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The Safe Asset Glut

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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…

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 constrains 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 billons 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 expose 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.

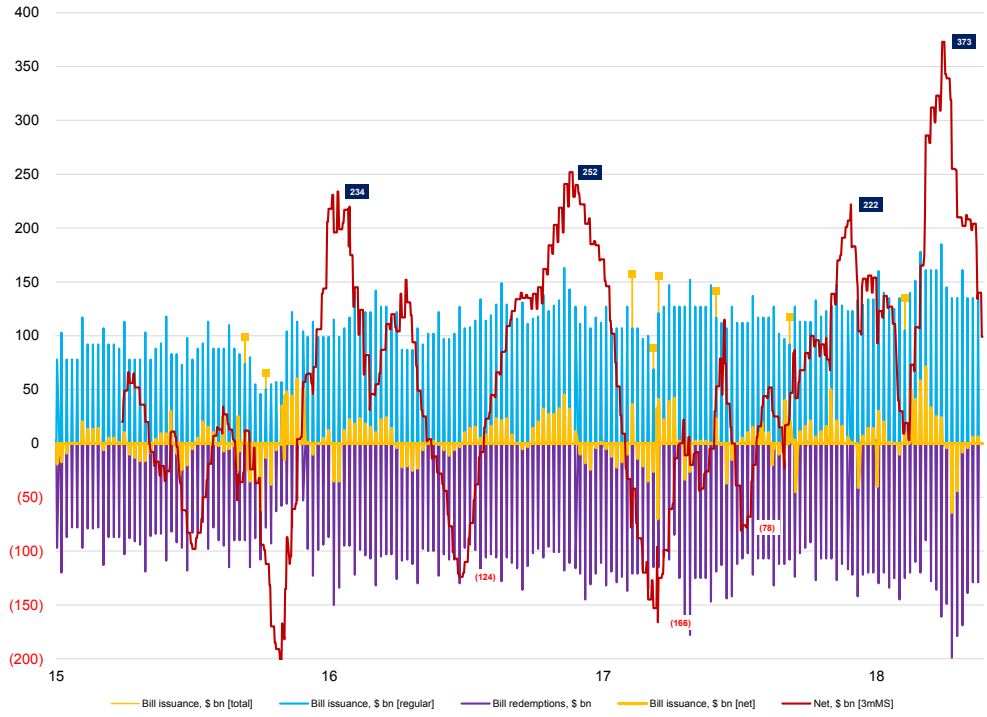
The Earth spins around the Sun and not the other way 'round. The o/n FF rate trades higher in the band because bill yields became the effective lower bound for o/n rates. You can't pin Earth down and make the Sun spin around it. Neither can you pin down the funds rate and push the band around it. If 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

