Developments in credit market liquidity

SEC FIMSAC Meeting

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Sonali Theisen, Global Head of Market Structure & Data Strategy
Citi Global Credit & Securitized Markets

Agenda

Credit as a principal market

Liquidity in credit – macro themes

Liquidity in credit – microstructure

Market structure considerations

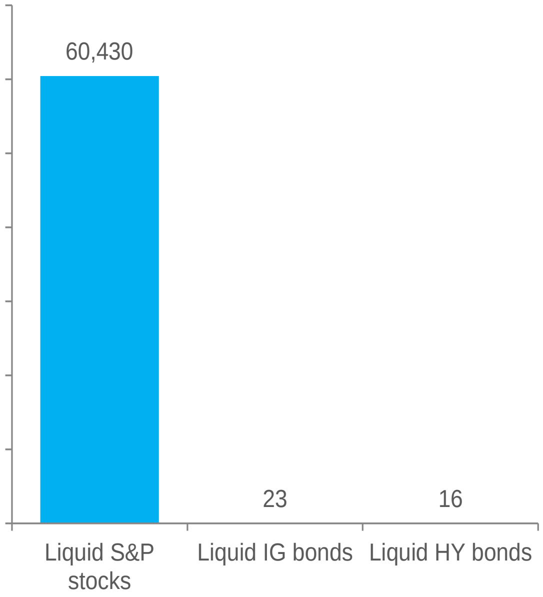
Trading in credit versus equities

Many more bonds than stocks
Composition of major equity indices

		Unique securities*	Market cap/ Outstanding ($Tn)
S&P 500	Equities	**500**	**23.48**
	Bonds	**11,990**	**4.35**
Russell 1000	Equities	**1,000**	**26.58**
	Bonds	**13,083**	**4.75**
Deutsche Börse	Equities	**30**	**1.43**
	Bonds	**5,559**	**0.73**
Euro Stoxx 50	Equities	**50**	**3.47**
	Bonds	**8,173**	**1.44**

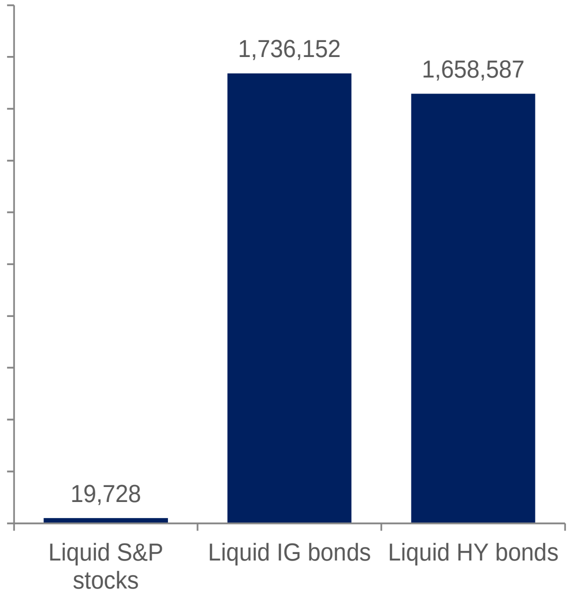
Source: Bloomberg, Dec 2017. *Bond unique securities equals total count of instruments per corporate in relevant equity index.

Bonds trade less often…
Average # trades per day



Source: Bloomberg, FINRA, TRACE. Top 50 IG & HY bonds and top 50 S&P 500 equity tickers by volume, FY 2017.

…but in larger sizes
Average trade size, $



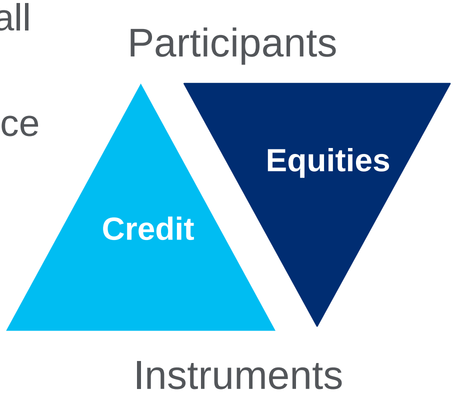
Source: Bloomberg, FINRA, TRACE. Top 50 IG & HY bonds and top 50 S&P 500 equity tickers by volume, FY 2017.

Relative to equities, few trades are spread out across many corporate bonds

Ingredients for principal versus agency-driven markets

Principal – Credit

1. Typically non-standardized products
2. Larger average ticket sizes; less retail involvement due to instrument features
3. No easy borrow, particularly on small size
4. Algorithmic trades not a major source of volume
5. Sustained two-way flow unlikely without market-makers to commit discretionary capital
6. Liquidity takers less willing/able to manage their own execution risk; rely on discretionary capital to warehouse or move risk
7. Counterparty identity more important due to lack of active daily trading in most instruments
8. Predominantly negotiated market



Agency – Equities

1. Typically standardized products
2. Smaller average ticket sizes; strong retail involvement due to simplicity of instruments
3. Easy borrow facilitates two-way flow
4. Algorithms promote ticket proliferation
5. Sustained two-way flow likely without market-makers to commit discretionary capital
6. Liquidity takers more willing/able to manage their own execution risk by breaking trades into smaller lots in firm orders
7. Counterparty identity less important due to depth of liquidity
8. Firm, disparate liquidity on same instrument across multiple venues

