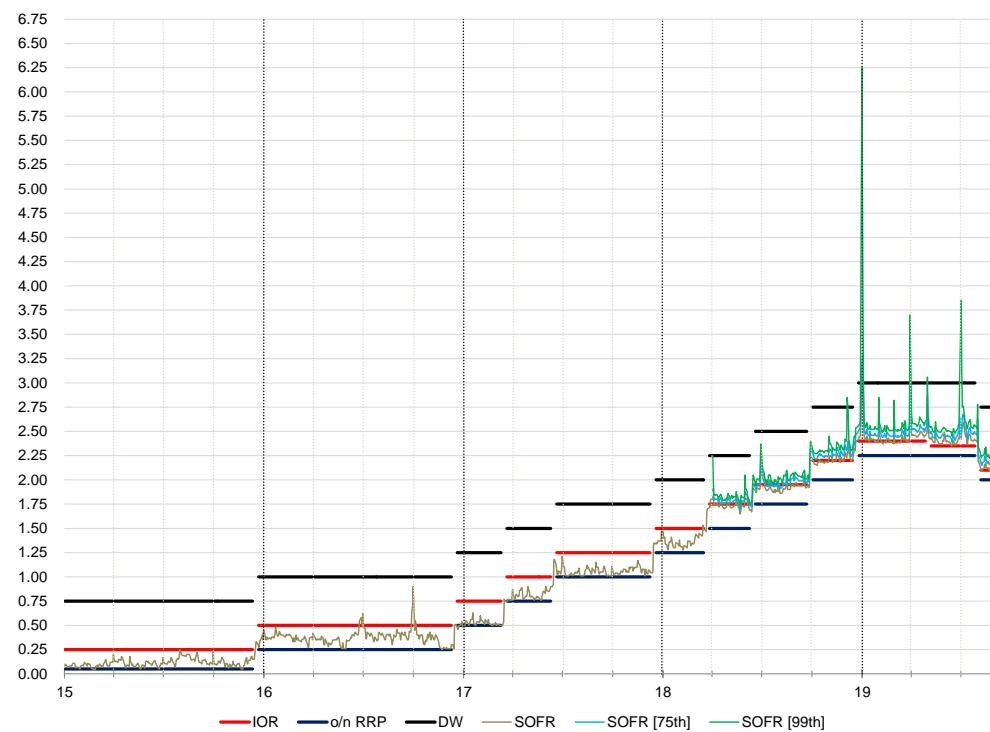
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 6: Repo Rates Relative to the Target Band [2]

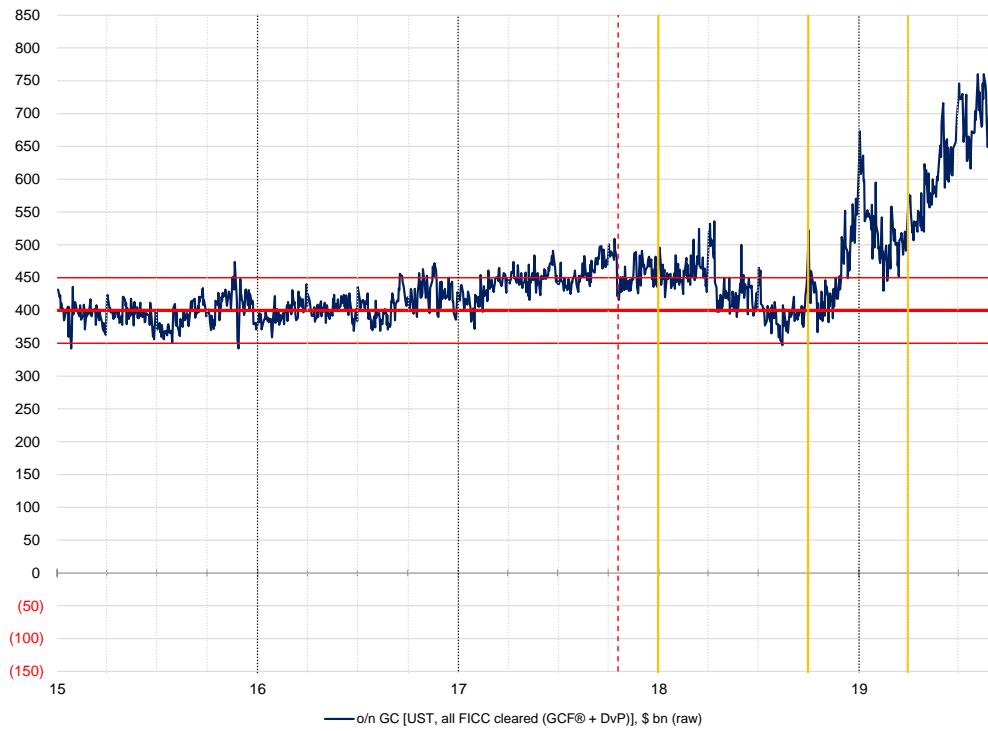
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 7: Growing Dealer Inventories of Treasuries Drive Demand for o/n GC Repos

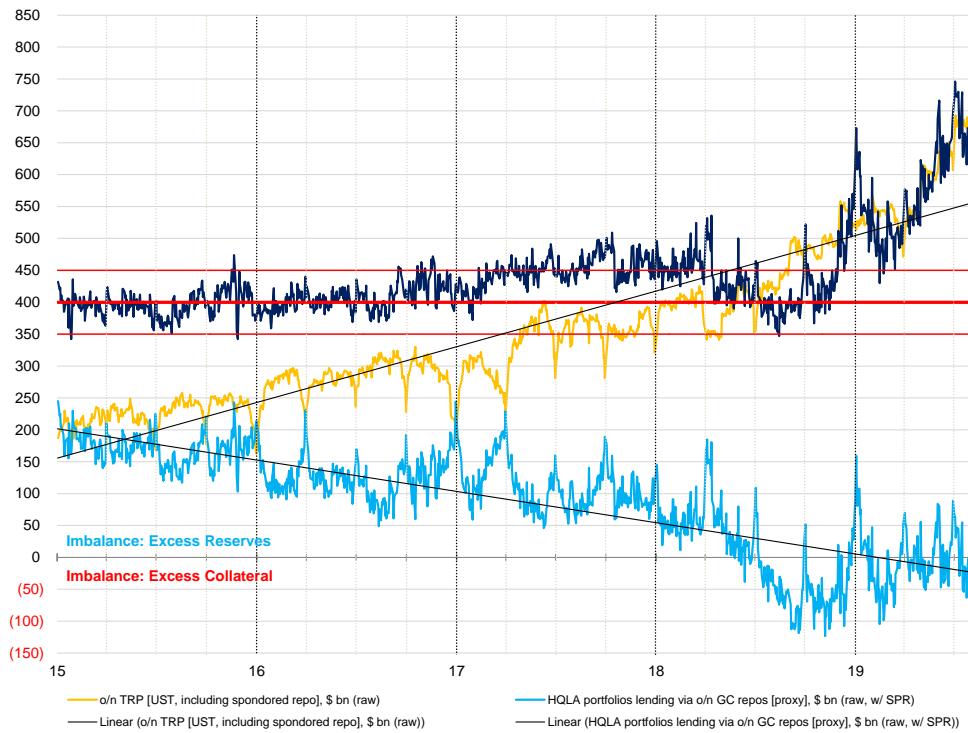
\$ billions, red dashed line notes the start of taper and the orange lines mark corporate tax reform, the FX-hedged curve inversion and the "3s/10s" inversion



Source: FRBNY, Credit Suisse

Figure 8: The Journey from an Excess Reserves to an Excess Collateral Regime

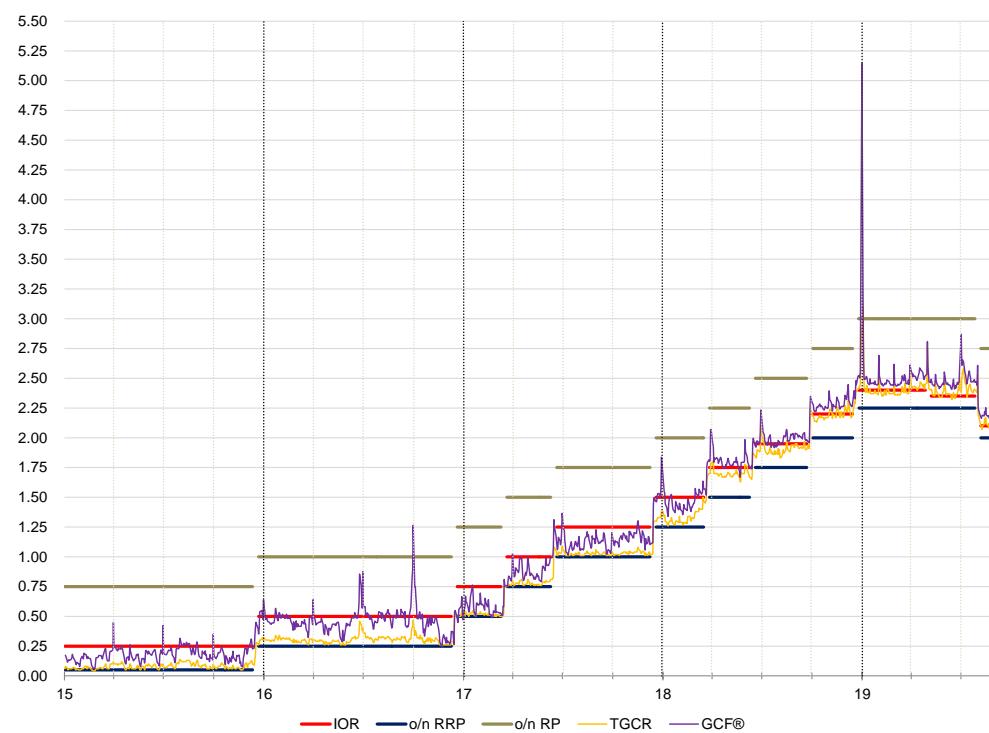
\$ billions



Source: FRBNY, Credit Suisse

Figure 9: An o/n RP Facility Priced to Deal with Calendar Turns

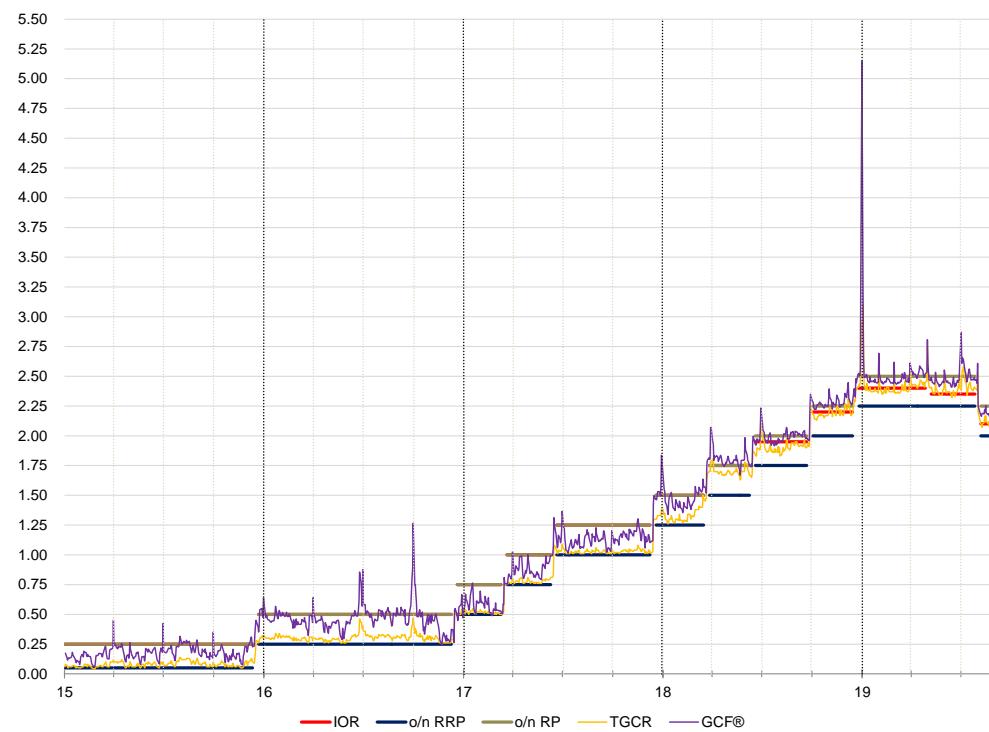
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 10: An o/n RP Facility Priced to Police the Top of the Band

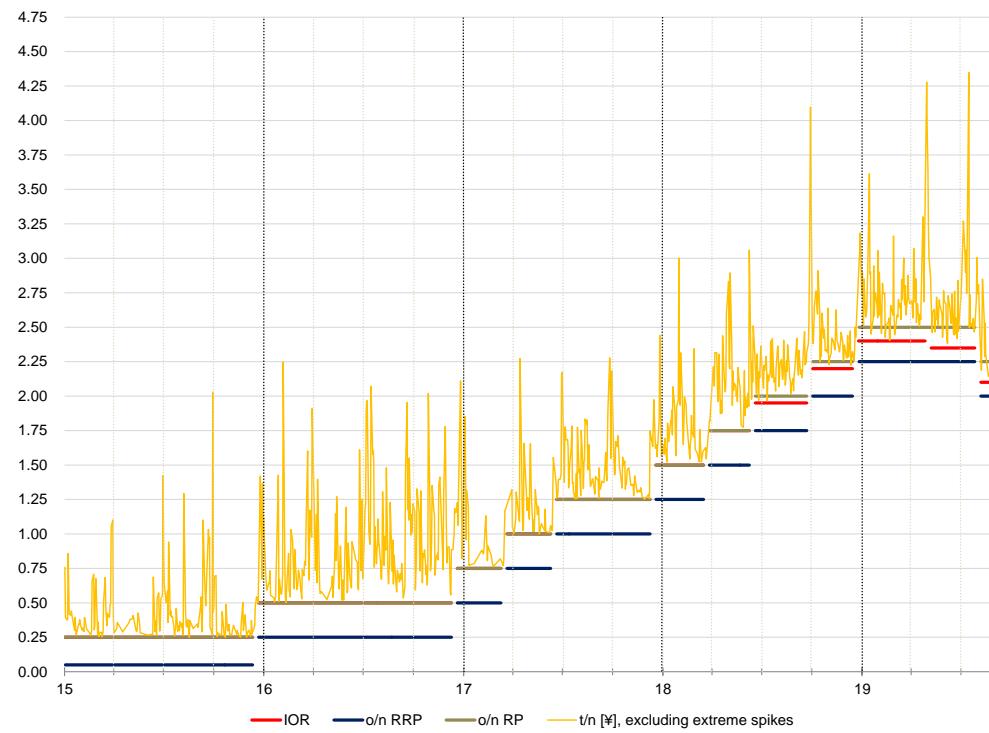
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 11: Using the o/n RP Facility to Arbitrage the \$/¥ Basis

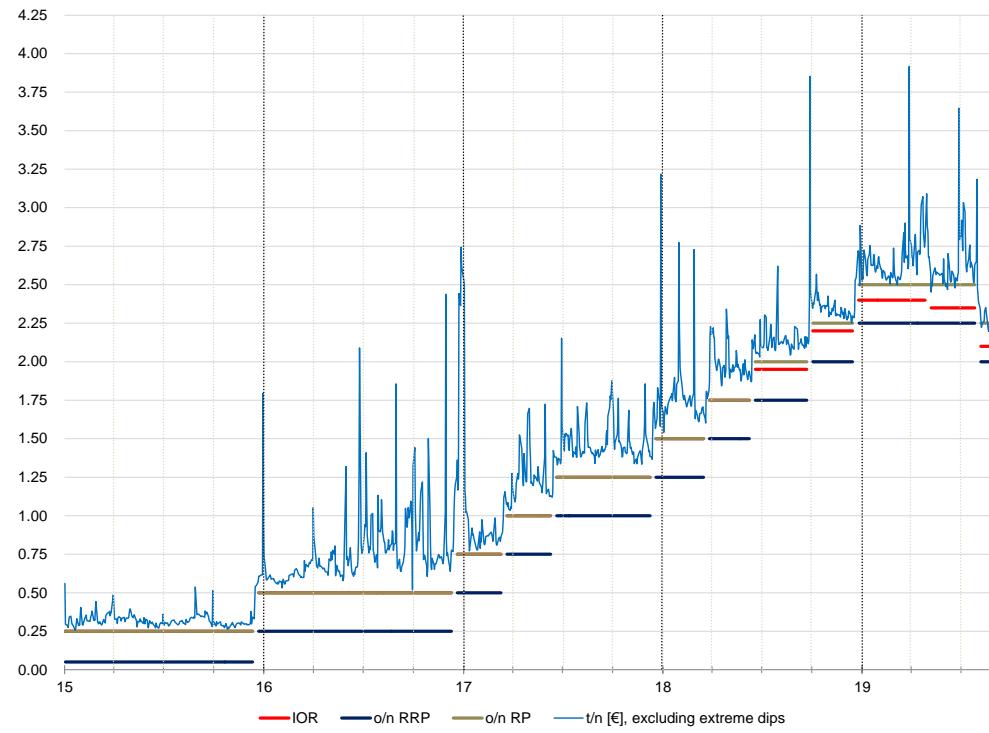
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 12: Using the o/n RP Facility to Arbitrage the €/\$ Basis

percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

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9 December 2019
Investment Solutions & Products
Global



Credit Suisse Economics

Global Money Notes #26

Countdown to QE4?

The Fed's liquidity operations have not been sufficient to relax the constraints banks will face in the upcoming year-end turn. Reserves are still insufficient; there are no true "excess" reserves; and large U.S. banks' G-SIB scores are shaping up to be a severe binding constraint heading into the year-end turn.

We have never had a year-end without a comfortable buffer of excess reserves or when G-SIB scores could force most U.S. banks to turn off market making.

The FX swap market shows implied yields that don't imply a bad year-end turn, yet it is the market most exposed to liquidity and balance sheet constraints.

The apparent lack of concern may come from last year's benign experience and that repo rates have been trading normally since the September blowout. But these facts are less relevant than they seem. Last December U.S. banks still had plentiful excess reserves to lend and had no G-SIB constraints; and that liquidity operations have kept a lid on repo rates since September, doesn't mean they will be effective as balance sheets bind going into year-end.

The FX swap market becoming unglued is the biggest risk for RV hedge funds' assumption that they will have balance sheet to fund their bond basis trades around the year-end turn at not-too-punitive rates, if at all. They've lined up forward settling sponsored repo trades to lock up balance sheet for the turn, but they don't know the rates they'll have to pay on these trades, or if banks will be able to fund these trades – and they are missing the incentives at play...

...which is that dealers selling forward settling sponsored repos over the turn have an incentive to introduce an imbalance in collateral markets to maximize the value of whatever excess reserves their bank operating subsidiary has left to lend over the turn. In turn, the dealers hedge funds expect to stand between them and the Fed to bridge the above imbalance may not be there for them if the FX swap market becomes unglued and offers better yields than GC repos.

If we're right about funding stresses, the Fed will be doing "QE4" by year-end: the safe asset – U.S. Treasuries – is funded by RV hedge funds on the margin and if the FX swap market pulls balance sheet and funding away from them, the safe asset will go on sale. Treasury yields can spike into year-end, and the Fed will have to shift from buying bills to buying what's on sale – coupons.

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Part I – Liquidity Operations ≠ Excess Reserves

The payments system used to be a credit system...

where banks routinely incurred daylight overdrafts – that is, negative balances – in their reserve accounts at the Fed. The Fed's intraday credit provision to the payments system ensured that payments between banks never bounced. Large money center banks like J.P. Morgan Chase Bank were the biggest and most active users of daylight overdrafts, and a once deep overnight (o/n) fed funds market was where large banks with negative reserve balances borrowed from small banks with positive reserve balances to get the reserves necessary to pay down their daylight overdrafts at the Fed by sunset.

The payments system morphed into a “token” system under Basel III...

as liquidity rules require large money center banks – which, under Basel III, we call globally systemically important banks or G-SIBs – to pre-fund their 30-day outflows, intraday liquidity needs and resolution liquidity needs. The liquidity war-chest of G-SIBs is held either in a reserve account at the Fed or in Treasuries. Intraday liquidity needs and resolution liquidity needs can only be met with reserves, whereas 30-day outflows can be met with both reserves and Treasuries and variations on their respective themes: o/n repos where banks swap reserves at the Fed for Treasuries reversed in for a day, and FX swaps where banks swap reserves at the Fed for reserves at the BoJ or the ECB.

Under Basel III, banks would never incur daylight overdrafts at the Fed for if were to, they would be in breach of either their intraday liquidity needs or resolution liquidity needs. This means that under Basel III the system clears with permanent reserves in circulation, as no bank has an incentive to borrow temporary reserves from the Fed on the margin.

The bank that has the most reserves in a token system...

functions as the system's lender of next-to-last resort, absorbing imbalances by lending some of its reserves via repos and FX swaps on the margin – but not all of its reserves. Since banks can meet their intraday and resolution liquidity needs only with reserves; reserves held for those liquidity needs aren't available for lending. It follows that a bank's ability to serve as the system's lender of next-to-last resort comes down to its reserves in excess of its intraday and resolution liquidity needs. Put differently, the excess reserves of the lender of next-to-last resort ensure that repo and FX swap markets have a backstop.

The concept of excess reserves is therefore an oxymoron...

as the lender of next-to-last resort's excess reserves are someone's required reserves and make the difference between money markets trading normally or falling into disarray. Given that J.P. Morgan was by far the largest user of daylight overdrafts before Basel III, it should not be a surprise that it became the largest holder of reserves under Basel III: if daylight overdrafts were the shock absorber that allowed the payments system, and, by extension, the repo and FX swap markets to deal with imbalances and clear seamlessly, it follows that if under Basel III no bank would ever tap the Fed for daylight overdrafts, J.P. Morgan's excess reserves became the system's shock absorber. J.P. Morgan's dominance in repo and FX clearing meant it had to hold more excess than other banks – its portfolio of excess reserves was the “[Bakken Shale](#)” of global dollar funding markets.

Thus, in a payments system that functions as a token system...

...an uneven distribution of reserves is the natural state. Upset that state by flattening the distribution of reserves and you rid the financial system of its lender of next-to-last resort. Taper and repeated cuts to the interest on reserves (IOR) rate were deliberately designed to eliminate excess reserves and flatten the distribution of reserves in the financial system, and that's precisely what caused the September storm in the repo and FX swap markets.

The Fed has been slow to recognize the full implications of this situation...

but in September it learned that when excess reserves are shredded through taper and the distribution of excess reserves is flattened through repeated cuts to the IOR rate, the system is left without a lender of next-to-last resort, and without such a lender the repo and FX swap markets can hit an air pocket, and the many entities that fund through those markets can't get things done: Treasury can't fund the deficits and pay its bills, dealers can't fund their Treasury inventories or their clearing accounts to make markets, and the world can't fund to get the U.S. dollars to pay for goods or to roll their FX hedges.

If carry makes the world go 'round, and reserves make carry possible...

...the day we run out of reserves would be the day when the world would stop spinning.

No, this is not an overstatement.

When Southeast Asia ran out of U.S. dollar reserves in 1997, the world did stop spinning – in Southeast Asia. Back then, the binding constraint was FX reserves – U.S. dollars in nostro accounts at large money center banks in New York. Today, the binding constraint is excess reserves – the reserves that G-SIBs hold in their reserve accounts at the Fed in excess of their regulatory requirements. When the money runs out, pegs get broken...

In Southeast Asia, we broke FX pegs.

In September, we broke o/n pegs – that is, the target range for the o/n rates complex.

To paraphrase Lou Mannheim's character: "*we looked in the abyss, there was nothing staring back at us, and at that moment, the Fed – with some delay – did the right thing and that was what kept us out of the abyss*"... and that was what kept the world spinning.

The Fed became lender of last resort to dealers as J.P. Morgan ran out of reserves to lend, and the primary financier of the government as \$250 of the \$275 billion of the reserves that's been put into the system since September ended up in Treasury's general account (see Figure 1). Thus, all that the Fed's liquidity operations have done to date is to ensure that the Treasury's cash needs don't drain further liquidity from banks' HQLA portfolios, but it did not inject excess reserves into the banking system ahead of the year-end turn.

That's another mistake in the making.

Under Basel III, year-end turns mark difficult to-get-through periods where the balance between balance sheet constraints and excess reserves determine where turns get priced.

Always and everywhere, excess reserves are what enable repo and FX swap markets to clear when foreign banks window dressing their leverage ratios stop making markets – when foreign banks stop borrowing in money markets to lend via repos and FX swaps, the market participants they've lent to would temporarily turn to J.P. Morgan for funding.

On the Fed's balance sheet, year-end flows would typically show up as liability swaps, where reserves drop and money funds' use of the o/n RRP facility spikes in equal amounts.

On J.P. Morgan's balance sheet, year-end flows would show up as asset swaps, where the above loss of reserves is filled by J.P. Morgan swapping its excess reserves for Treasuries through repos and for deposits at the ECB and the BoJ through FX swaps.

Thus, as the o/n RRP facility "sterilized" the reserves foreign banks did not have the balance sheet to intermediate, J.P. Morgan stepped up the lending of its excess reserves. This way, the aggregate reserves actively floating in the financial system did not change, only its mix – as some active reserves got sterilized, some excess reserves got activated...

but at a price: like the price of an Uber on a rainy day, surge pricing went into effect to mobilize excess reserves – a practice we've referred to as "fracking" in previous issues.

The growth of sponsored repo since 2018 changed some of these year-end dynamics as the reserves that went to the o/n RRP facility in the past now remain in the system as sponsored repo enables some banks to circulate them without using balance sheet. Figure 2 shows how year-end spikes in the o/n RRP facility migrated to sponsored repo and how the system went from sterilizing reserves on year-ends to retaining more of them.

As more reserves were retained in the repo market, fricking became less profitable – the FX swap market had more excess reserves and a better year-end turn in 2018, which made large U.S. banks spend all their excess reserves on Treasuries during 2019. Figure 3 shows the rotation from excess reserves to collateral in banks' HQLA portfolios: since the beginning of the Fed's balance sheet taper, large U.S. banks like J.P. Morgan that are central to year-end flows spent some \$350 billion of excess reserves on collateral.

Truly “excess” reserves are thus gone...

...but dealers and banks loaded up on collateral as a trade – a trade they were supposed to be taken out of by eventual coupon purchases by the Fed. But the Fed never did that, and for the first time we're heading into a year-end turn without any excess reserves.

Don't fight the Fed you say, they are adding liquidity through repos and bill purchases, and what's not in the system now will be there on year-end, and the turn will be just fine.

Not so fast!

What we need for the turn to go well are balance sheet neutral repo operations, or asset purchases aimed at what dealers bought all year: coupons, not bills – the former to get around foreign banks' balance sheet constraints around year-end, and the latter to ensure that excess reserves accumulate with large banks like J.P. Morgan.

Unfortunately, the Fed is doing neither.

Repo operations are done through the tri-party system which means they aren't nettable, which in turn means that once balance sheet constraints start to bind around year-end, foreign dealers will take less liquidity from it to lend it to those in need on the periphery: central bank liquidity is useless unless primary dealers have balance sheet to pass it on, and that they've been passing it on since September does not mean they will at year-end.

Bill purchases are also ill conceived because banks and dealers don't own any bills and so don't have anything to sell to the Fed to boost their excess reserves ahead of year-end. In our view, the notion that bill purchases will force money funds down the yield curve to buy short coupons from primary dealers who would then pay off their repos with banks so that banks build up some excess reserves into year-end involves too many moving parts...

...and Murphy's law applies in money markets too.

In our view, once the Fed's bill purchases push bill yields below the o/n RRP facility rate – there are about 10 basis points to go (see Figure 4) – the reserves entering the system won't flow down the curve and up to banks, but up the curve and down the drain...

to the o/n RRP facility where reserves get sterilized. Money market funds need a steeper money market curve to start buying short coupons, but with the Fed done with rate cuts for now, more slope is not in the cards. In turn, if o/n repos and short coupons yield the same, money funds will choose repos – with dealers until there is balance sheet, and with the Fed when balance sheet constraints flare up and start to bind into year-end.

In summary, year-end balance sheet constraints will preclude primary dealers from bidding for reserves from the Fed through the repo facility or through repos from money funds. The slope of money market curves suggest that excess reserves won't build up at banks, and so U.S. banks will not be able to fill the market making vacuum left by foreign banks.

Part II – G-SIB Scores and the Flow of Excess Reserves

Running low on excess reserves is only one factor that determines how bad the vacuum in market making can get around year-end turns. G-SIB scores are the other, as they determine what banks can do with whatever excess reserves they have at year-end: lend them through repos, spend them on Treasuries, or lend them through FX swaps, – in that specific order as repos are less punitive for banks' G-SIB score than FX swaps.

U.S. banks are particularly sensitive to their G-SIB scores this year, as they all moved up to a higher [surcharge bucket](#) due to bigger Treasury holdings and a heavier repo footprint: every U.S. bank except Morgan Stanley has an incentive to shrink its score into year-end.

G-SIB scores are a moving target as they are influenced by markets. The themes pushing G-SIB scores in the wrong direction this year are the equity market rally and the flat curve:

- (1) the rally in equities is inflating scores through G-SIBs' market capitalization and the value of equities G-SIBs hold as trading assets or available for sale securities;
- (2) the flat yield curve is inflating scores through G-SIBs' bloated Treasury portfolios, which, given auction supply and the equities rally, may grow further into year-end.

U.S. G-SIBs can't do a thing about the equity market, and, as the largest primary dealers, they also can't not take down more Treasuries at auctions if there are insufficient bids; but they can do two things to offset some of the factors that are pushing their scores up:

- (1) collateral upgrades where they repo equities out to raise some excess reserves, or repo or outright sell some of their Treasuries to raise some excess reserves.
- (2) clamping down on market making in the FX swap or sponsored repo markets whereby they'd add to the vacuum in market making triggered by foreign banks.

Note the connection between "remedial" trades to G-SIB scores and excess reserves – when G-SIB scores are too high and banks need to reduce them, they do so by swapping assets for excess reserves. In other words, when banks hold lots of excess reserves their G-SIB scores are relatively low and they have room to lend their excess reserves through repos and FX swaps, and conversely, when banks are low on excess reserves their G-SIB scores are high and that may force them to clamp down on market making.

Excess reserves are gone and as a result G-SIB scores are high...

and banks are lowering their scores by swapping assets for reserves to scrape together some excess reserves ahead of the year-end turn – and those scraps are all U.S. banks will have to lend into the market making vacuum left by foreign banks around year-end...

lending mostly via repos and not FX swaps given their G-SIB scores. But these flows will be scraps of excess reserves, not bursts from the Bakken Shale like in the past...

and that's the best case scenario.

The worst case scenario is that collateral upgrades aren't sufficient and U.S. banks stop making markets in FX swaps and so exacerbate the vacuum triggered by foreign banks.

We are on track to realize the worst case scenario, and the market doesn't price for that.

According to our conversations with market participants, U.S. G-SIBs rely heavily on Canadian pensions for equity upgrades to accumulate some excess reserves for the turn.

Furthermore, some large U.S. banks are selling Treasuries to lower their G-SIB scores and scrape together some excess reserves to harvest higher repo rates over year-end.

Finally, at least one large U.S. bank appears to be pricing some of its FX swaps trades such that it misses those trades – a polite way of clamping down market making activities.

G-SIB score-related year-end pressures are thus on...

...and the equity market rally and Treasury auctions are the main variables to watch: for every dollar of equities funded with Canadian pensions to reduce one's G-SIB score, a one dollar gain in one's market cap or equity inventories forces another upgrade trade; the more the stock market rallies into year-end the more the demand for upgrades trades, and the higher the rate where banks will lend scraps of excess reserves over the turn; similarly, for every dollar of Treasuries sold by a bank portfolio to reduce G-SIB scores, a one dollar gain in Treasury inventories due to a poor auction can push scores back up.

One step forward, one step back...

and if markets won't let G-SIBs reduce their scores, G-SIBs will retort to scale back market making, like the one U.S. bank that's already pricing FX swap trades to miss them. We do not see the pressure from this in FX swap markets yet as foreign banks still have balance sheet to pick up the slack, but pressures will come as we get closer to year-end.

Our point is that the realized turn in FX swap markets will be worse than what is priced by the market regardless of whether we end up in the best case or worst case scenario.

In our view, the FX swap market is expecting too much similarity between the current year-end turn to last year's turn. That's a mistake as last year's dynamics were different:

- (1) large U.S. banks still had excess reserves to lend, but this year they do not; and
- (2) they got a G-SIB relief from a 20% fall in equities, but this year end they do not.

