Financial market indicators of global liquidity risks

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Abstract

Uncertainty in US trade policy has coincided with but remains an insufficient explanation for the global economic slowdown since early 2018, which is only one of several such trade cycles since the Great Financial Crisis. Global liquidity conditions, particularly offshore dollar liquidity, remain a critical but obscure driver of these trade cycles. This paper's contribution to existing literature is the use of Treasury International Capital (TIC) data as an additional proxy for these global liquidity conditions. Additionally, I identify a set of financial market indicators that reflect financial intermediaries' perception of liquidity risks and demonstrate a close correlation with trade cycles.

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1 Introduction

General worldwide consensus in late 2016 and throughout 2017 was that the global economy as a whole had finally reached a critical stage from which it could shake off any lingering effects of the Great Financial Crisis (GFC). Termed “globally synchronized growth”, policymakers began to shift their thinking toward an inflationary envelope; ending nearly a decade of almost constant stimulus policies and replacing them with those directed toward managing a normalization process.

The view largely prevailed through much of 2018. As the year progressed, however, more and more financial markets as well as economic data began to display clear signs of uncertainty which was wholly inconsistent with acceleration in growth and inflation. Volatility in many markets erupted as last year came to a close. Of more concern, the same uncertainty continues to linger, as does volatility, nearly halfway through 2019.

The coincident timing of a rise in trade protectionism has formed the basis of many if not most mainstream explanations. In specific terms, the US imposing tariffs on Chinese goods and China’s response to those restrictions only amount to relatively small changes balanced against all of global trade. Attempting to make up the difference, to try and explain very clear and significant downside risks materializing in economies all over the world, economists have been left studying the potential channels of second and third order effects of “trade war” *sentiment* more broadly.

Rather than seeking to assign uncertainty to intangible concerns about potentially small, non-specific threats, we can look to financial markets for clues as to other alternative factors. In them, uncertainty is equivalent to “flight to safety”, the unusual and significant demand for highly liquid, low risk securities.

Analyzing the behavior of sovereign bond yields, particularly those in the United States (US Treasuries), there is an unmistakable pattern which in the short run focuses our attention first on May 29, 2018. In the longer-term, we observe how this kind of flight to safety isn’t a new development, nor has it been unusual for the last decade.

We observe repeating periods when flight to safety becomes established across a whole range of market and data points. Since 2009, there have been two of these “cycles” (2011-12, 2014-16) fully completed (not including the outlines of perhaps a minor, incomplete fluctuation in 2010) with a third (2018-) currently underway.

The nature of these market oscillations is consistent in each one [Table 1]. Putting them together with other indications (TIC, swap spreads) pointing in the direction of a shadow *structural defect* in global dollar funding markets, flight to safety going back to 2007 has become synonymous with recurrent *flight to liquidity*.

TABLE 1

	Q3 2011 - Q4 2012	Interim	Q4 2014 - Q2 2016	Interim	Q2 2018 -
Bond yields	Falling	Rising, then falling	Falling	Rising	Rising, then falling
Inflation Expectations (TIPS)	Fall sharply, rebound	Steady	Fall sharply	Rising	Steady, then falling
ST Rate Expectations (eurodollar futures)	Down sharply	Rising	Down sharply	Rising	Down sharply
Liquidity - repo rates	Higher spreads	Falling. low spreads	Higher spreads	Mixed spreads	Higher spreads
Liquidity - swap spreads	Lower to steady	Higher first, then steady	Sharply lower	Sharply higher	Falling
Liquidity - dealer positions (collateral)	Sharply higher	Lower	Higher	Steady	Sharply higher
Dollar - DXY	Rising	Steady	Sharply rising	Higher, then falling sharply	Rising
Global Trade (exports)	Decelerate sharply	Steady	Contracting	Growing	Decelerating

With regard to last May, in the minutes published for its July/August 2018 policy meeting, the Federal Reserve's policymaking body suggested a puzzle in the global bond markets. Forecasting wage-driven inflation from full employment and the economic acceleration accompanying it, the FOMC had been in the midst of a policy tightening cycle. All these factors together should have produced higher nominal interest rates not just in US dollar markets but all over the world (globally synchronized growth).

In between May 17 and May 29, 2018, yields suddenly and precipitously declined (not just in US bond markets). The benchmark 10-year US Treasury bond yield was 3.11% on May 17 falling to 2.77% on May 29; the rate dropping 16 bps on May 29 alone. In the wake of this contrary behavior, along with the sharply flattening yield curve, the FOMC in late July/early August struggled to explain the occurrence.

The text cited two factors: central bank bond purchases as well as "the strong worldwide demand for safe assets." [2] The first could potentially be reconciled as a matter of policy support (in other jurisdictions). The second could not; the minutes suggest policymakers were left to imply that the long end of the bond curve(s) in particular was perhaps mispricing conditions.

In the wake of May 29, 2018, however, though nominal yields did eventually rise again into October, economic uncertainty has continued to increase the world over. Subsequently, bond yields have fallen sharply in the months since last November.

Primarily, "safe assets" are in demand largely due to perceived liquidity risks among global financial participants. This asset class is characterized by the most favorable liquidity characteristics, which include use in repo markets as "pristine collateral."

Thus, in terms of yield curve analysis, financial market participants might react to rising liquidity risks by hedging and buying in UST's, UST futures, eurodollar futures,

[2] Minutes of the Federal Open Market Committee, July 31-August 1, 2018. During participants' discussion of the flattening yield curve, the Committee began to contemplate the possibility of inversion and at the time saw no reason why that would be an appropriate response in the Treasury market given the FOMC's projections and interpretations of conditions.

interest rate swaps, etc. This would propose a very different market-based view of inflation expectations as well as the projected path of short-term interest rates and therefore provide us with an answer for uncertainty unrelated to "trade wars."

What's left are only the possible reasons for these perceptions, starting with liquidity risks. Conventional theory suggests that after several rounds of quantitative easing (ending in October 2014) the US central bank had increased the level of bank reserves to a sufficient position. In this view, liquidity risks should be minimal thereby leaving only (negative) term premia to answer for (persistently) lower bond yields.

If, however, quantitative easing and the byproduct of bank reserves were an insufficient technical monetary policy response to system requirements for *effective* liquidity (money, more broadly), global bond yields in 2018 and 2019 would fall under the characterization of Milton Friedman's interest rate fallacy: persistently low rates advise of effectively *tight* money conditions in the real economy. [3]

A US dollar liquidity channel centered apart from US bank reserves would further propose a more closely linked global system, one of interwoven, tightly connected financial/money participants located all throughout the world. It would also present the possibility that it operates outside of traditionally defined boundaries, not just geography, and therefore presents an answer to central bank bond market and interest rate puzzles as well as provide a more comprehensive and consistent explanation for recent uncertainty, volatility, and global liquidity risk.

This paper is organized as follows: Section 2 provides a brief conceptual background and a survey of relevant literature on global liquidity, along with existing empirical measures. Section 3 describes a set of financial market indicators that reflect liquidity risks and are correlated with trade cycles. Section 4 concludes with a summary of key findings and proposed extensions in this research area.

2 Conceptual overview and empirical measures of global liquidity conditions

Conceptual overview and existing literature on global liquidity

The importance of US dollar liquidity is oftentimes understated or obscured. The functions of a global reserve currency are paramount to the health and maintenance of worldwide economic expansion. The scale of what is required from it, or at least what had built up of it, indicates its essential nature. A global reserve currency, by definition, has to be reasonably and efficiently accessible in all parts of the world.

[3] Economist Milton Friedman had first discussed the "interest rate fallacy" as far back as December 1967 in his remarks to the 80th Annual Meeting of the American Economic Association. He more famously reasserted the false impression of interest rates in 1997, recounted as a Hoover Institute research piece in April 1998 as follows: "After the U.S. experience during the Great Depression, and after inflation and rising interest rates in the 1970s and disinflation and falling interest rates in the 1980s, I thought the fallacy of identifying tight money with high interest rates and easy money with low interest rates was dead. Apparently, old fallacies never die."

The GFC beginning in 2007 acted as something like a particle collider which physicists use as a tool to peer into the hidden world of matter and energy. The panic which resulted, the great strain of liquidity upon financial markets applied sufficient pressure and energy to begin breaking open the cover of what had been at best an opaque operation. In the breakdown of especially interbank spaces, it gave interested observers the chance to begin piecing together a more detailed picture of what had been taken for granted for many years beforehand.

In October 2009, Patrick McGuire and Goetz von Peter (McGuire and von Peter 2009) estimated that, "The origins of the US dollar shortage during the crisis are linked to the expansion since 2000 in banks' international balance sheets" and that the scale of these international obligations had increased from $10 trillion at the beginning of 2000 to $34 trillion by the onset of the emergency.

They also estimated that a synthetic *dollar short* or funding requirement had emerged, a mismatch between generally longer-term US dollar assets and shorter-term even ultra short-term US dollar liabilities on the scale of $2 trillion to perhaps as much as $6.5 trillion. The functions of this dollar short were provided by these same international financial intermediaries, not all of which were banking entities (nonbanks such as money market funds were common participants). Operating in international capacities, the system was effectively *offshore*.

In response to a growing *global* financial crisis, the Federal Reserve on December 12, 2007, announced reciprocal dollar arrangements (currency swaps) with the European Central Bank, Bank of England, Swiss National Bank, and Bank of Canada. Along with TAF auctions, these were early "measures designed to address elevated pressures in short-term funding markets." [4]

By December 2008, the list of eligible central bank counterparties had been expanded and the aggregate amount drawn on them had reached more than $580 billion. [5] This indicated, very plainly, the serious, crisis *demand for dollars originating from outside the US geographical boundary*. Banks and financial counterparties domiciled elsewhere were left with no other options than to try to obtain alternate dollar sources.