Credit has traditionally relied on warehousers of risk

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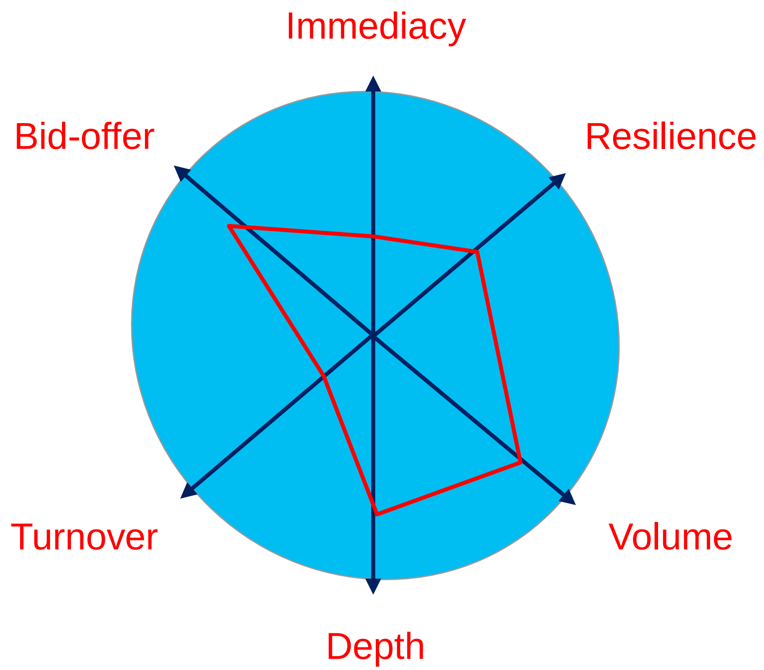
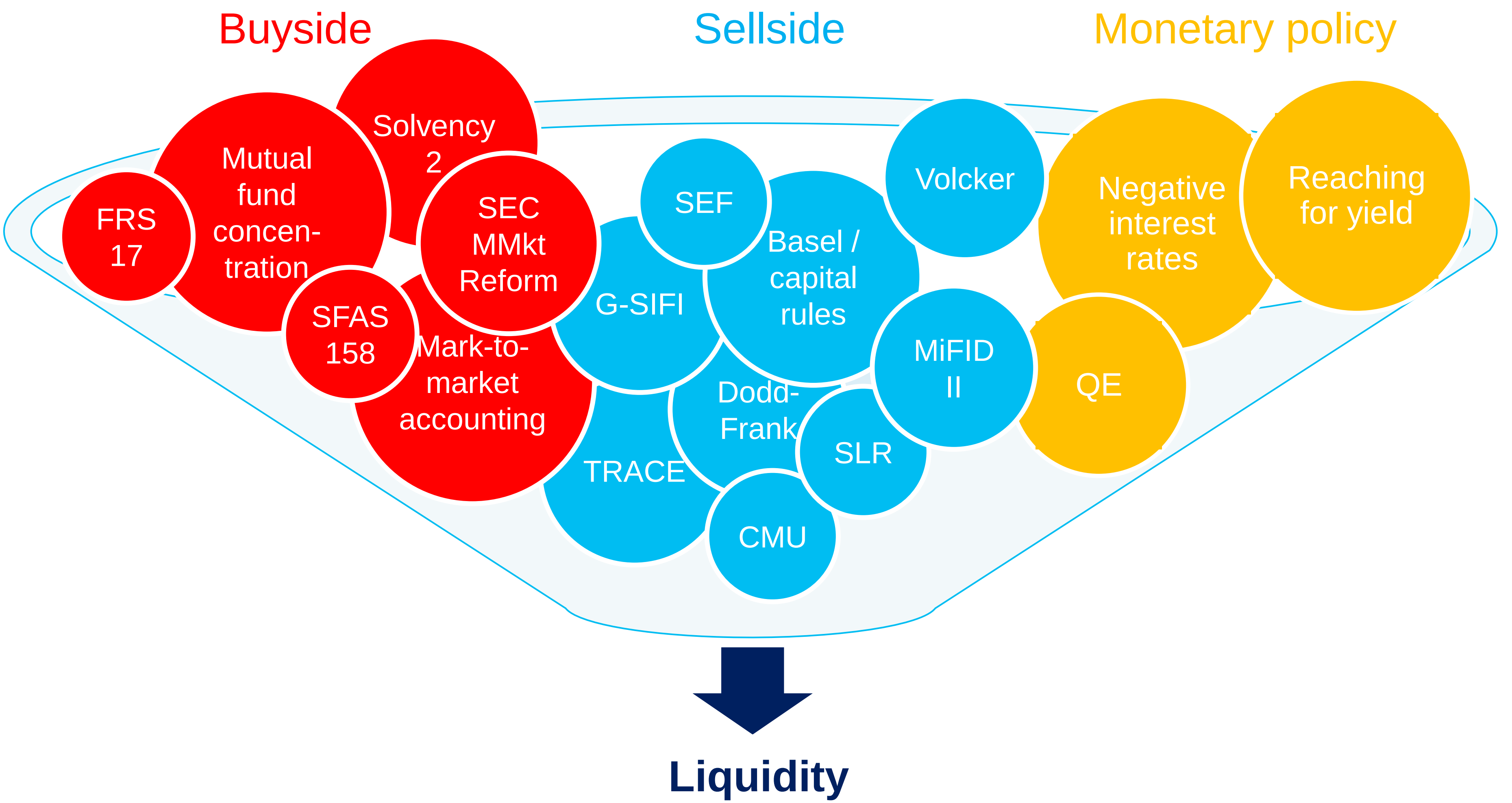
What do we mean by liquidity?

Absolute levels and changes may be observed



But it is impossible to define optimal targets

Cumulative impact of regulation and policy is difficult to isolate

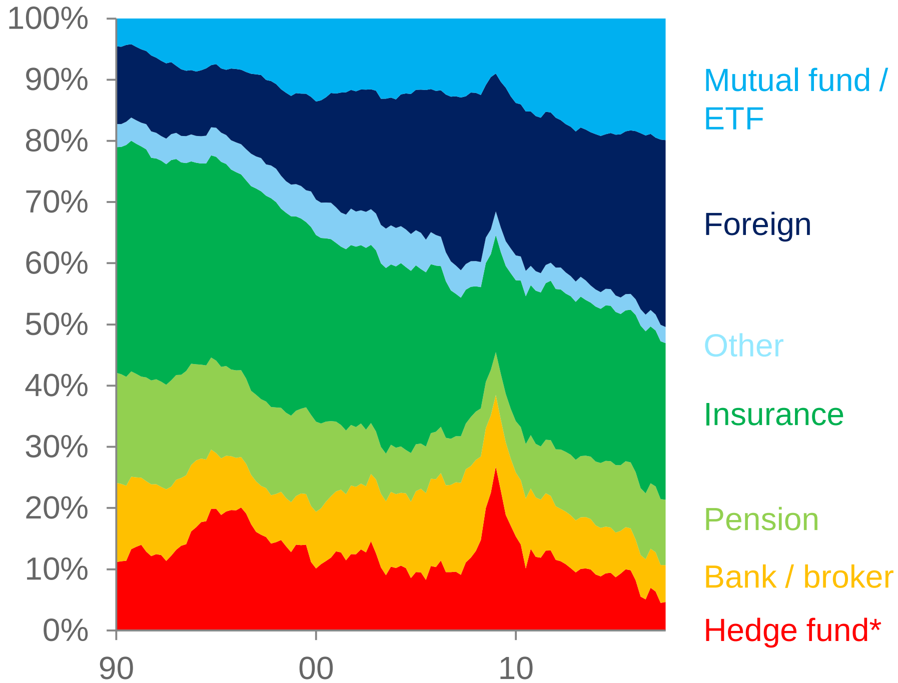


But the outcome is reduced buffers and a loss of heterogeneity

Market diversity has fallen significantly

Ownership base may seem diverse…

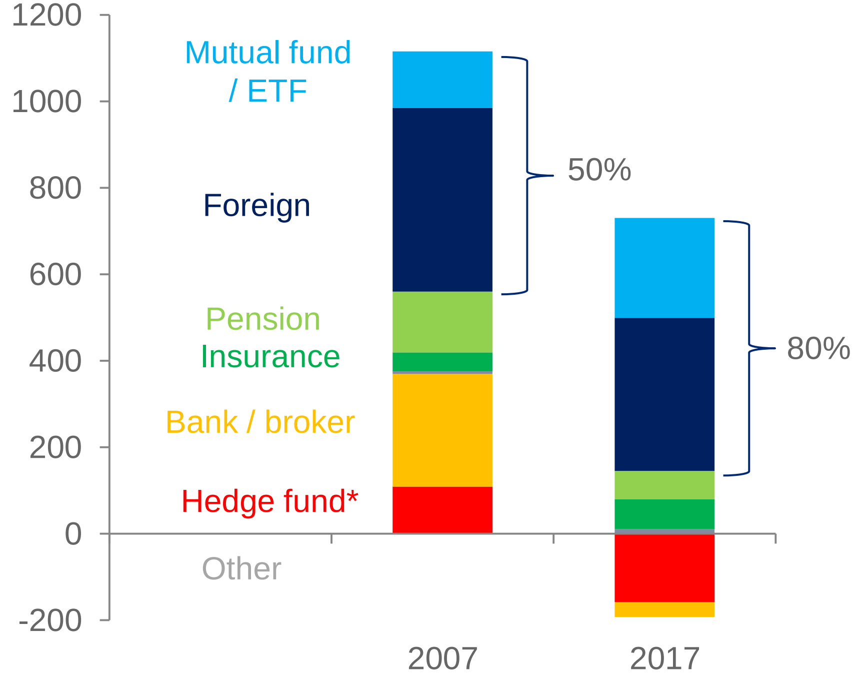
US corporate bond outstandings by owner, % total



Source: Federal Reserve Flow of Funds, Haver Analytics.
*Although described as "household" in flow of funds, series likely dominated by hedge funds.

