

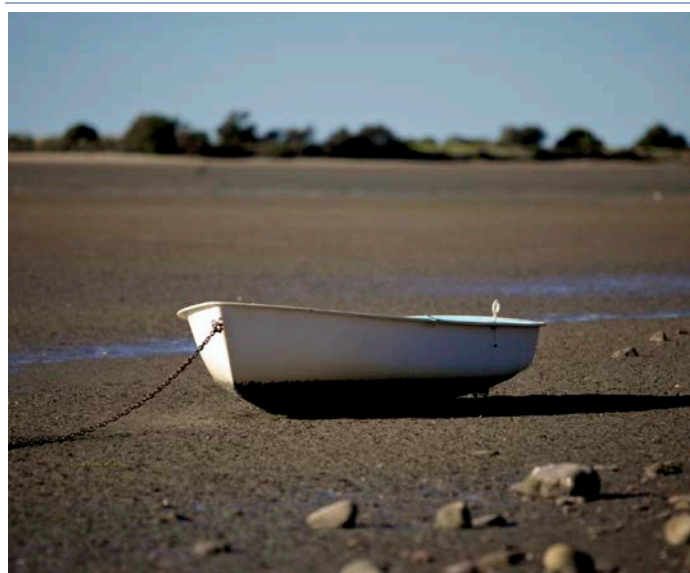
## Top of Mind

August 2, 2015

Issue 37

## A Look at Liquidity

**From the editor:** Discussion about market liquidity seems to be everywhere, and participants from all corners of the market have strong views on this Top of Mind topic. Given our role in the market, we are no exception. We offer our views, alongside many others, on key elements of the debate: if and why there is a market liquidity problem; the vulnerabilities of less liquid markets; and the prospects for unlocking liquidity through electronic platforms, bond standardization, and other means. In the end, there is no shortage of proposals to increase market liquidity; the question is whether they will be sufficient to ensure smooth transfer of risk under all market conditions. We are skeptical: regulations that limit the ability of banks and their clients to quickly step into the markets to minimize price dislocations in times of stress remain a key concern.



Source: www.istockphoto.com

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I don't think there is a liquidity problem...I think there is a plumbing problem. The challenge in the corporate bond market is the current 'principal' market structure that depends on intermediation by sell-side market participants who need a balance sheet to warehouse risk."

Richie Prager



The most problematic [regulations] are non-risk-based rules that inhibit banks from quickly executing low-risk but balance-sheet-intensive trades... in order to help clients in a crisis. Those are the rules that really create the brittleness in the system that has the potential to destabilize the market."

Steve Strongin



I have confidence that there are parties who will step in. I also think you can often find more patience in, for example, retail investors and institutions that are willing to stockpile cash and wait for market turmoil and substantial price dislocations to get involved."

Mary Miller

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# Macro news and views

We provide a brief snapshot on the most important economies for the global markets

## US

### Latest GS proprietary datapoints/major changes in views

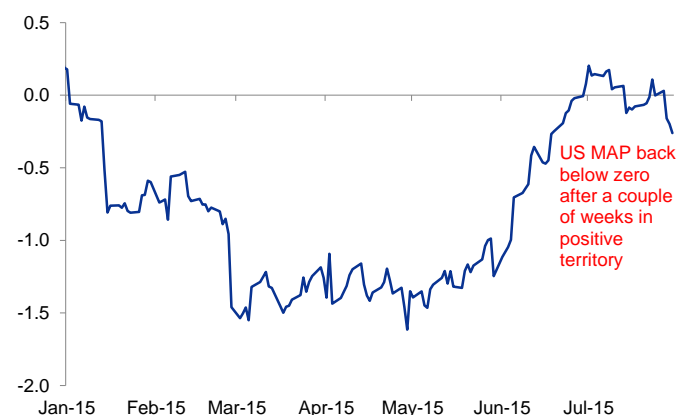
- No major changes in views. The little-changed FOMC statement in July leaves our expectation for Fed liftoff in December intact.

### Datapoints/trends we're focused on

- Soft consumer data, with June retail sales unexpectedly declining and July consumer confidence at a ten-month low.
- Disappointing growth in the 2Q Employment Cost Index, and new information on hourly compensation that lowered our 2Q wage tracker to 2.0% yoy from 2.3% yoy.

### Back in the red

GS US MAP Index of data releases' importance and surprise



Source: Goldman Sachs Global Investment Research.

## Japan

### Latest GS proprietary datapoints/major changes in views

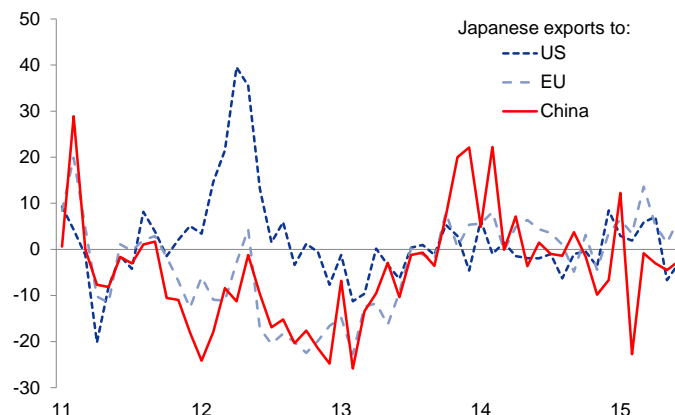
- With preliminary June figures, our CAI for 2Q stands at -2.1%, suggesting a considerable drop in economic activity.

### Datapoints/trends we're focused on

- A pronounced decline in exports to China—one-sixth of Japan's total—since 2014. Exports to the US have generally compensated for the drop but declined in recent months.
- The third consecutive monthly decline in the Tertiary Activity Index (a measure of non-manufacturing industry activity), wiping out over half the recovery since the 2014 VAT hike.

### Ongoing export woes

Japanese export volume, % yoy



Source: MOF.

## Euro Area (EA)

### Latest GS proprietary datapoints/major changes in views

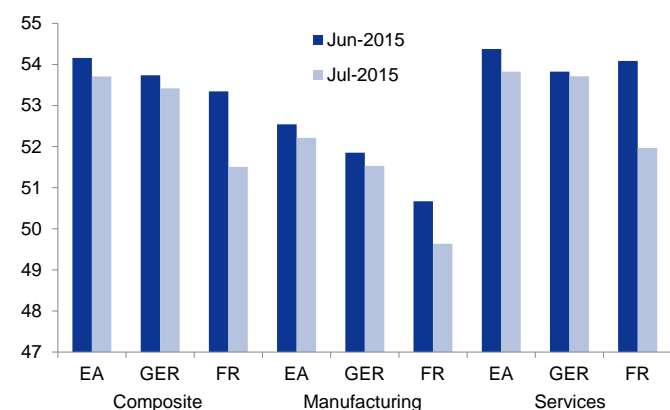
- We lowered our 3Q EA GDP forecast by 0.1 pp to 0.4% qoq due to the slowdown in Greece. This lowered our 2015 EA forecast down 0.1 pp to 1.4%, but only due to rounding, as spillover to economies outside Greece should be modest.

### Datapoints/trends we're focused on

- Weaker-than-expected EA flash PMIs for July, though national business surveys have been more resilient.
- Residual risks to the implementation of Greece's new bailout program, such as uncertainty over the role of the IMF.

### Wrong-way move

Euro area, German, and French PMIs



Source: Markit, Haver Analytics.

## Emerging Markets (EM)

### Latest GS proprietary datapoints/major changes in views

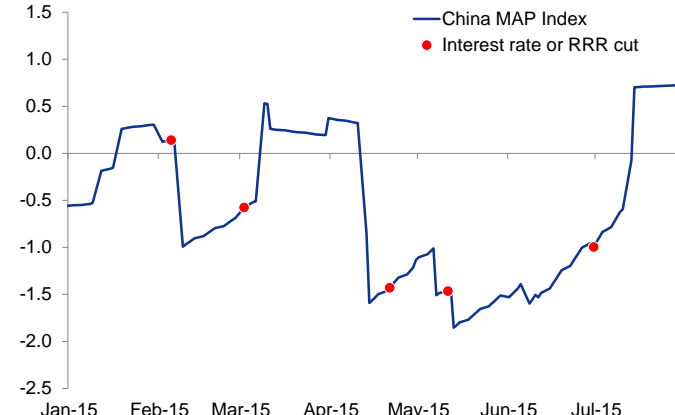
- No major changes in views.

### Datapoints/trends we're focused on

- The fallout from China's recent equity market volatility; we expect effects on the real economy to be fairly small.
- A weak July flash manufacturing PMI for China that has raised uncertainty about the continuation of generally encouraging activity data in June. We expect policy easing to continue until growth shows a more sustained rebound.
- A clearly communicated end to the tightening cycle in Brazil.

### Seeking a sustained pick-up

GS China MAP Index of data releases' importance and surprise



Source: Goldman Sachs Global Investment Research.

# A look at liquidity

Discussion and debate about **market liquidity** seem to be everywhere. Was it too abundant pre-crisis? Is it too scarce now? What are the implications of lower liquidity for markets, economies and financial stability? And what, if anything, should be done to adapt to this new liquidity environment and/or to address liquidity concerns? Participants from all corners of the market have strong views on this undoubtedly Top of Mind topic. And given our role in the market, we are no exception. Here, in Top of Mind fashion, we aim to present our views of the world alongside many others, with the hope of gaining a deeper understanding of the liquidity landscape.

To set the stage, GS co-head of Global Markets Research Charlie Himmelberg and GS Credit Strategist Bridget Bartlett characterize the post-crisis liquidity environment. They observe that lower market liquidity has likely prompted market participants to change their behavior—increasing their time to trade and their desire to hold more liquid assets, for example. But some of these changes have actually complicated documenting the deterioration in liquidity. For instance, increased **agency trading** (which sacrifices immediacy) versus **principal trading** may be resulting in tighter, not wider **bid-ask spreads**. But that should not be mistaken for improved liquidity. Himmelberg and Bartlett also point out that while market liquidity has declined, the demand for it has increased, fueling growth in a new generation of liquidity instruments. In their view, some of these instruments hold promise, but they are not a substitute for liquidity at the individual bond level, which is critical for both market efficiency and financial stability.

What's behind these changes? GS Large-cap Banks Analyst Richard Ramsden asserts that new regulations that have compelled a change in bank behavior have played an important role. While post-crisis financial reforms have reduced the likelihood of another banking-led crisis, he says, they have also limited the amount of liquidity banks can offer clients. (For a guide to bank rules, see page 18, and for a glossary of terms—including those bolded throughout the report—see page 17.) The latest set of **non-risk-based leverage and liquidity rules**, in particular, has reduced banks' propensity and ability to transact in low-return areas such as secured financing, even when these relatively safe trades could dampen unwanted market volatility.

For a deeper dive into the consequences of these shifts, we sit down with Steve Strongin, GS Head of Global Investment Research. He clarifies that prior to the crisis there was too much static leverage—funding and debt buildup—but not too much liquidity. Liquidity is the market's ability to function—to have buyers and sellers transact without causing sharp price moves—so arguing that markets functioned “too well” pre-crisis does not make sense. And non-risk-based rules have left markets functioning less well today. On a normal day, this amounts to slower trade execution and slightly more volatile prices. But it could become much more problematic in periods of market stress, when banks' inability to dynamically expand their balance sheets impedes them—and their clients—from quickly stepping into the market. The likely result is that markets will experience longer and larger **price dislocations** with potential consequences for economic growth and financial

stability. While there are some trade-offs between safety and liquidity, the rules have been implemented in a way that exacerbates these trade-offs.

Do policymakers worry that their efforts to improve bank safety have left the financial markets more brittle? Mary Miller, former Under Secretary for Domestic Finance at the US Treasury who helped coordinate post-crisis financial reforms, argues that the tradeoff Strongin describes need not play out in reality. In her opinion, regulators should work closely with industry to improve and simplify the current rule set. Even in the current framework, however, she is optimistic that new market participants will step in to provide liquidity as banks pull back.

At the heart of the issue, however, is that constraints on banks reduce the **funding liquidity** available for other participants, like hedge funds, to engage in the markets. As NYU Stern School/Copenhagen Business School professor and AQR Partner Lasse Pedersen explains, reductions in funding liquidity and market liquidity can be mutually reinforcing. He points out that in times of market stress, this relationship can sometimes create a downward “liquidity spiral”—think 2007-2008.