Conventionally, the Great Financial Crisis of 2008 has been explained as a consequence of unbridled risk-taking. Banks especially during the late nineties and middle 2000's took on leverage and invested in increasingly poor-quality assets (subprime mortgages). This does not explain how or why during the worst panic of the last four generations there came to be such massive demand for dollars offshore that no market participant was either willing or able to supply.

Take, for example, the emergence and persistence of an unusual LIBOR spread [Figure 2-1]. On August 9, 2007, this interbank offshore dollar rate rose sharply. Initially, the interest rate for federal funds did, too. On August 10, however, the two rates would diverge and stay that way for much of the rest of the crisis.

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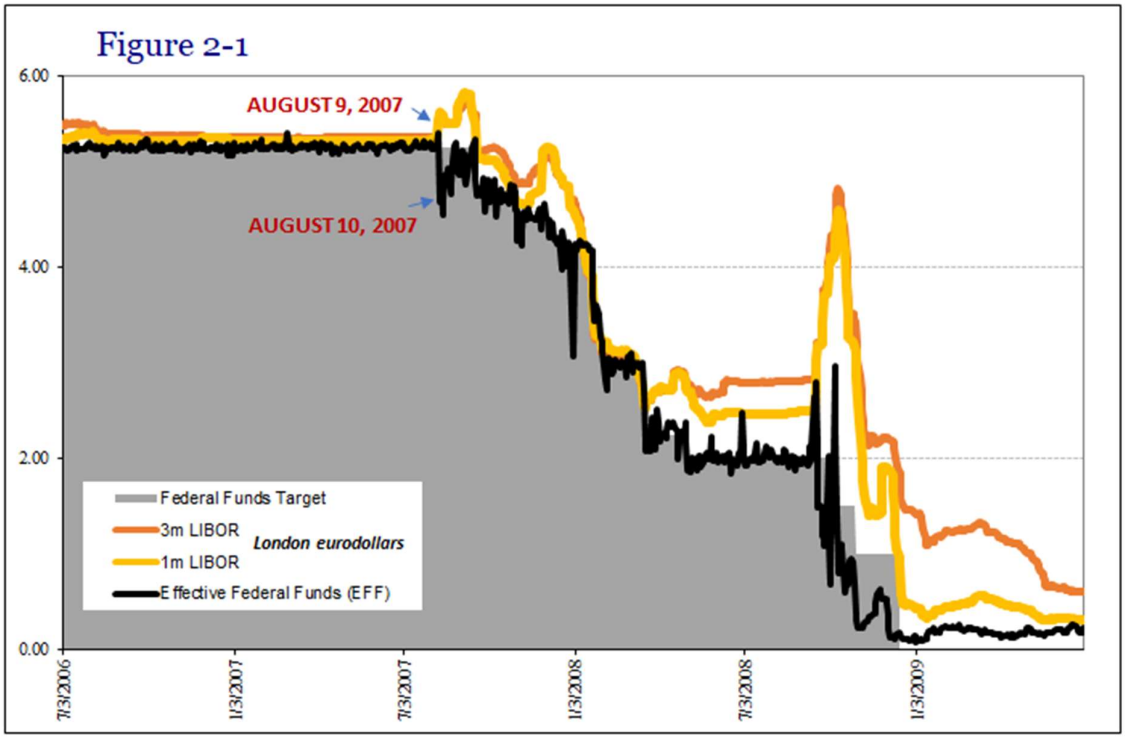
[4] Federal Reserve press release dated December 12, 2007.

[5] Federal Reserve, H.4.1 "Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks."



To put it in oversimplified and literal terms, there was “too much” money in domestic federal funds and a clear shortage of it in offshore interbank places. A breakdown of transmission in both policy (traditional measures of “accommodation” and new liquidity practices like dollar swaps invented during the GFC) as well as standard private monetary practice.

In response to what eventually amounted to a full-blown worldwide financial panic, central banks - particularly the US Federal Reserve - began to engage in large-scale asset purchases (LSAP). The primary accounting byproduct of these rounds of *quantitative easing* (QE) was a large increase in outstanding US dollar bank reserves. These are characterized in standard literature as a form of base money.

Despite the introduction of LSAPs/QE and the increase in bank reserves, we have observed successive discrete periods of what can only be described as insufficient liquidity; a global dollar shortage renewed at specific occasions. Spreads tend to worsen, the dollar tends to rise in exchange value, and the strong worldwide demand for safe assets rematerializes.

By 2010, the first “minor fluctuation”, there were already signs of reintroduced severe liquidity problems showing up in much the same places as before. In 2011, it became a second global liquidity crisis which swept over the system.

The Federal Reserve had already responded in November 2010 with a second round of QE. The level of bank reserves was increased further, and yet by the summer of 2011 FOMC officials were confronted by stark evidence for the ineffectiveness of those programs. On August 9, 2011, then-Open Market Operations Manager Brian Sack realized:

> "We are seeing a lot more discussion about the potential need for liquidity facilities. I mentioned in my briefing that the FX swap lines could be used, but we've seen discussions of TAF-type facilities in market write-ups. So the liquidity pressures are pretty substantial. And I think it's worth pointing out that this is all happening with $1.6 trillion of reserves in the system." [6]

The week before, Chairman Ben Bernanke had to confront the possibility that this system was in many ways detached from the central bank's area of responsibility. "I think a point that was somewhat underemphasized is that our transmission of monetary policy is an issue here as well. So to take an example, doing repos to keep the RP rate from uncoupling from the federal funds rate, arguably there are issues there relating to transmission." [7]

As I document in Section 3, these same repo issues have continued to persist with the appearance of these almost regular liquidity cycles regardless of the level of bank reserves.

Beyond the monetary and financial realms, global economic output is curtailed first in those economic sectors most sensitive to money and credit: global trade and global capital investment.

The GFC is very well defined, so my focus in this paper is on these ensuing periods of monetary uncertainty which are only slightly less clear. What we observe is the repeated breakdown in money market hierarchy, an imbalance beyond monetary policy transmission indicating the potential for serious even severe strain in worldwide dollar conditions.

While, again, the conventional explanation for 2008 has focused on subprime mortgages and occasionally shadow *banking*, the massive monetary dislocation of 2007-09 was as much a global dollar disruption which spread liquidity fears all over the world. Subsequent scholarship has more and more pointed in the direction of what might amount to shadow *money* at least starting in the form of interbank liquidity.

In May 2017, Hyun Song Shin (Shin 2017) noted how, "Behind the financial channel of exchange rates is a dense matrix of financial claims in dollars. The global economy is a matrix, not a collection of islands, and the matrix does not respect geography." In September 2017, Claudio Borio, Robert Neil McCauley, and Patrick McGuire (Borio, McCauley, and McGuire 2017) found:

> "Every day, trillions of dollars are borrowed and lent in various currencies. Many deals take place in the cash market, through loans and securities. But foreign exchange (FX) derivatives, mainly FX swaps, currency swaps and the closely related forwards, also create debt-like obligations. For the US dollar alone, contracts worth tens of trillions of dollars stand open and trillions change hands daily. And yet one cannot find these amounts on balance sheets. This debt is, in effect, missing."

[6] Transcript of the Meeting of the Federal Open Market Committee on August 9, 2011.
[7] Transcript of the Conference Call of the Federal Open Market Committee on August 1, 2011.

The complications for liquidity and its flow extend in multiple directions. In repo markets, for example, there is always the potential for collateral pressures. Caballero, Farhi, and Gourinchas (2017) describe several serious issues of what they call a “safe asset shortage.”

The collected inference is an external system of liquidity (from the point of view of not just US monetary authorities, but all monetary authorities as a consequence) that is at the very least not well understood nor very well documented. As it would account more completely for the breakdown(s) in the GFC, the implications stand as a possible *continuing* factor; prominent unsolved liquidity risks therefore financial uncertainty and volatility leading to ongoing global economic risk and restrained investment and growth.

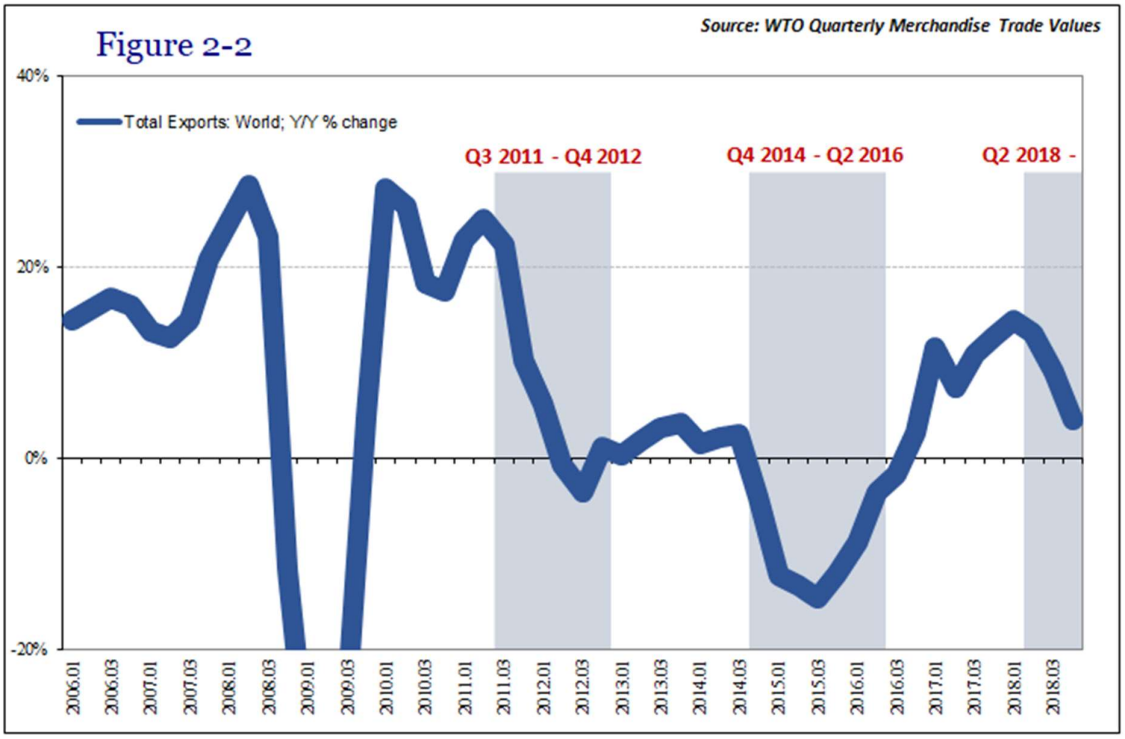
In particular, the potential for higher costs or the inability of economic agents to reasonably and efficiently source these global dollars as required of a global reserve currency system would act as a drag and an impediment first through *global trade* [Figure 2-2] and then through capital flows particularly related to capital intensive investment.