…but 80% of buying is funds and foreigners

US corporate bond net buying, 4Q sum, $bn



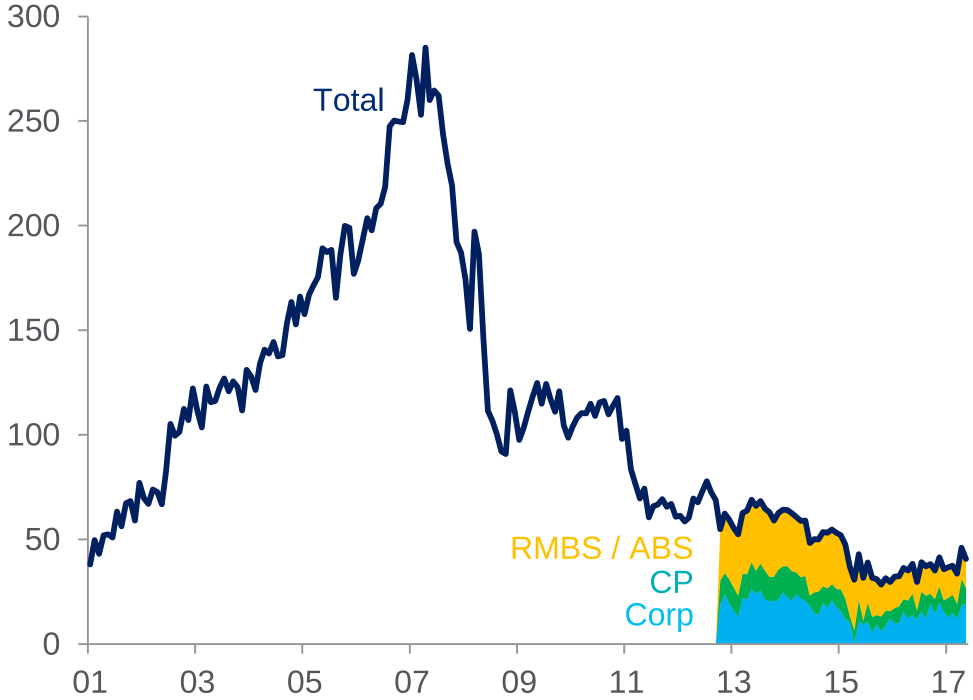
Source: Federal Reserve Flow of Funds, Haver Analytics.
*Although described as "household" in flow of funds, series likely dominated by hedge funds.
2017 data are 4Q16 through 3Q17.

The buyer base has become more homogenous

Decline in dealer inventory

Balance sheet: contraction or correction?

Street holdings of credit*, $Bn



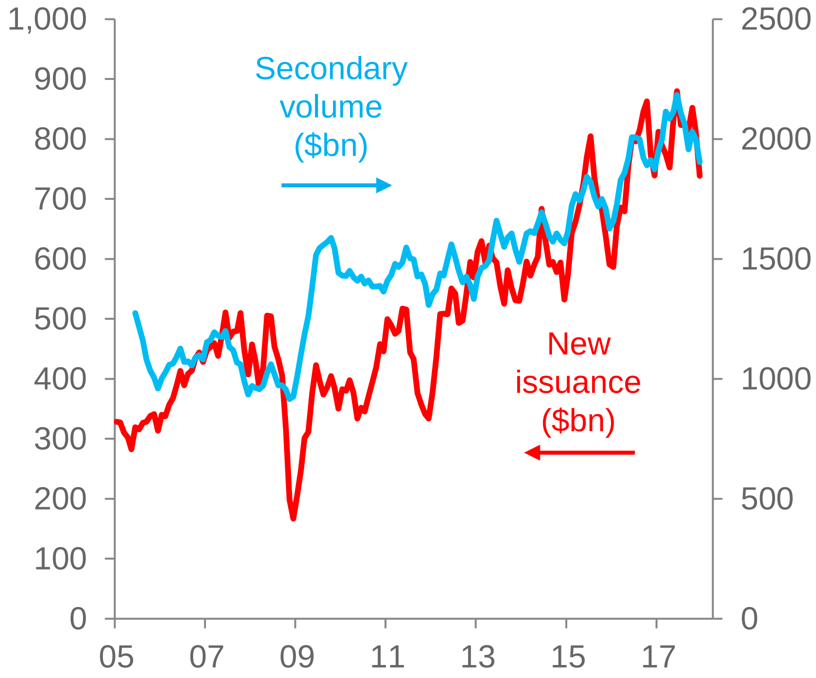
Source: Federal Reserve.
*Inventory numbers also include RMBS/ABS, which were likely much larger in 06-07.

After a decade of deleveraging, street inventory is similar to early 2000s

Issuance, volumes and bid-offer continue to improve

Traded volumes up with issuance

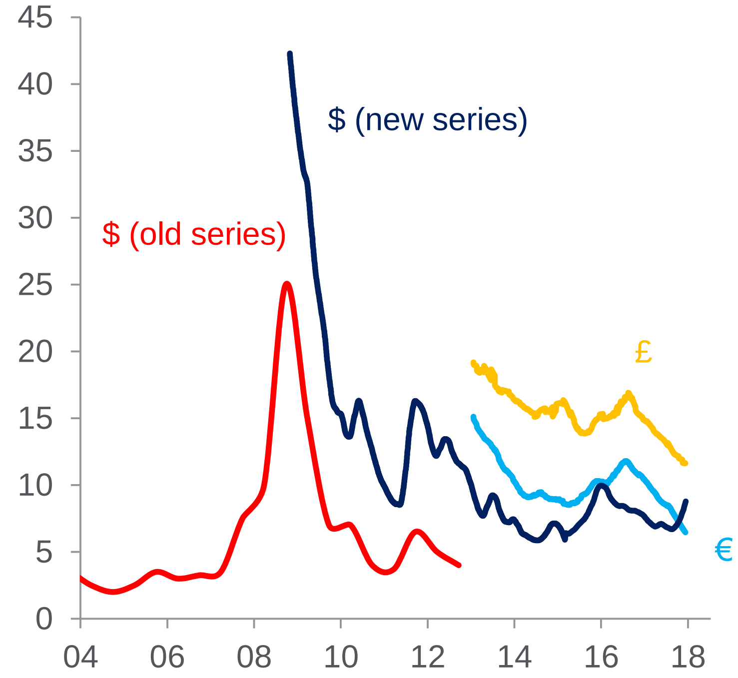
US IG gross issuance vs secondary trading (6m sum, $bn)



Source: TRACE, Dealogic, Citi.

