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Deutsche Börse
Global Funding and Financing Summit

Collateral, the force that binds us...
&
Farewell 2016…. Welcome 2017

26 January 2017

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Themes

Setting the Scene

Regulation: Catalyst for new Relationships and Reliance on Repo

Collateral: What matters - Cost or Quantum?

The Repo Desk: View from a Commercial Lens

European Repo Market: Depth, Breadth and Rigidity

Farewell 2016…. Welcome 2017

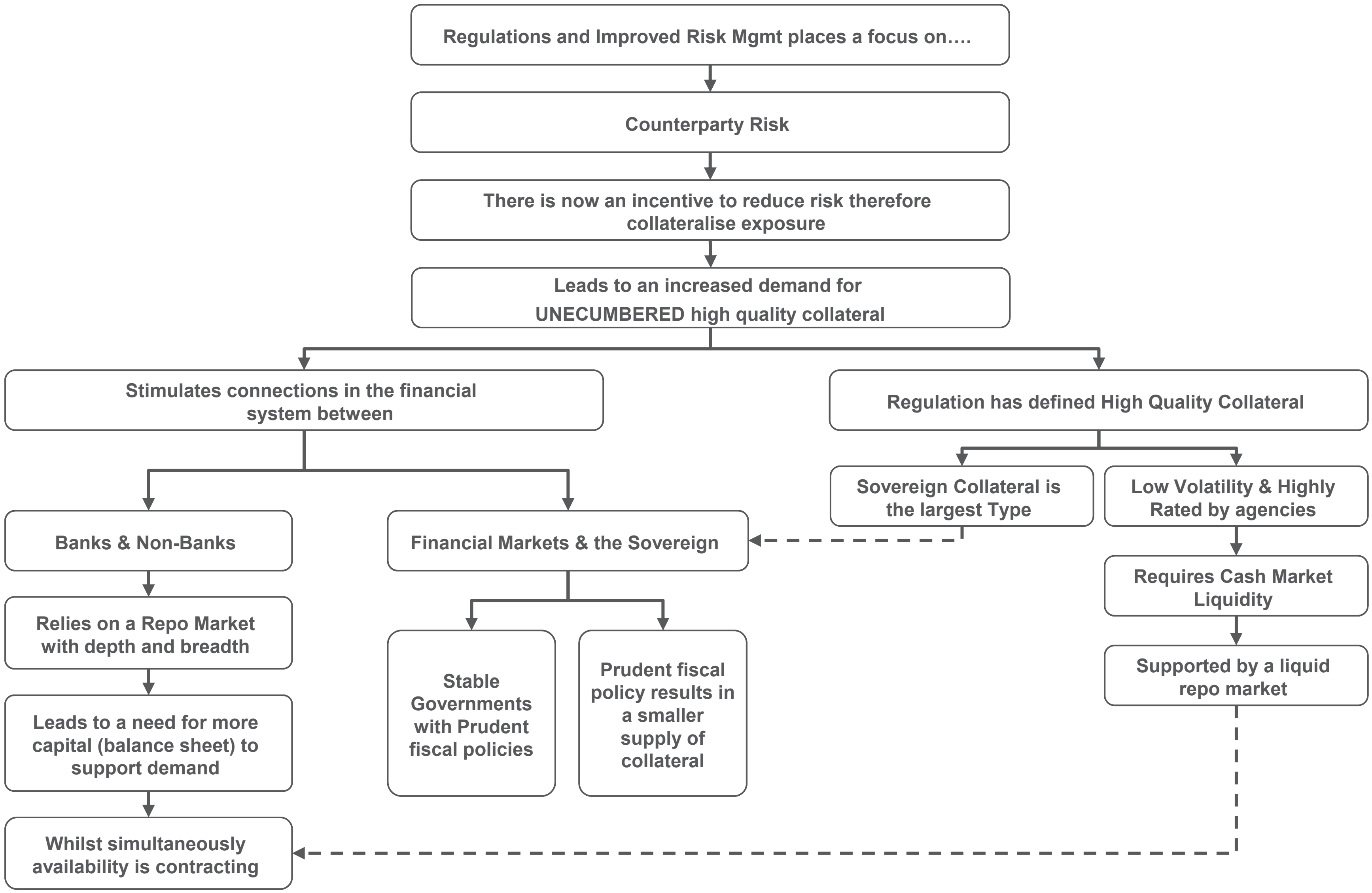
Setting the Scene……

Then		Now
Light Touch Regulation	→	Prescriptive Regulation
Simple System	→	Complex System
Based on Trust	→	Conditional Trust
No Shortage of Collateral	→	Debate about a Possible Shortage of Collateral
Abundance of Liquidity	→	Questioning Liquidity
Capital is Ample	→	Capital is Never Enough
"….the public perception of liquidity changed, from one based on assets (what you could sell) to one centred on Liabilities (ease of borrowing)"[(1)]	→	**Has the public perception of liquidity changed back to one based *"on assets (what you could sell)"* vs one *"centered on Liabilities (ease of borrowing)"?*[(1)]**
Something to think about….. • Could also be akin to a monetary system moving from a 'Gold Standard' to a 'Fiat Standard'?	→	**Something to think about…..** • If so, is the financial landscape gravitating away from one based on a 'Fiat Currency' and towards one based on a 'Gold Standard', underpinned by collateral?

1. *A speech by Lionel Barber, Financial Times editor, at Hughes Hall, University of Cambridge, May 1, 2014.*

Regulation: Catalyst for new Relationships and Reliance on Repo

Regulation: Catalyst for New *Relationships*



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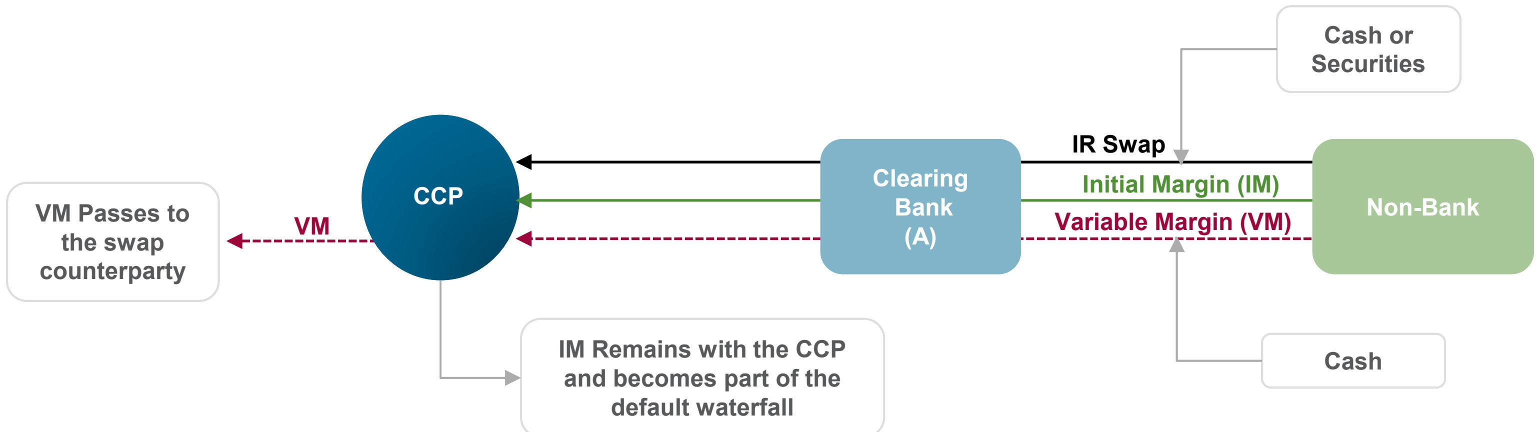
Mandatory Swap Clearing: Catalyst for New Connections

Dodd-Frank and EMIR rules have created a requirement for banks and certain non-banks to centrally clear swaps activity. This has lead to an increased need for both; initial and variable margin. This presents a real challenge for non-banks given how different this is to past practices.



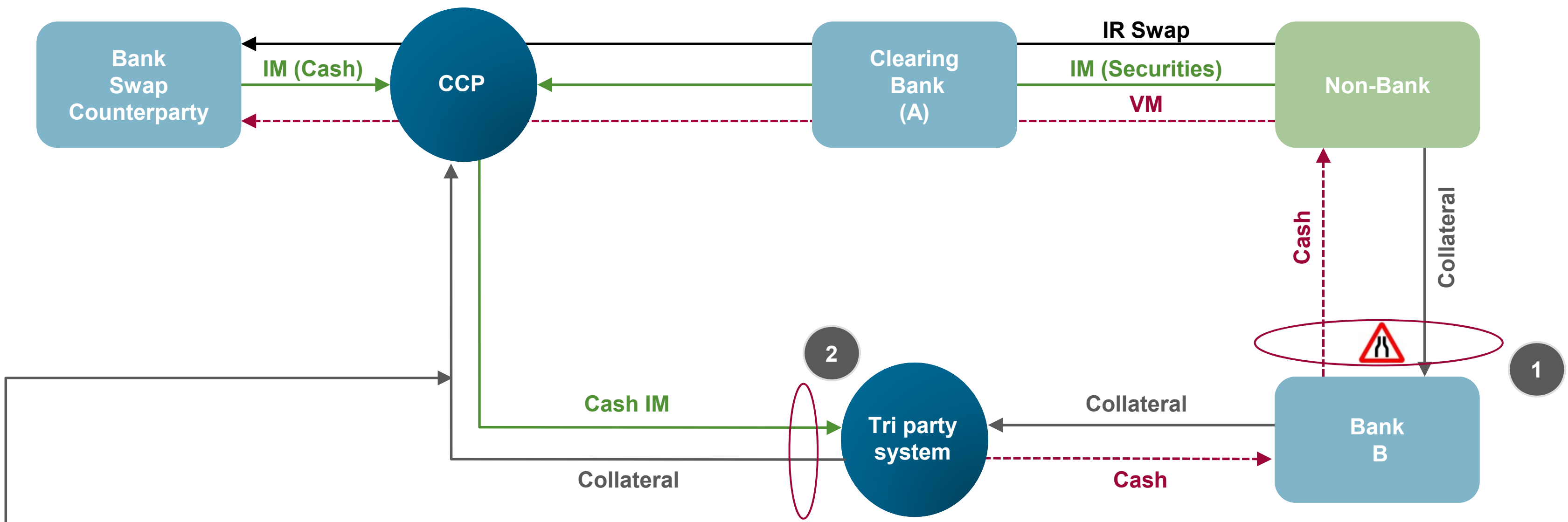
Assuming the pension fund has the right type of collateral in its portfolio to meet IM requirements, what options are available for meeting VM requirements?

1. Fund no longer uses derivatives
2. Hold a cash buffer – stay underinvested
3. Sell securities to meet VM margin calls
4. Stay fully invested, don't sell any securities and borrow the funds, A.K.A perform "collateral transformation" / convert securities into Cash

Choosing the 4th option is the catalyst for a new connection……

Mandatory Swap Clearing:
Two New Connections – Two Different Reasons

The preferred method for obtaining secure funding is through the repo market, Securities converted to cash, "Collateral Transformation", in other words physical leverage. The requirement for funding and collateralisation creates two new connections: (1) Bank and non-Banks, (2) CCP and Banks. Two different objectives both linked via the Repo market. In addition, this new demand creates a requirement to commit financial resources, i.e. balance sheet, to support this activity.