Hyun Song Shin (Shin 2019) talks about the relevant research of Global Value Chains (GVC):

> “Building and sustaining GVCs are highly finance-intensive activities that make heavy demands on the working capital resources of firms. When the financial requirements go beyond the firm’s own resources, the necessary working capital is dependent on short-term bank credit. The financing requirement for GVCs arises because firms need to carry inventories of intermediate goods or carry accounts receivable on their balance sheet when selling to other firms along the supply chain.”

The required financed capital is most often denominated in US dollars, the global reserve, supplied by this offshore shadow network of highly interrelated global financial firms. As in any basic economic circumstance, confronted by liquidity fears and uncertainty, liquidity suppliers will respond by pulling back what they offer (supply) which has the effect of raising the price of reserve money on the whole in very broad terms.

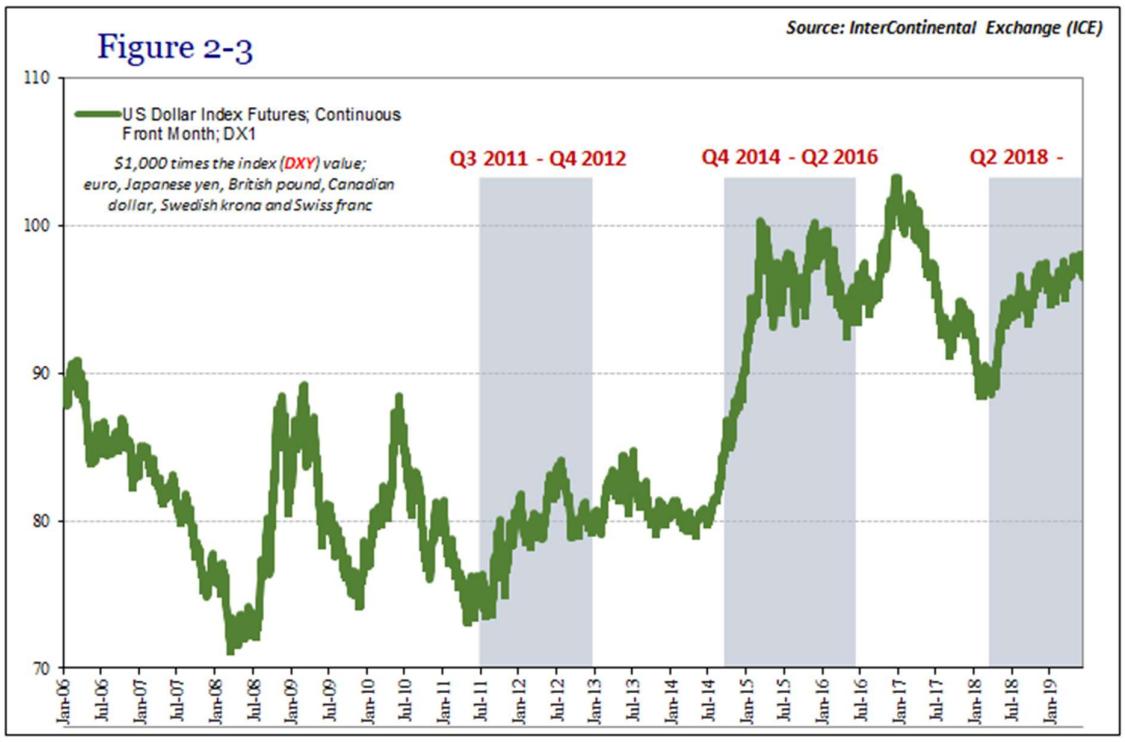
That transmits as feedback back into the monetary system as well as forward out into the real economy. It can become a self-reinforcing vicious cycle whereby liquidity fears lead to real constraints on global trade which reduce economic output more broadly and therefore confirming the concerns behind uncertainty. Avdjiev, Berger, and Shin (2018) found substantial links between the prior buildup of international credit financed by short-term interbank lending and the macroeconomic implications using the 1997 Asian financial crisis as an analog.



Given this monetary channel, I start by noting discrete periods of well-defined negative pressures on global trade. These coincide, as shown in the next section, with the same periods when we observe monetary irregularities and with flight to safety/uncertainty.

The US dollar exchange rate tends to rise during them, too [Figure 2-3]. There is a robust volume of literature documenting the apparent links between a rising dollar exchange value, financial uncertainty or upset, and the negative economic consequences that often follow. Valentina Bruno and Hyun Song Shin (Bruno and Shin 2013) write, "The focus on the US dollar as the currency underpinning global banking lends support to studies that have emphasized the US dollar as a bellwether for global financial conditions."

Avdjiev et al. (2018) found, "First, there is a strong negative relationship between the US dollar and cross-border bank lending denominated in US dollars. Second, an increase in US dollar denominated cross-border lending to a given EME is associated with greater real investment in that EME. Finally, a decline in the value of a country's currency against the US dollar triggers a decline in real investment in that country."



Empirical proxies of global liquidity

In discontinuing M3 thirteen years ago, the Federal Reserve hinted at one of the central problems we face in trying to describe and analyze offshore dollar liquidity conditions. The FRB "judged that the costs of collecting the underlying data and publishing M3 outweigh the benefits," suggesting already a high degree of difficulty in tracking and estimating the monetary forms in this space. [8]

Large-denomination time deposits continue to be published in other places, Z1 & H.8, while institutional money market fund balances became a regular memo item. The other components of non-M2 M3 which were *discontinued entirely* were estimates for the very things which the GCF placed front and center: repo and, representing the surface links to offshore dollar funding, eurodollars.

Without official definitions and well-sourced data, we are left with incomplete proxies and inference from other data sources as well as market prices. While this is a hindrance for those interested in studying the system, it stands to reason that it is a much bigger problem for those operating within it.

One particularly invaluable proxy is provided by the US Treasury Department. The Treasury International Capital (TIC) series contains a wealth of data including compiled activities drawn on a monthly basis from bank call reports of those banks' cross-border dollar transactions. Though this proxy is incomplete, it gives a starting point in more traditionally-defined short-term bank liabilities both from US banks to the offshore world, as well as coming from the offshore world to US banks.

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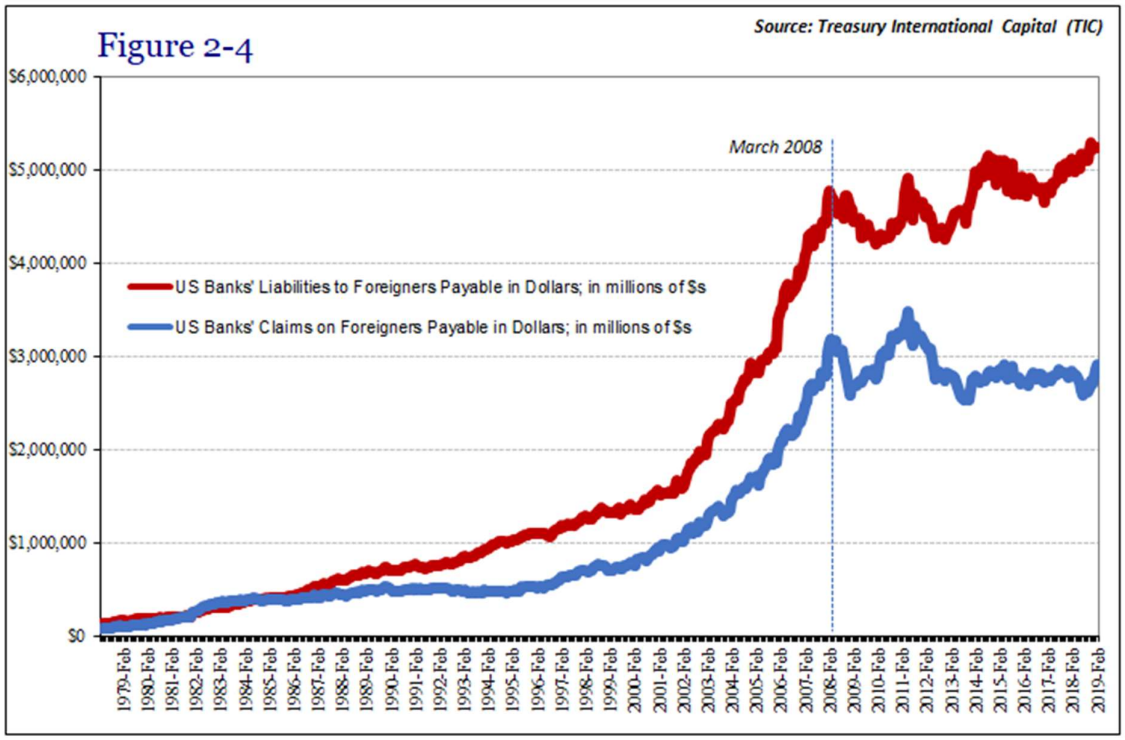
[8] Federal Reserve press release, H.6 Money Stock Measures, dated and released November 10, 2005.