Bid-offer spreads are tight

Average bid-offer spread in IG cash (bp)



Source: MarketAxess Bid-Ask Spread Index (BASI), Citi.
Note that all series are derived and may not be directly comparable.

Market is near highs in new issue supply and traded volumes and near lows in bid-offer spread

Capital rules may be impacting risk transformation

The role of market-maker

Absorbs supply and demand imbalances by transforming risk

Risk transfor-mation

Curve risk

(e.g. curve steepeners)

Liquidity

(e.g. off-the-run vs. on-the run)

Instrument type

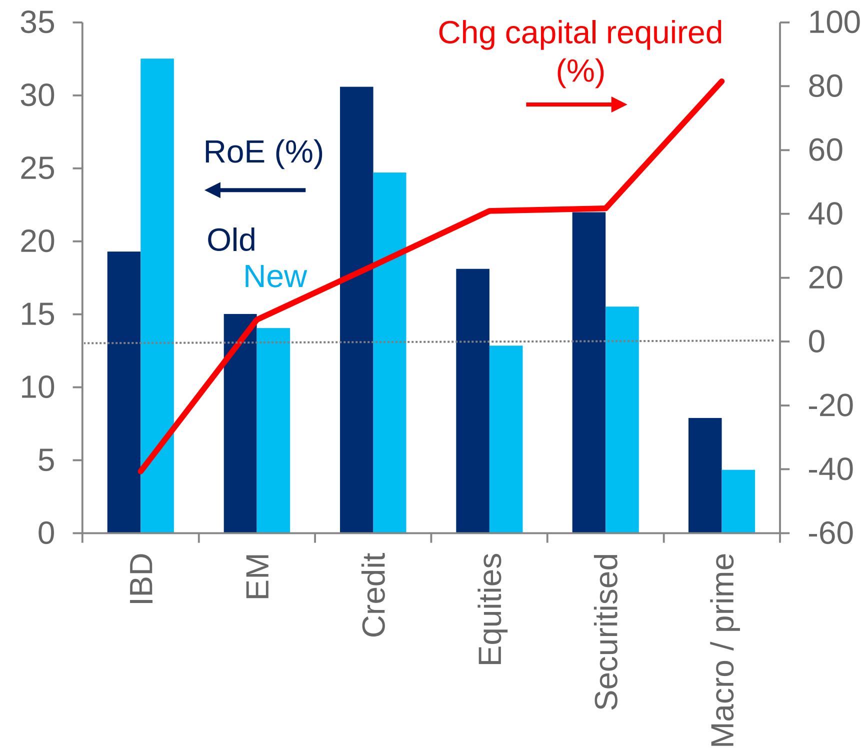
(e.g. funded vs. unfunded)

Replication

(eg. Index reconstruction)

Capital costs have risen

Bank* RoE and change in capital estimates under old and new leverage ratio constraints, by business, %



Source: Citi. *Numbers derived from one particular bank but are likely to be representative.

Market-making has become more expensive in the many cases where trading requires risk transformation

Investors need more conviction to trade

The cost of business…

Citi US Broad Investment Grade Corporate Index
2007 vs. 2017

	Then	*Now*
Transaction Cost Scenario	**12/31/2007**	**12/31/2017**
Citi USBIG Corporates Index YTM	**5.72%**	**3.26%**
Bid-Ask	**2-3 bps**	**2-3 bps**
Assume: Midpoint of Bid-Ask	*2.5 bps*	*2.5 bps*
Duration	6.1	7.5
Bid-Ask Cost, adjusted for duration, round trip	23 bps	28 bps
Transaction Cost as % of Par	**0.23%**	**0.28%**

USBIG Corporates Index Snapshot		
Eff Duration, USBIG, Corp.	6.1	7.5
Spread to Treasury, USBIG, Corp.	+197 bps	+94 bps
# of Issues, USBIG, Corp.	2,936	6,185
Yield to Maturity, USBIG, Corp.	5.72%	3.26%
Market Value, USBIG, Corp. ($ bn)	$1,876	$5,312
Average Life, USBIG, Corp. (years)	10.2	10.6

…with $10mm to invest

Expected transaction costs for switch trade, 1yr horizon
Holding spreads & yields constant (no roll-down)

	Then	*Now*
Expected Transaction Costs	**12/31/2007**	**12/31/2017**
Yield Return, Gross	$571,700	$325,600
Bid-Ask Cost, adjusted for duration, round trip	$23,051	$28,101
Transaction Cost as % of Yield	**4.03%**	**8.63%**

Consider the break-even horizon…

Then | 2007 break-even period = 15 days

Transaction cost = 4.03% of yield; Market yield = 5.72%

Now | 2017 break-even period = 32 days

Transaction cost = 8.63% of yield; Market yield = 3.26%

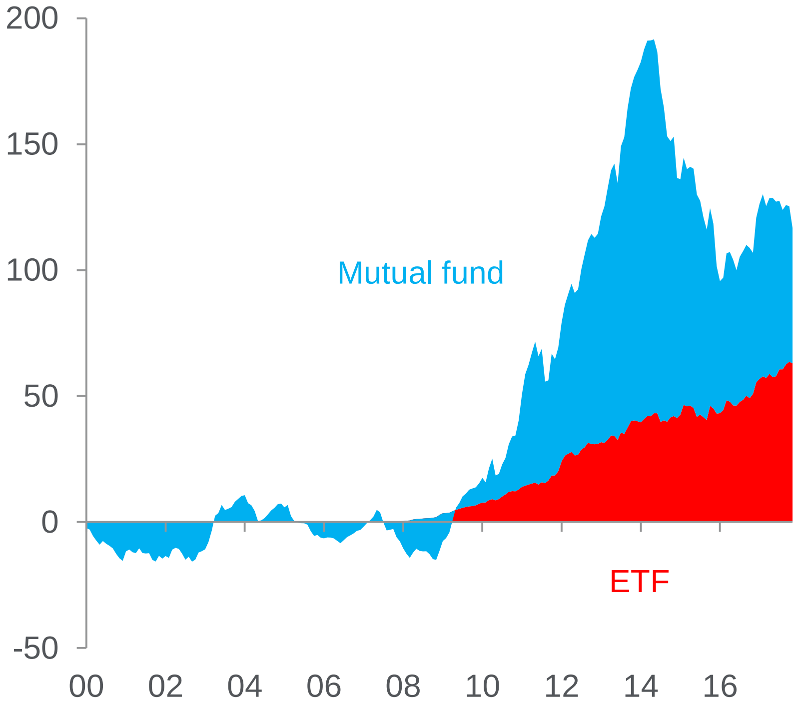
Source: Yield Book, Citi. Assumes a switch into a similar bond (price, yield, maturity) assuming selling at mid-market and buying new security at offer side.

Low yields, low volatility and high transaction costs create longer holding periods and disincentive to trade

ETFs – driving the market, or reacting to it?