Lower G-SIB scores allowed large U.S. banks to spend their hoards of excess reserves on more complex trades like FX swaps, and the year-end turn went down as a non-event – in FX swaps, but not repos. Recall that repo printed at 6.5% on December 31st spot.

This year may be the opposite.

Higher G-SIB scores will favor repos over FX swaps when deploying excess reserves, but given that the Bakken Shale has run dry, repos may still print as bad as last year-end, while FX swaps could end up as the orphaned asset class without an obvious backstop, and that may force banks in some parts of the world to the edge of the proverbial abyss.

Meanwhile, the relative value (RV) hedge fund community is certain that they will have balance sheet to fund their bond basis trades at reasonable rates over the year-end turn.

Why?

"Because we have locked up forward settling sponsored repos with dealers over the turn, and market making in sponsored repos is less likely to be scaled back than in FX swaps."

Forward settling sponsored repos are meant to substitute for the balance sheet that the RV hedge funds will lose from foreign banks around year-end, but their risk is that RV hedge funds don't know the rate at which they'll get balance sheet at year-end – forward settling sponsored repos only lock in balance sheet capacity, but not the rate...

...and with all due respect, RV funds are ignoring the incentives of repo dealers.

The "romantic" understanding of how sponsored repo works is that a sponsoring dealer sponsors in a unit of cash from a money fund and a unit of cash from an RV hedge fund and novates both sides of the book to FICC so that the growth of its sponsored repo book does not introduce an imbalance in the repo market. But that's not the way things work.

The "realpolitik" of sponsored repo is this: some sponsors have access to money funds and some sponsors have access to hedge funds and the former sponsor cash into FICC and the latter sponsor collateral into FICC. Thus, the pace at which cash and collateral is being sponsored in is never in line, and if collateral is being sponsored in faster than cash,

imbalances can arise. Those sponsors that have a large bank operating subsidiary with excess reserves have an incentive to sponsor in collateral in excess of their excess reserves to boost the value of their scraps of excess reserves; and if their scraps run out and forward repos can't be funded, that's not the sponsors' problem but the RV funds' problem.

Without having intelligence about the balance between forward settling sponsored repos and banks' progress to scrape together excess reserves to fund those forward repos, RV funds don't know where the rate on their forward settling sponsored repos will print. And given that there are no signs of excess reserves accumulating into year-end, it is likely that the RV community will be taxed excessively to get over the year-end turn.

No problem you say...

as the excess reserves missing from bank portfolios will be filled by a small cadre of primary dealers that do not have balance sheet constraints and they'll fill the hole and keep a lid on repo rates. Sure, let's assume for a moment that those primary dealers that are not subject to Basel III – Amherst Pierpont Securities LLC, Cantor Fitzgerald & Co. and Jefferies LLC – and three Canadian dealers whose year-end was on October 31st – the Bank of Nova Scotia, BMO Capital Markets Corp. and TD Securities (USA) LLC – will save the day by borrowing enough from the Fed to bridge your needs in repo markets.

Maybe, maybe not.

The risk to this benign and optimistic view is the FX swap market as discussed above: given that G-SIB scores bind and excess reserves are gone, the FX swap market, unlike last year-end, may end up without a lender of next-to-last resort, and so it will likely trade at implied rates far worse than anything that we've seen in recent year-end turns. If that will indeed be the case, the Canadian dealers you expect to lend to you to fund your bond basis trades will lend in the FX swap market instead and you'll end up short...

and you may end up as a forced seller of Treasuries.

Our overarching point is that a dealer is a hedge fund's enabler, not its friend...

and dealers that co-exist with large bank operating subsidiaries have an incentive to introduce imbalances the repo market to boost the value of their banks' excess reserves, and dealers that have the balance sheet to take liquidity from the Fed's repo operations will not necessarily do repos with RV hedge funds if FX swaps offer a much better value.

Our big picture conclusion is that...

the safe asset – U.S. Treasuries – is being funded o/n and therefore it depends on balance sheet to be held and printed. Balance sheet for the safe asset isn't guaranteed around year-end and if balance sheet won't be there, the safe asset will go on sale...

Treasury yields will spike.

The FX swap market could be the trigger of forced sales of Treasuries around year-end, and these funding market stresses will likely pull away capital and hence balance sheet from equity long-short strategies which could spill over into a broader equity selloff...

during a Treasury selloff – that's not the right kind of risk parity Christmas.

When these pressures will show up and how long they will last is the last big question, and here it's hard to have a definitive answer: it depends. It depends on how equities do, which depends on the trade deal and other random tweets. It depends on how auctions go, which depends on the equity market and the curve slope relative to actual funding costs.

If the equity market rallies and auctions go poorly, G-SIB scores will keep going higher and the risk that funding market pressures from managing G-SIB scores will show up starting the last two weeks of the year and will last longer than just the spot turn are rising.

Conclusions – FX Swap Lines and “QE4”

Year-end in the FX swap market is thus shaping up to be the worst in recent memory, and the markets are not pricing any of this. Prices don't seem to discount the facts that excess reserves are gone and the Fed's operations still have not added any, and that G-SIB scores are binding and risk large U.S. banks clamping down on market making.

Neither does anyone think that the Fed will cut one more time in December to deliver slope in the money market curve so that reserves from bill purchases flow up to banks; or that the Fed will actively encourage the use of FX swap lines around year-end to get around G-SIB bottlenecks; or that the Fed will start buying coupons from dealers to inject excess reserves in a balance sheet neutral and G-SIB score-reducing manner.

Something will have to give and the turn has to get very bad before something gives...

If we are right and the Fed loses control over the o/n rates complex going into year-end – not just around the spot turn but the weeks leading up to it – what else can the Fed do?

- (1) encourage foreign central banks to use of the FX swap lines;
- (2) start QE4 by switching from buying bills to buying coupons;

The Fed's FX swap lines would get around the G-SIB problem directly – if market making in the FX swap market breaks down due to G-SIB-related bottlenecks at large banks, flows get kicked higher up in the hierarchy and central banks become market makers in FX swaps and lend dollars to banks in their jurisdictions at a price of OIS + 50 bps...

...so that the world does not stop spinning.

That response would deal with the potential problems in FX swap markets above head on, and ensure that the reserves taken by a select group of dealers from the repo facility around year-end flow into the repo market to fill the funding needs of RV hedge funds.

QE4 would help through the backdoor: by reversing the mistake of balance sheet taper. QE4 would mean buying back from dealers and banks the Treasuries they were forced to buy during balance sheet taper and giving back the reserves they gave up in the process.

QE4 would re-liquefy HQLA portfolios by trading Treasuries for excess reserves...

the excess reserves that were always needed to get through to year-ends seamlessly, and which the system's liquidity profile and U.S. banks G-SIB scores need desperately.

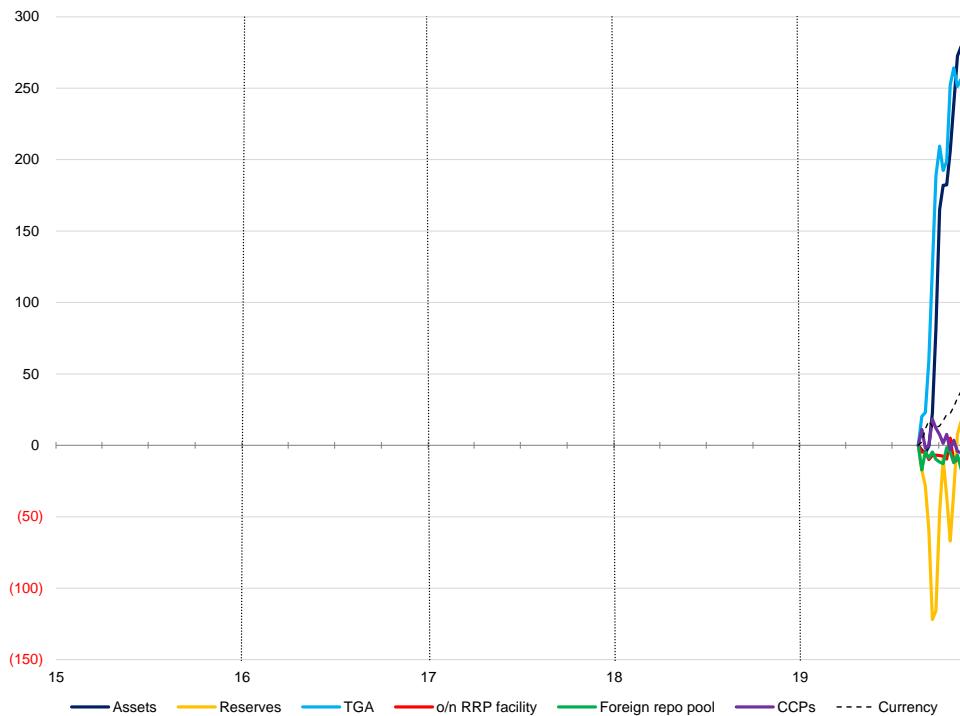
QE4 would re-fill the Bakken Shale in an instant...

as primary dealers stuck with Treasuries would pay off their repos with J.P Morgan, and that would bring us back to the natural state of the token system, that is, a state, where the distribution of excess reserves is uneven once again, and where J.P. Morgan is the system's lender of next-to-last resort once again. Why is that better than the Fed?

Because J.P. Morgan has the right set of pipes: it lends into FICC and the Fed does not. Because J.P. Morgan is pragmatic: it buys coupons when it has to and the Fed does not.

QE4 – as much as it makes sense – won't happen unless the Fed's hands are forced...

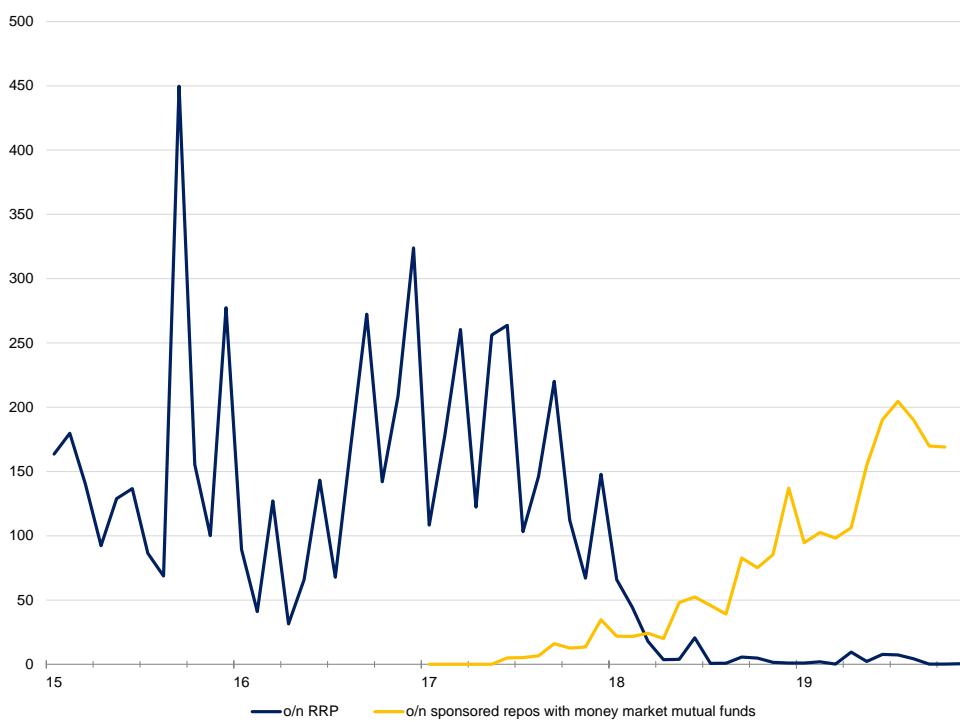
and not responding to potential stresses in the FX swap market with the swap lines, may be what forces the Fed's hands. If it will take the swap lines to help RV hedge funds to roll their positions without the risk of fire sales, not encouraging their use preemptively can lead to fire sales where QE4 goes live as a clean-up “operation” with the Fed buying what the RV funds are forced to sell – and what they could have bought from dealers under normal circumstances as dealers have been politely asking the Fed since September, just like they were asking for a repo facility before that – and we know how that ended...

Figure 1: Liquidity Operations Have Not Boosted Excess Reserves\$ billions, based = August 21st, 2019 = 0

Source: Federal Reserve, Credit Suisse

Figure 2: From Sterilization to Circulation

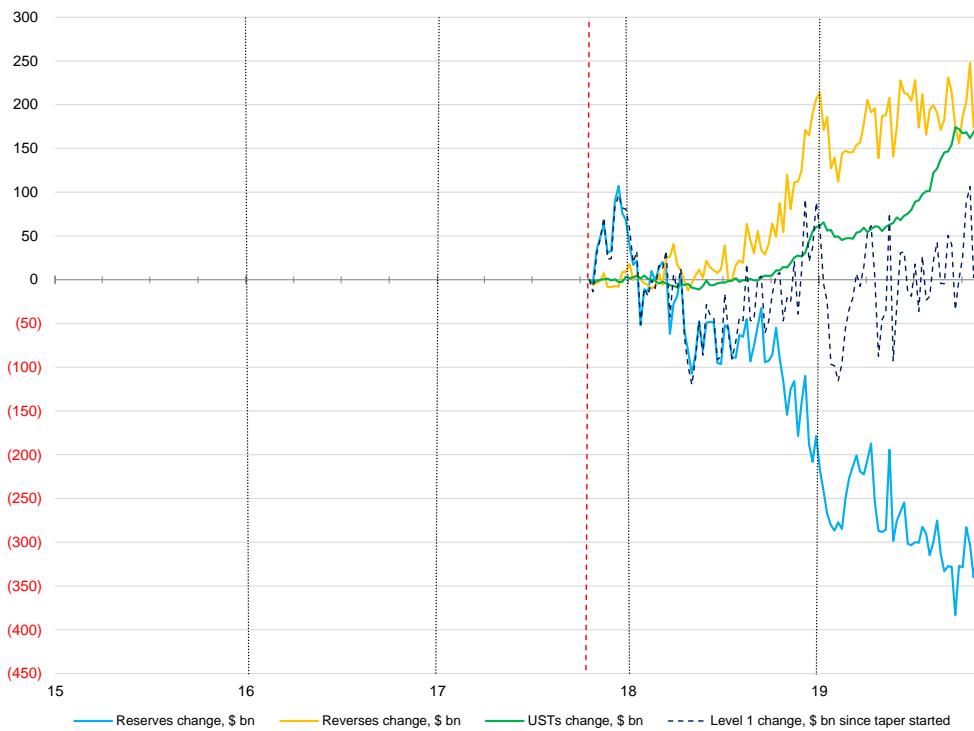
\$ billions



Source: Federal Reserve, FICC, Credit Suisse

Figure 3: Large U.S. Banks Have No Excess Reserves Left to “Frack”

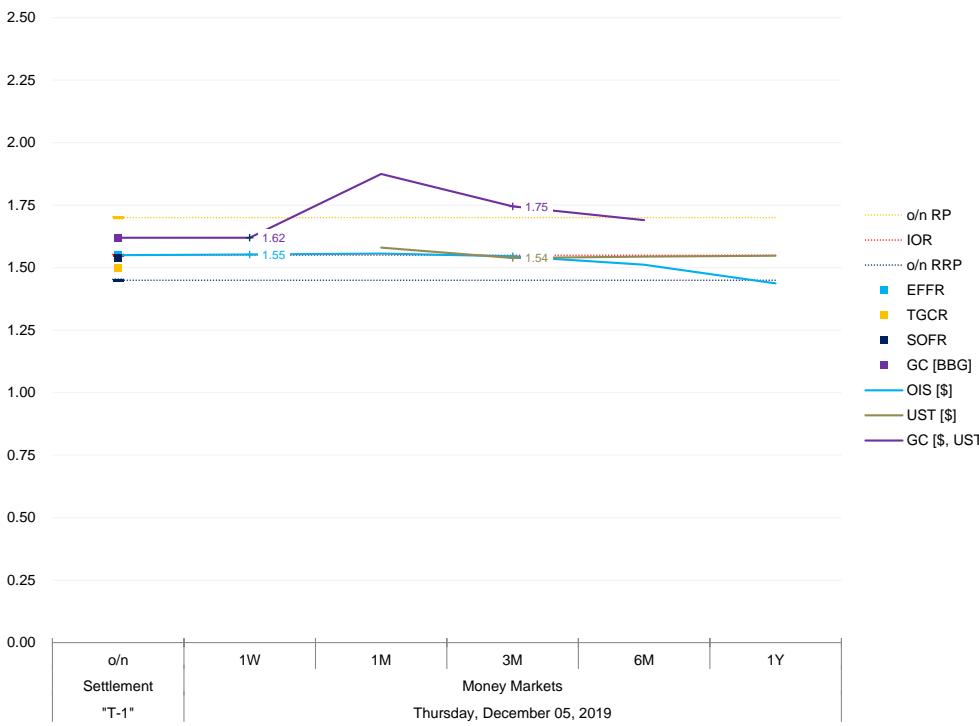
\$ billions, base = start of balance sheet taper = 0



Source: Federal Reserve, Credit Suisse

Figure 4: Up the Curve and Down the Drain

percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

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Credit Suisse Economics

Global Money Notes #27

Covid-19 and Global Dollar Funding

Today's liquidity conditions are like the waters receding before a giant wave.

The coronavirus outbreak and the shock that preventative measures introduced to manufacturing and services activity will lead to missed payments globally. Missed payments will force more and more firms to become deficit agents; as this cascades, banks and regional banking systems will become deficit agents.

Our main concern is about missed payments of U.S. dollars globally, as local central banks can deal with missed payments in local currency fairly easily.

Dollar funding is always the orphaned child of crises as the regions where the pressures flare up have no control over it and the Fed, uncomfortable with the reality of it being the *de facto* central bank of the world, takes time to step in...

...not necessarily in terms of rate cuts, but in terms of adding liquidity.

The safety net around the financial system has been enhanced since the GFC: FX reserves are plentiful, global banks have liquidity buffers and the standing FX swap lines are there to add liquidity. But FX reserves need to be monetized, the outbreak may reveal some design problems of Basel III, and FX swap lines are not for everyone. A lot can go wrong with the system's immune system...

In this issue of Global Money Notes, we present a framework to help macro traders think through how a crisis could spread through dollar funding markets, and what central banks can do to calm funding stresses: peripheral and core cross-currency bases are set to widen first, followed by Libor-OIS spreads...

...to at least 60 bps by June, if the outbreak worsens.

The biggest risk we see to the plumbing is the Fed cutting rates aggressively, without pledging an open-ended liquidity support through its balance sheet: due to the inversion, money funds have seen \$600 billion of inflows last year, most of which went to fund dealers' and hedge funds holdings of Treasuries. Aggressive rate cuts could send those funds back to the bond market, just when the funds are needed in the money market due to missed payments.

According to ancient Andaman folklore, when you see the waters disappear, move inland and get to the highest point you can find, away from the shoreline. As banks hoard the highest form of liquidity – reserves – the periphery will come knocking for liquidity. Now's not the time to end QE. It's time to lean in...

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Important Information

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Our flagship publications – Global Cycle Notes and Global Money Notes – are related. Global Cycle Notes tracks the global industrial production (IP) cycle due to its strong correlations with a wide range of financial variables including equity markets, bond yields, monetary policy decisions and commodity prices. Global Money Notes tracks the events that influence global funding spreads as funding spreads can have a strong influence on the same set of financial variables. Normally, the global IP cycle and funding spreads dance to different tunes and their impacts on asset prices can offset or amplify each other.

The coronavirus outbreak and the shock that preventative measures introduced to the global IP cycle and services activity mark a rare occasion when our two publications meet.

The supply chain is a payment chain in reverse...

...and so an abrupt halt in production can quickly lead to missed payments elsewhere.

Consider the difference between “value added” and “output” as measures of activity. Value added reflects a firm’s output minus its inputs, or simply the sum of its profits and labor costs. Output reflects its total sales (revenues), and so are a measure of payments. So, output at the end of a supply chain is the sum of everyone’s sales. Figure 1 shows the ratio of output to value added in manufacturing and services for the U.S. and China: the ratios for manufacturing are much higher than they are for services; and for China this is more extreme than the United States. China represents about 30% of global value added in manufacturing, but its share of payments, along the global manufacturing supply chain, is much bigger. This implies that a sharp shock to Chinese manufacturing will have a disproportionate impact on payments in the global goods sector, so a sharp IP shock is therefore a potential risk for widespread financial distress and missed payments globally.

The question is how much financial damage is done by the current IP shock and the fact that it coincides with a shock in services – a sector which is seldom volatile or cyclical.

Missed payments in manufacturing are one thing.

Missed payments in manufacturing and services at the same time are another.

On the following pages, we lay out a framework to help macro traders think about the possible impact of the outbreak on funding markets. When sketching such frameworks, it is helpful to describe how bad things can get and how central banks can calm markets.

Our focus is on global dollar funding markets, as we assume that local central banks can deal with local funding pressures deftly, which we already saw in the case of the PBoC.

In the case of dollar funding, the buck always stops with the Fed. But before pressures reach the Fed, the FX swap, Eurodollar and repo markets will exhibit some signs of stress.

Dollar funding is always the orphaned child of crises as the regions where the pressures flare up have no control over it, and the Fed, uncomfortable with the reality of it being the *de facto* central bank of the world, always takes its time to step in to ease the pressures until it’s absolutely necessary. The time between the initial flare-up of stresses and the Fed’s ultimate response is STIR traders’ window of opportunity to harvest funding market dislocations. This issue of Global Money Notes presents some indicators to time the onset of stresses and identifies potential weak links in funding markets in some corners of Asia.

Part one describes our approach to thinking about funding pressures due to the outbreak, and why the initial impulse from the outbreak on funding is positive. Part two describes how missed payments will cause more firms to deplete their dollar deposits over time. Part three describes some cyclical and structural dampeners that help banks manage the drawdown of corporate deposits. Part four describes how interbank markets can be overwhelmed by deposit drawdowns and what central banks can do to alleviate pressures.

Part I – The Elephant in the Dark

Trying to figure out the funding market impact of the outbreak is difficult, as there are no real time macro data on things like trade finance, shipping finance, commodity finance, and it's hard to say how fast firms are going from running positive to negative dollar deposits at banks as missed payments accumulate, and how fast these deposit flows are pushing individual banks and regional banking systems from dollar surpluses to dollar deficits.

The last time we had to get a feel for the shape of potentially bad things to come was just ten years ago as a trader/analyst at the New York Fed and a strategist at Credit Suisse, respectively. One of us mapped the shadow banking system (see [here](#)) and the other wrote about the central role collateral played in the shadow banking system (see [here](#)).

There was no map of the shadow banking system – we had to imagine it and map it. There were no data about collateral – we had to collect it anecdotally to write about it.

This is another time to imagine...

Our deep-dive to dissect the potential funding market impact of the outbreak had a difficult start. The issue wasn't as much a lack of data, but rather conflicting color we've received from talking to various bank treasurers in Hong Kong, Singapore and Tokyo in recent weeks. Some banks saw rapid drawdowns of dollar balances by corporations and regional banks, while other banks saw positive dollar balances due to a fall in demand for trade finance, shipping finance and commodity finance. Initially that confused us, but upon further reflection, we found the conflicting color illuminating: every bank runs on double entry bookkeeping and it is natural that deficits at some banks show up as surpluses at other banks – the very role of interbank markets is to clear those imbalances.

The very fact that anecdotes are divergent tells us that some corporations are becoming deficit agents – that is, entities that are losing dollar deposits and will soon borrow dollars.

Conceptually, visualize a tilted J-curve when thinking about the funding impact of the outbreak over time. The initial funding impact is positive due to a dropoff in demand for funding related to the sourcing and movement of commodities and intermediate goods, but over time, missed payments due to a prolonged halt in manufacturing and services will start to dominate and the funding impact of the outbreak will flip from positive to negative.

The initial positive funding impact comes from three sources:

- (1) Less demand for commodity finance, as commodities are not in demand and don't need to be mined and moved around (less demand for oil, coal and copper).
- (2) Less demand for trade finance as factories remain shut across China and there is no demand for intermediate goods (see our latest Global Cycle Notes [here](#)).
- (3) Less demand for shipping finance as new commodities and intermediate goods are not being sourced and because final goods are not being shipped.

Data on these financing activities are scarce, but a BIS [report](#) on trade finance from 2014 provides some contours: Figure 2 shows that trade finance is much bigger than commodity finance or shipping finance and is heavily reliant on banks, particularly in Asia.

When demand for trade and other financing falls, banks' funding needs naturally fall too, and as some funding that banks already raised to pre-fund customers' anticipated funding needs go unused, banks' liquidity portfolios get a temporary boost as well, which amplifies the initial positive funding impact. But this positive funding impulse is only temporary, and we are probably nearing the end of the initial grace period for global dollar funding.

Funding pressures will likely increase from here as missed payments accumulate and fixed costs drain dollar balances, forcing more firms to become deficit agents over time.

Part II – Contagion through Deficit Agents

Debt is agnostic to your circumstances – it must be serviced, otherwise you are bankrupt.

Factory closures and an abrupt halt in the assembly and shipment of final goods and quarantined metropolises therefore matter for firms as debts must be serviced regardless, and if dollars don't flow in from sales and payments, they have to be raised from banks.

Because the shock from missed payments is biggest in high-value added supply chains, we use the tech supply chain as our main example for mapping out how missed payments can propagate and to frame our thinking about missed payments in some other industries.

Thus, as we noted above, “the supply chain is a payment chain in reverse” and when output is not being shipped, the assembler/seller of final goods in China does not have inflows to pay the suppliers of intermediate goods, so firms in Japan, Korea and Taiwan are not having inflows either – every firm along the chain starts to become a deficit agent.

Beyond the initial deficit entry – not getting paid for components already shipped – deficits will multiply over time due to fixed costs. Think about servicing assets – plants, offices, ships, other transportation fleets – and servicing the debt that's financing these assets.

We know from a series of papers from the BIS that dollar-denominated debts dominate corporate balance sheets globally (see Figure 3) – their servicing will drain dollar balances.

Even though principal on these debts is due far out in the future, interest payments must be serviced at high frequency – every three to six months – and common sense would suggest that interest payments are normally financed from proceeds generated through operating activities: the orderly assembly, production and shipment of final goods.

Prolonged periods without dollar inflows will make servicing even the interest portion of debts problematic, so local banks could soon be tapped to raise dollars to service them.

As deficit entries accumulate across supply chains and across industries, deficit agents will multiply and spiral into a deeper deficit balance. These funding pressures will either lead or coincide with pressures on credit spreads – the two can even amplify each other.

Japanese banks became big lenders in trade finance post-GFC (see [here](#)) and a large part of their dollar funding needs through the FX swap market is related to trade finance.

Japanese banks' role in trade finance runs on the assumption of “business as usual” where the main entities they typically finance are the assemblers of final goods, not necessarily the producers of intermediate goods. If Japanese banks' funding the assemblers is what normally providers dollars to the producers of intermediate goods, if the assembly process comes to a halt and related demand for trade financing drops off, producers of intermediate goods have to get their dollars from somewhere else – from local banks, in local jurisdictions. That switch in funding sources has the potential to re-distribute pressures across cross-currency bases – less pressure on the \$/¥ basis and more pressure on the Korean won basis for example – and cause earnings shocks too as other countries' banking systems cannot raise dollars as cheaply as Japanese banks.

That's because the dollar funding leg of FX swap trades are the same for everyone, but the local funding leg of FX swap trades are the cheapest in Japan as that's where interest rates are negative – indeed, this has been a major factor in the rapid growth of large Japanese banks' market share in trade finance and shipping finance post-GFC.

Value added shares further complicate the potential impact on cross-currency bases.

High value added firms (chipmakers) are more at risk of negative payments shocks than low value added firms (assemblers). That's because the assembler gets the big payment, but keeps only a small portion to pay manual laborers and passes the rest of it on to the

chipmakers as a payment for intermediate goods. That means that the impact on funding pressures coming from missed payments along the manufacturing supply chain will mirror the value-added share of different jurisdictions along the funding chain. Figure 4 shows that Japan, Korea and Taiwan dominate the value added share of the tech supply chain that runs through China, which means that cross-currency bases are more at risk of widening on the back of missed payments in Japan, Korea or Taiwan than in China.

Ironically, the stock of FX reserves is much greater in China than in Korea or Taiwan, so the risk of a payments shock is not at all proportionate to the stock of FX reserves in some jurisdictions. Further complications come from the composition of FX reserves, which is the least favorable in Taiwan as we'll explain in detail in part four of our analysis.

Lower value added manufacturing supply chains are impacted by the outbreak as well, which will potentially lead to potential stresses in other jurisdictions across the world.

But the value created through these supply chains are small relative to tech supply chains (think T-shirts and rubber ducks), so the funding impact will be smaller and also less dollar centric, which means that local central banks should be able to handle the fallout.

Once we understand the funding impact along the global manufacturing supply chain, it's easy to run with the theme to look for parallels in the service industry, and in industries that combine manufacturing and services through high-value branding.

Consider, for example, an Asian airline that stops having inflows due to reduced demand to fly to, from and across Asia. The initial positive impact on funding comes from the reduced demand for jet fuel – which is also mirrored in the reduced funding needs of commodity houses that would fund the sourcing and shipment of jet fuel for airlines – but the deficits accumulate over time from keeping pilots and cabin crews on payroll, paying the rent on parking spots and gates at hundreds of airports the world over, and servicing the debt that finances the fleet of aircrafts. The longer passengers don't fly, the longer the planes are grounded, and the more the airline's dollar deposits are depleted: the airline gradually becomes a deficit agent, like chipmakers above. Hotels are next...

Similarly, think about the dropoff in the demand for luxury goods in China, and the need to keep artisans on payroll in Paris and Milan and financing the rent on a global portfolio of prime retail stores in London, New York, Zurich or Hong Kong or at empty airports.

Value added along these chains isn't high in the traditional sense, but because of branding: brands make the prices high, and high prices pay the rents. It's very easy to see how luxury brands can become deficit agents as cities are quarantined and people spend less.

These two service sector examples are admittedly extreme, but for framing purposes: they demonstrate well how the outbreak can impact a growing range of industries globally.

We know that these impacts are already happening and are impacting more and more firms in both manufacturing and services – the barrage of negative earning guidance we read about every day suggest that more and more firms are going from running positive dollar balances to depleting dollar balances on their way to become deficit agents.

As more and more companies report negative earnings guidance globally, STIR traders should be mindful of the trend that more corporations are becoming deficit agents and the growing risk that this represents for the current calm in global dollar funding markets.

As corporations deplete their dollar balances, the banks they bank with are also being pushed into becoming deficit agents and as outflows accumulate at more banks, pressures will accumulate in interbank markets where the deficit banks go to get funded.

But not yet...

Part III – Immune Systems and Liquidity Buffers

Firms burning through their dollar balances on their way to becoming deficit agents won't show up as funding stresses in interbank markets right away due to some dampeners.

In the case of the tech supply chain, cash-rich firms atop the value chain presumably serve as important dampeners as they extend intra-firm credit. Other dampeners include the Federal Reserve which is currently adding liquidity through bill purchases and repos, the equity market selloff, and last but not least banks' HQLA portfolios, thanks to Basel III.

That said, dampeners are just that – they are no panacea: cash-rich tech firms can help their suppliers for a limited time only; the Fed is planning to stop adding liquidity soon; the benefits from an equity market selloff are limited; and the outbreak has the potential to reveal some design weaknesses in the structure of Basel III. We'll discuss each in turn.

First, anecdotally, cash-rich firms atop tech supply chains are currently dampening the funding fallout from the coronavirus – as an example, think about flows from cash-rich tech firms' bank accounts going to suppliers' bank accounts in Japan, Korea or Taiwan, thereby slowing the burn of suppliers' dollar balances and delaying their day of reckoning – the day when they flip-flop from surplus to deficit agents *vis-à-vis* their bank. But the cash balances of tech firms are limited, as most of their wealth is in bonds (see [here](#)), and if the outbreak worsens, tech firms will have to repo bonds to help their suppliers. Such forms of financing will cause contagion in funding markets (pun intended) – a theme that has many variants and which we'll return to in more detail in part four of our analysis.

Second, the Fed's bill purchases and repo operations are adding liquidity for now – the best kind of liquidity at that, which are reserves. The bulk of these injections ended up with foreign banks' New York branches (see Figure 5). These are on top of the temporary HQLA surplus from the dropoff in demand for trade, shipping and commodity financing and are an additional dampener that currently help some banks fund the outflow of corporate deposits and others recycle corresponding inflows through interbank markets.

