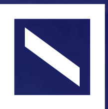


Special

Deutsche Bank
Research

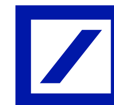
TheHouseView

Searching for liquidity

March 2016

DISCLOSURES AND ANALYST CERTIFICATIONS ARE LOCATED IN APPENDIX 1. MCI(P) 124/04/2015

TheHouseView Special – Searching for liquidity



Liquidity concerns for US and European corporate bond markets are not new. But the rise of "flash events" since the crisis in the absence of clear fundamental drivers, including in some of the world's most historically liquid markets, has rightly captured the attention of market participants and policymakers alike.

Both the level and the resilience of liquidity are important for market participants. Unfortunately, no single metric fully captures both concepts, making it impossible to easily summarise liquidity conditions across markets.

The overall level of liquidity does not appear low. Markets seem to be working reasonably well, especially in periods of low stress, with many liquidity measures not materially worse than pre-crisis. The fact that the period just before the crisis in many cases saw extraordinarily benign liquidity conditions may be contributing to the sense of low liquidity.

But this is not to say there is no issue. There is evidence of deterioration in some liquidity metrics in recent years even during periods of relatively low volatility. And more concerning, liquidity has proven to not be resilient, as seemingly ample liquidity has been an illusion during times of stress, exacerbating market moves and contributing to volatility.

What has driven the changes in liquidity conditions? In fixed income markets observers have focused on the large drop in dealer bond inventories at a time when the bond market was expanding, blaming tighter bank regulation post-crisis. But this is only part of the story: both cyclical and structural factors are playing a role.

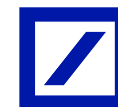
Markets are finding ways to adapt to these evolving liquidity conditions. Alternative liquidity providers, such as hedge funds, private equity firms, and primary trading firms in electronic markets, have emerged as banks scale back their market making and liquidity provision. The final impact on liquidity is still uncertain. On the investor side, one response has been to look at ETFs and mutual funds to manage liquidity risk, but this comes with its own set of issues – think of the liquidity mismatch between an illiquid high yield bond and the high yield ETF offering daily liquidity.

Ultimately, the factors affecting liquidity are unlikely to recede anytime soon, suggesting that liquidity is likely to remain fragile. Investors should brace themselves for continued "flash events" and bouts of volatility.

The views in this publication are informed by Deutsche Bank's Global Strategy Group, which advises management and clients on broad market risks and global economic and financial developments. The views and forecasts of the group, which consists of senior research staff, may occasionally differ from those disseminated by their research colleagues

Editors: Marcos Arana, Matthew Luzzetti, Rajni Thakur

Concern over market (il)liquidity continues to capture the attention of market participants and policymakers alike



QE raises fears of eurozone liquidity squeeze — FT, 14th April 2015

IMF tells regulators to brace for global 'liquidity shock' — The Telegraph, 15th April 2015

Shrinking liquidity exposes markets to crunch — Reuters. 1st May 2015

Wall Street Bemoans Bond Market Liquidity Squeeze — WSJ, 2nd June 2015

Bond market liquidity will get worse, not better - industry experts — Reuters, 24th June 2015

Market liquidity warning from IMF — FT, 29th Sept 2015

Beware of the liquidity delusion — FT, 6th Oct 2015

Fed's Powell says investors see less bond market liquidity, disagree on severity — Reuters, 20th Oct 2015

Investors will pay if liquidity dries up — FT, 12th Nov 2015

Market liquidity drought raises alarm bells inside Fed — Reuters, 23rd April 2015

Shrinking liquidity exposes markets to crunch — Reuters, 1st May 2015

BoE delves deeper into asset managers, "fragile" market liquidity — Reuters, 25th Sept 2015

Fed's Dudley downplays market 'liquidity' concerns, eyes HFT — Reuters, 30th Sept 2015

BOE Says Market May Be Underpricing Risks of Falling Liquidity — Bloomberg, 1st Oct 2015

Ample liquidity in U.S. corporate bond market: N.Y. Fed — Reuters, 5th Oct 2015

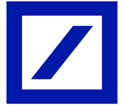
There's Lots of Liquidity in Treasuries, Except When Needed Most — Bloomberg, 6th Oct 2015

Global bond market suffers from erratic swings amid liquidity drought — The Telegraph, 21st Oct 2015

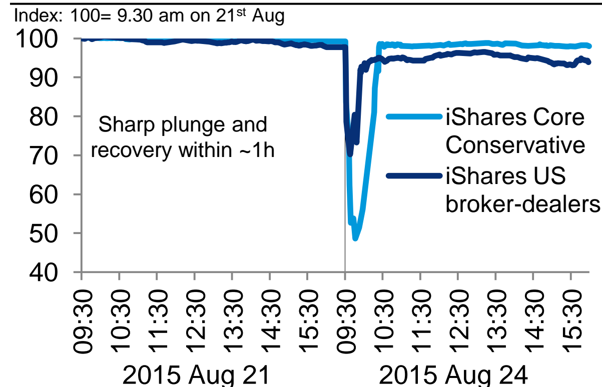
Fears of global liquidity crunch haunt Davos elites — The Telegraph, 20th Jan 2016

'Seismic' shock awaits bond liquidity — FT, 31st Jan 2016

Several "flash events" in recent years in traditionally liquid markets have raised fears that liquidity conditions have worsened

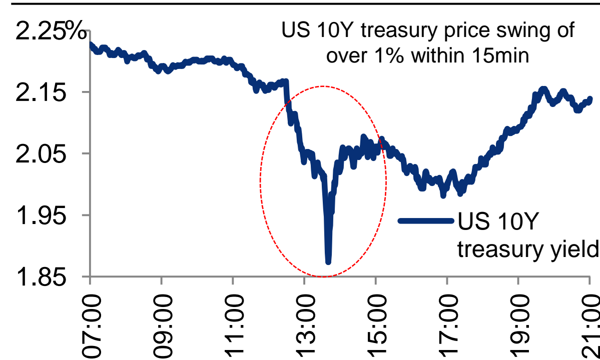


Equity ETFs plunged, some by 50%, and recovered within 1h



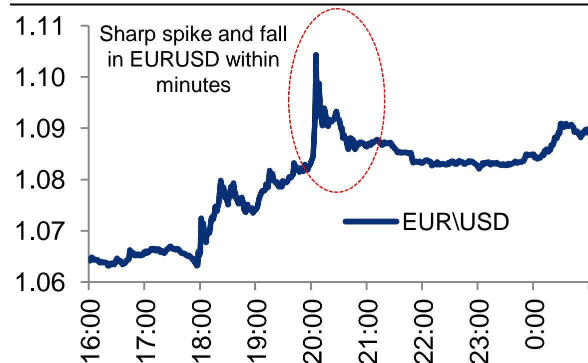
Source: Bloomberg Finance LP, Deutsche Bank Research