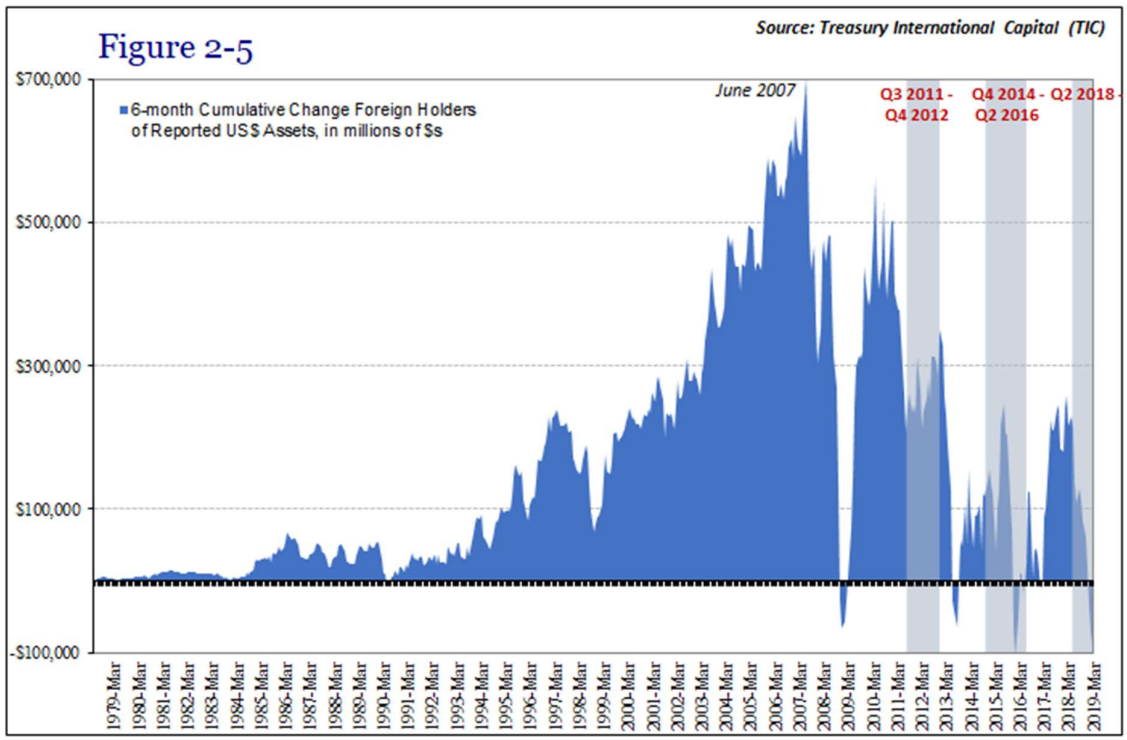
Domestic banks, from which the Treasury Department solicits the call reports, engage in all manner of cross-border interbank relationships. The data presented below [Figure 2-4] relates to several classes of short-term dollar liabilities. It is a partial reconstruction of potential liquidity volumes available for global liquidity usage.

These outbound as well as inbound dollar proxies display rapid growth particularly in the late nineties and middle 2000's but only up to March 2008 (Bear Stearns), and then a very clear and what has proven to be permanent change in trajectory/condition following.



The headline or overall TIC figures are consistent with the implications of a more permanent breakdown in offshore dollar liquidity (in the interbank channel) represented above. The series ostensibly measures how much buying and selling of US dollar assets is taking place in foreign hands. Put simply, if dollars offshore are exceedingly plentiful for whatever ultimate purposes, it stands to reason foreigners would have more opportunity and ability to purchase more dollar assets.

Consistent with the liquidity thesis, foreigners as reported by TIC tend to buy *far fewer* US dollar assets, on net, during these occasions associated with noted liquidity pressures. This has even led to the outright and sustained *selling* of US dollar assets, on net, in those instances associated with the most strain – including the latest up-to-date data [Figure 2-5].



We therefore have an outline and a framework from which to begin interpreting the robust sets of market data pertaining to more visible financial dimensions, factors such as bond yields which may contain otherwise hidden liquidity risks embedded within them. Though the TIC figures are far from dispositive, they present to us an intriguing and startling possibility; this idea of an unsolved structural defect which rather than showing up all at once in one shot during the GFC may continue to intermittently plague a global system therefore the global economy highly dependent upon the behavior of its global reserve (i.e., offshore dollar liquidity).

3 Financial market indicators of liquidity risk

In this section, I present evidence first for liquidity problems visible in dollar markets. This includes the repo market, cash and collateral, as well as interest rate swaps. These are then translated into market-based signals of inflation expectations using TIPS and the expectations for the future path of short-term interest rates suggested by eurodollar futures. This latter market is also itself a robust indication of perceptions of liquidity risks.

These then form the basis for further interpreting the behavior of US Treasury yields overall, aligning the constituent parts of them with the data indicating liquidity issues in order to project flight to safety or flight to liquidity within the strong worldwide demand for safe assets.

The accepted Fisherian deconstruction of interest rates decomposes bond yields into three parts: the expected path of short-term interest rates; the expected levels of future inflation; and term premiums. In the context of the recent outburst of

uncertainty, as well as in past episodes, policymakers have especially since the end of US QE viewed lower bond yields as relating to term premiums alone. In 2018 and 2019 specifically, mainstream forecasts uniformly called for continued rising US dollar short rates and higher to significantly higher levels of inflation.

This introduces a high degree of bias, assuming first that bond market yields are the consistent product of general even specific agreement with mainstream forecasts. If yields are falling, then policymakers leave only term premiums to answer for them. They reject other explanations based on the assumption primarily surrounding bank reserves/QE, leaving them no option to incorporate market uncertainties in view of alternate cases for effective global liquidity conditions.

Uncertainty about mainstream predictions would no doubt affect both expectations components, the level of inflation as well as how ambiguity may lead to a variety of outcomes in monetary policy cases. In fact, the two go hand in hand; less visibility about the intermediate term and even short run would cloud views on how central banks might be *able* to conduct monetary policy, leaving bond investors to further wonder what inflation might be or even could be under those same circumstances.

Faced with more immediate perceptions of heightened liquidity risks across all markets, financial participants have historically engaged in this flight to safety activity. As bond markets are forward-looking especially at the longer ends of each yield curve, additional demand for the most liquid securities would reflexively take account of the prospective *effects* of these negative short run considerations.

Therefore, the strong worldwide demand for safe assets is the lynchpin between these perceptions about liquidity and the perceived short, intermediate, and long run *consequences* which might arise when monetary risks are serious.

Repo

Repurchase agreements, or repo, are a form of collateralized interbank borrowing. Over the last four decades, the repo market has become the most prominent form of exchanging the shortest-term liabilities. In the aftermath of the GFC, the repo market has taken on even more operational importance as other short run liquidity/funding formats, unsecured interbank lending, have diminished or even largely disappeared.

This places enormous weight on its collateral dimensions, including the demand for securities to be used in obtaining this short run funding. As with any modern interbank space, complexity is an everyday concern as it pertains to how these markets actually operate. The role of repo in the GFC is well-established (and beyond the scope of this paper) as it introduced a variation in how collateral is viewed at specific times.

When liquidity is regarded more generally with uncertainty or suspicion, repo participants which include not just cash borrowers but also *securities lenders* (those often engaged in parallel collateral transformation) tend to demand these “pristine” forms of collateral like US Treasury securities as a safeguard or as replacement for securities further down the chain which are being re-evaluated as acceptable collateral (and on what terms).

This added demand for US Treasuries independent of long-range forecasts describes an inherent liquidity quality to the securities themselves at all points on the yield curve.

Primary dealers positioning

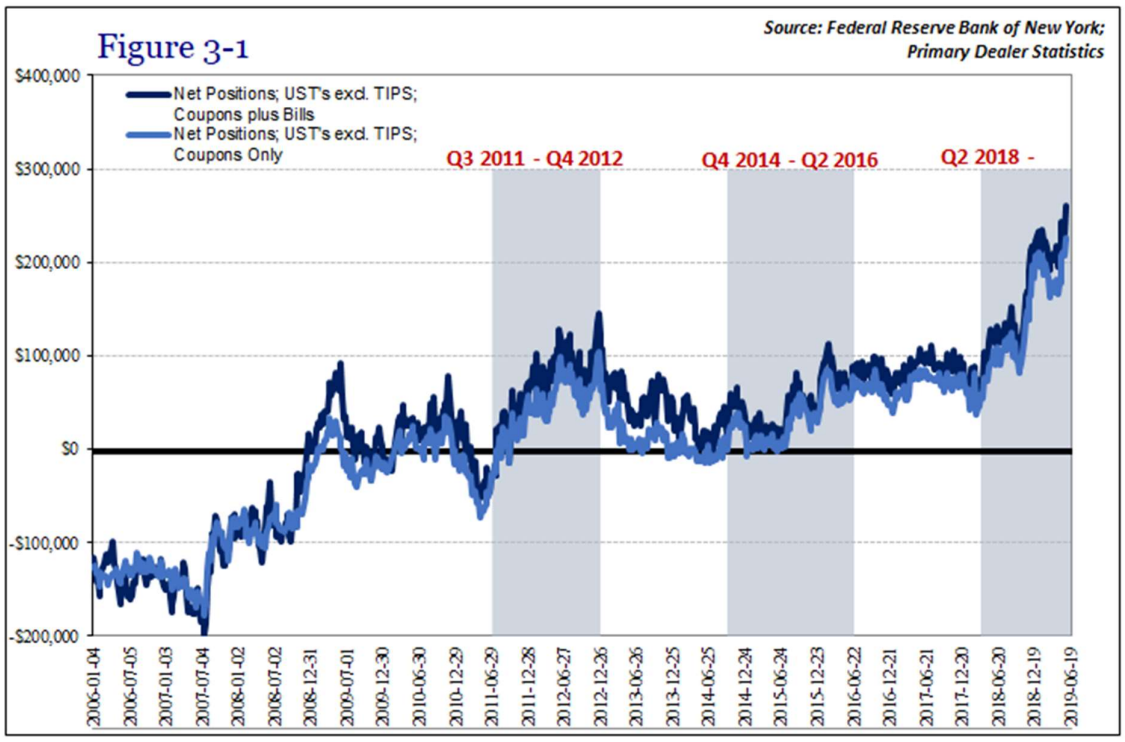
Primary dealers are a technical subset of global money dealer firms. In the US, these are banks or the domestic subsidiaries of foreign banks who deal directly with the Federal Reserve. Among their primary activities is money dealing, as the term implies.