Third, the equity market selloff serves as a dampener too. Without going into too much technical detail here, the equity market selloff has a positive funding market impact through two channels: equity derivatives desks at banks need less unsecured funding to fund their equity inventories (see [here](#)) and, as investors go from equities to Treasuries, Treasury desks at primary dealers get to reduce their Treasury inventories and see a rotation in their HQLA portfolios from bonds to cash – the reverse of last year (see [here](#)).

Fourth, and most important, we now have a global banking system where all major banks have to pre-fund 30-day outflows by running HQLA portfolios. Maybe the biggest reason why we have not seen funding stresses from missed payments due to the outbreak yet, are these portfolios. In that sense, this crisis is playing out differently from the GFC, where funding stresses showed up real time ("T+1"), as banks had no liquidity buffers to tap into as deposits slipped away from them. HQLA portfolios are powerful dampeners.

That said, the LCR and HQLA portfolios are not panacea.

Some jurisdictions already mandate currency matching HQLA portfolios with outflows, but some jurisdictions do not, and in those jurisdictions the outflow of dollar deposits can quickly show up in the FX swap market if HQLA is held mostly in local currency assets...

...and that's the least of potential problems.

It is important to remember that the type of deposits that firms are exhausting currently are operating deposits. And that's a potential problem for banks. Operating deposits are one of the best types of funding for banks under Basel III due to low outflow assumptions, and that presents a potential design weakness of Basel III under current circumstances:

the 25% outflow assumption on these deposits means that losing them can inflict considerable damage on banks' liquidity profile as a dollar of outflow in operating deposits means an outflow of four credits of HQLA and an abrupt drop in their LCR compliance!

Barring regulatory forbearance – banks' and supervisors' equivalent of *force majeure* – these dynamics can quickly push banks to go to funding markets to fix their LCRs, which would stress unsecured funding markets and can push Libor-OIS spreads wider.

With their thinking shaped by the experiences of the GFC, the architects of Basel III assumed that only financial, non-operating deposits are slippery. They did not consider a scenario in which a rapid drawdown of operating deposits can occur without offsetting inflows over prolonged periods. Of course, DSGE models will suggest that there is nothing to worry about, as corporations burning through their operating deposits is due to people not buying phones, not flying and not shopping for luxury goods, which means that retail deposits with even lower outflow assumptions than corporate deposits must be accumulating somewhere – retail surplus agents – so the impact should be LCR positive!

Maybe, maybe not.

In our experience, finance is anthropological (see [here](#)) and the diversity assumed away in DSGE models is always what comes back to bite you. It is perfectly possible that corporations bank with different sets of banks than the people that stopped spending; if so, the deficit banks will borrow from surplus banks in interbank markets at high prices.

Firms depleting their dollar balances, pushing individual banks and local banking systems into deficits, and banks struggling to fund outflows is stage one of potential stresses; stage two is when firms start borrowing dollars from the same banks as their obligations to pay continue but their dollar balances are empty. There are two corporate lifelines: for big, public corporations the CP market, and for everyone else, credit lines from banks.

Firms tapping the CP market at the same time as banks are fixing their LCRs isn't good; neither is many firms tapping their credit lines from banks all at the same time – another potential scenario that can reveal another potential design weakness of Basel III.

Potential outflows related to the drawdown of corporate credit lines form a part of the 30-day outflows that banks have to pre-fund, but similar to the outflow assumption on operating deposits, the drawdown assumptions on corporate credit lines are very low – only 10%. Similar to the outflow of operating deposits, the drawdown of credit lines can inflict significant damage on LCRs which banks would have to fix in unsecured markets.

Missed payments due to the outbreak is the type of event that could cause many corporations to draw on their credit lines at the same time – and so what supervisors provisioned for as an idiosyncratic shock (a random corporation drawing on a credit line) becomes systemic (a random virus that forces all lines to be called all at the same time).

Corporations have not called their credit lines yet to "test" their banks if they're there, but they soon could. This is a fast-moving risk STIR traders should be the most aware of.

Even with regulatory forbearance on LCR compliance, the underlying funding mechanics of such a massive liquidity call could be overwhelming for the repo and FX swap markets, unless all HQLA portfolios are made up of reserves at the Fed, and we know they're not.

A flood of corporate drawdowns could force the entire banking system into becoming a deficit agent – the extreme example of the outbreak infecting the top of the hierarchy: from firms to individual banks, to country level banking systems, to financial centers and, as contagion spreads and turns the global banking system into a deficit system, to the Fed – the only entity that can serve as a surplus agent to match the needs of a deficit system.

No, that's not an overstatement. We saw something similar in September!

Part IV – Breathing Machines and Central Banks

Collateral is dead, long live reserves...

...should be everyone's key takeaway from the repo market dislocation in September. Mind you, that dislocation was caused by corporate tax payments and Treasury settlements, events that individual banks were prepared for, but the entire system apparently was not.

The cascade of missed payments and the changes they could force in dollar flows globally is not something that individual banks can prepare for and so the system cannot either.

Could missed payments quickly run up to \$200-300 billion? That's not unrealistic.

Could funding markets in New York City be overwhelmed if forced to recycle an extra \$200-300 billion? Easily. If reserves were insufficient to deal with routine tax payments and Treasury settlement in September, and if the Fed only added just over \$150 billion of excess reserves since then (see Figure 6), a mass drawdown of corporate credit lines due to missed payments could push the U.S. banking system back into deficit in short order.

Demand for reserves ain't linear...

...and banks' estimates of their "lowest comfortable level of reserves" are circumstance dependent. The worse the outbreak gets, the floor to banks' comfort levels will rise and so the effective amount of excess reserves added since September could fall rapidly as banks decide to hoard reserves as a "vaccine" instead of lending them opportunistically.

Like our reference to the Spanish flu in our 2020 outlook (see [here](#)), Governor Quarles' recent [speech](#) about opening up the discount window to help large banks monetize their Treasuries under stress scenarios was eerily prescient. What are some of the dynamics that could start pushing rates around in the repo and FX swap markets before too long?

There are at least three:

- (1) U.S. banks gradually starting to pull back from lending in the repo market and starting to monetize Treasuries to fund the drawdown of corporate credit lines.
- (2) Tech companies starting to monetize their bond portfolios to roll the lifeline they extended to their strategic suppliers in various corners of Southeast Asia.
- (3) Foreign central banks starting to tap into their FX reserves to help local banks, and the pressures these flows might cause to repo and FX swap markets.

Each of these examples makes us think it unlikely that the Fed should or will be able to step back from adding liquidity after the tax season. Now is not the time to step back...

...it's time to lean in!

First, U.S. banks are less liquid today than they were a year ago, because they have been absorbing collateral from the Fed as the Fed has been busy tapering its balance sheet – talk about bad timing. Figure 7 shows the rotation in large U.S. banks liquidity portfolios away from reserves and into collateral in recent quarters and this rotation will make the funding of corporate credit lines harder and the appeal of the Quarles proposal greater.

Second, tech companies repoing their bonds to fund their suppliers are a similar story, but unlike banks, their port of call won't be the discount window, but the repo market. Now, if the Fed is the marginal lender in the repo market now to the tune of \$150 billion, a new marginal supplier of collateral will give the Fed no choice but to upscale its repo ops.

Third, tech companies' repo needs will be small potatoes relative to foreign central banks': while tech companies need to backstop suppliers, foreign central banks may need to backstop individual banks and would have to raise considerable dollar liquidity to do that.

We'll consider the cases of China, Japan, Korea and Taiwan as potential deficit regions.

In the case that banks in China are overwhelmed with a drawdown of dollar deposits, their natural port of call will be the PBoC for dollar liquidity. In turn, the PBoC's port of call will be dealers first in Hong Kong and London and then the primary dealers in New York.

The PBoC – like all major central banks – keeps a portion of the liquidity tranche of its FX reserves in FX swaps, where they lend U.S. dollars in exchange for euros and yen.

But if they need to start lending dollars to local banks through bilateral arrangements, China effectively flip-flops from being a lender of dollars to being a borrower of dollars in the FX swap market, and dealers in Hong Kong and London now have to find the missing link to their previously matched \$/¥ and €/\$ FX swap books. As the PBoC goes from funding carry traders in the FX swap market to helping local banks bridge dollar deficits, it naturally transmits local imbalances globally and carry traders end up holding the bag...

...the Fed's dollar swap lines could be called by FX swap dealers in London.

Once the PBoC exhausts its dollar liquidity in cash markets like the FX swap market, it will next tap its Treasury portfolio and will either repo or sell those Treasuries through dealers in New York to raise more dollars to lend to local banks. The one place the PBoC won't go to raise dollars is the Fed's dollar swap lines – because it has no line to the Fed!

China's dollar needs will therefore stress private balance sheets in London and New York, not public balance sheets, unless a swap line between the PBoC and the Fed is created.

Remember that the breakdown of the payment chain in reverse hurts high value added intermediate goods producers much more – in jurisdictions like Japan, Taiwan and Korea.

Here, the first observation we'd make is that none of these countries have as big a stock of FX reserves as China, so the drawdown on their FX reserves from missed payments will be disproportionate; that said, differences in the composition of FX reserves will help some countries weather funding stresses better than others. Consider the case of Japan.

Japan's Ministry of Finance is the single largest account holder at the New York Fed's foreign RRP facility with \$150 billion on deposit – see Japan's reserves portfolio [here](#).

Thus, while the PBoC would start withdrawing liquidity from money markets the moment it starts to ease the dollar needs of domestic banks, the BoJ would add *de novo* liquidity as it pulls funds out of the foreign RRP facility and deposits them at local megabanks...

...from Sagittarius-A* to the big bang, and if the big bang ain't big enough, the BoJ has access to the dollar swap lines at the Fed. Let's consider the case of South Korea next.

Like the PBoC, the BoK does not have FX swap lines with the Fed and unlike the BoJ, it only has a small amount in the foreign RRP facility (see Figure 8), so the market impact of the BoK's responses will likely be similar to the PBoC's but with a much smaller splash.

Taiwan appears to be a case unlike any other.

As described in an impressive [detective work](#) by Brad Setser and Constructive Ambiguity, Taiwan's reserves are lent in the FX swap market but not versus euros and yen, but against domestic currency which provide the hedges for Taiwanese life insurers' U.S. fixed income portfolios – this is how Taiwan's central bank recycles Taiwan's massive current account surpluses, which are routinely north of 10% of Taiwan's GDP.

Now consider that if Taiwan's central bank is dependent on chipmakers' sales to add to or just to roll life insurers' U.S. dollar hedges, missed payments due to factory closures and chipmakers' growing dollar deficits are a risk to Taiwanese life insurers' steady bid for U.S. Treasuries, mortgages, callable bonds and credit and their ability to sell vol insurance!

Conclusions – Asymptomatic ≠ Not Contagious

Liquidity kills you quick...

...but the countries at the eye of a potential storm learned that lesson during the Asian financial crisis, and the banks that form the backbone of the global financial system learned that lesson during the GFC. Safety nets have been enhanced and expanded, with the Fed's dollar swap lines with the ECB, the SNB, the BoE, the BoC and the BoJ being the most important. These regions are therefore well insured for funding stresses, and Japan has a lot of liquidity on deposit at the Fed before it would tap the swap lines.

We are more worried about other jurisdictions.

In the coming weeks, there will likely be dozens of research notes in which DSGE-types will show that most emerging market countries have multiples of their import bills in FX reserves, arguing that you should not worry about liquidity problems. That is precisely our point: most FX reserves are invested in the FX swap market or are in U.S. Treasuries and MBS, not on deposit at the foreign RRP facility, and when foreign central banks begin to monetize their FX reserves, GC repo rates and the €/\$ and \$/¥ currency bases will feel it.

Central banks are lenders of last resort, not lenders of first resort and the time it takes for them to go from one mode to another can take a long time and it can take a short time.

In August 2007 it took a long time – subprime was “contained”.

In September 2019 it took a day – with a 15 minute delay.

That said, the Fed's response time last September was sped up by the fact that the markets exhibiting stresses were the o/n repo and federal funds markets, which are the core of U.S. money markets. The stresses we are imagining here would first strike:

- (1) peripheral cross-currency bases (e.g., KRW/USD) as missed payments grow;
- (2) €/S and \$/¥ bases as reserve managers stop lending in the FX swap market, to help banks and banking systems deal with dollar outflows in their jurisdictions;
- (3) U.S. dollar Libor-OIS spreads as banks start fixing their LCRs that are being damaged by outflows of operating deposits and corporate credit lines; and lastly,
- (4) o/n GC repo markets as FX reserve managers and large banks are scrambling to turn collateral into cash to fund banks' and corporate customers' liquidity needs.

Stresses would strike in that specific order, which means that peripheral funding markets would show signs of stress first and core funding markets would show signs of stress last.

That risks a slow balance sheet response from the Fed...

...on top of the Fed's plan to soon end liquidity injections via repos and bill purchases.

Chair Powell's [opening shot](#) to rate cuts could further complicate a complicated picture...

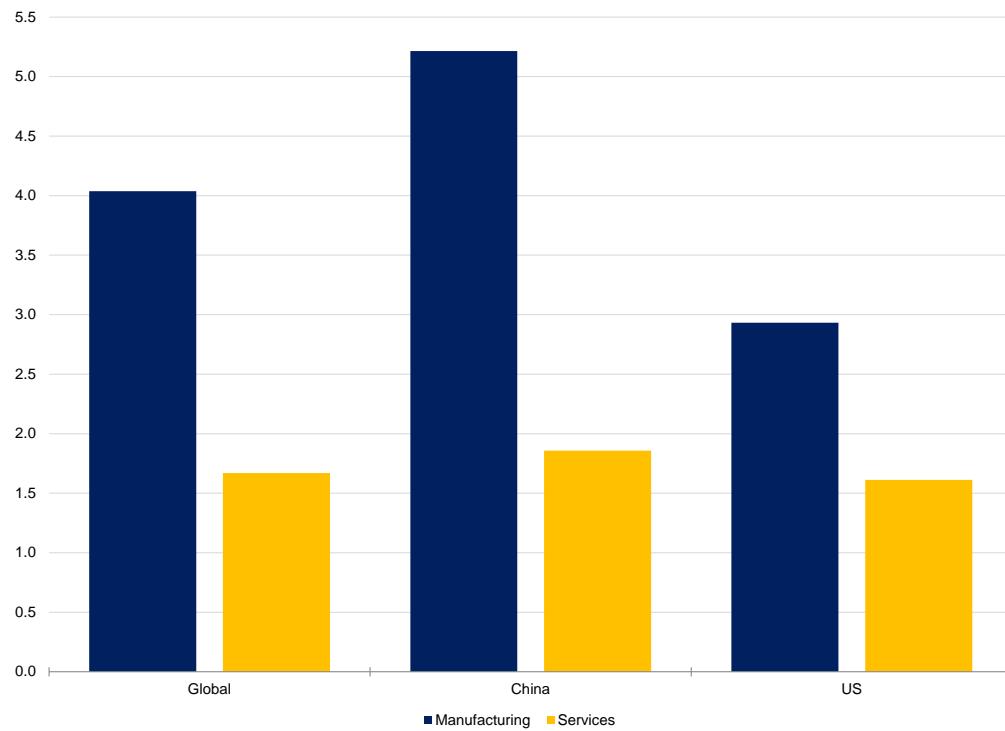
given that the yield curve has been inverted for over a year, Treasury supply has been absorbed by primary dealers and hedge funds on the margin, funded in the repo market by money funds. Figure 9 shows that money funds have absorbed \$600 billion of inflows over the past year and rate cuts could send those funds back to the bond market, precisely when the funds are needed in the money market. Our concluding point is this:

If the outbreak worsens, funding market pressures can easily escalate. Rate cuts will help, but rate cuts, if they re-steepen the curve materially, can exacerbate funding pressures.

Our recommendation for the Fed would be to combine rate cuts with open liquidity lines that include a pledge to use the swap lines, an uncapped repo facility and QE if necessary.

Figure 1: A Recipe for Shocks from Missed Payments

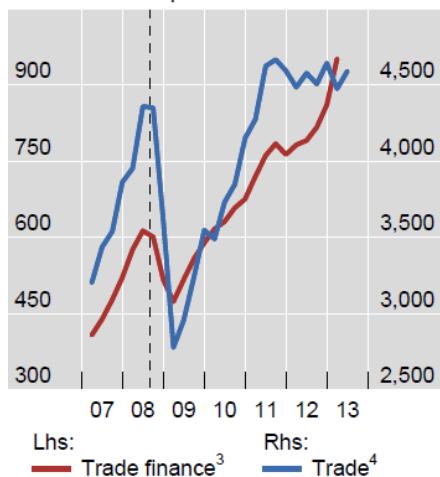
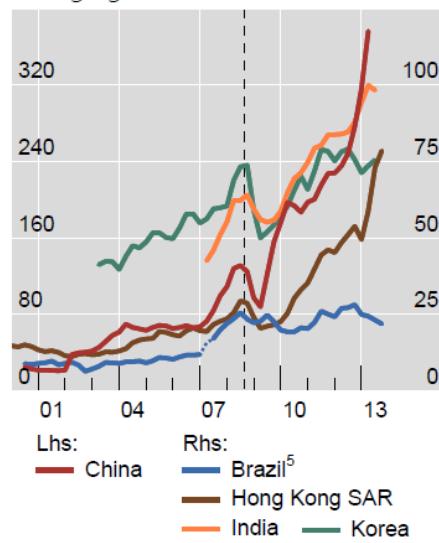
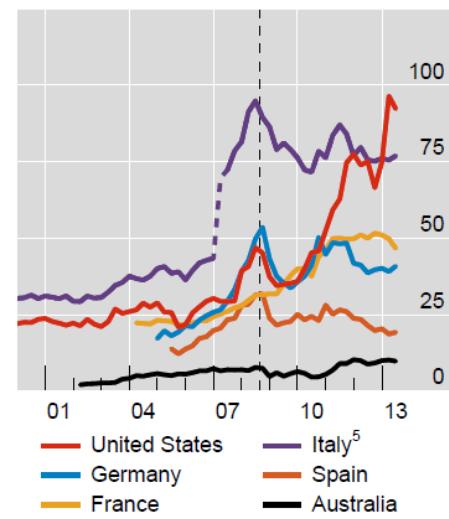
Ratio of output to value added



Source: World Input-Output Database, Credit Suisse

Figure 2: Trends in Trade Finance

\$ billions

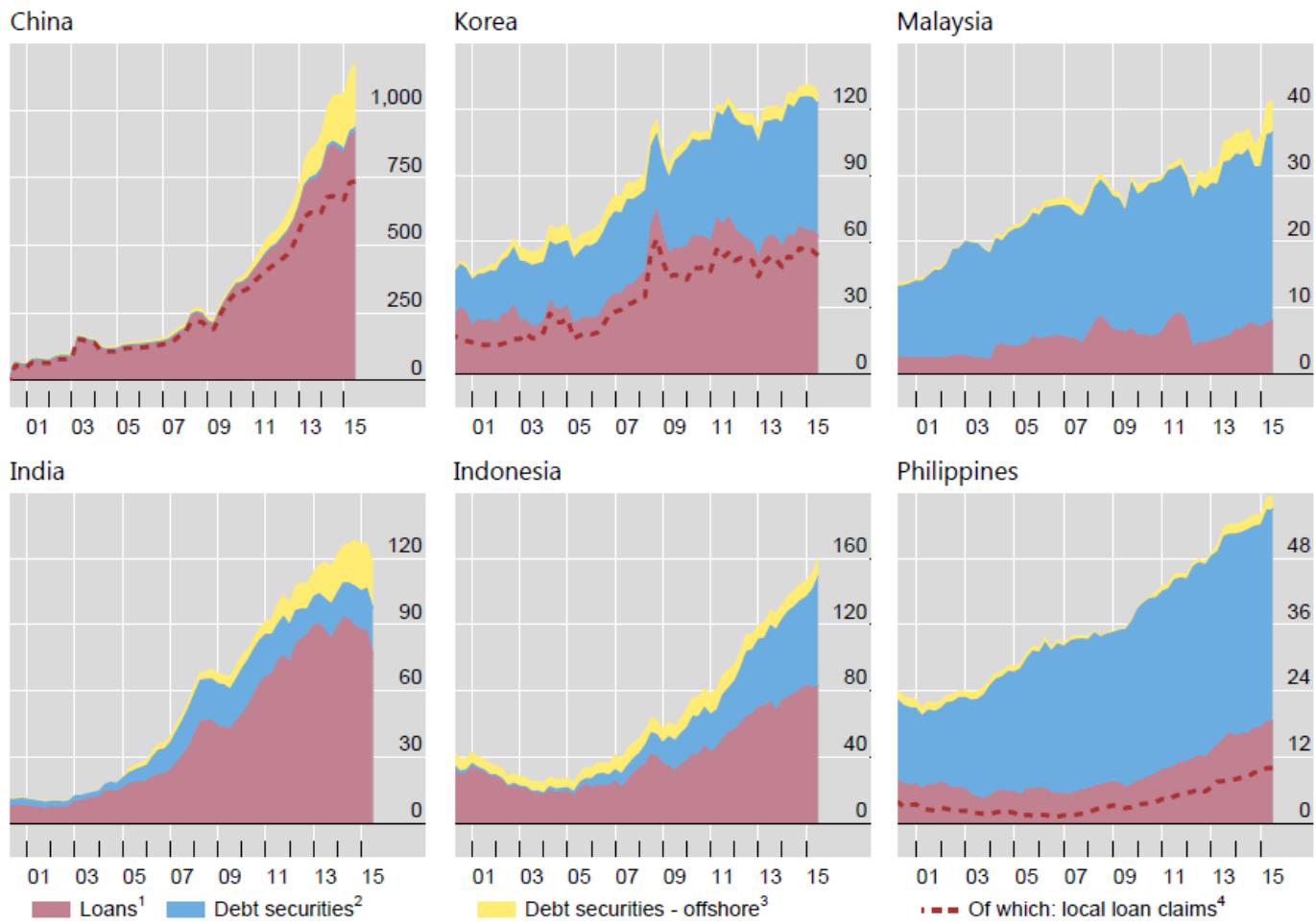
Global developments**Emerging markets²****Advanced economies²**

¹ Dashed line: Q3 2008. ² Stock of bank-intermediated trade finance. ³ Sum of trade finance in Australia, Brazil, France, Germany, Hong Kong SAR, India, Italy, Korea, Mexico, Spain and the United States. ⁴ Global merchandise trade (average of exports and imports). ⁵ Structural breaks in Q1 2007. Brazil: inclusion of import loans. Italy: inclusion of export and import guarantees.

Source: CGFS, IMF, national data

Figure 3: U.S. Dollar Credit to Selected Non-Bank Borrowers

\$ billions

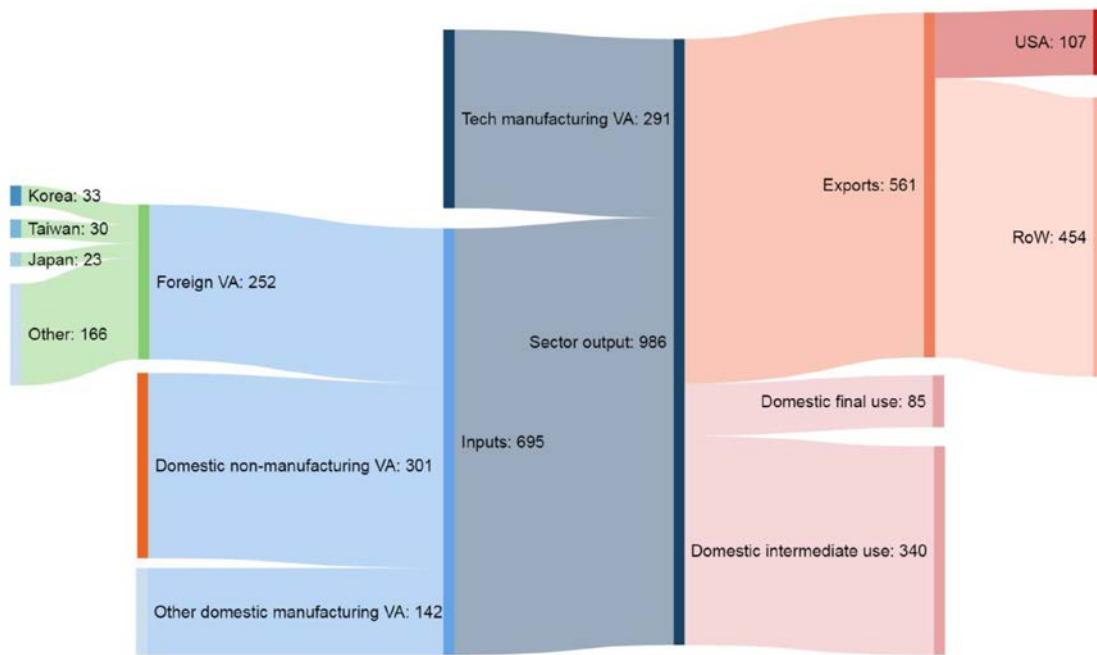


¹ US dollar loans to non-bank residents of the country listed in the panel title. ² Outstanding US dollar international bonds issued by non-bank residents of the country listed in the panel title. ³ Outstanding US dollar international bonds issued by offshore affiliates of non-banks with a parent entity headquartered in the country listed in the panel title. ⁴ US dollar loans booked by banks located in the country in the panel title to non-bank borrowers in that country. For China and the Philippines, figures are estimates based on national data.

Source: BIS

Figure 4: The Chinese Tech Sector's Manufacturing Supply Chain

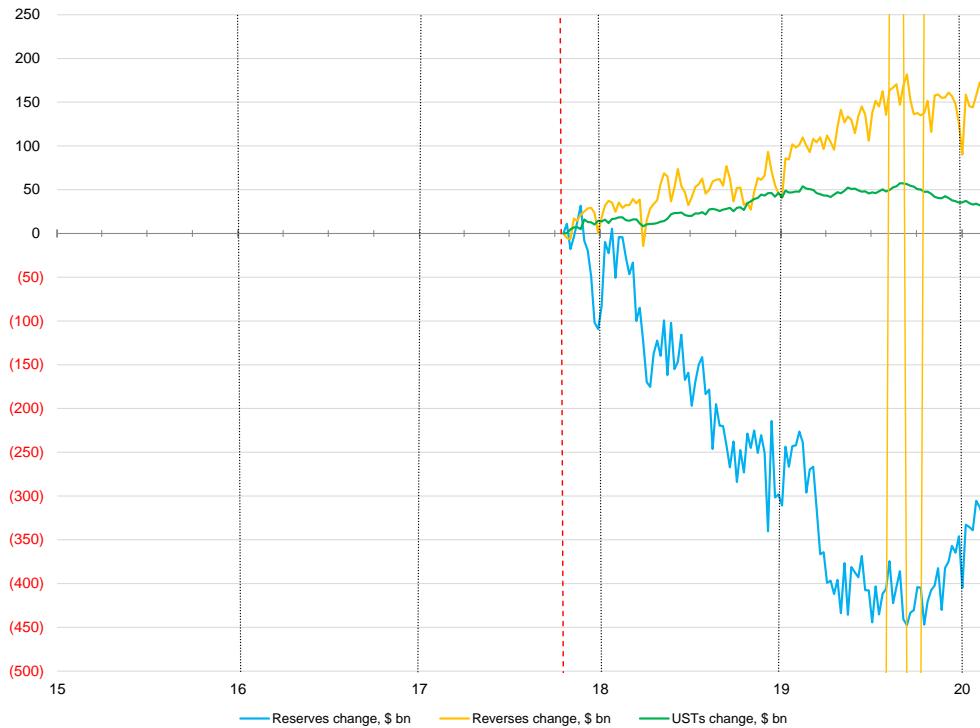
\$ billions, as of 2014; value added (VA) = labor costs plus profits



Source: World Input-Output Database, Credit Suisse

Figure 5: Foreign Banks Absorbed the Bulk of Liquidity Injected by the Fed

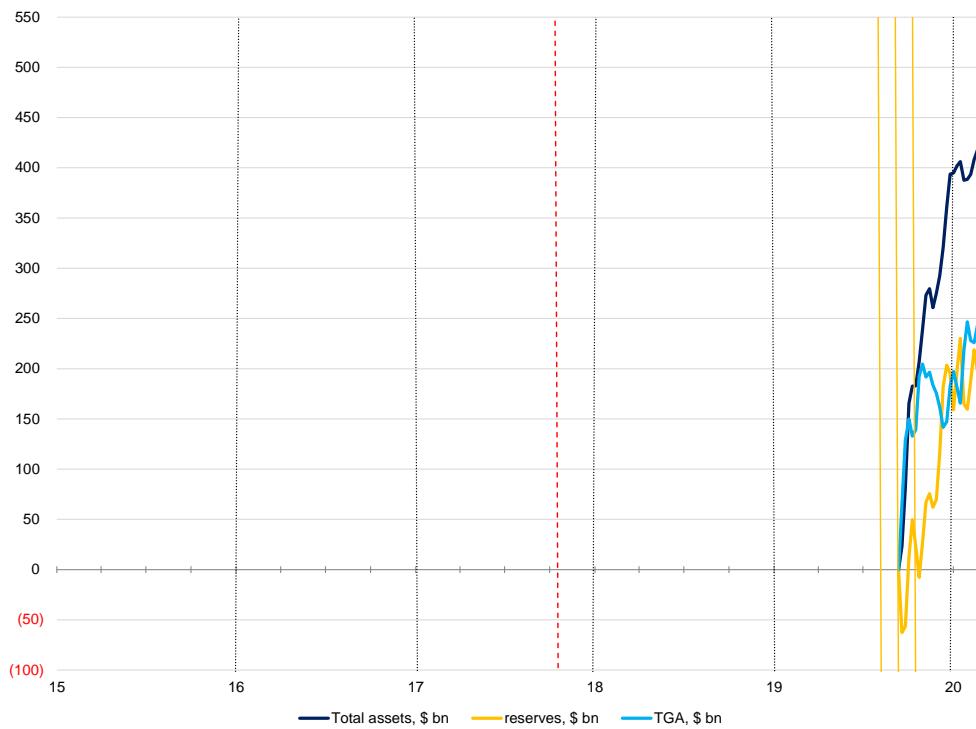
\$ billions, vertical red line marks the start of taper and orange lines mark the end of taper, the start o/n repos and bill purchases, respectively



Source: Federal Reserve, Credit Suisse

Figure 6: This Does not Look Like “Foam on the Runway”

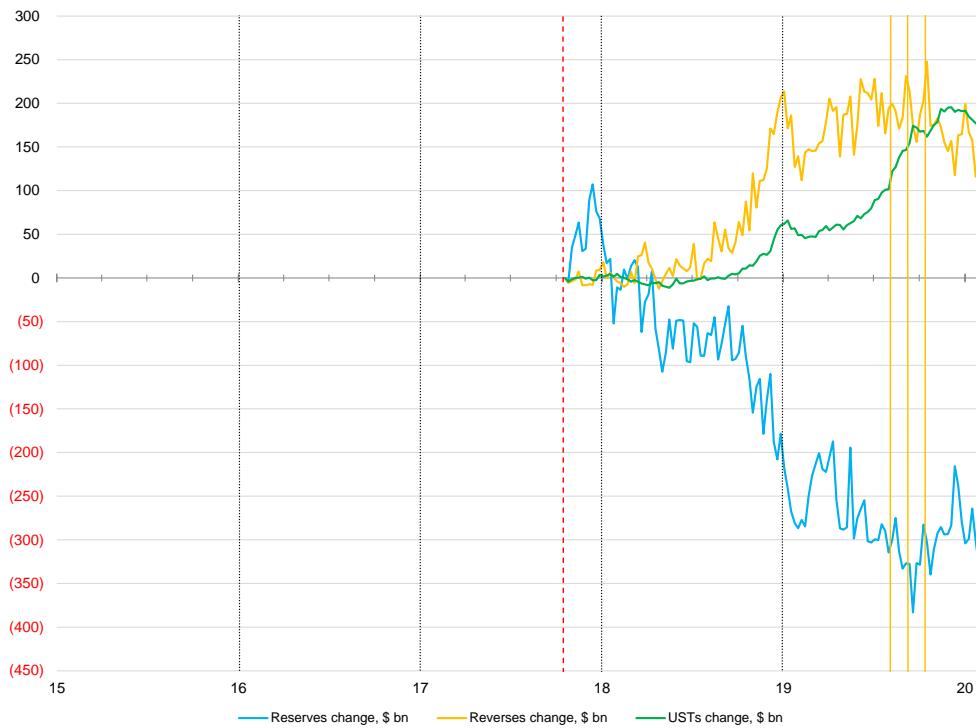
\$ billions, vertical red line marks the start of taper and orange lines mark the end of taper, the start o/n repos and bill purchases, respectively