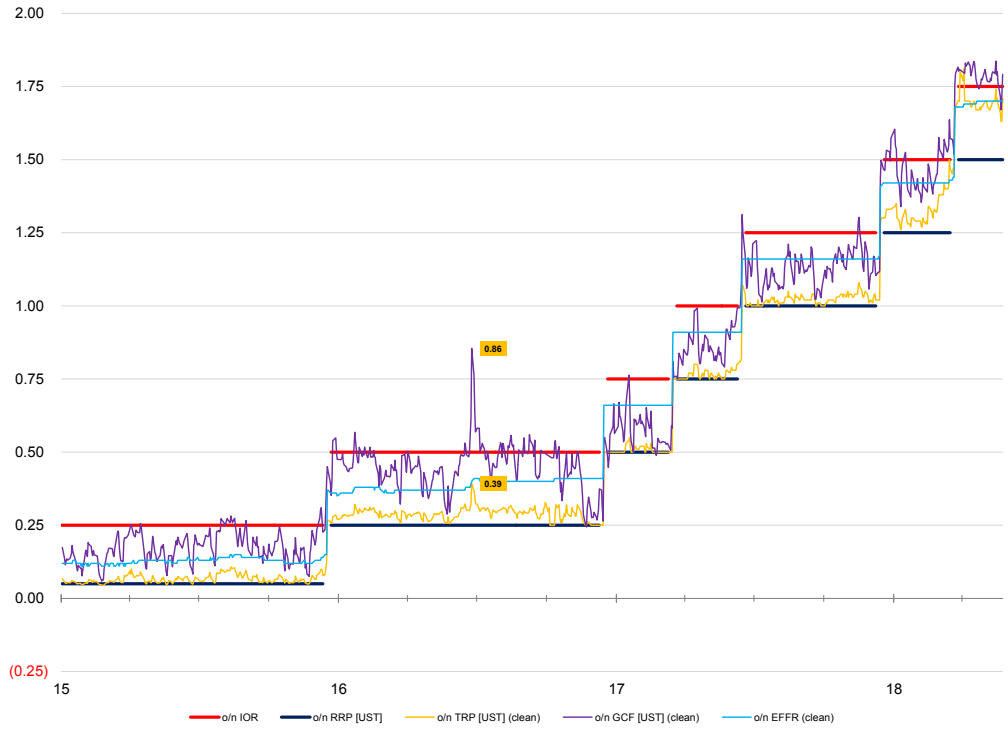
$ billions



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 2: Kissing the Band Goodbye?

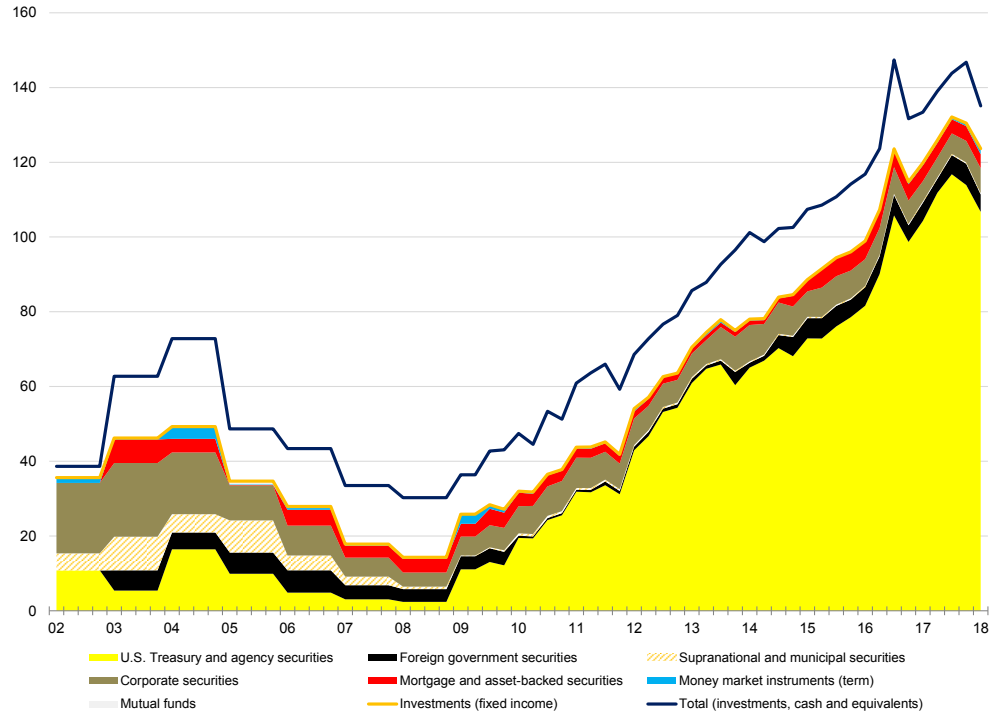
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 3: Bidder-of-Last Resort No More

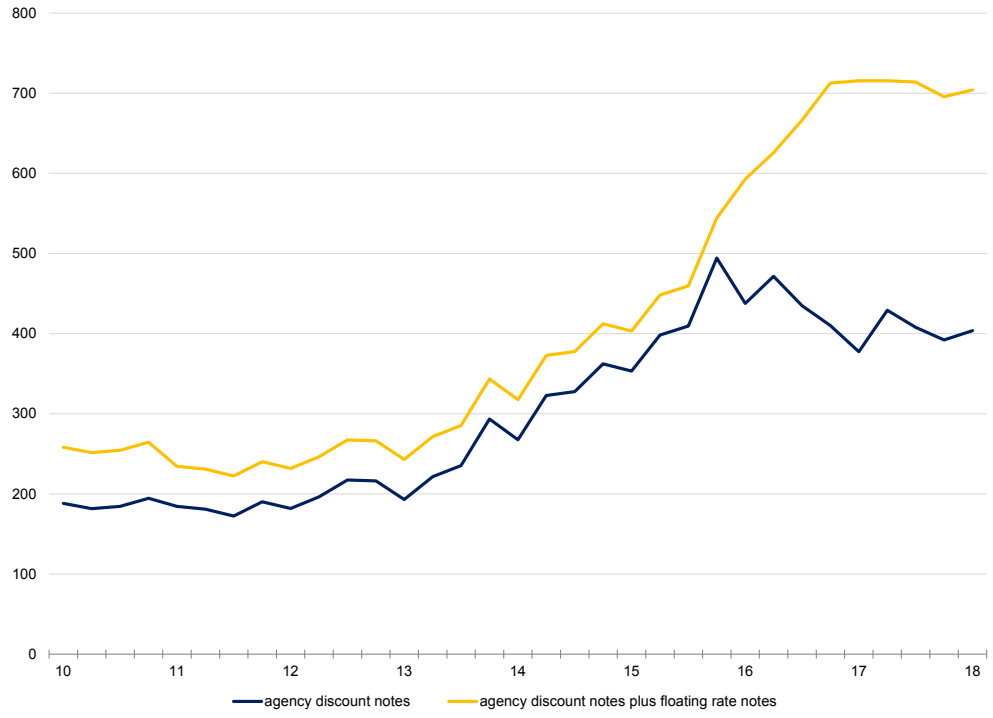
Microsoft Corp.'s offshore investment portfolio, $ billions