These include liquidity functions such as the repo market, both as a possible cash provider as well as a securities lender (including, again, collateral transformation). It also includes funding of its own activities, meaning cash borrower, using the repo market as its own source of backstop liquidity to fund further dealer activities down the line.

Primary dealers report their positions of the securities they hold to the Federal Reserve's New York branch on a weekly basis. *On net*, this dealer subset shows a determined increase in long positions of US Treasury securities of all ranges during the discrete periods I've identified when liquidity risks/perceptions/impairments are rising [Figure 3-1].

This would suggest how dealers are shifting collateral available to their own purposes in favor of the most "pristine" tiers, a possible defensive strategy against a dealer's own liquidity backstop (being able to use those securities in repo for cash in an emergency) as well as possible demands from wider breakdowns in collateral chains (using US Treasury collateral to satisfy rehypothecation curtailment or in the potential for the forceful and involuntary unwinding of transformations).

The implications amount to systemic *collateral pressures*. A dealer that tends to report higher net long positions is one that in effect is "lending" (a net short position) less of those securities into the collateral marketplace, or at the very least suggesting there are overall negative collateral pressures forcing a response at the basis of the domestic dealer network. Another way of saying that is the potential for a more acute *collateral shortage* - indicative of, and consistent with, generalized periods of heightened liquidity risks.



General collateral repo rate

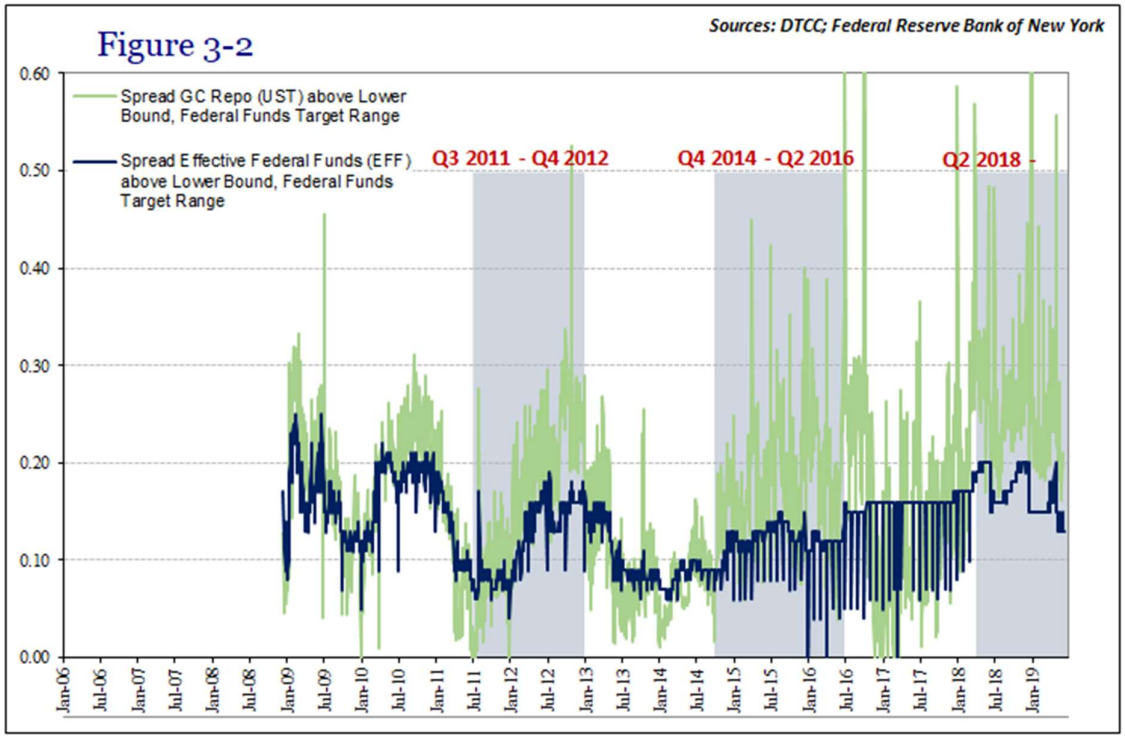
On the cash side of repo, money markets should otherwise operate along the lines of a strict hierarchy. Basic finance demands attention to risk/reward; that is, one of the most basic assumptions in every market is that for additional risk there must be additional return. In terms of comparable markets, including money markets, a money rate applied to a riskier monetary alternative would feature a higher rate than one applied to a less risky situation.

Short-term interbank borrowing unsecured by any collateral would on average be conducted at interest costs above those secured by collateral. Yet, we observe anomalous periods when the main indication of repo costs is above even well-above uncollateralized short-term money alternatives such as federal funds.

In terms of hierarchy, in the pre-crisis period money dealers, that is, global financial participants operating in these markets (on both sides), would police these spreads and take advantage of arbitrage opportunities. In the specific case where the repo rate might move above an alternative like federal funds the money dealer would borrow in federal funds and then lend the excess liquidity in repo until such time as hierarchy might be restored and the risk arbitrage no longer opportune.

The generic repo rate case is represented by the interest on borrowing using general collateral US Treasury securities: the GC rate. We again observe discrete post-crisis periods when the GC repo rate not only rises well above federal funds (both rates normalized to comparison with the Federal Reserve's lower bound of the target policy range) it remains in that station for a prolonged period [Figure 3-2].

We have to infer some dynamic among money dealers, some sort of potential impediment which is preventing them from realizing arbitrage and thereby regulating these spreads and imposing basic hierarchy. It begins to raise substantial questions of broader liquidity concerns only beginning with repo, starting with the potential for systemic reluctance even perhaps impairment (Chairman Bernanke's 2011 questions about "transmission" in repo) among global US dollar money dealers.



Interest rate swaps

Interest rate swaps tell us market perceptions of both risk (fixed leg) as well as funding costs or liquidity (floating). When the *swap spread*, that is, the quoted price of the fixed leg when compared to the same maturity US Treasury yield, compresses even to the point of being negative, it suggests a substantial degree of imbalance on one or both of those sides – perceived credit risks as well as funding difficulties.

Gross outstanding interest rate swaps amount to several hundred trillion notional, a sense of just how substantial and deep trading in this area is. As such, grave imbalance shouldn't be a sustained condition unless due to substantial factors.

Since the "price" of the interest rate swap is that fixed leg, it is related to a comparable maturity US Treasury security to gauge market perceptions. This swap spread is therefore a barometer for interpreting conditions in this huge piece of the global US dollar fixed income and funding market.

We would expect, under normal conditions, the spread to be *nominally positive at all maturities* – there is at least credit risk embedded in receiving a fixed rate payment from a financial counterparty whereas there is perceived none in being paid fixed coupon payments by the US federal government. Again, higher risk/higher return.

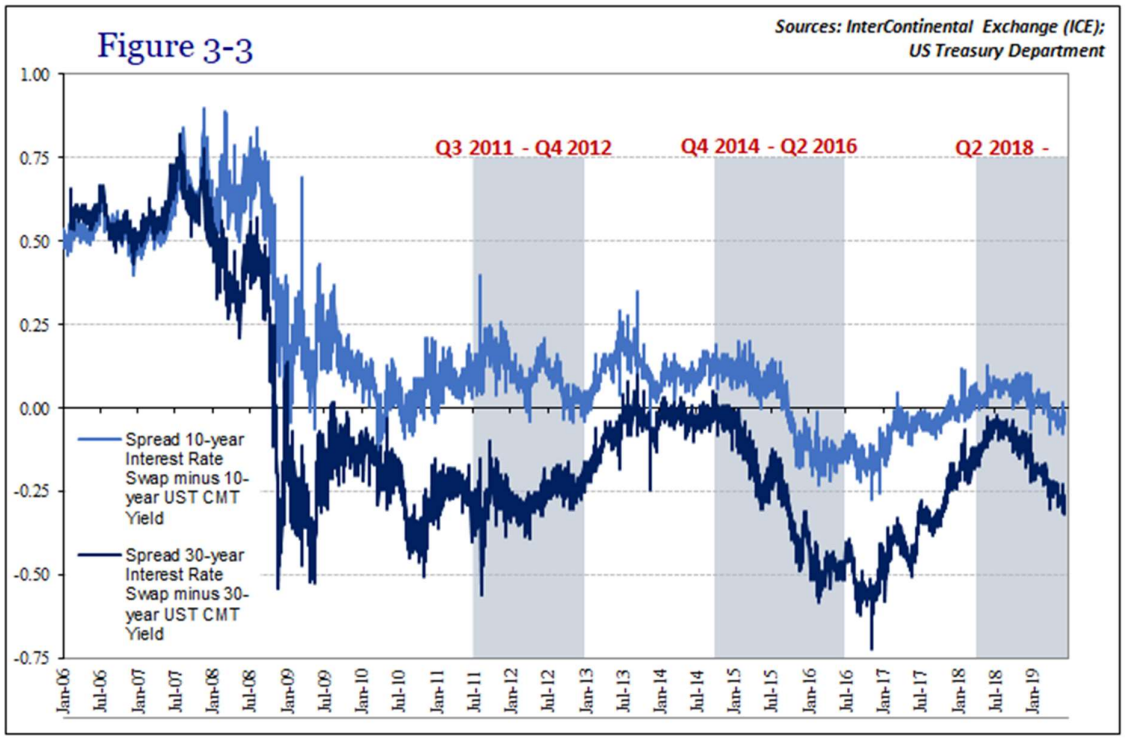
A negative spread would, on the surface, suggest the market is viewing the credit/default risks inherent from receiving payments from the government are greater than those of financial counterparties. Normal financial hierarchy suggests there are no scenarios where this would be the case.