Source: Federal Reserve, Credit Suisse

Figure 7: Thanks to Balance Sheet Taper, U.S. Banks are Much Less Liquid

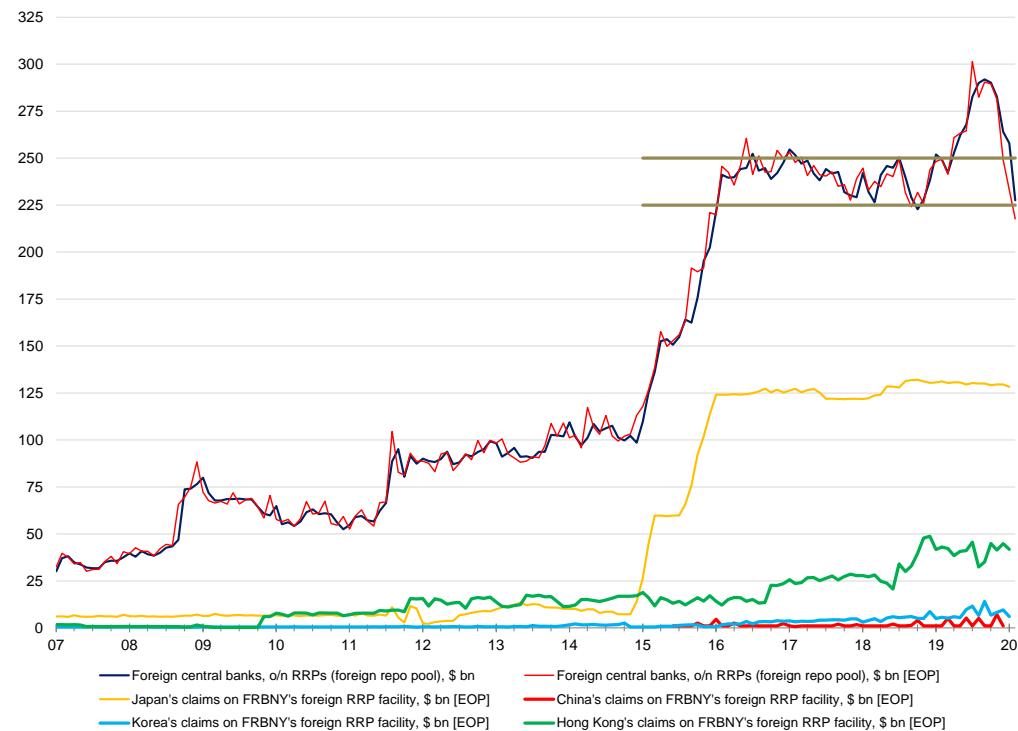
\$ billions, vertical red line marks the start of taper and orange lines mark the end of taper, the start o/n repos and bill purchases, respectively



Source: Federal Reserve, Credit Suisse

Figure 8: Foreign Central Banks' Claims on FRBNY's Foreign Repo Pool

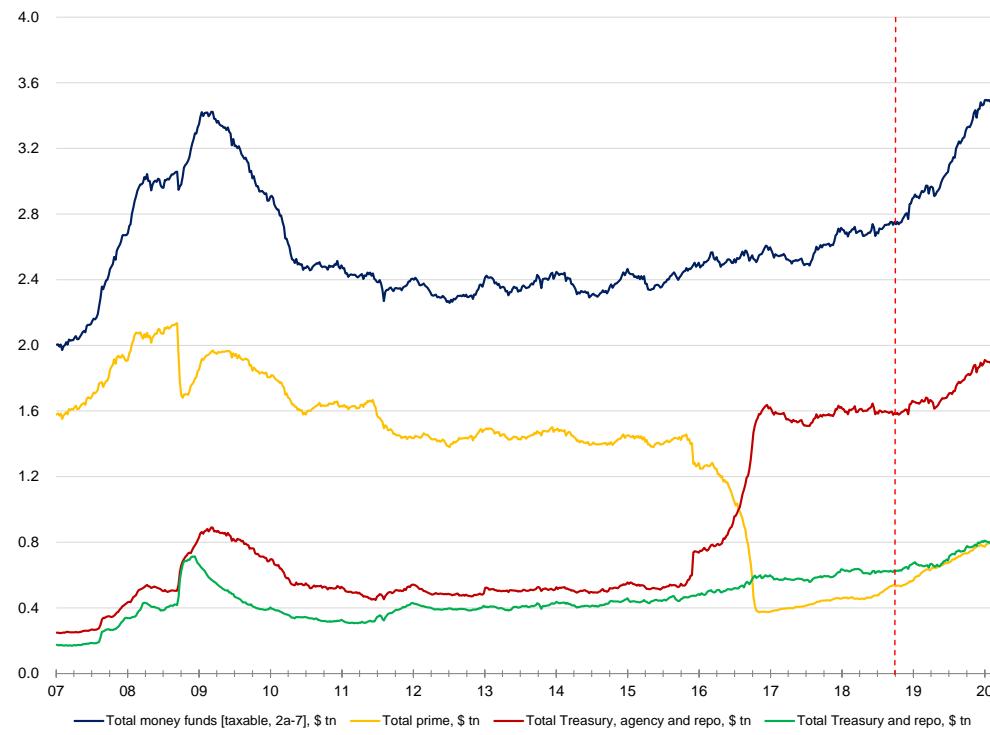
\$ billions, proxy (country data show FX reserves at "other central banks, BIS and IMF")



Source: IMF, Federal Reserve, Credit Suisse

Figure 9: What if the Tide Washes Out if the Fed Cuts Rates Aggressively?

\$ trillions, vertical dashed line marks the start of the curve inversion relative to three-months FX hedging costs



Source: ICI, Credit Suisse

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Credit Suisse Economics

Global Money Notes #28

Lombard Street and Pandemics

The Fed's liquidity injections appear not to be working.

All segments of funding markets – secured, unsecured and FX swaps – continue to show growing signs of stress. The Fed may have to do more still.

In the U.S., we watched, but didn't feel the funding impact of large banks in other countries being asked to help their economies. Now that U.S. banks are asked to do the same, dollar funding markets are starting to feel the impact.

As U.S. banks increase their lending to the real economy as corporations draw on credit lines and banks lend more to households and firms, lending will consume more balance sheet and risk capital, and that will leave less room for market making and arbitrage, which under current circumstances are "luxury".

The breakdown of o/n repo markets yesterday tell us that balance sheet is now getting scarce to conduct even the most basic type of market making.

As banks are pulling back from market making, the Fed and other central banks need to assume the role of dealer of last resort...

The Fed needs to become a buyer of CDs and CP, but not through the CPFF.

The Fed needs to offer dollars on a daily frequency through the swap lines, and other central banks need to lend dollars on to both banks and non-banks.

The Fed needs to broaden access to the swap lines to other jurisdictions as dollar funding needs are large in Scandinavia, Southeast Asia, Australia and South America, not just in the G-7. The dollar funding needs of both banks and non-banks is what's at risk and the assets that are being funded are U.S. assets – Treasuries, MBS and credit – so the Fed has a vested interest.

A hallmark theme of the post-QE global financial order has been the secular growth of FX hedged fixed income and credit portfolios at non-bank institutions like life insurers and asset managers from negative interest rate jurisdictions – the new shadow banking system, epitomized by money market funding (FX swaps) of capital market lending (Treasuries and the full credit spectrum).

Carry makes the world go round and as banks do more for the economy central banks will have to backstop the shadow banking system – yet again...

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The Fed's liquidity response may not trickle down to every corner of the financial system.

The liquidity response doesn't address the functioning of unsecured funding markets, and the effectiveness of the FX swap lines may be limited by its operational details and reach.

It feels like the Fed needs to do more still.

We are concerned about four areas: liquidity in the CD and CP markets; the frequency with which the Fed plans to do swap line operations and the FX points where it's active; and the funding needs of institutions and regions that aren't embraced by the swap lines.

First, the initial shock to the CD and CP markets came from the equity market collapse and the flows it triggered whereby cash started to flood back from securities lenders' cash collateral reinvestment accounts to short sellers' accounts. Given that seclenders invest cash in the CD and CP markets and short sellers invest mostly in Treasury bills, these flows turned seclenders into net sellers of CD and CP, precisely when issuance from corporations and banks is picking up. Outflows from prime money funds have been small to date, but given ongoing stresses in funding markets and heightened risk aversion, prime funds could see more outflows this week as investors take refuge in the safety of government money funds. Such a rotation would further hurt demand for CD and CP this week and will continue to pressure funding spreads including U.S. dollar Libor-OIS.

It isn't reasonable to expect real money accounts – reserve managers and bond funds – to substitute demand from seclenders and prime money funds as reserve managers are raising dollar liquidity themselves to help banks in their jurisdictions and bond funds have better yielding opportunities to harvest elsewhere if they are not struggling with outflows.

We do not think that the right solution here is re-activating the [CPFF](#). The legal aspects of onboarding issuers takes time and liquidity can kill you quick. Our recommendation would be for the Fed to come to an agreement with the U.S. Treasury whereby the latter provides a "first-loss buffer" on any financial or non-financial CP the New York Fed buys in the primary or secondary market. The first loss buffer would ensure that the Treasury takes the credit risk and the Fed only takes the liquidity risk such that the Fed feels "secured to its satisfaction" – which is what the Fed cares about most in a crisis situation.

The money to fund such a first loss buffer is already in the system – it's sitting in the Treasury General Account. Putting up \$50 billion of the \$400 billion sitting idly at the Fed would provide sufficient comfort for the Fed and near immediate support for the market – the Bank of Japan and the Bank of Canada already buy CP in their domestic jurisdictions.

This template could then be extended to corporate bond purchases by adding more buffer and as President Dudley would say "going out the curve and down the credit spectrum".

Second, the swap lines are now active but it feels like the operational aspects of it need to be fine-tuned. Currently dollars are being offered weekly, but the FX swap market trades like they should be offered daily, and not only at weekly and three three-month maturities but at ultra-short tenors as well, similar to how the Fed lends in the repo market.

Third, the swap lines are open only for banks and that is a fault line in the system.

The swap lines were originally designed to help the funding needs of banks during 2008; they work by the Fed lending dollars to other central banks which then lend it to banks.

But since the financial crisis, non-banks eclipsed banks as the biggest borrowers in the FX swap market: a hallmark theme of the post-QE global financial order has been the secular growth of FX hedged fixed income and credit portfolios at non-bank institutions like life insurers and asset managers – the new shadow banking system epitomized by money market funding (FX swaps) of capital market lending (Treasuries and credit).

Unless these non-bank entities get access to dollar auctions – from local central banks – FX swap spreads may remain wide if banks won't serve as matched-book intermediaries.

There is a growing risk that such intermediation will fracture as the assets that FX swaps fund include not only Treasuries but credit and CLOs too. Credit quality is fast deteriorating across various sectors and that makes it riskier for dealers to fund some life insurers through FX swaps, just like it became riskier to fund some insurers during the 2008 crisis.

Over the past five years balance sheet and the availability of reserves were the main drivers of spreads in the FX swap market. It's time to think about credit risk creeping in to funding markets through the asset side of some portfolios funded through FX swaps.

Fourth, the geographic reach of the swap lines is too narrow.

The Fed has swap lines only with the BoC, the BoE, the BoJ, the ECB and the SNB, and that's because the 2008 crisis hit banks mostly in these particular jurisdictions.

But the breadth of the current crisis is wider as every country is struggling to get dollars. The dollar needs of Sweden, Norway, Denmark, Hong Kong, Singapore, South Korea, Taiwan, Australia and Brazil and Mexico seem particularly striking for a variety of reasons.

Scandinavia countries, like Japan have large dollar needs due to institutional investors' hedging needs and only Norway is endowed with large FX reserves to tap into. Mexico is dealing with a terms of trade shock due to the collapse of oil prices. Southeast Asian countries that serve as banking centers need U.S. dollars to clear dollar payments and countries like South Korea and Taiwan have life insurers with meaningful hedging needs.

The Fed's dollar swap lines need to go global, the hierarchy needs to flatten.

The message for central banks that emerges from this brief note is this:

backstop not only the banks at the core of the financial system, but also markets and non-banks. The market backstops should include the CD and CP market where we need a buyer of last resort as the structural buyers of paper are losing cash fast; the backstop of the FX swap market should include daily operations at more points along the FX curve.

Like primary dealers offer round the clock liquidity across timezones, dealers of last resort – the central banks of the swap network – should offer dollar liquidity round the clock too.

Finally, like primary dealers, who trade with anyone with an ISDA, dealers of last resort should too: the Fed by broadening access to other central banks and other central banks by broadening access to dollar auctions to non-banks like life insurers and asset managers.

Demand on bank balance sheets will increase from here to provide credit locally for the real economy – that will consume balance sheet and risk capital and will naturally leave less room for market making and arbitrage, which under current circumstances are luxury.

While it's too much to ask central banks to lend to the real economy, it's not too much to ask them to become more active in making markets as banks free up balance sheet for lending more to the real economy. The breakdown of o/n repo markets today tell us that balance sheet is now scarce to conduct even the most basic type of market making.

Charts showing Target2 balances became known as the visual representation of the ECB clearing payment imbalances between northern Europe and southern Europe through the balance sheet of local central banks within the eurozone. Now it's time for the Fed to do the same globally with other central banks and for those central banks to lend broadly – after all what is at stake here is the funding of U.S. assets: Treasuries, MBS and credit.

In the U.S., we watched, but did not feel the funding impact of banks in other countries being asked to help their economies. Now that U.S. banks are asked to help the economy, dollar funding markets are starting to feel the impact. When the U.S. sneezes...

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Credit Suisse Economics

Global Money Notes #29

U.S. Dollar Libor and War Finance

The Fed's liquidity injections are working.

Global dollar funding conditions have eased, and U.S. dollar Libor-OIS spreads started to tighten. We don't think that lower prices on the CPFF or the MMLF are necessary for Libor-OIS to tighten more – other factors can tighten it further.

First, positive Libor-Libor bases are prompting banks to shift their funding from the U.S. unsecured funding market to euro and sterling unsecured markets – as banks arbitrage positive bases, pressure on U.S. unsecured rates subside.

Second, the U.S. dollar swap lines, Section 402 of the Crapo Act and the temporary exemption of Treasury securities and potentially repos from the SLR will continue to improve the flow of dollars to non-banks through FX swaps – this will lower FX swap implied funding costs and compress Libor-OIS further.

Third, the FIMA repo facility is the only live liquidity facility that's not being used, and one can make the argument that the Fed is currently mispricing the facility: a lower price for FIMA repos could free up more balance sheet for FX swaps...

...with further declines on FX swap implied funding costs and Libor-OIS.

Fourth, positive Libor-Libor bases are also prompting some central banks to deploy their U.S. dollar FX reserves in A1/P1 rated unsecured bank debt, as these offer significantly better yields than FX swaps; the case for central banks to buy more unsecured bank debt is compelling, and more central bank buying could provide a backstop bid for the U.S. dollar commercial paper/CD markets.

Based on these developments, our target for three-month Libor-OIS is 75 bps by the end of April, and 25 bps by the end of May. Our target for May is based on three assumptions: the temporary exclusion of Treasury repos from the SLR; the Fed lowering the price on the FIMA repo facility to the price of o/n repos; and the Fed capping Treasury bill yields at OIS rates through bill yield control.

The machinery of war finance is in full swing...

...and liquidity injections over the past month have stabilized funding markets and are compressing Libor-OIS spreads from the top down. Messing things up from the bottom up – with bill supply – would be a mistake and also confusing. The target range and the price of the liquidity facilities are the Fed's sanctum: as a matter of principle, the Fed shouldn't let bill supply breach the sanctum...

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Part I – Machiavelli, Bagehot and the CPFF

Had the Fed wanted to lower the prices of the Commercial Paper Funding Facility ([CPFF](#)) and the Money Market Mutual Fund Liquidity Facility ([MMLF](#)), it would have done so by now.

The CPFF's price at OIS+110 bps for A1/P1 issuers and OIS+200 for A2/P2 issuers is high relative to other programs, most of which are priced at 25 bps flat or OIS+25 bps.

The main reason for the pricing gap is that the low-priced facilities – the discount window, the PDCF, the U.S. dollar swap lines and the FIMA repo facility – are all secured, but the CPFF and the MMLF are unsecured, and the Fed is using their price to mitigate the credit risk of buying unsecured bank debt. But there is an easy way to fix this problem: all the Fed would have to do is ask for a bigger first loss buffer from the U.S. Treasury, and lower the price on the facilities in exchange – to say OIS+25 bps for A1/P1 issuers.

The fact that the Fed has not done this in recent weeks is telling...

...given all the other things the Fed has done, which include launching [three new facilities](#) to backstop the credit market, and temporarily [exempting](#) reserves and Treasuries from the leverage ratio (SLR). Why does the price of the CPFF remain far above other facilities'?

There are at least two possible answers.

First, maybe the Fed is sending us a Machiavellian message on benchmark rate reform: Libor is going away and SOFR is the future, and if one-sided borrowers like the Treasury or corporate treasurers were reluctant to issue SOFR-linked debt as they were put off by periodic spikes in repo rates in the past, they should reconsider. The Fed has shown a strong willingness and ability to police the SOFR rate through a low-priced repo facility, but it backstopped unsecured markets – which drive Libor – at much wider spreads. Borrowers now have a choice: in times of stress borrow at a low SOFR rate plus a spread or at a high Libor rate plus a spread. SOFR may come out of this crisis with stronger legs.

Second, the answer may have less to do with Machiavelli and more to do with Bagehot: “*central banks should lend freely to solvent firms against good collateral at a penalty rate*”.

Central banks do their core activities – open market operations and emergency lending – on a [collateralized](#) basis: the [discount window](#) lends to banks at 25 bps against collateral; the [PDCF](#) – the discount window for primary dealers – also lends at 25 bps collateralized; the [repo facility](#) lends to primary dealers at the IOR rate against U.S. Treasury collateral; the [FIMA repo facility](#) lends to central banks at IOR+25 bps also versus Treasuries; and the [dollar swap lines](#) lend to central banks at OIS+25 bps versus local currency collateral.¹

No one can say that the Fed has not done enough to backstop the [core](#) of the system: core assets like Treasuries are backstopped; core institutions like banks and dealers are backstopped; and core funding markets like repos and FX swaps are backstopped too.²

Money is hierarchical...

...and during crises, rules are flexible at the core and rigid at the periphery. In this crisis, the penalty rate part of Bagehot's rule was replaced with “friendly” rates for the [core](#) – with Covid-19 there is no moral hazard in lending to the core of the system at low rates.

¹ Liquidity absorbing facilities like the o/n reverse repo (RRP) facility or the foreign RRP facility are also collateralized, but in the case of these facilities it is the Fed that provides collateral. Central bank operations are always [collateralized](#).

² Implicit in this web of backstops is that the dollar needs of emerging market (EM) economies are backstopped too, to the extent that EM central banks have a sufficient amount of U.S. Treasuries to repo privately or through FIMA repo.

But ignoring the need for collateral when lending to the periphery is anathema for the Fed, and given the unsecured nature of the CP market, it's understandable why the price of the CPFF and MMLF facilities are 100 bps higher than the price of collateralized facilities.³

Once again, there is a way to get around the Fed's discomfort around lending unsecured, which is the U.S. Treasury increasing the first loss buffer backing the CPFF and MMLF.

We doubt that U.S. Treasury would say no to such a request and if the Fed hasn't asked the Treasury for a bigger first loss buffer, that may suggest that the Fed is intent on either delivering the Machiavellian message above or drawing a stark contrast between the terms of lending secured versus unsecured, and lending to the core versus the periphery.

It appears that according to the Fed's mental map, prime funds are peripheral institutions, commercial paper is a peripheral funding market and Libor is a vestige of the past, and government funds are core institutions, repos and FX swaps are core funding markets and SOFR is the future. Instead of arguing for lower rates on the CPFF and the MMLF, maybe the market should reflect and listen to what the Fed is trying to say with its pricing.

Let's assume that the pricing of the CPFF and MMLF will not change from current levels: could U.S. dollar Libor-OIS spreads still tighten materially from their peak and if yes, how?

The answer is yes: Libor-OIS started to tighten already without a lower price on the CPFF (see Figure 1), and further significant tightening is likely by the end of April. How?

In previous issues of Global Money Notes we compared money markets to a cake...

...sponge, cream, sponge, cream.

Cakes have a bottom layer and a top layer and stuff in-between. In dollar funding markets the bottom layers are the fed funds/OIS curve and the general collateral (GC) repo curve and the top layer is made up of FX swap implied curves from the main funding currencies.

Unsecured rates – and hence U.S. dollar Libor – typically trade in-between (see Figure 2): it is unusual for Libor to go through the top layer and to stay there for a sustained period, which is to say that if the Fed can lower the top layer with the U.S. dollar swap lines, Libor will fall back into range irrespective of whether the price of the CPFF is lower or not.

That's because commercial paper and Libor trading above FX swap implied yields mean that Libor-Libor cross-currency bases are trading positive. In turn that means that it's cheaper for Libor panel banks to raise funding in yen, euros, sterling, and Swiss francs and swap it to U.S. dollars, than to issue U.S. dollar commercial paper onshore in the U.S. Banks headquartered in these currency zones can bid up local currency funding and bid for dollars in the FX swap market until Libor-Libor bases go into negative territory again.

In fact, we started to see these funding arbitrage trades gather momentum last week as Libor-OIS spreads traded considerably wider for the euro and sterling, and corresponding OIS-OIS cross-currency bases started to go more negative once again (see Figures 3-6).

Banks headquartered in these currency zones have around 40 bps more to squeeze from their local funding markets and corresponding OIS-OIS bases, respectively, before the arbitrage disappears. This is how U.S. dollar Libor-OIS spreads can fall to 75 bps by the end of April, which would put U.S. dollar Libor 40 bps below the price of the CPFF – so healing in the commercial paper market is possible without a lower price on the CPFF.

³ The MMLF is the secondary market cousin of the CPFF. The MMLF provides prime money funds with a liquidity put to the Fed at a price of the discount window rate plus 100 bps, or 125 bps. This discount rate is a floor under CP rates. Prime funds would not buy CP at lower yields. If they did, they couldn't cover the cost of raising liquidity from the Fed.

Part II – Balance Sheet Relief and OIS-OIS Bases

Further tightening in U.S. dollar Libor-OIS spreads is possible during the course of May, if FX swap implied yields fall and OIS-OIS cross-currency bases go less negative from here.

This is where the interaction between some of the Fed's new liquidity facilities and recent regulatory changes becomes important: the U.S. dollar swap lines, Section 402 of the Crapo Act, the temporary exclusion of Treasuries and repos from the leverage ratio, and changes to the pricing of the FIMA repo facility can all increase the flow of dollars through FX swaps to non-banks and drive OIS-OIS cross-currency bases less negative.

The U.S. dollar swap lines are currently lending close to \$400 billion (see Figure 7) – this means that foreign banks consume that much less dealer balance sheet and corresponding risk capital to get the dollars they need. They now get those dollars from central banks, and dealers have more balance sheet to lend to non-banks via FX swaps.

Section 402 of the Economic Growth, Regulatory Relief and Consumer Protection Act (otherwise known as the Crapo Act) of 2018 went into effect last week, on April 1, 2020, and like the swap lines, it also increases the flow of dollars to non-banks via FX swaps.

Section 402 exempts central bank deposits from the calculation of the SLR for custodians, namely for The Bank of New York Mellon Corporation, Northern Trust Corporation, and State Street Corporation. Importantly, under the exemptions granted by Section 402, central bank deposits refer not only to deposits at the Fed, but also to deposits at any central bank of a member country of the OECD. This means that Section 402 increases custodian banks' ability to swap the U.S. dollar liquidity injected by the Fed through QE for deposits at the BoJ, the ECB, the SNB, the BoE and the BoC and other central banks.

Section 402 thus boosts the flow of U.S. dollars in the FX swap market: as QE stuffs the custodians with reserves, they will lend more to non-banks via FX swaps; the limit to these flows will be custodians banks' Tier 1 leverage ratios, but the banks' voluntary suspension of stock buybacks for the duration of the crisis will delay that limit, so "limitless FX swap books" at custodian banks is a game changer we should be aware of.

Next, the temporary exclusion of reserves and U.S. Treasury securities from the SLR is a highly "unusual" rule change. First, it's been issued by the Board of Governors of the Fed, not including the Fed's supervisory peers from the FDIC and the OCC as it's customary.

Second, given that the Board has sole jurisdiction over bank holding companies only – it shares jurisdiction over banks with the FDIC and the OCC – the exemption applies to U.S bank holding companies and U.S. intermediate holding companies of foreign banks and the key operating subsidiaries of such holding companies, which are primary dealers.

Third, given that the operating entities the exemption applies to are primary dealers, exempting reserves from the SLR is meaningless since primary dealers don't have any – only banks have reserve accounts at the Fed. So where do these contradictions leave us?

In our reading, the net impact of this rule will be that primary dealers will be able to run "limitless Treasury inventories", which, if need be, will be financed via repos by the Fed. In that sense, the Board of Governors of the Fed is "drafting" the dealer community to take part in the war effort – by financing the war on Covid-19. Paraphrasing Churchill:

"we give you the balance sheet, and you'll finish the job".

One detail of the exemption that's still not clear is whether repos backed by Treasuries will also be exempt from the SLR. Given that the exemption applies to primary dealers, and that repo is the bread-and-butter activity of dealers, our working assumption is that repos will be exempt too by mid-May, by the time rule change's comment period is over.

If our assumption is right and repos are exempt from the SLR, primary dealers can run “limitless repo books”, similar to how they can now run limitless Treasury inventories, with one caveat: repos have risk weights and Treasuries do not, so Tier 1 leverage ratios can limit the size of repo books. But here too, buyback suspensions will delay that limit.

Limitless repos in turn mean even more lending of dollars to non-banks via FX swaps: if balance sheet for repos is freely available, any hedge fund or asset manager can repo more Treasuries for dollars to lend more to non-banks in the FX swap market.

To pull three balance sheet relief themes together: as central banks lend more to banks through the swap lines, custodian banks lend more in the FX swap market thanks to Section 402, and dealers finance more Treasuries for hedge funds and asset managers thanks to the relaxation of the SLR, the flow of dollars in the FX swap market improves – FX swap implied yields can fall further and OIS-OIS bases can go less negative from here.

The FIMA repo facility has the potential to provide further balance sheet relief.

The facility allows central banks to repo Treasuries with the Fed, and if central banks shift their repo needs from the dealers to the Fed, dealers will have more balance sheet to offer to hedge funds and asset managers to lend even more to non-banks via FX swaps.

The Fed seems to think of the facility as a swap line for central banks without a swap line: whereas some central banks can use their own currency to borrow U.S. dollars through the swap lines, some central banks cannot – the FIMA facility is for these central banks.

Because the Fed sees the facility is a quasi-swap line, it is pricing it at IOR+25 bps, in line with the price of the swap lines.⁴ But at IOR+25 bps, or 35 bps, it is priced relatively high compared to private repo rates, which explains why foreign central banks are not using it.

The FIMA repo facility is the only live facility of the Fed that's not being used.

That could suggest that the Fed should not think of the FIMA facility as a quasi-swap line, because there is a big difference between one pledging foreign currency for U.S. dollars and one pledging Treasuries for U.S. dollars: one is called an FX swap; the other a repo.

Were the Fed to lower the price on the FIMA repo facility from IOR+25 bps, or 35 bps, to the price of the repo facility for primary dealers, which offers liquidity at IOR, or 10 bps, the usage of the facility would increase as foreign central banks shift their repo needs from private dealers to the Fed. That would free up more balance sheet for FX swaps, and lead to further declines in FX swap implied yields and less negative OIS-OIS bases.

In our view, the liquidity facility that's overdue for a price change is the FIMA repo facility, and not the CPFF: a lower rate on FIMA repos can push U.S. dollar Libor lower indirectly.

The liquidity the Fed is pumping into the system, combined with balance sheet relief coming from both regulatory changes and the liquidity facilities means that the drivers of dollar funding stresses under Basel III – liquidity shortages and balance sheet constraints – are about to disappear from our radars for the foreseeable future. In turn, if these drivers were what kept FX swap implied yields high and OIS-OIS cross currency bases negative, their absence can push FX swap implied yields lower and OIS-OIS bases less negative.

OIS-OIS bases can go as high as -25 bps, in line with the price of the Fed's swap lines, and that can tighten U.S. dollar Libor-OIS further to around 25 bps by the end of May.

⁴ The Fed's U.S. dollar swap lines are priced at OIS+25 bps. Because the dollar swap lines offer term U.S. dollars, they are priced off of OIS. But the FIMA repo facility offers only overnight U.S. dollars and so it is priced off of IOR.

Part III – FX Reserve Managers and U.S. Dollar Libor-OIS

Clearly, there is a lot of moving parts in funding markets and as everything falls into place, FX swap implied yields will grind lower and OIS-OIS cross-currency bases less negative, and these dynamics will bring down commercial paper yields and tighten Libor-OIS, so the Fed is right not to lower the price on the CPFF yet. We'll see how things play out given the existing lending and regulatory responses. The signs so far are encouraging...

Other than less negative OIS-OIS bases, FX reserve managers could also help Libor-OIS by providing a much needed backstop bid for the commercial paper and deposit markets.

The problem with the U.S. commercial paper market currently is that the usual buyers – corporate treasurers, prime money funds, offshore money funds and securities lenders – are not buying. Corporate treasurers usually have excess cash but now they do not; prime and offshore money market funds had big outflows and are unwilling to term out; and securities lenders won't have cash inflows and won't term out until risk is definitely on.

U.S. dollar Libor-OIS spreads reflect problems with buyers, not problems with banks.

During past episodes of money market dislocations, medium-term bond funds stepped in with a backstop bid for commercial paper and that backstop bid was what started to drive Libor-OIS spreads in. But this time around, medium term bond funds are absent as they chase better yields in the IG market, where paper trades 200 bps over three-month Libor.

With the usual backstop bid for commercial paper absent, and the CPFF priced too wide, foreign central banks have a potential role to play as buyers of U.S. commercial paper: foreign central banks with access to the dollar swap lines are not in a position where they have to liquidate their U.S. dollar reserves, and if they don't, they leave money on the table.

First, if they lend their dollars in the FX swap market, they are leaving money on the table because commercial paper – as implied by U.S. dollar Libor – offers better yields than lending dollars versus euros, sterling and yen for example (see Figures 4, 6, and 8).

Second, if they lend dollars in the Treasury market, they are leaving money on the table too because commercial paper offers yields that are at least 100 bps better than Treasuries.

Switching from FX swaps and Treasuries to commercial paper should not be a big deal: while FX swaps are secured and commercial paper is unsecured, the global banks (GSIBs) that are the biggest issuers of commercial paper do not pose a credit risk given that they are on liquidity support in every jurisdiction they operate in. Furthermore, most the commercial paper issued by banks funds portfolios of high-quality liquid assets (HQLA) like reserves and Treasuries, so really, commercial paper is basically HQLA in a "gift-wrap".

The relative value case for commercial paper and certificates of deposit are compelling, and if central banks backstop the commercial paper market below the price of the CPFF, then U.S. dollar Libor-OIS spreads could drop to as low as 50 bps by the end of April, independent of the FX swap market dynamics that we have discussed on the prior pages.

And then there is the obvious...

...general risk on, the equity market rally, inflows into prime funds and securities lenders which will all help the bid for commercial paper and certificates of deposit, and of course the Fed may listen to the consensus and lower the price on the CPFF and the MMLF.

These things can all improve Libor-OIS spreads, but their timing is uncertain.

Our aim with this analysis was to show how absent any improvement in the obvious drivers of front-end dynamics, there is a lot of war finance in motion already that will ease unsecured funding pressures from the top down: by compressing FX swap implied yields and potentially by bringing central banks in as marginal buyers of unsecured bank debt.

Conclusion

Our analysis showed how the machinery of war finance can ease unsecured funding pressures from the top down: by compressing FX swap implied yields and OIS-OIS bases.

But bill supply can complicate this picture from the bottom up.

Bill supply last week pushed Treasury bill yields from below OIS to 20 bps above OIS, and further supply without yield curve control could push bill yields higher, which would risk undoing the improvement that the Fed's liquidity and regulatory measures helped engineer:

higher bill yields could pull funds away from the FX swap market as foreign central banks put their dollars into bills, not FX swaps, and as bill-OIS spreads grind more positive, they will push FX swap implied yields higher, OIS-OIS cross-currency bases more negative and that will limit how much more U.S. dollar Libor-OIS spreads can tighten from here.