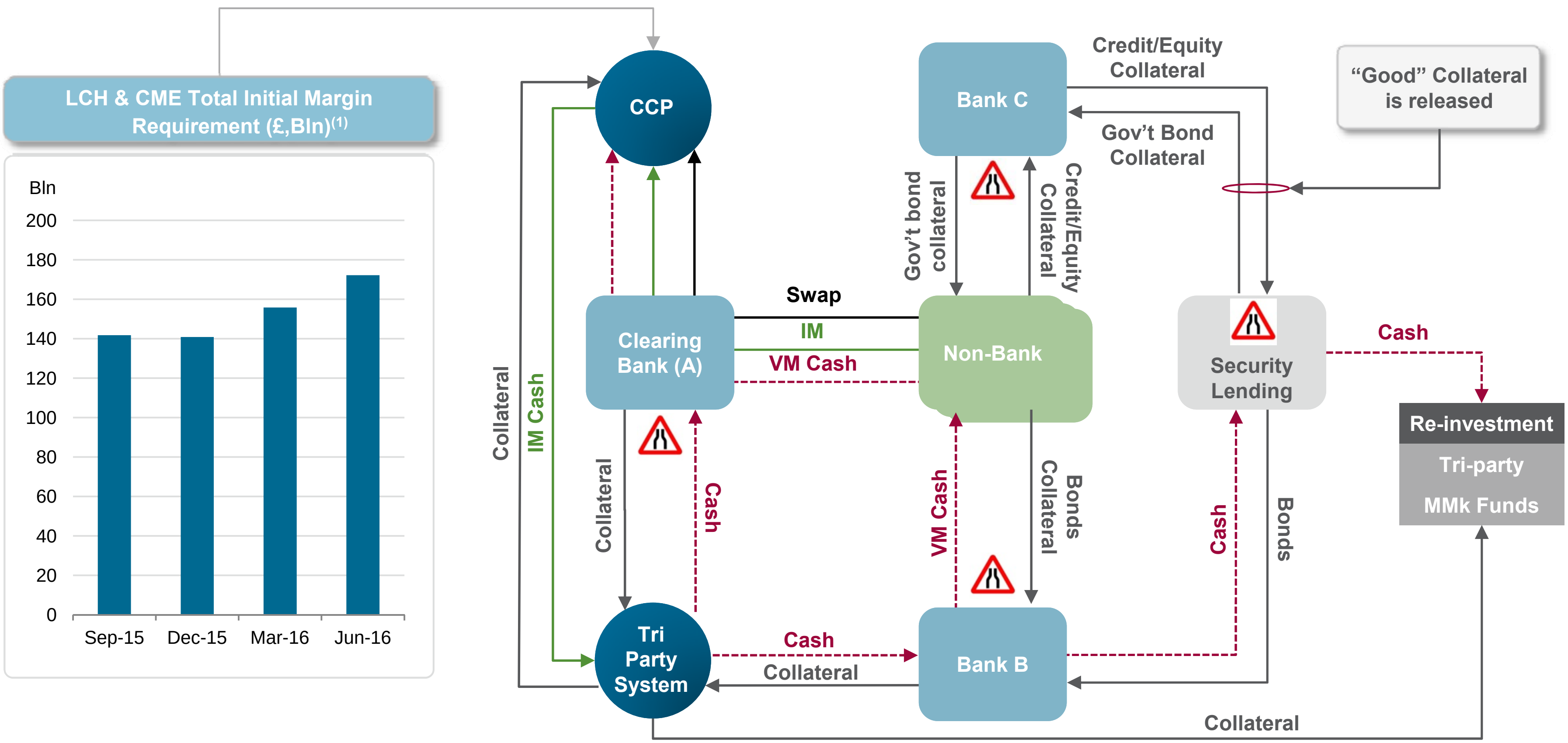


Classical Collateral Transformation in Reverse

New demand from CCPs transforms cash to collateral in order to segregate the IM.
This collateral is not re-used; it becomes encumbered & thus loses "velocity"

Mandatory Swap Clearing: Participation Grows, Requirements Expand, Connections Increase – the System becomes more Complex

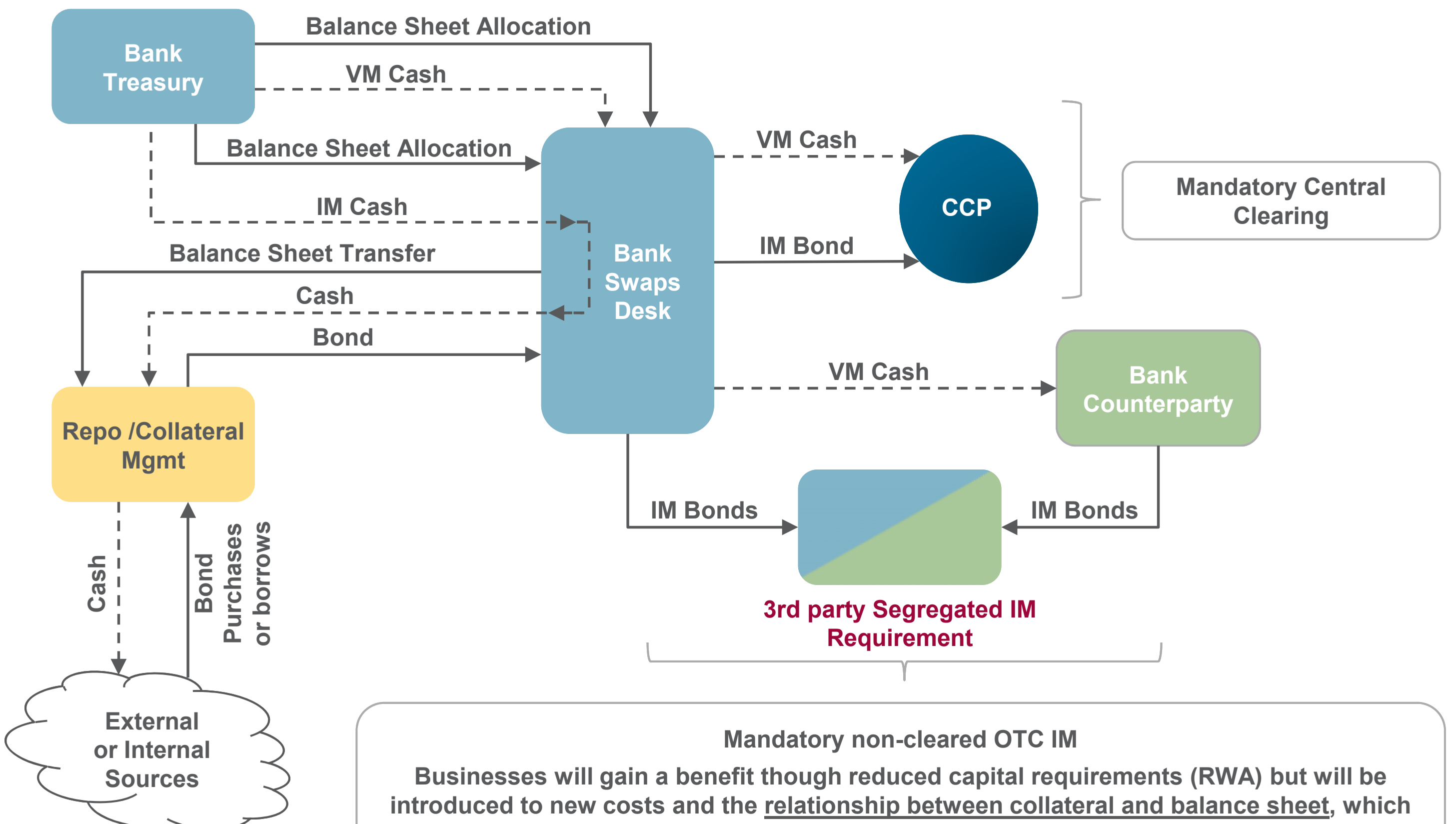
As central cleared swap volumes and/or volatility increase the requirement for transforming; securities into cash, cash into collateral and in some cases ineligible collateral into good collateral will also increase. Naturally, connectivity between banks, non-banks and the CCPs will also increase. All these activities will also place an increased demand on banks balance sheet. The Basel 3 leverage ratio limits how much leverage one bank can facilitate for non-banks forcing them to diversify counterparties → creating more connections.



1. Source: CPMI IOSCO Quantitative Disclosure from LCH and CME.
http://www.lch.com/rules-regulations/regulatory-responses
http://www.cmegroup.com/clearing/cpmi-iosco-reporting.html

Uncleared Derivatives Margin: Existing Connection, Demand for Collateral Increases – Velocity Decreases

In September 2013 the Basel Committee on Banking Supervision (BCBS) and the International Organisation of Securities Commissions (IOSCO) jointly published a final framework establishing consistent global standards for margin requirements for non-centrally-cleared derivatives.
The rules require one way VM posting but two way IM collateral posting. An important aspect is the fact that the collateral will be segregated and cannot be re-used. This will have a lasting effect on its availability and price.

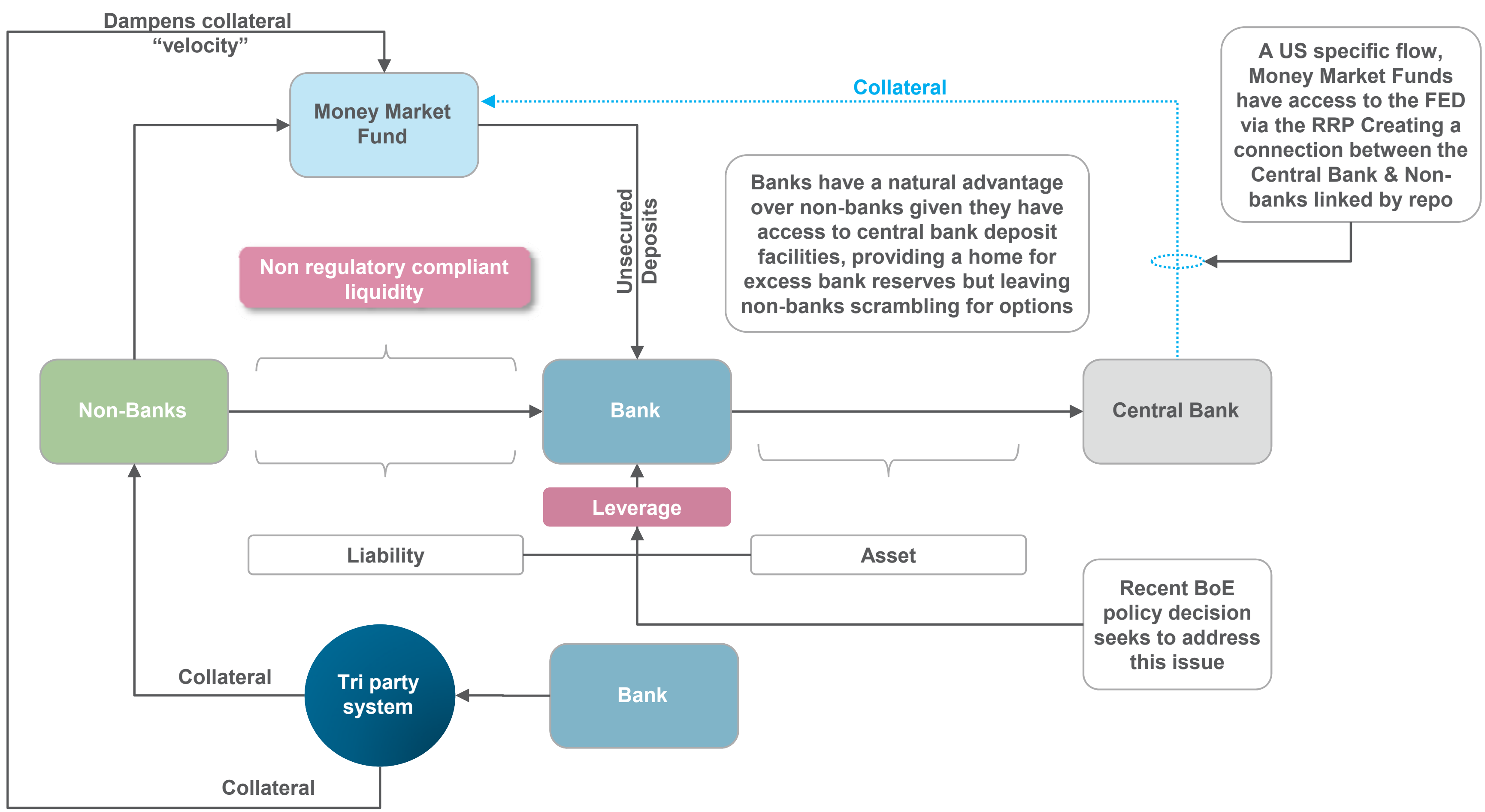


Mandatory non-cleared OTC IM

Businesses will gain a benefit though reduced capital requirements (RWA) but will be introduced to new costs and the relationship between collateral and balance sheet, which unless they can increase revenue, will have a drag on their RoE

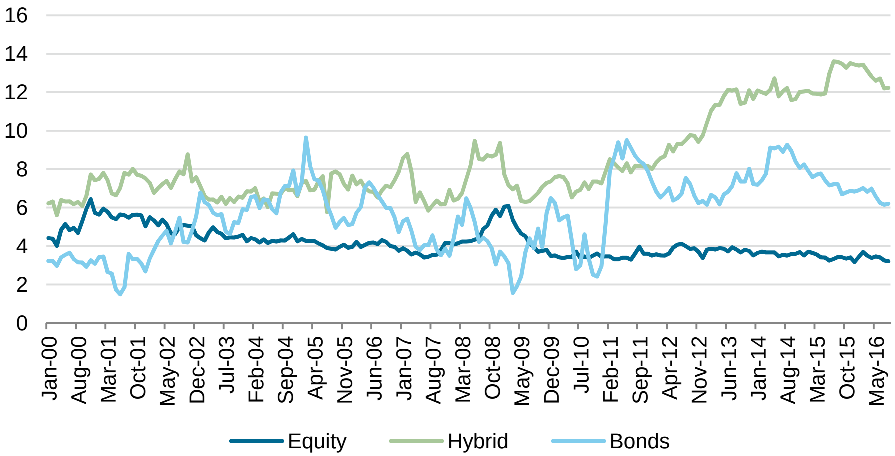
New Connections: *I Have Cash, need Collateral….*

Monetary policy has created a large amount of excess bank reserves and at the same time non-bank cash reserves have grown. Regulation clearly defines what constitutes regulatory compliant liquidity. Some institutions are comfortable to commit to term deposits but most are looking for a short term option (<1 month) to place their cash. Unfortunately as bank balance sheets shrink and they improve their funding composition to meet new standards, short term deposits become not only unattractive but also costly with regards to returns on leverage balance sheet. This forces cash rich non-banks to seek alternative options.