Some buy-side participants are also less sanguine about liquidity provision as banks play a smaller role. Ritesh Shah, COO of Global Fixed Income at Citadel Investment Group—the asset manager arm of Citadel—explains that trading in large size in the corporate bond market is increasingly difficult. He asserts that new innovations in terms of **electronic platforms** are helpful, but mostly on the margin; the real issue is less risk capital willing to facilitate transacting in corporate credit markets. In his view, electronic platforms need more than increased participation; they need participants actually willing to contribute to price discovery—and those are in short supply.

But not all market participants agree on the notion of a liquidity problem in the first place. Richie Prager, Global Head of Trading and Liquidity Strategies at BlackRock, points out that there is plenty of capital and risk being put to work in the corporate bond market. The issue, in his opinion, is not with market liquidity but with market “plumbing,” which he describes as a reliance on intermediaries that have seen their ability to transfer risk reduced as the market itself has expanded. Prager's solution: modernizing the plumbing to allow holders of risk to transact directly, as well as innovating with new products—bond ETFs being a standout.

In the end, there is no shortage of proposals to improve the functioning of bond markets; the question is whether they will be sufficient to ensure smooth transfer of risk under all market conditions. We are skeptical, particularly about the expectation for other liquidity providers to quickly step in and minimize price moves. As it stands, there are strains in market liquidity even under normal market conditions, let alone in times of stress.

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# Interview with Steve Strongin

Steve Strongin is head of Goldman Sachs Global Investment Research (GIR). Below, he argues that regulation has left banks significantly safer since the financial crisis but markets more brittle, leaving us more vulnerable to sharp market dislocations and their consequences.



**Allison Nathan: Market participants and policymakers have voiced concern about a post-crisis decline in liquidity. How is this decline showing up in the markets?**

**Steve Strongin:** Not in the way you might expect. The paradox is that in many markets day-to-day volatility is actually lower and **bid-ask spreads**

are tighter. But that is consistent with the core complaint we hear from investors: it isn't that they can't get trades done; it's that they can't get trades done as quickly, in the same size and at the same price as they did historically. For example, one \$10 million trade that historically may have taken a day to get done now needs to be split into 20 \$500,000 trades that take a week or two to execute. From an investor's standpoint, that is very uncomfortable because we live in a 24-hour news cycle so information is flowing much faster, but your ability to execute trades is now much slower. It also means that certain types of investment strategies—such as arbitrage strategies that rely on the ability to quickly identify and act on market dislocations—no longer work nearly as well, if they work at all.

**Allison Nathan: Is reduced liquidity today just the normalization of excessive liquidity before the crisis?**

**Steve Strongin:** No. People talk about liquidity as though it is water in a pond and the question is simply what the height of the water should be. The common but confused answer is that pre-crisis, the water was too deep and people were drowning, and now it is too shallow and they are running aground. The reality is that prior to the crisis, there was too much static leverage—funding and debt buildup—but not too much liquidity. Liquidity is the market's ability to function—to have buyers and sellers transact without causing sharp price moves. So arguing that markets functioned “too well” before the crisis does not make sense. But markets are functioning less well today.

**Allison Nathan: Why aren't markets functioning as well as they could be today?**

**Steve Strongin:** The post-crisis regulatory framework has reduced the willingness and ability of banks to provide liquidity. Higher **capital requirements** and the **Volcker Rule**, which prohibits **proprietary trading** at banks, have made it riskier and more difficult for banks to warehouse risk in a cost-effective manner. And many bank clients are also less willing or less able to take on risk for a number of reasons including the changing market and liquidity landscape; some investors—like the arbitrage investor who was dependent on high levels of leverage—are simply no longer there at all. For those investors that are still willing to take risk, doing so takes longer than in the past because although banks have more capital, they have less immediate **balance sheet** to offer to clients to enable them to execute trades.

**Allison Nathan: Now that banks are better-capitalized and hold a sizable amount of liquid assets, aren't they better positioned to help the market adjust in a crisis?**

**Steve Strongin:** No. Higher capital and balance sheet requirements incentivize banks to aggressively optimize their use of capital and balance sheet. As a result, banks have much less spare capacity. For example, assume a shock induces market participants to sell equities and buy bonds—a typical flight-to-safety trade. A core balancing trade would be for bond owners to sell their bonds, which will have risen in value, and to buy equities, which will have cheapened; they would typically do this through a bank intermediary. But that trade is very **balance-sheet-intensive** for the bank, which bears the risk of both trades until they clear. In reality, the risk associated with this trade is relatively low. But balance sheet constraints count this very safe client transaction—buying Treasuries—in exactly the same way as riskier transactions in equities or corporate bonds. Before the crisis, banks would have dynamically expanded their balance sheets to accommodate these trades; today they would quickly hit regulatory constraints in doing so. As a result, participants must now conduct the same transaction in a less balance-sheet-intensive way by selling the first asset, waiting for the proceeds, and only then buying the second asset. The result is that balancing trades take longer to execute, prolonging the market dislocation. And the longer the market dislocation persists, the larger the **price dislocation**.

**Allison Nathan: Is there any one regulation that is particularly problematic?**

**Steve Strongin:** Unquestionably, the problem is the combination of regulations. But the most problematic are **non-risk-based rules** that inhibit banks from quickly executing low-risk but balance-sheet-intensive trades—even on a short-term basis—in order to help clients in a crisis. Those are the rules that really create the brittleness in the system that has the potential to destabilize the market.

**Allison Nathan: Won't other participants—i.e., hedge funds and independent broker-dealers—step in if banks can't?**

**Steve Strongin:** Not necessarily. If a bank is subject to a rule, its clients can become indirectly subject to the same rule. This is because client access to banks' balance sheets is now more limited and expensive as banks charge clients more for use of this scarce resource. So hedge funds and independent **broker-dealers** don't rent more balance sheet—i.e., obtain bank financing or establish lines of credit—than they need to conduct their daily business. And they can no longer rent balance sheet from a bank on demand in order to **be the bid** in a dislocated market. So their ability to step in during a stress event is significantly reduced relative to history. Regulators probably intended this to ensure that banks were not enabling a transfer of outsize risk to shadow banking areas. But very few market participants are able to hold cash outright to wait for a



dislocation. So if banks can't expand their balance sheet to provide leverage, the shadow banking system can't make the bid in a period of stress.

**Allison Nathan: What about asset managers? Given their growth, are they in a better position to step in?**

**Steve Strongin:** No. Asset managers manage a constant pool of assets against a constant leverage. They have no ability to expand their balance sheets in order to provide a bid in a stressed market. In order for them to be the bid, they have to be holding much higher cash balances, which is expensive and weighs on their performance relative to their benchmarks. Expecting an asset manager to use its cash balances to buy other people's stressed assets—especially when it is likely to be facing redemptions—is not realistic. And, if anything, the increased size of asset managers in recent years has put them in a position to demand more liquidity, not to provide it.

**Allison Nathan: Some have argued that today's liquidity problem is really rooted in the markets' reliance on bank intermediaries to warehouse risk, and that changing the market structure to enable buyers and sellers to efficiently transact directly—for example, via electronic platforms—is the solution. What is your response?**

**Steve Strongin:** Platforms that directly match buyers and sellers can work in balanced markets, but they tend to only solve the problem by increasing the time to trade. As I mentioned earlier, in lit pools buyers and sellers are generally forced to break up large blocks of risk into smaller pieces and trade over a longer period; in **dark pools**, large orders hang around hidden until they accumulate the necessary match to clear the trade. The increase in time to trade depends critically on frequency of trading. In markets where trades are frequent and pricing is thus transparent, the increase in time to trade is relatively small; in less frequently traded securities—where price discovery is much more challenging without an intermediary—the increase can quickly become extreme, making matching platforms ineffective.

But the largest problems are likely to arise when markets are not balanced and under significant net selling pressure, and new participants must enter the market to bring new capital and help bring prices back into equilibrium. These new participants often have the capital but not the immediately available funds to buy the distressed assets, which brings us back to the need for a dynamic bank balance sheet that lets banks provide short-term funding and enables other buyers to step in. Establishing a platform that would bring imbalanced markets back to equilibrium without the help of an intermediary is still a challenge for the industry that is far from being solved.

**Allison Nathan: Has post-crisis regulation left us more or less vulnerable to a financial crisis today?**

**Steve Strongin:** It has changed the type of financial crisis we are vulnerable to. On the one hand, we are much less vulnerable to a banking crisis similar to 2008. Banks are safer today owing to risk-based rules; banks now have stronger capital, greater transparency, more stable funding, rigorous stress-testing, and capital structures that put debt investors at risk if the bank fails—not taxpayers or the bank's depositors and clients. And given that the rules are designed to steer fresh

capital to the operating companies if they come under stress, it is hard to come up with a scenario in which a systemically important operating company fails. This all means that the biggest US banks are in a position to weather crises much larger than the Great Depression or 2008. We simply don't have an historical example that would endanger banks today.

On the other hand, we are substantially more vulnerable to market failures in which markets cease to function effectively, possibly similar to what happened in the equity market in 1987—Black Monday—when we saw a 23% price move in equities. With less liquidity available for any imbalance, prices will need to adjust more in order to induce market participants to step in and assets to flow. And this adjustment is likely to be non-linear—as the size of the imbalance grows, the price dislocations will grow more extreme and prices will take longer to normalize. This could force much larger price dislocations than we have seen in the past, and in markets, such as corporate credit and even sovereign debt markets, where we have not seen these types of price dislocations historically.

**Allison Nathan: What impact would this type of crisis have on the real economy?**

**Steve Strongin:** We don't know. We've never seen very large dislocations in anything but the equity markets, and the impact of those dislocations was typically muted by aggressive Federal Reserve action. Today, it is much less certain how the Federal Reserve could act; the banking system is already awash with central bank liquidity, so the ultimate policy response is unclear and could be politically difficult; the Fed might have to buy the distressed assets directly and/or other parts of the government might need to step in. It is also unclear how people would react if they woke up one day and their bond portfolio had moved 10-20%, which would have major implications not only for their own wealth, but for insurance payouts, pension funding, and other functions in the economy. A widespread loss of faith in the markets from large price moves without obvious catalysts can have long-term implications for investor confidence and financial stability.

**Allison Nathan: What would you advise policymakers and regulators do to address these liquidity issues?**

**Steve Strongin:** I would advise at least three responses. First, policymakers and regulators need to assess the aggregate impact of the new rules and regulations that are impairing the ability to trade on a normal day; if market participants are not comfortable trading on a normal day, they are very unlikely to trade on an abnormal day when the market needs their liquidity the most. Second, they need to make sure the rules allow for more flexibility in the use of bank balance sheets; the goal should not be to enable more static leverage, but to allow short-term, dynamic balance sheet expansion so that banks are better able to execute lower-risk but balance-sheet-intensive trades, especially when those trades can help dampen market shocks. Third, they should recognize the significant improvement in bank resiliency arising from new capital and pending **total loss-absorbing capital (TLAC)** rules and thus be more willing to adjust other rules, such as the **supplementary leverage ratio (SLR)**, that have only added limited incremental safety but have created significant rigidities in how banks can respond to client needs during periods of stress.

# Why market liquidity has deteriorated

Charlie Himmelberg and Bridget Bartlett assesses the evidence for lower liquidity in the corporate bond markets

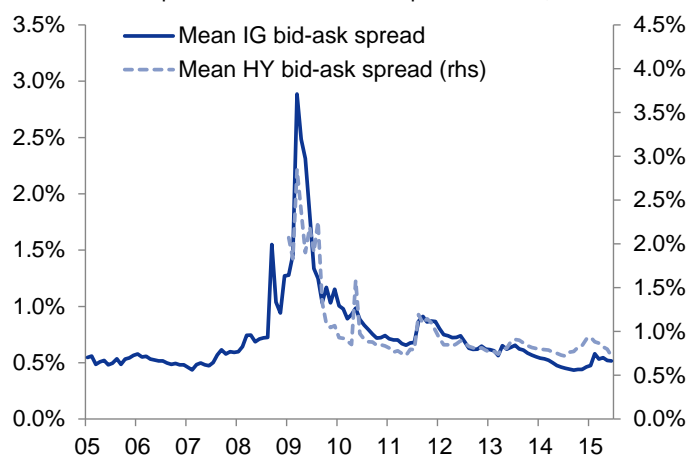
Investors increasingly agree that trading liquidity (or **market liquidity**) in the corporate bond market "ain't what it used to be." By market liquidity we mean the extent to which investors can execute a fixed trade size within a fixed period of time without moving the price against the trade (which should not be confused with monetary liquidity, access to short-term funding, or liquid assets held on company balance sheets). New macro liquidity products are growing to fill the demand-supply imbalance for liquidity. But restoring financial market efficiency requires more progress on bond-level liquidity.