Treasury "flash crash": 10-year Treasury value rose 1% and re-traced in 15 minutes



Note: Data for 2014 October 15.
Source: Bloomberg Finance LP, Deutsche Bank Research

Euro spike against US dollar quickly reversed



Note: Data for 2015 March 18.
Source: Bloomberg Finance LP, Deutsche Bank Research

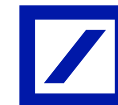
S&P 500 dropped 5% and recovered within 15 minutes

Note: Data for 2010 May 6.
Source: Bloomberg Finance LP, Deutsche Bank Research

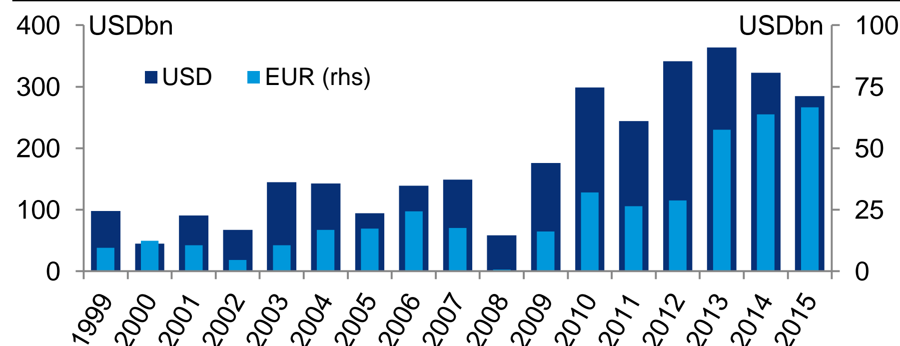
- "Flash events" in which asset prices adjust in a sharp and sudden way have seemed to become more regular post-crisis
- These events have occurred across asset classes, including in equities, sovereign bonds and FX
- The sharp nature of these moves, often in the absence of new fundamental information, has raised concerns about liquidity
  - Technology (and technological faults) have also played a part
- Specifically, the concern is that liquidity tends to vanish during periods of stress

> *"When liquidity drops sharply, prices become less informative and less aligned with fundamentals, and tend to overreact, leading to increased volatility."*
>
> *IMF Financial Stability Report, October 2015*

The fact that money has flowed into riskier and less liquid parts of the market only exacerbates these concerns

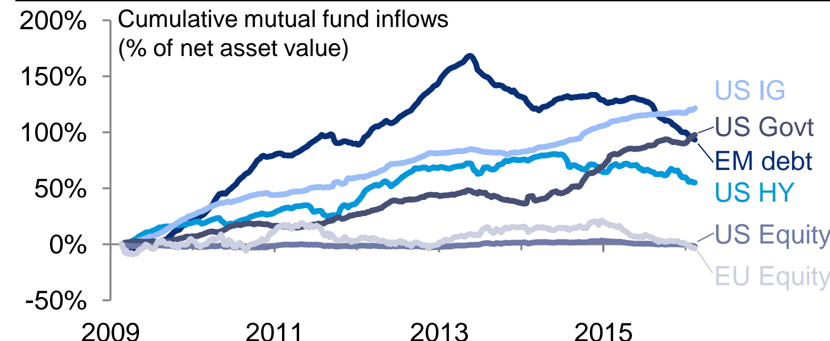


Bond issuance in the riskier and less liquid high yield space ballooned post-crisis both in dollars and in euros



Note: fixed rate issuance in each currency. Source: Dealogic, Deutsche Bank Research

Riskier assets, e.g., EM debt and US HY, received material inflows post-crisis, though this has reversed somewhat in the last few years



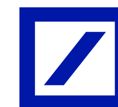
Source: EPFR Global, Deutsche Bank Research

- Bond issuance reached record levels post-crisis, with issuers taking advantage of ultra-low rates
- In particular, issuance in the riskier and less liquid high yield space ballooned
  - Average annual issuance 3x higher since 2010, vs. 1999-2007 average

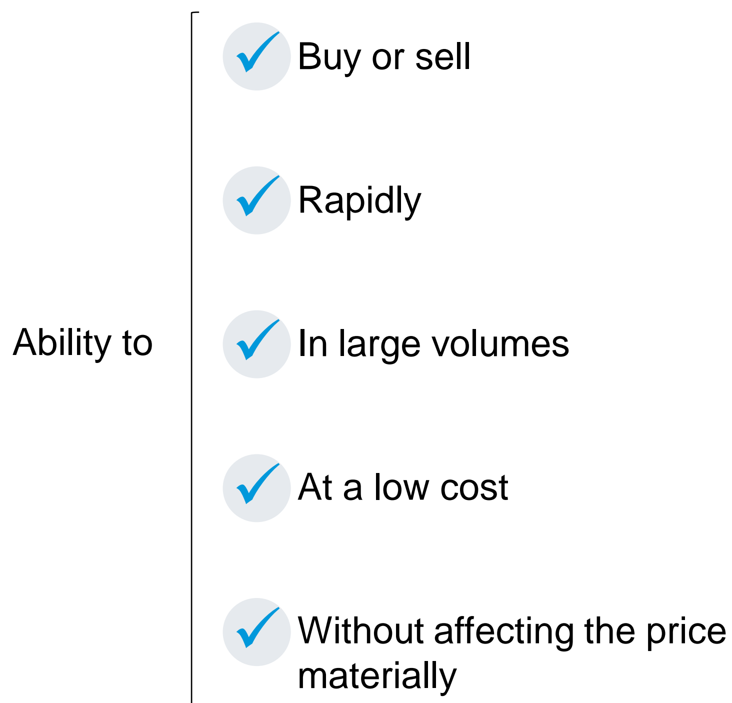
- Mutual funds investing in riskier assets saw record inflows immediately after the crisis
  - EM debt, US high yield saw flows as a percentage of net assets jump considerably
  - Also true for US investment grade, and more recently for core rates, e.g., US govt. debt

As rates rise and the dollar strengthens, there is concern that investors who piled into riskier and less liquid assets will rush for the exit, exacerbating liquidity concerns and leading to outsized price moves