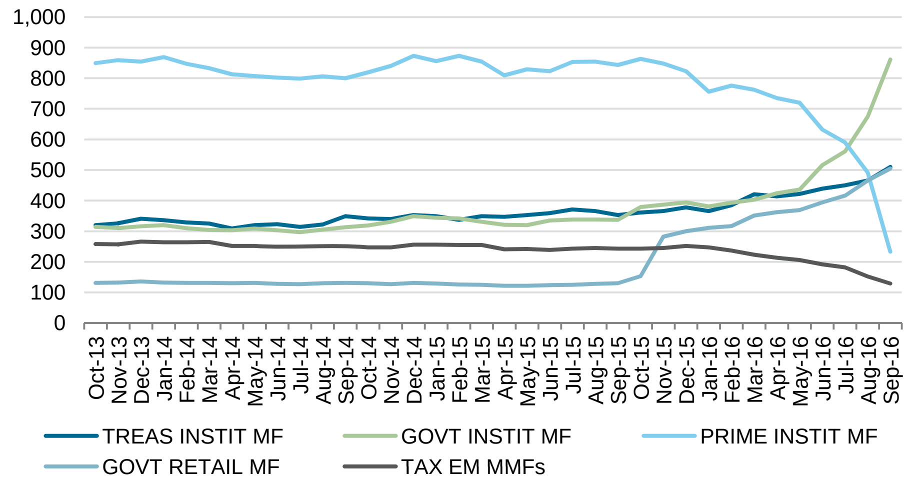


New Connections: *I Have Cash, need Collateral….*

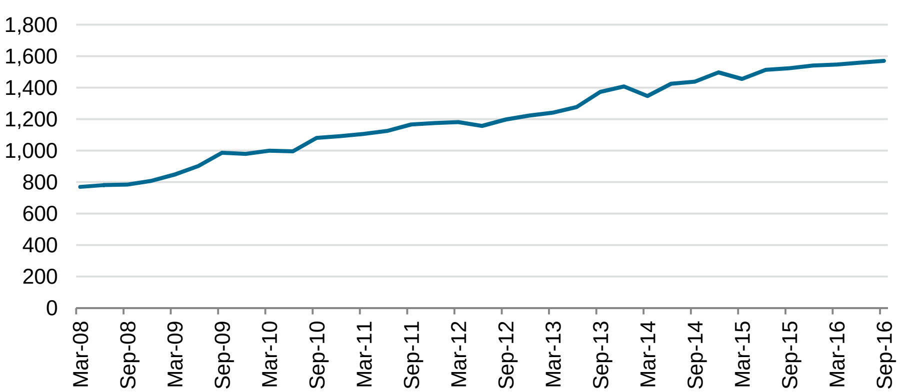
% Cash Levels Held by Asset Managers (Non-MMK Funds)[1]



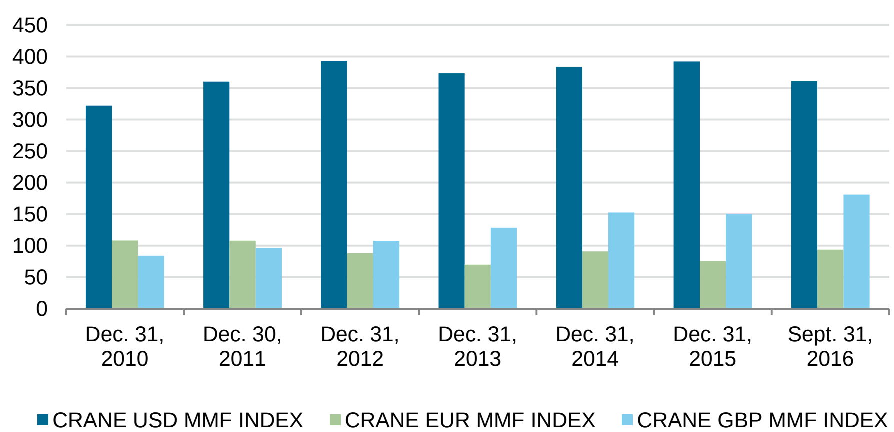
On-Shore US Money Fund Assets ($Bln)[3]



S&P 500 ex-Financials: Cash and Equivalents ($Bln)[2]



International Money Fund Assets ($,€,£Bln)[3]



Sources:
1. *Investment Company Institute / Haver Analytics.*
2. *Barclays Research and FactSet.*
3. *Crane Data's Money Fund Intelligence.*

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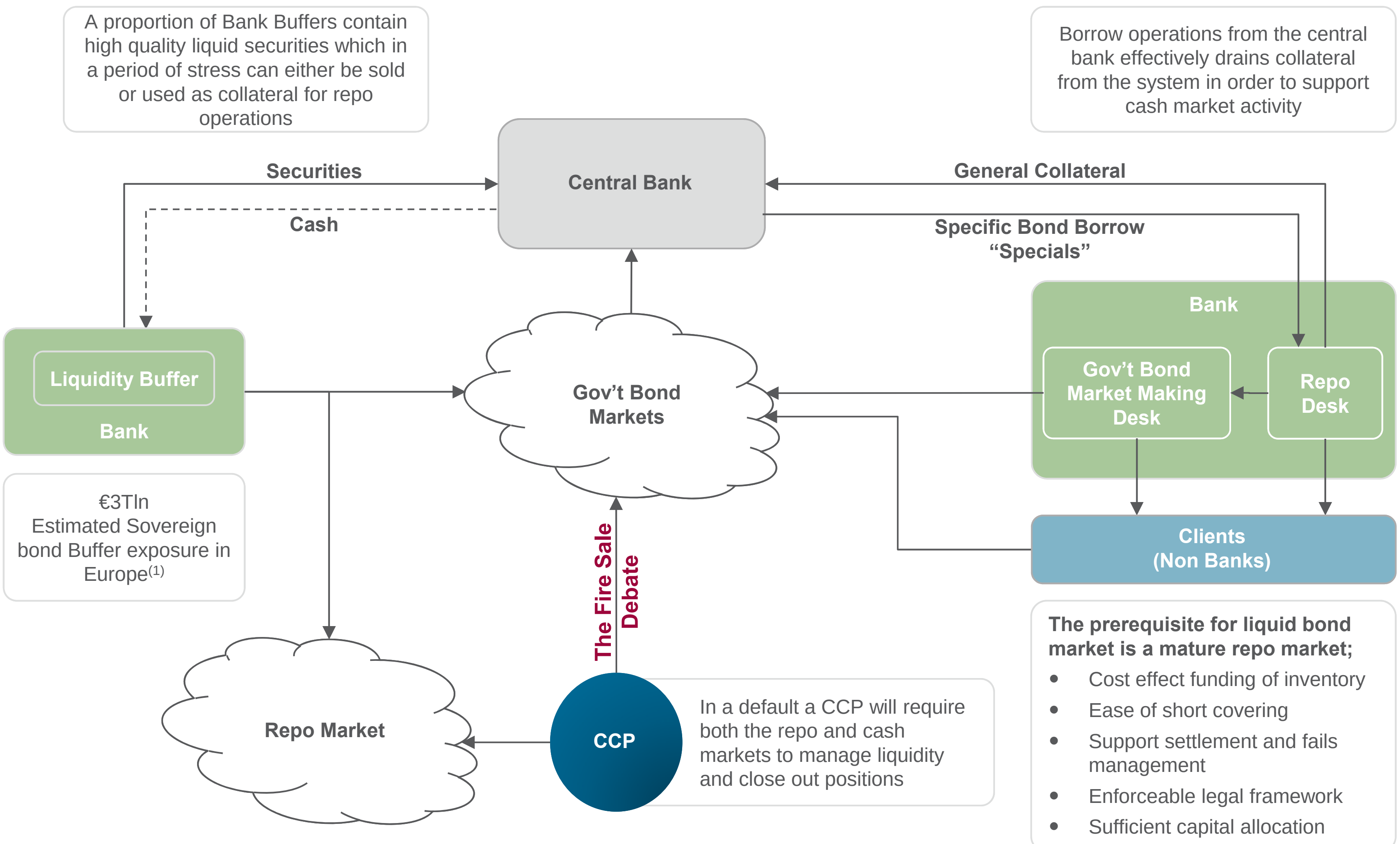
New Connections:
Banks, Central Banks, CCPs & Sovereign Bonds

Regulation and unconventional monetary policy has increased connectivity further between banks, central banks and CCPs. In addition, these two forces have linked both entities to sovereign bonds and their presumed cash market liquidity which requires a repo market. What is also interesting is the expectation that banks use the repo market for the provision of liquidity before turning to the last resort option. Finally, the CCP requires the use of both to manage a member default event.



1. *Company report and Barclays Research.*

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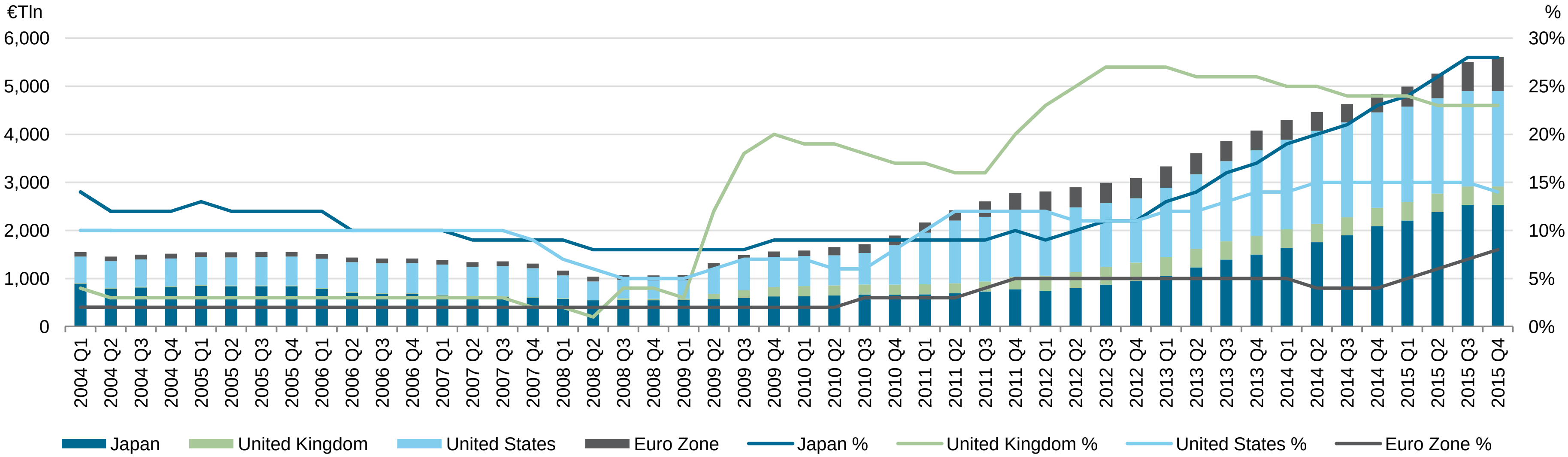
New Connections: Central Banks & Sovereign Bond Repo

Central Bank Government Bond Holdings[1]



QE in Europe & Repo Market End of Program Estimates (December 2017)

Country	% Repo Activity	Estimated Market Size	Estimated End of Program Purchases by ECB Capital Key(€Bln)	Proportion of ECB Purchases Relative to Estimated Repo Market Activity
Germany	20.3%	1,092	435	40%
Italy	10.4%	559	312	56%
France	10.9%	586	347	60%
Spain	5.9%	317	222	70%

1. *IMF, Sovereign Investor Base Dataset for Advanced Economies, as of Sept 15, 2016,* http://www.imf.org/external/pubs/ft/wp/2012/Data/wp12284.zip
2. *ICMA Repo Survey, June2016, and ECB.*

Connections……"*the Tie that Binds*"

New Regulation has….

- …altered the financial landscape by increasing inter-connectedness and creating a system dependent on high quality collateral.
- It links the relationship between physical and synthetic leverage and promotes the use of leverage in non-banks
- New connections have extended beyond banks and are now increasing between banks and non-banks and in a few cases non-bank to non-bank *(shadow banking?)*
- Increased inter-connectivity has lead to increased counterparty risk, mitigated with collateral

- ….in addition to central banks, defined what constitutes "Good" "Safe" or "High Quality Collateral"
- By far the largest asset class which fits this description are sovereign bonds
- Low volatility and assumed liquidity of the government bonds markets is the foundation
- Has the Sovereign - Bank nexus evolved to become the Sovereign – Financial Markets nexus?

- …..created this, it also produced dependency on capital (balance sheet) in order for banks to act as principles distributing collateral and/or facilitating leverage for non-banks
- The leverage ratio is the measure which is used to monitor, but also the measure used to calculate returns on capital
- The measure is asset class and activity blind
- Current calibration results in economics which may disincentive banks from increasing capital for Repo to meet future market demand

Collateral: What Matters - Cost or Quantum?

Defining “Safe”, “Good”, “High Quality” & Availability

Regulation and Central Banks have defined what are “Safe, High Quality Assets”

Generic HQLA Definition

1a	Cash; Central bank reserves able to be drawn down in times of stress; Liquid, marketable securities issued or guaranteed by sovereigns, central banks and certain international organisations and which qualify for a 0% risk-weight under the Basel II standardized approach for credit risk; and Certain non-0% risk weighted assets may also be included where these match an institution’s jurisdictional currency liquidity needs or operational requirements.
2a	Non level 1a assets, these can be included subject to a minimum 15% supervisory haircut to their market value and are capped at 40% (post haircut) of the total buffer.
2b	Non level 1a assets, these can be included subject to a minimum 25% supervisory haircut to their market value and are capped at 40% (post haircut) of the total buffer.

