

The GFMA and ICMA Repo Market Study: Post-Crisis Reforms and the Evolution of the Repo and Broader SFT Markets

December 2018

Foreword

This report, *The GFMA and ICMA Repo Market Study: Post-Crisis Reforms and the Evolution of the Repo and Broader SFT Markets*, has been written to provide an analysis and evaluation of the post-crisis assessment of the vulnerabilities in the SFT markets, the subsequent regulatory reforms and how the reforms have influenced the way the SFT markets function. It also highlights practitioners' views on potential future developments and vulnerabilities that may stem from regulation and other factors.

In many ways, the repo market represents the foundation stone of the financial system, vitally facilitating the flow of cash and securities across the system. More broadly, the SFT markets play a crucial and central role in the modern financial ecosystem, facilitating a number of critical functions and interacting with a variety of different financial markets and their users.

The post-crisis reforms have led to a financial system that depends on high-quality collateral that has low volatility and a high degree of liquidity as its foundation. The system has more concentrated inter-connectivity with derivatives clearing requirements, limited unsecured funding capacity and higher mitigation of counterparty risk, using collateral. Therefore, it is imperative that the system has adequate capacity to move high-quality collateral – mainly through SFTs – across the system to where and when it is needed by market participants.

In recognition of the work undertaken by the Committee on the Global Financial System, the Bank of England and U.S. Treasury and understanding the fundamental importance of the SFT markets, GFMA and ICMA decided to provide an up-to-date view of the SFT markets from the industry viewpoint. As such, this is a contribution to the ongoing debate on whether these markets fulfil their economic functions

as effectively as possible, given the multitude of constraints that have and are yet to be put in place as part of the post-crisis regulatory reform package as well as other markets regulations.

This report brings together a vast array of previous work across key themes and further adds to the existing research through a survey that was run among 33 senior practitioners, often heads of repo and collateral management desks across North America, Europe and Asia. It also includes quantitative assessment of the SFT minimum haircuts regime, which may lead to unintended consequences if the scope of transactions and counterparties is not further clarified in the yet to be implemented Basel Committee of Banking Supervision's (BCBS) credit risk framework.

We believe that this report is a timely contribution since the Financial Stability Board and the BCBS are already working on evaluation of the post-crisis reforms, and their coherence and calibration.

We would like to thank all participating member firms for their active cooperation and contribution to this important project.

“Understanding the fundamental importance of the SFT markets, GFMA and ICMA decided to provide an up-to-date view of the SFT markets from the industry viewpoint”

Executive summary

Securities financing transactions (SFTs) play a crucial role in the capital markets and the broader economic system, contributing to market resilience and supporting the efficiency of financial markets. The use of repos and other SFTs for secured funding and collateral sourcing puts them at the heart of the post-crisis financial system. As a result, it is essential that the SFT markets function smoothly during both normal and stressed times.

Over the past decade SFTs have been, and continue to be, the target of significant post-crisis regulatory reforms. In light of these reforms, this report provides an up-to-date account of the current state of the repo and broader SFT markets, including securities lending. More importantly, it provides insights into concerns raised by stakeholders regarding how the repo markets operate today, the degree to which they are fulfilling their important economic and market functions, and whether regulatory reforms have any unintended negative impacts on the markets' resilience and efficiency.

By providing a holistic account of the operation of repo and securities lending markets during the crisis, and analysing the subsequent reforms, this report explains how regulatory change has impacted banks' SFT businesses and how that has changed the way these markets function. This assessment is followed by an analysis of how the changes in the cost of SFTs have affected banks' product offerings and client choices, as well as how volatility in some repo markets has impacted the selection of IBOR replacement rates.

The report's findings are supported by primary research in the form of qualitative and quantitative analysis. The qualitative analysis consists of a survey on the current and future state of the repo markets completed by 33

senior front office staff from major dealer banks across the globe. In addition, a quantitative impact study (QIS) assesses the impacts of the proposed minimum haircuts framework for SFTs. This framework was introduced as part of Basel III in 2017, based on recommendations made by the FSB through its shadow banking work stream. While the FSB's original objectives, "to limit the build-up of excessive leverage outside the banking system, and to help reduce procyclicality of that leverage"¹ were clear, many stakeholders have raised concerns that the rules as they were introduced in the final Basel III framework may have detrimental impacts on the functioning of key markets, in particular securities lending, and transactions with regulated counterparties such as pension funds, mutual funds and broker-dealers.

Key conclusions

It is clear from the primary and secondary research that regulation is a key driver of changes in the way the repo and broader SFT markets operate today and how they will evolve in the near future. While the markets have thus far proved resilient, they are still some way from reaching a new normality, with regional markets at different stages of that evolution reflecting divergent implementation of regulatory reforms on different timelines. This in turn influences the need for central banks to step in and provide capacity particularly at key reporting dates, such as year-ends when multiple regulatory and other measures such as bank levies encourage banks to reduce balance sheet capacity allocated to low-risk/low return activity. This is of particular concern given the need for the private sector to absorb the unwind of QE programmes over the coming years.

“The report’s findings suggest the need for several policy revisions and that further work needs to be conducted”

¹ FSB: Transforming Shadow Banking into Resilient Market-based Finance, Strengthening Oversight and Regulation of Shadow Banking, Regulatory framework for haircuts on non-centrally cleared securities financing, 12 November 2015. <http://www.fsb.org/2015/11/regulatory-framework-for-haircuts-on-non-centrally-cleared-securities-financing-transactions-2/>

The impact of future regulatory reform is a key concern across all jurisdictions. The implementation of forthcoming regulations such as the NSFR and the SFT minimum haircuts framework could further constrain capacity, to the detriment of the market. Unless revised, the SFT haircuts framework would increase SFT RWAs by 61% under the advanced approach and by 63% under the standardised approach, with over half of that impact coming from securities borrowing. This would have detrimental impacts on the repo and securities lending markets:

- Securities lenders may have to accept significantly lower returns for their portfolios due to lower demand;
- Dealer banks may not be able to provide the same level of liquidity in case their ability to borrow securities to meet client demand is limited due to the haircut rules;
- Short-sellers may need to seek for alternative ways to “short” securities and improve the price discovery process;
- Increased costs and reduced capacity for transacting with regulated counterparties could ultimately lead to increased costs for investors in pension funds and mutual funds.

Recommendations

The report’s findings suggest the need for several policy revisions and that further work needs to be conducted in recalibrating the global prudential standards, without sacrificing safety and soundness, to ensure better functioning of the repo and broader SFT markets for the benefit of the wider global economy:

- The FSB and BCBS should review the coherence and calibration of the post-crisis regulatory framework, particularly pertaining to how it impacts the repo market. As evidenced in the literature and the primary research, in particular the treatment of repo transactions backed by the highest quality government bonds should be reviewed in order to ensure that the private sector market has the capacity to absorb QE unwind and to operate without significant reliance on central banks during normal and stressed market conditions. The key review focus areas should be:
 - Treatment of high-quality government bonds repos in the leverage ratio; and
 - Treatment of repos in the NSFR framework.
- The minimum SFT haircuts regime should be reviewed in order to avoid significant disruptions to the repo and securities lending market. The following clarifications would limit the negative spill-over effects without compromising the objectives of the FSB and BCBS:
 - Provide further clarity on international level on the exclusion of transactions with regulated entities, which have statutory limits on their use of leverage. Otherwise the regional implementation of the rule may result in further regulatory fragmentation;

- Exclude securities borrowing transactions that are not financing transactions as the purpose of the transaction is to borrow a specific security and for which the banks receive a “negative haircut”.
- The borrows should not be included in the minimum haircuts calculation when the borrows can be demonstrated to support current or anticipated demand or when adequate client representations of the collateral management process are obtained. To facilitate this, there should be a read-across to the original FSB exemption from representations for short-term client facilitation.
- The exemption should apply without the need to seek representation for securities sourced through agent bank lending programmes that manage the collateral reinvestment without any provision of leverage to the lender; and
- Consider a more risk-sensitive approach instead of ignoring 100% of the collateral when minimum haircuts are not met.

Summary of key findings

The key findings from the secondary research show that:

- The repo market did not lie at the heart of the financial crisis. Repo's role in the broader financial crisis was overemphasized in the early analysis while the collapse of a significant proportion of the asset backed commercial paper (ABCP) and the wider unsecured funding market had a much more significant economic impact. The issues that were reported as key vulnerabilities during the crisis, such as sudden increases in haircuts or overreliance on intra-day liquidity, were not evident in all markets nor did the widening of haircuts impact all asset classes;
- While some regulations impacting the repo market have addressed legitimate regulatory concerns (e.g. opacity, overreliance on short-term funding for low quality portfolios), the lack of a holistic view of the application and impacts of the full suite of regulatory reforms has resulted in multi-layering of prudential regulations addressing the same or similar risks. While the repo and the broader SFT markets are still in a state of flux and adjusting to the new regulatory environment, the impacts of the post-crisis rules have had a profound effect on how these markets operate;
- The impact of regulation on the availability of bank balance sheet capacity for repos with different types of clients and transactions shows a preference for larger clients and nettable (centrally cleared or with clients that have more both way transactions) repo. The research also shows that there are marked differences between regional repo markets, depending on the progress in implementing key regulations that impact the product, such as the leverage ratio.
- Seasonal volatility in repo rates caused by regulation has also influenced the choices that have been made in selection of the benchmarks that will replace IBORs. Regions with the most significant volatility have generally opted for unsecured benchmarks, even if the volumes in unsecured wholesale lending are significantly lower.
- A multitude of academic papers and reports by national and international authorities suggest that further regulations should not be implemented without careful consideration of their impact on this already compressed market.

Quantitative impact study results

The QIS exercise was undertaken by 14 banks based on a standardised interpretation of the Basel III text, resulting in the following key findings:

- The scope of the BCBS text goes beyond the FSB's original objective, in capturing stock borrowing and transactions with regulated counterparties such as pension funds, mutual funds, and broker-dealers. In aggregate, it could increase risk-weighted assets (RWAs) for SFTs by 61% under the advanced and 63% under the standardised approach compared to the current RWAs for the same risk, with 52%

and 57% of the impact respectively coming from securities borrowing.

- The significant increase in capital requirements for SFTs could detrimentally impact the securities lending market in particular. For example, sourcing securities for market making and settlement could be impaired, with significant impact on market liquidity and price discovery as well as the ability of mutual funds and pension funds to achieve returns for their investors.

Qualitative survey results

The qualitative survey covered key areas where stakeholders have raised concerns, including: current state of the SFT markets and key regulatory and other drivers for their future developments; client activity, pricing and key drivers of product and market development; and dealers' concerns with regards to stressed market conditions. Key takeaways include:

- **Current market conditions:** Overall, the repo markets are functioning well, with the vast majority of responses suggesting that the capacity is "normal" or that there is "somewhat more capacity than normal". Key factors driving the increase in capacity include: the entry of less regulated participants; a change in the capital allocation costs (binding leverage to risk-based capital) for the business; delays in implementing the NSFR; improved economic conditions; and supporting actions by central banks. However, concerns remain over the performance of the market under stressed conditions.
- **Regulatory impact on repo:** Expectations of further regulatory restrictions is a key concern across all jurisdictions, though some regional variations exist. While many North American respondents thought that most of the regulatory restrictions are already priced in, European and Asian respondents expected regulation to continue to have a more significant impact on the market than any other factor. Key concerns include the combination of binding LR with G-SIB add-ons, NSFR, SFTR reporting requirements and CSDR mandatory buy-in rule creating a significant barrier to market capacity and repo flow or intermediation business. In addition, regional variances in the implementation of the NSFR may lead to differences in market capacity.
- **Regulatory impact on securities lending:** Respondents highlighted that LCR, credit risk and single counterparty credit limits in combination with significant pricing pressure are squeezing out mid-tier participants, with only systemically important institutions and less regulated entities left intermediating in this market.
- **Future regulatory constraints:** The minimum SFT haircuts framework was also considered to be highly impactful, as it may introduce a very punitive cost for regulated banks who borrow securities from lenders – effectively making borrowing of securities for those entities unviable.