## Liquidity supply has declined (but that's not easily measured)

Documenting the decline in market liquidity is surprisingly difficult, but there are good reasons for this. For one, market liquidity, like credit availability, tends to be readily supplied at times when it's needed least, as opposed to when it's needed most. When market conditions are tranquil and events do not force investors to trade, it is difficult to measure the extent to which market liquidity would dry up under more volatile conditions. Under such conditions, investors can also adapt to the lower market liquidity by sacrificing immediacy, holding more liquid assets, or switching from active to more passive management strategies. Since these effectively reduce the demand for market liquidity, they may cause common metrics to understate declines in market liquidity.

## Normal bid-asks don't mean normal liquidity

Mean bid-ask spreads for IG and HY corporate bonds, %



Source: iBoxx, Goldman Sachs Global Investment Research.

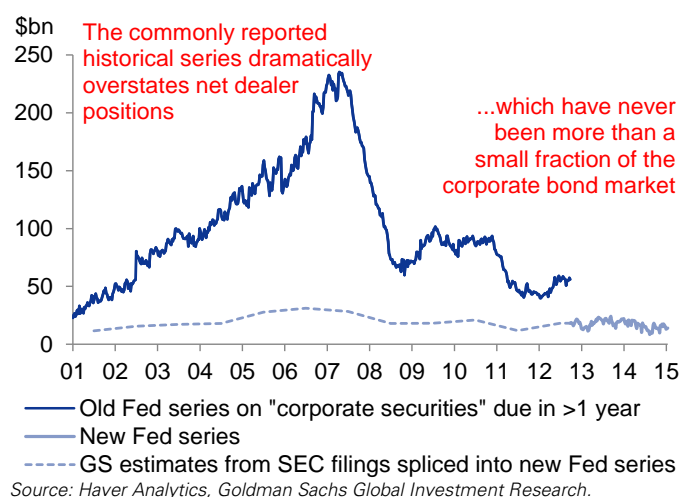
For example, **bid-ask spreads** for corporate bonds have narrowed materially over the post-crisis period. While this appears to show improving market liquidity, we think it more likely reflects a substitution away from trades executed on a **principal** basis in favor of trades executed on an **agency** basis. In a principal trade, **dealers** offer immediate execution by purchasing the bond, for which they require a wider bid-ask spread as compensation for bearing the mark-to-market risk while searching for buyers in the market. In an agency trade, by contrast, investors sacrifice immediacy and delay the trade until the **broker-dealer** has found the other side of the market.

Since the **market maker** bears no risk, the bid-ask spread is lower to reflect only the service of finding the buyers. This is indeed what we suspect has been happening, in which case it is even fair to say that falling bid-ask spreads are a sign that liquidity has gotten worse, not better.

Measures of "price impact," which is the price concession required to move a block of risk, encounter their own empirical issues. Unlike bid-ask spreads, this measure conveys depth and thus comes closer to reflecting liquidity conditions experienced by traders. In previous work we have estimated price impact measures by regressing weekly bond returns on weekly mutual fund flows, holding constant other spread drivers. Consistent with intuition, we find that price impact is higher for illiquid assets (like HY bonds), and higher still during periods of market duress. But we also find that HY market liquidity has been relatively stable in recent years, contrary to the experience of many investors. Again, we suspect this could reflect adaptive behavior of fund managers.

## The overstated drop in dealer inventories

Primary dealer inventories of corporate bonds, \$bn



Source: Haver Analytics, Goldman Sachs Global Investment Research.

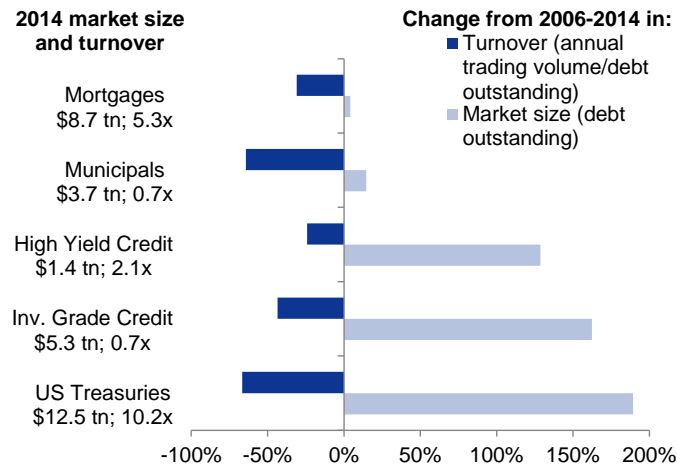
The decline in net dealer inventories of corporate bonds is yet another fact that is sometimes used to argue that market liquidity has fallen. This evidence matches the investor claims of lower liquidity, but we're skeptical. For one, as we have noted elsewhere, this data series overstates pre-crisis inventories because it improperly includes non-agency MBS ("Revised survey of primary dealers sheds new light on inventories," *The Credit Line*, April 18, 2013). But even if the historical data didn't suffer from this flaw, we would still be skeptical that *net aggregate* inventories reveal very much about the supply of market liquidity for individual bonds.

What matters more for the *depth* of market liquidity, we think, is the size of the *gross single-name* positions that dealers have capacity to acquire. Anything that makes single-name risk more expensive to hedge and hold will reduce the gross size of the position the market maker can acquire, and thus reduce depth of the offered market. It is here, we suspect, that "micro" factors such as the decline of single-name hedging instruments (**CDS**), the loss of capital relief from hedges (under **Basel** rules), the increased capital costs of carrying risk (Basel and stress tests), post-trade transparency (TRACE plus technological developments) and tighter limits on the choice of offsetting single-name positions the market-maker can enter

into (under the **Volcker Rule**) have cumulatively combined to reduce dealer capacity for committing risk on a principal basis. As the saying goes, dealers are in the moving business, not the storage business. But to match buyers and sellers across time, the moving business requires not just risk capital but also the tools to manage risk. In the context of the moving company metaphor, it is not just the cost of warehouses but also the cost of trucking that has risen.

**Some compelling evidence**

Change in market size and turnover by asset class, 2006-2014



Source: SIFMA, FINRA TRACE, Goldman Sachs Global Investment Research.

One simple piece of evidence we do find convincing is the decline of trading volumes relative to the size of the overall market (or trading **turnover**). Of course, lower market liquidity is not the only possible explanation for this. For example, changes in trading volume can also reflect changes in the volatility of fundamentals. But given the extent and frequency of liquidity concerns in our conversations with investors, our view is that higher trading costs are a large part of the reason why trading volumes have fallen.

**The rise to new (macro) liquidity instruments is only a partial solution**

At the same time that supply of credit market liquidity has fallen, demand for credit market liquidity has arguably risen. This reflects both behavioral changes (i.e., a fear that the illiquidity shock of the last crisis might repeat) and institutional changes (i.e., the shortening of hedge fund lock-up periods in response to demand from investors). And at 24% of the corporate bond market, open-end mutual funds are today a larger-than-ever fraction of the ownership base. Many investors worry this has increased the risk of sustained liquidity demands on the market to meet retail outflows.

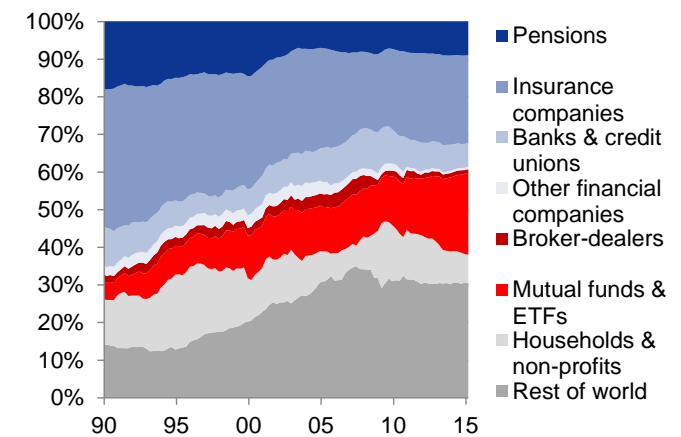
This liquidity supply-demand imbalance is fueling growth in a new generation of "liquidity instruments." Specifically, while the single-name CDS market has been shrinking—a problem that faster regulatory action on the implementation of new trading platforms could help reverse—market size and trading activity have grown for products such as HY **ETFs**, synthetic CDS indices (which are now centrally cleared, in contrast to single-name CDS), options on CDS indices, and total return swaps.

We find the growth of fixed income ETFs particularly interesting, in part because it has been accompanied by so much controversy over their impact on market liquidity and volatility. We are sympathetic to the possibility that ETFs will

create more liquidity than they demand. While the creation of liquid instruments on less liquid underliers strikes some observers as dubious, corporate capital structures do this routinely by creating liquid equity claims on top of the firm's substantially less liquid stock of plants, property, equipment, inventories, etc. By concentrating a critical mass of the market's supply and demand for aggregate credit risk on a common portfolio of bonds, we think ETFs can play an important role in helping to grow market liquidity ("**For HY ETFs, volatility trends for basis and fund flows imply maturing market structure,**" *Global Markets Daily*, July 20, 2015).

**Changing hands**

Share of corporate bond ownership by investor type, %



Note: Includes US-owned foreign bonds, private MBS, and other ABS. Source: Federal Reserve Board, Goldman Sachs Global Investment Research.

**Capital market efficiency requires better bond-level liquidity solutions**

The restoration of market liquidity requires more than "macro" solutions, however. The growth of macro liquidity products cannot do much to improve liquidity and price discovery at the individual bond level. Without improvements in single-name liquidity, the feasibility of active portfolio management and hence market efficiency will necessarily suffer. Just as the "plumbing" of money markets was taken for granted in the run-up to the last financial crisis by regulators and market participants alike, we worry that market liquidity (like money market stability) is easily overlooked and will be taken for granted until it goes missing.

The experience of the global financial crisis—during which collapsing market liquidity amplified price declines, accelerating the negative feedback loop between price declines, leverage constraints, and forced sales—reminds us just how critical market liquidity is to financial stability. Post-crisis financial reforms have dramatically reduced the economy's vulnerability to systemic risk. But only recently have market participants and regulators begun to recognize the unintended consequences this may have had for market liquidity. Given the central importance of market liquidity for both market efficiency and financial stability, we think it warrants urgent focus from industry, academic, and policy researchers.

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# Interview with Richard (Richie) Prager

Richie Prager is Head of Global Trading and Liquidity Strategies at BlackRock. Below, he argues that the markets are not experiencing a liquidity problem but rather a “plumbing” problem that can be addressed with more all-to-all platforms, more electronic trading protocols, more benchmark issues and changes in behavior of all participants.

*The views stated herein are those of the interviewee and do not necessarily reflect those of Goldman Sachs.*



**Allison Nathan: Is there a liquidity problem in the corporate bond markets?**

**Richie Prager:** We first need to define liquidity. **Market liquidity** in this context is the ability to buy and sell an underlying security at a price without unduly disrupting the market. I don't think there is a *liquidity* problem in terms of buyers and sellers; I think

there is a *plumbing* problem. The challenge in the corporate bond market is the current “principal” market structure that depends on intermediation by sell-side market participants who need a balance sheet to warehouse risk. We need to modernize the market plumbing to allow holders of risk to transact directly, whether buy-side or sell-side.

**Allison Nathan: Why does the current market plumbing pose a problem?**

**Richie Prager:** The bank environment has changed dramatically since the crisis. Banks have changed their business models owing to regulations and other external factors. Most people on the sell side would say that banks' **market-making** capability actually has not changed that much, depending on the firm; **proprietary trading** activities have declined. But banks' ability to intermediate and hold risk on a temporary basis is challenged. At the same time, the corporate bond market has grown substantially, roughly doubling in size since the crisis. So there is more capital and risk being put to work, but the ability to intermediate risk in the current market structure is not keeping pace with that growth.