For all the talk about the war on an invisible enemy and war finance, we haven't heard from the Debt Management Office of the Treasury and the Fed about the need for the monetary financing of the CARES Act and further stimulus measures. The exemption of Treasuries from the leverage ratio frees up demand for supply ("limitless inventories"), but the near-term supply of bills is too much and can push bills yields higher from here, risking a reversal to the improved funding conditions the Fed worked so hard to achieve.

The Fed has done a lot...

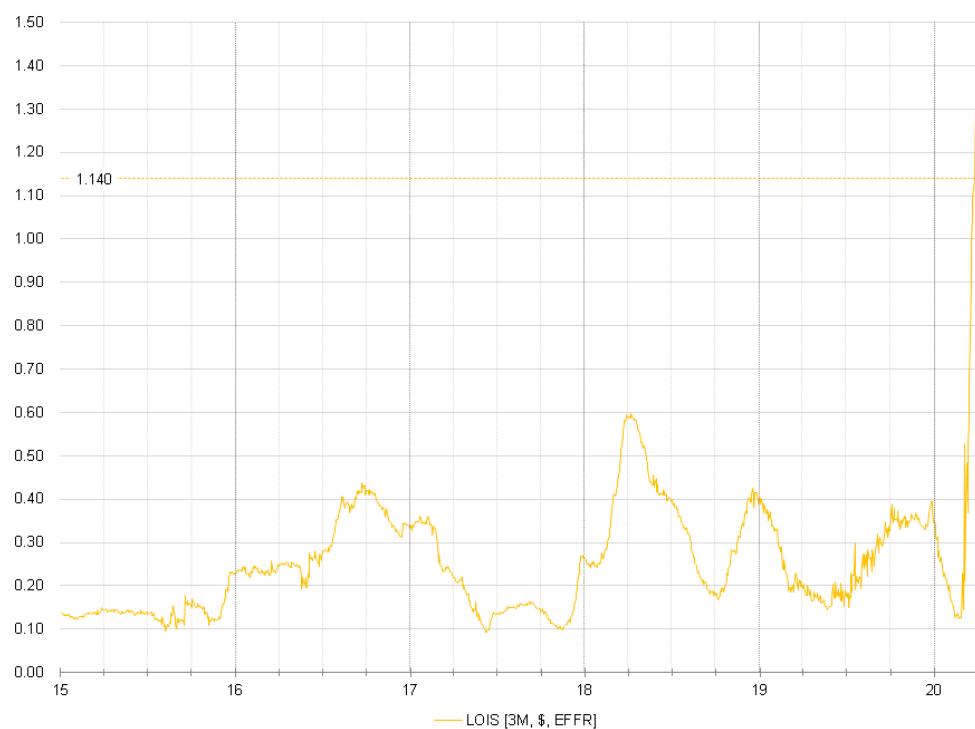
...and yield curve control where they peg three month Treasury bill yields at OIS rates and is the only thing the Fed has not done yet, but soon will have to. The target range for overnight rates and the OIS curve – the bottom layer of the money market cake – are the Fed's monetary sanctum. Everything the Fed does is priced based on variables within that sanctum: the top of the band, IOR, IOR plus a spread and OIS plus a spread.

The fiscal authority should not breach the Fed's sanctum in money markets and the monetary authority shouldn't tolerate a breach – especially in the current environment.

The monetary authority should cap the bill curve at OIS rates so that money market rates do not get pushed around by bill supply and do not offset the impact of liquidity injections.

Figure 1: U.S. Dollar Libor-OIS

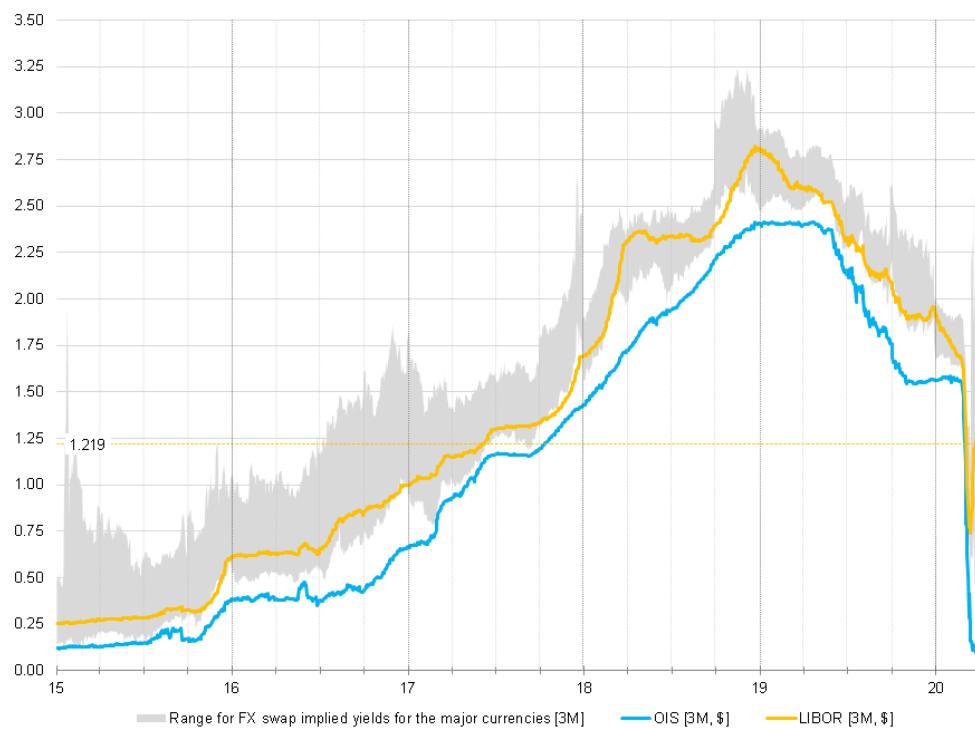
percent



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 2: U.S. Dollar Libor Usually Doesn't Trade above FX Swap Implied Rates

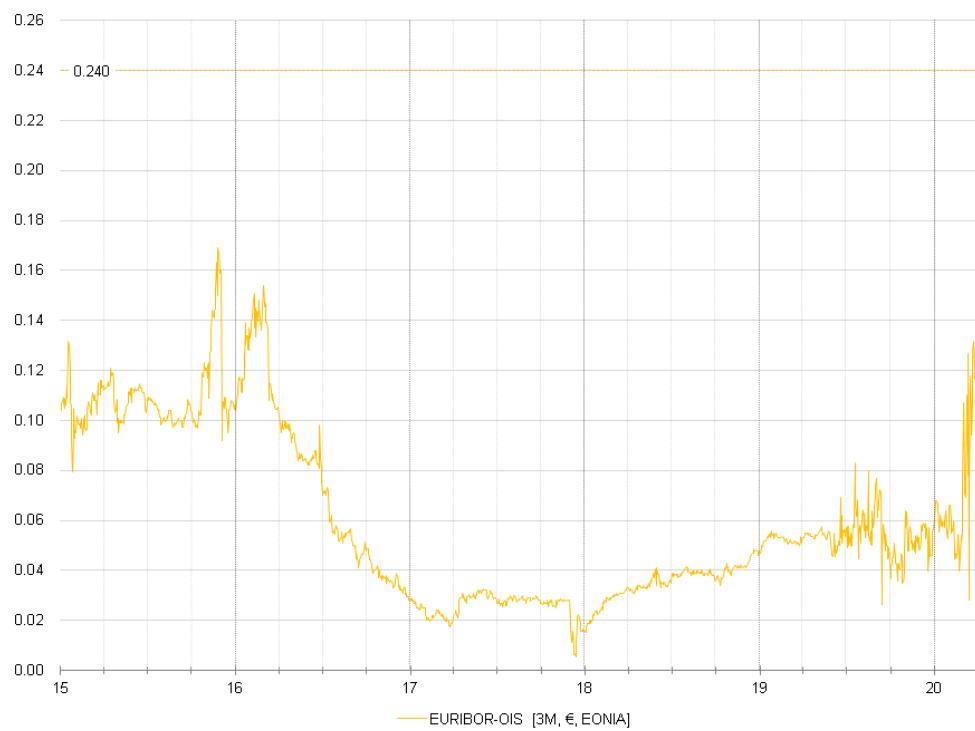
percent



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 3: EURIBOR-OIS

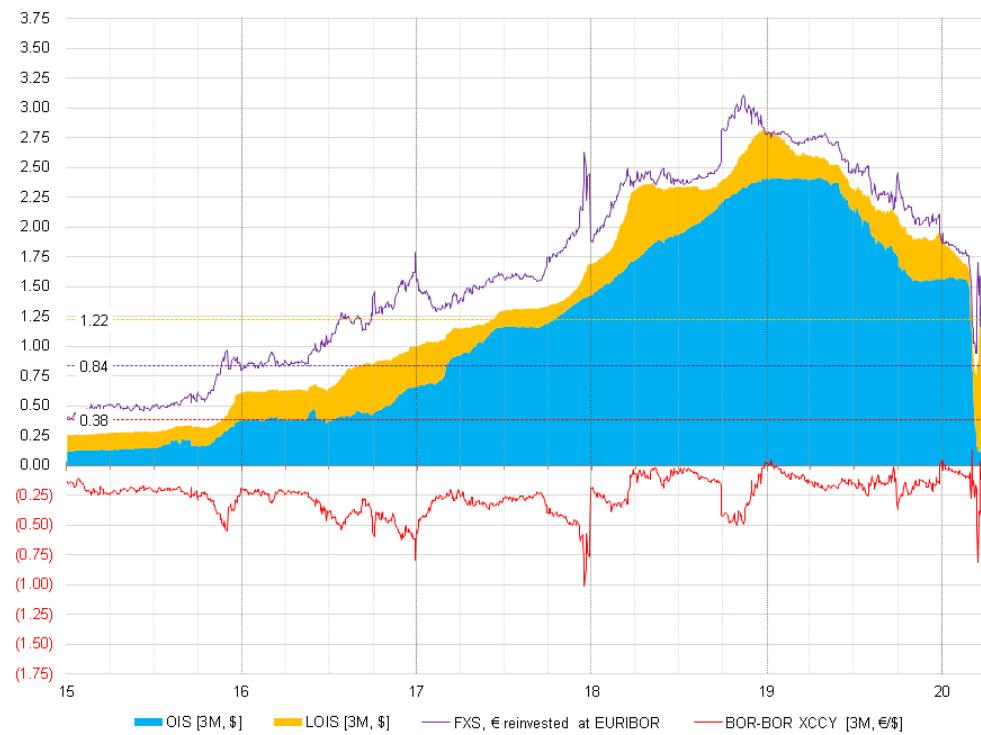
percent



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 4: FX Swap Implied Cost of Dollar Funding from €

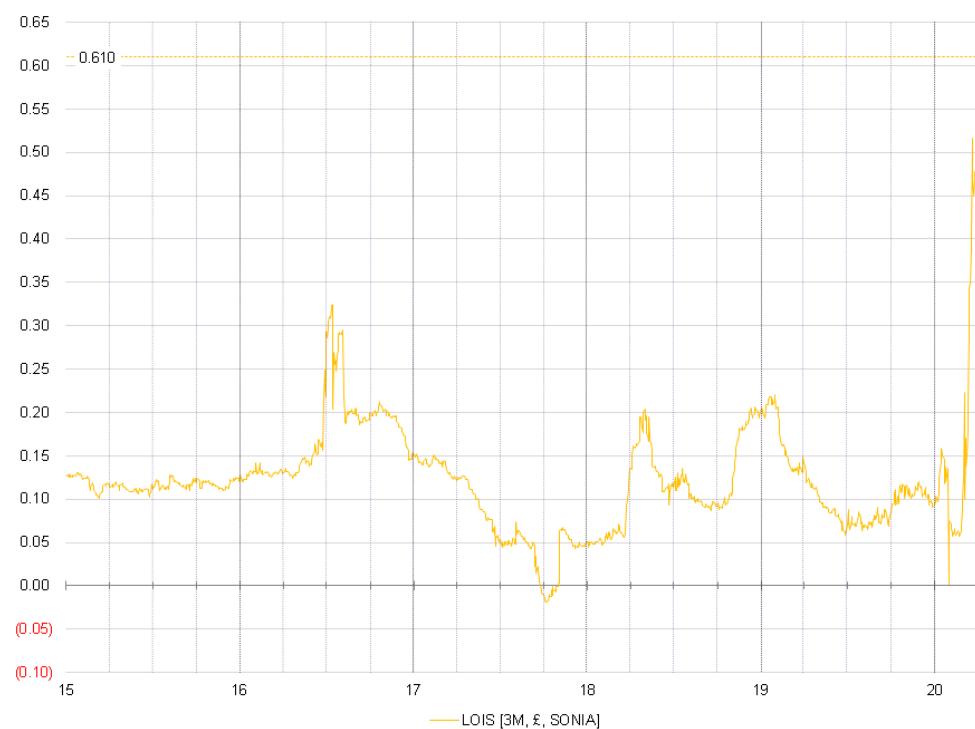
percent



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 5: Sterling Libor-OIS

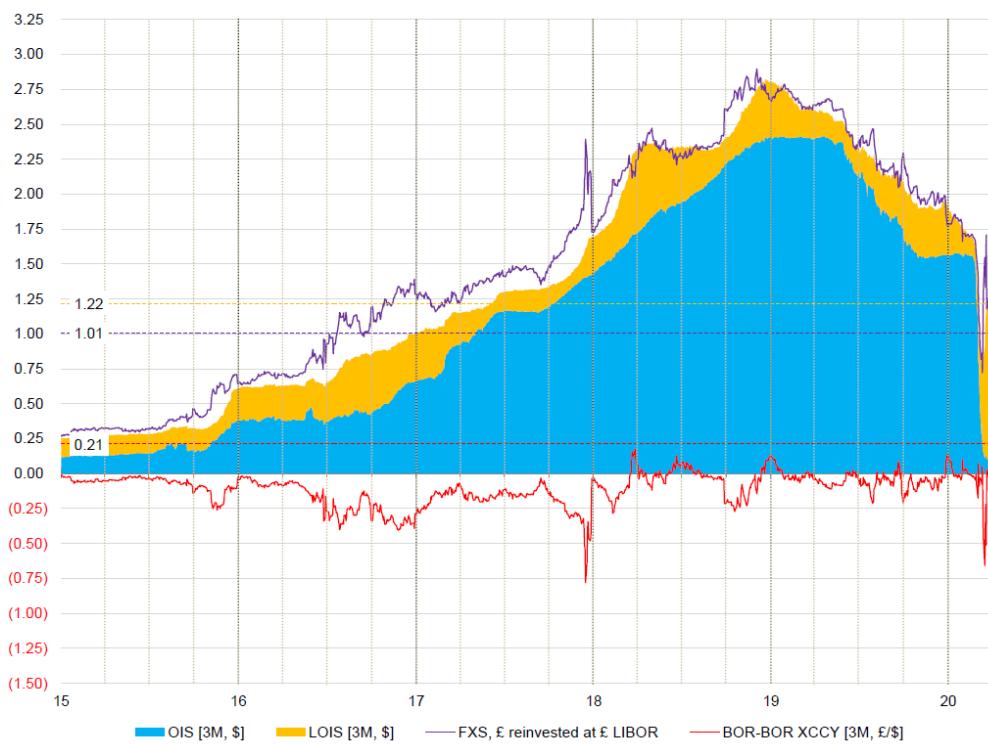
percent



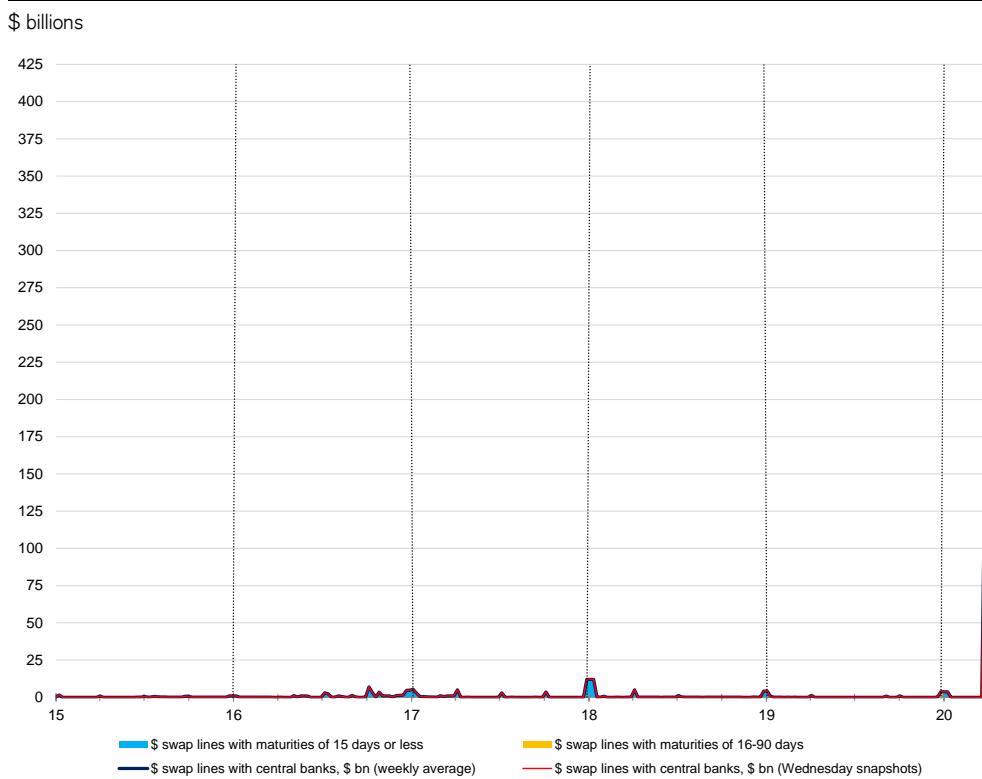
Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 6: FX Swap Implied Cost of Dollar Funding from £

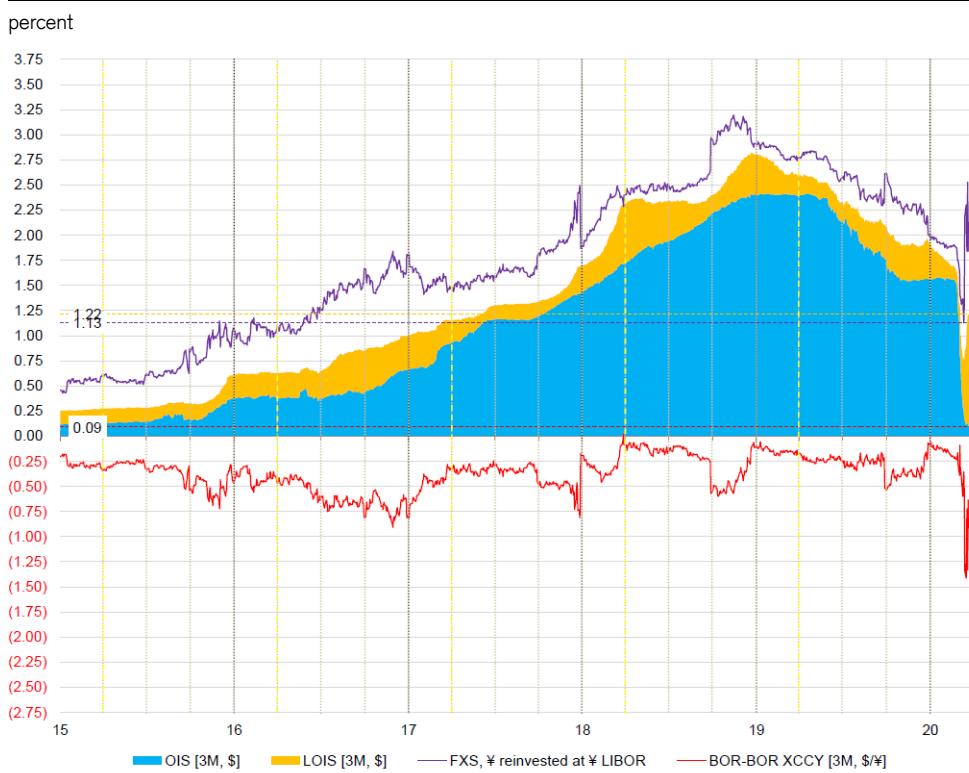
percent



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 7: Swap Lines for Banks means more FX Swaps for Non-Banks

Source: Federal Reserve

Figure 8: FX Swap Implied Cost of Dollar Funding from ¥

Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

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Credit Suisse Economics

Global Money Notes #30

Singularity

In astrophysics, singularity refers to infinite density at the center of a black hole, and the earliest state of the universe – before the Big Bang. In money markets, we define singularity as an “infinite” tightness of spreads at the zero bound.

Singularity is nigh, and its gravitational pull can drive the U.S. dollar Libor-OIS spread tighter from its current level, to the 10-20 bps range by the end of June.

The dollar swap lines, together with strong inflows to prime money funds continue to pull unsecured funding rates and hence U.S. dollar Libor lower, and we don’t share the market’s concerns over the coming supply of Treasury bills and we don’t think that bill supply will push U.S. dollar Libor-OIS spreads wider.

While \$1.25 trillion of Treasury bills over the next two months sounds like a lot, it’s actually not that much relative to the scale of the Fed’s liquidity injections, and the availability of a standing repo facility and dollar swap lines at low rates.

We see three pools of liquidity that will easily absorb \$1.25 trillion in bill supply:

First, QE will add \$300 billion of reserves, and the Treasury bringing down its cash balances by \$400 billion will add that many reserves by the end of June. Both will increase inflows to government money funds which will recycle inflows into bills directly, or indirectly by funding dealers and hedge funds through repos.

Second, the exemption of reserves and U.S. Treasuries from the leverage ratio and corresponding adjustments to the calculation of G-SIB scores will free up \$200 billion of balance sheet for dealers to run larger Treasury bill inventories. If there won’t be sufficient funding for this from money funds in the repo market, the Fed will be glad to provide funding through the repo facility at just 10 bps.

Third, if bill yields were to go as high as 25 bps, there is a deep pool of dollars in the global FX swap market that would trade out of German and French bills and buy U.S. bills instead – let’s assume at least \$200 billion on the margin. If these outflows stress the FX swap market, the Fed’s dollar swap lines will soothe it at OIS+25 bps... and just like that, we absorbed \$1.1 trillion of bills.

The rest can be bought by the Fed, if necessary.

Governor Quarles’ recent [letter](#) to Senator Crapo suggests the Fed wants to make carrying reserves less punitive for banks. Negative rates would do the opposite; yesterday, Chair Powell left the question of negative interest rates at that...

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Important Information

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This issue of Global Money Notes has four parts.

Part one reviews the main factors that drove U.S. dollar Libor-OIS wider and then tighter. Part two estimates the upper bound for U.S. dollar Libor-OIS at the zero lower bound. Part three looks at the inner workings of [war finance](#) and explains why the financial system will be able to absorb \$1.25 trillion of Treasury bills fairly easily. Finally, part four concludes.

Part I – A Morbidity Review of U.S. Dollar Libor-OIS

Prime money funds suffered outflows of \$150 billion during the last two weeks of March, and reversed about a half of those outflows since the middle of April (see Figures 1 and 2).

Over these two months, foreign banks toggled between three [private](#) funding channels:

First, during the last two weeks of March, they relied on U.S. primary dealers to issue short-term U.S. dollar unsecured debt (CD/CP), while prime funds struggled with outflows.

Second, during the first half of April, they raised local currency and swapped it for dollars, enabled by the rapid normalization of the FX swap market thanks to the dollar swap lines.

Third, from mid-April, they started to issue CD/CP in volume to prime money market funds once again, using rapidly falling FX swap implied funding rates to lock in low CD/CP rates.

These three funding phases correspond to the rapid widening, the inflection point and the equally rapid tightening of the U.S. dollar Libor-OIS spread during the past two months.

During the first phase, during the last two weeks of March, the three-month U.S. dollar Libor-OIS spread widened by 120 bps, and dealers' CD/CP inventories rose by \$20 billion. Foreign banks without a dealer arm in the U.S. rely on U.S.-headquartered dealers to underwrite and distribute their short-term debt, and as prime funds stopped buying, dealers went from “underwrite and distribute” to “underwrite and hold” – for a spread: dealers were underwriting CD/CP at rates as high as 2.5% the last two weeks of March, while the Primary Dealer Credit Facility ([PDCF](#)) – the discount window for primary dealers – became operational on March 17th, offering primary dealers secured funding at 25 bps. Figure 3 shows primary dealers’ holdings of CD/CP alongside their usage of the PDCF: dealers were basically buying CD/CP from foreign banks at 2.5% and funded at 25 bps.

During the second phase, during the first half of April, Libor-OIS peaked and began to fall. Libor-OIS peaked on April 1st, and this peak happened around the same time when FX swap implied yields at the three-month point started to show material improvement: while the Fed switched to daily U.S. dollar swap operations on March 20th with an expanded list of central banks, the Japanese fiscal year-end kept the FX swap market stressed for all major currencies through the end of March, as lenders of U.S. dollars shifted their lending to earn higher FX swap implied yields in yen and lent less elsewhere. But by the first week of April, the Japanese year-end turn was over, and Figure 4 shows that the Fed’s lending of U.S. dollars through the swap lines reached some critical mass – these developments pulled FX swap implied yields for most major currencies lower. In turn, lower FX swap implied yields opened a new funding channel for foreign banks – raising local currency funding and swapping it for U.S. dollars – which helped them diversify their funding away from dealers’ exorbitant rates starting the first week of April.

During this phase, Libor-Libor cross-currency bases went sharply positive for the euro, the Swiss franc, sterling and yen, which started to put pressure on EURIBOR-OIS and Libor-OIS spreads (see Figures 5 and 6) – effectively, as the Fed flooded the world with dollars through the swap lines, it exported unsecured funding pressures as a byproduct. These flows were the key reason behind our [conviction](#) that U.S. dollar Libor-OIS spreads were about to rapidly normalize during April as discussed in our previous issue (see [here](#)).

During phase three, which began mid-April, just when we published our previous issue, Libor-OIS went into a freefall: during the last two weeks of April Libor-OIS fell 62 bps. The freefall had two drivers: the dynamics from the second phase gathering momentum – as expected – and big inflows to prime money market funds – which came unexpected.

Falling FX swap implied costs of dollar funding – a combination of small increases in local EURIBOR-OIS and Libor-OIS spreads and big declines in FX swap implied yields – combined with big inflows to prime money market funds quickly changed the dynamics in U.S. unsecured funding markets. Inflows to prime funds during the last two weeks of April brought marginal liquidity back to the U.S. dollar CD/CP markets, and foreign banks used falling FX swap implied costs of dollar funding as leverage to extract low rates from prime money market funds – foreign banks went from being price takers in late March, to being price makers by mid-April. Over the course of one month, the CD/CP market went from trading around 2.5% in late March to trading around 50 bps by the end of April.

Figures 7, 8 and 10 show how the constellation of U.S. dollar funding/lending rates changed as we transitioned from the first to the second phase, and where we are today.

Figure 7 shows the global dollar funding market in a state of disarray on March 31st – the day that marks the end of phase one, and the apex of U.S. dollar Libor at 145 bps.

The figure shows the full range of borrowing/investment options involving U.S. dollars: the blue, brown and orange square-shaped markers show onshore and FX swap-based OIS, generic government bill and Libor yields; the lone green marker shows where foreign banks issued short-term unsecured debt in the onshore U.S. dollar CD/CP market; and, the red dashed lines show the maximum level for each FX swap-based category. We show these yields at the three-month point for all the major countries/currencies where the list of U.S. dollar Libor panel banks are headquartered, plus the Australian dollar.

The Fed's cuts brought onshore OIS and Treasury bill yields to zero, but U.S. dollar Libor was still in the stratosphere, and foreign banks raised short-term U.S. dollar funding from U.S. primary dealers at Libor-like levels on average, and some high as 2.5% (see above).

Looking at FX-swap implied yields, lending U.S. dollars and reinvesting foreign currency in central bank deposits or government bills – depending on one's place in the hierarchy – yielded significantly more than leaving cash at the Fed or buying U.S. Treasury bills; this yield pickup was close to 150 bps for the yen and at least 50 bps for other currencies.

FX swap-implied yields in bank funding markets were also high, and in some countries, for example in Canada and Japan, they were even higher than U.S. dollar Libor fixings.

For European financial centers – London, Frankfurt, Paris, and Zurich – FX swap-implied funding costs were lower than U.S. dollar Libor fixings, but this was a risk off environment and most institutional lenders of U.S. dollars in the FX swap market were only willing to reinvest local currency collateral in deposits at central banks or generic government bills...

...but not unsecured bank debt. As such, foreign banks could not get around funding at exorbitant rates with U.S. primary dealers and at U.S. dollar Libor-like levels on average – foreign banks were still price takers of U.S. dollar funding in unsecured funding markets.

Figure 8 shows the state of dollar funding markets on April 14th – the end of phase two.

Compared to the second half of March, the first half of April was a “risk on” environment – by mid-April, the S&P500 was up by over 20% from its trough reached in mid-March.

FX swap implied yields in bank funding markets fell considerably and with “risk on”, foreign banks could now tap unsecured funding markets in euros, sterling and yen locally and then swap local currency funding for U.S. dollars at rates that were at least 25 bps and at most 50 bps lower than rates that prevailed in U.S. unsecured funding markets.

Canada was the only exception, where the lack of an o/n RRP-like facility to absorb the excess liquidity added by the Bank of Canada and the collapse in oil prices drove the U.S. dollar/Canadian dollar cross-currency basis more negative at the tomorrow-next and three-month points, respectively, which kept U.S. dollar funding costs high in Toronto.¹

FX swap implied yields involving central bank deposits and generic government bills also fell considerably for the major currencies, as the flood of U.S. dollars flowing through the swap lines worked their way through the system. FX swap implied yields for the Japanese yen remained relatively high, however, as most of the demand for U.S. dollars through FX swaps in Japan – and the world in fact – comes from Japanese life insurers that do not have access to the Fed's U.S. dollar swap lines through the Bank of Japan.

According to the Bank of Japan, life insurers' U.S. dollar needs in the FX swap market exceed \$1 trillion, which outweighs the need of banks by a factor of four (see Figure 9). In contrast, in other jurisdictions, banks' U.S. dollar needs in the FX swap market are much bigger than those of life insurers, pension funds or asset managers combined, so bank's access to the Fed's U.S. dollar swap lines through local central banks helped bring down FX swap implied yields for other currencies more than for the Japanese yen.

Figure 10 shows the state of dollar funding markets today – that is, phase three-to-date.

The main theme of phase three is the return of liquidity to the U.S. CD/CP market and foreign banks using the ongoing fall in FX swap implied costs of U.S. dollar funding to extract low rates on CD/CP issued to prime money market funds. The top and bottom green dashed lines show the highest and lowest rates at which foreign banks have issued CD/CP in recent days (based on our conversation with brokers and foreign banks), and the middle green dashed line shows where CD/CP has traded on average in recent days.

CD/CP now trades near the FX swap implied cost for U.S. dollar funding from euros and Swiss francs, and some of the extreme low CD/CP prints have come from foreign banks – predominantly Scandinavian banks – that typically issue only when they can swap the U.S. dollars they raised unsecured back to euros or other currencies at a positive spread.

Unsecured spreads are thus low – they're back to "normal". Where will they go from here?

Provided that the inflows to prime funds continue, low yields on U.S. Treasury bills will continue to drag CD/CP rates lower, as at the zero bound the "laws of physics" change...

...anything with a substantially non-zero yield has strong demand for it. Strong demand from prime funds for CD/CP also coincides with a decline in the structural supply of CD/CP – think of the fact that foreign banks have raised \$450 billion through the swap lines, and some of that funding naturally reduces the amount of CD/CP foreign banks need to issue.

Strong inflows into prime funds driving demand for U.S. dollar CD/CP, combined with the decline in the structural supply of U.S. dollar CD/CP as foreign banks use the swap lines points to a perfect storm where U.S. dollar Libor-OIS spreads can compress further still...

...but to what level? 25 bps as implied by the June FRA-OIS contract or tighter still?

To answer that question, we need to have a view on the upper bound of non-U.S. banks' Libor submissions, which is a function of their FX swap-implied cost of U.S. dollar funding.