- **Changes in client activity:** Differences between client segments are driven by ability to net repo transactions (gross vs. net), with access to clearing also a prominent driver for lower cost and continuous access to repo. The responses suggested that for buy-side clients with no nettable repo balances, “platinum account” status or access to clearing, the alternatives to repo are sponsored or peer-to-peer repo, prime brokerage, or structured contingent liquidity facilities.
- **Month-end volatility:** European survey responses evidenced concerns about market distortions at quarter- and year-ends, noting that this gives rise to divergences between implied and real repo rates; and stems from balance sheet cost impacts arising from periodically applied regulatory and other constraints coupled with QE related impacts, related to the availability of high-quality collateral. Such capacity constraints were also noted in Asia, but North American respondents generally reported lesser concerns in this regard.
- **Systemic risk concerns:** Responses clearly point to the ecosystem built after the financial crisis depending on the fluidity of high-quality collateral and the markets’ capacity to channel it to where it is needed at times of stress. The survey respondents highlighted in particular their concerns regarding private sector capacity to source and allocate that collateral, and the dependency on availability of central bank facilities to plug the gap.
- **RFRs:** Respondents suggested that policymakers should be made aware of the risks that have been put on the funding market due to regulation reducing capacity – resulting in increased volatility. The respondents suggested that there is a need for sufficient balance sheet capacity to build a deeper term repo market. Many respondents thought that the unsecured benchmarks will be more volatile during stress, but that at the moment there is no alternative for pricing term premium due to lack of term repo market depth.

Introduction: The structure of this report

The analysis in this report has been structured in the following way. Firstly, the scene is set in a background section which outlines why the repo market is important, including some details regarding the valuable functions it performs. In short, the repo market is a cornerstone of the financial markets, serving as a fundamental contributor to the overall resiliency, risk mitigation activities and efficiency of financial markets. It is for these reasons that analysis of this market is important, to both private market participants and central banks and regulators rely on its safety, liquidity and efficiency to underpin market activities and implement official sector goals.

This is followed by a review of what the initial assessment of SFT market performance during the crisis was and what was driving the observed behaviour, identifying the key reasons and the academic research which were used to determine the pre-crisis repo market vulnerabilities that drove the policy response. The perceived key vulnerabilities in the repo markets, both in the US and Europe, are outlined. A critique on that early assessment of what happened in the market is then laid out next, highlighting areas where the role of repo is now understood to have been overexaggerated in that early analysis.

Turning back to the risks which were initially identified, the next section of the analysis then examines whether these have been addressed by the implementation of post-crisis reforms. On a system-wide level, some of the key root causes of the crisis have been addressed by a number of reforms, while the repo product itself has become subject to a range of laws and regulations enforced by regulatory agencies. This section is then followed by a further one which analyses whether the post-crisis regulatory framework which has been established is indeed commensurate with the risks in repo markets. Given the now better developed understanding of what happened and of the role of repo markets, which was not as profound as initially posited, there is evidence of some regulatory overreach and duplication even as yet further measures continue to be contemplated.

To create further context for considering whether and how any adaptation of the post-crisis regulatory framework, as applied to the repo markets, should best be formulated, the analysis goes on to examine the ways in which these markets have changed subsequent to the crisis – in part responsive to the changes in the regulatory framework.

The survey results are then analysed and reviewed to build a picture of how market participants view the current state of the repo market, its near-term developments and potential risks and opportunities. This analysis also covers market participants’ views on potential systemic risks in more detail.

Finally, the report makes policy recommendations, as a basis for debate regarding what may therefore now need to be done, to ensure that the repo and broader SFT markets function well through economic cycles and stress periods.

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Background: Why is the repo market important?

The repurchase, or repo market is a cornerstone of the financial markets and is a fundamental contributor to the overall resiliency, risk mitigation activities and efficiency of financial markets. Both private market participants and central banks and regulators rely on the safety, liquidity and efficiency of this market to underpin market activities and implement official sector goals.

The repo market performs the following functions which are set out in more detail below:

- Cash investment and fund raising
- Collateral and liquidity management
- Supporting primary and secondary cash markets
- As a vehicle for the delivery of central bank policy and operations

Cash investment:

The repo market provides an opportunity for investors with surplus cash, such as money market funds and asset managers to deploy it in short-term low risk secured transactions. The purpose is to generate safe returns for institutional investors and individuals. By providing an outlet for asset managers to invest in high-quality ready realizable collateral through the repo market they do not need to hold as much cash in their portfolios as they would otherwise have to do. This means that a greater proportion of their assets are able to be kept invested, which generates higher returns for their investors.

Repo also allows corporates with surplus cash balances to reduce their counterparty risk with their depository institutions in a cost-efficient way. These corporates instead of leaving all funds at deposit with the bank to receive good quality collateral from the banks to secure their otherwise uninsured deposits. On the other side of the coin, the repo market provides an easy and simple avenue for institutions with inventories of liquid securities to raise funding for them in a simple low-cost way. It also presents valuable opportunities for investors to enhance the yield of portfolios by lending out securities.

Funding:

By being able to offer deposits secured against high-quality liquid assets (HQLA) and diversification to include lenders other than commercial banks, repo is able to mobilise cheaper and deeper funding for financial intermediaries such as securities dealers. This in turn helps to lower the cost of financial services provided by intermediaries to investors and issuers. Institutional investors also use repo, to meet temporary liquidity requirements without having to liquidate strategic long-term investments. Since the introduction of the regulatory requirement to clear standardised OTC derivatives across CCPs, the repo market has become an important source of cash for non-banks to provide as variation margin (VM) on OTC derivatives transactions. The importance, liquidity and secure nature of the repo market has made it the preferred source for the interest rate indices which the G-20 Financial Stability Board (FSB) and others wish to see published as measures of risk-free or nearly risk-free interest rates and banks' cost of funding to replace existing illiquid unsecured interbank deposit indices.

The resilience of the repo market helps to mitigate systemic risk. Repo is a more stable source of short-term wholesale funding than unsecured deposits because collateral in the form of HQLA (overwhelmingly the most common collateral) hedges both the credit and liquidity risks of lenders. This means lenders are more willing to offer longer-term funding and, as recognised in the Liquidity Coverage Ratio (LCR), are less likely to refuse to roll-over lending, even in a highly stressed market. For example, although the repo market was not immune to the disruption triggered by the default of Lehman Brothers in 2008, it did not suffer a seizure and has

been essential in avoiding total and unsustainable dependence on central bank liquidity.² The stability of repo funding is reinforced by the wide range of lenders who are willing to lend in the wholesale money market on a collateralized basis. Diversification creates a market which is deeper and naturally more resilient. Repo also mitigates systemic risk by allowing traders and investors in a stressed market to convert assets temporarily into cash in a way that is less disruptive than outright sales. Outright sales will depress the price of collateral securities and crystallize any unrealised losses on the holdings being liquidated or on hedges that have to be unwound when holdings are sold. Falling prices and mounting losses could amplify market stress and fuel the self-reinforcing dynamics of a crisis.

Collateral and liquidity management:

The repo market facilitates the efficient deployment and sourcing of high-quality collateral, which is increasingly important to help market participants meet margining requirements for non-cleared and cleared OTC derivatives. The HQLA framework, which underpins a significant part of the post-crisis regulatory framework, increases demand for HQLA, which can be satisfied through the repo market. HQLA are used as collateral for central clearing and other financing transactions by most market participants and as liquidity reserves by small and large banks, and they play a critical role in the smooth functioning of financial markets. If market participants' ability to generate liquidity from these assets – most often through the repo channel, such that portfolios can be maintained – is impaired, particularly during stress periods, it risks undermining the safety and soundness of the wider financial system by restricting the flow of resources to where they are needed.

Hence, it is important to ensure collateral fluidity, which allows collateral to move around the financial system in order to meet varying demand requirements across the financial markets. This is elaborated in reports such as the CICF's Collateral Fluidity White Paper³ and the ICMA ERCC's paper "Collateral is the new cash: the systemic risks of inhibiting collateral fluidity"⁴. This latter paper describes the increasing importance of collateral and calls for regulators to consider the impact of financial regulation on the movement of collateral, highlighting the potential risks of inhibiting collateral fluidity. The paper explains why it is that achieving an adequate degree of collateral fluidity requires the simultaneous existence of robust and efficient settlements infrastructure, as well as bank repo funding desks that are able to source, price, manage, and mobilise collateral.

Cash market support - primary and secondary markets:

Repo plays an important role in lowering the cost of issuance in the primary market. Dealers fund their underwriting positions and hedge their risks cost-effectively through the repo market – thereby reducing the cost of underwriting to the benefit of the issuer and hence the real economy. Indeed, in the sovereign market the hedging benefits for primary dealers of an active repo market permits debt issuance at a lower cost to the benefit of taxpayers.

Repo markets also contribute significantly to the liquidity in the secondary market. Repos smooth the functioning of the cash market by lowering the cost of carrying wholesale inventories, including by creating netting opportunities in the process of managing banks' trading books, and providing an efficient way to source securities not currently held in the dealers' inventory. This helps underpin market making capacity and contributes to the overall liquidity of the cash markets. The secondary market liquidity in turn influences the liquidity premiums that private and public issuers have to pay, with the greater the secondary market liquidity, the lower the required premium to be paid on issuance.

Repos also help support markets in several other ways. Like dealer banks, leveraged investors require financing (often secured via the repo market) to facilitate their trading strategies, which in turn contribute to liquidity in the secondary market. Furthermore, repos help with price discovery for less often traded cash markets. And, more broadly, repo plays a critical role in supporting the day-to-day operational efficiency of securities markets – including the facilitation of faster settlement times – by allowing issues to be borrowed to ensure timely onward delivery, where short positions have arisen unintentionally, usually because of unexpected lags between inward and outward deliveries of securities, infrastructure frictions or a tight supply of particular issues.

Furthermore, short-selling plays an important role in capital markets for a variety of reasons, including more efficient price discovery, mitigating price bubbles, increasing market liquidity, facilitating hedging and other risk management activities. IOSCO has recognised this⁵, while opining that short-selling should operate in a well-structured regulatory framework in the interests of maintaining a fair, orderly and efficient market. Yet without the ability to conduct reverse repo or securities borrowing transactions the realization of

2 Papadia & Välimäki point out that, between 2008 and 2011, the unsecured eurozone money market shrank by EUR 327 billion, forcing the ECB into exceptional emergency lending in order to prevent a seizure of the financial system and serious damage to the real economy. In fact, the ECB lent EUR 115 billion. But growth in the repo market contributed another EUR 212 billion, without which, the burden on the ECB would have been dramatically greater.

3 <https://www.icmagroup.org/assets/documents/Regulatory/CICF/Collateral%20Fluidity%20WP%207Nov2012.pdf>

4 <https://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/repo-and-collateral-markets/icma-european-repo-market-reports-and-articles/collateral-fluidity/>

5 <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD292.pdf>

these capital market enhancing features of short-selling would not be possible. So, it is important to keep these channels sufficiently well-maintained that they can function adequately well, even under stressed conditions, otherwise less economic benefits will be derived from capital markets.

Repo rates are important in identifying the true cost of carry for positions on securities, affecting the pricing of derivatives contracts. Repo rates are considered as an alternative benchmark to the unsecured LIBOR and other benchmark rates due to their better observability/transparency.

Central bank operations:

A primary role of central banks is to manage the cost and quantity of credit in an economy, in order to control economic growth and the rate of inflation. To control the cost and quantity of credit, most central banks intervene in the money markets to influence short-term interest rates. Repo has become an important tool for central bank intervention around the world, because of the size of the repo market, its role in funding other financial markets and the fact that repo reduces credit risk being taken with public funds⁶.