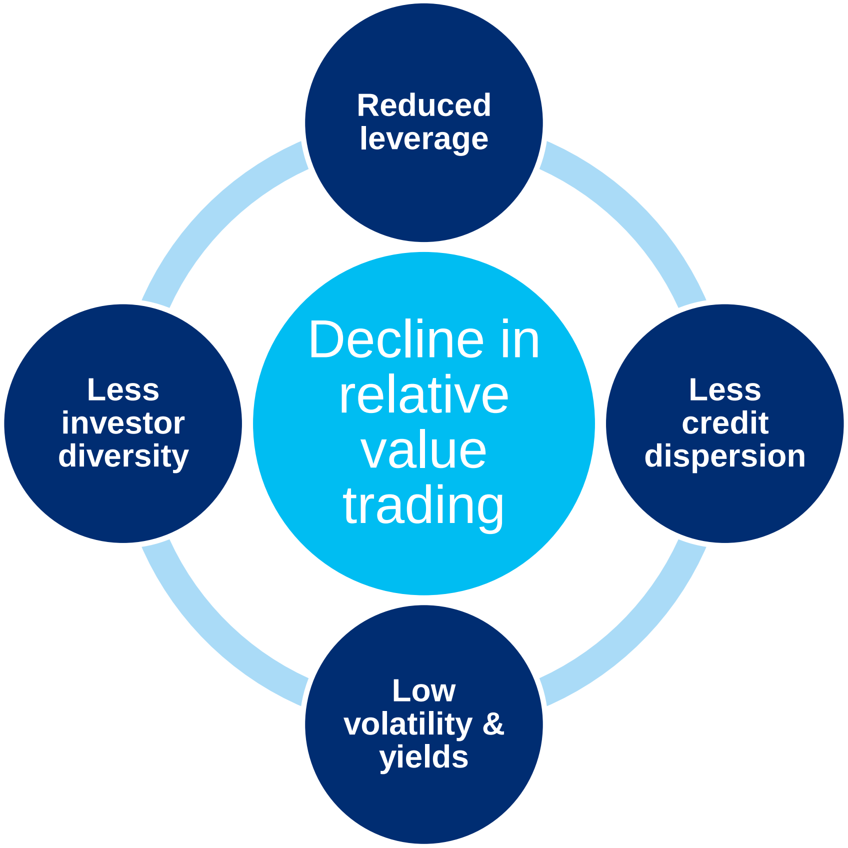
HY Mutual and ETF fund flows

Cumulative inflow since 2000, $bn



Source: ICI, Citi.

Contributors to the rise of passive investing



Higher ETF flows have coincided with a decline in relative value trading and a period of technological innovation

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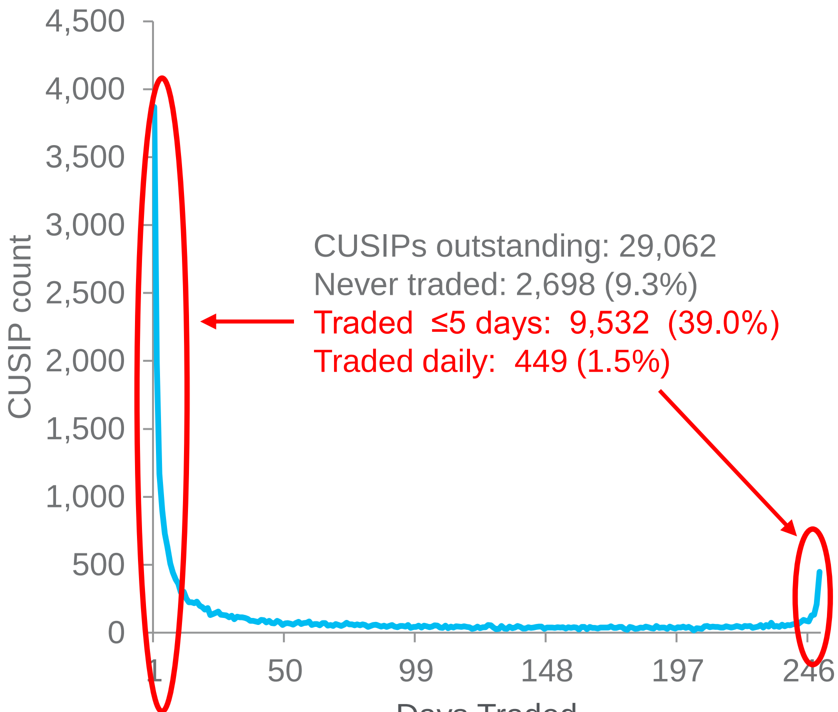
Liquidity in corporate bonds is transient

The liquid core is very, very small….

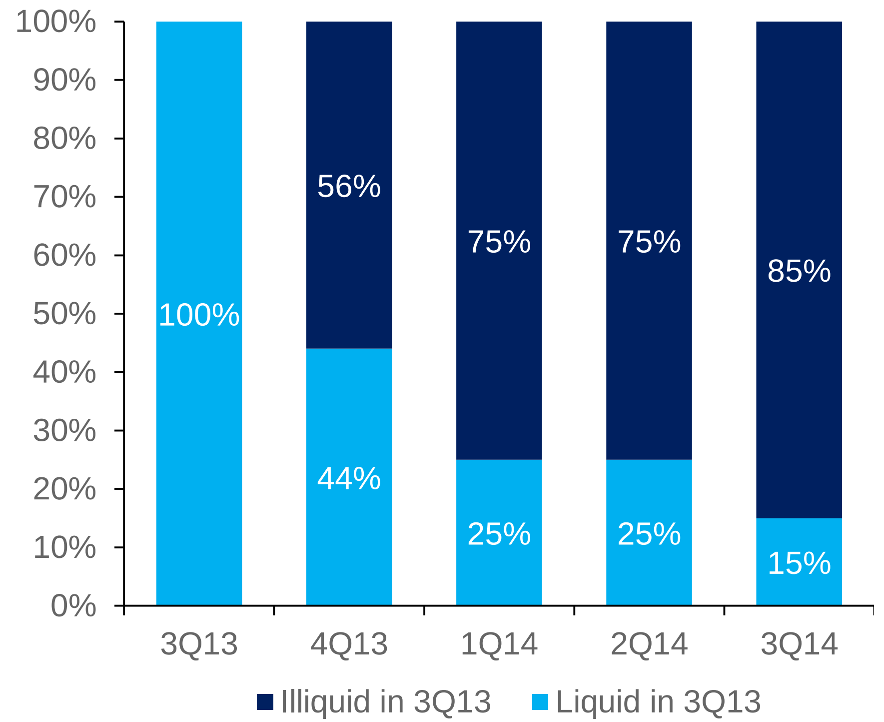
Trading days for US corporate bonds



Source: Citi, Bloomberg, TRACE.

…and it migrates through time

% of bonds that would have been deemed liquid* under MiFID II framework in 3Q13 and again in subsequent quarters, € corps