¹ Growing demand for U.S. dollars in Canada is understandable in the context of collapsing oil prices. In contrast, the link between excess Canadian dollar liquidity and strong demand for t/n U.S. dollars is a bit harder to understand: demand for t/n U.S. dollars was strong not because Canadian pension funds and other non-bank institutional investors needed U.S. dollar funding per se, but rather, because they didn't have a place to put excess Canadian dollar liquidity at home. As a solution, they lent more and more Canadian dollars and borrowed U.S. dollars in the FX swap market, and reinvested these U.S. dollars in a much deeper U.S. Treasury bill and repo market than what Canada has to offer.

Part II – Cakes and Pancakes

Money markets are like a cake...

...most of the time, but they can be like pancakes too when we're at the zero bound and we are using the tools of war finance. For as long as inflows to prime money funds remain strong, we don't see a reason why CD/CP rates and hence U.S. dollar Libor could not fall more from here on the back of strong demand/reduced supply (see above), and why June FRA-OIS could not "pancake" further from here to as low as 10-20 bps.

That's the case if Libor panel banks base their submissions on rates in the CD/CP market. U.S. banks certainly will, and because most of the liquidity that has been and will be added by the Fed has flown and will flow to U.S. banks, their U.S. dollar Libor submissions will be relatively low and falling and so will most likely fall out of the U.S. dollar Libor panel.

But what about foreign banks that may base their submissions on FX swap implied costs of U.S. dollar funding? Because FX swap implied costs typically trade above CD/CP rates, they determine the upper bound for U.S. dollar Libor submissions and Libor-OIS spreads.

In the remainder of this section, we'll try to "forecast" the path of FX swap implied costs of U.S. dollar funding and hence the upper bound of the Libor submission of the group of U.K., eurozone, Swiss, and Japanese banks that make up the U.S. dollar Libor panel.

The FX swap implied cost of dollar funding is a simple concept, with three components: local currency OIS, the local currency Libor-OIS spreads and FX swap implied yields. The path of the last two of these three components is different for each major currency.

Starting with the local currency component, Libor-OIS spreads for the sterling and euro can fall 20 bps and 15 bps from here, respectively, as pressures on local funding markets subside now that the U.S. dollar CD/CP market is open again (see Figures 11 and 12).

Assuming no change in FX swap implied yields, these declines in sterling Libor-OIS and EURIBOR-OIS spreads can bring down U.K. and Eurozone banks' FX swap implied costs of U.S. dollar funding – and hence the upper bound of their U.S. dollar Libor submissions – to about 30 bps at the three-month point. In fact, some U.K. banks are issuing CD/CP in the U.S. around 30 bps at the three-month point, and are swapping dollars back to sterling to fund in sterling – these flows are helping to normalize both U.S. dollar and sterling Libor-OIS spreads, as low dollar CD/CP prints are pulling U.S. dollar Libor lower and raising sterling via FX swaps is pulling sterling CD/CP prints and sterling Libor lower.

What about the path of the FX swap component: is there a room for declines here too?

We don't think so.

Consider that for the euro, sterling and the Swiss franc, ultra front-end – that is, tomnext, spotnext and one-week – FX swap implied yields (OIS) trade about one to 10 bps over the U.S. dollar OIS rate, and three-month implied yields trade about 10 and 15 bps over the U.S. dollar OIS rate. These yields are at or below the rate of the dollar swap lines (see Figure 13), and suggest that market makers in the FX swap market make a meager spread of 5 to 10 bps sourcing U.S. dollars at the tomnext, spotnext and one week points and lending them at the tree-month point. That's not a lot of "bang" for a market maker's balance sheet, and so further compression of OIS-OIS cross-currency bases are unlikely for these currencies as market makers need a minimum spread to keep making markets.

This also means that further declines in the FX swap implied costs of U.S. dollar funding from the sterling and the euro will come solely from declines in local Libor-OIS spreads, not FX swaps, and if that happens, the upper bound of U.K. and European banks' U.S. dollar Libor submissions will likely drift down to around 30 bps by the end of June.

The Japanese yen is a different story.

The FX swap implied cost of U.S. dollar funding from yen is high relative to other currencies due to the FX swap component – the Libor-OIS spread for the Japanese yen is small – and the FX swap component is expensive due to non-banks' U.S. dollar needs (see above).

Figure 14 shows that FX swap implied yields (OIS) from yen trade well above those from the euro, sterling and the Swiss franc, and the FX swap implied yield curve for the yen is much steeper than for other currencies, offering market makers much better spreads.

That means that for the Japanese yen, any decline in FX swap implied funding levels will have to come from declines in FX swap implied yields. Three things could bring that about:

- (1) the BoJ giving access to U.S. dollar auction to non-banks, which we don't expect;
- (2) the Fed lowering the price of FIMA repo facility as discussed previously (see [here](#));
- (3) the SLR exemption for reserves and Treasuries getting extended to other assets.

Each of these developments would increase the flow of dollars in the \$/¥ segment of the FX swap market: the first by offering dollars cheaper to non-banks than the market; the second by freeing up balance sheet for primary dealers to lend more via FX swaps; the third by excluding repos, repo-style transactions, foreign central bank deposits and foreign sovereign bonds – each an important cog in the global facilitation of FX swaps – from the calculation of the SLR and thereby freeing up more balance sheet for FX swaps.

The third bit is no fairy tale...

...the Fed is already working on it. When the Fed issued the temporary exemption of reserves and U.S. Treasuries from the calculation of the SLR on April 1st, it also asked whether the final rule change – due out on May 15th – should also exclude other assets:

"Question 2: What additional assets or exposure types should the Board consider to exclude temporarily from the SLR in order to achieve the interim final rule's objectives? For example, should the Board exclude deposits at certain foreign central banks and foreign sovereign debt instruments [...]? Should the Board exclude any specific repo-style transactions that would support banking organizations' role as financial intermediaries [...]?"

Why, yes! These are easy questions for a dealer to answer...

...and if granted, these changes will improve the flow of U.S. dollars versus the yen, and bring down the outlier – the FX swap implied cost of U.S. dollar funding from yen. If that happens, all FX swap implied costs of dollar funding would trade around 30 bps, reinforcing our view that the upper bound for U.S. dollar Libor-OIS should be 30 bps. But don't sweat it if these exemptions do not happen, as for calibrating the upper bound for Libor submissions, Japanese banks' high FX swap implied rates will fall out anyway...

That means that 30 bps on June FRA-OIS is an absolute upper bound, and if inflows to prime money funds continue, June FRA-OIS can trade even tighter – to as low as 15 bps.

But what of bill supply?

The U.S. Treasury is about to issue about \$1.25 trillion of bills by the end of June and that will surely pressure bill yields and hence Libor-OIS wider, and ruin the pancake party...

Maybe, maybe not.

As we've noted in our previous issue, in the extreme, the Fed has the option of buying bills or to cap bill yields at OIS or thereabouts. At a "macro" funding level, it would not make any sense for the Fed to launch all these new liquidity facilities to bring rates down to zero, and then watch passively as bill supply pushes rates away from zero. The Fed shouldn't, and we think won't let that happen. It will buy bills if it has to. But they may not have to, as there are other avenues that can help absorb the flood of bills over the next two months.

Part III – Inside War Finance

As far as core funding markets like U.S. Treasury repos and FX swaps are concerned, the Fed is demonstrably intent on providing backstops at extremely generous rates. The price of the U.S. dollar swap lines at OIS+25 bps is perhaps the best example of that, as it suggests that the Fed doesn't want the cost offshore dollar funding above OIS+25 bps. Given that the offshore dollar funding market – the FX swap market – is the “outer rim” of funding markets, if the outer rim is backstopped at OIS+25 bps, all other funding markets should trade below that rate too: repos for sure and if prime money fund inflows continue, unsecured funding markets too. Furthermore, the Fed's willingness to backstop banks' and dealers' term funding rates at 25 bps flat through the discount window and the PDCF suggests that the Fed doesn't want to see the cost of onshore funding north of 25 bps.

But then if onshore and offshore U.S. dollar funding markets, and U.S. and foreign banks and dealers are backstopped at 25 bps flat and OIS+25 bps, respectively, why exactly does the market worry about the funding needs of the U.S. Department of the Treasury? Given the above construct, we'd be surprised to see U.S. Treasury bill yields above banks' backstop funding rate, which means that bill yields can go a maximum of 10 bps higher from here before the Fed decides to cap them at OIS or OIS + some small spread.

But outright bill purchases by the Fed may not even be necessary...

Consider the following four pockets of liquidity that could each take a chunk of bill supply: demand from government money funds and some decline in Treasury's cash balances; demand from central banks; demand from dealers; and demand from asset managers.

First, the Fed is still buying \$35 billion of U.S. Treasuries a week, which will add around \$300 billion of reserves by the end of June. Like the bulk of liquidity injections to date, most of these funds will end up with government money market funds (see Figure 15), which will recycle them into bills or repos. Thus, it's either government funds that will buy \$400 billion in bills directly or dealers and relative value hedge funds that fund via repos. Furthermore, consider that according to the U.S. Treasury's latest borrowing estimates (see [here](#)), the target for U.S. Treasury's cash balances at the Fed is \$800 billion for the end of June, which is about \$400 billion lower than its current level of \$1.2 trillion (see Figure 16). That's another \$400 billion of reserves in the system in addition to the \$300 billion from QE, and another \$400 billion of inflows for government money funds.

Second, foreign central banks still park \$300 billion at the Fed's foreign repo pool, earning the o/n RRP rate, that is, zero rate of interest. While this pool of money has been remarkably sticky, some of it could move into the bill market to earn some positive interest – let's assume \$100 billion (maybe the Fed could apply a little bit of incentive here, by imposing counterparty caps or negative rates on the foreign repo pool, for example).

Third, primary dealers were just given more balance sheet through the exemption of reserves and U.S. Treasuries from the calculation of the SLR. This rule change can easily provide \$200 billion of balance sheet for running bigger U.S. Treasury inventories, and if funding for these inventories runs out from money funds, the Fed can offer it through the o/n repo facility at 10 bps. Given that dealers barely make 10 bps of carry on their FX swap books, they'll be content with buying bills at 20 bps and funding them at 10 bps.

Fourth, asset managers that lend in the FX swap market could start buying more U.S. bills if their yield exceeds the FX swap implied yield of holding German, French and U.K bills (see Figure 17). If that will stress the FX swap market, the swap lines will soothe it at OIS+25 bps. Let's assume \$100 billion of bill demand from this source and *voilà*, the financial system absorbed \$1.25 trillion of bills without a penny purchased by the Fed.

That's war finance...

Conclusions

In astrophysics, the concept of singularity refers to infinite density at the center of a black hole, and the earliest state of the universe – before the Big Bang. In money markets, we define singularity as an “infinite” density of funding spreads at the zero lower bound.

Singularity is nigh, and its gravitational pull can drive U.S. dollar Libor-OIS spreads tighter, to 10-20 bps by mid-June. U.S. Treasury bill supply won’t stand in the way, in our view.

\$1.25 trillion in bill supply over the next two months sounds like a lot, but it’s actually not relative to the size of the Fed’s liquidity injections and the availability of liquidity facilities...

QE keeps adding reserves to the system at a pre-scheduled, \$35 billion a week pace; the U.S. Department of Treasury running a lower cash balance will add reserves too; and foreign central banks “selling” the foreign repo pool and buying bills can add reserves too.

If these additional reserves aren’t sufficient to absorb bill supply, the Fed can add more:

the o/n repo facility is there to fund dealers’ U.S. Treasury inventories on the margin, and the swap lines are there to lend U.S. dollars to the world at OIS+25 if asset managers decide to buy U.S. bills and lend less in the FX swap market and hold fewer foreign bills.

It’s war finance...

...and the Fed appears committed to ensure that collateral supply (U.S. Treasury issuance) does not outpace the supply of reserves by a crushing margin: ongoing QE ensures that; standing liquidity facilities ensure that; and changes to the edifice of Basel III ensure that.

But there is more...

Governor Quarles’ [letter](#) to Senator Crapo on April 22nd, where he encourages Congress to:

“consider modifying [the Collins Amendment] of the Dodd-Frank Act to allow regulators to ease banks’ Tier 1 leverage requirements as banks respond to increased credit demands”

also suggests that the Fed is laser focused on ensuring that there is enough balance sheet and reserves to meet the U.S. government’s and everyone else’s growing credit needs.

There is all that to absorb the coming wave of U.S. Treasury bill supply before the “nuclear” option – outright purchases of bills and capping bill yields – becomes necessary.

But what’s the big deal about bill purchases?

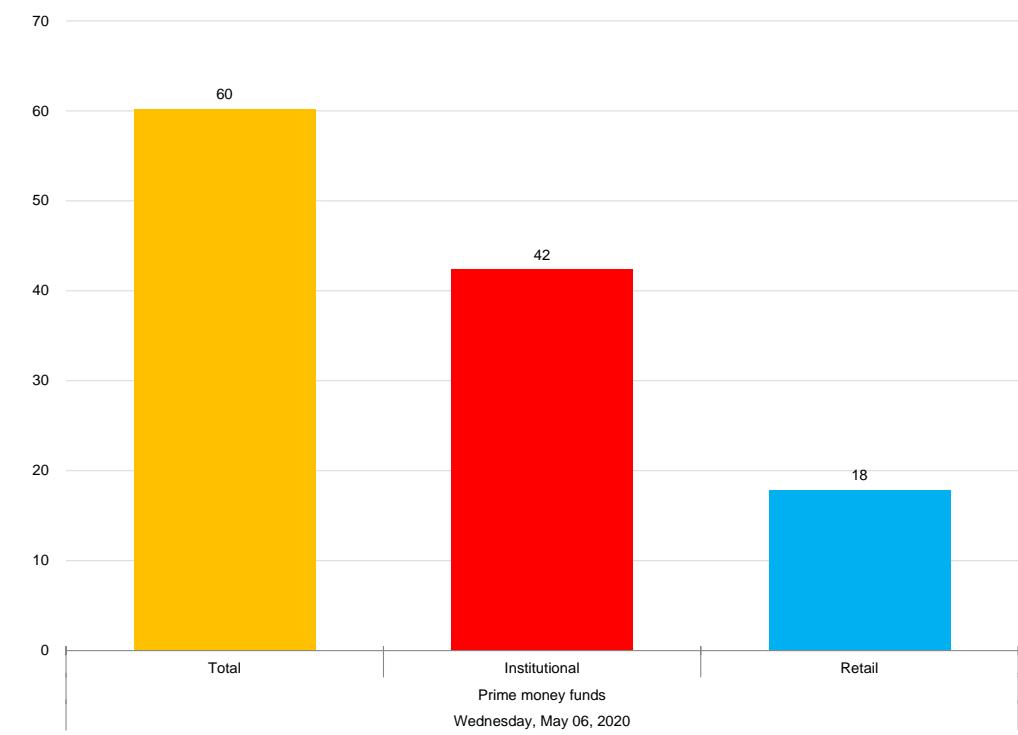
U.S. Treasury bills are the easiest asset for the Fed to buy – it’s the Fed’s natural habitat (and for money-fundamentalists, it should be the Fed’s only habitat). If bills are in excess, and this excess were to push global dollar funding rates up and away from the zero bound, the Fed will simply buy the excess. If the Fed is backstopping the credit market, why wouldn’t it backstop its natural habitat? So don’t sweat the tsunami of Treasury bills:

U.S. dollar Libor-OIS spreads will continue to tighten through June and will stay low beyond.

Prepare for singularity...

Figure 1: Prime Money Fund Inflows

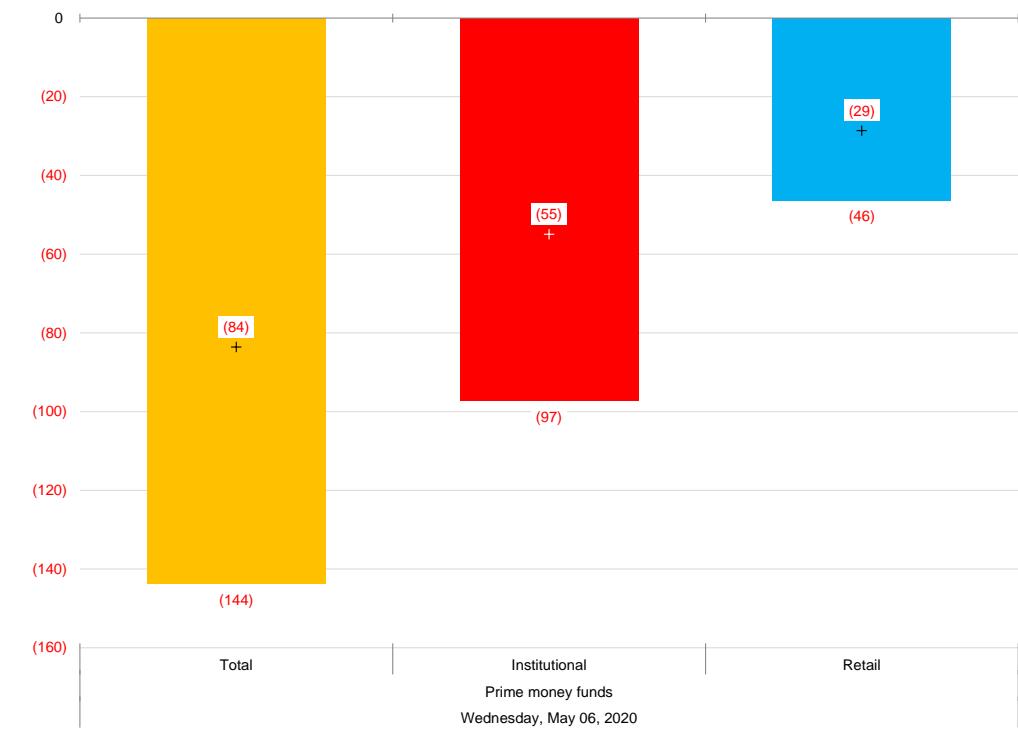
\$ billions, inflows to prime money market funds since April 1st, 2020



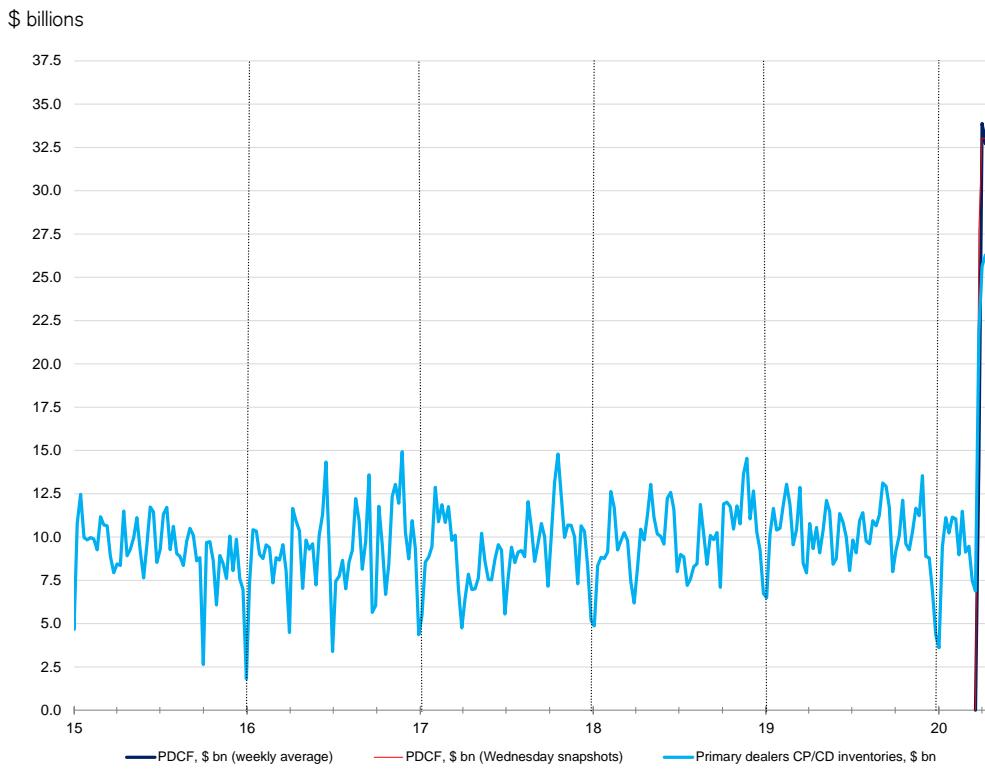
Source: ICI, Credit Suisse

Figure 2: Prime Money Fund Outflows

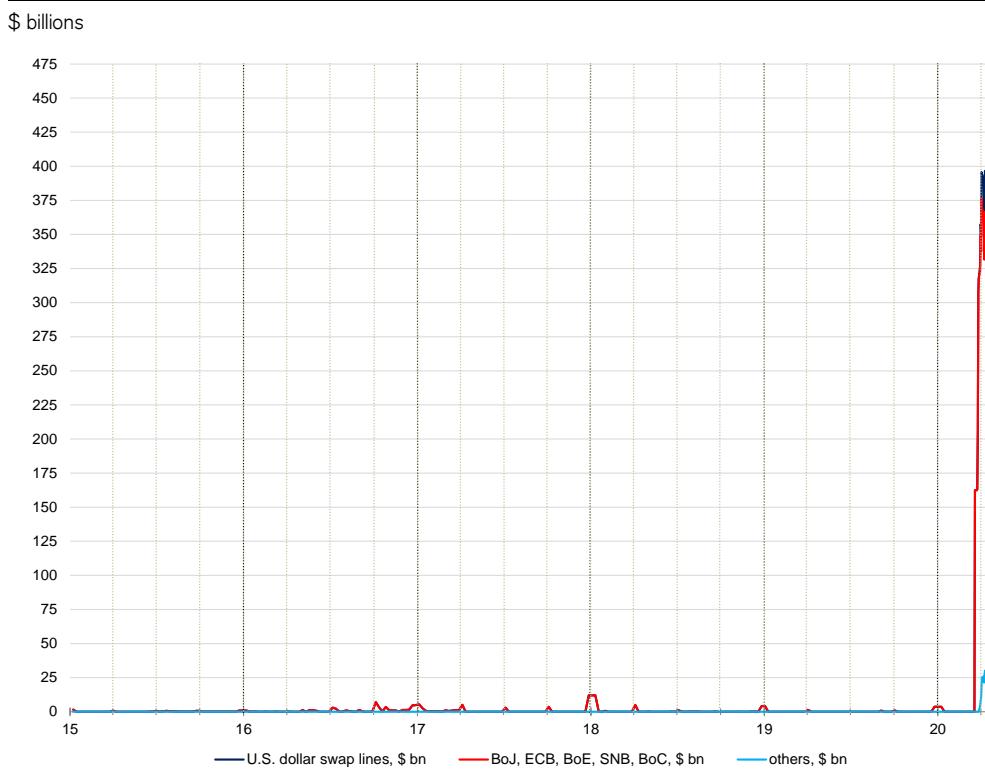
\$ billions, prime money funds' peak outflows during March [bars]; peak outflows minus inflows since April 1st, 2020 [“+” markers]



Source: ICI, Credit Suisse

Figure 3: Primary Dealers' Inventories of CD/CP and the PDCF

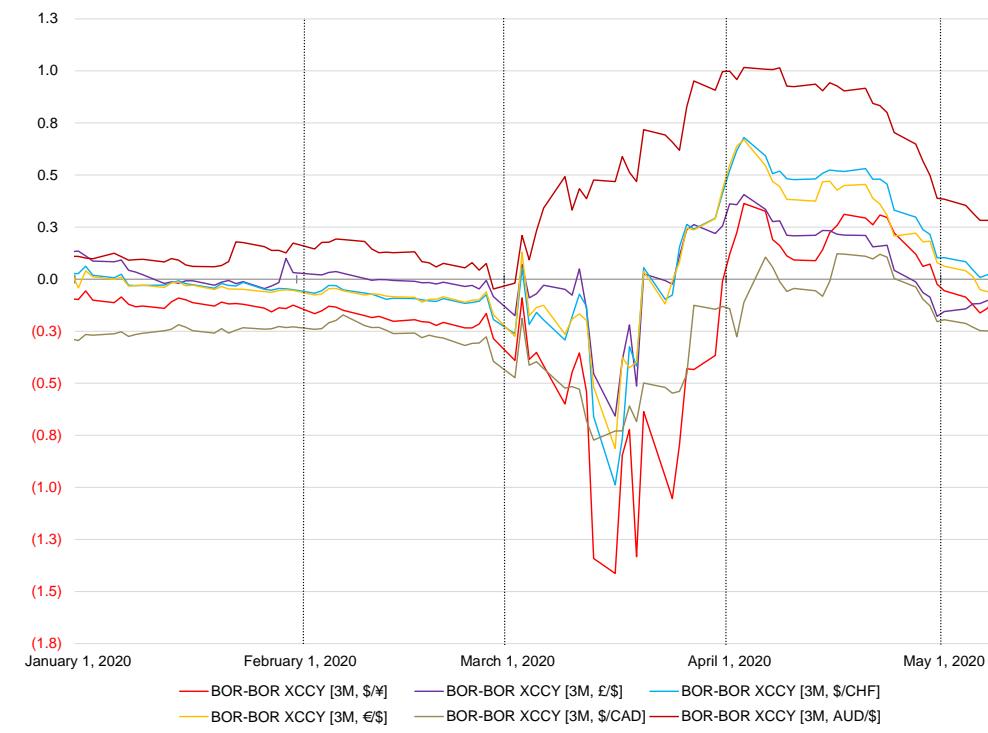
Source: Federal Reserve, Credit Suisse

Figure 4: The U.S. Dollar Swap Lines

Source: Federal Reserve, Credit Suisse

Figure 5: Less Stress in the FX Swap Market...

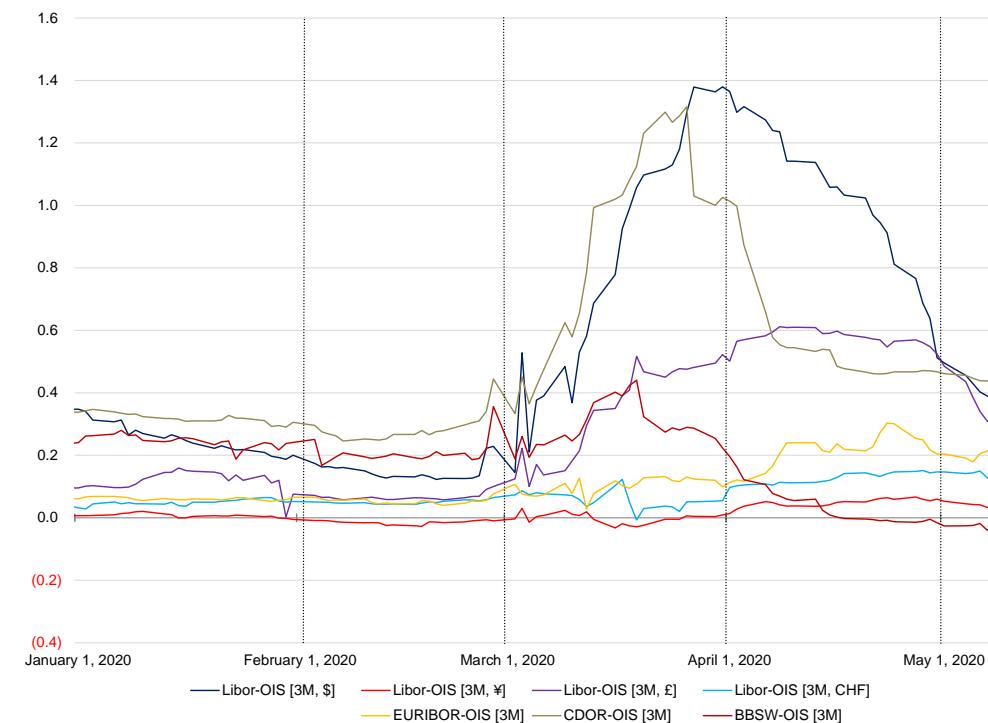
percent, three-month Libor-Libor cross-currency bases



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 6: ...More Stress in Local Currency Funding Markets

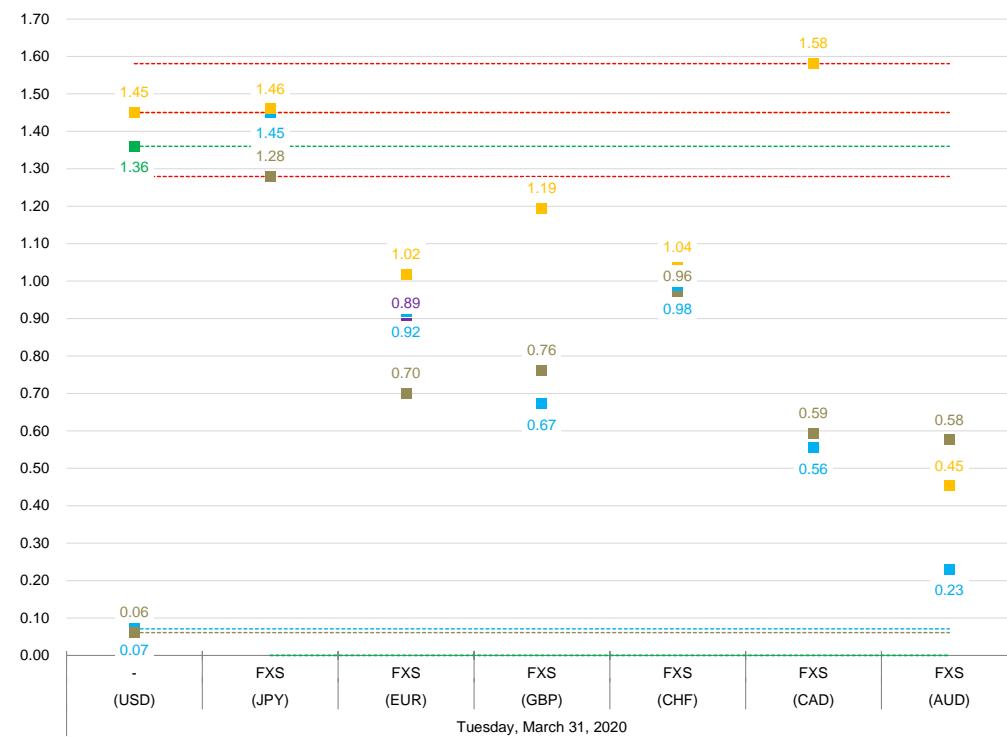
percent, three-month Libor-OIS bases



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 7: The View from the Eye of the Storm (Phase 1)

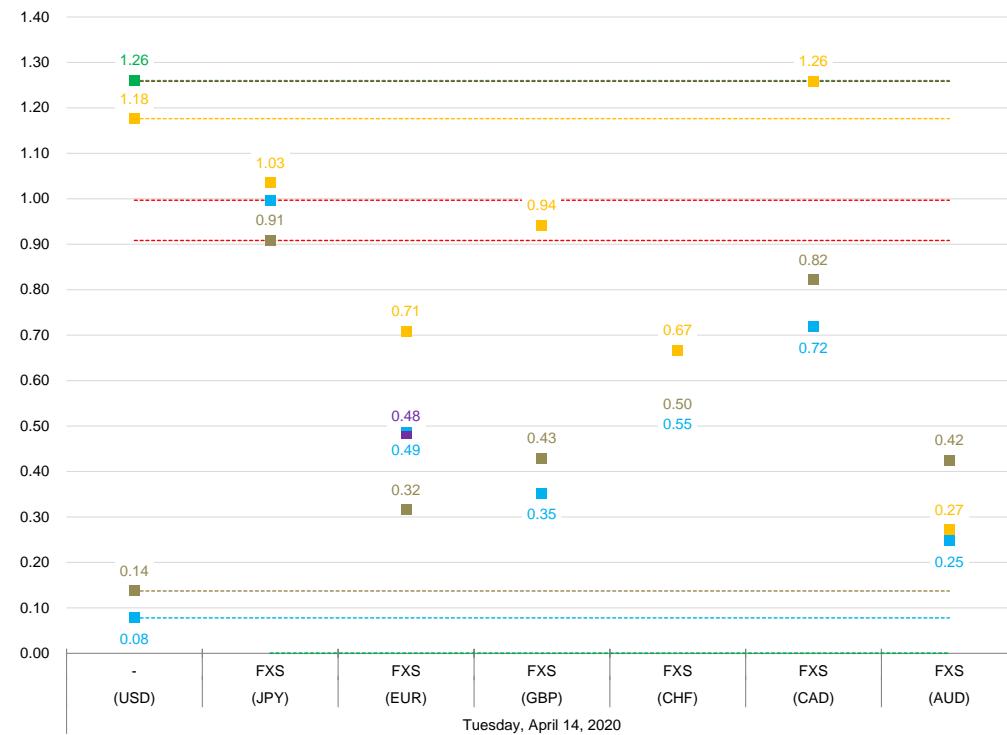
percent, three-month; blue, brown, orange and green markers refer to U.S. dollar OIS, bill, Libor and CD/CP yields, respectively