The repo market is a ready-made collateral market which enables central banks to implement monetary policy more efficiently under normal market conditions or to act more swiftly as lenders of last resort during periods of market turbulence. Central bank repo feeds seamlessly into the interdealer repo market. Moreover, a liquid repo market is a source of virtually risk-free interest rates which can provide the central bank with a sensitive gauge of monetary and macro-economic conditions and, in the form of a repo rate index, a meaningful operational target for open market operations.

According to Benoit Coeuré⁷, Member of the Executive Board of the European Central Bank, “the repo market is a cornerstone in the transmission of monetary policy. In its traditional role, it is a prime short-term funding market for banks. Before the outbreak of the global financial crisis, secured transactions accounted for around a third of the daily turnover in euro area money markets according to money market statistical reporting (MMSR) data. Today, their share is closer to two-thirds”.

He further elaborates that movements in short-term repo rates change the market-based financing conditions for banks and therefore their ultimate customers. Repo rates are thus a prime channel through which changes in the monetary policy are transmitted to the broader financial market and the real economy.

To summarise this section, well-functioning repo and broader SFT markets serve many economic purposes and benefit all users of financial markets (see table 1 below), as well as real economy end-investors who benefit from better yields as a result of more fluid markets.

Table 1: Economic functions of the repo market and users of repo

Economic functions of repo	Users of repo								
	Banks	Hedge funds	Money market funds	Insurers, pension funds	Long-only asset managers	Corporates	Public agencies	Central banks	CCPs
EF1. Low-risk option for cash investment	✓		✓	✓	✓	✓	✓	✓	✓
EF2. Transformation of collateral	✓	✓		✓				✓	
EF3. Supporting cash market efficiency and liquidity	✓	✓		✓				✓	
EF4. Facilitating hedging of risk	✓	✓		✓				✓	
EF5. Enabling monetisation of liquid assets	✓							✓	✓

Source: CGFS report 59

⁶ <https://www.theotcspace.com/sites/default/files/2011/11/003-the-repo-market.pdf>

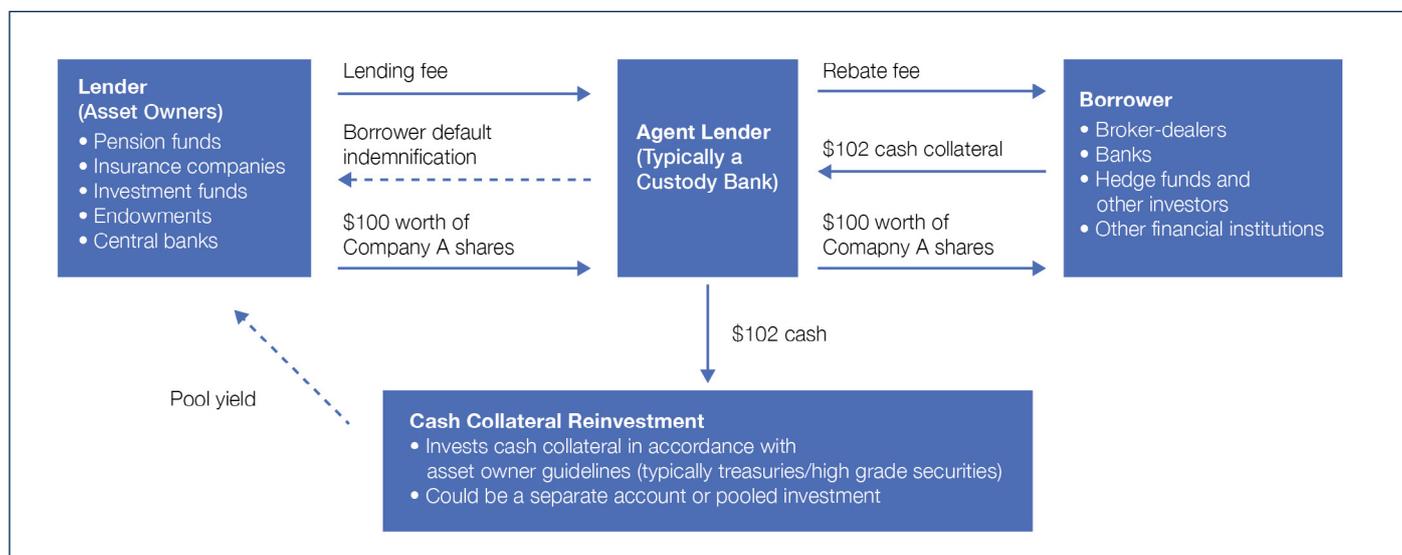
⁷ https://www.ecb.europa.eu/press/key/date/2017/html/ecb.sp171114_1.en.html

Background: Why is the securities lending market important?

Securities lending is a less well-known form of SFT. In contrast to most repo transactions, securities lending is driven by demand for particular security instead of a funding requirement. To put it simply, Federal Reserve Bank of New York⁸ summarises that it “can be viewed as the collection of rental fees on idle assets through fully-collateralized loans. More precisely, securities lending is the market practice by which securities are transferred temporarily from one party, a securities lender, to another, a securities borrower, for a fee. This transfer is secured by collateral, which can be cash, another security, or another form of financial commitment such as a letter of credit. Normally, securities lending is facilitated by a third party, a “securities lending agent”.”

Securities lending transactions are facilitated by lending agents that are typically custody banks that safekeep institutional investors’ assets in safe custody accounts (see table 2 below).

Table 2: Participants and flows in agency securities lending business



Source: GFMA

However, other agents such as investment advisors who provide lending services as an adjunct to their advisory business and third-party agents who do not have custody or advisory services with their clients. The principal lenders may choose a single or many agents, depending on asset classes and geographies they are invested in. Securities lending is a demand driven activity and it does not directly provide leverage or funding for:

1. Borrowers, who receive securities (not cash) and post cash or non-cash collateral;
2. Beneficial owners, whose cash is placed in separate accounts or in conservatively managed pooled investment products, managed by the agent; or
3. Agent lenders, who act solely as agents and have no access to cash or the collateral.

8 https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr740.pdf

Its benefits are multi-faceted. From a more macro-perspective, Norges Bank⁹ points out that institutional ownership and greater concentration of securities ownership has shrunk the proportion of securities available for trading and price discovery. Securities lending as well as repo make some of these securities available again, while imperfections in the market occur due to imbalance between securities available for borrowing and the demand. In turn, increased availability of securities for trading enhances functioning of the financial markets in several important ways. It provides liquidity for trading and settlement of securities transactions, enhances price discovery by facilitating short-sales of securities (increasing securities available for sale) and thus also reduces price volatility and bid-offer spreads as the views of a greater proportion of investors are reflected in the market values.

Securities lending is a strong enabler of asset mobilization, allowing the sell side to access buy-side investment pools. For securities lenders such as for pension funds and other long-term investors, the product generates incremental income, reducing costs and improving returns on long-term portfolios. To ensure that the product delivers the benefits to lenders with minimal risk, the amount of collateral posted by the borrower must exceed the value of the security borrowed by a predefined amount known as haircut. According to Aite Group¹⁰, these haircuts typically range from 2% to 5%, depending on the collateral's credit quality, currency type, underlying borrower's credit quality, and method of transacting. Based on Markit Group data, securities lending typically adds five basis points to pension or investment fund yields, while investors in 2014 received \$8.3 billion from securities lending programmes.

The securities borrowers enter borrowing transactions to cover short-sales or failed trades, prime brokerage, swaps collateral and/or to hedge risks stemming from long positions elsewhere. In addition, securities lending provides access to high-quality collateral, meeting growing demand for high-quality assets for margining or liquidity requirements. The latest data collected and reported by ISLA¹¹ indicates that an estimated 46% of all open securities lending transactions globally are HQLA government bond assets – with at least 50% of all government bond loans being for periods of three months or more, to allow the borrower to include such borrowed assets within LCR calculations. Securities lending has also played an integral part in QE programmes, by providing a conduit to allow securities purchased within central bank asset purchase programmes to be recycled back into the market.

The wider benefits of short-selling, which is directly facilitated by securities lending and repo have been widely documented in numerous studies by academics and market practitioners. Finadium¹² identified \$61 billion in increased investor costs per annum if securities loans, and hence short-selling, were no longer available. The paper also reviews other recent studies on impacts of short-selling bans, with evidence for example on significant deviations in bid-ask spreads between stocks that were and were not subject to short-selling bans.

9 https://www.nbim.no/contentassets/fa779bdb63724b13a0b25fb976212a13/assetmanagerperspective_2-16_the-role-of-securities-lending.pdf

10 Aite Group: Securities Lending Market 101: Poised for Change? February, 2017

11 <https://www.isla.co.uk/system/files/2018-09/Completed%20ISLA%20Report%20Sep%2018.pdf>

12 Finadium: Securities Lending, Market Liquidity and Retirement Savings: The Real World Impact, November 2015

What was the initial assessment of SFT market performance during the crisis and what was driving the behaviour?

This section identifies the key reasons and the academic research used to determine the pre-crisis repo and other SFT market vulnerabilities that drove the policy response. The critique on the early assessment of what happened in the market is in the following section, which highlights areas where the role of repo was overexaggerated in the immediate post-crisis analysis. However, to provide a full review of the decision-making process this section outlines the key perceived vulnerabilities in the repo markets both in the US and Europe. These included: (1) liquidity risk and procyclicality; (2) interconnectedness and leverage; (3) opacity; and (4) market infrastructure.

1. Liquidity risk and procyclicality:

Prior to the financial crisis, many market participants were overdependent on short-term wholesale funding. The inability to refinance their portfolios led to the demise of certain dealers (e.g. Lehman Brothers, Bear Stearns), banks (Northern Rock) and shadow banks such as securitisation vehicles.

Additionally, based on the limited evidence from the bilateral US repo market, underlying credit of certain securities became riskier, and procyclical pressures increased haircuts and margin. An increase in the haircut for a type of collateral reduces the amount of borrowing available from a given amount of collateral. A market-wide rise in haircuts on certain collateral quality can spiral and result in unwillingness by market participants to lend against those securities. Such “runs on collateral” or “runs on repo” can force market parties facing funding challenges to resort to asset fire-sales (which can put further upward pressure on haircuts). If the funding challenges are acute, the firm could fail. Gorton et al¹³ studied the bilateral repo haircuts during the crisis against use of the three Federal Reserve liquidity facilities (the Term Auction Facility (TAF), Term Securities Lending Facility (TSLF), and Primary Dealer Credit Facility (PDCF). They proposed that when haircuts on privately produced collateral increased, borrowers were eager to bring this collateral to the Federal Reserve in exchange for US treasuries – essentially the most liquid, cash equivalent asset.

Similarly to the sudden loss of liquidity/collateral value, in the context of margin lending the FSB¹⁴ noted that reuse of client assets has similar features due to procyclicality: *“Increased availability of client assets to finance client activities and the use of collateral in excess of client funding needs used for own funding (if permitted) in good times, followed by the sudden withdrawal of client assets or of consent to re-hypothecate the assets in times of stress, may also make intermediaries’ business and funding generally more procyclical (i.e. enhanced growth in good times, larger reductions in times of stress)”*.

2. Interconnectedness and leverage in the system:

ESMA¹⁵ has highlighted that SFTs may be used by market participants to build leverage and that from a system-wide perspective, the contribution of SFTs to the build-up of (gross) leverage is widely recognised and documented. Regulators estimated that the amount of reuse was significant during the crisis.