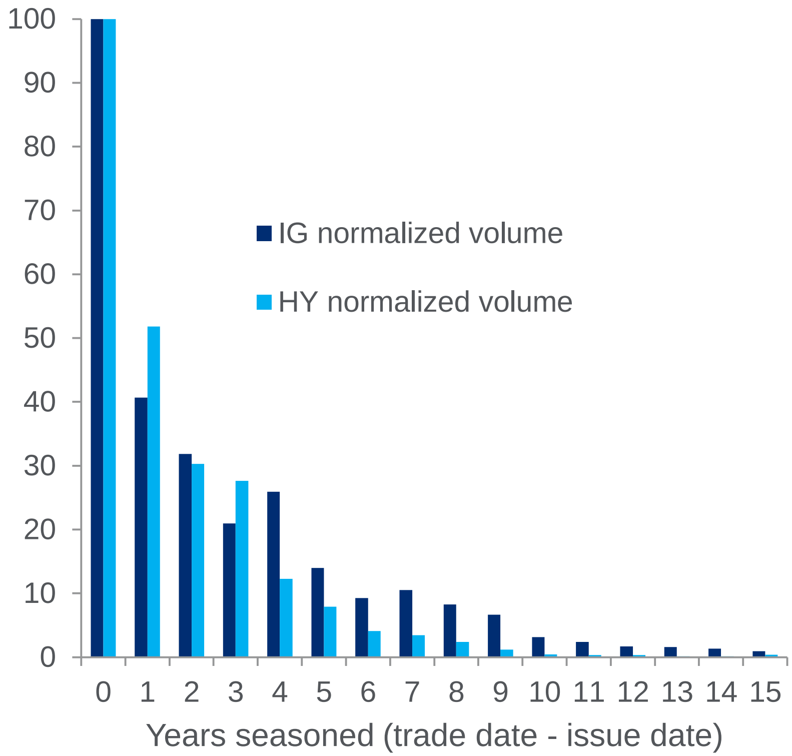


Source: MarketAxess Research.
*Uses previous ESMA (Scenario 6) definition of liquidity: >2,400 trades per year, average daily volume of at least €1m, plus requirements on the number of days the bond traded and number of participants in the market.

Agents connect buyers and sellers only when two-way interest exists, which can be sporadic

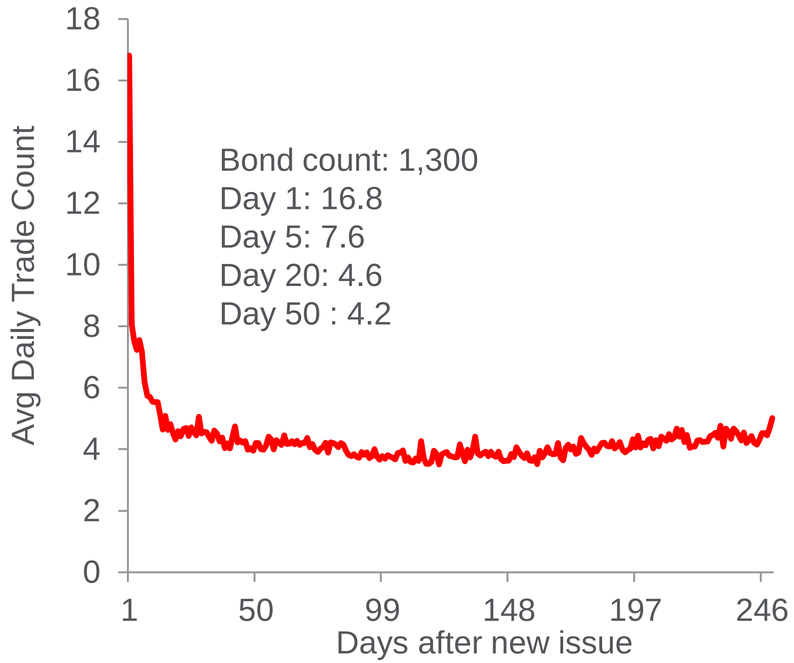
Time since issuance impacts liquidity

Newly issued bonds trade largest volume…
Dealer US corp bond trading data, normalized



Source: Citi, 2014-15.

…as well as trade count
US corp bonds average trade count post-issuance

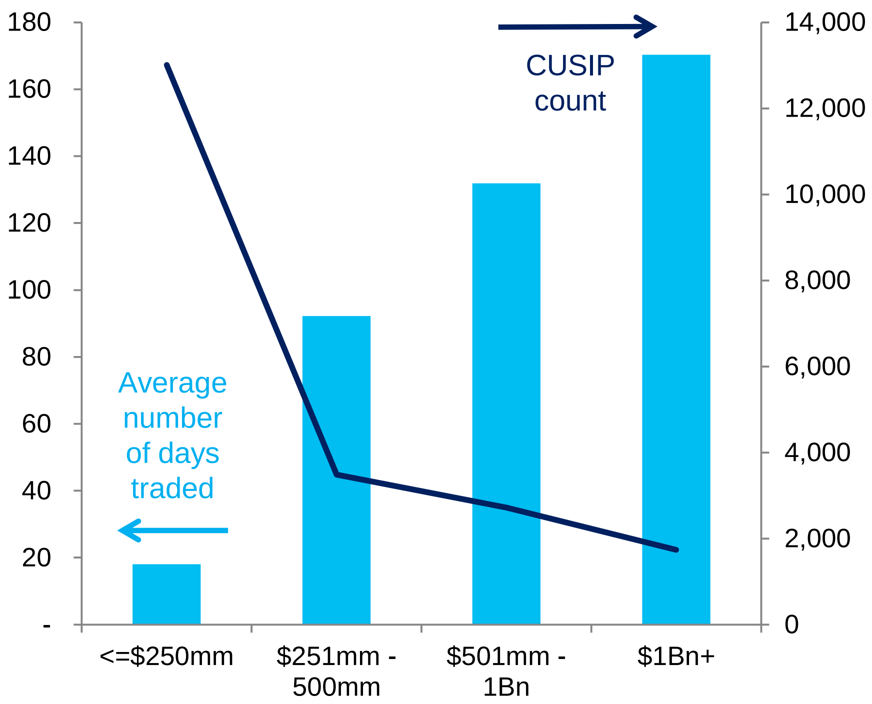


Source: TRACE, 1H15-1H16.

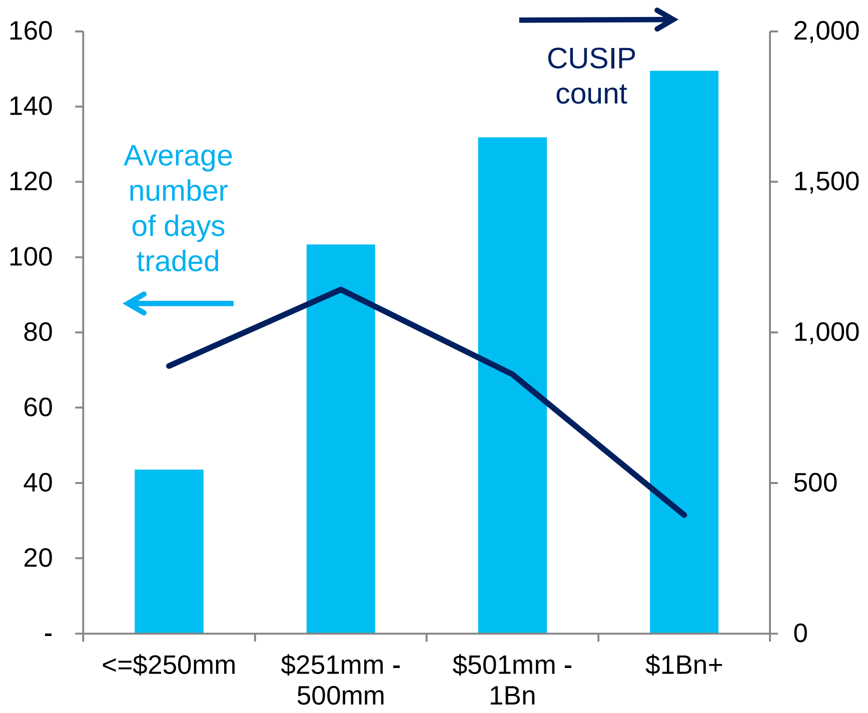
Trading volumes and frequency taper quickly after issuance