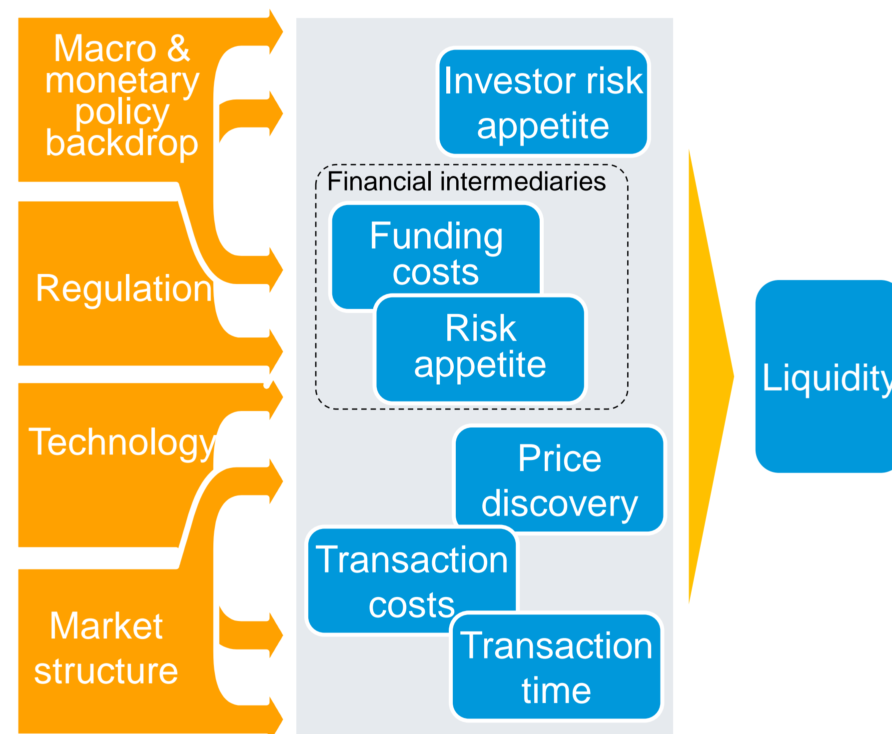
But what do we mean by market liquidity? This is a multi-dimensional concept, and several drivers can affect it



Definition of liquidity

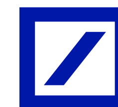


Drivers of liquidity



Source: IMF Financial Stability Report, Deutsche Bank

There are two key and distinct aspects of trading liquidity: the level of liquidity and the resilience of liquidity



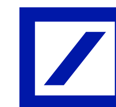
Low liquidity will typically not be resilient, but high liquidity does not imply high resilience

Market liquidity has many dimensions

	Dimension	Measures	Example metrics*
Level	Cost	▪ Ability to transact cheaply	▪ Bid-ask spread ▪ "Round-trip" cost
Level	Price impact	▪ Ability to transact without moving market	▪ Price impact
Level / Resilience	Depth	▪ Quantity / amount of liquidity ▪ Ability to transact in size	▪ Quote depth ▪ Turnover ratio ▪ Dealer count
Level / Resilience	Breadth	▪ Distribution of liquidity within a market segment	▪ On / off the run spread ▪ Share of volume of most liquid assets
Resilience	Resilience	▪ Ability of liquidity to remain even in periods of market stress, vs. "fair weather" liquidity	▪ Dealer count ▪ Volatility spikes

Note (*): Round-trip cost is the cost of a buy-and-sell transaction for the same quantity within one day. Price impact measures how much an asset price or total return moves for a given level of trading. Quote depth measures the total number of quotes or sum of quote sizes. Turnover ratio measures trading activity relative to market size.

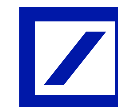
The picture from liquidity metrics across asset classes is mixed, but liquidity has deteriorated in many cases



Asset class	Sovereign debt US	Sovereign debt Europe	Equities US	Equities Europe	Credit US	Credit Europe	Comments
Market turnover	✗	✗	✓	✗	✗	N/A	Broadly fallen sharply across asset classes
Price impact	~	N/A	~	✗	N/A	N/A	Generally remains low relative to early 2000s period, though has risen slightly and higher than just before crisis
Bid-ask spreads	~	✗	✓	✓	~	~	Little to no evidence of deterioration relative to before the crisis across assets
Average trade size	N/A	✗	N/A	N/A	✗	N/A	Limited data but has declined for assets for which data is available
Liquidity spikes	~	~	✗	✗	N/A	N/A	Have become more frequent across assets (including FX – not shown), suggesting resilience is an issue

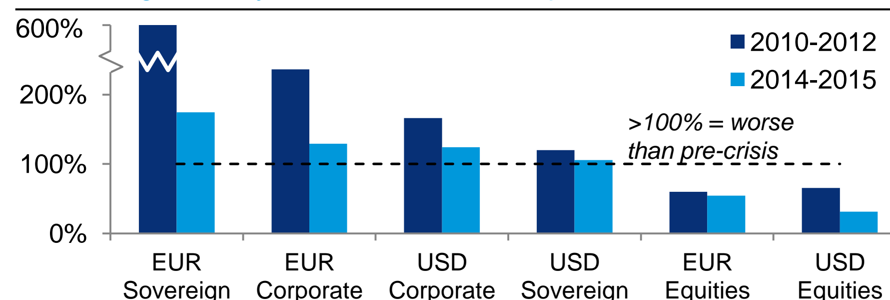
Relative to pre-crisis: ✓ Better liquidity ~ Mixed / not materially different ✗ Worse liquidity N/A = Insufficient data

The overall level of liquidity does not appear low: markets seem to be working reasonably well, especially in periods of low stress



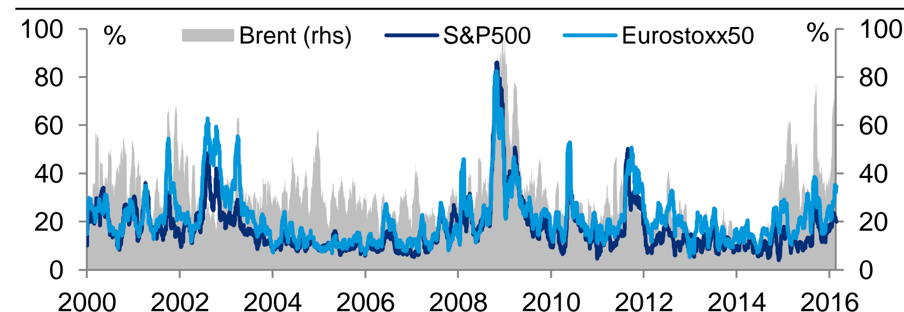
- On a number of dimensions, persistent market malfunctioning is not evident
- Bid-ask spreads, one of the most common metrics of the level of liquidity, do not show particular stress
  - Bid-ask spreads have recovered meaningfully from their crisis levels and are now stable
  - In most cases they are close to pre-crisis levels
- While it has become more difficult to transact in size in some markets, greater impact on prices from trading activity is not widespread
- Market volatility, both realised and implied*, is not particularly high, despite the rise over the last year – indicating markets functioning well in general
  - Realised volatility is far from peaks seen at different stages in the last 15 years, with a few exceptions (e.g., oil price volatility is elevated)
  - Implied volatility is actually lower than pre-crisis