In the banking system for example, the Financial Stability Board (2017) finds that among the 13 largest global banks, collateral reuse

13 https://www.gsb.stanford.edu/sites/gsb/files/fin_11_17_gorton.pdf

14 <http://www.fsb.org/wp-content/uploads/Re-hypothecation-and-collateral-re-use.pdf>

15 https://www.esma.europa.eu/sites/default/files/library/2016-1415_-_report_on_sfts_procyclicality_and_leverage.pdf

2006 – 2014 was about 30% of the total assets of these banks and that it peaked at around EUR 4.3 trillion in 2006. This implies a collateral velocity around 1.5. In the broader system, Singh¹⁶ estimates that the velocity was four prior to the crisis. Gorton et al opine on the dangers of high velocity that if the velocity of treasuries is greater than one, there cannot be enough treasuries should all repo borrowers want their treasuries back at the same time. However, ESMA's report states that it is important to distinguish between gross and net leverage from a bank balance-sheet perspective: SFTs may be used to hedge against other physical or synthetic exposures, resulting in higher gross leverage but possibly lower net leverage.

In the US, repo and securities lending play an important role underpinning the financial system. New York Fed¹⁷ estimate (based on various sources and academic research) that the total repo activity at its peak level before the 2007-09 financial crisis ranged from \$5 to \$10 trillion outstanding. In the current post-crisis era, their estimate of total repo activity is around \$5 trillion and the estimate of the outstanding value of securities on loan is just under \$2 trillion. In terms of banks and broker dealers, based on incomplete Fed Flow of Funds data, net repo financing provided to them fell by more than 50%, or nearly \$900 billion, from the second quarter of 2007 to the first quarter of 2009 according to the New York Fed.

In Europe, repo and wider SFT markets are also important in financing the economy. Industry surveys conducted by ICMA put the gross amount of outstanding repos on the books of participating European parties at around EUR 7.35 trillion¹⁸, and ISLA's latest report puts the global amount of securities on loan at EUR 2.1 trillion¹⁹. The latter includes a significant amount of EU securities on loan. However, the differences in the coverage and definitions of available data imply that the figures used in the report are not directly comparable. This, together with the absence of data on margin lending, implies that there is currently no comprehensive estimate of the size of EU SFT markets or volumes of SFTs in the EU.

In relation to leverage outside the regulated system, the FSB²⁰ notes that interconnectedness arising from chains of transactions involving the re-use of collateral was also to blame during the crisis. Speaking broadly of this sort of concern: "experience from the crisis demonstrates the capacity for some non-bank entities and transactions to operate on a large scale in ways that create bank-like risks to financial stability. Such risk creation may take place at an entity level but it can also form part of a complex chain of transactions, in which leverage and maturity transformation occur in stages, and in ways that create multiple forms of feedback into the regular banking system."

FSB's paper²¹ on Collateral reuse identified that reuse may also increase interconnectedness among market participants, which may create a risk of contagion where fails to deliver reused collateral by one party cause additional fails. In addition to the chains of transactions created by collateral reuse, the FSB criticizes the inadequate collateral valuation/haircutting practices that left institutions with large losses that could have been at least partially mitigated if price changes were marked more frequently. ESMA also highlights that by creating contagion channels, systemic leverage created by repo market interconnectedness may create negative externalities for market participants that are not directly dealing in these markets.

3. Opacity:

The FSB's assessment of Shadow Banking Risks in Securities Lending and Repos²² argues that it is critically important that regulators have visibility on risk build-ups and developments in financial markets, including in securities financing markets that acted as a key channel for the transmission of systemic shocks during the crisis. This lack of timely information, in FSB's view resulted in significant disadvantages whereby authorities did not have a comprehensive and timely picture of the risks and found themselves dealing with late-stage systemic events.

The FSB further argues that the assumption that securities financing is always durable even in a stressed market was flawed, and the degree to which systemically important players were conducting significant maturity, liquidity and credit risk transformation during their securities financing and collateral management activities were all opaque to authorities, given the gaps in data available to them at that time.

Gorton et al²³ go as far to say that the lack of data was the defining feature of the "shadow banking system" and that therefore it is difficult to understand what happened during the crisis. They further suggest that had this system been measured and documented prior to the crisis there probably would not have been a crisis.

16 <https://www.imf.org/en/Publications/WP/Issues/2016/12/31/The-Sizable-Role-of-Rehypothecation-in-the-Shadow-Banking-System-24075>

17 https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr740.pdf

18 <https://www.icmagroup.org/assets/documents/Market-Info/Repo-Market-Surveys/No-35-June-2018/ICMA-European-repo-market-survey-number-35-conducted-June-2018.pdf>

19 <https://www.isla.co.uk/system/files/2018-09/Completed%20ISLA%20Report%20Sep%2018.pdf>

20 http://www.fsb.org/wp-content/uploads/r_130829b.pdf

21 <http://www.fsb.org/2017/01/non-cash-collateral-re-use-measure-and-metrics/>

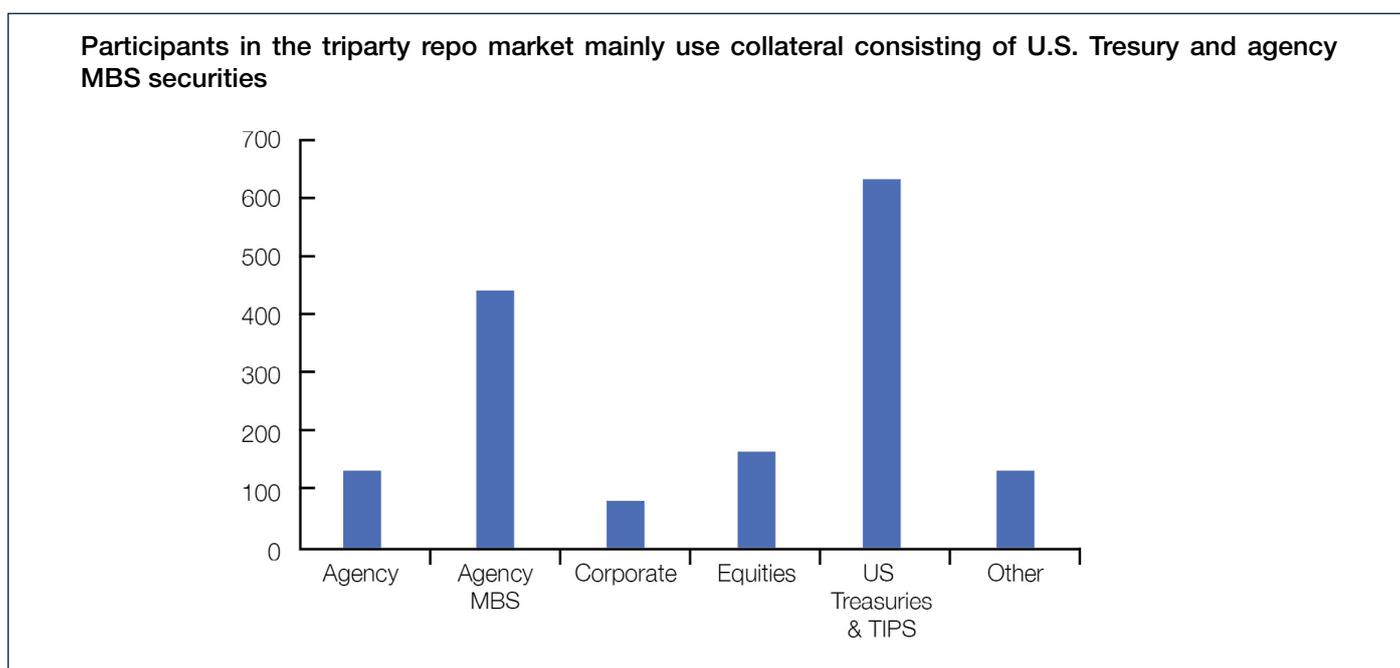
22 <http://www.fsb.org/wp-content/uploads/Re-hypothecation-and-collateral-re-use.pdf>

23 https://www.gsb.stanford.edu/sites/gsb/files/fin_11_17_gorton.pdf

4. Market infrastructure:

From a collateral management standpoint, the repo market is divided into tri-party repo and bilateral repo markets. In tri-party repo, an operational agent stands between borrowers and lenders, facilitating the collateral and cash moves and settlement of repo trades in the parties' accounts at the tri-party agent and according to the terms of the repo agreement. The US tri-party repo market is a short-term funding market for large regulated institutions, such as securities dealers. Opacity was much less of an issue for the US tri-party repo market as data on transactions was more readily available to regulators. Moreover, the securities posted as collateral cannot in practice be repledged outside the tri-party platform, which limits the collateral velocity and leverage that can be achieved through tri-party repos. According to the Federal Reserve Bank of New York (FRBNY) analysis²⁴, tri-party repo trades in the US are mainly collateralized by high-quality securities such as U.S. Treasuries and agency MBS.

Table 3: Types of collateral used in the US tri-party repo market



Source: Federal Reserve Bank of New York, June 2015

However, the FRBNY identified weaknesses in the policies, procedures, and systems supporting the US tri-party repo market during the crisis, especially when the financial condition of dealers deteriorated, and collateral valuations became uncertain. One of the main infrastructure concerns was that the settlement of tri-party repo contracts heavily relied on clearing banks extending intraday credit to securities dealers, which subjected clearing banks to significant risk in case of dealer failure combined with insufficient and illiquid collateral.

While the US tri-party market is mainly used by larger institutions and dealers for funding purposes, the bilateral repo market in the US is also a market for collateral. Collateral moves around in the economy for various purposes: collateral is needed for derivative transactions, for cross-border financial transactions, and for leveraged finance for hedge funds. In the bilateral repo, the cash investor receives full control over the securities posted as collateral, exposing the collateral provider to the possibility of a settlement failure on the closing leg of the repo. This risk was considered to have been exacerbated during the crisis because trades in the US were not cleared through a third-party clearing bank.

Moreover, Gorton et al²⁵ show in their analysis of the use of the Federal Reserve's emergency funding facilities that an increase in the haircut on a given type of collateral in the bilateral repo market resulted in those specific assets being taken to the Federal Reserve as collateral against loans from emergency facilities. The borrowers were eager to exchange this collateral for treasury securities – safe assets whose value and liquidity was not questioned during the crisis. The Term Securities Lending Facility (TSLF) was the only one of the US Federal Reserve's facilities that allowed borrowers to access good collateral, instead of cash. Gorton et al argue that because TSLF borrowing was uniquely sensitive to changes in bilateral repo haircuts, the repo borrowers need to regain their high-

²⁴ https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr740.pdf

²⁵ https://www.gsb.stanford.edu/sites/gsb/files/fin_11_17_gorton.pdf

quality collateral was an important contributor to crisis dynamics.

Additionally, regulators in the US discovered that operational controls and inefficiencies in firms' operational procedures for managing rehypothecated margin lending assets were inadequate following the Lehman Brothers default in September 2008. Moreover, some clients may not have fully understood the nature of rehypothecation.

In the EU, the markets operate differently. While tri-party repo plays a significant role in the US, it is only about 10% of the repo volume in Europe²⁶, where diversity across the region leads to a far less homogeneous and more fragmented market. For term repos, the EU tri-party market (except DBV in the UK) is not subject to the daily unwind practice and the resulting intra-day credit exposures for the clearing institutions as was the case in the US. Instead, term repos are subject to daily substitution and margining processes, which limits the credit and valuation risks. Thus, during the crisis, the EU tri-party markets were not subject to similar stresses as the US tri-party market.

In terms of bilateral repos, the EU market is proportionally larger than the bilateral market in the US. The EU repo contracts are legally different to those in the US, as they transfer the legal title of the collateral to the buyer from the seller, which is known as true sale – while the US market uses a pledged collateral construct. Therefore, in the EU there is certainty about legal title and counterparties are free to use the collateral they acquire. A meaningful proportion of repos were uncleared in the EU before the crisis, thus exhibiting similar potential risks to the US bilateral market. However, the EU regulators did not observe similar issues that occurred in the US bilateral market during the crisis. While longer maturities that are typical in the EU market reduced the settlement and roll-over risks, it is evident that longer tenor trades require good operational controls for margining.