Source: Company filings, Credit Suisse

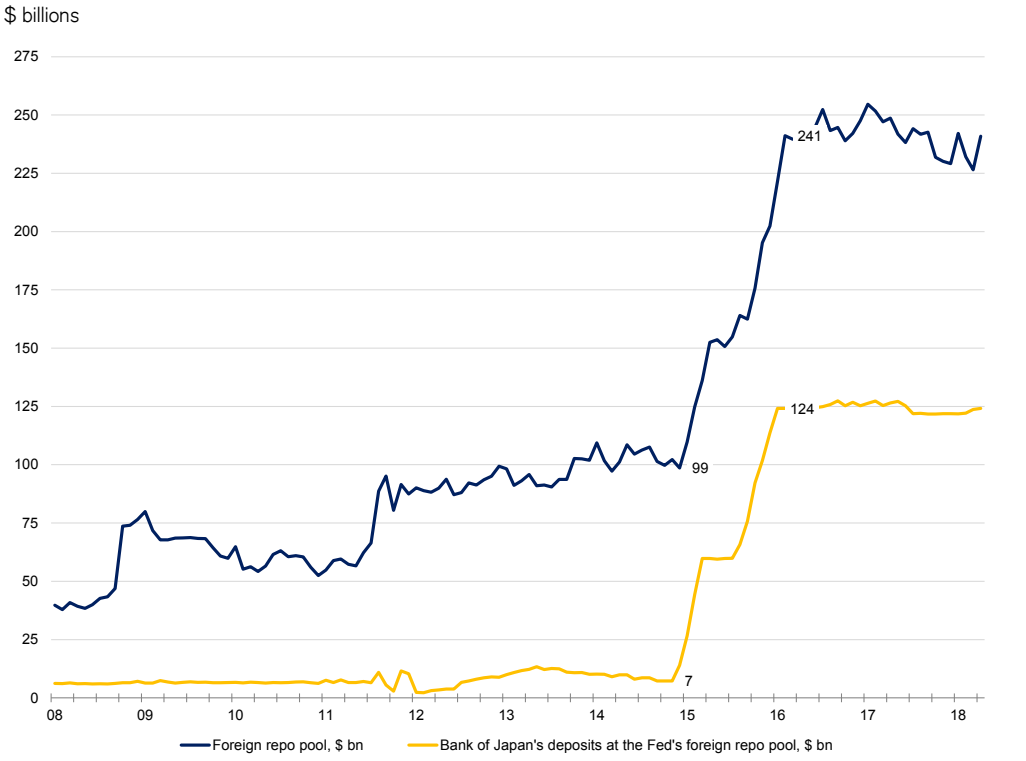
Figure 4: FHLBs as Providers of Safe, Short-Term Assets