Example Central Bank Eligible Collateral Classifications

ECB	Bank of England
Category I	Level A
Category II	Level B
Category III	Level C Securities
Category IV	Level C Loan Collateral
Category V	----

Encumbrance of High-quality Collateral (US$ trillion)[1]

Owner Type	Holdings	Amount Encumbered	Source of Encumbrance	Unencumbered Supply
Governmental institution	8.9	8.9	Inability to engage in securities lending	0.0
Commercial Bank	5.3	4.5	Liquid asset buffer or initial margin	0.8
Insurance company or pension fund	5.7	0.0		5.7
Central banks	4.4	4.2	Mostly lending against other government bonds	0.2
Non-resident	11.5	11.3	Foreign exchange reserves	0.2
Other	6.0	3.5	Various	2.6
Total	**41.8**	**32.3**		**9.5**
Total post derivatives reform		**33.3**		**8.5**

Source: BIS, SIFMA, ECB, IMF. Numbers may not add up due to rounding.

1. *ECB, Official Journal of the EU, Annex: Table 1, https://www.ecb.europa.eu/ecb/legal/pdf/oj_jol_2016_014_r_0006_en_txt.pdf*
2. *BoE, http://www.bankofengland.co.uk/markets/Pages/money/eligiblecollateral.aspx*
3. *BoE SWP#6 609, The Role of Collateral in Supporting Liquidity, Y. Baranova, Z. Liu, and J Noss. Page 5, Table #2, http://www.bankofengland.co.uk/research/Documents/workingpapers/2016/swp609.pdf*

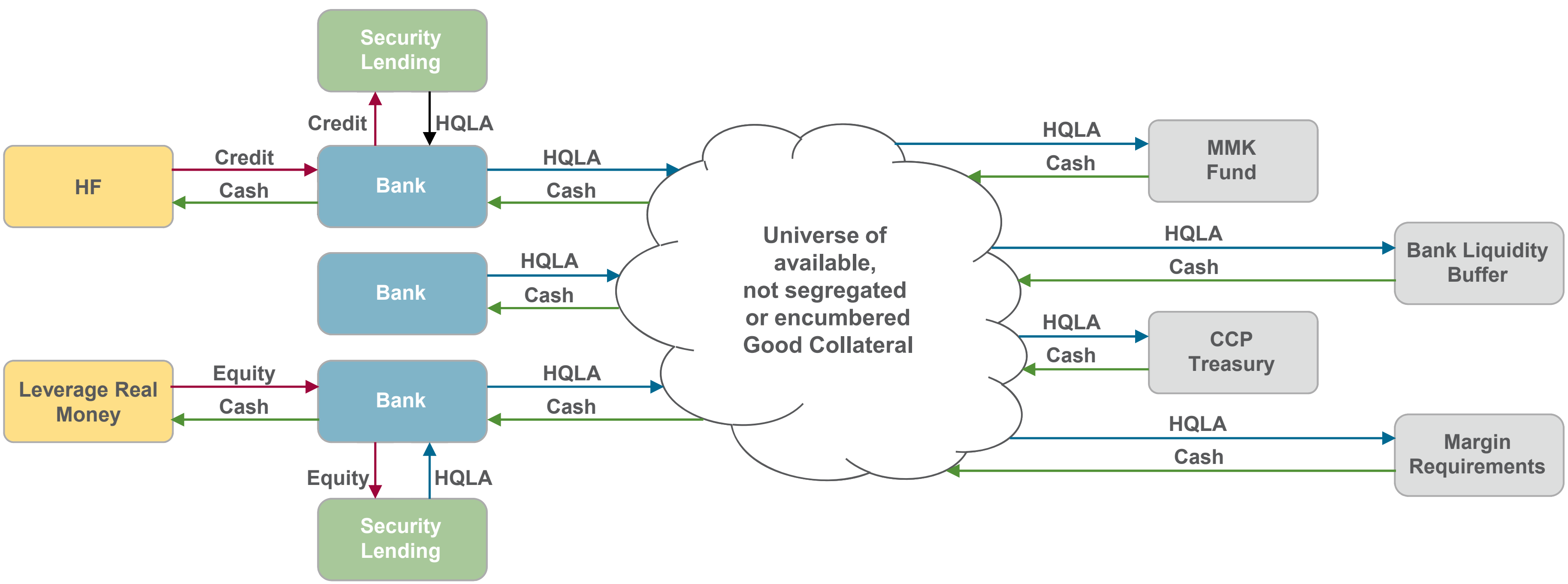
Availability & Mobility of Collateral: How Does it Work?

The availability & mobility of high quality collateral is a function of:

- **The amount of physical leverage being used in the financial system**
- **The capacity to 'transform' low quality collateral into Good collateral**
- **The availability of balance sheet needed to facilitate its movement**

The repo market being the primary facilitator of all of the above.

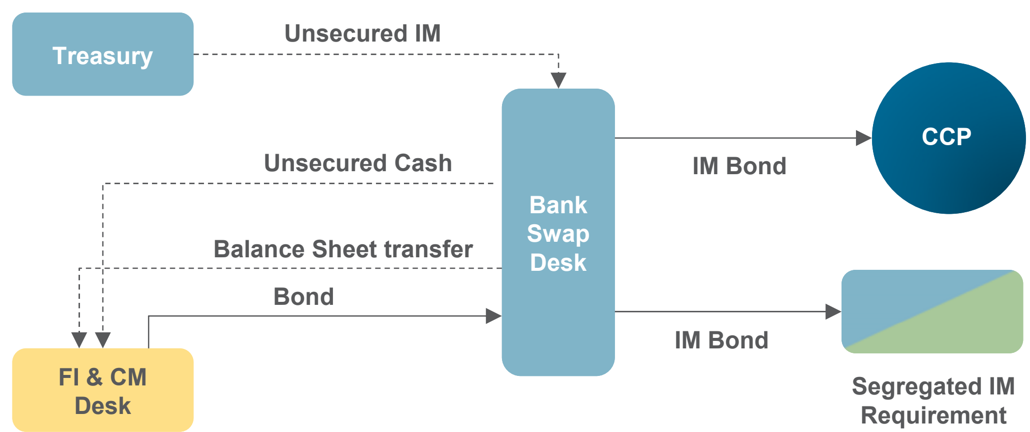
Leverage Agents	Demand for Collateral



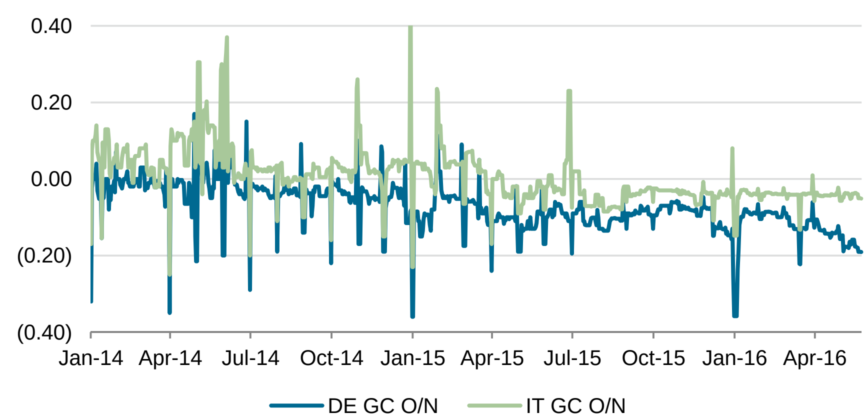
Collateral: Cost vs. Quantum may be the Driver

Much has been written about the quantum of collateral which may be needed to support new rules regarding cleared and uncleared derivatives. The analysis seems to omit how supply and demand translates into actual cost and eventually an economic impact which may have an influence on behaviour.

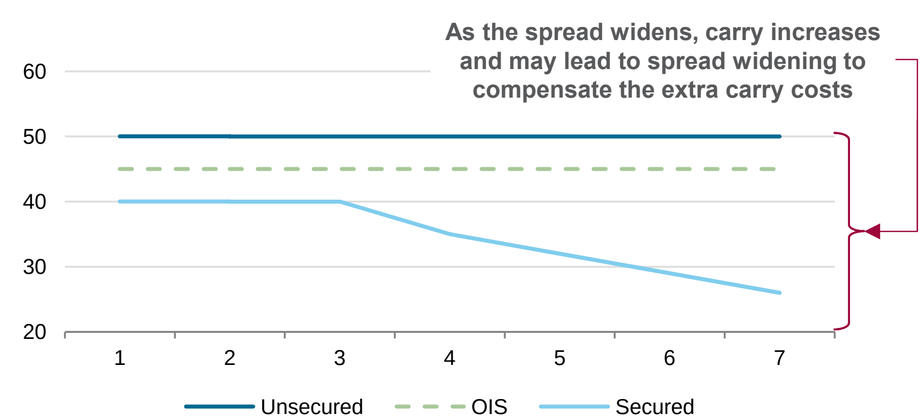
Cost of collateral measured by the spread between OIS and GC has a direct influence on the cost of carry in a derivatives book



The OIS GC Basis "Cost of Collateral"