**Allison Nathan: Other market players cite these same changes, and their impact on business activity, precisely as a liquidity problem. Why the difference in terminology?**

**Richie Prager:** Again, this goes back to our definitional challenge. While some—like us—are focused on improving the market structure, others are talking about different issues and an assortment of hypothetical notions, resulting in a fair amount of confusion. We think that in order to find appropriate solutions, we need to be precise in defining the issues—and we need to do so with an appropriate tone. While we think market plumbing needs to be modernized, this should not be viewed as a “crisis.”

**Allison Nathan: How do you modernize the plumbing?**

**Richie Prager:** There are four dimensions that we need to work on, which we highlighted in our July *ViewPoint* piece: more **all-to-all platforms**, more electronic trading protocols, more benchmark issues, and changes in behavior of all participants. The change of behavior is the hardest one to achieve. The **buy side** needs to become more comfortable

being a price maker—expressing a price at which they are willing to buy a security, which adds liquidity—as opposed to being a price taker, which drains liquidity. The **issuers** need to take more responsibility in creating an orderly bond market and consider what will happen if rates rise, market activity slows and markets become more volatile: their issuance will become more expensive, and they must be prepared. **Regulators** also need to help foster solutions. They have been highly prescriptive on how the swaps market should trade and be cleared, yet they have been silent on how the fixed income markets should be modernized. More specifically, there are some actions that regulators could take to facilitate more market making—for example, altering post-trade reporting so that participants do not necessarily have to worry about information leakage. So there is no silver bullet here. It will take effort along each of those dimensions to progress. And virtually every actor needs to help push this along. We are quite confident that the market will ultimately modernize, like it always does. But without leadership to get us there it will take longer, and the longer we focus on the past—i.e., attempting to roll back rules and regulations—the longer it will take.

**Allison Nathan: What do you envision in terms of new all-to-all platforms and protocols?**

**Richie Prager:** If you look at the current spectrum of execution protocols, on one extreme is request for quote (RFQ), which is basically an electronic phone call that solicits bids for a security on offer. RFQ is the principal protocol for fixed income trades today but is generally dependent on an intermediary to transfer the risk. The other extreme is a **central limit order book (CLOB)**, which is the principal protocol for standardized products such as equity or futures. An order book requires not only a standardized product but also enough buyers and sellers interested in that same product to be successful. Clearly, we need something between these two extremes. We need to establish new all-to-all venues, whether they be **electronic communication networks (ECN)**, **alternative trading systems (ATS)** or exchanges where multiple buyers and sellers can congregate and use various protocols to transact numerous products in varying size.

**Allison Nathan: What has been holding the industry back from developing new trading venues and protocols?**

**Richie Prager:** Behavior—that's the concise answer. But we are generally making progress. For example, two years ago BlackRock and MarketAxess launched an open trading protocol for corporate bonds that allows multiple buyers and sellers to come together and trade in a different way than RFQ. Two years ago, 0% of MarketAxess transactions were done in that format. That share rose to 2% as of one year ago and about 10% as of the last earnings call, reflecting growing acceptance.



**Allison Nathan: How do new trading platforms dovetail with your views on corporate bond standardization?**

**Richie Prager:** I am under no illusion that the market is going to standardize tomorrow or that every bond issuer will have just one bond outstanding. But some of the largest issuers today have upwards of two thousand outstanding bonds, many of which rarely trade. If some of the frequent borrowers were to standardize their issues or undertake more benchmark issues—issues of a certain minimum size—I think this would attract more market makers, including the electronic market-making community, which would further enhance liquidity.

**Allison Nathan: Since future funding conditions are never certain, wouldn't concentrating large bond issues in fewer maturities expose corporates to greater risk?**

**Richie Prager:** Not in our assessment. The data speaks for itself. If you look at the number of outstanding bonds for the top ten issuers that are liquid enough to be included in the index, it is typically a very small percentage of the total, yet those bonds account for a very material amount of the issuers' total debt. Effectively, these issuers only need a couple hundred bonds to have the equivalent amount of debt outstanding. Those couple hundred bonds would trade more easily because they would be larger in size and would attract more interest. And they would be more than enough to manage the issuer's liability structure in a responsible and flexible way.

**Allison Nathan: As part of the solution, BlackRock has also been focused on adoption of new products. What role should bond ETFs play in improving liquidity?**

**Richie Prager:** We are a strong believer that the classic bond buyer today has three arrows in their quiver: cash bonds, derivatives, and now **ETFs**. The growth in the fixed income ETF market in 2015 has been quite stunning, precisely in response to this plumbing issue. Bond managers have realized that there is a fixed income market that is liquid, transparent, and proven to have volumes that rise in times of stress—the ETF market.

**Allison Nathan: What is your response to concerns about the liquidity of some securities underlying bond ETFs not always being very robust?**

**Richie Prager:** These concerns reflect a lack of education about how the product works. Fixed income ETFs are a hybrid between a closed-end fund—which has a fixed number of units that trade at a premium or discount based on supply and demand—and an open-end fund—which can create new units and trades effectively once a day at the net asset value (NAV). Fixed income ETFs normalize an outstanding number of shares based on supply and demand so that when demand exceeds supply, more shares are created to sell into that demand, as opposed to a closed-end fund where the price would rise. Conversely, if supply exceeds demand, the ETF wrapper is unzipped and underlying securities are delivered to the market, thereby reducing the number of ETF shares. Given these mechanics, even in an extreme scenario, you could unzip the wrapper and be left owning bonds. You are never going to be worse off than the underlying market, and in virtually every other scenario you are better off given that ETFs are much easier and cheaper to trade. An ETF is just an elegant wrapper, so if investors are happy to hold the underlying securities, they

should be happy to hold the ETF. With improved understanding of the product, I see ETFs as a part of the solution to the plumbing challenges of the underlying bond market.

**Allison Nathan: Questions have also been raised about fund redemption risk in the current liquidity environment. Are you thinking about redemption risk differently today?**

**Richie Prager:** Liquidity risk management has always been a core part of the risk management practices of our firm, dating back to its founding in 1988. And if there is a product that is subject to redemptions in an open-end mutual fund, the portfolio managers will manage it accordingly. So that is nothing new. But we do think that a “toolkit” of product enhancements and other measures could be undertaken and endorsed by product sponsors and regulators to address periodic liquidity challenges and minimize redemption risk. For example, mutual funds based in the European Union (i.e., UCITS) employ a function called swing pricing; rather than having investors buy and sell at the end-of-day NAV, with transaction costs spread across the remaining holders in the fund, swing pricing recognizes the asymmetry in demand or redemption of a fund on the day and will move the NAV accordingly to externalize the transaction costs to the party looking to exit or enter the fund. That basically removes any sort of first-mover advantage and allocates the cost appropriately. (A footnote: ETFs are structured to externalize transaction costs.) And there are numerous other tools that could greatly minimize redemption risk: short-term borrowing facilities to meet redemption demand if necessary; “out-of-the-money” redemption gates that would temporarily limit or suspend redemptions in extraordinary circumstances; enhanced disclosure of liquidity risk associated with a particular fund; and standardized stress testing, to name a few.

That being said, there is no evidence that “mass redemptions” of non-money market mutual funds have ever occurred historically. A deeper understanding of the actual investors—whether they be 401(k) participants who actually don't rebalance their portfolios very often or insurance companies that hold fixed income assets because they have to—reveals that some of these redemption risks are not nearly as great as people think they could be.

**Allison Nathan: Redemption risk aside, are financial markets less at risk of a crisis than they were before 2008?**

**Richie Prager:** We don't see a crisis today or in the works; we see a change in the way markets behave, which may entail discontinuous pricing and greater volatility that reflect bad plumbing. As I said, I think some of these concerns about a potential crisis reflect a lack of understanding of asset owners and their behavior. That is not to say a market disruption is not feasible. But we don't see a pain point that is going to cause a “crisis.” In fact, the largest market disruptions in the last year have owed more to policy actions than anything else, with the Swiss National Bank's decision to unexpectedly de-peg its currency probably the best example. Regulators themselves have become such dominant players in the markets that their actions, rather than something structural in the system, may very well be the catalyst for the next disruption. But even here we need to distinguish between the possibility of investor losses and genuine systemic risk.

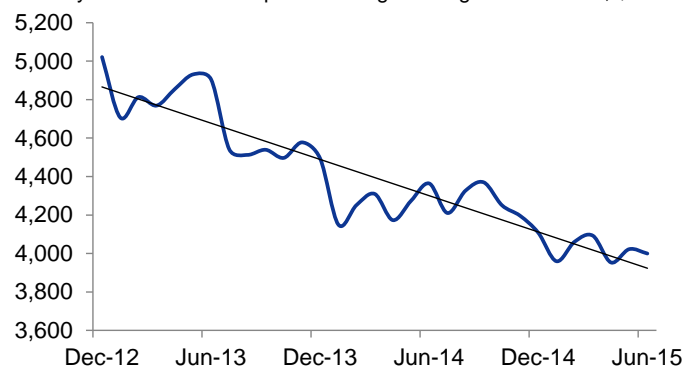
# Regs, bank business models and liquidity

## Richard Ramsden explains how regulation has changed bank business models and reduced market liquidity in the process

New regulations have forced banks to adjust their businesses in numerous ways. These changes have substantially reduced the likelihood of another banking-led crisis, but they have also limited the amount of liquidity banks can offer clients. The impact of these adjustments appears to be accelerating as the focus of regulation shifts from **bank capital** to leverage and liquidity. In turn, this has both reduced the size and increased the cost of **banks' balance sheets**—limiting banks' capacity to lend or take on inventory, and making these core activities more expensive. These bank limitations and the resulting decline in **market liquidity** have had limited consequences thus far, but that could change as market volatility increases the demand for bank balance sheets.

### Languishing liquidity in key financing markets

Primary dealer reverse repo financing of US gov. securities, \$bn



Source: SIFMA, Goldman Sachs Global Investment Research.

### Unintended consequences of bank regulation

In the aftermath of the financial crisis, US lawmakers and regulators set out to make the financial system safer by ensuring that banks would remain solvent and liquid in periods of stress. The result was the **Dodd-Frank Act** and **Basel 3** rules, which prohibited banks from certain **proprietary trading** activities, more than doubled capital and liquidity requirements, with additional capital surcharges for the largest banks, and required banks to undergo an annual **stress test by the Fed**.

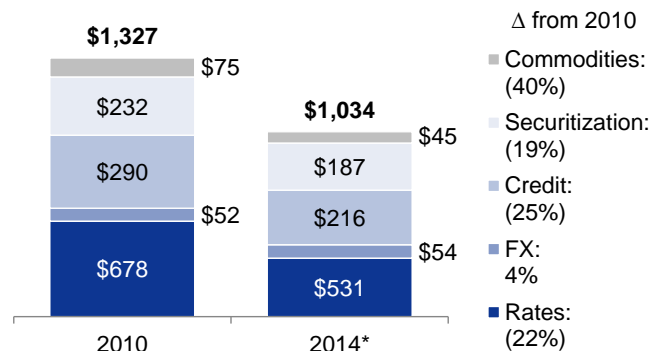
Initially, regulators were focused on ensuring there was enough capital in the system to reflect the amount of risk banks were taking. Recently, this focus has shifted to leverage rules that aim to ensure banks' capital adequately reflects their balance sheet size and systemic importance, regardless of how risky their assets are. This has created two unintended impacts.

First, the new constraints on leverage are forcing banks to charge clients more to use their balance sheet when they facilitate trades or provide financing. Historically, banks were willing to provide these services cheaply; the opposite is true today. Bank regulation is thus feeding through to clients' market participation—contributing, for example, to lower leverage at macro hedge funds. Second, banks are pulling back from lower return on asset (ROA) businesses, as the capital required under leverage rules is the same regardless of the

assets' risk profile, reducing banks' propensity to transact in low-risk areas such as secured financing.

### Collapse in capital committed to trading

Fixed income trading assets for top US banks, \$bn



\*Avg. of first three quarters. Source: Regulatory filings, Goldman Sachs Global Investment Research.