$ billions



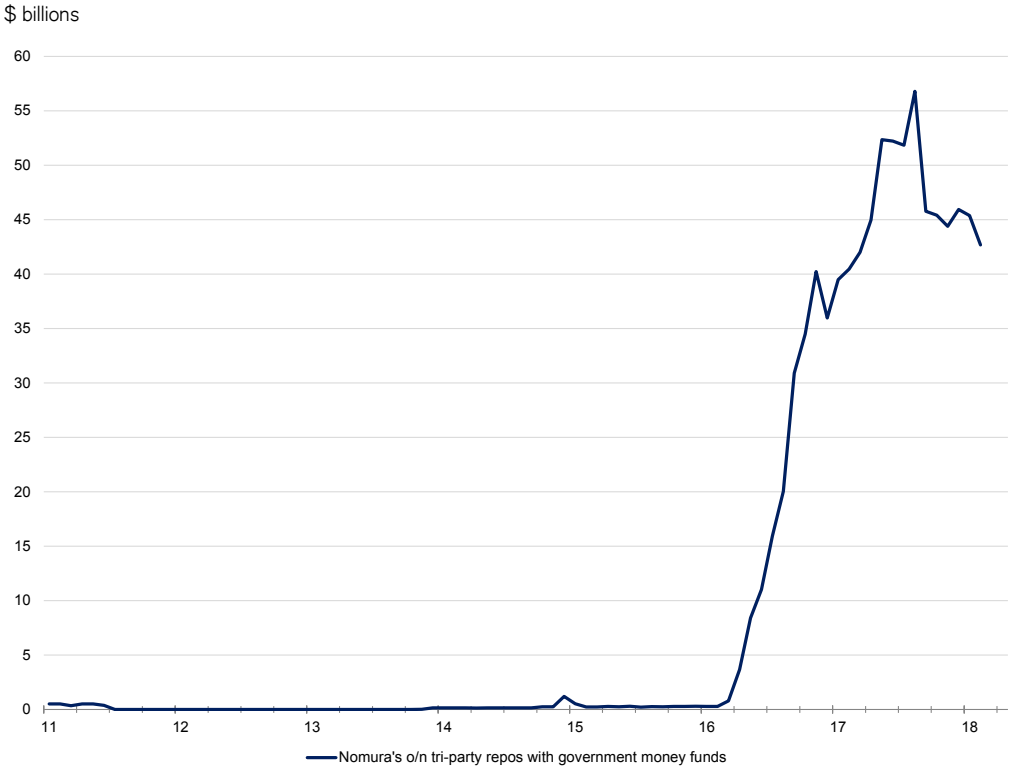
Source: Office of Finance, Credit Suisse

Figure 5: Japan's MoF Loves the Fed's Foreign Repo Pool



Source: Federal Reserve, Credit Suisse

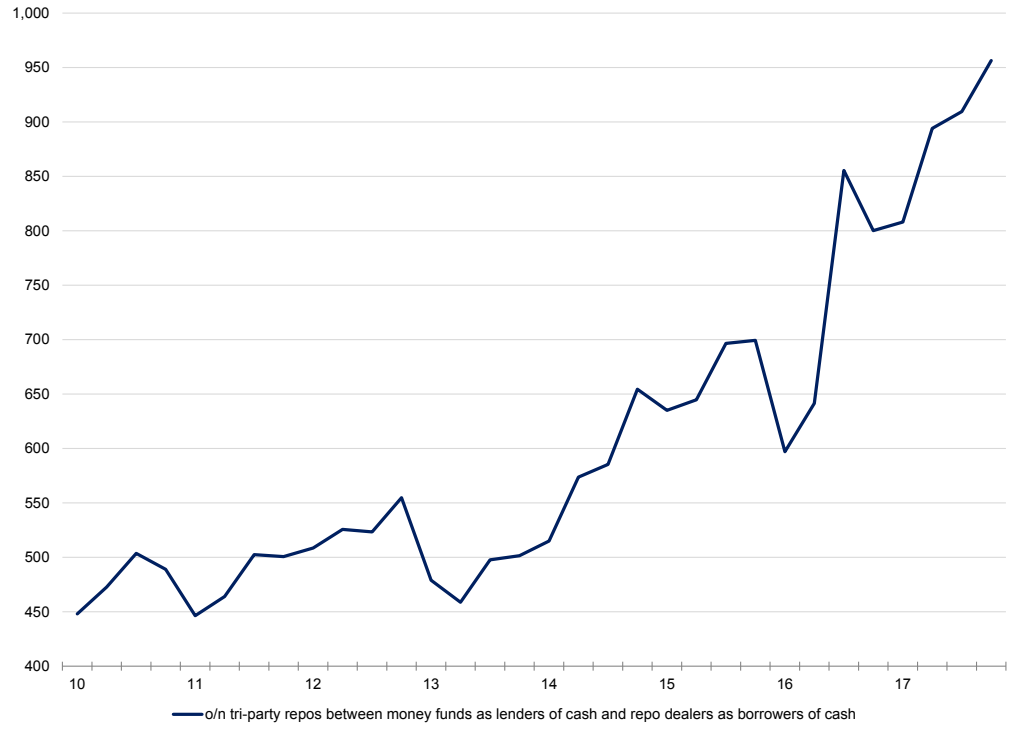
Figure 6: For Collateral Call 1-800-MoF-Japan