In the later period of the GFC, however, swap spreads first at the longer run maturities collapsed and even turned negative. Worse, they've persisted this way for extended periods.

As in repo, money dealers are given the opportunity for risk/return and arbitrage. Therefore, what we are observing is not this vast market viewing the default risk of the US government rising above credit institutions; it is the absence of money dealers to arbitrage and therefore make sense of one of the more fundamental credit spreads. A negative swap spread is literal nonsense, especially in view of flight to safety and the strong worldwide demand for safe assets.

Taken instead as an indirect indication of *dealer capacities* and their perceptions about liquidity risks (embedded in floating rate considerations), a negative swap spread signals a heightened degree of reluctance/impairment in dealer capacities again implying the potential for shadow liquidity problems.

Unsurprisingly, the same periods when we observe repo rates breaking with hierarchy, we also find swap spreads compressing even when they are already negative [Figure 3-3]. And, in overall terms, the fact that swap spreads have never normalized at any point since 2008 suggests, like the TIC data, the system has suffered what appears to have been a permanent rupture.

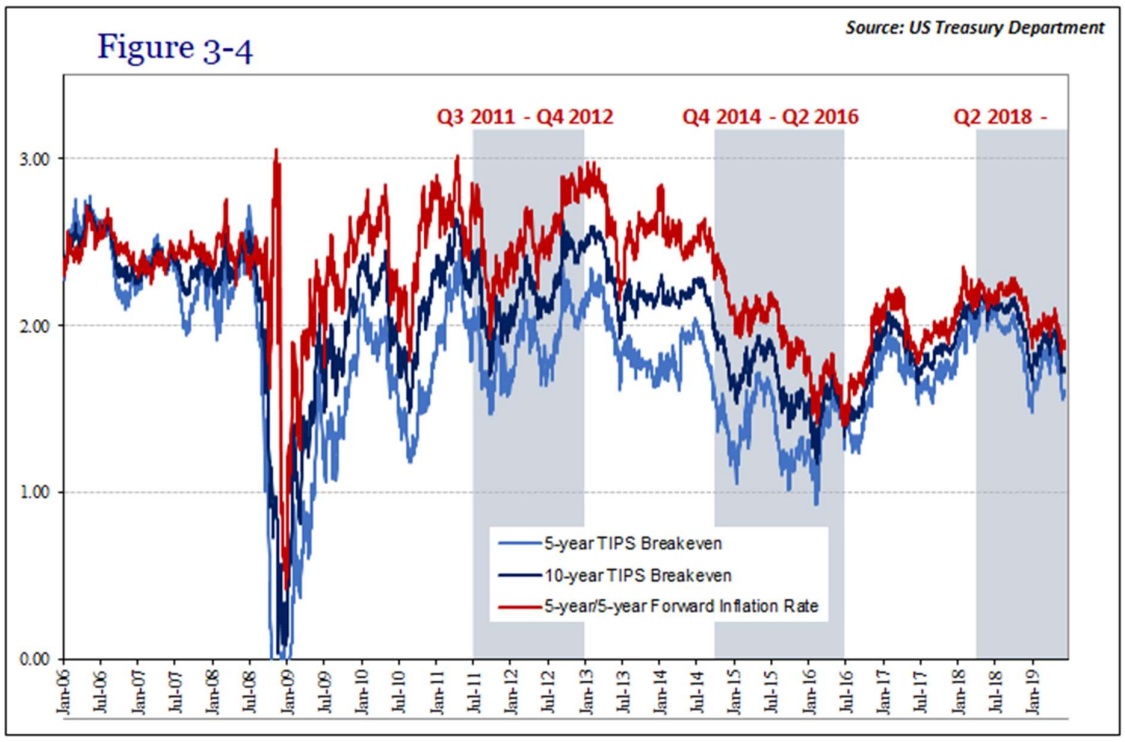


Inflation Expectations (Fisherian decomposition)

Market-based measures of inflation expectations, those drawn from the TIPS market, are consistent in displaying the symptoms of uncertainty driven by systemic liquidity constraints. As a general case, inflation breakevens, the difference between real yields on TIPS instruments and the nominal US Treasury yield for the same maturity bond or note, suggest lower demand for forward inflation compensation at these specific times.

Aligning with the same periods of falling yields, it suggests significant and direct relationships between liquidity perceptions, the strong worldwide demand for safe assets (uncertainty), and a diminishing outlook for inflation and economic growth [Figure 3-4].

Going back to yield decomposition, it is evidence for the alternative case; that declining sovereign yields are not being determined solely as a matter of term premiums – at least here in the US dollar system.



Expectations for the path of future money rates (Fisherian decomposition)

Related to the deep markets for US Treasuries and interest rate swaps, the market for eurodollar futures combines perceptions of monetary policy objectives, present and future monetary conditions (liquidity), and the often longer run consequences of both or either.

A eurodollar futures contract pays at maturity based upon where 3-month LIBOR is fixed at that time. Therefore, the contract holders have enormous incentive to forecast the trajectory of short-term interest rates as a whole along with any monetary alternatives that may influence 3-month LIBOR over the contract period.

A primary consideration along those lines is Federal Reserve monetary policy. Since the US central bank conducts its policies using alternate money rates, including in its current format the interest paid on excess reserves (IOER) and the reverse repo rate (RRP), financial institutions operating in both onshore as well as offshore money markets will offer and bid for funds taking that influence into account.

Eurodollar futures therefore embed expectations starting from the central bank perspective: what the Federal Reserve itself believes it will be doing over the life of the contract. Should the central bank express a generally positive outlook the eurodollar futures market will factor the likelihood that the FOMC will try to conduct its policy along those lines (a higher rate bias).

This market must also take into account any factors which might interrupt or in more extreme cases supersede the FOMC's economic projections, leading to what might otherwise seem significant disagreements.

In late 2006 and throughout 2007, the eurodollar futures market and the money curve produced from contract values displayed a growing downward expectation for short-term money rates. The curve inverted, which only meant investors were increasingly betting on a series of rate cuts developing in later 2007 and continuing into 2008.

This stood in contrast to the official stance. US policymakers remained steadfast that even serious problems developing in the subprime mortgage space would not amount to a substantial financial factor and therefore would not interfere with the general direction of the economy. Official projections continued to show a steady federal funds target if not one biased upward (on inflation concerns).

By August 2007, the eurodollar futures market had pressed even further into an inverted curve. Contemporary FOMC deliberations often centered around how and why this market would be, in essence, disagreeing with most econometric forecasts; and why they might be doing so. Bill Dudley, head of the New York branch's key Open Market Operations, described what was involved in their as opposed to the market's thinking:

> "You know, it's certainly possible that, when people want to hedge their risk in areas where they can't easily sell the assets, they would buy something that will perform well if those assets continue to deteriorate. One thing to do would be to buy Eurodollar futures or Treasury securities. So, at least temporarily, those yields may not fully reflect what the market expectations are. That said, the Eurodollar market is a very deep market, and if one thought that the Fed was not going to do what the market priced in, there certainly would be the ability of people to take the other side of the bet. So it's sort of hard to know exactly how big or long-lasting the effects that you are talking about could actually be. In the short run, that kind of thing certainly goes on. If I can't sell the bad asset that I hold, then I will buy something that will perform well if the bad asset deteriorates." [9]

[9] Transcript of the Meeting of the Federal Open Market Committee on August 7, 2007.

It is a profound observation of not just eurodollar futures but also what can often drive US Treasury yields and related securities in the specific context of this paper; these are instruments *used to hedge against illiquidity* and amounting to a signal of the consequences from it regardless of the official central bank position. If market conditions might continue to deteriorate into the future, as was being projected by money and bond curves in 2007, the Fed would at some future point respond to that worsening condition first by reducing its monetary policy target whether or not it believed that was likely or even a possibility in the present.

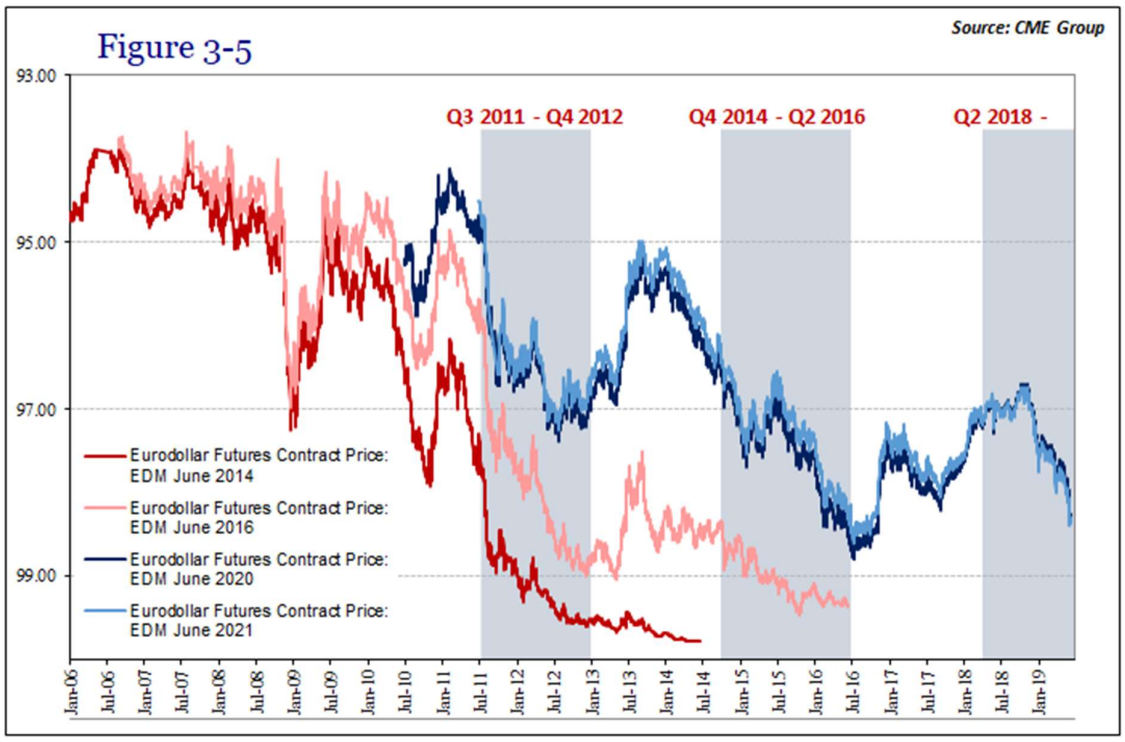
The same pattern emerges even for periods where that interest rate target (or those which have come to replace the simple prior target) is already at zero. Rising and higher eurodollar futures *prices* in this situation are disagreements with the official projection for the trajectory of short-term interest rates once they leave the zero lower bound.