These changes are not occurring on a blank slate, but rather on a backdrop of ongoing cutbacks in bank activity due in large part to regulation. Banks are committing less capital to trading desks with fixed income assets down 22% since 2010, and have exited some businesses altogether; for example, JPM and MS no longer make markets in physical commodities while DB has exited single-name **CDS**. European banks have also pulled back because of their own capital constraints and new US rules that make it more expensive for foreign banks to operate.

Lastly, banks have been less willing to provide corporates unfunded lines of credit (which banks must assume will be drawn down under the stress test). These lines had been a key source of support historically, providing corporates with \$60bn of liquidity during the peak two months of the financial crisis.

### Market impacts manageable so far

The cumulative effect of banks' adjustment to new regulation has manifested itself in at least three ways: 1) A smaller short-term financing market; the **repo** market is down 20% since 2010 as banks pull back from Treasury repo, a lower ROA business; 2) relatedly, acute market stress during quarter end as financing becomes unavailable and repo pricing surges; and 3) lower market liquidity, especially in the corporate and even sovereign bond market, raising concerns about potential dislocations under stress.

### But could grow

We see risks that more changes in bank behavior could increase market impacts. Banks are still adapting to the final rule set, and this year's stress test will incorporate the supplementary leverage ratio (a more onerous leverage requirement) for the first time. Additionally, almost all banks are still struggling to produce returns on equity in-line with the higher cost of capital they face as a result of regulation—we estimate ROAs need to be 50bp today vs 20bp pre-crisis—likely forcing continued restructuring. The combined impact of these changes could result in a continued decline in short-term financing and wider **bid-ask spreads** across many markets.

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# Interview with Ritesh Shah

Ritesh Shah is the Chief Operating Officer of Global Credit on the asset management side of Citadel. Below, he describes the dynamics asset managers observe when sourcing liquidity in the corporate bond and single-name CDS markets in the post-crisis environment.

*The views stated herein are those of the interviewee and do not necessarily reflect those of Goldman Sachs.*



**Allison Nathan: How has liquidity shifted post-crisis, and how has this changed the way you do business?**

**Ritesh Shah:** First, trading in large size in the corporate bond market is increasingly difficult. Second, there are fewer liquid instruments; we need to have confidence in our ability to exit a position, and the list of corporate

bonds and **CDS** where that is the case seems to shrink by the day. So our potential investing universe has shrunk. We also have a higher return threshold for less liquid securities, which means changing our price targets for trades that may face liquidity issues. More broadly, given the higher transaction costs resulting from these shifts, we have moved towards more fundamental-based, longer-duration investing as opposed to model-based, shorter-term investing; our strategies as well as our personnel reflect that new reality.

**Allison Nathan: Has it been more difficult for you to obtain funding given constraints on banks' activity?**

**Ritesh Shah:** Funding is a bit more challenged, but the larger hindrance on our ability to execute our strategies has been difficulty in transacting as opposed to funding.

**Allison Nathan: What is driving these changes in liquidity?**

**Ritesh Shah:** In single-name CDS markets, it is undoubtedly the lack of regulatory clarity or a clearing mandate from the SEC for single-name CDS that has left the marketplace in limbo. New entrants are put off by the uncertainty, as well as the huge setup costs with individual counterparties in the absence of **centralized clearing**. In contrast, the CFTC has been proactive in establishing rules for index CDS to open up the market and clear the product. We are able to transact on small or large scale in index CDS at reasonable bid-offer terms, which is a great case study in how regulation can be helpful.

On the corporate bond side, less risk capital deployed to trading businesses has induced our **dealer** counterparties to transact increasingly as **agents** as opposed to **principals**, limiting their ability to trade in size. Contrary to the often repeated narrative that behavior is driven solely by regulatory changes, macro factors have also impacted liquidity. Low interest rates have prompted a massive amount of corporate new issuance, which has led market size to eclipse market turnover. Industry consolidation is also mentioned in this context, but I have seen that ebb and flow too much over time to consider it a large factor.

**Allison Nathan: How can these problems be addressed?**

**Ritesh Shah:** In the CDS market, first and foremost, participants need to start clearing single-name CDS of their own volition in the absence of a regulatory mandate, which we believe will happen later in 2015. Second, moving from

quarterly rolls to semi-annual rolls will be marginally helpful in concentrating liquidity and in reducing roll costs. Third, the methodology for CDS index inclusion should be improved to promote newer names entering the marketplace, which would also make the index more representative of the current market. To illustrate the problem we have today, when the energy markets turned down late last year, the high yield CDS index didn't react in the same way that the high yield corporate bond market did, precisely because representation of energy in the former was much smaller than in the latter.

**Allison Nathan: What about standardization of corporate bond issuance?**

**Ritesh Shah:** Having fewer, larger bonds is a great idea from the investor's point of view. However, corporate CFOs will have to decide whether an increase in liquidity is worth concentrating their refinancing risk. If your large bond issue happens to mature at a time when there is less liquidity on offer, you put yourself in a very difficult position.

**Allison Nathan: How helpful are electronic platforms? Are they creating more liquidity or just moving liquidity around?**

**Ritesh Shah:** The electronic marketplace has not yet appreciably changed the liquidity environment for corporate bonds. Some platforms have just provided electronic versions of liquidity that is already available by other means. And there is still no platform on which we can execute large block trades, which is what we are really missing. That said, some of the newer platforms are actually adding liquidity, albeit through niche approaches and in small size. For example, one new platform shows executable prices on a continuous basis on a large swath of corporate bonds, which is a large improvement upon the indicative pricing runs we typically receive. And another offers short trading sessions for specific bonds that effectively create greater point-in-time liquidity. None of these platforms are universal solutions by themselves, but they are steps in the right direction, and we do find ourselves using them more. However, even as these platforms evolve, we still find substantial value in conversations with the dealer desks to better understand the market and credit technicals. It is not purely an execution process in credit, so this connectivity remains important.

**Allison Nathan: What is holding electronic platforms back from offering more supplemental liquidity?**

**Ritesh Shah:** The real issue is that there is less risk capital to facilitate corporate credit markets. No matter how many participants electronic platforms attract, if those participants are not contributing to the price discovery process, they are not going to solve the problem. In addition, we need capital willing to intermediate between buyers and sellers of corporate credit, whether it comes from alternative liquidity providers or from renewed risk appetite from dealers.



# Interview with Mary John Miller

Mary John Miller served in the US Treasury Department from 2010-2014, most recently as the Under Secretary for Domestic Finance where she was responsible for Treasury policies in the areas of financial institutions, federal debt financing, financial regulation, and capital markets. Previously, she served as Assistant Secretary of the Treasury for Financial Markets. Prior to joining the Treasury, she spent 26 years at T. Rowe Price, where she was Director of Fixed Income and a member of the firm's Management Committee. Here, she expresses optimism that financial regulation should leave banks and markets more resilient in periods of stress.

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**Allison Nathan: In the wake of post-crisis financial regulation, market participants and policymakers have voiced concern about a decline in liquidity—or about “illusory” liquidity that quickly disappears. Do you share these concerns?**

**Mary Miller:** I do share these concerns but I don't think they are all related to financial regulation. For example, people often talk about illusory liquidity in the equity market associated with high frequency trading (HFT). But HFT developed long before the financial crisis, and I would not want to confuse high-volume trading with liquidity. Similarly, we have seen substantial growth in certain **ETFs**, which offer instant liquidity but are investing in underlying investments that are less liquid. And those products existed long before the crisis.

I also want to emphasize that many of these worries are anticipatory because current market conditions show plenty of liquidity, which is in part fueled by central banks. What we don't know is how markets are going to react when the Federal Reserve begins to raise rates and roll back quantitative easing (QE). Having worked in the markets since the 1980s, I have lived through some pretty tough interest rate cycles; 1994 comes to mind as a particularly punishing year for fixed income markets, and then there were the 17 consecutive rate hikes in the mid-2000s. The question is, what is different today? The answer is that the capital markets are much larger, the speed of trading is faster, new capital requirements make it more expensive for banks and **broker-dealers** to stockpile inventory, and the demand for high-quality liquid assets created by new regulations is requiring much more collateral. Interest rates are also at much lower levels, which may create more pain in a rising-rate environment. So I do share concerns about reduced liquidity, but I think it owes only partly to financial regulation, with longer-term trends in markets and products also playing a role.

**Allison Nathan: Has regulation had unintended consequences for liquidity? Or did policymakers consciously set out to reduce liquidity that they thought was unsustainably high?**

**Mary Miller:** I never observed any regulators consciously trying to reduce **market liquidity**. If anything, they were focused on making financial institutions stronger to allow them to participate in market making. And the Federal Reserve's QE programs put more cash into market players' hands to buy

riskier assets. So I think in many ways regulators were trying to increase market liquidity. But there are always unintended consequences with regulation. Recently, we have seen market liquidity move to less regulated places. Specifically, in the wake of the **Volcker Rule**, we are seeing a wave of new **market makers** taking up activities that might have more traditionally taken place inside banks and broker-dealers. On the one hand, this migration has helped achieve the goal of putting taxpayers less at risk because the institutions with access to deposit insurance and the Fed discount window are now engaged in less risky trading activity. On the other hand, there is a concern about the broader financial system and whether we have sufficient oversight of risk.

**Allison Nathan: How do you view the tradeoff between regulation and financial stability on the one hand and liquidity and financial market flexibility on the other?**

**Mary Miller:** Most people would agree that having solvent, strong financial institutions is key to having sound financial markets. Most of the focus today has been on building capital in these institutions to ensure that they don't again become a source of risk for the financial markets. But having liquidity in these institutions that will allow them to continue to participate in a period of great stress is also critical. So it is important to distinguish between liquid firms and liquid markets.

That being said, the better-capitalized, more liquid institutions in the financial crisis were able to take advantage of opportunities compared to the ones that were not. So there are reasons to believe that stronger banks today should be in a better position to weather a storm and participate. In that sense, I don't think there needs to be a large tradeoff between having safe and sound institutions or having liquid markets. The **leverage ratio** does keep the size of **banks' balance sheets** down, however, so their overall capacity to participate may be smaller. And it is certainly more expensive to hold riskier assets.

**Allison Nathan: Can other participants step in and provide liquidity as banks play a smaller role?**

**Mary Miller:** There are certainly many new entrants. We will have to weather a few cycles to see how deep and reliable those market makers can be throughout a period of stress. But the markets are very innovative. And I have confidence that there are parties who will step in. I also think you can often find more patience in, for example, retail investors and institutions that are willing to stockpile cash and wait for market turmoil and substantial **price dislocations** to get involved. But you can't expect to find perfectly liquid markets at narrow spreads



through all cycles. I would also emphasize that trading has changed a lot. When I was at T. Rowe Price during the financial crisis, we couldn't find liquidity through our normal counterparties. But we were able to sell securities on electronic exchanges if we broke down the trades into smaller pieces. I think there's going to be more of that behavior.

**Allison Nathan: How else can market participants help manage liquidity risk today?**

**Mary Miller:** Asset managers really have to review whether they have made commitments that they can't keep in terms of redemption provisions. If a portfolio manager honestly thinks that there is insufficient liquidity in the market for potential sales that they may need to make, then they need to adjust their positions and manage their portfolios differently. The asset management industry has grown significantly and there are issues on that side of things as much as there are issues in the financial institutions that they face as counterparties.

**Allison Nathan: We often hear complaints that the cumulative effect of rules written in isolation ends up being greater than intended. Should or could there be a more holistic approach?**

**Mary Miller:** I don't think that rules have necessarily been written in isolation; during my time at the Treasury, I often saw the same people working on multiple rules both within agencies and across agencies. But, if we could do it over again, I think it would have been helpful to try to agree on a best sequence of rule writing, because sometimes one rule informs another. I also think it would have been better to get our international partners involved earlier. But you have to remember what a daunting task we had. We had 15,000 letters in response to the first proposal on the Volcker Rule alone. And there was an enormous amount of pressure to just get things done.

Going forward, I think there is an opportunity to enhance regulatory coordination; regulators should want this as much as the industry because it will lead to a much more coherent and workable system of financial regulation that people will have confidence in. I would look to the Financial Stability Oversight Council (FSOC), which has so far been focused on financial stability but was also charged with regulatory coordination, as a place to start thinking about a more holistic approach.