Source: OFR, SEC, Credit Suisse

Figure 7: Repo Thriving Again…

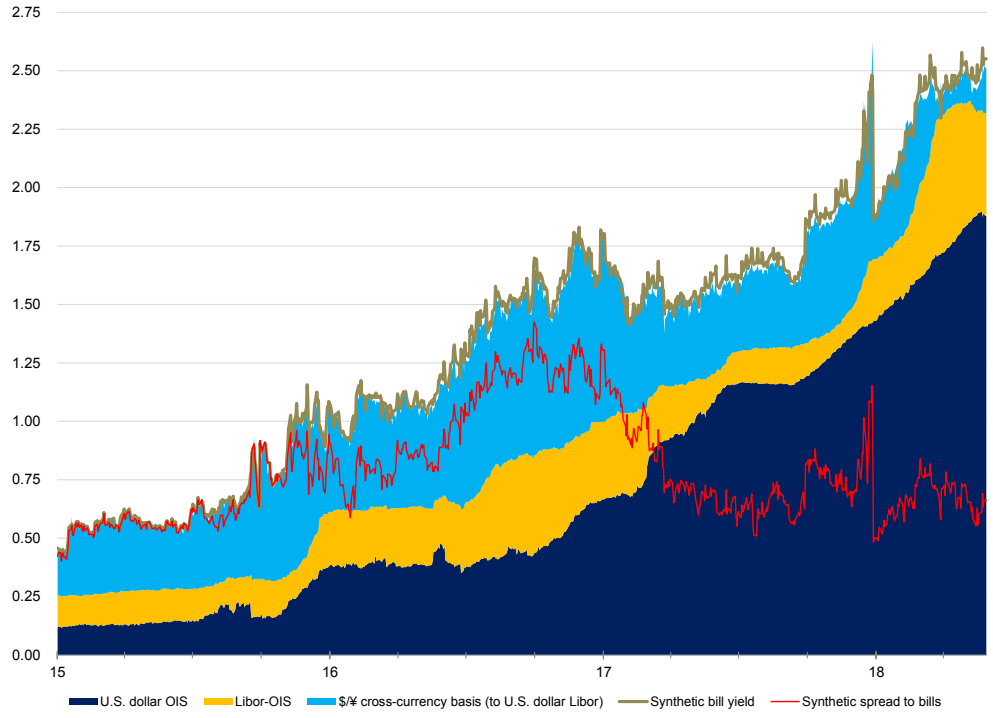
$ billions



Source: Federal Reserve, Credit Suisse

Figure 8: Real vs. Synthetic Bill Yields

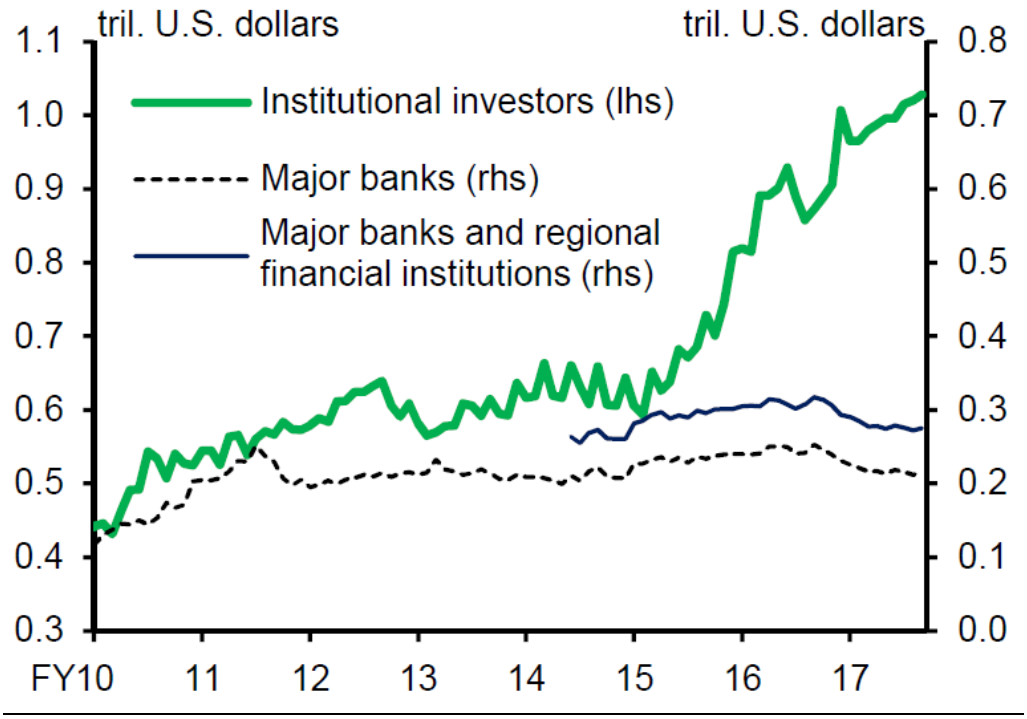
Percent, three months



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 9: Synthetic Bill Supply in Tokyo