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 8: The Storm Subsiding (Phase 2)

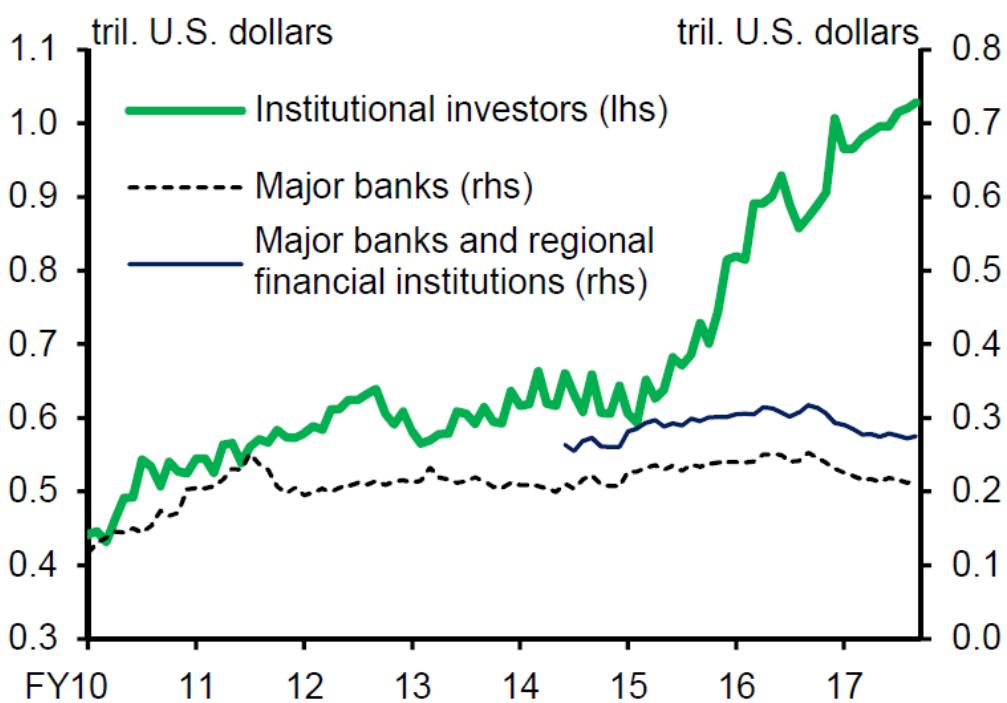
percent, three-month; blue, brown, orange and green markers refer to U.S. dollar OIS, bill, Libor and CD/CP yields, respectively



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 9: The Non-Bank vs. Bank Bid for U.S. Dollars in Japan

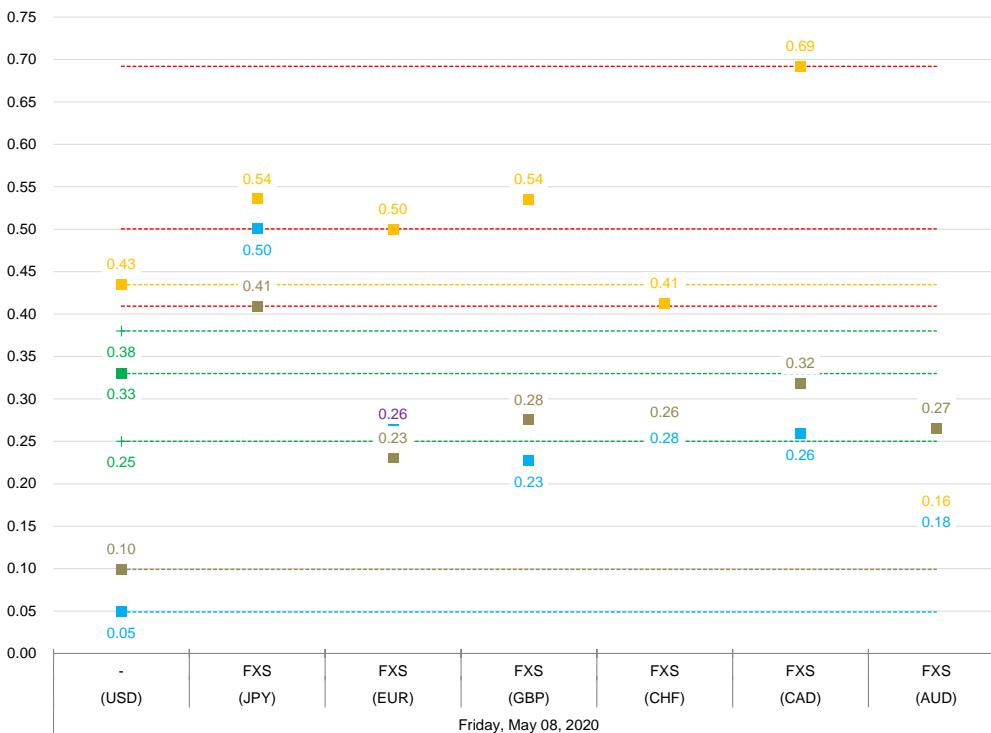
\$ trillions



Source: Bank of Japan

Figure 10: The Storm is Over (Phase 3)

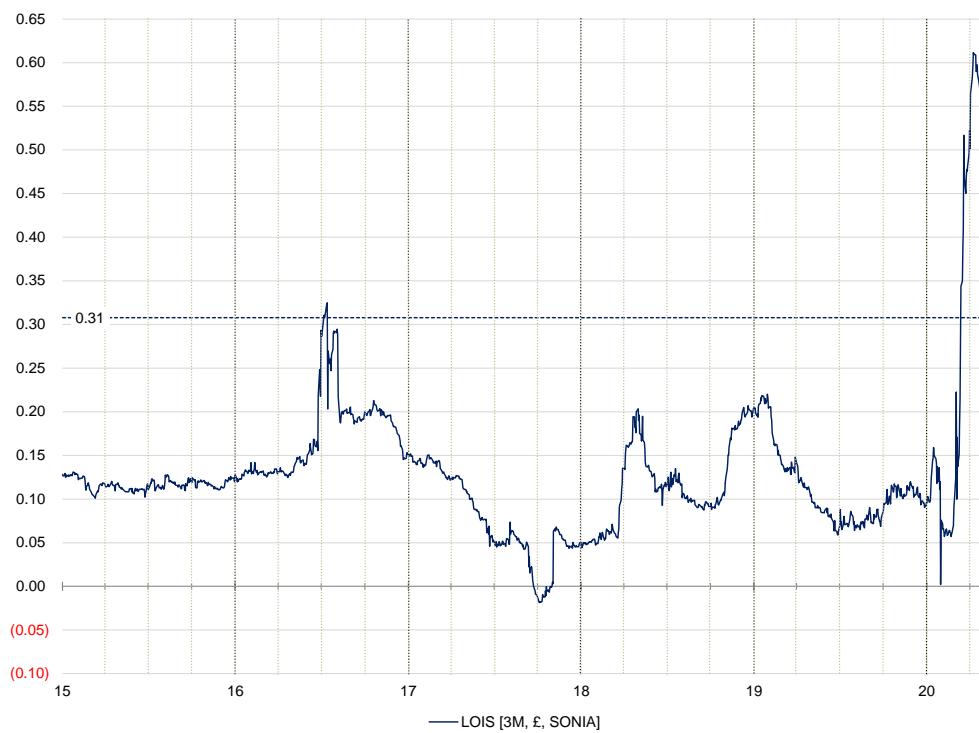
percent, three-month; blue, brown, orange and green markers refer to U.S. dollar OIS, bill, Libor and CD/CP yields, respectively



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 11: The Libor-OIS Spread for Sterling

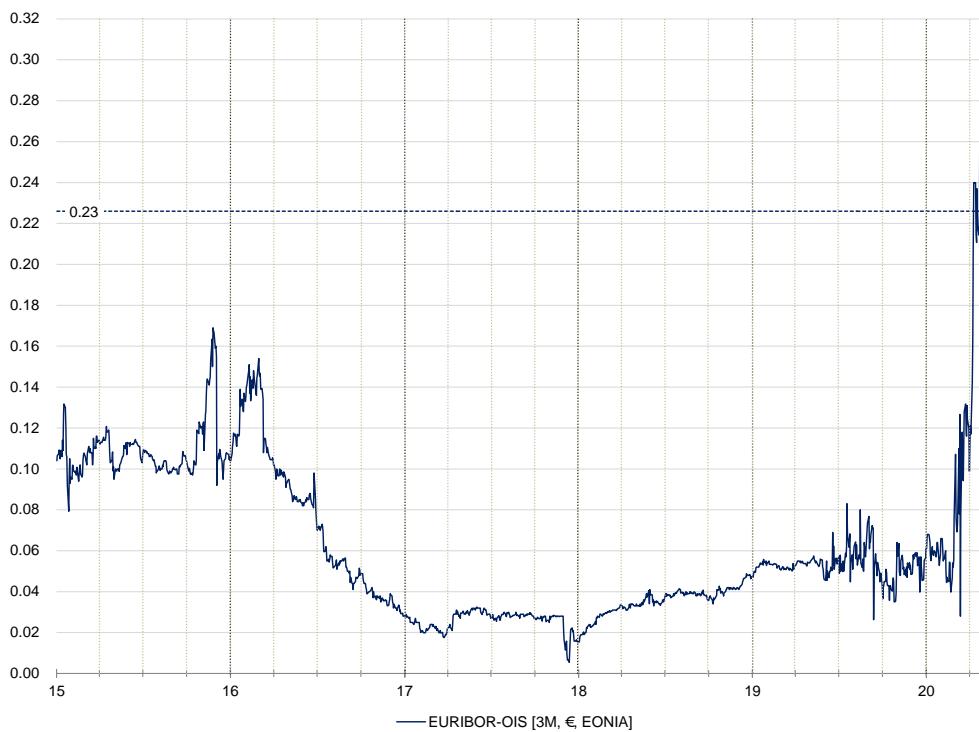
percent, three-month



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 12: The “Libor-OIS” Spread for the Euro

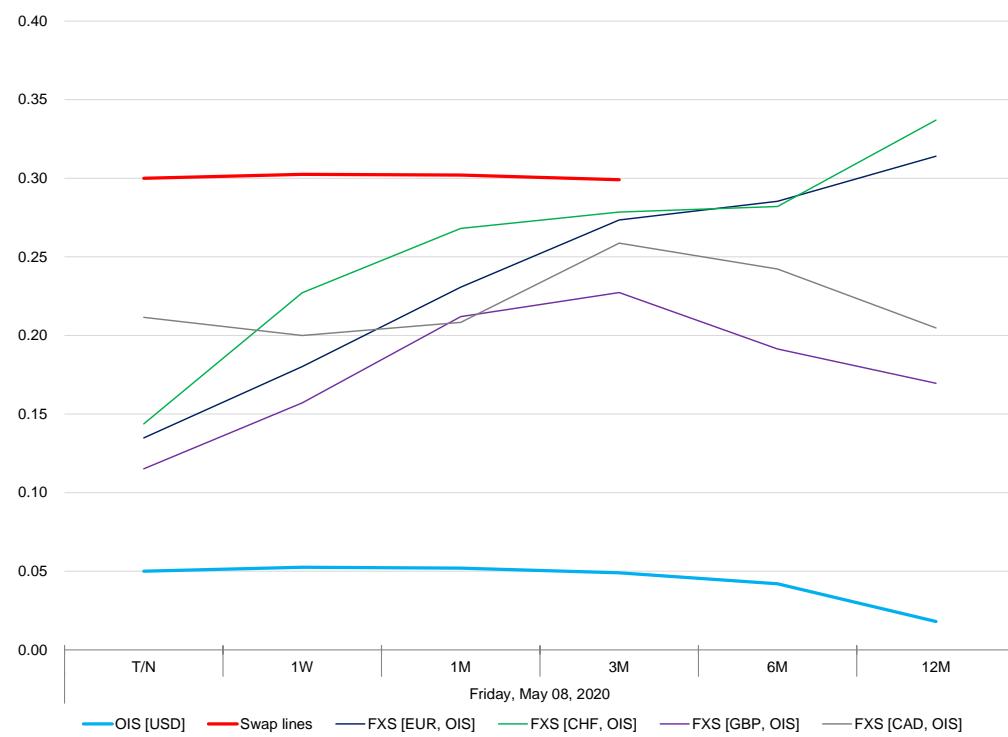
percent, three-month



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 13: FX Swap Implied Yield Curves

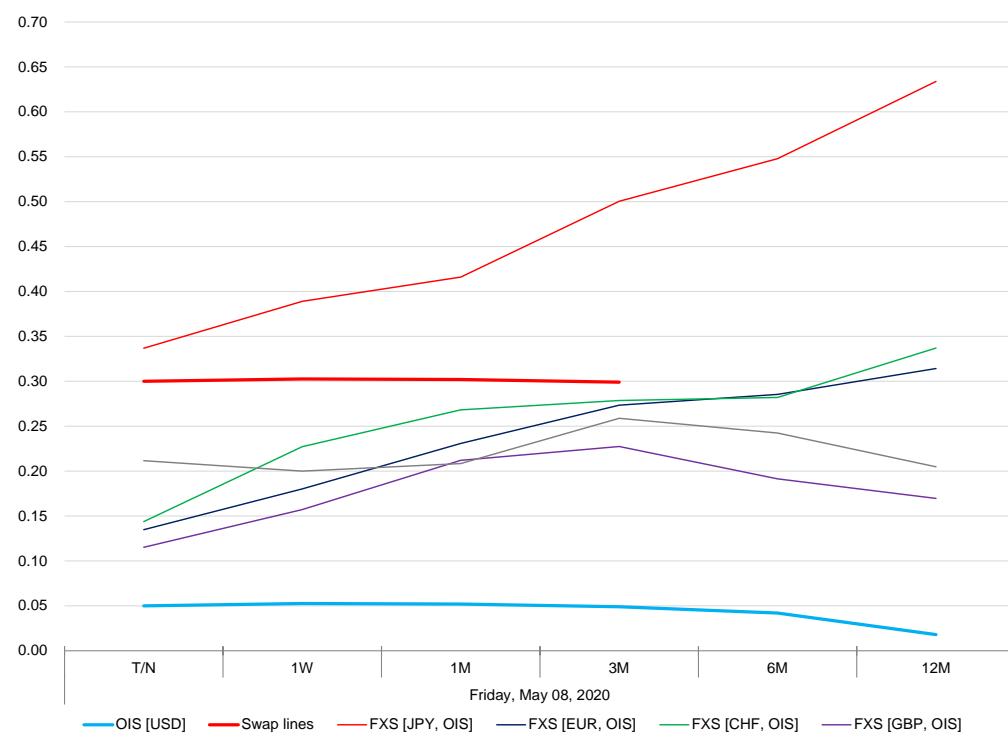
percent, local currency collateral reinvested at OIS



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 14: The “Mount Fuji” of FX Swaps

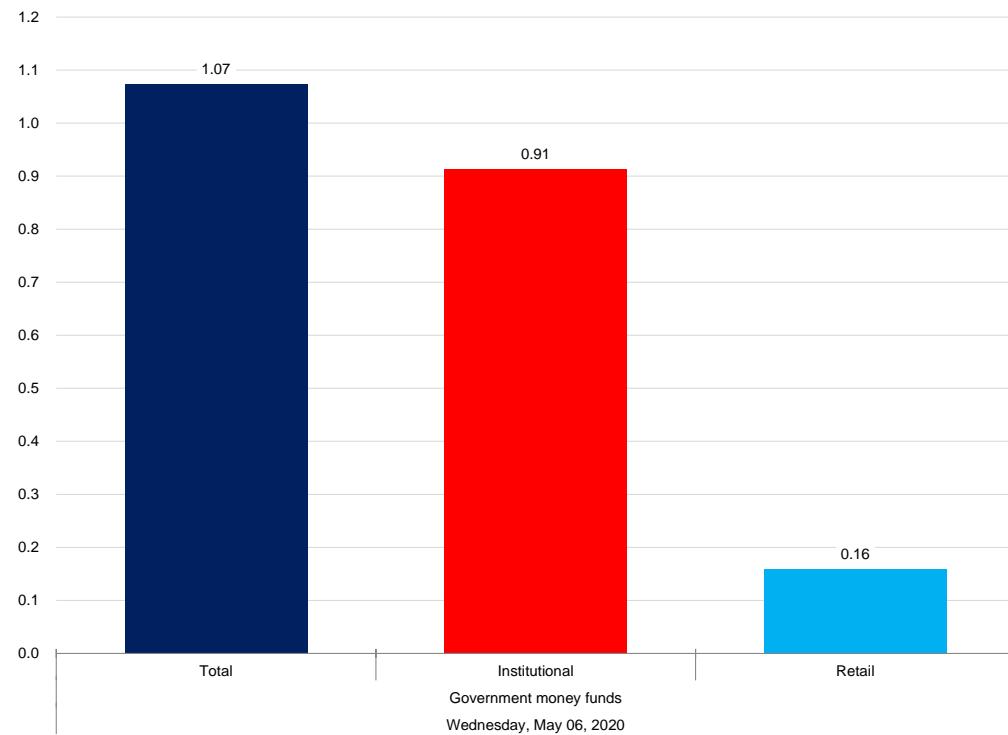
percent, local currency collateral reinvested at OIS



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

Figure 15: Government Money Fund Inflows

\$ trillions, inflows to government money funds since March 11th, 2020



Source: ICI, Credit Suisse

Figure 16: U.S. Treasury's Cash Balances

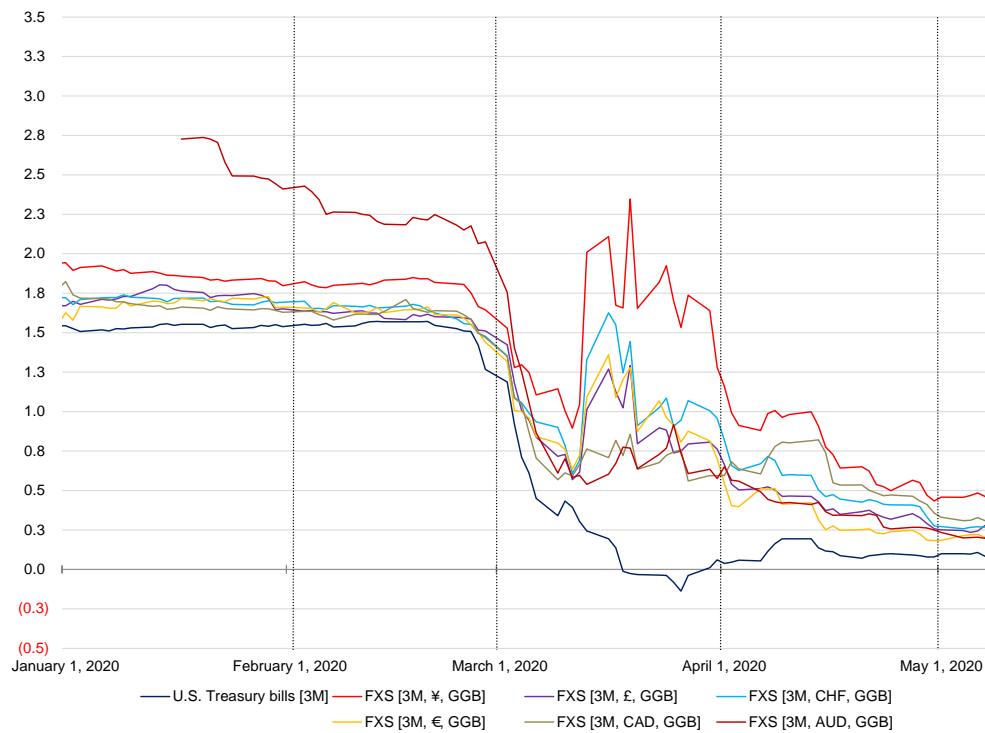
\$ trillions



Source: U.S. Treasury, Credit Suisse

Figure 17: U.S. Treasury Bill Yields and “Synthetic” U.S. Treasury Bill Yields

percent, three-month, synthetic U.S. Treasury bills refers to U.S. dollars lent via FX swaps and local currency collateral reinvested in local government bills



Source: Credit Suisse, the BLOOMBERG PROFESSIONAL™ service

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Credit Suisse Economics

Global Money Notes #31

U.S. Dollar Libor and Swap Line Rollovers

The market's concerns over the upcoming swap line maturities are overdone: in our view, the maturities this month will pass without any major market impact.

The current state of dollar funding markets reminds us of a bathtub full of toys, with the faucet still running and the drain at the bottom open: there is some drama developing at the bottom, as a whirlpool coming out of nowhere starts to suck some little toys in – balances in the Treasury general account (TGA) reach a record \$1.5 trillion and the o/n fed funds rate ticks up a massive basis point.

The water level in the tub – the total amount of reserves in the banking system – begins to fall. But then the use of the o/n repo facility suddenly begins to rise – the faucet is being turned up on demand, and that's a good thing. In this context, we don't understand why the market is worried about the use of the repo facility: you got the standing facility you were asking for, so just use it and don't worry; and you got something even cooler – a standing dollar swap line at a low rate. With these facilities, bill supply, rising TGA balances and swap line rollovers don't matter: if the water level drops, the faucet will be turned up – on demand.

Regarding swap line rollovers we'd make two observations.

First, if the foreign banks that took dollars through the swap lines in late March still need those dollars, they will likely roll them with the Fed as the swap lines are still cheaper than the FX swap market at the three-month point. The fact that the CD market trades cheaper than the swap lines doesn't mean too much, as chunky funding needs typically get done via FX swaps, not in the CD market.

Second, if the foreign banks that took dollars through the swap lines in late March no longer need those dollars, their payback will mean less lending of dollars by banks in the ultra-short segments of the FX swap market, where dealers borrow to provide FX hedges to institutional investors in Japan and Europe. But if that will happen, dealers will simply shift their funding from banks to the Fed.

What goes up, must come down, and with the Fed's standing liquidity facilities, what drains from the tub, will surely flow back in – at a fixed price, on demand.

Because the dollars taken via the swap lines are "broadcast" by central banks through cross-currency repos, the swap lines make foreign sovereign bonds and U.S. dollars fungible. BTPs are the biggest beneficiaries of this fungibility.

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Starting this week, some of the three-month U.S. dollar loans that foreign banks borrowed from the Fed's dollar swap lines during the last two weeks of March will begin to mature. By the end of June, over \$350 billion of these loans will have matured. FX swaps with the BoJ and the ECB account for the bulk of these maturities at \$175 billion and \$140 billion, respectively, and smaller central banks account for the remainder (see Figures 1 and 2).

The market is concerned about the following:

given that it's now "cheaper" to tap the unsecured funding market and the FX swap market than to tap the Fed's swap lines, will U.S. dollar Libor-OIS and FRA-OIS spreads widen as banks shift their funding from the Fed back to the market, and if yes, by how much?

Before getting into the details, we'd make two high level observations.

First, no one really knows whether the dollars that were borrowed via the swap lines during the last two weeks of March reflected precautionary demand by foreign banks – precautionary referring to a "deer in the headlights" moment for many bank treasurers.

Recall the market environment back then (see [here](#)): prime money market funds have lost \$150 billion in assets in the span of two weeks; unsecured funding markets were shut; and to fund their outflows, prime funds were asking banks to buy back their own funding.

In such an environment, banks' precautionary demand for dollars is presumably soaring, and the bulk of the \$350 billion borrowed via the swap lines the last two weeks of March most likely reflects that. But conditions in funding markets have normalized since then, which means that the reserves borrowed through the swap lines then are less needed now.

So the use of the swap lines may fall when the first wave of loans start to mature, potentially by as much as \$350 billion – the full amount of maturities – by the end of June.

A decline that big is not unrealistic, given the recent experience with other Fed facilities: for example, the combined use of the repo facility, the discount window, the PDCF and the MMLF declined from their recent peak by close to \$300 billion, as banks' and dealers' need to borrow temporary reserves fell as the Fed added permanent reserves through QE.

Second, whether foreign banks' demand for dollars was mostly precautionary or not, once the Fed's swap lines were drawn, reserves were added to the financial system. Banks didn't just let those reserves sit at the Fed, but have been diligently deploying them in the ultra-short segment of the FX swap market – at the tom-next and one-week points.

The borrowers on the flipside of these trades were primary dealers that used this funding to lend at longer-dated points in the FX swap market – typically at the three-month point – to meet the hedging needs of insurers and pension funds in Japan and northern Europe.

Thus, from our perspective, the real question isn't how banks will refinance their maturing swap line loans as they may not, but how dealers will refinance their FX swap books as banks lend less at the ultra-short end as they pay back their swap line loans to the Fed.

Our concern is the same as the market's...

...what will swap line maturities do to term funding? But we don't see a big direct impact from banks swapping public term funding for private term funding, nor an indirect impact from changes at the ultra-front end of the FX swap market rippling out to term segments.

We explore the difference between the two perspectives in three steps: first, we explain the "plumbing" of tapping the swap lines; second, we gauge the price of tapping the lines and then review how market prices drove the quantities borrowed through the swap lines; finally, we conclude that BTPs are the big winner of the current regime of "war finance" and the o/n repo facility will ensure that swap line maturities won't cause funding stresses.

Plumbing. Prices. Quantities. Let's begin...

Part I – Plumbing

Relative to the plumbing behind plain-vanilla FX swap transactions, the plumbing behind tapping the Fed's swap lines are complex. The steps involved in FX swap transactions are:

sell U.S. dollars for foreign currency spot today, take your foreign currency and reinvest it in a central bank deposit, repo or bills for say three months, and sell the future value of your foreign currency investment at today's three-month forward exchange rate, also today.

From a bank's balance sheet perspective, the FX swap transaction is just an asset swap where the bank simply swaps a deposit at the Fed for a deposit at a foreign central bank.

While the central bank deposit swap does not change the bank's balance sheet size, there is a 40 bps notional balance sheet add-on on the FX forward leg of the transaction (technically it's called "PFE" or potential future exposure). However, this notional add-on is so very small that we can consider the balance sheet impact of FX forwards *de minimis*.¹

Once the trade is done, no margining is involved over the life of the FX swap.

Tapping the Fed's dollar swap lines through a foreign central bank is a bit more complex, and involves up to four steps ("up to" because not every bank has to take all four steps):²

- (1) Raise foreign currency funding (in an amount equal to the dollars you need)
- (2) Raise foreign currency collateral (with the cash you just raised above)
- (3) Fund the haircut (the "ticket" to tap dollar auctions at your local central bank)
- (4) Raise dollars at OIS + 25 bps

Using foreign currency bonds to get dollars means that banks tap the swap lines through cross-currency repos, not through FX swaps, as assumed by many. More precisely, the FX swap is between the Fed and foreign central banks, but foreign central banks "broadcast" the dollars they get from the Fed to local banks through cross-currency repos.

Unlike plain-vanilla FX swaps, there is also a margining aspect to cross-currency repos.

For example, if the spot FX value of the foreign currency collateral that's backing the dollar loans falls by 10% due to a spot FX move, a bank would have to post 10% more collateral to the central bank so that it's not in technical default on its cross-currency repo.

The costs involved in sourcing this additional collateral would have to be included in the all-in cost of tapping the swap lines, but because this component is unknown today – it depends of future FX moves – banks ignore it when gauging the cost of tapping the lines.

Let's now get into some specifics.

Paraphrasing Tolstoy, "every bank liquidity portfolio is liquid, but liquidity is a spectrum and every bank taps the swap lines in its own way". We noted a few paragraphs above that tapping the swap lines can involve up to four steps, but depending on each foreign bank's own "social" circumstance, tapping the swap lines can involve fewer steps. In some cases, tapping the swap lines involves only one step. In turn, the number of steps a bank has to take to tap the swap lines is important because it determines the cost of the swap lines.

We next turn to a review of the factors that determine how many steps a foreign bank has to take to tap the swap lines and then review the balance sheet impact of taking these steps.

¹ The 40 bps add-on means that on a \$100 million FX forward trade, a bank would book a \$400,000 notional add-on.

² We will explain overleaf the factors that determine the number of steps that a bank has to take to tap the swap lines.

Tolstoy and Liquidity

"No Excess"	"Excess Cash"	"Excess Collateral"	"Preserve"	"No Frills"	"Market Rate"
-	Cash _¥	Cash _¥ JGB	Cash _¥ JGB	Cash _¥ JGB	Cash _¥ JGB

Source: Credit Suisse

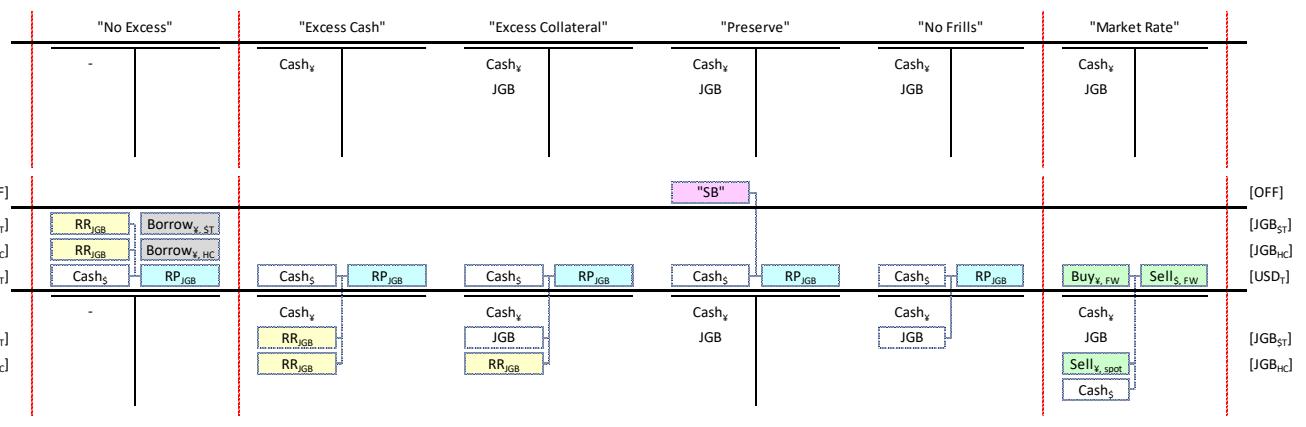
The exhibit above shows six positions that a bank – let's assume a Japanese bank – can start from when trying to raise U.S. dollars. Going from left to right, the positions are:

- (1) "No Excess": this case refers to a bank that doesn't have reserves at the BoJ in excess of its intraday liquidity needs or Japanese government bonds (JGBs) in excess of its LCR needs, so it will have to go through the first three steps to tap the swap lines, i.e. raise yen cash, raise JGBs and fund the haircut. Because megabanks are more than compliant on their intraday liquidity needs and LCRs, this example likely represents the situation of regional and Shinkin banks in Japan.
- (2) "Excess Cashhere and [here](#)).³
- (3) "Excess Collateral": this is a bank that has both excess yen reserves and JGBs, so it will have to raise only a bit of collateral to cover the haircut to tap the BoJ.
- (4) "Preserve": this is a bank whose treasurer prefers not to touch the structure of the bank's liquidity portfolio – it doesn't want to spend reserves or encumber JGBs – so it will borrow the JGBs for a small fee in the unsecured collateral market where regional banks lend to megabanks (there is no government involvement). Like in the previous two cases, the bank will take only two steps to tap swap lines: borrow JGBs to cover the target dollar amount and the haircut to tap the BoJ – but in contrast to the previous two cases, the bank's reserve balances at the BoJ and the encumbrance of its JGB portfolio didn't change. HQLA was preserved.
- (5) "No Frills": this is a bank that's extremely flush with JGBs and is not subject to the LCR or other metrics – and so it is more flexible with its liquidity portfolio – and the only thing it will have to do to tap the swap lines via the BoJ is to pledge the JGBs it already has. There won't be additional costs like above in tapping the swap lines – only the Fed's "advertised" rate of OIS+25 bps, clean and simple.
- (6) "Market Rate": this is a cash rich bank with lots of excess yen reserves at the BoJ that considers swapping its excess yen for dollars in the private FX swap market.

The exhibit overleaf expands on the above exhibit and plots the actual steps involved in tapping the swap lines in the first five cases and the market in the sixth. These steps are:

³ To which we would answer that for a bank, collateral is superior to reserves only in circumstances where you need to tap central banks (central banks lend only collateralized), but in normal circumstances, reserves beat collateral, because when the FX swap market is functioning well, you need reserves at a central bank or, if you are a non-bank, positive balances in a bank deposit to do swaps, not collateral. Our point is that reserves and collateral are both key, but their relative importance shifts around depending on circumstances and depending on one's place in the hierarchy.