**Allison Nathan: Is there appetite for revisiting existing regulation to reduce overlap?**

**Mary Miller:** I don't want to speak for the regulators, but I think there should be an appetite for that. The hard work is to first get the rules out there. The second step is to try to gain international standardization. And then I think there is an opportunity to assess what has been built and what could benefit from calibration and simplification. I am a big advocate for working closely with industry to get feedback and assess what is and is not working. There are certainly rules that were initially widely opposed but, once adopted, were not as bad as people expected or in fact gave them new insights. For example, the **bank stress tests** have provided banks with useful information in terms of internal risk management.

**Allison Nathan: Are electronic exchanges part of the solution to liquidity concerns or the problem? What about clearing houses? ETFs?**

**Mary Miller:** On the whole, these things are part of the solution, but there are always areas of concern. Electronic exchanges provide more transparency, lower cost, and better technology that can shorten payment and settlement time frames. At the same time, the lack of human intervention and the high-speed activity can lead to accidents. So we need to build these trading platforms carefully. Similarly, moving more trading to collateralized, safer venues in the form of clearinghouses is also a positive development, but those venues need to be well capitalized for the risks that they are taking on. And we need to make sure that ETFs are providing liquidity all day long—not just at the open and the close.

**Allison Nathan: What else can address liquidity concerns?**

**Mary Miller:** Increased standardization in terms of having fewer CUSIPs—individual securities—for corporate bonds is a good idea. In the Treasury market we would hold a quarterly auction for a new 10-year bond. And in the following months, we would sell more supply into the same CUSIP in order to limit multiple independent securities. That could work as well for large corporate issuers. But it may not solve liquidity concerns for the broader corporate bond market because it is unclear how smaller issuers that are in the market less often would fare.

I also think we should explore new benchmarking practices. Currently, asset managers are measured against market benchmarks, and that is a deterrent for holding cash. Let's say you are an equity portfolio manager who is measured against the S&P500; if you are holding 5% cash in your portfolio, that is a drag on your investment performance against the index. But asset managers may need to hold cash in order to provide liquidity for their investors. We should have a different way to benchmark the performance of the fund ex-cash and liquidity that would show the skill of that investment manager while allowing for the redemption needs that investors may have. Firms should also be thinking about intra-firm liquidity, and whether there are self-help measures that can keep them from having to access the market during a period of stress. More broadly, there are a lot more products today that are designed for asset allocators—like target date retirement funds—that are constantly rebalancing as markets shift. I think those products provide support for markets when they need it most and can play a larger role in dampening market volatility.

**Allison Nathan: What is your advice to policymakers?**

**Mary Miller:** First, let markets be markets. I would hate to see policymakers meddle so deeply in markets that they don't allow normal cycles to play out. Regulators absolutely have to be vigilant about financial stability and preventing weak markets from translating too much stress into the real economy. But markets have to adjust and react. Second, policymakers must communicate clearly so there are no surprises, which will be particularly important in a rising-rate environment. And, lastly, policymakers should pursue a two-way conversation with participants in the financial system because there is so much that both sides can learn from that conversation.

# Interview with Lasse H. Pedersen

Lasse Heje Pedersen is a finance professor at Copenhagen Business School and the NYU Stern School of Business whose research has focused on liquidity risk and asset pricing. He is a principal at AQR Capital Management and author of the recent book, *Efficiently Inefficient: How Smart Money Invests and Market Prices are Determined*. He has served as Director of the American Finance Association, in the Liquidity Working Group meeting at the Federal Reserve Bank of New York, on the New York Fed's Monetary Policy Panel, and on the Economic Advisory Boards of NASDAQ and FTSE. Below, he discusses the importance of funding and market liquidity risk, the mutually reinforcing relationship between the two, and their impact beyond markets.

*The views stated herein are those of the interviewee and do not necessarily reflect those of Goldman Sachs.*



**Allison Nathan: Much of your work has focused on liquidity risk. How do you define liquidity risk, and why is it important?**

**Lasse H. Pedersen:** One part of liquidity risk is what I call **market liquidity** risk, which is defined as the risk of incurring a large transaction cost when you need to buy or sell a

position. I distinguish that from **funding liquidity** risk, which is the risk that you cannot finance your position, so that you may ultimately be forced to sell it. And those two are of course related.

Liquidity risk is important for a number of reasons. One is that it obviously makes it riskier and more costly to invest. As a result, if investors have two securities offering the same return, with one being very liquid, that is, cheap to trade and easy to finance, and another being very illiquid, then they should logically give preference to the liquid one. We would therefore expect that investors who hold illiquid securities or securities with liquidity risk would earn a premium. In that sense, liquidity risk also creates opportunities. If you are the investor who can hold over the long term and who can buy when other people are selling—i.e., provide liquidity—you can earn the **liquidity risk premium**. So liquidity risk is important because it creates cost and risk for the investor; it affects the way securities are priced; and it affects trading strategies.

**Allison Nathan: Is liquidity risk only relevant to markets, or does it also affect the real economy?**

**Lasse H. Pedersen:** Liquidity risk is incredibly important for thinking about how the financial markets operate, how investors invest, how companies finance themselves and at what cost, how the macro-economy goes into recession versus a boom, and how monetary policies try to address these cycles. All of these big questions in economics ultimately are very closely linked to liquidity risk. For example, since investors must be sufficiently compensated by the liquidity risk premium to hold less liquid securities, elevated liquidity risk and transaction costs can increase the cost of capital of the corporations issuing the securities, influencing their investment and other strategies.

**Allison Nathan: What drives fluctuations in liquidity risk?**

**Lasse H. Pedersen:** Liquidity is provided by a number of different market participants. And when these liquidity providers—be they bank **dealers** or other **market-making** firms or hedge funds—face less risk, have greater risk tolerance, or have more capital and easier access to funding, then liquidity will tend to be ample. And vice-versa, when there are fewer liquidity providers in the game and they have less capital or face more regulatory constraints, liquidity will decline.

**Allison Nathan: How would you characterize the degree of liquidity risk today?**

**Lasse H. Pedersen:** I see a difference in liquidity risk between the **dealer markets**—the fixed income market in particular—and the electronic markets, notably the equity markets. In the dealer markets, heavy regulation of the banking sector since the financial crisis has tended to reduce the number of banks making markets and restrict the amount of liquidity that they can provide. Part of liquidity provision is warehousing risk as you intermediate between buyers and sellers who are not available at the same time, and the banks' willingness or ability to do so has declined.

At the same time, though, I think part of the problem is the structure of the dealer markets, in which an oligopoly of bank dealers has control over the network that connects all the different potential buyers and sellers. That is not particularly conducive to market liquidity, especially as these dealers are facing a stricter regulatory environment and less access to risk capital. So overall, I think it is fair to say that we have seen a decline in market liquidity in those markets. But there is another opposing force right now, which is very expansive monetary policy globally that has flooded parts of the market with liquidity, primarily reducing funding liquidity risk. So regulation and monetary policy are pushing liquidity risk, and the associated liquidity premium, in opposite directions.

In contrast, in some electronic markets and in particular in equity exchanges, liquidity has generally remained strong because many different market participants can submit orders and provide liquidity to electronic **limit order books**—even high frequency traders, as vilified as they may be. Inside the limit order book, anybody can serve the role of a liquidity provider.

**Allison Nathan: Your research has shown that market liquidity and funding liquidity are mutually reinforcing. Can you describe that relationship?**

**Lasse H. Pedersen:** Traders' ability to provide market liquidity depends on their funding—that is, their capital and the margin requirements charged by those that are lending them capital. A dealer, hedge fund, or bank buying a security needs capital to cover the margin between that security's price and its value as collateral. So at any time the trader must hold enough capital to cover the margins on all of his positions. Understanding this reliance on funding is crucial to understanding liquidity risk, but is often overlooked.

When funding liquidity is tight, dealers are more careful with their capital and **balance sheet** as they risk hitting their constraints. So they may be inclined to scale back their own trading and the amount of capital they lend to other traders such as hedge funds, which leaves the latter facing higher margins. In short, if banks cannot fund themselves, they cannot fund their clients. And this can affect dealers' ability to take positions in several types of securities, which helps explain why market liquidity tends to be correlated across stocks and across stocks and bonds. The net impact of all this is that market liquidity is reduced. And in some cases, the prospect of even lower market liquidity in the future can raise the risk of financing a trade, and therefore increase funding costs. In times of crisis, reductions in market liquidity and funding liquidity are mutually reinforcing in a negative way, leading to a liquidity spiral.

**Allison Nathan: What does the play-by-play of that spiral look like?**

**Lasse H. Pedersen:** Basically, poor funding for some investors leads to less trading and even forced selling, increasing market volatility. As the market becomes riskier and less liquid, creditors who are financing positions start to worry. So they increase margin requirements or in some cases stop accepting certain securities as collateral. That worsens funding liquidity, which in turn leads to more forced sales, less trading and less market liquidity. As a result, prices spiral down, market liquidity dries up, and funding liquidity evaporates. We've seen liquidity spirals in quantitative equity markets in 2007 and in convertible bonds and many other markets in 2008. The global financial crisis basically started in the subprime markets and then spread throughout the credit markets and much of the financial markets.

**Allison Nathan: You mentioned that reduced market liquidity can increase market volatility.**

**Lasse H. Pedersen:** Yes, if there's less liquidity then supply and demand shocks can push the price around more, which will induce more volatility. But I have found that the causality can also work in the other direction, so that market liquidity declines as fundamental volatility increases. In other words, volatility can increase just because of increases in risk, say, around the Greek crisis. And that increased fundamental volatility poses a greater risk for market makers and other liquidity providers, which leads to higher **bid-ask spreads** and possibly margins. Because it is more capital-intensive for dealers to trade in volatile securities, they might reduce the

amount of liquidity they're willing to provide. There can also be a "flight to quality" or "flight to liquidity" with dealers choosing to provide liquidity only in lower-volatility, lower-margin stocks. So illiquidity increases volatility, and volatility increases illiquidity.

**Allison Nathan: Can central bank actions improve market liquidity?**

**Lasse H. Pedersen:** Central banks are most effective at improving funding liquidity. For example, if the central bank identifies liquidity as the source of a market shock, it can influence market participants to loosen their funding requirements. The central bank can improve dealers' funding conditions during a liquidity crisis directly or even simply state its intention to provide extra funding during a crisis, which can loosen margin requirements immediately. Obviously, in the wake of the financial crisis, central banks around the world first injected liquidity by lowering interest rates—ultimately to (or below) zero across the developed markets—which reduced the cost of borrowing. And then they resorted to unconventional monetary policy where the focus was again on injecting funding liquidity. For instance, the Fed implemented lending facilities where it would accept various asset-backed securities as collateral when those funding markets had broken down. That made it easier to borrow against those securities, which made investors more willing to buy them. As a result, I do think market liquidity improved as a consequence of trying to put the liquidity spiral in reverse by helping the funding liquidity.

**Allison Nathan: How should investors factor liquidity risk into their trading strategies?**

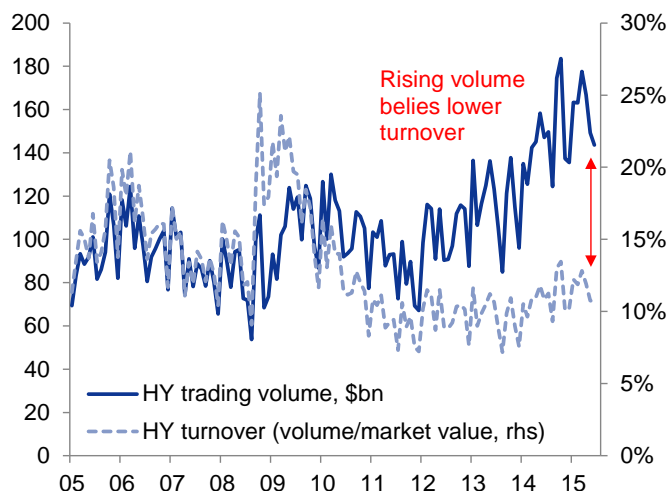
**Lasse H. Pedersen:** Liquidity risk is a key driver of the transaction cost of any trade, and managing those transaction costs is an important component of any optimal trading strategy. For example, rather than having very large **turnover** in order to have the best possible expected return at any point in time, a trader might be better off by trading more slowly towards what would otherwise be an optimal portfolio. So you save on transaction costs by lowering your churn, and then balance the costs and benefits of trading.