In other words, if FOMC and mainstream forecasts are like they were in 2017 suggesting above-trend growth as well as above-trend inflation, then that would lead to a higher expected path of short-term rates. If the eurodollar futures market, like the US Treasury yield curve, instead thinks there is a non-trivial chance that trend is either wrong or if correct could be interrupted by a serious monetary/liquidity setback/impairment not contained in the mainstream forecasts, then the eurodollar futures market in particular would price a much-reduced trajectory for short-term interest rates than the official version – represented by rising and higher contract prices.

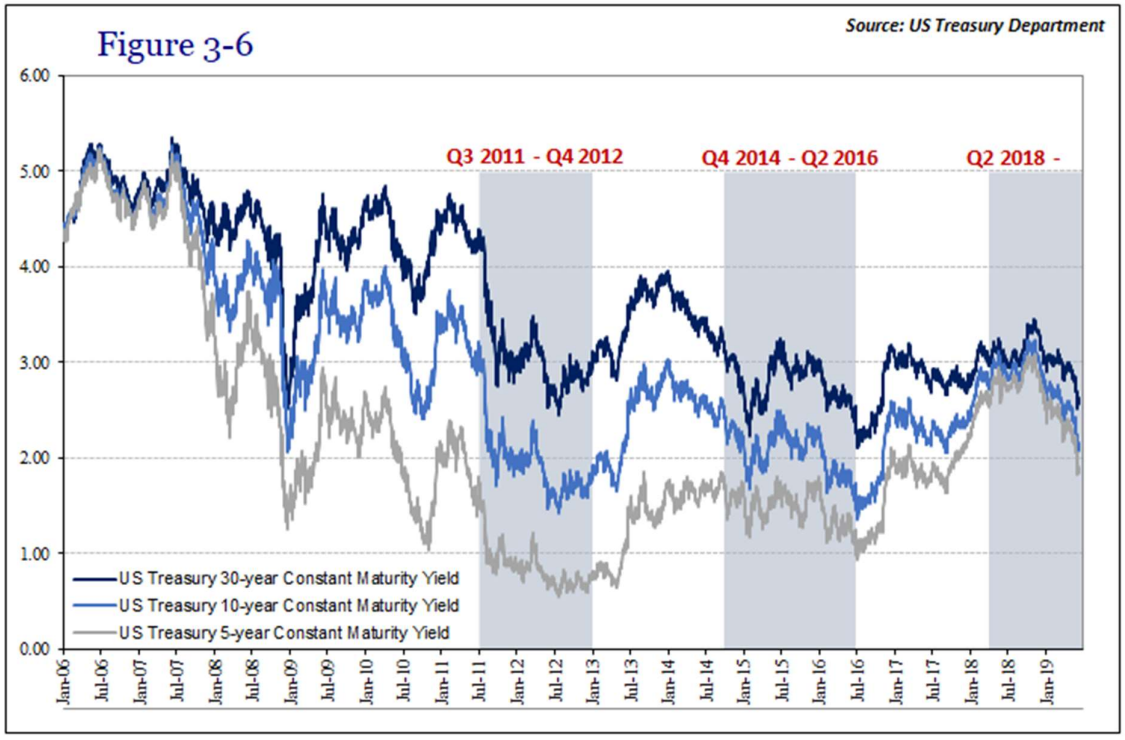
This accounts for what we have observed in the eurodollar futures market during these periods under study. Before the most recent outbreak, contract prices often were bid (lower anticipated interest rates in the future) even though monetary policy rates during those times were already at zero, and the FOMC's projections were for accelerating growth and inflation.

The current trend in 2018 and 2019 is more like that of 2007, in that the eurodollar curve is again inverted and going back to around May 29 last year [Figure 3-10] projecting the increasing likelihood of rate cuts – even though up until January 2019 the FOMC had continued to indicate more rate hikes, and up until the current date the FOMC suggests keeping the federal funds range where it is.

In all of these cases, during the study periods the eurodollar futures market "disagrees" with how the future trajectory of short-term money rates in general is likely to unfold [Figure 3-5]. As a broad liquidity hedge, it also indicates the nature of that "disagreement."



Taken together the *repeating* strong worldwide demand for safe assets [Figure 3-6] along with indications of liquidity uncertainty and disruption, and finally the behavior of market-based inflation expectations, falling bond yields are not explained by term premiums alone; if at all. Instead, there is a clear mechanism which puts together broad uncertainty with specific monetary irregularities – and then provides a more robust framework for understanding and mapping the channel out into the broader economy which has led to, and can still lead to, serious global economic weakness beyond strictly global trade.



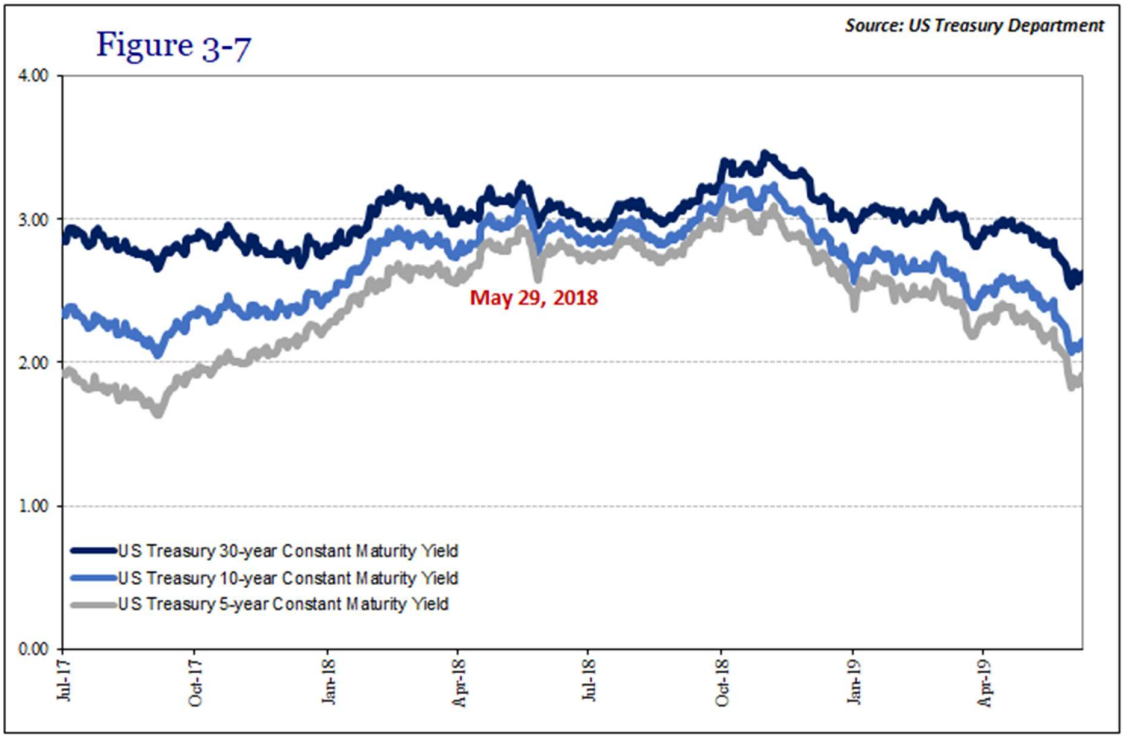
Indications of another dollar disruption

Having established the overall mechanism, we go back to observe the same processes in the short run context of 2018-19. Following May 29, 2018, I find how uncertainty surrounding the global liquidity function is heightened leading to what looks like a uniform *inflection* in these key markets.

As 2018 turned to 2019, the trend following that inflection has not only continued it has strengthened with growing conviction: unchecked liquidity concerns which over time reduce the likelihood of future inflation and the path of short-term interest rates (rate cuts) raising both financial and economic risks for this year and beyond.

Lower bond yields, then, would be consistent with both economic as well as monetary/financial uncertainty; in fact, a transmission of the latter into the former. The yield curve in this situation would not be mispriced. Furthermore, it would offer a compelling and more comprehensive explanation for both financial and economic behavior unrelated to trade protectionism.

There is substantial market and financial evidence for what amounts to a third re-visitation of the same structural global dollar defect [Figures 3-7, 3-8, 3-9, 3-10], the repeating cycles that pertain to the function, or dysfunction, of a worldwide reserve currency system (i.e., offshore dollar liquidity).