With the notable exception of Eurozone sovereigns, bid-ask spreads haven't significantly worsened relative to pre-crisis levels



Note: columns show average bid-ask spreads relative to 2002-2007 average for each asset class. Exact time horizon varies for each asset class depending on data availability
Source: Markit iboxx, Bloomberg Finance LP, IMF, Deutsche Bank Research

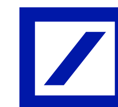
Actual market volatility does not look elevated from a historical perspective



Note: 20d realised volatility, per cent, annualised
Source: Bloomberg Finance LP, Deutsche Bank Research

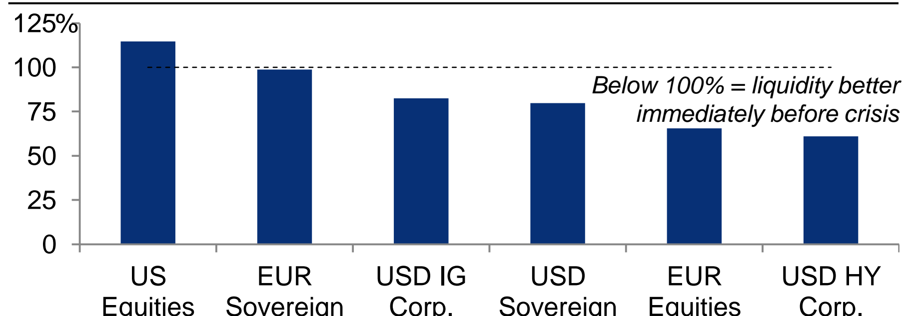
Note (*): Volatility as implied by options markets.

That liquidity conditions just prior to the crisis were particularly benign certainly adds to the widespread perception of illiquidity



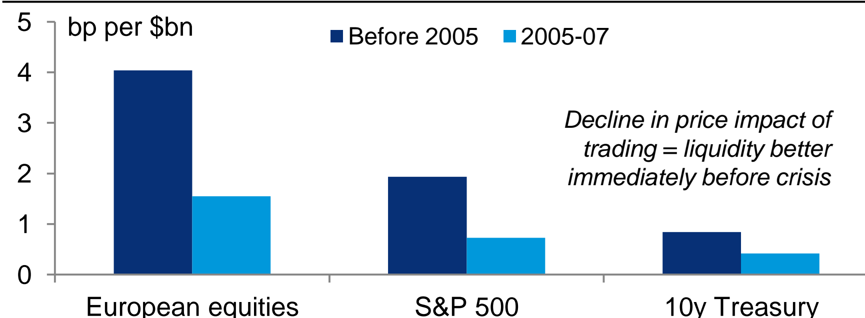
- Contributing to the perception of widespread illiquidity is that liquidity conditions just before the crisis were abnormally benign
- This extraordinary level of liquidity was driven by numerous factors
  - Low macroeconomic volatility
  - Supportive monetary and financial conditions
  - Elevated risk appetite
- But that period is an unsuitable reference point
- Many liquidity metrics were substantially better just before the crisis relative to earlier periods
  - Bid-ask spreads were lower immediately before the crisis across assets (except US equities)
  - Price impact of trading was half or less across assets in 2005-07 compared to earlier periods

Across most assets, liquidity conditions were particularly benign immediately pre-crisis (e.g., bid-ask spreads)



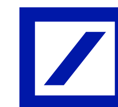
Note: columns denote bid-ask spread for period 2006-07 as per cent of 2002-05 (round-trip cost not bid-ask spread for USD Corp credit). Source: Markit iboxx, Bloomberg Finance LP, IMF, Deutsche Bank Research

The impact of trading on prices in 2005-07 was half or less of that in earlier periods, consistent with unusual liquidity just before the crisis

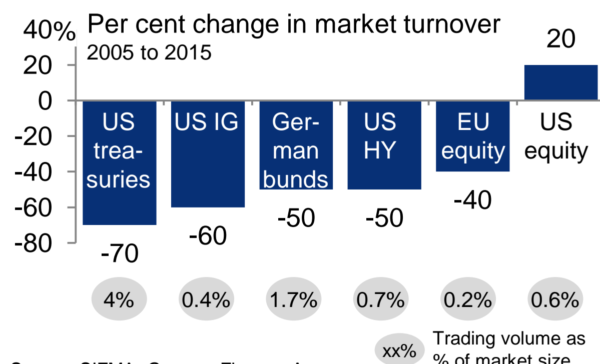


Note: Price impact is calculated as total return divided by trading volume.
Source: Bloomberg Finance LP, Datastream, Haver Analytics, Deutsche Bank Research

But there is indeed evidence of deterioration in some metrics of liquidity in recent years

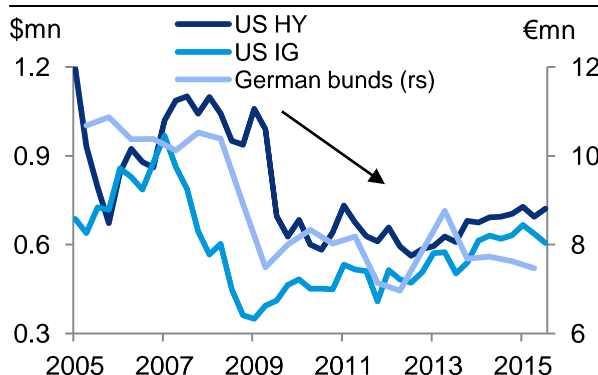


Trading volumes relative to market size have fallen across assets, excluding US equities



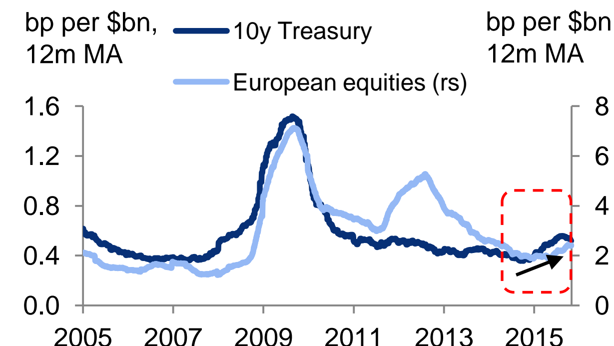
Source: SIFMA, German Finance Agency, Datastream, Bloomberg Finance LP, Deutsche Bank Research

Average trade size has declined across assets



Source: SIFMA, German Finance Agency, Deutsche Bank Research

Price impact of trading in some assets has risen, consistent with lower liquidity