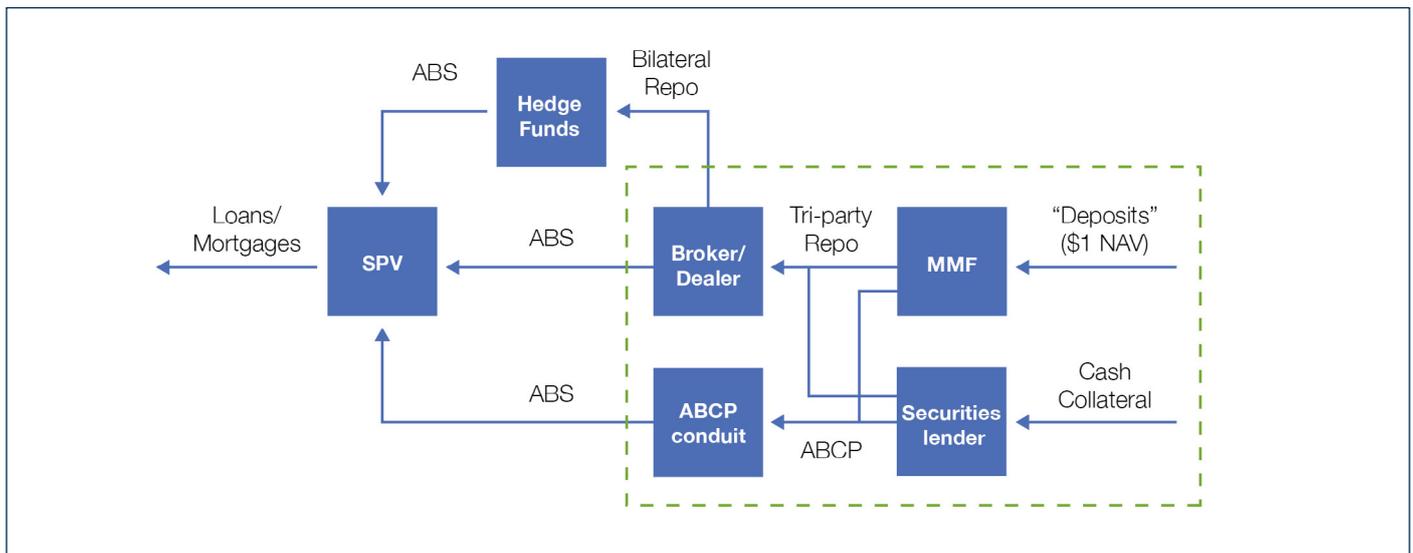
26 <https://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/repo-and-collateral-markets/icma-ercc-publications/repo-market-surveys/>

Was the crisis response based on correct assessment of what happened in the SFT markets?

Since the immediate aftermath of the crisis, more academic studies and other research has emerged with the benefit of more reflection and time to look through the events and interlinkages, as well as identifying more data sources that provided further insights into the way events in the crisis unravelled. While many issues remain undisputed (such as opacity and infrastructure), the early assertion of the role of repo funding in causing the crisis has been reassessed.

In a broader context, the whole role of repo in the collapse of the US shadow banking system has been questioned by Krishnamurthy, Nagel and Orlov²⁷. They analysed the US tri-party repo funding data extended by money market funds (MMFs) and securities lenders to the shadow banking system (table 4).

Table 4: Shadow bank funding flows chart



Source: Adapted from Krishnamurthy et al: "Sizing Up Repo"

The analysis included the quantities, haircuts and repo rates by type of collateral underpinning the transactions. In their analysis of the shadow bank funding contraction, they conclude that:

"During the financial crisis, repo funding collateralized by private-label securitized assets contracted sharply. This aspect of the data is consistent with the "run on repo" that has been prominently emphasized by Gorton and Metrick. However, repo accounts for only a small fraction of the short-term funding of securitized assets in the shadow banking system prior to the crisis. This finding [of this study] does not support broadbrush picture painted by Gorton and Metrick that the expansion of repo drove the large shadow-banking system and the subsequent run on repo caused its collapse. The short-term funding of securitized assets through ABCP and direct investments by money market investors is an order of magnitude larger than repo funding, and the contraction in ABCP is an order of magnitude larger than the run on repo. A picture that emphasizes the role of short-term debt, through both ABCP and repo, driving the expansion and collapse of the shadow banking sector is more consistent with our data."

²⁷ <http://www.nber.org/papers/w17768.pdf>

This view – that a significant proportion of the ABCP funding market collapsed – is consistent with the broader picture in table 5 below, which shows the dramatic expansion and the eventual crash of the US securitisation issuance market.

Table 5: US Corporate Debt and securitisation issuance



Source: Thompson Reuters, adopted from Gorton and Metric (2010)

Krishnamurthy, Nagel and Orlov observe that unlike the assertion of Gorton et al in the US bilateral repo market, haircuts moved very little in the US tri-party market during the crisis. While the haircuts in the bilateral market were often zero even for private sector securities, in the tri-party MMF repo market the haircuts were at least 2% for treasuries and agency securities. Copeland, Martin, and Walker²⁸ were intrigued by the divergence in margins between the US tri-party and bilateral markets, considering their similarity and strong interconnectedness. While large securities dealers often lend cash in the bilateral repo markets and use the securities obtained in those bilateral repo transactions as collateral in tri-party repo transactions (i.e. dealers reuse the collateral they receive in the bilateral repo market for funding from the tri-party market).

To reconcile between the two data sets, Krishnamurthy, Nagel and Orlov note that, compared to dealers, MMFs are much less capable of disposing of collateral upon the occurrence of a repo counterparty’s default, suggesting that they withdraw funding as soon as the collateral illiquidity or riskiness increases. This is also recognised by Duffie²⁹, who notes that “Unlike insured depositors at a commercial bank, many of those with exposures to dealer banks have no default insurance, or do not wish to bear the frictional costs of involvement in the bank’s failure procedures even if they do have insurance”. This withdrawal of funding against lower quality assets was then transposed to the bilateral repo market by dealer banks and their heightened consciousness of credit quality and worry about illiquidity of collateral evidenced by Gorton and Metrick³⁰.

More importantly, Krishnamurthy, Nagel and Orlov discovered that while the contraction in repo on aggregate was insignificant and by a magnitude smaller than the ABCP funding market, it impacted certain key dealer banks disproportionately. Their findings are echoed by Copeland, Martin and Walker³¹, who importantly note that while dealers like Lehman Brothers saw a precipitous decline in the repo funding availability, other dealers did not experience any difficulty at all. To conclude, broker dealers that ran into existential trouble did so because of too much leverage and losses not backed by sufficient capital, lack of liquid asset buffers and overdependency on short-term funding^{32, 33, 34}.

28 https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr506.pdf

29 <https://www.darrellduffie.com/uploads/pubs/DuffieFailureMechanicsDealerBanks2010.pdf>

30 <https://www.cambridge.org/core/books/fed-and-lehman-brothers/14BE6C2AD579DC4782EC27F2A6AF2FA6>

31 <https://www.econstor.eu/bitstream/10419/60811/1/667313494.pdf>

32 <https://www.econ2.jhu.edu/People/Ball/Lehman.pdf>

33 <http://som.yale.edu/sites/default/files/files/001-2014-3A-V1-LehmanBrothers-A-REVA.pdf>

34 <https://www.darrellduffie.com/uploads/pubs/DuffieFailureMechanicsDealerBanks2010.pdf>

Separately, Krishnamurthy, Nagel and Orlov find that MMFs stopped accepting securitised assets as collateral for tri-party repos during the crisis. While Copeland, Martin and Walker identify that some other cash lenders continued to accept ABS as collateral, troubles in funding securitised assets with repo was a major factor in the problems of systemically important dealer banks that were most heavily exposed to these assets. Furthermore, funding difficulties of such institutions were significantly exacerbated by their perceived default risk, which led to sudden worsening of repo terms (access to unsecured funding had disappeared much earlier) and the wider market's willingness to lend to them, resulting in a sudden withdrawal of funding by their counterparties days before the eventual failures – suggesting a much broader run on these institutions rather than a run on the repo product per se.

Krishnamurthy, Nagel and Orlov highlight separately that the Federal Reserve's Primary Dealer statistics (including interdealer and repo between dealer banks and non-dealers (bilateral)) show a much more pronounced contraction than the non-bank repo lending in their data while the interdealer repo haircuts (bilateral) documented by Gorton and Metrick³⁵, based on data from one unidentified dealer, show a more pronounced increase in the repo haircuts. Krishnamurthy, Nagel and Orlov conclude in their assessment that *"affected dealers acted defensively given their own capital and liquidity problems, raising credit terms to their borrowers, producing the observed rise in interdealer haircuts, as well as reduction in interdealer quantity. Overall, the picture therefore looks less like the analogue of a traditional bank run by depositors and more like a credit-crunch"*.

On the other hand, dealers that were less exposed to securitised assets, or with more substantial liquid asset buffers did not run into funding difficulties, even if their default risks were high. Krishnamurthy, Nagel and Orlov observe that even after the Federal Reserve begun its TSFL and PDCF facilities that allowed dealers to swap their private sector collateral to treasury securities (at a lower cost than in the market), these dealers often preferred not to use these facilities. This was due to the risk of stigma resulting from a perception of financial weakness based on accessing these facilities which was seen as similar to that associated with using the discount window. In this context, it is important to note that these facilities skewed the way both the bilateral and tri-party repo markets functioned after the facilities became available and that thus the data available after their introduction is not directly comparable to the market conditions before.

To conclude, it appears that repo's role in the broader financial crisis is quite significantly overemphasised in the early analysis, as the collapse of a large segment of the ABCP funding market was much more significant in terms of overall funding of the non-regulated financial sector. Furthermore, while haircuts on bilateral repos rose sharply, the same was not true in the tri-party market. The analysis suggests that the key reason for this was that the funding of securitisation portfolios in the bilateral market became more expensive due to a significant negative shift in views of these assets' credit quality and market liquidity. Furthermore, it was only in respect of repos collateralized by these more complex securitised assets that there was a significant shift in haircuts, skewing the assessment made by Gorton and Metrick since their haircuts' data set from one anonymous dealer when postulating the "run-on-repo" only comprised such transactions. While in terms of the broader repo market these securities did not play a substantial role, the impact of increased funding costs and MMFs' unwillingness to lend against such collateral was amplified by the fact that certain dealer banks were overexposed to these assets and did not have alternative funding sources once these assets became non-fundable. Therefore, while procyclicality did play a role in the conditions in bilateral repo market and systemically due to exposures at certain large dealers, it was not evidenced across the whole market and particularly in the tri-party market.

From the analyses, it is also clear that while MMFs shied away from repos against risky collateral and dealers that were at risk of default, most dealer banks were not worried about "collateral chains" and continued to lend against good quality collateral even when certain institutions were close to the brink, trusting their legal close out rights and ability to manage the collateral exposures. The reason why money market funds retreated from repo against securitisation appears to be more due to their unwillingness or limited ability to deal with close outs rather than fear of contagion caused by "collateral chains".

Additionally, while Gorton and Metrick's analysis may have overestimated the impact of haircuts/initial margins in the US market, it also says little about the European repo market, which has a very different structure to the US market. It is inappropriate to extrapolate certain events in one part of the US credit repo into the European repo market, where a significant majority of the collateral is high-quality government securities. This can be demonstrated by attempting to quantify the impact of changes in haircuts/initial margins in the European market, which leads to the conclusion that they could have been only a minor cause of the deleveraging that took place over this period³⁶.