Size of issuance impacts liquidity

US IG – Avg days traded by issue size
excluding matured and 144a, including converts



US HY – Avg days traded by issue size
excluding matured and 144a, including converts



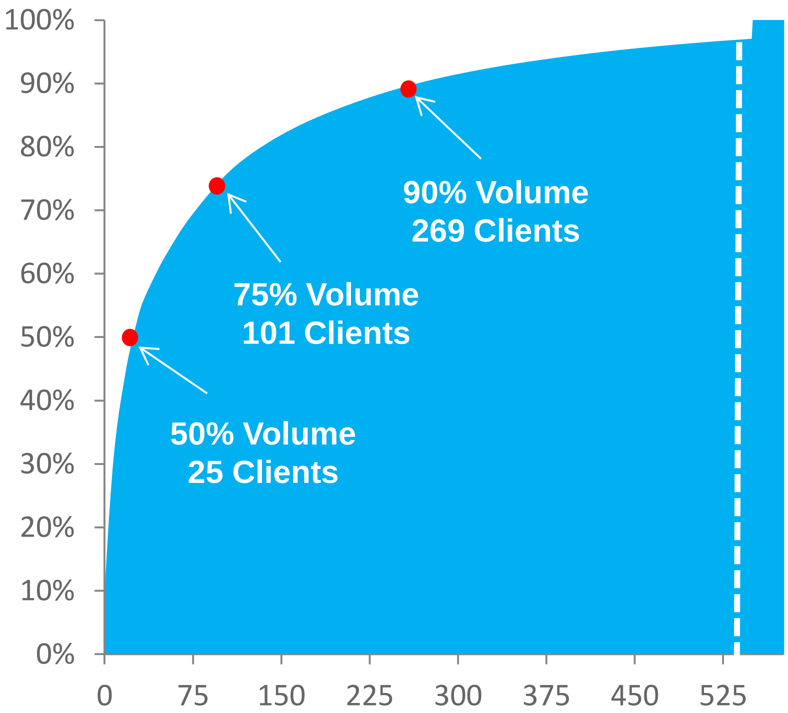
Source: TRACE, Bloomberg FY 2016.

There are many smaller issues which trade less actively than larger issues, especially in IG

Reciprocally high investor and dealer concentration

Half the volume from a few investors…

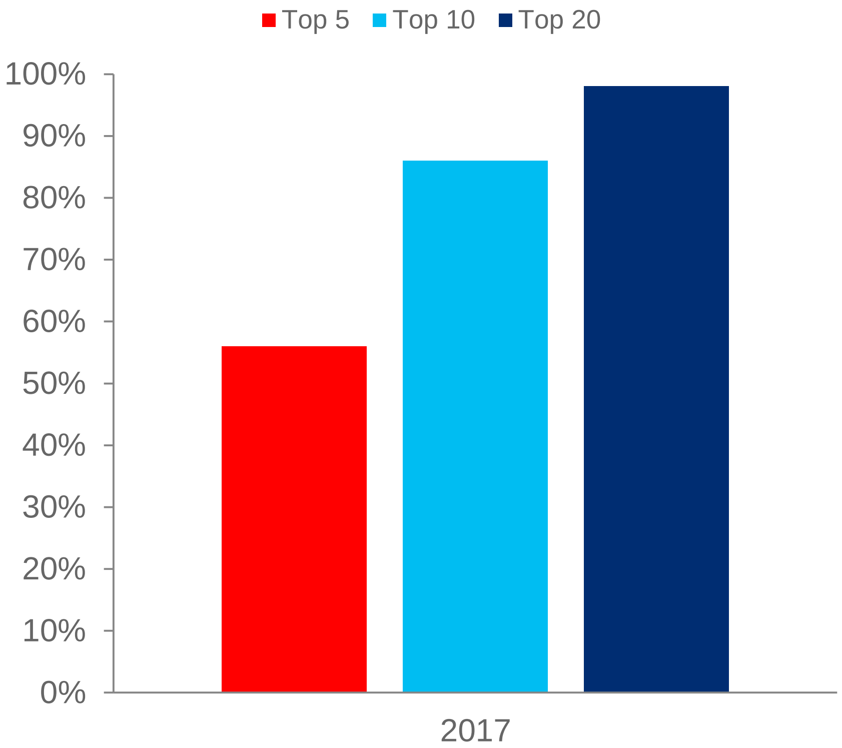
% total US IG volume of a large dealer



Source: Citi, FY 2017.

…who themselves use few dealers

Proportion of investor trading by number of dealers, US IG, %



Source: NAM Greenwich Associates Survey.

Bouts of illiquidity more likely when activity is dominated by few participants with similar strategies

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Building robust electronic markets is a good safeguard

SEC Former Chair, Mary Jo White

Commentary to the major equities markets following the Aug 1 2012 Knight Capital software glitch and the Aug 22 2012 NASDAQ trade halt

The relevant parties in consultation with other market participants will:

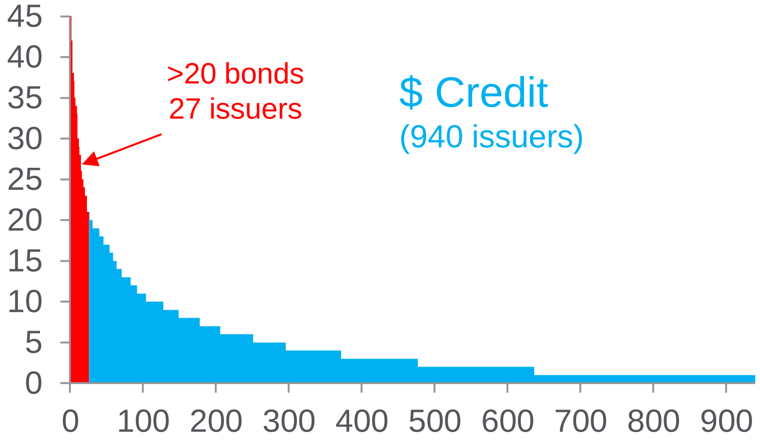
- Provide comprehensive action plans that address the standards necessary to establish highly resilient and robust systems for the securities information processors (SIPs), including testing standards and disclosure protocols.
- Identify and provide assessments of the robustness and resilience of other critical infrastructure systems.
- Provide SIP plan and/or rule amendments addressing the issuance, effectiveness, and communication of regulatory halts.
- Review their rules relating to the trade break process and procedures to reopen trading following a trading halt, and provide amendments to those rules as necessary.
- Provide rule amendments to implement “kill switches” that would allow exchanges to shut down trading in the event of technological failures, and review and consider other potential risk mitigation mechanisms.

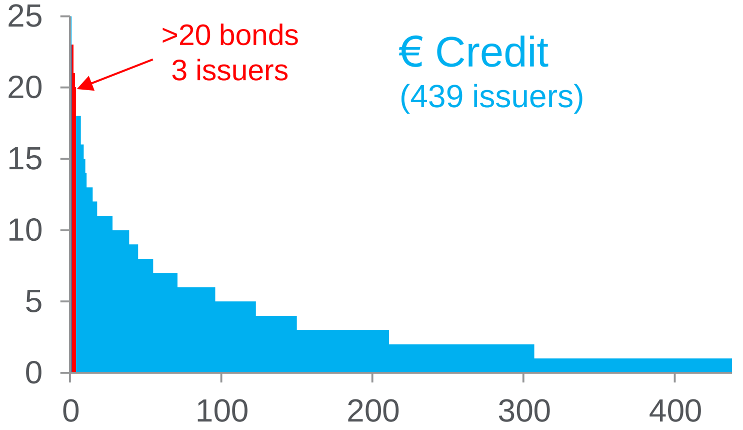
Best practices from more mature electronic markets are still largely missing in Credit

Standardizing issuance is an unlikely option

Most issuers have only a few bonds…

Number of bonds outstanding by issuer, $ and € IG





Source: Markit, 2015.