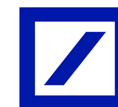
Source: Bloomberg Finance LP, Datastream, Haver Analytics, Deutsche Bank Research

- Market turnover (trading volumes relative to market size) has generally plunged across assets
- Some of the largest drops have come in most liquid assets
  - Treasury: -70% versus 2005
  - Bund: -50% over same period
- US equities are an outlier in this trend – turnover has risen slightly

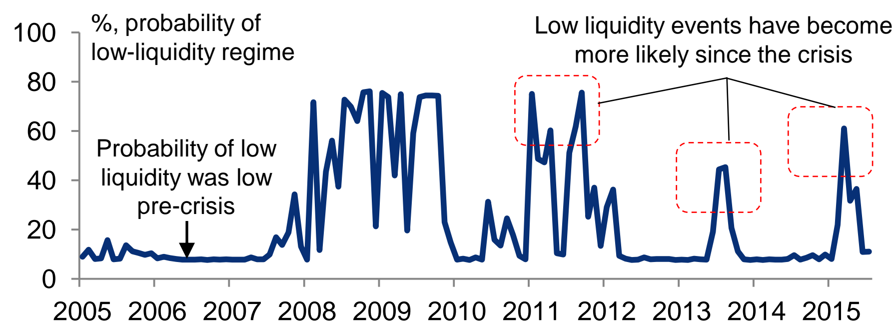
- Average trade size has declined
  - About 30% below pre-crisis for US credit, German bunds
- Smaller transactions could indicate difficulty for larger trades from low liquidity, but also likely reflect rising electronification
- The recent uptrend, at least in US credit, suggests small trade sizes may be a lingering effect of crisis

- Price impact of trading appears to be rising in some assets (e.g., US Treasuries, European equities)
  - Levels remain far below crisis
- This signals lower liquidity, as a given level of trading volume has a larger impact on asset returns
- Suggests it may be more difficult to transact in size without affecting price

And more importantly, liquidity has proven to not be resilient, as ample liquidity has been an illusion during times of stress

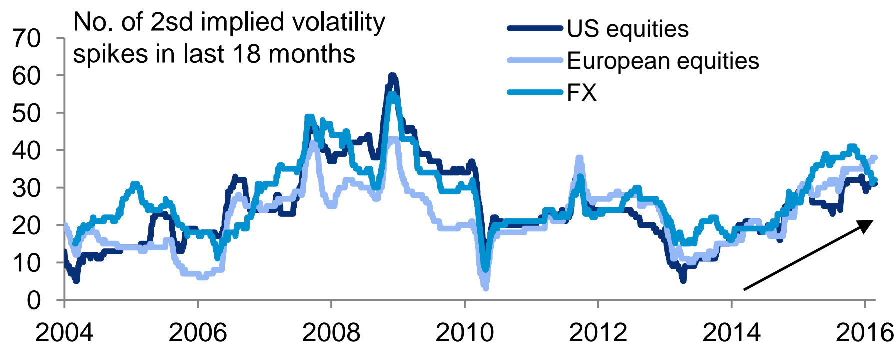


The likelihood of low-liquidity events has risen substantially since the crisis: the Treasury market is an example



Note: liquidity regime probability as calculated by the IMF. Source: IMF, Deutsche Bank Research

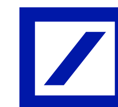
Number of spikes in implied volatility, a proxy for liquidity spikes, has trended up and is near the highest in a decade (excl. financial crisis)



Source: Bloomberg Finance LP, Deutsche Bank Research

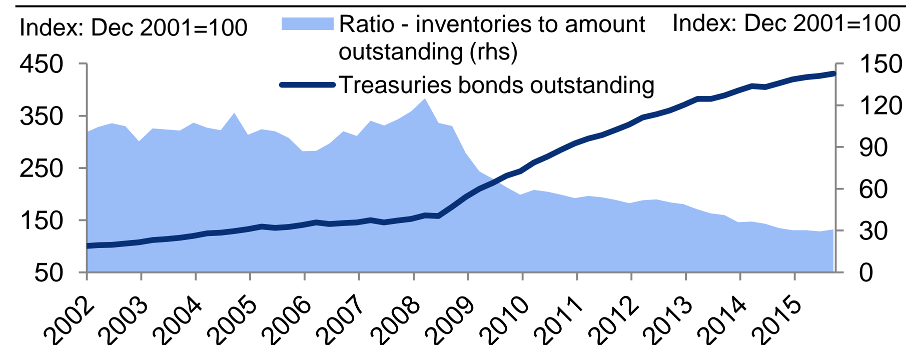
- The absence of broad-based deterioration in average liquidity does not mean that liquidity is fine, as liquidity resilience could still be impaired
- Indeed, liquidity has seemed to vanish during periods of market stress, suggesting that resilience has been a significant problem
- IMF estimates suggest that bouts of illiquidity have become more common since the crisis
  - For example, several episodes of illiquidity in the US Treasury market since the crisis vs. no spikes in 2005-2007
- Spikes in implied volatility, a proxy for liquidity spikes in US Treasury and equity markets according to NY Fed analysis, have trended up
  - Number of implied volatility spikes in past 18 months at or near highest level in last decade (excl. crisis) for US, European equities and FX
  - Illiquidity shocks also elevated for US Treasuries

In fixed income markets, observers have focused on the large drop in dealer bond inventories relative to bonds outstanding…



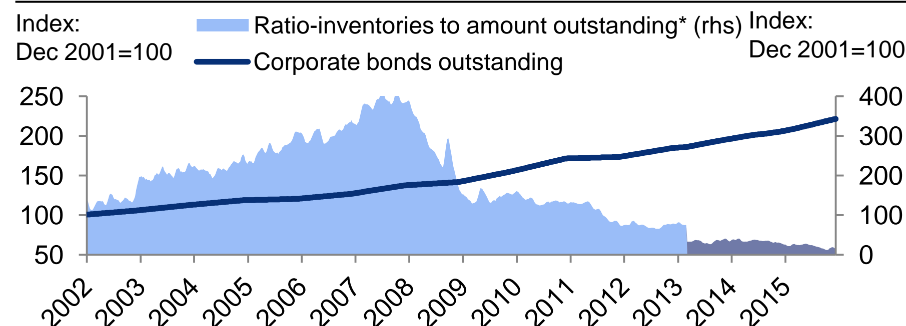
- Broker-dealers play an active market-making role as providers of liquidity in over-the-counter markets
- Their ability to provide liquidity is constrained by their balance sheet, among other things
- This explains why dealer inventory data in the US has drawn so much attention in recent years
- While the stock of bonds outstanding has expanded considerably...
  - US Treasury issuance on the back of US fiscal deficits post-crisis
  - Corporates have issued considerably, to take advantage of historically low interest rates
- ...Dealer bond inventories have not followed through and have actually fallen
- The situation is very likely to be similar in Europe
  - Stock of outstanding debt has expanded for both sovereign and corporate markets
  - Dealer inventory data are unavailable but anecdotal evidence suggests a similar trend