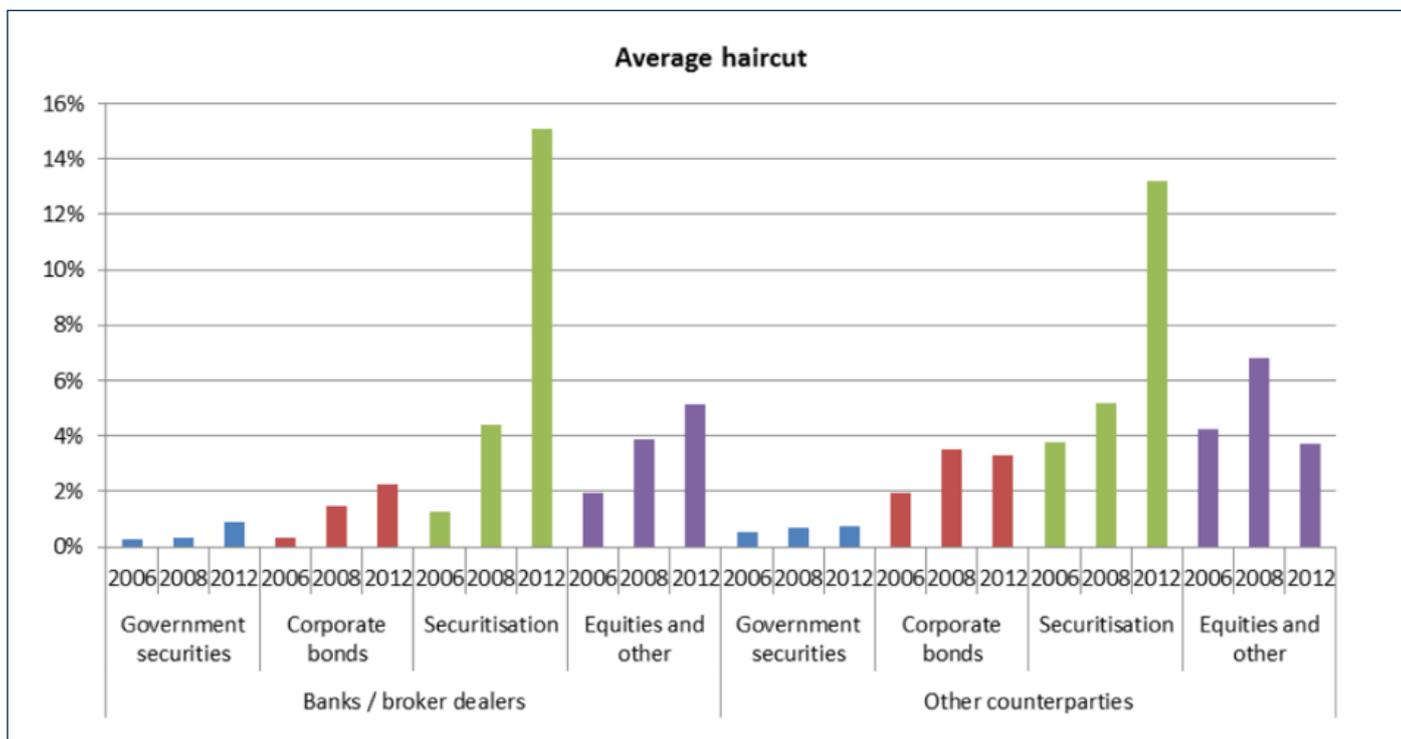
The FSB's quantitative impact study³⁷ (QIS) (see table 6 below) very clearly illustrates that truly dramatic changes in haircut levels were only a feature where the collateral was from the securitisation asset class.

35 <https://files.stlouisfed.org/files/htdocs/publications/review/10/11/Gorton.pdf>

36 Comotto, February 2012: https://www.icmagroup.org/assets/documents/Maket-Practice/Regulatory-Policy/Repo-Markets/Haircuts%20and%20initial%20margins%20in%20the%20repo%20market_8%20Feb%202012.pdf

37 FSB, October 2014: http://www.fsb.org/2014/10/r_141013b/

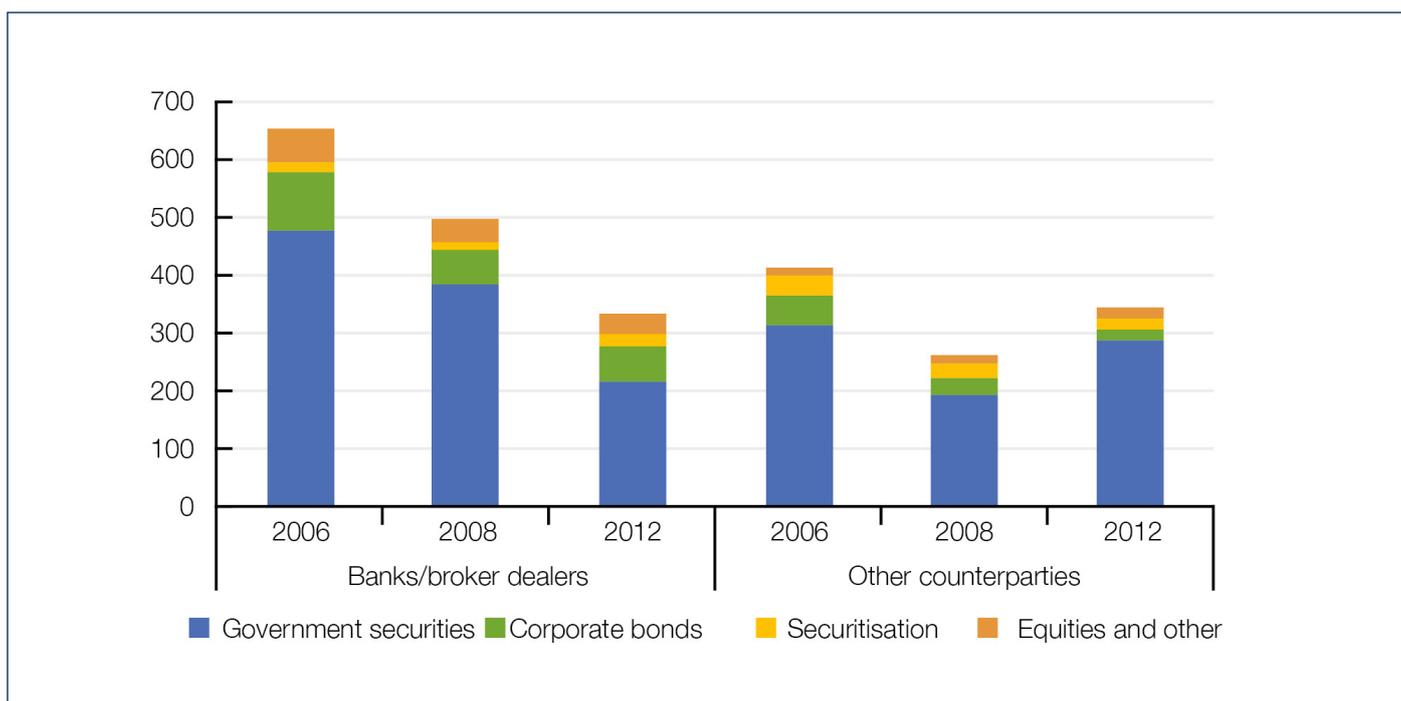
Table 6: Haircut levels across asset classes



Source: FSB's background document on Regulatory Framework for Haircuts on Non-Centrally Cleared SFTs

At the same time, the FSB's QIS also very clearly shows that the securitisation asset class only provides a small portion of the collateral used in repo markets, with government bonds, where haircut changes were relatively minimal, being far and away the most significant collateral asset class.

Table 7: Collateral used in repo markets



Source: Ibid

Rather than focusing on concern about the impact of haircut changes, these data point to the fact that debate ought to focus on the quality of collateral and the way in which risk management processes can best guard against problems which might stem from the collateral being used in repo markets. And, it should not be overlooked that even this focus on collateral is a second order consideration, as first and foremost what matters – as evidenced above – is good counterparty credit assessment.

Finally, it is well worth noting that although the repo market was not free of stress during the crisis, it continued to function – in sharp contrast to the unsecured money market, which largely evaporated. Papadia and Välimäki³⁸ point out that, between 2008 and 2011, the unsecured eurozone money market shrank by EUR 327 billion, forcing the ECB into exceptional emergency lending in order to prevent a seizure of the financial system and serious damage to the real economy. In fact, the ECB lent EUR 115 billion. But growth in the repo market contributed another EUR 212 billion of funding, without which, the burden on the ECB would have been dramatically greater. Hence, certainly in Europe, far from causing the crisis repo in fact played an important part in mitigating its impact.

38 Papadia and Välimäki: Central Banking in Turbulent Times, 2018

Are the risks identified during the crisis addressed by the implementation of the post-crisis reforms?

The vast majority of regulatory reforms to address the risks were largely based on the initial assessment of the crisis. On a system-wide level, some of the key root causes of the crisis have been addressed by a number of reforms ranging from accounting standards to specific regulation to address weaknesses in underwriting standards and disclosure.

The repo product itself has become subject to a range of laws and regulations enforced by regulatory agencies. In Europe for example, repo is impacted directly by the SFT Regulation, by laws and regulations implementing the EU Financial Collateral Directive, and the Short Selling Regulation, and indirectly through regulation of the market users such as commercial banks and investment banks under laws and regulations implementing the Basel post-crisis reform package via the Capital Requirements Regulations and Directives. Several other regulations, including the European Market Infrastructure Regulation (EMIR), the Markets in Financial Instruments Directive (MiFID) and Regulations (MiFIR), the European Central Securities Depositories Regulation and the Crisis Management Directive affect the repo market.

More specifically and in the context of the global post-crisis regulatory reform, the key vulnerabilities identified in relation to repo markets have been addressed by the following reforms.

1. Liquidity risk and procyclicality:

Since the crisis, banks including regulated broker dealers are required to consolidate all special purpose vehicles (SPVs) on their balance sheets and disclose them appropriately to the market. In addition, risks that are undertaken by SPVs owned by banks are consolidated on the parent bank balance sheet and thus capitalised and liquidity managed by the parent bank.

The LCR addresses directly the issue of dealer bank overexposure to securitised assets and overdependency on wholesale markets to finance their portfolios by requiring them to hold sufficient quantities of liquid assets to withstand a 30-day liquidity stress period.

The Net Stable Funding Ratio (NSFR) requires regulated banks to hold an element of long-term stable funding for the financing of short-term assets. Additionally, the NSFR applies a haircut on matched book repo transactions, which effectively applies a long-term financing cost (amount of required long-term stable funding) depending on the quality of the asset that is being funded by the repo desk.

Through the FSB's shadow banking work programme, minimum haircut requirements will be established for certain non-centrally cleared SFTs. According to the FSB, the framework aims to limit the build-up of excessive leverage outside the banking system, reduce the procyclicality of that leverage, reduce the risk of regulatory arbitrage, and maintain a level playing field.

Furthermore, the Basel III framework incorporates countercyclical capital buffers for regulated banks, which jurisdictions can use to build capital buffers during economic growth periods that can be utilized during stressed times to smoothen the financial cycles.

2. Interconnectedness and leverage in the system:

The money market fund (MMF) reforms both in the US and Europe have reduced their ability to invest in ABCP directly or indirectly by banning MMFs from accepting ABCP as collateral. Similarly, the MMFs' ability to provide maturity transformation, i.e. invest in long-term assets while providing daily liquidity has been significantly reduced. This regulation driven change in MMFs' risk appetite is clearly reducing the ability of money market funds to engage in higher risk/yield activities, reducing the potential for losses to investors but also reducing the potential return.

Similarly, capital requirements for banks' inventories of securitisations have gone up substantially due to introduction of securitisation specific capital requirements and other reforms, which have significantly disincentivized systemic build-ups (of securitisation portfolios) in the regulated financial sector and the sector's ability to intermediate between buyers and sellers of securitisations.

Accounting rules have changed with regards to consolidation of off-balance sheet SPVs, requiring banks to recognise risks stemming from such entities that typically are used for securitisations issuance and funding. Similarly, the step-in risk recommendations further reinforce banks' risk recognition from activities in their asset management arms (including MMFs) and SPVs.