Investors can also consider targeting trades to explicitly earn a liquidity risk premium. Liquidity risk is just that—a risk that needs to be managed—but can also be an opportunity if you are in a position to provide liquidity when others desire it, especially if you have a good trading system that enables you to trade at lower costs than other investors. There are several trading strategies that aim to earn a liquidity risk premium which I discuss in my book, including convertible bond arbitrage; merger arbitrage; and fixed income arbitrage (where, for example, a pension fund has a preference for certain instruments—let's say swaps versus cash bonds, or vice versa—and you are willing to take the other side). Of course, like all trades there is by no means a guaranteed profit. If you buy a convertible bond, can hold it to maturity, and hedge it along the way, then it's very likely that you will make a profit. But if you're forced to unwind at the worst possible time, then of course you will likely make a large loss. In those scenarios, you're really incurring the prospective loss that you were being compensated for when you first bought the security.

# Liquidity and more in pics

## Bond issuance has outpaced trading turnover

HY trading volume, \$bn; HY turnover, % (rhs)



Source: FINRA TRACE, Barclays, Goldman Sachs Global Investment Research.

## HY market already tested by record mutual fund outflow

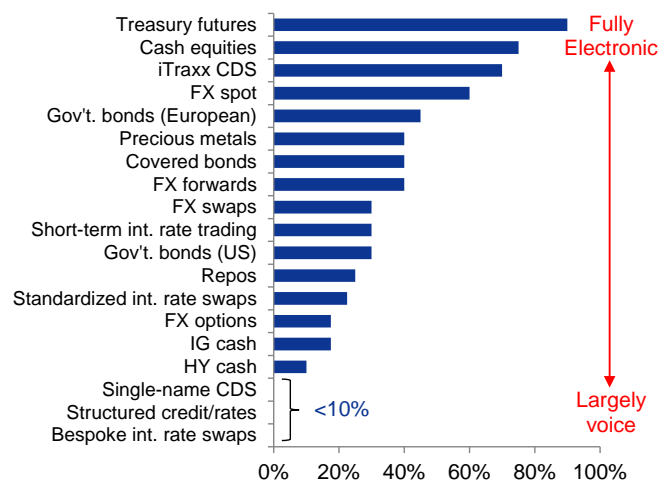
Cumulative 6-mo. outflows from HY mutual funds, % of lagged AUM



Source: Investment Company Institute, GS Global Investment Research.

## Room for e-penetration in some asset classes

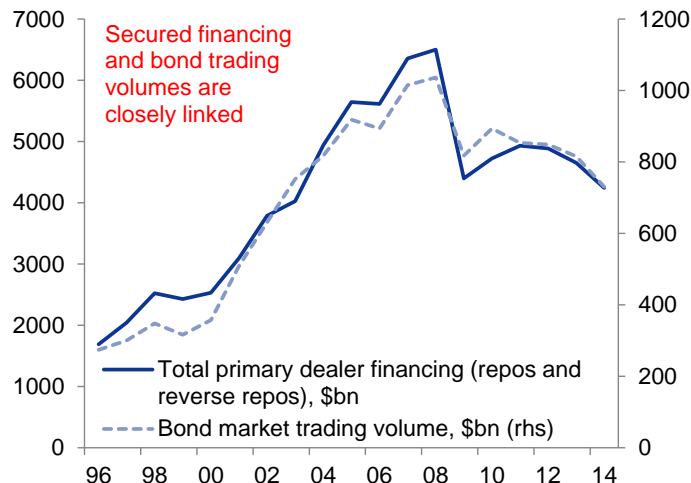
Penetration of electronic trading by volume, % (as of 2013)



Source: McKinsey and Greenwich Associates.

## Lower dealer financing accompanied by lower volumes

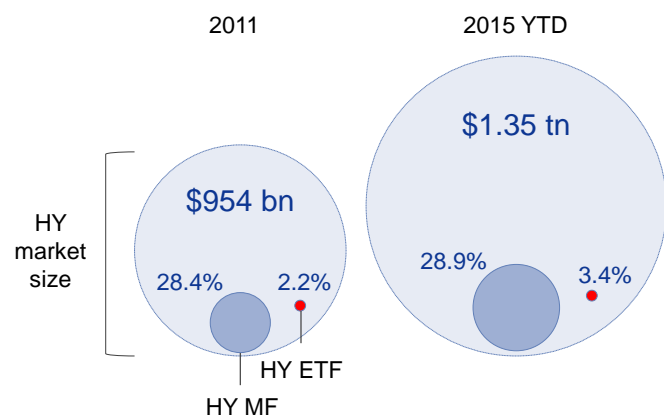
Primary dealer financing, \$bn; avg. daily bond trading volume, \$bn (rhs)



Source: SIFMA, FRBNY.

## ETFs: a small but growing share of the bond market

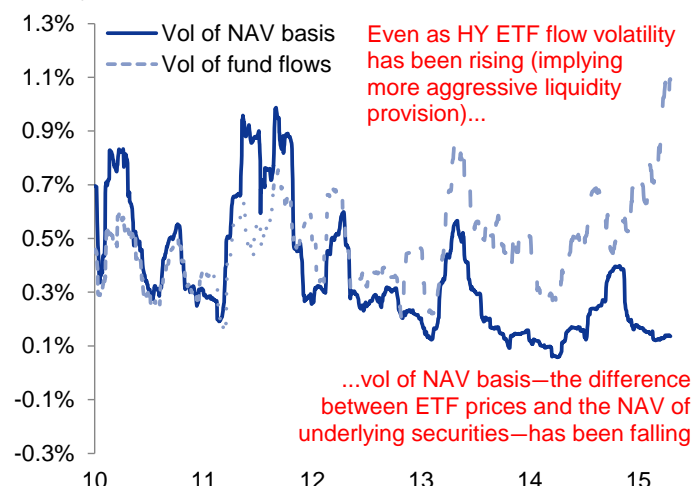
HY mutual funds and ETFs compared to overall HY market size



Not to scale. 2015 YTD is as of May. Source: Investment Company Institute, GS Global Investment Research.

## Bond ETF market structure appears to be maturing

Volatility of HY ETF net fund flows and of HY ETF NAV basis, %



Source: Bloomberg, Goldman Sachs Global Investment Research.



# Liquidity lingo

**Alternative Trading System (ATS):** A non-exchange trading venue. Examples include some *electronic communication networks* and *dark pools*.

**All-to-all platform:** A trading venue that enables customers from both the buy side and the sell side to transact directly with one another, in contrast to trading that takes place only through intermediaries.

**Bank balance sheet capacity:** A bank's capacity to add to its asset base, provide financing, lend, or engage in other activities that affect the size of its balance sheet. When banks facilitate or finance their clients' trades, they are "providing" balance sheet; the clients receiving these services are said to be "using" or "renting" balance sheet. Particularly relevant today in the context of *capital requirements* that affect balance sheet size and composition. Activities that take up a significant portion of balance sheet are termed "balance-sheet intensive." "Expensive" or "scarce" balance sheet implies greater limitations on the activity a bank can undertake within regulatory limits.

**Bid-ask spread:** The difference between the price at which someone is willing to buy an asset (the bid) and the price at which someone is willing to sell the same asset (the ask or the offer). "Being" the bid (offer) refers to being a willing buyer (seller) of an asset.

**Bank capital:** Funds available to absorb bank losses, including retained earnings, common stock, preferred stock and subordinated debt, which do not involve obligatory distributions. The predominant form of bank capital is common shares, which has the lowest priority claim in bankruptcy.

**Broker-dealer:** A trading intermediary that acts both as an agent, or **broker** (matching buyers and sellers on commission) and as a *principal*, or **dealer** (buying and selling for its own account).

**Capital requirements:** Rules and regulations (primarily under the Basel framework) demanding that banks maintain certain amounts of capital relative to their assets.

**Central limit order book (CLOB):** An *all-to-all platform* that automatically, and usually anonymously, matches buyers and sellers.

**Centralized clearing:** A system in which transactions clear through a single counterparty (rather than through various bilateral counterparties). Post-crisis financial reforms have included efforts to move *OTC* derivatives toward centralized clearing models in an effort to reduce risk by concentrating and netting exposures within the central counterparty.

**Credit default swap (CDS):** A derivative contract that compensates the purchaser in the event of non-payment by a third party (typically default on corporate or sovereign debt). Single-name CDS references an obligation of one issuer/entity; index CDS provides exposure to a pool of names.

**Dark pools:** *Alternative trading systems* in which bid and offer prices are not made public until after a trade is executed, with the intention of anonymously facilitating large orders. In contrast, **lit pools** typically make pre-trade prices public.

**Electronic communication network (ECN):** An automated *alternative trading system* that displays quotes and connects buyers and sellers directly rather than through an intermediary. ECNs are newer to fixed income markets than to equity and FX. Also known as an **electronic platform** or e-trading platform.

**Exchange-Traded Fund (ETF):** An investment vehicle that tracks an index or basket of assets, with its shares trading on an exchange at market-determined prices. ETF shares are created or redeemed in exchange for a basket of assets representative of the ETF's composition. Authorized participants—typically market makers or other large financial institutions that have contracted with the ETF—create or redeem shares to hold, trade, or sell to clients.

**Funding liquidity:** The ease of obtaining funding—be it equity or debt—for a market participant to execute a trade or maintain a position.

**Liquidity risk premium:** The additional return that compensates investors for the risk of holding a less liquid security (i.e., one that cannot be as readily converted into cash).

**Market liquidity:** The ability to buy or sell an asset without significantly impacting the overall market price.

**Market maker:** A firm or person who routinely stands ready to quote, purchase and sell financial instruments in order to satisfy the demands of its clients.

**On-the-run:** The most recently issued security, in contrast to all previously issued securities of the same type/maturity ("**off-the-run**"). On-the-run securities are typically more liquid than off-the-run.

**Over-the-counter (OTC):** Transactions that take place bilaterally rather than on an exchange. Post-crisis financial reforms have included efforts to move OTC derivatives toward *centralized clearing* models. OTC markets are sometimes referred to as **dealer markets**.

**Price dislocation:** A large mispricing of an asset relative to its fundamental value.

**Principal trading:** Buying and selling financial instruments by a firm using its own balance sheet, in order to profit from the market value of positions it holds. In contrast, **agency trading** matches buy and sell orders in the same security and transfers ownership between counterparties for a commission.

**Proprietary trading:** Trading as principal by a firm or person who is not acting as a market maker.

**Repurchase agreement (repo):** A collateralized loan whereby the borrower obtains short-term funding in exchange for a security that will be bought back at a predetermined time and price. (For the lender, this is a reverse repo.)


**Risk-based rules:** Regulatory standards (primarily under the Basel framework) for the amount of capital banks must hold relative to risk-weighted assets. In contrast to non-risk-based rules, such as the leverage ratio, which set capital requirements regardless of the assets' risk profile. See also pg. 18.

**Turnover:** Trading volume as a share of total value outstanding for a particular security or group of securities.

Source: Goldman Sachs Global Investment Research, *Financial Times Lexicon*, *Investment Company Institute*.