Drop in dealer inventories of US bonds has drawn attention. US Treasuries: inventories to outstanding ratio down 70% from Dec-01



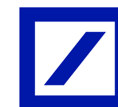
Source: Haver Analytics, Fed, US Treasury ,Deutsche Bank Research

US corporate bonds: story likely similar, but a change in definition in the inventories series does not allow for a robust comparison

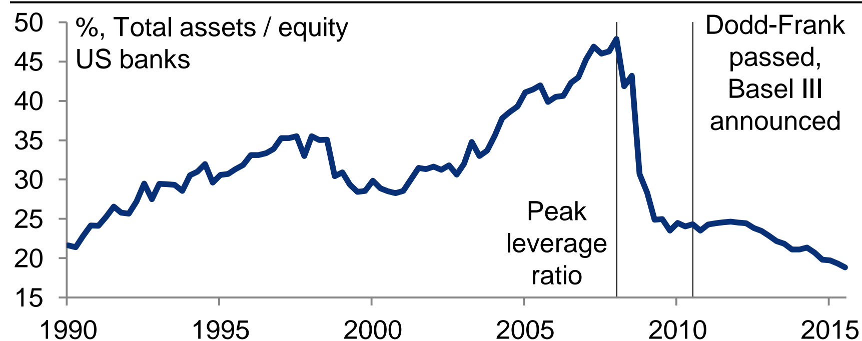


Note: corporate bond dealer inventories data reflect a change in definition in Apr-2013.
Source: Haver Analytics, SIFMA, Deutsche Bank Research

…Blaming tighter bank regulation post crisis – even though the evidence is not conclusive

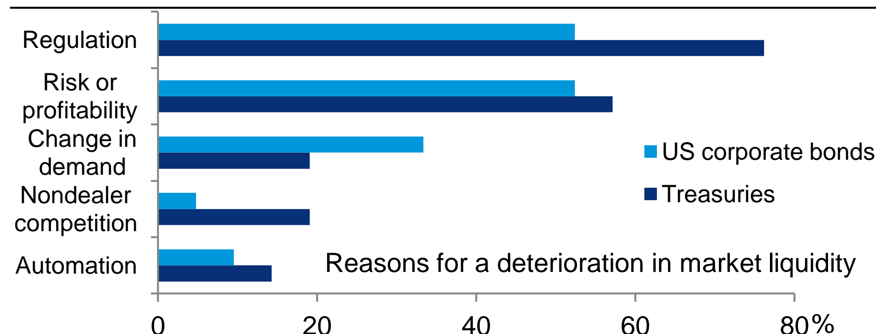


Broker-dealer leverage is cyclical and peaked well ahead of tighter regulations…



Source: Federal Reserve, Haver Analytics, Deutsche Bank Research

…But in addition to decreased risk taking, US dealers have noted regulation is the primary reason for deterioration in market liquidity

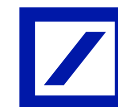


Note: Percent of survey respondents citing in top three reasons for worse liquidity
Source: Federal Reserve Senior Credit Officer Opinion Survey (Jun-2015), Deutsche Bank Research

- Tighter regulation is commonly blamed for shrinking dealer balance sheets and the decline in traditional market-making activity (e.g., broker-dealers)
- Regulatory changes have very likely contributed to these trends and hurt liquidity...
  - Higher capital charges, limits to bank leverage, curbs on proprietary trading have all raised the cost of a large balance sheet
  - Restrictions on derivatives trading have impaired liquidity in the underlying asset
- ...But these trends are the result of various factors – the reality is more complex
- Declining risk appetite has also played a role – broker-dealer leverage is very cyclical and plunged well ahead of tighter regulation*
- Surveys of US dealers suggest lower risk appetite and profitability have been nearly as important as regulation for lower liquidity
- Euro area surveys are consistent with this narrative: Decline in risk appetite, profitability and regulation have all contributed to the decline in market making

Note (*): Of course, expectations of tighter regulation could have contributed to the decline in dealer leverage ahead of the actual implementation.

Both cyclical and structural drivers are affecting liquidity, with cyclical conditions partly masking the negative structural trends

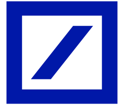


Cyclical and structural factors affecting liquidity conditions

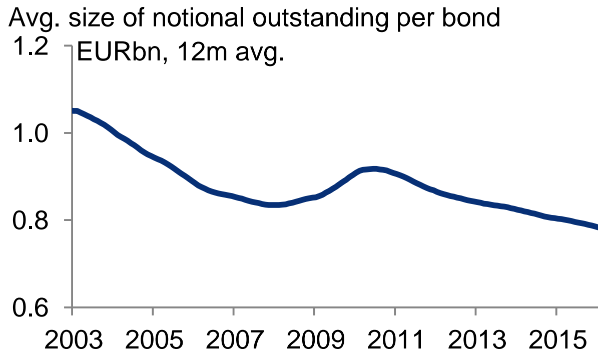
	Factor	Impact	Comments
Cyclical	Risk appetite	+	▪ Higher risk appetite, which we have typically had since the crisis, means a higher willingness to trade, thus improving liquidity
Cyclical	Accommodative monetary policy	?	▪ Positive effect in cases, e.g., improved funding for financial intermediaries, more risk appetite ▪ Negative impact in certain markets, e.g., QE purchases reduce availability of some assets ▪ One-sided markets, forward guidance reduce volatility & tension between market participants
Structural	Rise of smaller bond issues	–	▪ Increase in the number of small issues reduces liquidity for each individual bond ▪ Trading in any issue is often infrequent and lumpy
Structural	Regulatory changes	–	▪ Tighter bank capital and bank leverage regulation and proprietary trading constraints, aimed at reducing bank systemic risk, have lowered bank risk tolerance and market-making abilities ▪ Changes to introduce more pre- and post-trade transparency are positive for liquidity
Structural	Fewer primary dealers	–	▪ Sharp fall in number of primary dealers, traditional providers of market-making services and absorbers during liquidity shocks
Structural	Rising buy-side concentration	–	▪ More concentrated asset ownership reduces liquidity ▪ Increased risk of herd-like behaviour
Structural	Rising mutual fund holdings	–	▪ Larger holdings by mutual funds, especially open-ended mutual funds, is negative for liquidity ▪ Open-ended mutual funds (and ETFs) that offer daily liquidity can exacerbate liquidity shocks
Structural	Electronification	?	▪ In principle makes it easier to match buyers and sellers, improving liquidity ▪ But the rise of high-frequency and algorithmic trading may increase the probability and severity of liquidity shocks and market dislocations