In terms of system-wide leverage, the Basel III revisions included a leverage ratio for the regulated financial sector, with additional globally systemically important bank (G-SIB) buffers for large institutions as well as risk-based additional capital requirements. Because it is not a risk-based measure, the leverage ratio has a particularly negative impacts on repo business, when contrasted with risk-weighted capital requirements associated with such typically low-risk activities which are very small compared to the aggregate amounts being transacted. Also, in the methodology in defining G-SIBs, the size of the capital add-ons, interconnectedness is a key measure and captures SFTs in multiple indicators³⁹.

3. Opacity:

While in many other areas the regulatory requirements are globally aligned and there is a current FSB initiative to identify data gaps, the requirements as they stand to report repo transactions to authorities are largely based on regionally or domestically designed templates and apply to different sets of institutions/data sets.

In Europe, for example, there are several overlapping reporting requirements established by different EU institutions. The key reporting requirements addressing the opacity issue in the EU are listed in table 8 below and in the US in table 9.

Table 8: Summary of selected EU SFT reporting requirements

Regulation:	SFT Reporting ³⁸	Money Market Statistical Reporting ³⁹	Asset Encumbrance ⁴⁰	Analytical Credit DataSet ⁴¹
Requirement	Daily transaction reporting requirement on repos, securities and commodities lending, margin lending and sell/buyback transactions.	Daily reporting of unsecured and secured money market transactions (maturity up to 397 days).	Quarterly supervisory reporting by regulated financial firms on encumbered assets such as repos and collateral received.	Credit institutions in the euro area to report to the ECB individual credit exposures falling within the reporting scope
Applies to	All SFT users based or operating in the EU (subject to small firms exception).	A sample of "reporting agents", which is a list of banks defined by the ECB (and similar to the Bank of England regime). The sample is likely to be further extended.	EU regulated financial institutions subject to CRR.	Eurozone credit institutions.
Data requirement for SFTs	Counterparty, transaction collateral type, margin and reuse data. A total of 153 data fields are anticipated.	Repos and reverse repos and securities lending.	Asset encumbrance and encumbrance ratio.	Instruments, counterparty and collateral for reverse repos, securities borrowing and cash collateral for repos.

39 In addition to the global standards, the US specific G-SIB Method 2 includes a short-term wholesale funding indicator. Details of this are further down in this report.

40 <https://www.esma.europa.eu/press-news/esma-news/esma-provides-implementing-details-sfr>

41 https://www.ecb.europa.eu/stats/financial_markets_and_interest_rates/money_market/html/index.en.html

42 <https://www.eba.europa.eu/regulation-and-policy/supervisory-reporting/draft-implementing-technical-standard-on-supervisory-reporting-asset-encumbrance->

43 <https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op187.en.pdf?fb74f800842e7dbfd364fe4cfb7c60ea>

Table 9: Summary of selected US reporting requirements

Data Collection	Collecting entities	Reporting entities	Main data elements
Triparty repo (excluding GCF repo)	FRBNY	Triparty clearing banks	Collateral value and type, counterparties, cash, rate, maturity, haircuts
GCF Repo	FRBNY	FICC	Counterparties, collateral type
Primary Dealer Reporting Requirements (FR2004 series)	FRBNY	Primary Dealers	Positions, cumulative transactions, net forward financing commitments
Call reports	FFIEC	US depository institutions	Netted repo/reverse repo positions, types of collateral
Form Y-9 C	Federal Reserve Board	US bank holding companies	Netted repo/reverse repo positions, types of collateral
Office of Financial Research, FRBNY (proposed)	FRBNY (on behalf of OFR)	FICC	LEI, date/tenor, trade size/rate, collateral information

4. Market infrastructure:

According to the FSB⁴⁴, significant improvements have been achieved across the securities financing market infrastructure since the crisis, including multilateral netting as well as robust collateral valuation and management processes, reducing financial stability risks associated with SFTs. The FSB also recommended that its member authorities evaluate by January 2016 the costs and benefits of introducing CCPs in their inter-dealer repo markets where CCPs did not exist. Where CCPs exist, authorities were encouraged to broaden participation, particularly to include important funding providers in the repo market.

In Europe, it was witnessed during the financial crisis that CCP clearing helped to preserve access to the repo market for banks from some peripheral Eurozone countries who were being squeezed out of the uncleared market by other banks cutting their risk limits on these countries. Notwithstanding the absence of any mandated CCP clearing, CCPs already clear a very significant proportion of the European repo market. The ICMA's semi-annual survey of the European repo market⁴⁵ suggests that about 30% of outstanding repos by value are cleared across a CCP. The proportion of repo turnover cleared across a CCP is highly likely to be even higher because the repos cleared in CCPs tend to be short-term transactions and are therefore relatively understated in measures of outstanding volume (the ECB's money market survey suggests in the order of about two-thirds for euro-denominated repos).

Most European CCP-cleared repos are negotiated on automatic repo trading systems (ATS). However, repo negotiated directly between parties, or via a voice-broker, can also be registered with a CCP post trade.

In the US, a key regulatory focus has been to address weaknesses in the tri-party repo market infrastructure. In the FSB's view, the reform efforts have substantially ameliorated the potential financial stability risks associated with the tri-party repo market infrastructure. The FSB notes as an example that the share of tri-party repo volume that is financed with intraday credit from a clearing bank has dropped markedly from 100% in 2012 to a level averaging 3 to 5% in 2015.

Other FSB recommendations, such as the minimum standards for cash collateral reinvestment by securities lenders or their agents, which ask authorities to set specific requirements for the cash collateral reinvestment portfolio and/or liquidity pool maintained to meet cash collateral recalls by securities borrowers, have also been largely implemented. Similarly, the principles for regulations governing re-hypothecation of client assets have been largely taken on board by FSB member authorities (tables 10 and 11).

⁴⁴ <http://www.fsb.org/wp-content/uploads/P300617-1.pdf>

⁴⁵ <https://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/repo-and-collateral-markets/icma-ercc-publications/repo-market-surveys/>

Table 10: Existing regulatory approaches to re-hypothecation of client assets by broker-dealers⁴⁶

	Canada	France	Germany	Italy	Japan	Switzer-land	UK	US	EU
(i) Disclosure requirements									
a) Disclosure to professional clients	✓	✓	✓	✓	✓	-	✓	✓	✓
b) Disclosure to retail clients						✓			
(ii) Consent requirements									
a) Consent of professional clients	✓	✓	✓	✓	✓	✓	✓	✓	✓
b) Consent of retail clients						✓	✓		
(iii) Internal and external audit requirements	✓	✓	✓ (external audit)		✓		✓	✓	
(iv) Reporting requirements on disposition of re-hypothecated assets									
a) Reporting to clients	✓	✓	-	✓	-	✓	✓	-	
b) Reporting to regulators	✓	✓	✓	✓	-	✓	-	✓	✓
c) Reporting through public disclosures	-	✓	✓		-			✓	
(v) Prohibition or limitation on re-hypothecation									
a) Outright prohibition	-	-	-	-	-	-	-	-	
b) Prohibition on using client assets for own-account activities	✓	✓	✓	✓	-	-	-	✓	✓
c) Quantitative limits on re-hypothecation	✓	-	-	-	-	-	-	✓	-
(vi) Alternatives to traditional creditor treatment in bankruptcy for customers									
a) Priority claims for clients	✓	-	-	-	-	-	-	✓	-
b) Existence of an investor protection fund	✓	✓	✓	✓	✓	-	✓	✓	✓
(vii) Capital and liquidity requirements for firms that re-hypothecate client assets	✓	✓	✓	✓	✓	✓	✓	✓	✓
(viii) Segregation and custody requirements	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: FSB's report on Re-hypothecation and Collateral Re-use

46 <http://www.fsb.org/wp-content/uploads/Re-hypothecation-and-collateral-re-use.pdf>

Table 11: Current status of implementing Recommendation 7 of the August 2013 Report (based on self-assessment)

	Canada	France	Germany	Italy	Japan	Switzerland	UK	US	EU
<u>Principle 1:</u> Financial intermediaries should provide sufficient disclosure to clients in relation to re-hypothecation of assets so that clients can understand their exposures in the event of a failure of the intermediary.	Yes	Yes	Yes	Yes	Yes	Banks: Yes for retail Funds: re-hypothecation not allowed	Yes	Yes	(In the process of implementation)
<u>Principle 2:</u> In jurisdictions where client assets may be re-hypothecated for the purpose of financing client long positions and covering short positions, they should not be re-hypothecated for the purpose of financing the own-account activities of the intermediary.	Yes	Yes	No	Yes	Yes	No Funds: re-hypothecation not allowed	No	Yes	(Currently being assessed)
<u>Principle 3:</u> Only entities subject to adequate regulation of liquidity risk should be allowed to engage in the re-hypothecation of client assets.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: *Ibid*

Is the post-crisis regulatory framework commensurate to risks in the repo markets?

As discussed in the previous section “Was the crisis response based on correct assessment of what happened in the repo market?”, the initial assessment was based on limited data and analysis on how the events unfolded. This resulted in some misleading analysis and an over-exaggeration of the role of repo in the collapse of the shadow banking system.

Furthermore, it should be considered that one of the main impacts of the crisis has been to prompt a major overhaul of internal risk management practices, as firms have sought to ensure that lessons from the crisis are fully assimilated into the ways in which risk is being managed⁴⁷ (e.g. the development of term structure in the risk modelling of non-HQLA repo books and improvements in margining processes). Hence, even absent the establishment of new regulatory constraints to provide a layer of official control, supervisors of those authorized entities active in the repo and other SFT markets will be able to observe that there are more robust and better devised process in place, with a consequent shift towards an overall reduction of risks in these markets.

Understandably, many of the revisions to the way the financial system is regulated were developed at the immediate aftermath of the crisis, without ensuring that a certain business activity or product line is not targeted multiple times by different rules to address the same risk. As an example, the macroprudential tools that impact repo activity are highlighted in table 12 below, adopted from Claessens⁴⁸.

Table 12: The Macroprudential Toolkit (policies impacting repo are those in green text)

	Restrictions related to borrower, instrument, or activity	Restrictions on financial sector balance sheet (assets, liabilities)	Capital requirements, provisioning, surcharges	Taxation, levies	Other (including institutional infrastructure)
Expansionary phase	Time varying caps/limits/ rules on: - DTI, LTI, LTV - margins, hair-cuts - lending to sectors - credit growth	Time varying caps/limits/ rules on: - mismatches (FX, interest rate) - reserve requirements	Countercyclical capital requirements, leverage restrictions, general (dynamic) provisioning	Levy/tax on specific assets and/or liabilities	- Accounting (e.g., varying rules on mark to market) - Changes to compensation, market discipline, governance
Contractionary phase: fire-sales, credit crunch	Adjustment to specific loan-loss provisioning, margins on hair-cuts (e.g., through the cycle, dynamic)	Liquidity limits (e.g., Net Stable Funding Ratio, Liquidity Coverage Ratio)	Countercyclical capital requirements, general (dynamic) provisioning	Levy/tax (e.g., on non-core liabilities)	- Standardized products - OTC vs on exchange - Safety net (Central Bank/ Treasury liquidity, fiscal support)
Contagion, or shock propagation from SIFIs or networks	Varying restrictions on asset composition, activities (e.g., Volker, Vickers)	Institution-specific limits on (bilateral) financial exposures, other balance sheet measures	Capital surcharges linked to systemic risk	Tax/levy varying by externality (size, network)	- Institutional infrastructure (e.g., CCPs) - Resolution (e.g., living wills) - Varying information, disclosure