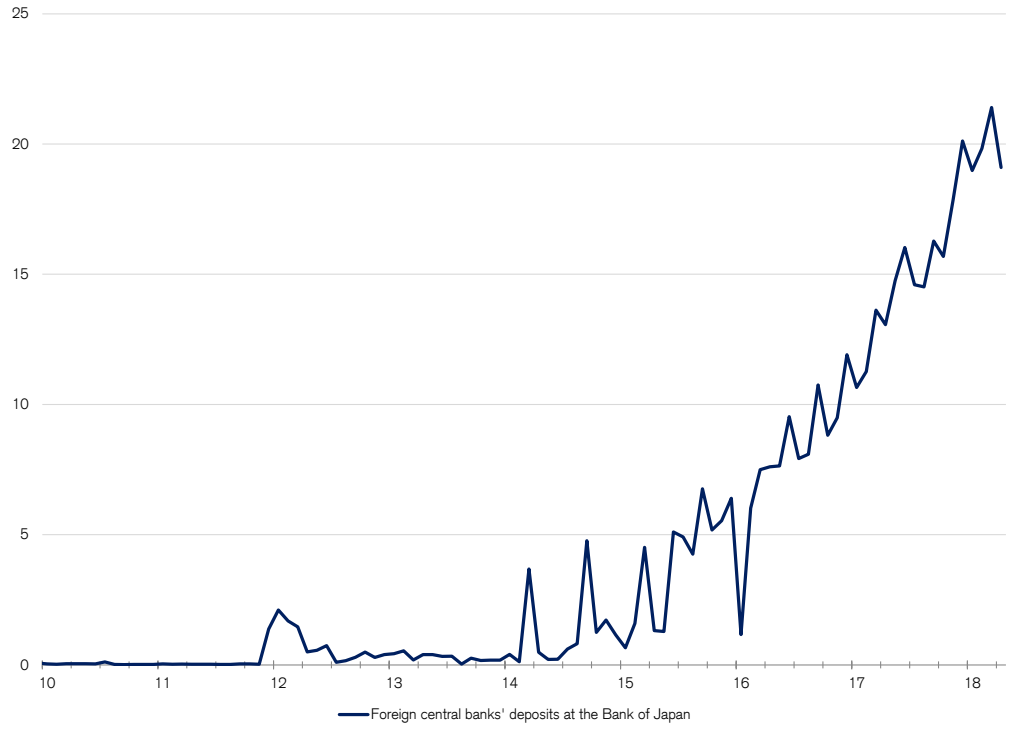
$ trillion



Source: Bank of Japan

Figure 10: A Good Type of Black Hole…

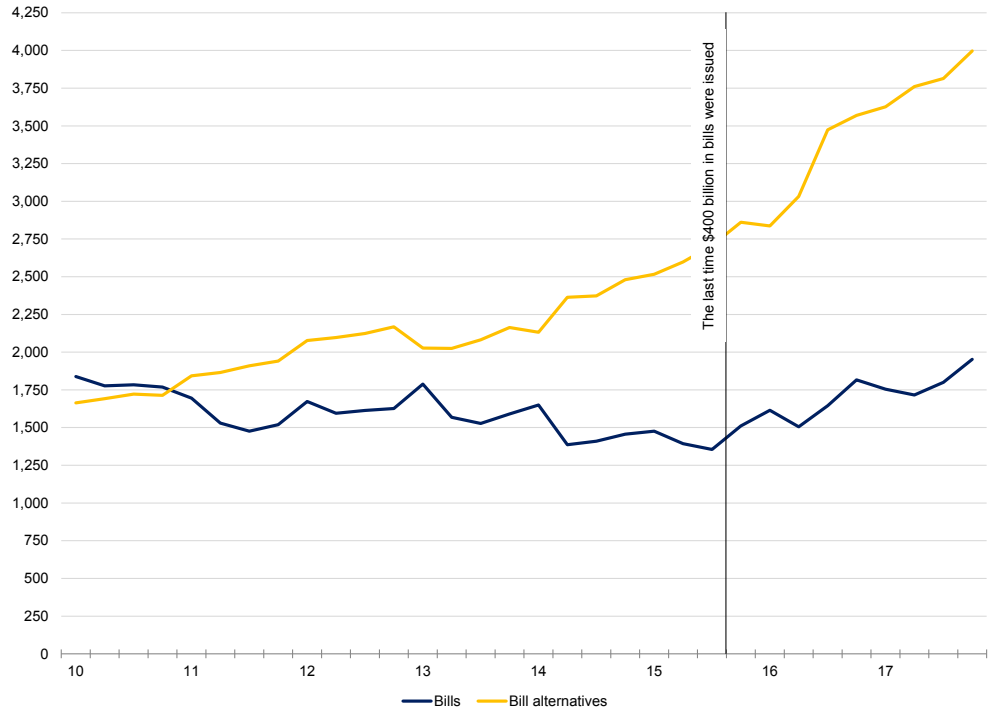
¥ trillions



Source: Bank of Japan, Credit Suisse

Figure 11: Who Needs More Bills?