Impact on liquidity: + Improves ? Unclear – Worsens

Examples of cyclical and structural trends

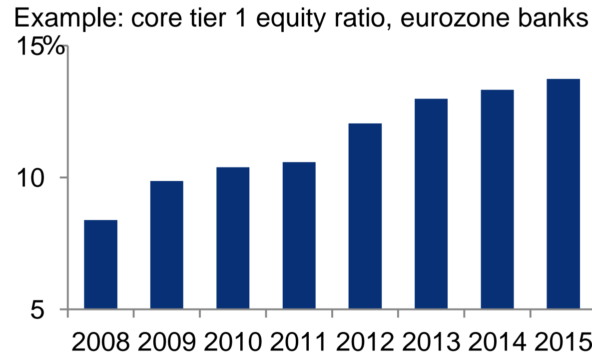


Rising number of smaller issues, e.g., Europe



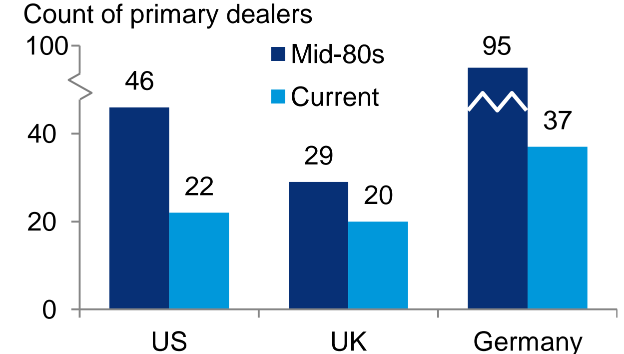
Note: based on iBoxx EUR non-financials index
Source: Markit, Haver Analytics, Deutsche Bank Research

More onerous bank regulation



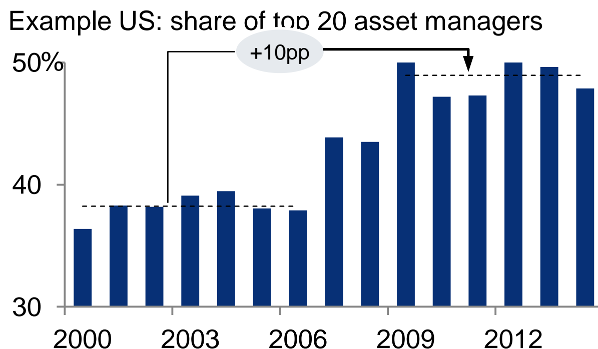
Note: End-September for 2015. Source: ECB, Deutsche Bank Research

Sharp drop in number of primary dealers



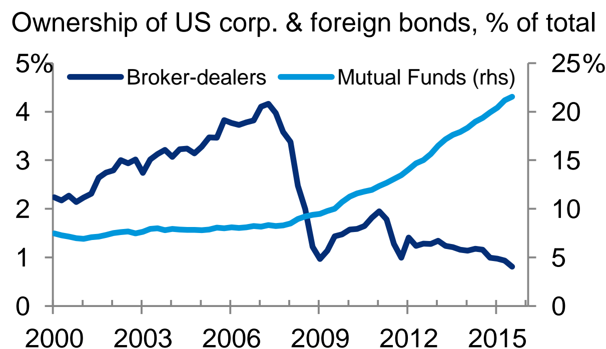
Source: Fed, UK DMO, German Finance Agency, IMF, Deutsche Bank Research

Higher concentration in buy-side



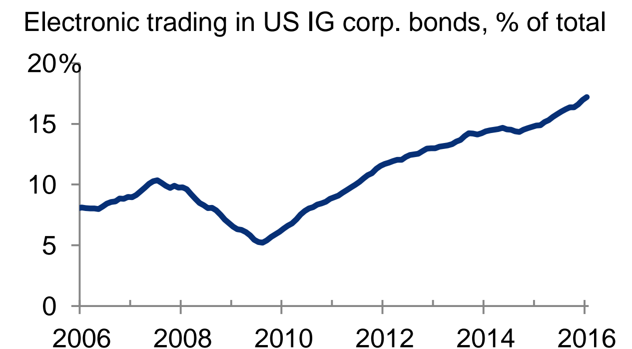
Source: Towers Watson, Deutsche Bank Research

Increasing role of mutual funds in bond mkts.



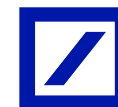
Source: Fed, Haver Analytics, Deutsche Bank Research

Rise in electronification and electronic trading



Source: MarketAxess, FINRA TRACE data, Haver Analytics, Deutsche Bank Research

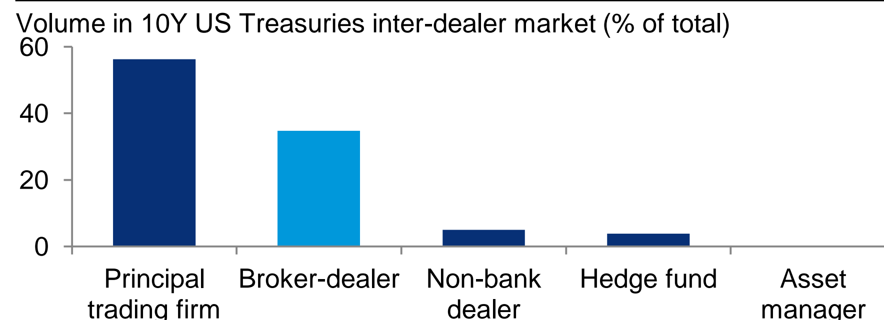
Alternative liquidity providers have emerged as banks scale back their market making and liquidity provision – the impact is unclear



- Banks taking a lesser role in market making and liquidity provision create opportunities for others
- The new liquidity providers include shadow banking players such as hedge funds, private equity, SWFs* as well as principal trading firms (PTFs)**
  - Private equity firms have set up credit arms to operate in corporate bond markets
  - PTFs now account for over half of trading activity in the futures and electronic inter-dealer cash market for Treasuries
- The overall impact of these new liquidity providers is still unclear – and traditional liquidity providers are likely to remain key in the short to medium term
  - More players willing to step in and provide liquidity should make liquidity more resilient and help put a floor on prices
  - However, they have arguably fewer incentives to support market making in periods of stress
  - And are likely to be more aggressive pricing-wise, which can lead to adverse effects