# Rules and regulations

## CAPITAL

|                        |  |
|------------------------|--|
| <b>Basel</b>           | <p><b>Basel Framework</b><sup>1</sup>  A set of standards and guidelines for banking supervision developed by the <b>Basel Committee on Banking Supervision (BCBS)</b>, a body established in 1974 by the governors of G10 central banks that has since expanded to include representatives from 28 member economies. The committee's efforts to establish international standards for capital adequacy led to the 1988 Basel Accord, now known as Basel I, which called for banks to meet a <b>risk-based capital requirement</b>, i.e., to maintain a minimum ratio of capital to <b>risk-weighted assets (RWA)</b> of 8%. The Basel framework has since evolved to include expanded capital rules and new supervisory processes under Basel II (released in 2004) and, most recently, Basel III (released in 2010). Regulators of member economies are responsible for adopting Basel standards nationally; implementation and timelines thus vary by country. Members can also adopt more stringent rules.</p>  |
| <b>Basel III</b>       | <p><b>Basel III</b>  The latest set of bank rules issued by the BCBS in 2010. Basel III is intended to enhance bank governance, risk management, and transparency, as well as improve the banking sector's resilience to shocks. Basel III has increased risk-based capital requirements: While the minimum ratio for total capital to RWA remains 8%, the ratio for <b>Tier 1 capital</b>—a category of high-quality capital consisting of common stock, disclosed reserves, and some forms of preferred stock—has increased to 6% from 4% previously. Basel III has also introduced a new requirement for <b>Common Equity Tier 1 (CET1) capital</b>—the highest-quality capital—at 4.5%. These requirements have been phased in since 2013 and came into full force in 2015. Basel III also calls for capital “buffers” above the minimum capital ratios. Banks that fail to maintain a 2.5% <b>capital conservation buffer</b> made of up common equity will face restrictions on capital distributions and discretionary bonuses. National regulators may also impose a <b>countercyclical buffer</b> requirement of up to 2.5% if and when they deem aggregate credit growth to be excessive. Both buffers will be phased in from 2016 through 2018. These changes come against a backdrop of stricter definitions of capital, as Basel III stipulates a phasing out of non-core Tier 1 capital and lesser-quality Tier 2 capital over a 10-year period that began in 2013. At the same time, Basel III has made the measurement of assets more conservative, increasing the risk weights for certain assets including derivatives. Aside from more stringent capital requirements, Basel III has introduced new rules intended to limit excessive bank leverage and strengthen banks' liquidity profiles (see leverage ratio, liquidity coverage ratio, and net stable funding ratio below).</p> |
| <b>G-SIB Framework</b> | <p><b>Global Systemically Important Bank (G-SIB) Framework</b>  A 2011 Basel framework calling for additional capital buffers for <b>global systemically important banks (G-SIBs)</b>, sometimes described as the G-SIB surcharge. The framework demands additional CET1 capital ranging from 1.0% to 2.5% of RWA; each bank falls into a “bucket” within this range based on its systemic importance, taking into account size, interconnectedness, cross-border activity, substitutability and complexity. An initially “empty” bucket of 3.5% exists to deter banks from becoming more systemically important. This upper bound can increase over time if systemic importance scores go up. Currently, Basel has designated 30 banks as systemically important. Surcharges are to be phased in starting in 2016 and fully adopted by 2019. In the US, the Federal Reserve has adopted a methodology that includes a measure of banks' reliance on short-term wholesale funding and results in surcharges ranging from 1.0% to 4.5%, with empty buckets at 5.0% and 5.5%.</p>  |
| <b>TLAC</b>            | <p><b>Total Loss-Absorbing Capacity (TLAC)</b>  A standard proposed by the Financial Stability Board (FSB), an international body that works closely with the BCBS, to ensure that G-SIBs can absorb losses before/during resolution and maintain systemically critical functions without resorting to taxpayer support or imperiling financial stability. The FSB has proposed a requirement of minimum TLAC equal to 16-20% of RWAs and consisting of Tier 1/Tier 2 capital plus additional loss-absorbing capital. Of total TLAC at least 33% must consist of long-term unsecured debt. The proposed TLAC must also be at least twice the required Tier 1 leverage ratio under Basel III. The FSB intends to finalize the proposal in time for the G20 summit in November 2015. TLAC will also be subject to national implementation.</p>  |
| <b>Leverage Ratio</b>  | <p><b>Leverage Ratio</b>  A component of Basel III that sets a 3% minimum for <b>Tier 1 capital</b> as a share of assets on a non-risk-weighted basis. The leverage ratio is therefore agnostic between high- and low-risk assets, which may incentivize banks to step away from lower-risk, lower-return businesses. The ratio is intended to serve as a backstop for risk-based capital requirements, but it can be binding in practice.<sup>2</sup> Banks began disclosing ratios to national supervisors in 2015, with 2018 targeted for full enforcement. The United States has introduced <b>supplementary leverage ratios (SLR)</b> that bring the total leverage ratio requirements to 5% for bank holding companies and 6% for their insured depository institutions.</p>  |
| <b>CCAR</b>            | <p><b>Comprehensive Capital Analysis and Review (CCAR)</b>  The Federal Reserve's process for evaluating the capital planning and capital adequacy of the largest <b>bank holding companies (BHCs)</b> operating in the US, including their ability to withstand stress. BHCs prepare and submit capital plans to the Fed on an annual basis, providing details on their implementation of capital adequacy standards and a forward-looking assessment of their capital positions. For example, BHCs must disclose plans for dividend payments, share repurchases, or other decisions that could affect their capital. While CCAR is intended as a backstop for risk-based capital requirements, it can be binding in practice.<sup>3</sup> The Fed may object to a bank's capital plan, at which point the bank will resubmit a revised version. CCAR has been conducted since 2011. The Fed conducts <b>Dodd-Frank Act Stress Testing (DFAST)</b> in parallel with CCAR to assess banks' resilience in the face of hypothetical adverse economic scenarios. BHCs also conduct their own tests under these scenarios.</p>  |

Sources for both pages of this guide unless otherwise noted: Bank for International Settlements and Basel Committee on Banking Supervision; Federal Reserve Board; US Securities and Exchange Commission; US Department of the Treasury; Financial Conduct Authority; European Securities and Markets Authority.

Source for icons: [www.istockphoto.com](http://www.istockphoto.com).

<sup>1</sup> Unless otherwise noted, requirements and dates of implementation refer to Basel guidelines. National implementation may differ.

<sup>2</sup> “As regulation shifts to leverage & liquidity, short-term financing markets may get squeezed,” *GS US Banks Research*, May 4, 2014.

<sup>3</sup> “Back in style this holiday season: Big bank regulations,” *GS US Banks Research*, October 27, 2014.

## LIQUIDITY

|      |  |
|------|--|
| LCR  | <p><b>Liquidity Coverage Ratio (LCR)</b> 🌐 A component of Basel III aimed at improving banks' short-term resilience to liquidity stress. The LCR requires banks to hold enough <b>high-quality liquid assets (HQLA)</b> to cover their total net cash outflows over a 30-day stress scenario involving a market shock. HQLA consist of cash or assets that can be converted into cash with little or no loss in value, with Level 1 HQLA being the most liquid (e.g., cash deposited at central banks, sovereign debt). Less liquid Level 2 assets are limited to 40% of total HQLA and must be valued net of haircuts of up to 50% that reflect potential losses under the stress scenario. The BCBS calls for banks to report their LCR to national supervisors at least monthly and potentially weekly or daily. The BCBS has recommended that national regulators allow the LCR to temporarily fall below 100% during severe market stress. The LCR is being phased in gradually, beginning with a 60% minimum in 2015 and increasing in 10% increments to reach 100% in 2019. The US begins with an 80% minimum in 2015, to be fully phased in by 2017, and currently requires daily reporting for the largest banks.</p> |
| NSFR | <p><b>Net Stable Funding Requirement (NSFR)</b> 🌐 A component of Basel III aimed at strengthening banks' liquidity profiles over a longer term by ensuring they have adequate stable funding to cover at least 100% of the stable funding they require over a one-year period. Stable funding requirements are based on a weighted calculation that considers the maturity of a bank's liabilities and the likelihood of its funding sources being withdrawn. Available stable funding used to meet the requirement is based on the tenor, quality and liquidity of bank assets, among other criteria. The NSFR will come into full force by 2018.</p>   |
| CLAR | <p><b>Comprehensive Liquidity Analysis and Review (CLAR)</b> 🇺🇸 The Federal Reserve's process for assessing banks' liquidity profiles. CLAR was first implemented in 2012 for a group of systemically important banks. It includes a liquidity stress test and an assessment of the bank's liquidity planning processes (e.g., its approach to managing a liquidity crisis).<sup>4</sup></p>   |

## ACTIVITY

|                  |   |
|------------------|---|
| Dodd-Frank       | <p><b>Dodd-Frank Wall Street Reform and Consumer Protection Act (US)</b> 🇺🇸 Complex and far-reaching US financial market legislation developed in the wake of the Global Financial Crisis and passed by Congress in 2010. The Act includes measures to reform financial services regulation and bank supervision (particularly for SIFIs), improve transparency and accountability in certain financial instruments, and strengthen consumer protection.</p>  |
| Exposure Limits  | <p><b>Exposure Limits</b> 🌐 Rules intended to limit interconnectedness—particularly among <b>systemically important financial institutions (SIFIs)</b>—and thereby reduce the risk of contagion. The Basel framework sets rules for reporting large exposures to individual counterparties and limits them to 25% of Tier 1 capital (15% for exposures between G-SIBs). Exposures to sovereigns are exempt. Exposures to qualifying central counterparties (CCPs) will be exempt through an observation period that concludes in 2016. The rules are scheduled to come into effect in 2019. Proposed rules in the US, which have not been finalized, are stricter and remove the exemptions for non-US sovereigns and CCPs.</p>                   |
| Short Sales      | <p><b>Short-Selling Regulations</b> 🌐 Rules in many major developed markets that restrict short-selling (the sale of a security that the seller does not own, which becomes profitable when the price of that security falls). These rules often ban or heavily restrict naked short-selling (when the seller has not borrowed or arranged to borrow the security being sold).</p>  |
| Volcker Rule     | <p><b>Volcker Rule</b> 🇺🇸 A component of Dodd-Frank that prohibits US banks and US subsidiaries of non-US banks from engaging in proprietary trading, or trading for their own account, with exemptions for activities such as underwriting, market making, hedging to mitigate risk, and trading in US government debt. The conformance period for adjusting to these rules ended on July 21, 2015, though with special approval, some banks may extend their conformance period until July 21, 2017.</p>  |
| Title VII        | <p><b>Title VII</b> 🇺🇸 A section of Dodd-Frank that calls for stricter regulation of <b>over-the-counter (OTC)</b> derivatives markets, including requirements for clearing and exchange-trading of clearable derivatives contracts; increased reporting and transparency; higher margin requirements; and mandatory registration by swap market participants. Title VII rules apply to a broad definition of US persons and entities, with extraterritorial application to many types of cross-border transactions.<sup>5</sup> Title VII rules are in various stages of implementation.</p>   |
| MiFID II & MiFIR | <p><b>EU Markets in Financial Instruments Directive (MiFID)</b> 🇪🇺 A European Union legislative framework that became effective in 2007 with measures to increase competition in financial services, harmonize trading rules across EU members, and strengthen investor protection. In 2011, the European Commission proposed an amended directive, <b>MiFID II</b>, and a new regulation, the <b>Markets in Financial Instruments Regulation (MiFIR)</b>. These frameworks require clearable derivatives to trade on organized trading platforms; create a new multilateral trading venue for non-equity instruments; increase equity market transparency; and extend transparency standards to other instruments. Both take effect in 2017.</p> |
| EMIR             | <p><b>European Market Infrastructure Regulation (EMIR)</b> 🇪🇺 The European Union's regulation of OTC derivatives, which includes new requirements for reporting, risk management, and central clearing, as well as margin rules for derivatives that are not centrally cleared. EMIR applies to non-EU entities transacting with EU entities. It took effect in August 2012, though some requirements are only coming into force this year (2015) or being phased in over time.</p>   |

<sup>4</sup> Elliott, Douglas, "Bank Liquidity Requirements: An Introduction and Overview," *The Brookings Institution*, June 23, 2014, [http://www.brookings.edu/~media/research/files/papers/2014/06/23-bank-liquidity-requirements-intro-overview-elliott/23\\_bank\\_liquidity\\_requirements\\_intro\\_overview\\_elliott.pdf](http://www.brookings.edu/~media/research/files/papers/2014/06/23-bank-liquidity-requirements-intro-overview-elliott/23_bank_liquidity_requirements_intro_overview_elliott.pdf).

<sup>5</sup> Kenadjian, Patrick S., Annette L. Nazareth, Gabriel D. Rosenberg, "The Cross-border Impact of the Dodd-Frank Act," October 22, 2013, <http://www.davispolk.com/sites/default/files/The.Cross-border.Impact.of.the.Dodd-Frank.Act.pdf>.

## Disclosure Appendix

### Reg AC

We, Allison Nathan, Marina Grushin, and Steven Strongin, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

We, Richard Ramsden, Charles P. Himmelberg, and Bridget Bartlett, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

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