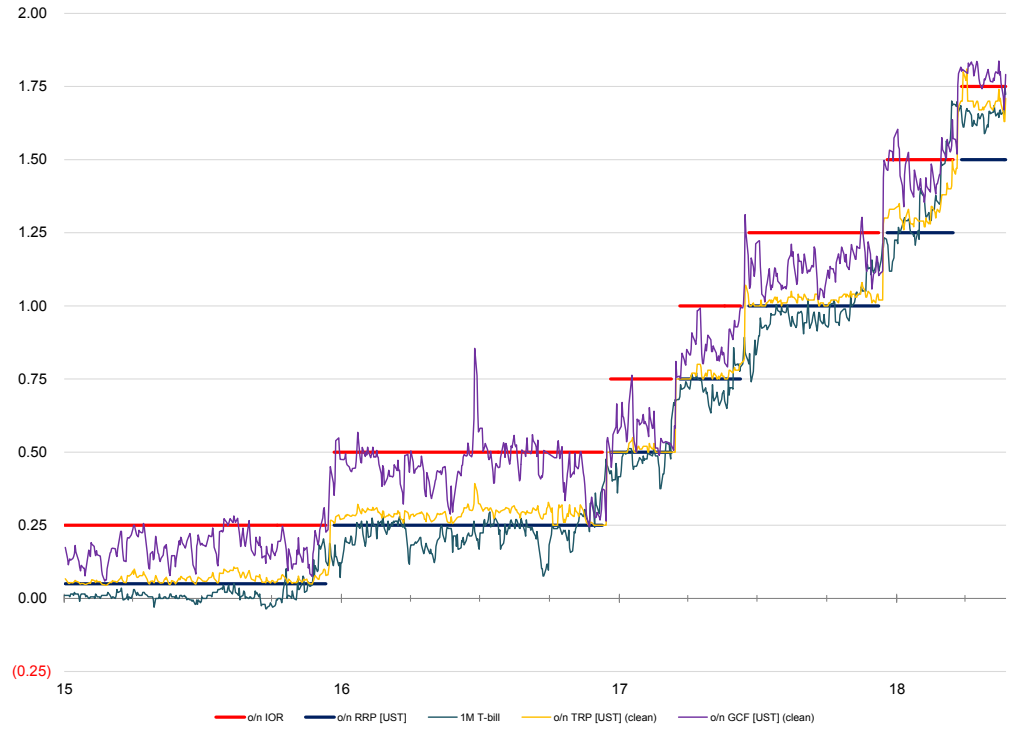
$ billions



Source: Credit Suisse

Figure 12: From a Leaky Floor to an Escalator

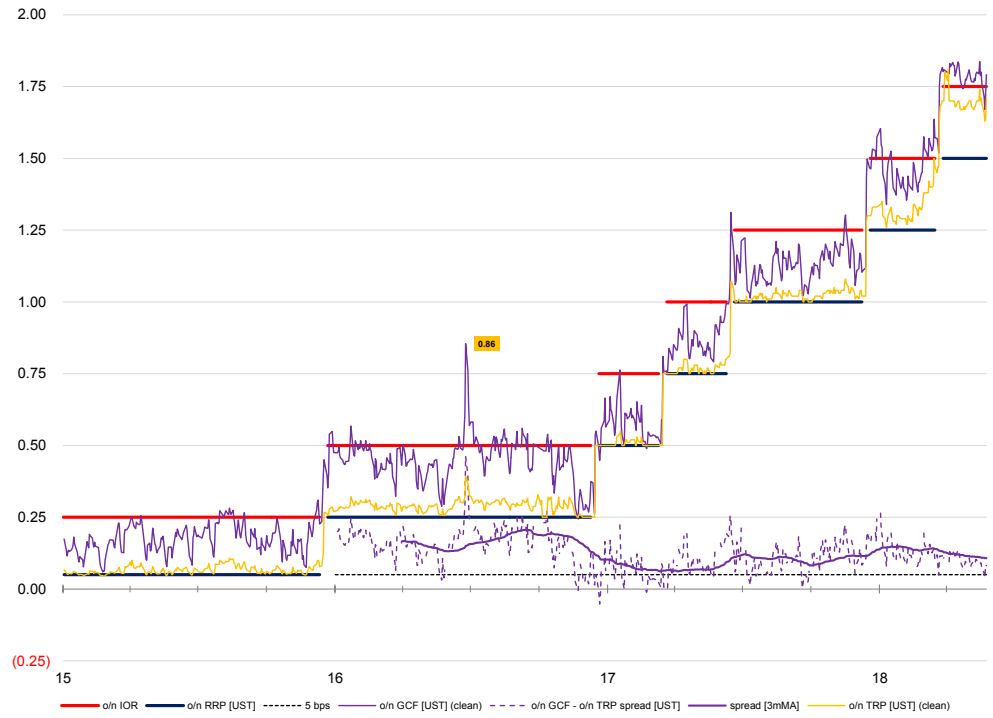
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 13: Interbank Liquidity Isn't Tight