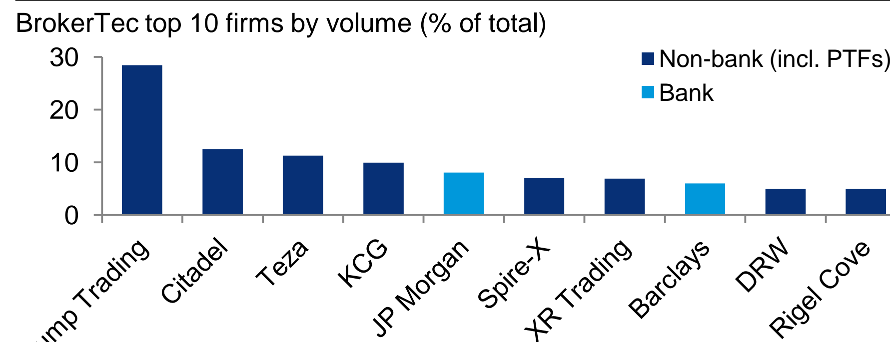
    …Unlike broker-dealers, these players don't sell additional services to clients

PTFs account for over half of trading in the Treasuries market



Note: based on BrokerTec data; BrokerTec is an electronic trading platform that captures around two thirds of the inter-dealer market for Treasuries. Source: Joint Staff Report (2015), Deutsche Bank Research

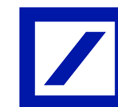
…and only 2 of the top-10 firms in BrokerTec are broker-dealers



Note: based on May-June 2015 data. Source: Risk.net, Deutsche Bank Research

Note: (*) Sovereign wealth funds. (**) According to Joint Staff Report (2015), principal investor who deploys proprietary high frequency automated trading strategy and may be registered as broker-dealer but does not have clients in a typical broker-dealer business model; operates in inter-dealer market

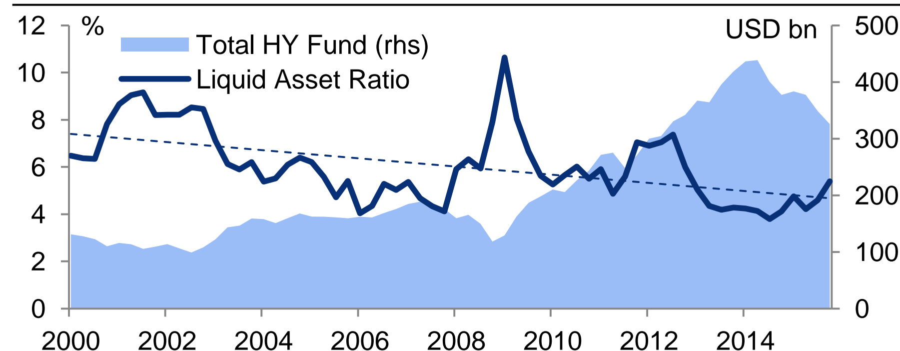
One response from investors has been to look at ETFs / MF to manage liquidity risk – but this does not solve liquidity concerns



Investors have turned to ETFs and mutual funds for liquidity...

- Rise in use of ETFs and mutual funds to mitigate liquidity concerns
- ETFs in particular have become very popular...
  - US ETF market more than tripled in 2007-14
  - Record number of US ETF launches in 2015
- ...And have increasingly invested in small and illiquid bonds via bond funds

Funds have become increasingly invested in illiquid underlying assets while trimming buffer of liquid assets (e.g., HY funds)



Note: US Domiciled Domestic Funds. Source: ICI, Haver Analytics, Deutsche Bank Research

...But problems arise from mismatch between illiquid underlying assets and liquidity promised by funds

- But ETFs and mutual funds also present problems
- Perceived liquidity of vehicles is inconsistent with illiquidity of underlying asset (i.e. liquidity mismatch)
- If losses lead to large redemptions, funds may need to sell illiquid assets at a discount*, raising losses...
- ...A dynamic that is likely to be exacerbated by herd behaviour, especially with rise of retail ownership
- However, systemic risk is limited by low leverage and still-small share of assets under management

U.S. Stock Mutual Funds Suffer Biggest Weekly Outflow Since 2011

Bloomberg, 12th Nov 2015

Fund closure rattles credit markets

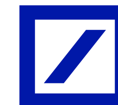
FT, 11th Dec 2015

Record redemptions hit US corporate bond funds

FT, 18th Dec 2015

Note (*): ETFs and mutual funds have a number of ways to deal with redemptions before selling underlying assets, including holding liquid assets, redemption in-kind (i.e., giving a basket of bonds to investors), and access to credit facilities, among others.

The factors affecting liquidity are unlikely to recede anytime soon – and investors should get used to these conditions



- Market commentary that liquidity conditions have worsened across the board appears misplaced
- But analysis does suggest that in some areas liquidity, and more importantly the resilience of liquidity, has eroded
- It is difficult to see a reversal of the structural factors that have affected liquidity in recent years – and cyclical factors could turn more unfavourable
- As such, liquidity conditions are unlikely to improve in the short to medium term
- Many players have put forward proposals aimed at improving liquidity conditions, but it is clear that there is no silver bullet
  - Proposals from private sector market participants, official institutions, academia
  - Generally it will take time to see sustained improvement in market liquidity
  - In many cases, the impact is likely to be minimal
- Investors should get used to these liquidity conditions – and factor the risk of lower liquidity into their investment decisions
  - Flash events and bouts of volatility likely to stay

Many proposals have been put forward* to improve liquidity, but there is no silver bullet

Proposal	Commentary
Move corporate bond trading to on-exchange	▪ Limited applicability – Highly heterogeneous market relative to equities or FX (no. of issuers, issues, sizes, maturities, ratings) – Pricing often needs request for quotes
Incentives to standardise issuance (size, maturity)	▪ Could help but only on the margin, for larger issuers that make up a fairly small proportion of the HY and IG universes
Regular real-time monitoring of liquidity conditions	▪ "No brainer" for central banks and financial supervisors ▪ Focus on range of liquidity metrics ▪ Especially relevant for corporate bonds
Targeted central bank support in periods of financial stress	▪ Could include temporarily flexing collateral policies to alleviate liquidity constraints
Mitigate liquidity mismatches in asset manage-ment industry	▪ Cannot be eradicated, but mitigants should focus on pricing the cost of liquidity

Note (*): Table lists a selection of proposals from IMF, BIS, BlackRock

Appendix 1
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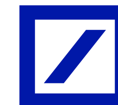

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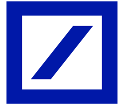
The authors wish to acknowledge the contributions made by Shakun Guleria in the preparation of this report.



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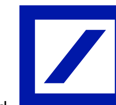

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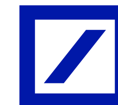

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