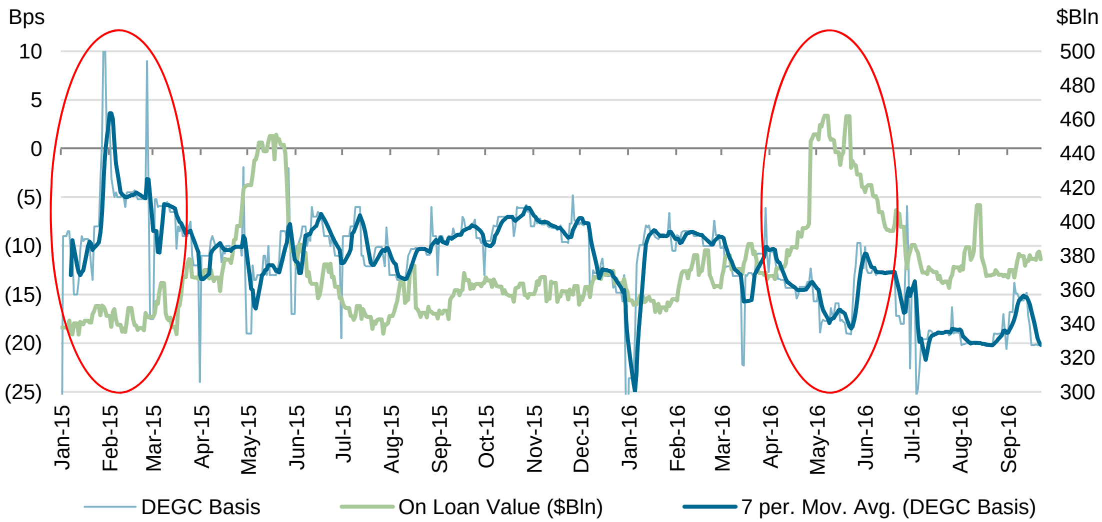


Cost of Carry for IM

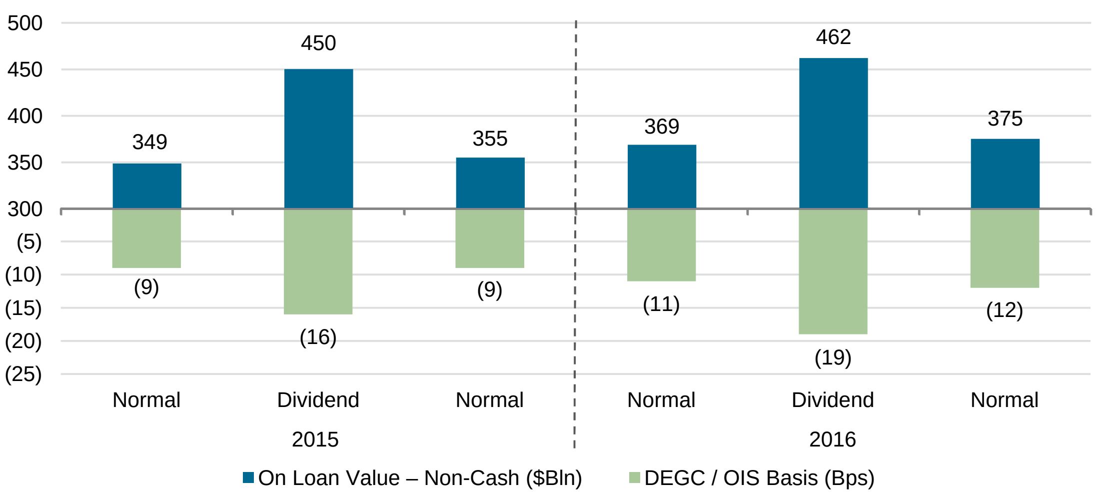


Cost of Collateral: Supply vs. Demand Dynamics

Equity on-loan Value vs. Bund GC-OIS Basis



Transient Shock Effect on Collateral Pricing



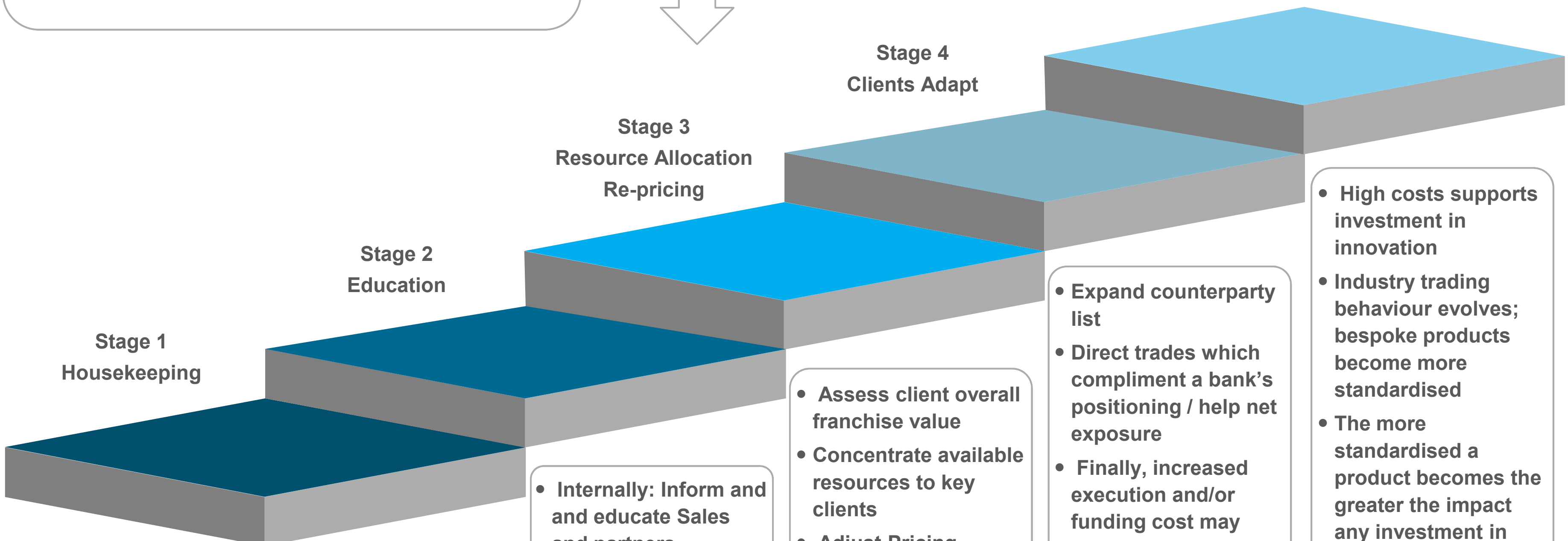
- Equity dividend and script season creates a higher demand to borrow equities from security lenders (beneficial owners)
- Equity borrows requires a pledge collateral. The majority of security lenders stipulate sovereign collateral for the pledge. In Europe this is specifically core-country issuers, which narrows the eligible collateral pool
- Equity borrows are also subject to a haircut/over collateralization of 5-8%
- Assume all factors remain equal. These transient events or 'shocks' present an excellent opportunity to measure how demand impacts the cost of collateral
- Based on the evidence, we can observe;
  - The effect is a 7-8bps widening of German collateral (DEGC) basis (GC/OIS)
  - The market quickly absorbs the additional demand and reverts to normal
  - Calculating the sensitivity results in a 0.8bp move in basis per €10bln of additional equity borrow demand

Source: Datalend and Barclays.

Collateral Demand: Have we Considered Everything?

Inject a large cost to any product or service, without the ability to pass on a majority of the cost and two possibilities occur:

1) Triggers a process of product or service evolution
2) Start the path of product and service extinction



Stage 1
Housekeeping

- Adjust KPIs
- Eliminate “lazy trades”
- Develop MIS
- Seek out efficiencies

Stage 2
Education

- Internally: Inform and educate Sales and partners
- Externally: inform clients, explain the reasons and manage expectations
- Give them time to adjust

Stage 3
Resource Allocation
Re-pricing

- Assess client overall franchise value
- Concentrate available resources to key clients
- Adjust Pricing strategy

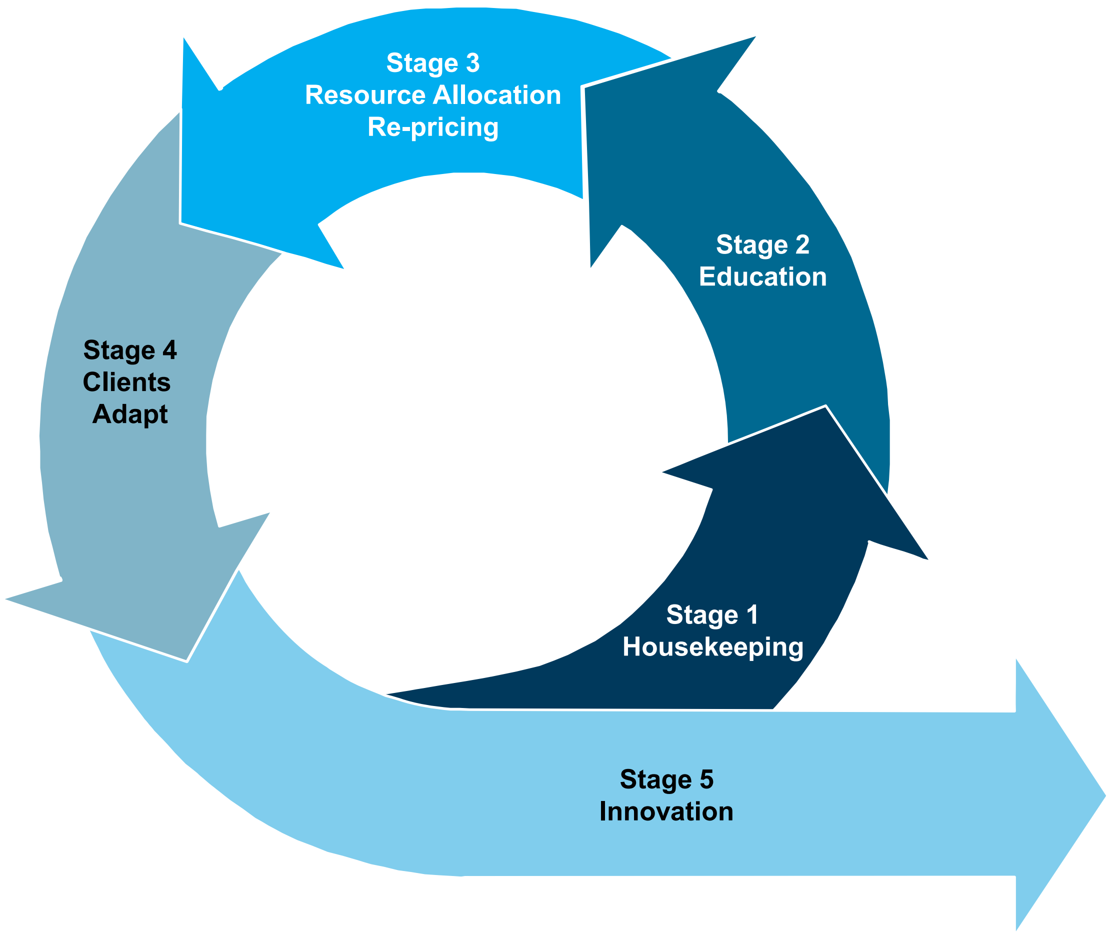
Stage 4
Clients Adapt

- Expand counterparty list
- Direct trades which compliment a bank’s positioning / help net exposure
- Finally, increased execution and/or funding cost may make certain strategies obsolete

Stage 5
Innovation

- High costs supports investment in innovation
- Industry trading behaviour evolves; bespoke products become more standardised
- The more standardised a product becomes the greater the impact any investment in innovation will have
- Standardised OTC products may move to central clearing

Collateral Demand: Only Time will Tell……

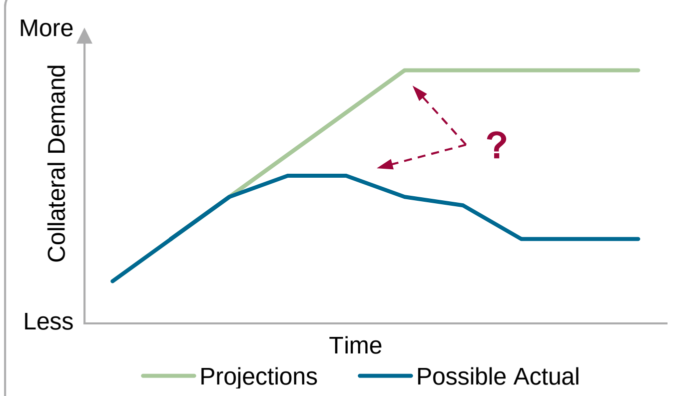


Product and Service Evolution

Results in:

- Activity levels decrease and/or innovation takes root
- Both outcomes reduces the need for capital to support exposure and improves the return profile
- Less exposure, requires less collateralisation
- The reduced need to collateralise exposure leads to reduced demand for collateral
    - *Deflationary pressure on collateral demand*
- So how accurate are the forecasts for collateral?

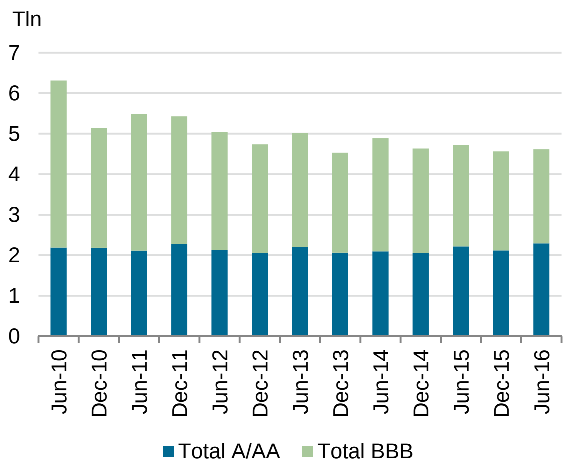
Collateral Forecasting

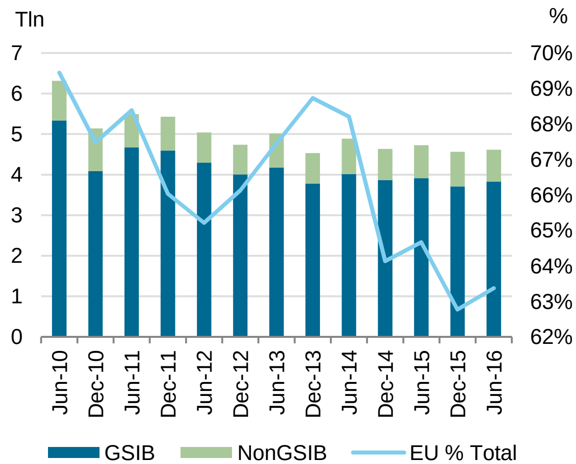


European Repo Market: Depth, Breadth and Rigidity

European Repo Market: Depth and Breadth

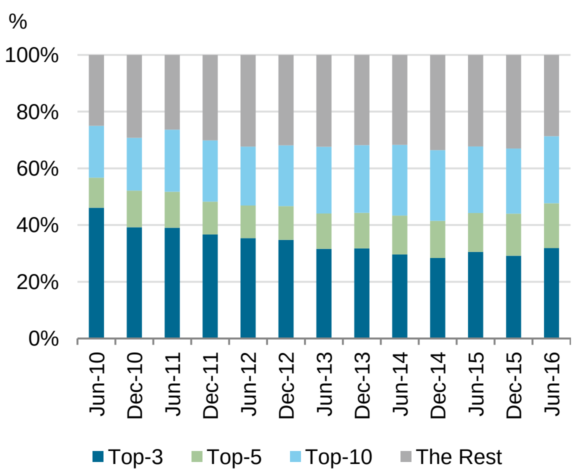
European Repo market Breadth, How has it changed?

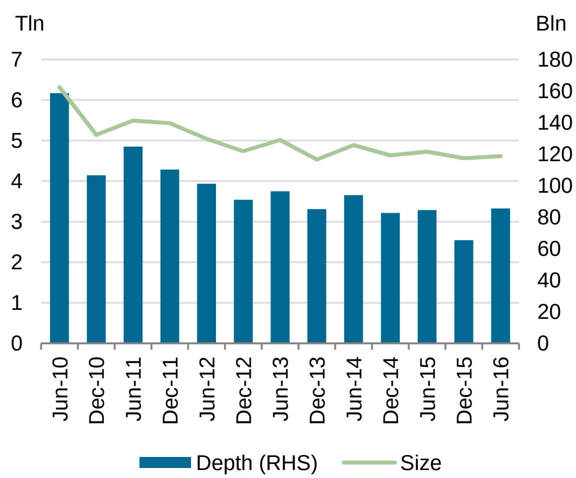




- Survey data indicates the European repo market has become smaller since 2010, but roughly the same size over the last 3 years
- Reduction from BBB rated institutions seems intuitive as banks may be under pressure to reduce leverage or have higher funding costs thus makes them less competitive
- GSIB designated banks reduced activity but are still a major player
- The majority of banks that contribute to repo market activity in Europe are domestic but this number is on a declining trend

European Repo Market, What about Depth?