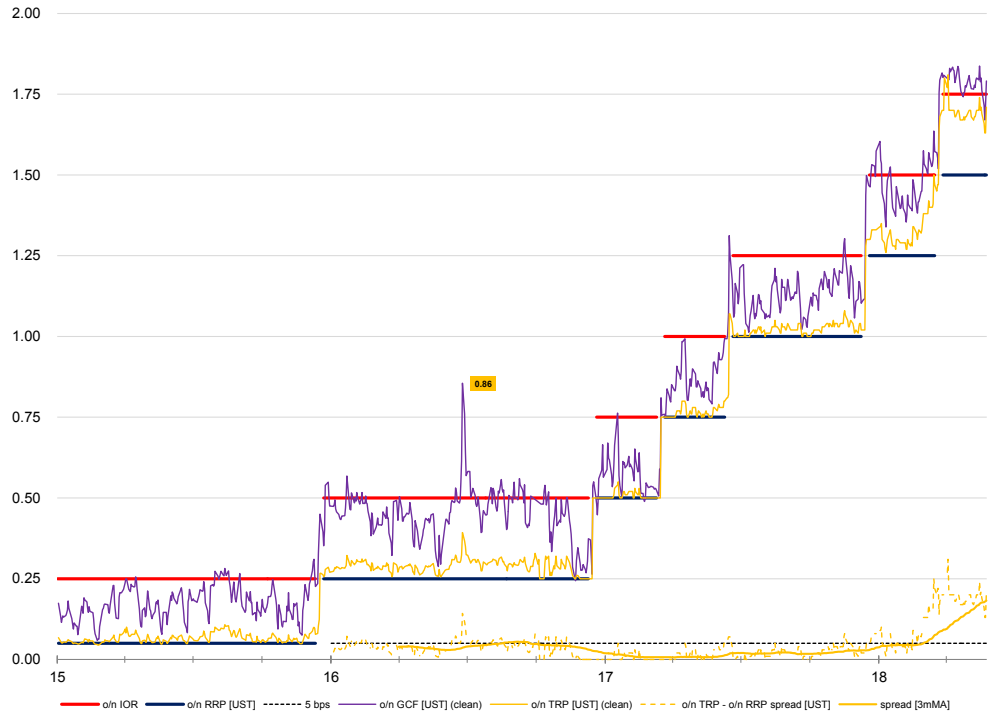
percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

Figure 14: Bill Supply is Way Too High

percent



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

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