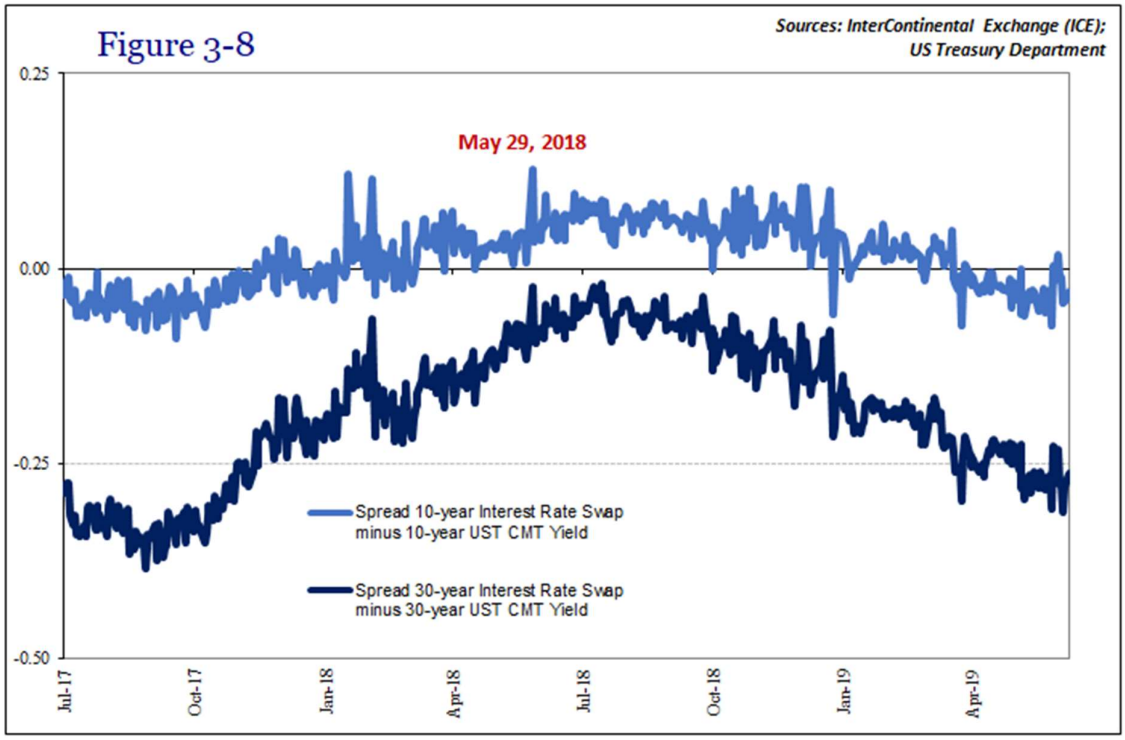


Figure 3-9

Source: US Treasury Department

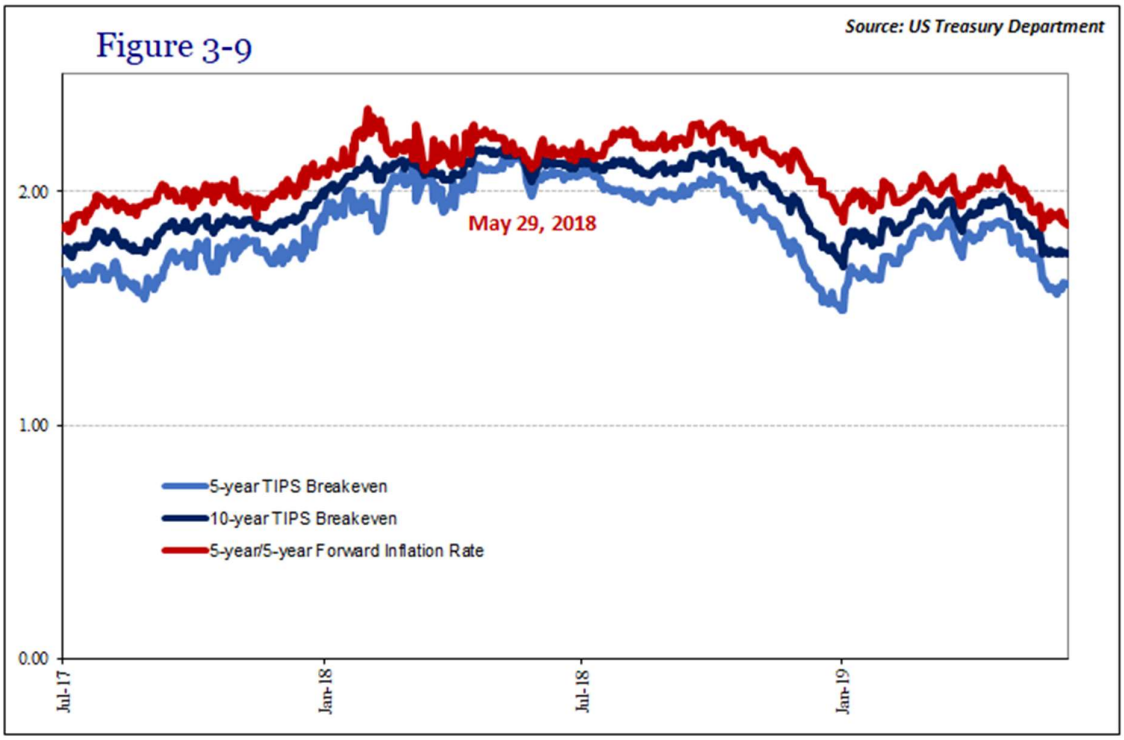
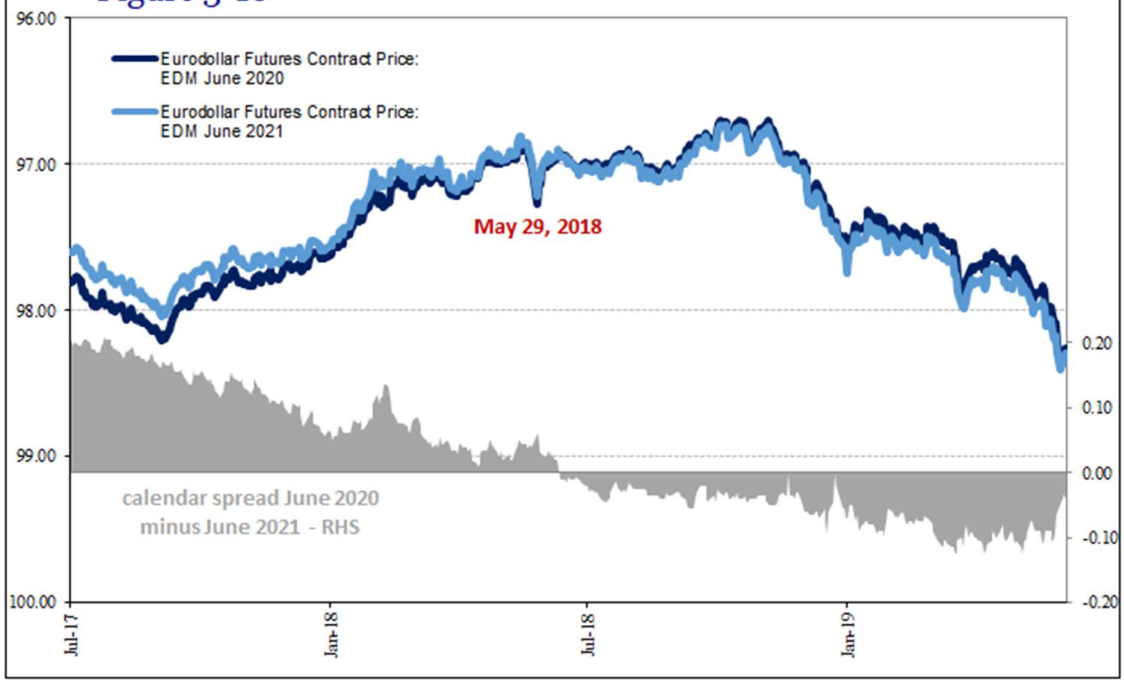


Figure 3-10

Source: CME Group



4 Conclusion

Several explanations have been put forth to explain the recent outbreak of financial and economic uncertainty. Rising protectionism has been the main focus in attempting to define causality. This has been joined at times by questions surrounding the Federal Reserve's more recent monetary policy tightening, rate hikes either in combination with the Fed's balance sheet normalization (so-called quantitative tightening) or in isolation.

As I've shown, however, what we can observe systemically predates all of those explanations and the current case remains consistent with prior occurrences. These all display the same general pattern and even specific signals, leaving for us the realization of a third additional event in what has been a series by the scorecard of global liquidity and measures of uncertainty like bond yields.

There is certainly a case to be made for how trade policies are being unhelpful, perhaps harmful, or even how unwinding QE could be having negative effects on sentiment. In terms of identifying an underlying cause, however, the consistency of this latest outbreak with those previous, taken in the wider context of TIC, it all proposes *an existing structural defect* in the operation of this offshore global dollar system – especially following the first recurrence in 2011.

Over the long run, some commenters have proposed regulatory impositions in the wake of 2008 as an explanation for the paradigm shift in global banking therefore shadow money. Dodd-Frank, Basel 3, particularly the Liquidity Coverage Ratio, many have said these have restrained risk-taking behavior and therefore could account for the lackluster nature of the balance sheet expansion which ultimately drives monetary growth in this system.

As before, these are no doubt playing some role in observed bank behavior. Bank demand for safe assets and even liquidity conditions, though, line up far more with market rather than political events. As we find with TIC, the systemic break or paradigm shift also predates those regulatory attempts. The near failure of Bear Stearns as a liquidity matter appears to have been the guiding force setting behavior moving forward.

The mechanism I have identified to explain the patterns in economic, financial, and market data is in some ways as simple as the processes they relate to are complex: an offshore dollar matrix that wasn't sufficiently supported by the creation of bank reserves in the aftermath of an abrupt systemic dislocation which left it susceptible moving forward to sustained periods of uncertain operation and worse. Financial market indicators described above provide real-time gauges of the realized or perceived risks of global financial intermediaries. In those periods, rising liquidity fears explain the implications of lower bond yields, and therefore the basis for not just a strong worldwide demand for safe assets but also the more general economic consequences associated with them.

The policy implications are profound and ultimately beyond the scope of this current study. Obviously, what this suggests may be required is a more complete, detailed picture of the monetary mechanisms currently in the shadows within this private offshore dollar network – just as a starting point.

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