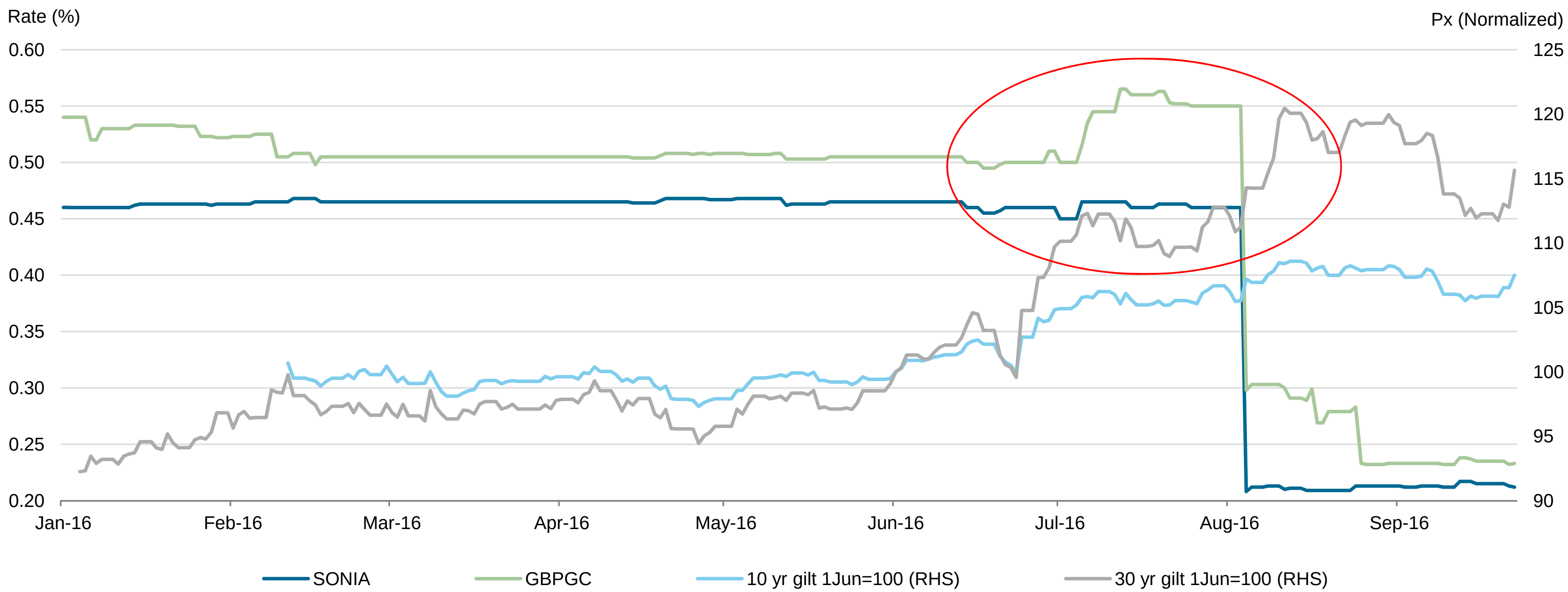


- **Breadth?** Repo market is less concentrated with the top-3 declining with top-5 and especially top-10 taking up a bigger proportion of the market.
- **Depth?** In the repo market, there is less flexibility to apply some simple assumption to assess balance sheet capacity, given sudden client flows/shocks or increased demand for collateral intermediation
- New entrance provides breadth but how much depth in a stressed situation and what about their stability
- How to measure?

Data Source: ICMA Repo Survey, June 2016.

Balance Sheet Rigidity: Can we Identity any Evidence?

Brexit – Balance Sheet Indigestion



Simple Assumptions for leveraged UKT Balance sheet Footprint

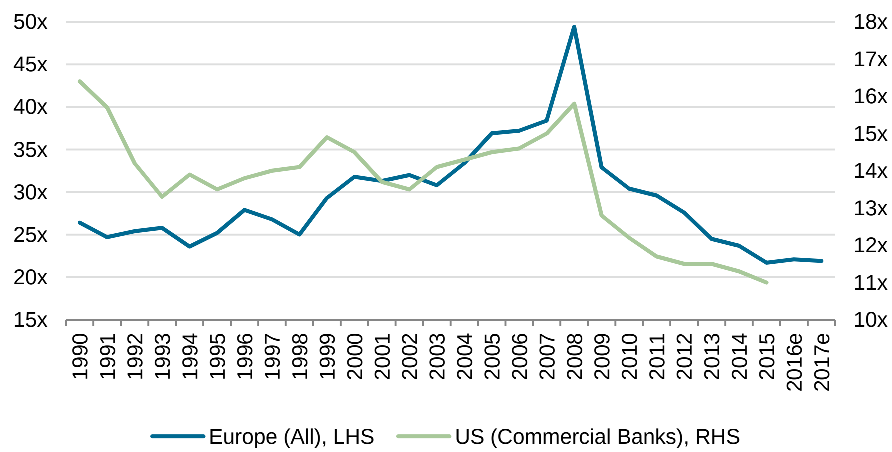
	Gross B/S Position	Estimated Asset Value Move (%)	Delta Impact
UK LDI (Leveraged Pension Fund)	£200Bln	15% (30yr)	£30Bln
Dealer (GEMS)	£30Bln	8% (10yr)	£2.4Bln
Leveraged Asset Management	£50Bln	8% (10yr)	£4.0Bln
Total	**£280Bln**		**£36.4Bln**

- Brexit was the catalyst for a sharp upward asset price revaluation, est. at 8-15%
- The move would have resulted in the requirement of more capital to support the same positions, a simple estimation could be £36bln
- Data suggests a £10bln increases results in a ~1.5bp increase in Gilt GC rates

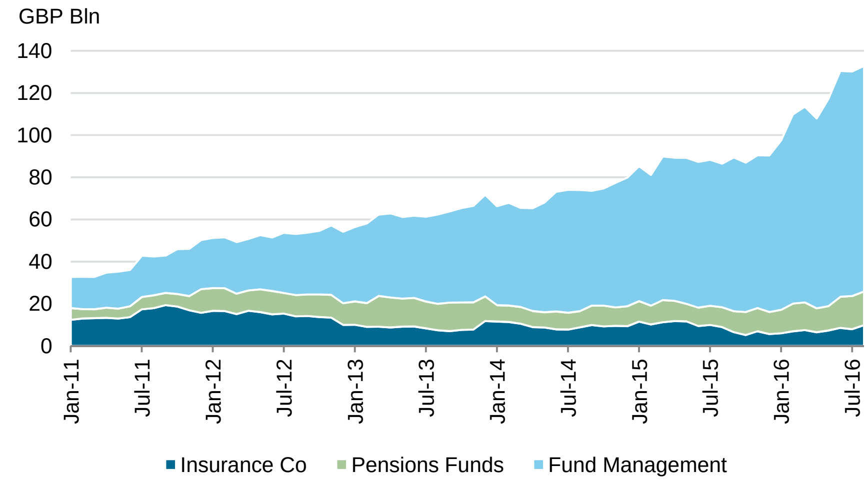
Source: Bloomberg and Barclays.

Cost of Balance Sheet: Evidence of Re-pricing?

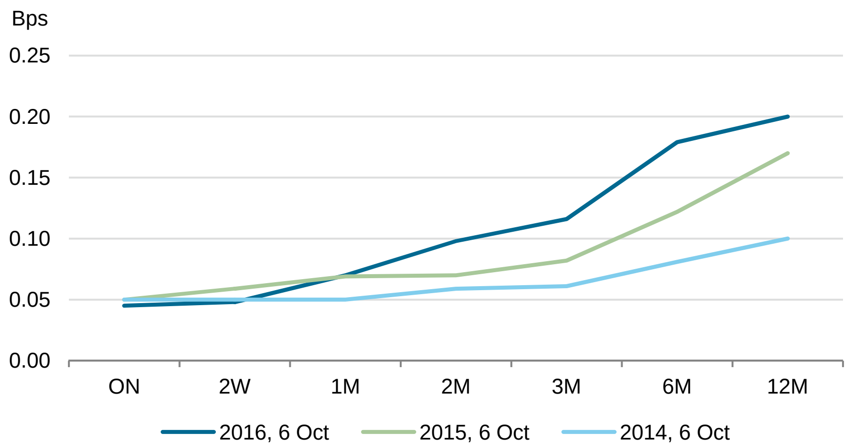
European and US Bank Leverage[(1)]



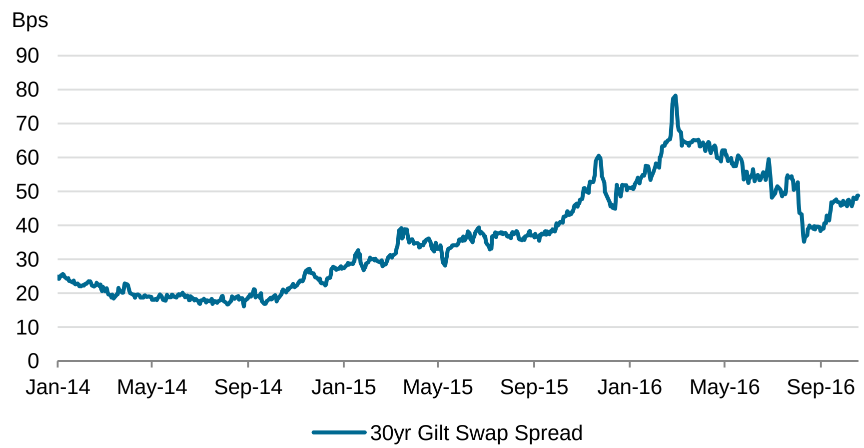
Lending from UK MFIs to Various Client Bases[(2)]



Spread Curve (Gilt GC to Sonia)[(3)]



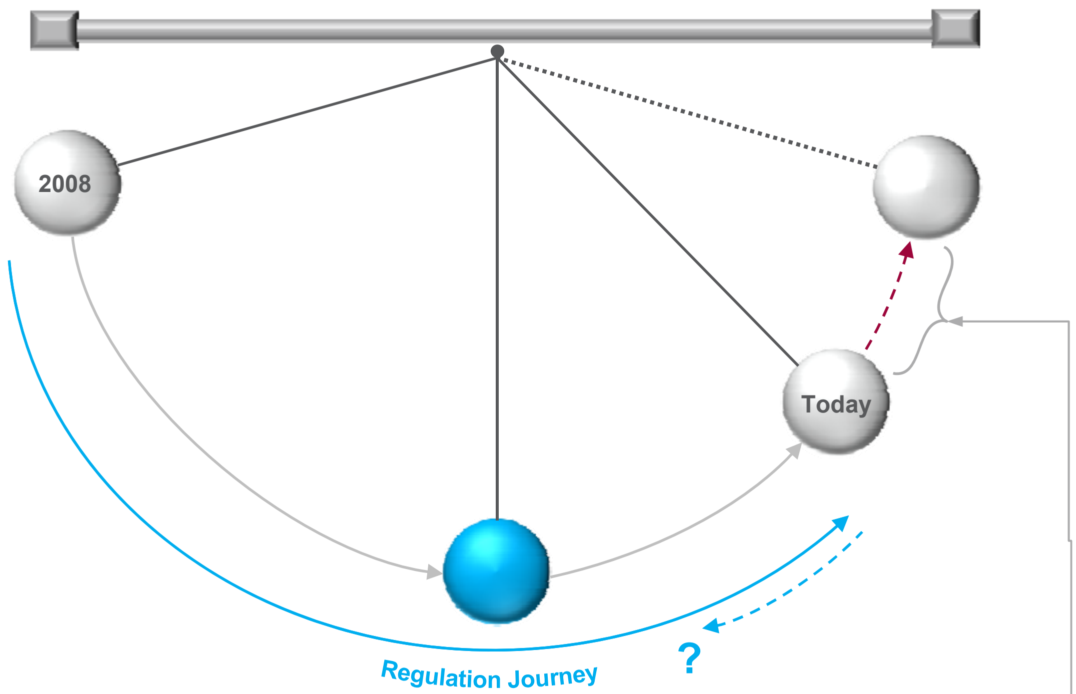
UK Gilt 30 year Swap Spread[(3)]



1. *Barclays Research.*
2. *Data from Bank of England Statistical Interactive Database using codes: RPMB3V6, RPMB3W4, RPMTBVU*
3. *Barclays Data.*

The Regulatory Pendulum: Direction of Travel?

Following the events of 2008, there was little doubt that the regulatory pendulum would swing in the direction of a more uncompromising application of regulation in order to promote macro prudential stability. New regulation was written against the backdrop of a caustic political environment, with the then available evidence and with no credible ability to fully assess its impact. Eight years later, we have new facts, we're starting to observe unintended consequences and regulators are asking questions. Is there enough evidence to support delaying the regulatory pipeline and/or recalibrate existing rules?

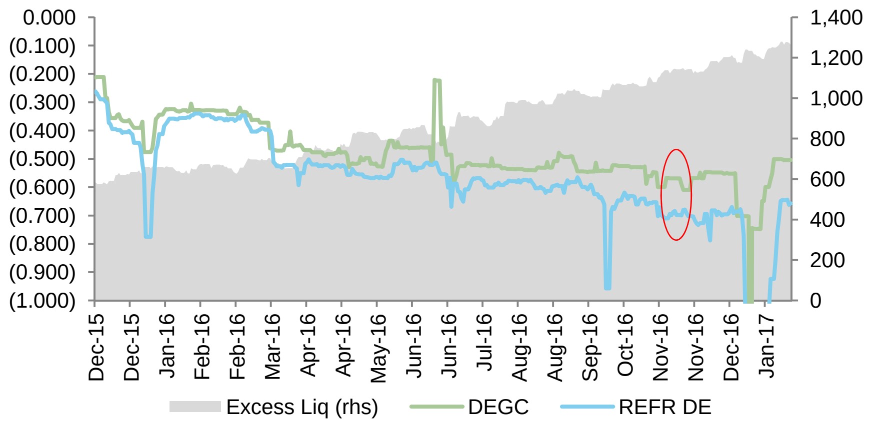


- Finalised European NSFR rules
- Limitation on collateral re-use
- Minimum HC & countercyclical requirements
- The idea of "counterparty" agnostic lending
- MiFiD 2 – Best Execution applies?