…and cherish their flexibility

Considerations upon issuance consolidation

Maturity management	• Large towers can cause significant refinancing and credit risk
Reopening bond amid fluctuating rates and credit markets	• Potential OID and premium issues
Bespoke transactions for each issuer	• Potential impediment on capital raising strategies
Standardized coupons	• Hinder cash management strategies
Covenant language	• Could be used by issuers, limiting bond reopening
Infrequent, small issuers	• Elevated borrowing costs as a result of not reaching the threshold
Secondary market underperformance	• Reopening of bonds could push issuers wider

Would impact only a small number of issuers

Transparency is helpful but also introduces new complexities

TRACE

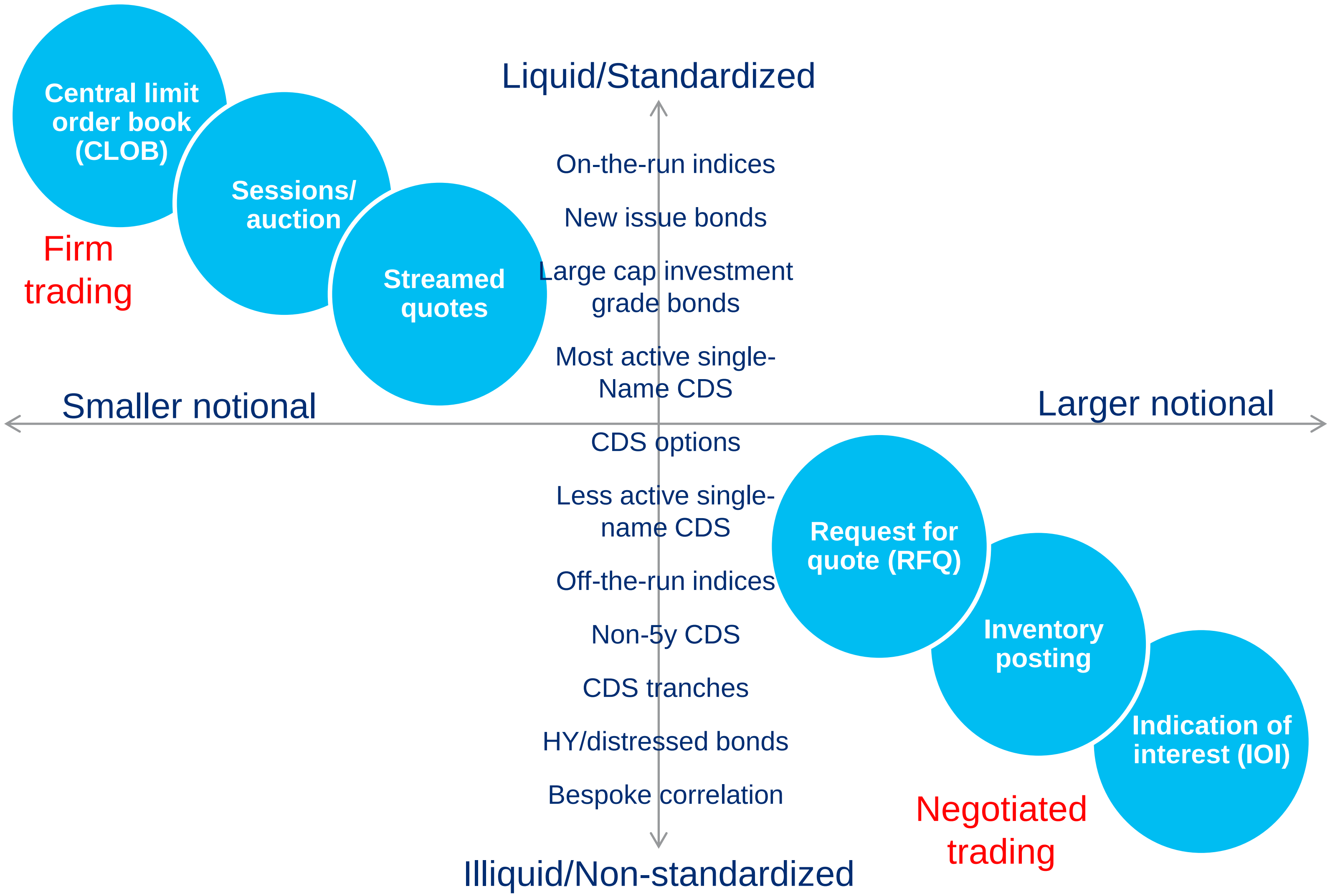
- “One size fits all” approach
- Impact on less liquid blocks
- Timing of reporting conventions
- Embedded e-trading fees

MiFID II

- “Big bang” implementation
- Data quality
- Recalibration of transparency and liquidity thresholds
- Global harmonization

Transparency does not automatically beget liquidity; each framework has advantages and challenges

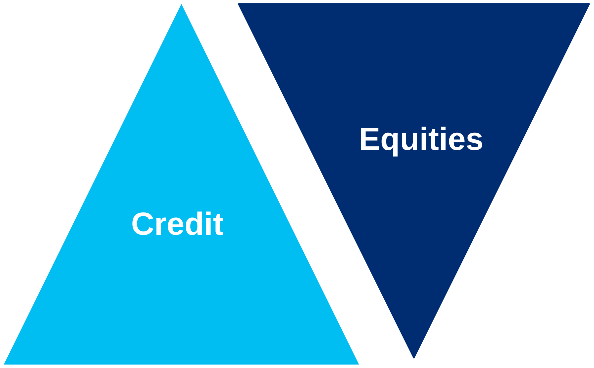
Protocols best left to evolve organically as suited to market



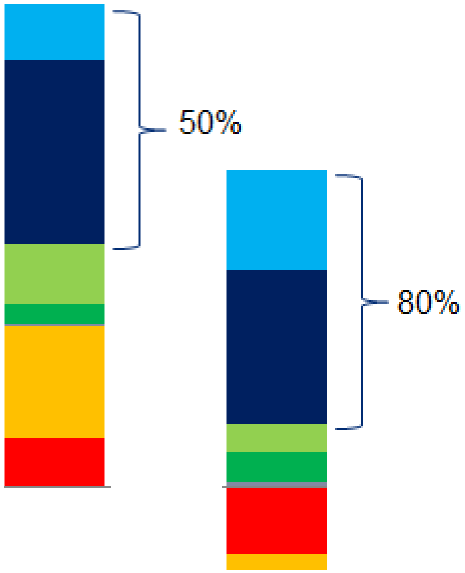
Imprudent to prescribe protocols;
better to remove barriers to confidence

Conclusion

Credit remains a predominantly principal market



A myriad of influences have led to a loss of heterogeneity



Prudent to focus on building robust infrastructure

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