The Steps Involved in Tapping the Swap Lines



Source: Credit Suisse

- (1) **"No Excess"**: raise yen cash in unsecured markets in an amount equal to the U.S. dollars you need (Borrow_{y, \$T} in grey color), and then raise collateral by lending the yen cash in the GC repo market (RR_{JGB} in cream color); repeat the same steps to fund the haircut needed to tap the swap lines through the BoJ (JGB_{HC} in white color); take all the collateral you raised above (RR_{JGB} in cream color), and pledge them to the BoJ (RP_{JGB} in blue color) to tap the swap lines for dollars (Cash_{\$} in white color) to cover your target dollar amount (USD_T in white as well).
- (2) **"Excess Cash"**: unlike the previous example, which involved all four steps, this example involves only three steps. The bank already has the yen so it doesn't need to raise yen cash, only the collateral to cover the target dollar amount and the haircut to tap the dollar swap lines through the BoJ (RR_{JGB} in cream color and JGB_{\$T} and JGB_{HC} on the left-hand sidebar, respectively). The bank then takes all the collateral it raised in the above two steps and pledges it at the BoJ like before.
- (3) **"Excess Collateral"**: unlike the prior example, which involved three steps, this example involves only two steps. Raise JGB collateral to fund the haircut to tap the swap lines through the BoJ (RR_{JGB} in cream color), and pledge that collateral and some pre-existing collateral to the BoJ to get the target dollars (JGB_{HC} and JGB_{\$T} on the left-hand sidebar and Cash_{\$} and USD_T, respectively).
- (4) **"Preserve"**: like in the previous example, this example too involves only two steps. Borrow the JGBs from a regional bank for a fee in a "repo-style" transaction in an amount that covers the target dollars one needs and the haircut needed to access the swap lines through the BoJ ("SB" in pink color), and next pledge the borrowed collateral at the BoJ to get the target amount of dollars you need.
- (5) **"No Frills"**: unlike any of the previous examples, there is only one step here – take some excess JGBs and pledge it at the BoJ and get the dollars you need.
- (6) **"Market"**: unlike any of the previous examples, this example does not involve tapping the swap lines. It's a market-based FX swap transaction involving the spot purchase and simultaneous forward sale of U.S. dollars as discussed above.

These examples show that the first option is the most balance sheet intensive for banks, adding three new balance sheet layers and the others add only one balance sheet layer.⁴

⁴ The low-balance sheet intensity of cases two to five can change as yen reserves are spent and JGBs are encumbered.

Part II – Prices and Quantities

Let's next populate our balance sheets with prices.

The exhibits below and overleaf show the all-in cost of tapping the Fed's dollar swap lines through the BoJ and the ECB, respectively, for each of the five cases discussed above, alongside the sixth case which was tapping the FX swap market through a vanilla FX swap.

We used the following assumptions to populate the balance sheets:

- (1) For both the BoJ and the ECB we assume that banks raise unsecured funding at the three-month OIS rate and raise collateral through three-month GC repos.
- (2) For the BoJ we assume an average haircut on JGBs of 2% (see [here](#)).
- (3) For the ECB we assume that the European government bonds that most banks pledge as collateral are OATs, and assume an average haircut of 3% (see [here](#)).
- (4) For the BoJ we assume that banks pay 25 bps to borrow JGBs uncollateralized, and for the ECB we assume that banks pay 40 bps to get OATs uncollateralized.

We think these assumptions are realistic, but if the reader would like to make adjustments on the margin, the orange cells in the bottom right-hand corner provide the needed inputs:

a backward looking average of o/n GC repo rates to switch term repo rates for o/n rates, if the reader wants to assume daily posting of collateral to central banks instead of term; and a CD spread over OIS to switch from raising cash at OIS flat to OIS plus a CD spread.⁵

None of these adjustment factors are big enough to change the conclusions emerging...

Plugging live market prices into our balance sheets show that in the case of Japan, collateral rich banks sitting on piles of JGBs are in the best position to tap the swap lines, paying only 32 bps for three-month dollars (the third and fifth balance sheets from the left). The next cheapest option is the second one at 35 bps, and the third cheapest option is the very first one – the case of a bank with no excess HQLA in its treasury – at 38 bps; the most expensive way of tapping the swap lines is by borrowing JGBs for a fee at 58 bps.

Tapping the Swap Lines through the BoJ

Wednesday, June 10, 2020

	"No Excess"	"Excess Cash"	"Excess Collateral"	"Preserve"	"No Frills"	"Market Rate"	
[OFF]				0.25			[OFF]
[JGB _{ST}]	(0.12)	(0.07)					[JGB _{ST}]
[JGB _{HC}]	(0.12)	(0.07)					[JGB _{HC}]
[USD _I]	Cash _s 0.32	Cash _s 0.32	Cash _s 0.32	Cash _s 0.32	Cash _s 0.32	Cash _s 0.32	[USD _I]
[JGB _{ST}]	-	(0.10)	(0.10)	Cash _y JGB		(0.10)	[JGB _{ST}]
[JGB _{HC}]		(0.12)	(0.12)		Cash _y JGB		[JGB _{HC}]
[COST]	0.38	0.35	0.32	0.58	0.32	0.49	[COST]
[BoJ _{HC}]	0.02	0.02	0.02	0.02	0.02		[BoJ _{HC}]
[Fed _{SW}]	0.25	0.25	0.25	0.25	0.25		[Fed _{SW}]
BoJ: https://www.boj.or.jp/en/mopo/measures/mkt_ope/operule02.htm/				GC _{y, o/n} : (0.09) CD-OIS _{y, 3M} : 0.06			
Fed: https://apps.newyorkfed.org/markets/autorates/fxswap							

Source: Credit Suisse

⁵ CD stands for certificate of deposit.

Tapping the Swap Lines through the ECB

Wednesday, June 10, 2020

	"No Excess"	"Excess Cash"	"Excess Collateral"	"Preserve"	"No Frills"	"Market Rate"	
[OFF]	(0.50)	(0.47)		0.42			[OFF]
[EGB _{ST}]	(0.50)	(0.47)					[EGB _{ST}]
[EGB _{HC}]	(0.50)	(0.47)				[EGB _{HC}]	
[USD _I]	Cash _S 0.32	Cash _S 0.32	Cash _S 0.32	Cash _E 0.32	Cash _E 0.32	Cash _E 0.32	[USD _I]
-	(0.50)	(0.50)	(0.50)	Cash _E EGB 0.76	Cash _E EGB 0.32	(0.50)	[COST]
[COST]	0.35	0.32	0.32	0.76	0.32	0.31	[COST]
[ECB _{HC}]	0.03	0.03	0.03	0.03	0.03	0.03	[ECB _{HC}]
[Fed _{Sw}]	0.25	0.25	0.25	0.25	0.25	0.25	[Fed _{Sw}]

ECB: https://www.ecb.europa.eu/press/pr/date/2010/html/sp090728_1annex.en.pdf
Fed: <https://apps.newyorkfed.org/markets/autorates/fxswap>

GC_{E,o/n} : (0.39)
CD-OIS_{E,3M} : 0.11

Source: Credit Suisse

In the case of the eurozone, the cheapest options are those of collateral rich banks at 32 bps and 32 bps, respectively – in this case, French banks with lots of excess OATs. The next cheapest option is the first one at 35 bps, and the most expensive option involves tapping the swap lines by borrowing OATs unsecured for a fee at a steep 76 bps.

Unlike the all-in cost of tapping the swap lines through the BoJ, the all-in cost of tapping the swap lines through the ECB varies based on the type of sovereign bonds that banks pledge as collateral. Because repo rates are higher on peripheral sovereign bonds than core sovereign bonds, banks have an incentive to source BTPs over OATs and bunds to tap the swap lines. This applies in the case of uncollateralized collateral borrows as well, where BTPs can be borrowed for a fee of 30 bps for three months versus 40 bps on OATs.

Let's next take a look at the price of the swap lines relative to the market over time, and how these relative prices drove the quantity of dollars borrowed via the BoJ and the ECB.

Figures 3 and 4 show the amount of dollar liquidity swaps between the Fed and the BoJ and the all-in cost of tapping the BoJ for three-month dollars for each scenario discussed. Notice the path of the quantity of dollars that Japanese banks borrowed through the BoJ: a sharp jump during the last two weeks of March, followed by a modest use during April, and no marginal use since May. The amount of dollar liquidity swaps aligns perfectly with the decline of the cost of dollars in the FX swap market – the use of the swap lines flatlined precisely when the market price of three-month dollars fell below the cost of the swap lines with borrowed collateral and when the unsecured CD market reopened in May.

Figures 5 and 6 show the same for the ECB. But in contrast to the case of the BoJ, the uptake of the swap lines here is different: a heavy use during the last two weeks of March, and then a sudden flatlining. Here too, the use of the swap lines flatlined precisely when the market price of dollars fell below the cost of tapping the lines with borrowed collateral.

These figures show that unless all banks tap the swap lines with borrowed collateral, the swap lines are still the cheapest game in town for raising three-month dollars on scale: in Japan, most ways of tapping the dollar swap lines are cheaper than the cost of raising three-month dollars in the FX swap market, and are only 5-7 bps more expensive relative to prices in the unsecured CD market. In the eurozone, the situation is exactly the same.

The situation is different at the one-week point, however. Figures 7 and 8 show that the cost of raising one-week dollars through the swap lines is higher than the market price. But judging from this week's auction results, some foreign banks prefer to pay an extra 15 bps to roll their dollar funding with the Fed to avoid the risk of paying up in the market.

Conclusions

Three conclusions emerge from our analysis.

First, in case that foreign banks do need the dollars they borrowed from the swap lines, the market's concerns about the coming wave of swap line maturities are overdone.

The dollar swap lines are still cheaper than the market and provide unlimited dollars at a "fixed" price. Tapping the swap lines does not carry the risk of not getting "done" at the prices posted on the screen. No one really knows the marginal liquidity of bank portfolios under Covid-19, and so refinancing chunky swap line rollovers in the market may run the risk of moving the FX swap market too much – where the small advantage of tapping the market becomes a big disadvantage. This is the type of tactical thinking that would explain why Japanese banks took one-week dollars from the Fed this week above market prices.

Thus, if foreign banks still need most of the dollars they borrowed through the swap lines during the dark days of late March, they will most likely roll their swap lines with the Fed – the market impact of this will be minimal both in the ultra-short and three-month segments.

Second, in case that foreign banks don't need the dollars borrowed from the swap lines, the market's concerns about the coming wave of swap line maturities are overdone too.

Here, the relevant dynamic is that as foreign banks pay off their maturing swap line loans, they will lend less at the ultra-short tom-next and one week points in the FX swap market, and the loss of that funding will upset the recent stability of rates at the ultra-short end, which will then ripple out on the FX swap curve and push three-month and longer-dated FX swap implied funding rates, unsecured CD rates and ultimately U.S. dollar Libor higher.

But with all due respect, who cares if we lose foreign banks as large, marginal lenders of borrowed reserves when we have a quasi-standing repo facility where dealers can take borrowed reserves from the Fed at 10 bps. We would simply go from dealers taking borrowed reserves from foreign banks through short-dated FX swaps, to dealers taking borrowed reserves from the Fed directly. It would actually cost dealers less to fund their FX swap books with the o/n repo facility as the Fed offers reserves at IOR flat, whereas foreign banks lend their reserves via short-dated FX swap trades at IOR + a small spread.

Thus, if foreign banks no longer need the U.S. dollars they took from the swap lines and stop lending in the FX swap market, the Fed will be there to step in with the repo facility.

Third, the swap lines, combined with the fact that foreign central banks broadcast dollars through cross-currency repos makes foreign sovereign bonds and U.S. dollars fungible!

BTPs beat any other type of collateral banks can pledge at the ECB and at central banks that accept collateral beyond local sovereign bonds – for example the BoE and the SNB – as they yield better than any other sovereign collateral sitting on a bank's balance sheet, and their price is "protected" by the ECB. That, and the fungibility of BTPs with dollars should ensure strong demand for BTPs from bank portfolios for the foreseeable future (note that neither BTPs nor bonos were hit during last week's global bond market selloff).

So stay calm, wash your hands and carry on...

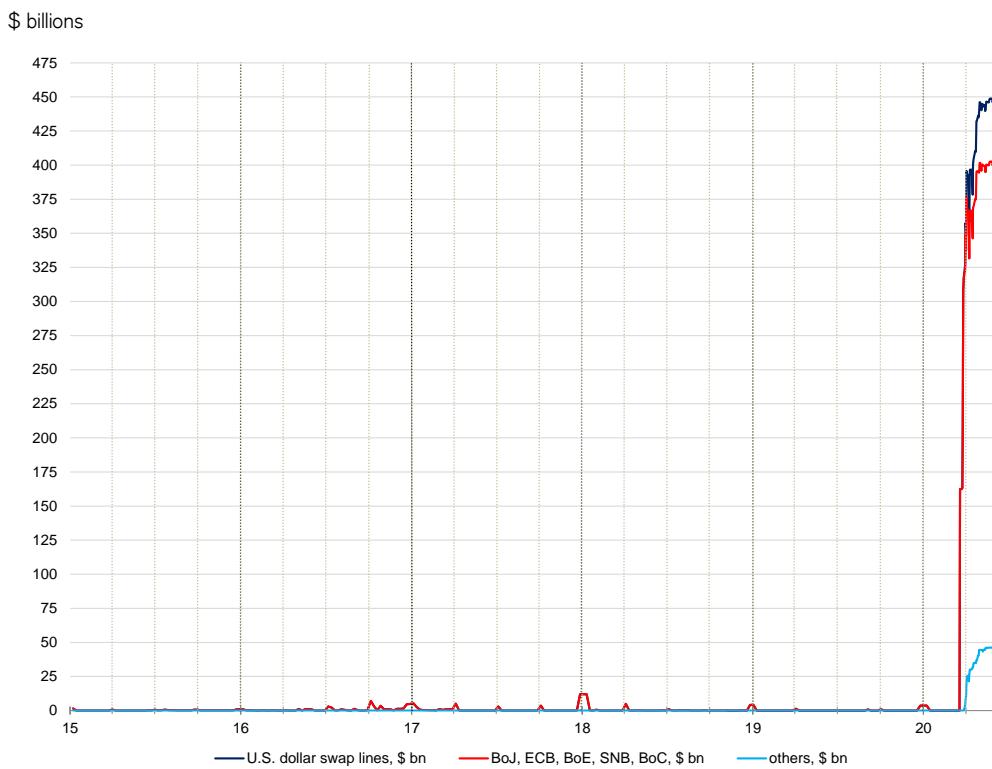
It's singularity.

It's war finance.

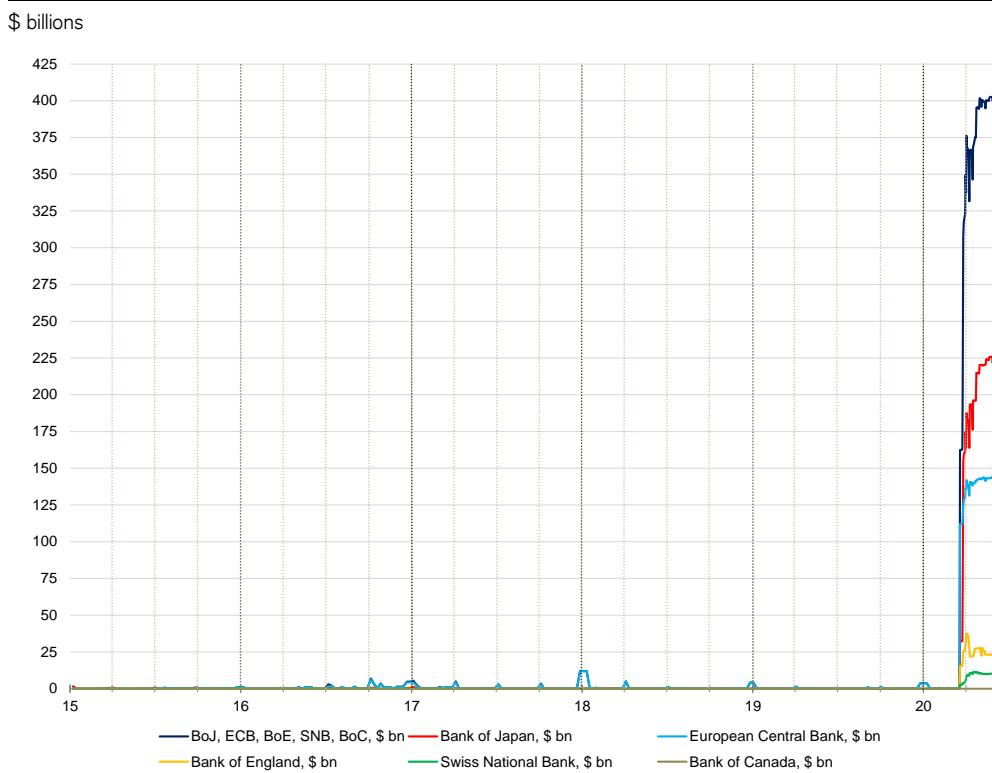
It's a pancake party...

...where chunks of hazelnuts become hazelnut cream in an instant with standing facilities: we maintain our view that U.S. dollar Libor-OIS will trade in the 10-20 bps range by July.

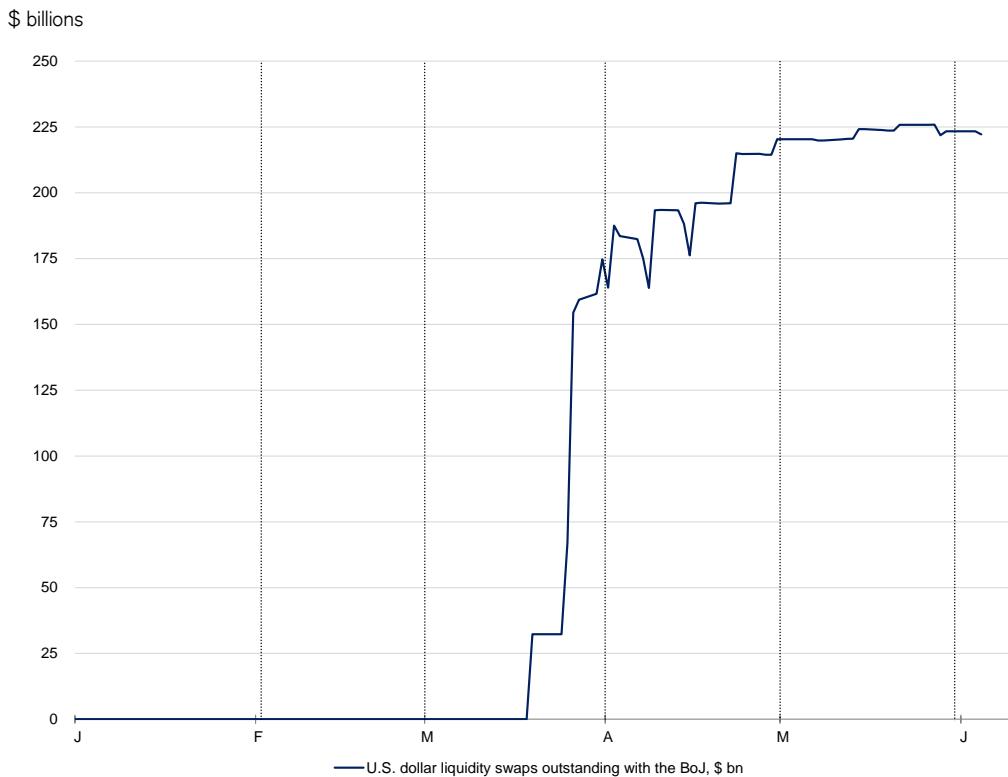
Let the swap line maturities begin.

Figure 1: The Use of the Fed's Dollar Swap Lines (1)

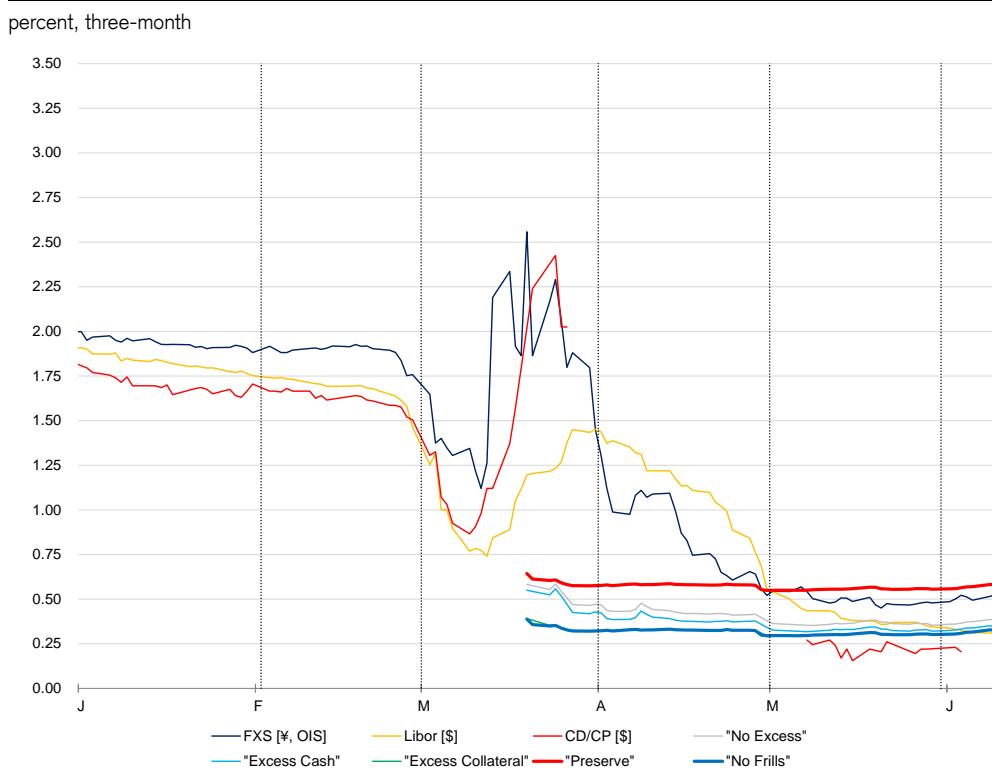
Source: FRBNY, Credit Suisse

Figure 2: The Use of the Fed's Dollar Swap Lines (2)

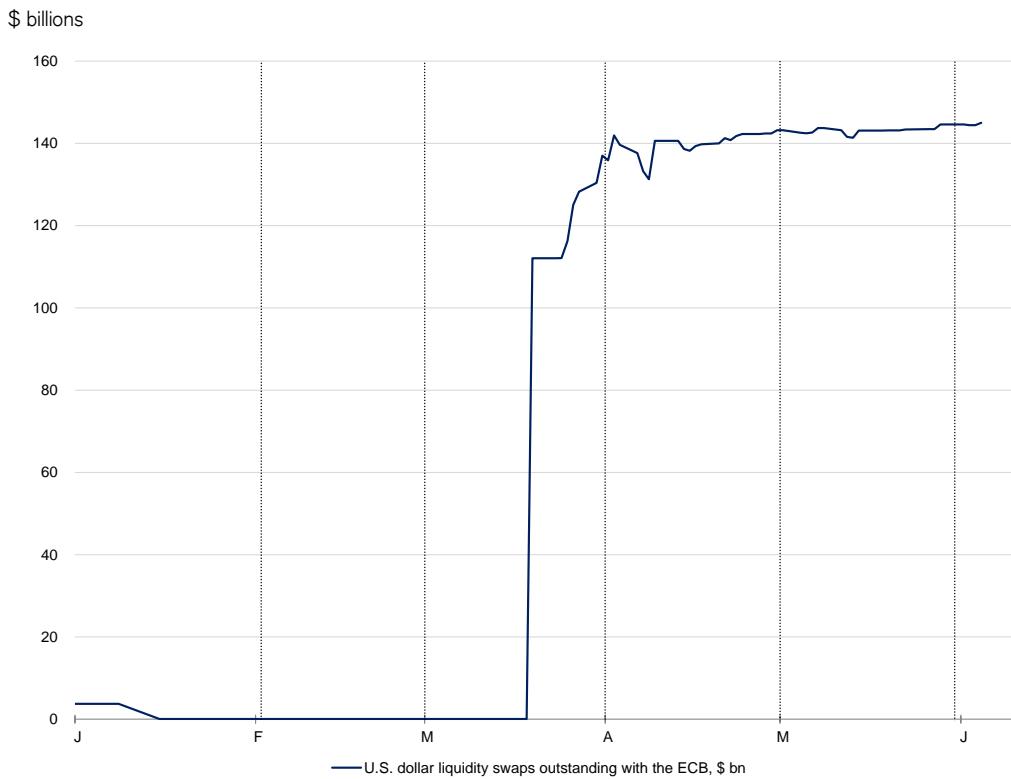
Source: FRBNY, Credit Suisse

Figure 3: U.S. Dollar Liquidity Swaps Outstanding with the BoJ

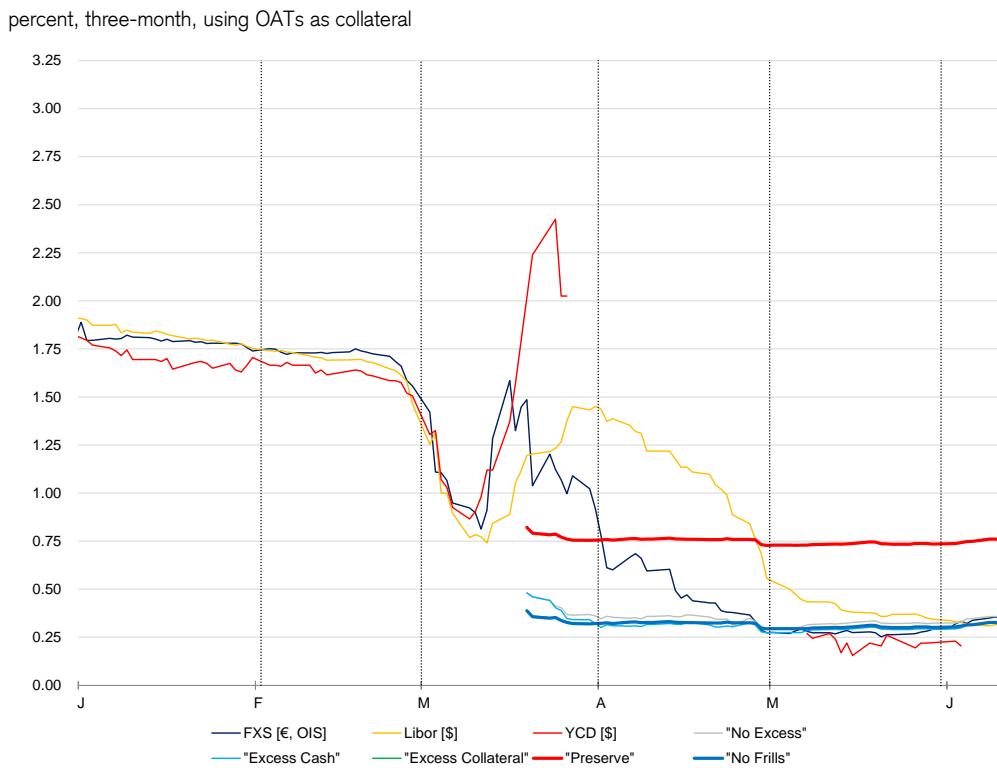
Source: FRBNY, Credit Suisse

Figure 4: The Cost of Tapping the Swap Lines through the BoJ

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 5: U.S. Dollar Liquidity Swaps Outstanding with the ECB

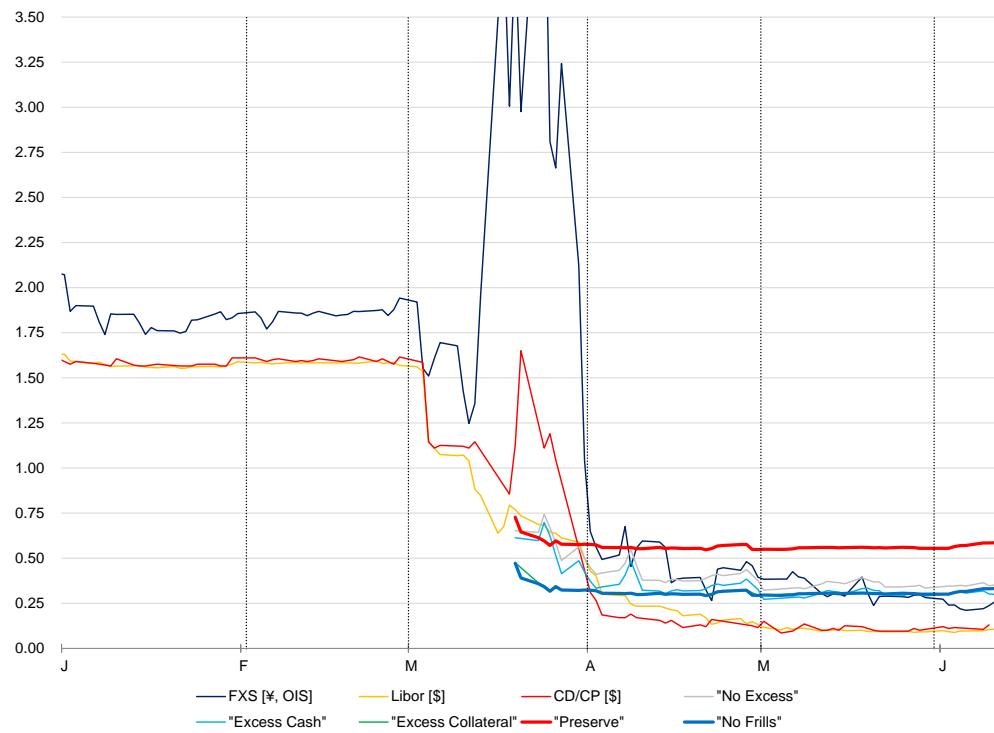
Source: FRBNY, Credit Suisse

Figure 6: The Cost of Tapping the Swap Lines through the ECB

Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 7: The Cost of Tapping the Swap Lines through the BoJ

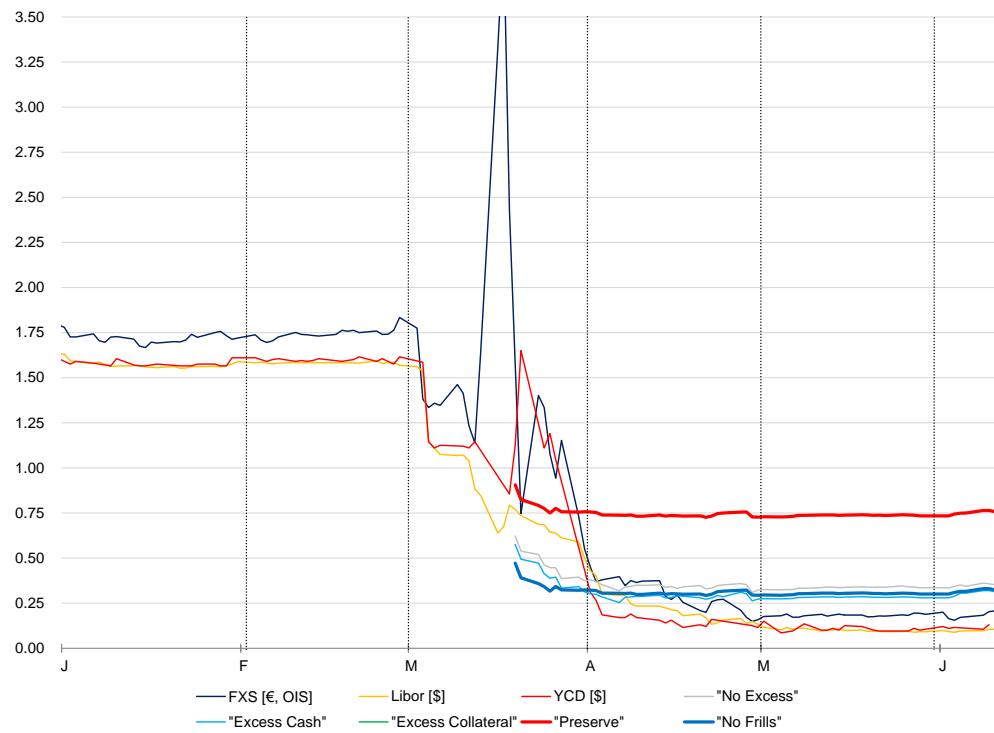
percent, one-week



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 8: The Cost of Tapping the Swap Lines through the ECB

percent, one-week, using OATs as collateral



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

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