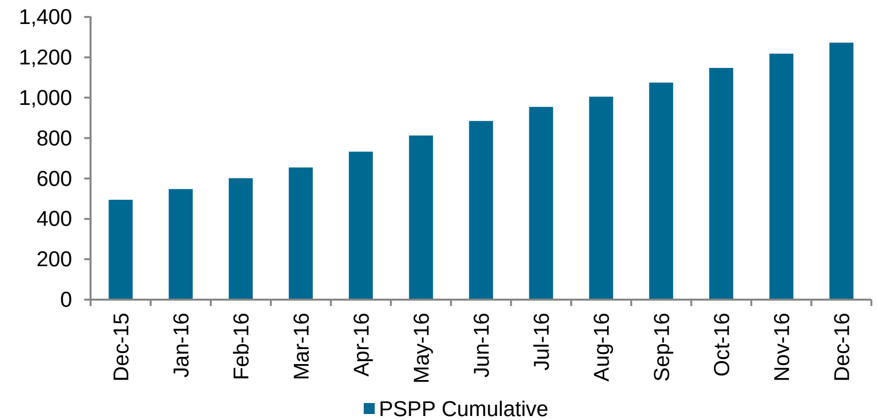
Farewell 2016…. Welcome 2017

2016: GC Starts Turning *Special*?

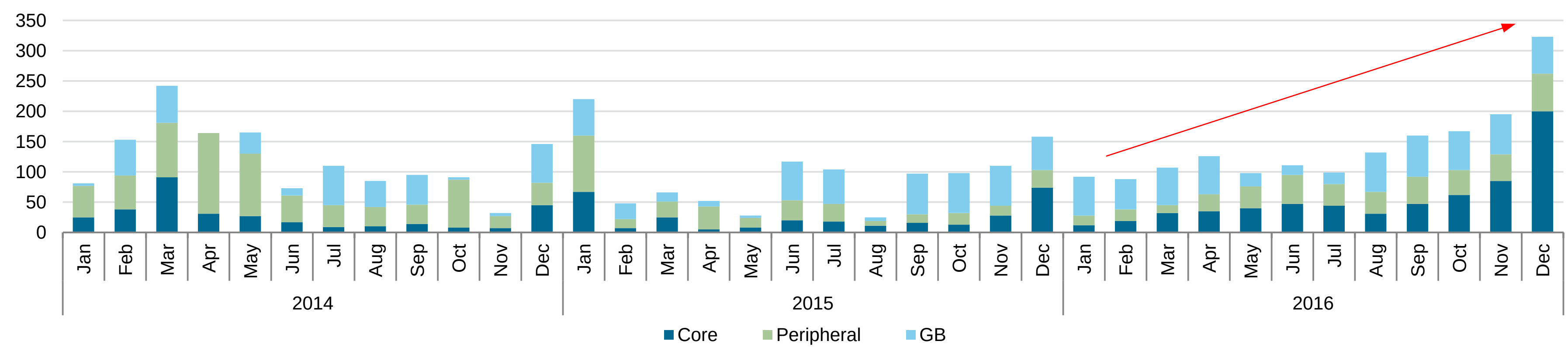
Rising Impact from Specials[1]



PSPP Cumulative Holdings (€mm)[2]



Number of Bonds Trading >10bps Through GC[3]

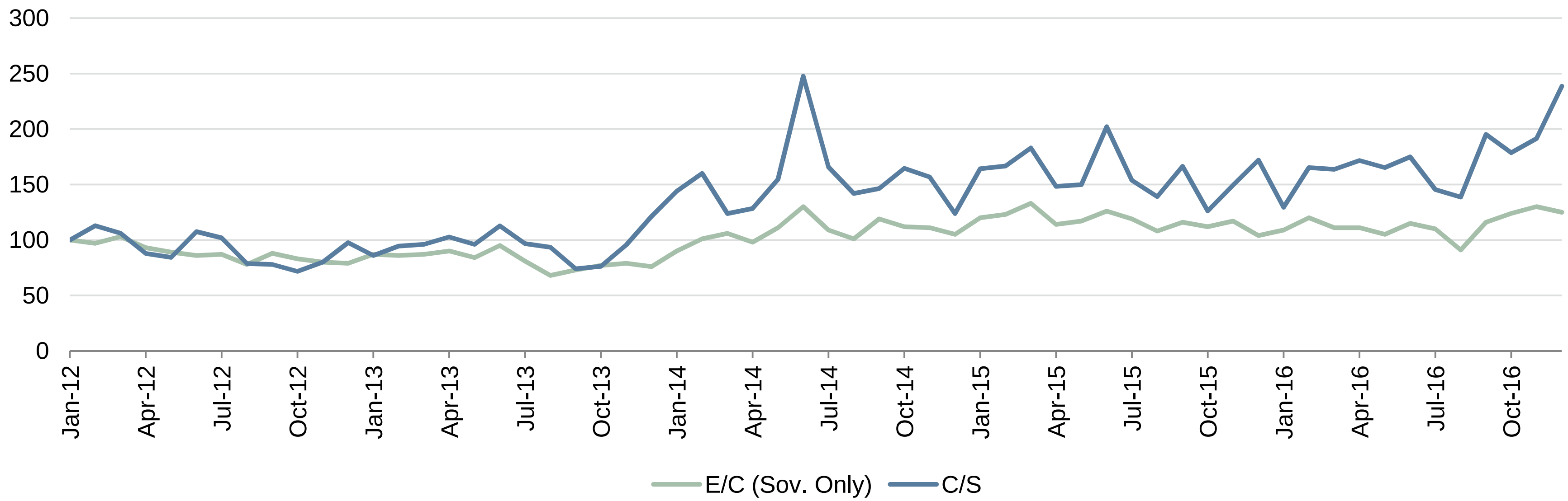


1. ECB , Bloomberg, and Barclays Data; 2. ECB; 3. Barclays Data

2016: Fails & Market Function

Shrinkage of the repo balance sheet, dealers holding less inventory and central bank purchases (QE) has raised the questions if settlement fails are becoming more common. An increase in settlement fails not only makes balance sheet and liquidity management more difficult but begins to erode confidence in market liquidity.
In Europe there are no public sources of market fails data.
The below charts illustrates ISCD auto-borrow activity, the market's last safety net to prevent a fail.

ICSD Auto-Borrow Activity Month-on-Month Change Index, Jan 2012 = 100 (1)



Source: Euroclear & Clearstream

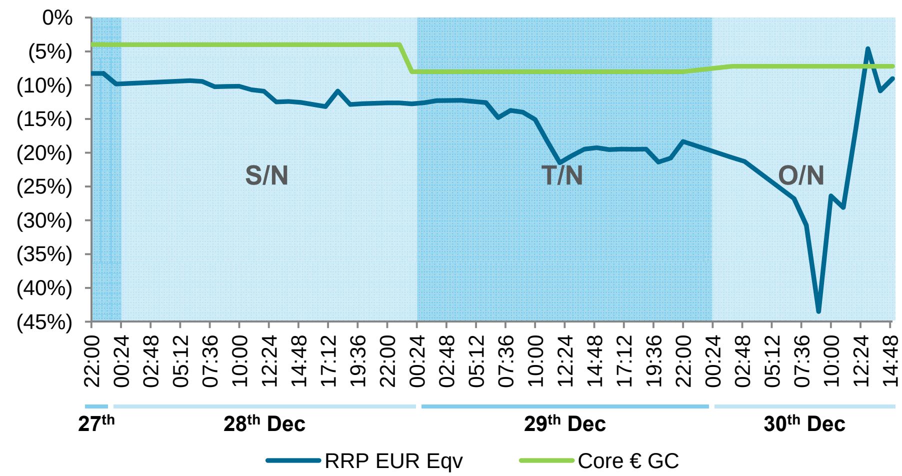
2016: What Happened at Year End?

Where's the smoking gun(s)?

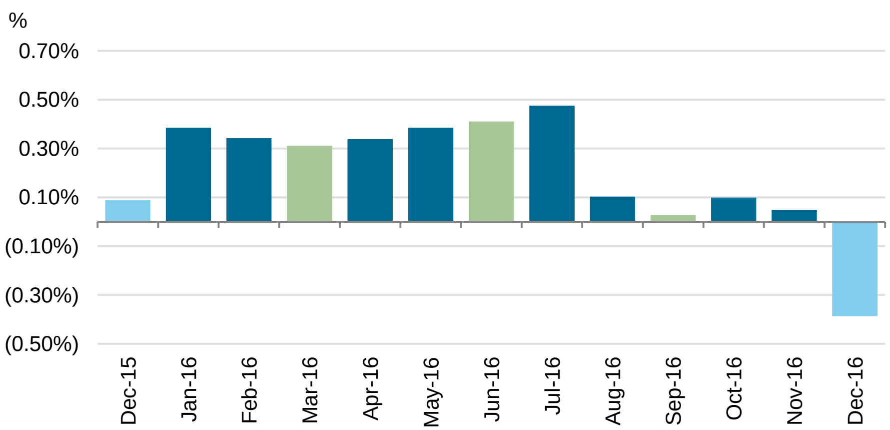
Not one but a number of factors may have contributed to the price action we experienced:

1. **Balance sheet constraints & Management**
2. **Cash hunting for a home**
3. **Lack of 'safe assets'**
4. **X-CCY basis**
5. **Cash market positioning**
6. **Levy/Tax policies influencing behaviour**

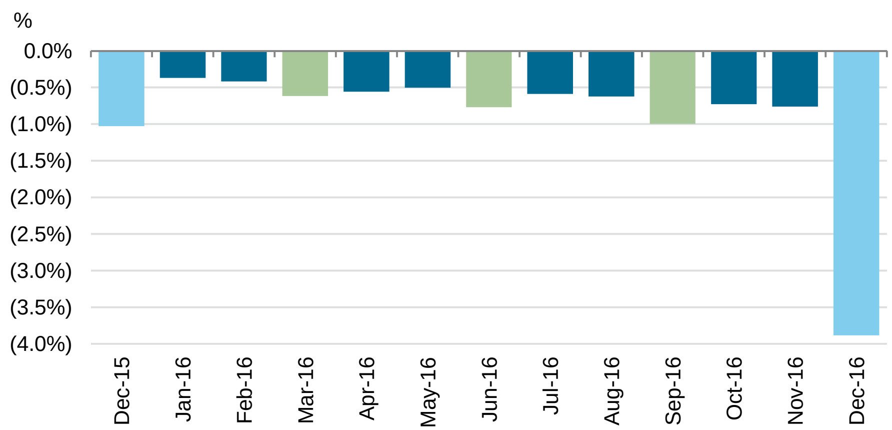
Was FX basis a factor?[1]



Money Fund £ Weighted Average Rate[2]



Money Fund € Weighted Average Rate[2]



1. Barclays and Bloomberg Data; 2.. Craine Data

2017: What Could we Expect?

Balance Sheet & Behaviour Continues to Evolve

Demand for Collateral remains constant with up-side risk in light of uncleared derivative margin requirements

Supply of short end ‘safe assets’ & Collateral Remains Challenged

Increased Specials Activity & a Possible Increase in Fails

Cleared swaps VM demand will influence 2H17 demand for balance sheet

Make or break time for new business models built on sponsored clearing & bank disintermediation

NCB become larger participants in the repo market as a result of lending QE holdings

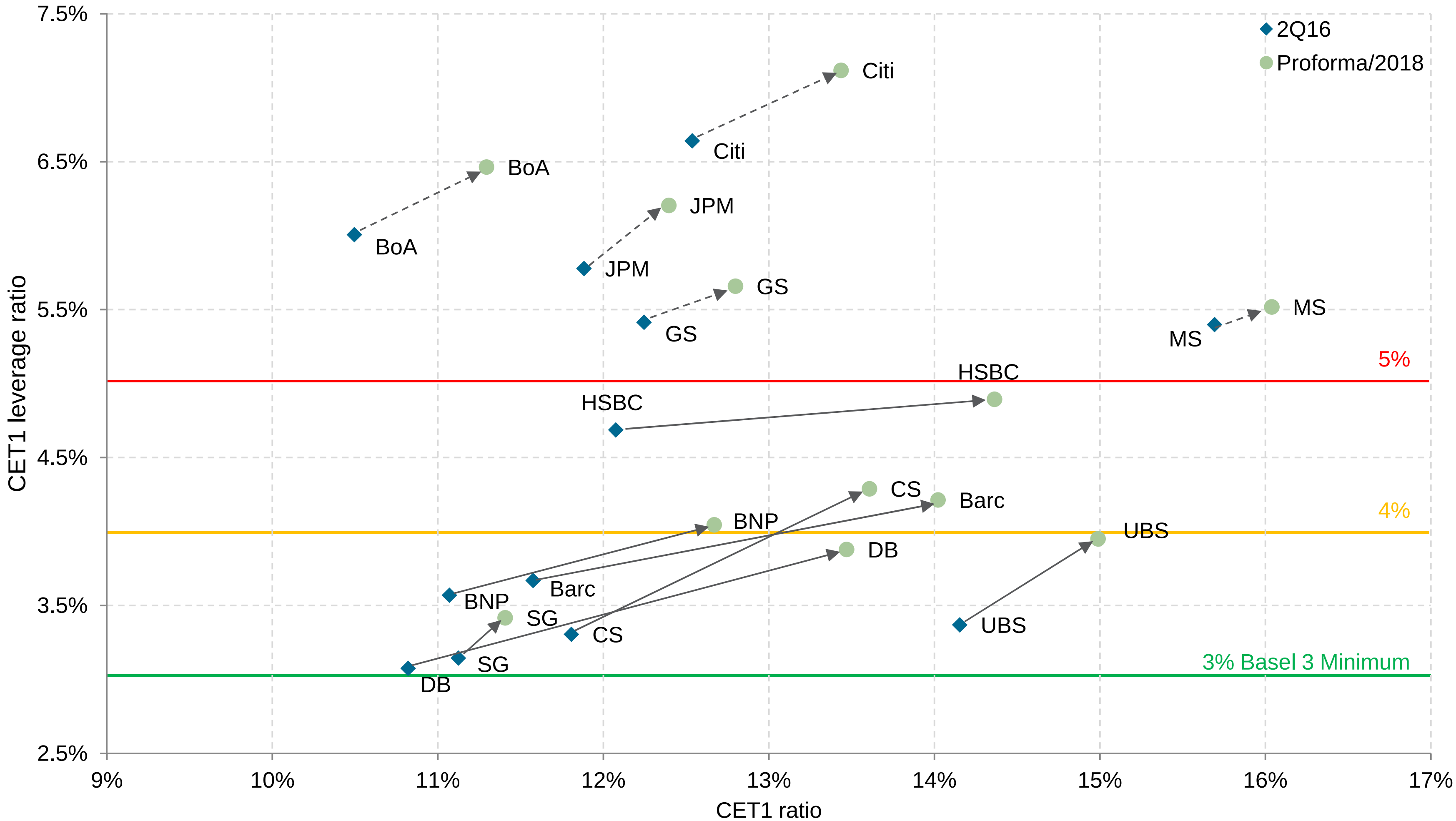
Could we see RRP in Europe or the UK?

European Money market Reform & US Earning Repatriation

Regulation, the Final Stretch, Pause and/or Recalibration?

2017: Balance Sheet & Behaviour

We are fast approaching 2019 and banks are busy executing their publically stated capital and leverage plans. The leverage solutions take the form of either deleverage and /or increase capital base. Also worth noting currently only 3 jurisdictions in this sample have binding leverage rules (US, UK & Switzerland).



Source: Barclays Research
Note: US Banks based on GAAP.

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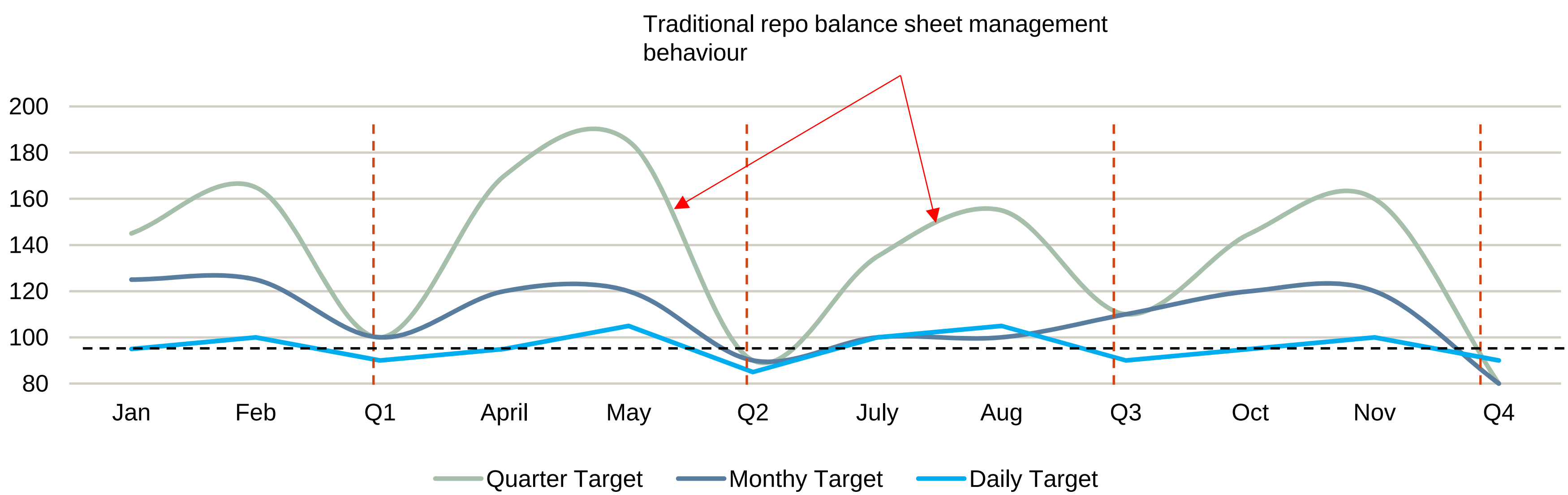
2017: Balance Sheet & Behaviour

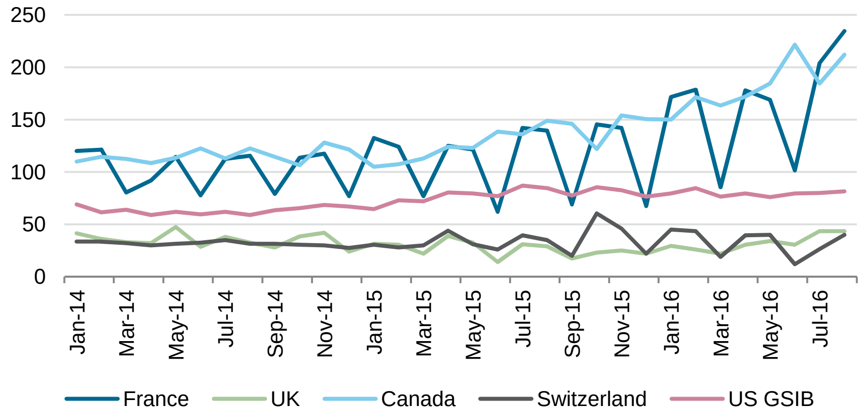
In the past, intra-quarter end leverage increases were standard market practice. Now that leverage is a key focus, reporting is done on an average basis rather than at specific points in time, thus avoiding the opportunity for 'window dressing'. This reduces volatility, but also reduces the repo balance sheet between the traditional reporting periods.



This type of behaviour is not only limited to Repo but any activity which is easy to 'dial up and down' and impacts leverage. Examples include cash trading and a bank's treasury desk taking advantage of arbitrage opportunities.

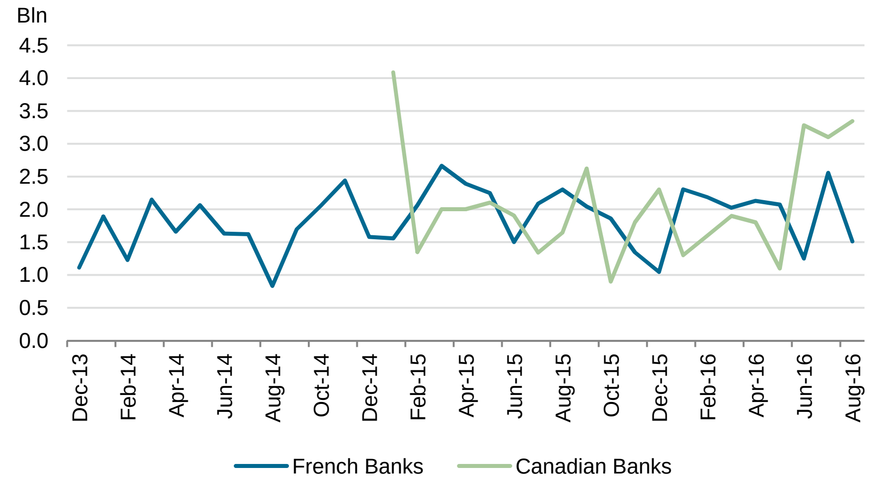
2017: Balance Sheet & Behaviour

USD On-shore Money Fund Holding (Indexed 2012 =100)

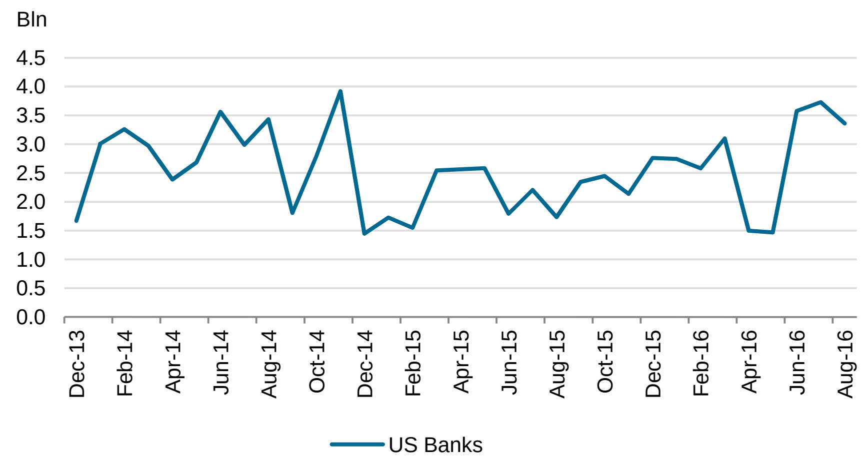


Note: US GSIBs include: BoA, Citi, GS, JPM, MS, and Wells. Source: Crane's Data, Barclays Research.

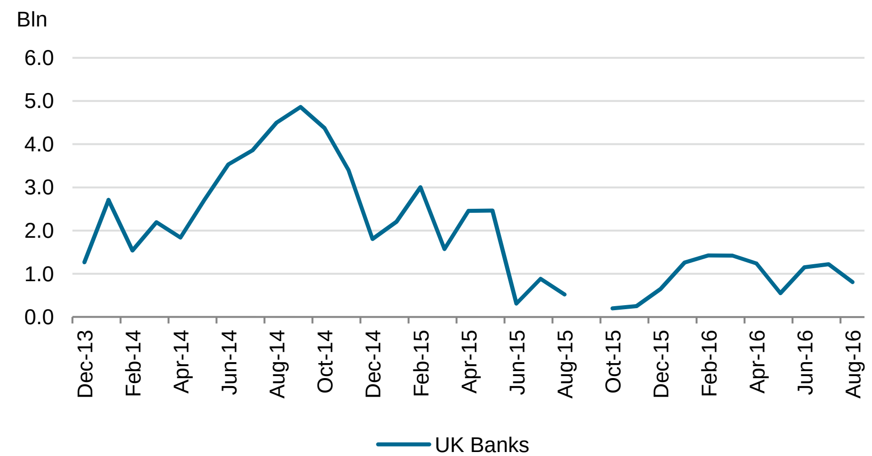
Sterling Off-Shore Money Fund Collateral Borrows (GBP) French and Canadian Banks[1]



Sterling Off-Shore Money Fund Collateral Borrows (GBP) US Banks



Sterling Off-Shore Money Fund Collateral Borrows (GBP) UK Banks



Source:
1. *Barclays US Money Market Update, 30Sept16.* *http://my.barcapint.com/PRC/servlets/dv.search?contentPubID=FC2263007&bcllink=decode*
2. *Crane Money Market Data.*

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2017: Collateral Question
EGB Issuance, QE and Demand for Margin

In 2017, depending on the demand for collateral, market positioning and the available balance sheet/use of leverage, GC may become more expensive with specials activity remaining elevated. The two main observable reasons are; the ECB will purchase ~€780bln of securities if the QE programs ends when announced (Dec-17) and Euro governments will issue less securities than they did in 2016.

€ bln	Gross Issuance (A)	(Δ vs. 2016e)	Bond Redemptions (B)	(Δ vs. 2016e)	Net Issuance (A-B)	(Δ vs. 2016e)	Net Issuance Post QE	Coupons (C)	Net Cash Flow (A-B-C)	(Δ vs. 2016e)	Net Cash Flow Post QE
Germany	160	0.5	142	-26.5	18	27	-117.4	21.1	-3.1	8.7	-138.5
France	211	-3.5	121.8	-5.2	89.2	1.7	-21.1	38.7	50.5	-5.6	-59.8
Italy	250	18.6	215.6	31.6	34.4	-13	-67.4	44.5	-10	22.8	-111.9
Spain	123	2.8	87.1	1.5	35.9	1.3	-36.6	27.2	8.7	-2	-63.8
Other	146.4	12.7	133.7	29.4	12.7	-16.8	-97.3	38.7	-26	-17.9	-136.1
Total Euro	**890**	**31**	**700**	**31**	**190**	**0.3**	**-340**	**170**	**20**	**6**	**-510**

Source: Barclays Research , Global Rates Weekly, 12 January 2017, "Euro area 2017 supply and cash flows"
Note: France forecast is gross issuance; net of buybacks the French target is officially €185bln.

THANK YOU

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