Enhancing resilience
 Dampening the cycle
 Dispelling gestation of cycle

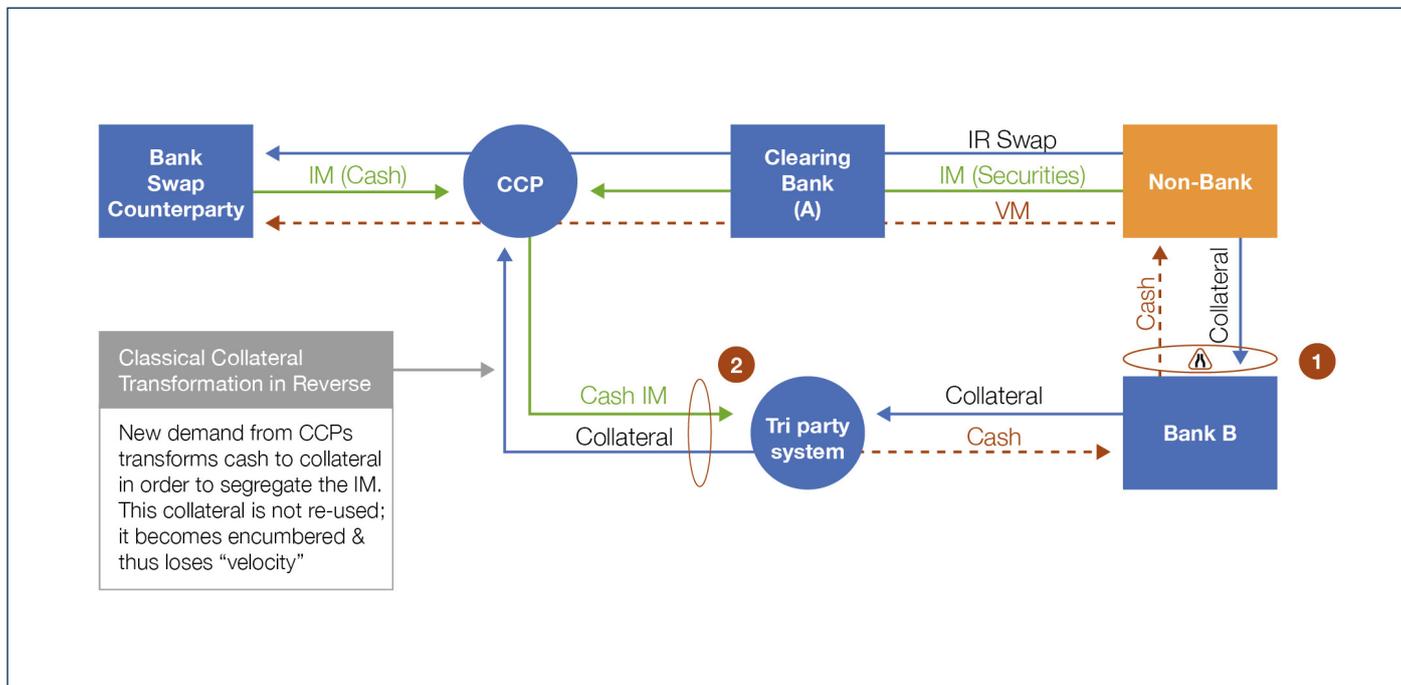
Source: adapted from IMF WP 14/214

47 <https://www.bis.org/publ/cgfs59.pdf>

48 <https://www.imf.org/external/pubs/ft/wp/2014/wp14214.pdf>

The post-crisis reforms have led to a financial system that depends on high-quality collateral defined by regulators – mainly government bonds – that has low volatility and a high degree of liquidity as its foundation. The system has more concentrated interconnectivity with derivatives clearing requirements, limited unsecured funding capacity and higher mitigation of counterparty risk, using collateral. This has led to an increase in the requirement for both initial margin (IM) and VM (see table 13 below).

Table 13: Interconnectedness



Source: Barclays

One of the key drivers of the interconnectedness and complexity is the interaction between clearing requirements, such as EMIR in the EU and Dodd-Frank in the US and the BCBS's leverage ratio (LR) framework. The BCBS LR does not currently recognise the exposure-reducing effects of the IM in cleared derivatives exposures and VM posted in securities will be added to the LR exposure measure⁴⁹. Only VM posted in cash (with strict settlement system requirements) for cleared derivatives can be considered offsetting the derivatives exposure within the LR framework. This requirement leaves asset managers with three viable options, 1) stop using derivatives, 2) stay underinvested to hold sufficient cash buffer, or 3) stay invested and repo out securities to meet cash VM demands.

This overlap of regulations imposes high capital requirements on client cleared transactions for dealer banks, adds complexity to the margining process of non-banks and runs counter to the regulatory push under EMIR and Dodd-Frank towards central clearing for derivatives transactions. More broadly, looking at the full rule-set today, there are duplications and inconsistencies between the rules that together have an undesirable cumulative effect on the repo market. The following sections look at the rules and their interactions across capital, liquidity and other measures.

Capital and liquidity

The rules designed to prevent funding mismatches are overlapping. The LCR and NSFR significantly mitigate near- and longer-term risks of funding mismatches, and regulators have widely acknowledged that banks have reduced their reliance on short-term wholesale funding, concurrent with the implementation of new prudential standards⁵⁰. Yet other rules target the same funding activity as well. The European Systemic Risk Board in its survey⁵¹ indicates that market participants perceive the new regulatory requirements as reducing market-making activities (thus impacting wider market liquidity), with the new capital requirements, LCR

49 This is currently under consultation. See <https://www.bis.org/bcbs/publ/d451.pdf>

50 See, e.g., Chair Janet L. Yellen, "Improving the Oversight of Large Financial Institutions" (Mar. 3, 2015) (noting that large U.S. banks' "reliance on short-term wholesale funding has dropped considerably" since the financial crisis), available at: <http://www.federalreserve.gov/newsevents/speech/yellen20150303a.htm>.

51 https://www.esrb.europa.eu/pub/pdf/reports/20161005_market_liquidity_market_making.en.pdf?797687ae4d404cddb51d57b0c7dc9604

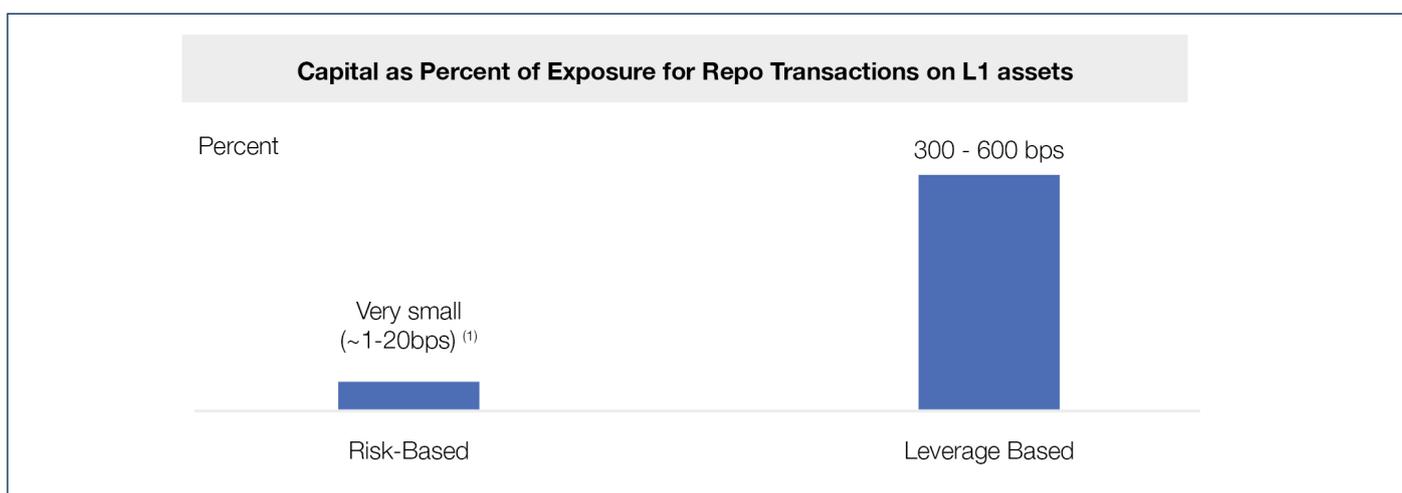
and NSFR identified by the majority of respondents as having the greatest dampening effect on market activity. PwC⁵² also note that within the G-SIB framework, banks do not receive credit in their capital requirements following the implementation of NSFR, LCR and TLAC which contribute to lower bank risk. They note that such a layering of capital and liquidity requirements, each individually sensible, can be excessive in aggregate.

The CGFS⁵³ identified that NSFR could potentially have negative implications for repo market due to the differential weightings applied to repo assets and liabilities but note that many of these implications are intended consequences of regulation. However, they recognise that asymmetries built into the NSFR may affect repo markets in some jurisdictions more than in others depending on the local repo market structure – such as the term, counterparty and collateral composition of repos outstanding and the repo trading motive. For example, the CGFS notes that repo markets which used to trade against collateral baskets consisting of Level 1 (L1) and Level 2 /non-HQLA assets might be subject to changing collateral standards and increased market segmentation due to different repo rates or haircuts applied to repos for L1 and non-L1 assets. The CGFS also concludes that the NSFR “encourages banks to conduct longer-term (i.e. more than six months) repos and tends to encourage longer-term transactions to be conducted on an unsecured, rather than a secured, basis. This is because the value of collateral is not acknowledged in longer-term reverse repo transactions. This treatment reflects the improvement in the funding position of the recipient when the funding is unsecured relative to secured. This might lead to an increase in unsecured funding in term funding markets. Moreover, this could restrain the range of longer-term central bank liquidity absorbing operations, as banks might be more reluctant to enter long-term reverse repos.” Additionally, PwC highlights that securities borrowed by broker dealers to support secondary market making attract the same RSF factor as other loans to non-banks, regardless of the underlying asset and maturity of the transaction, and that this is likely to further reduce bank activity in repo markets with wider implications to overall market liquidity.

In terms of capital, the LR by its design adds a significant cost on SFT transactions (see table 14 below). The main reason for this is that repos are treated as principal value exposures in the LR framework, which is a significant divergence from the way the LR treats derivatives exposures so far⁵⁴. For derivatives, the exposure is currently calculated based on current mark-to-market (replacement cost) and a potential future exposure is added to it, reflecting potential price moves under adverse scenarios. The exposure measure for repos thus does not reflect the fact that the majority of the market is for sourcing collateral and funding against “cash equivalent” government bonds and is more akin to the treatment of unsecured lending.

While the capital cost of a repo on L1 assets under the risk-based framework reflects the quality of the collateral and potential worst-case market valuation moves over the tenor of the transaction, the LR applies a flat charge of 3% (G-SIBs under BCBS standard 3.5 – 4.75%, US standard 5 – 6%).

Table 14: Minimum capital requirements for repo transactions on L1 assets



1. The 1-20bps of risk-based capital as a percent of exposure is calculated based on the following assumptions: (a) the Risk Weight of 4-60% is calculated assuming 1-month maturity; investment grade credit ranging from BBB-to AAA with default probabilities calculated based on S&P data; loss given default estimated at 35% (mid-point of 20%-50% range); (b) the Exposure at Default is calculated as a percent of notional and is estimated at ~1-3% since positions are overcollateralized; and (c) capital as a percent of risk weighted assets is estimated at 11%. Based on these assumptions, the capital as a percentage of notional = (4-60%) * (1-3%) * 11% = 1-20bps

Source: GFMA analysis

52 <https://www.pwc.se/sv/pdf-reports/global-financial-markets-liquidity-study.pdf>

53 <https://www.bis.org/publ/cgfs59.pdf>

54 The BCBS has defined a new metric, SA-CCR, to take into account derivatives exposures in the leverage ratio. The industry believes that the SA-CCR calibration will extend the current penalization of repos to derivatives when the SA-CCR is implemented, unless the framework is revised.

Combined with the typical management buffer of 100 bps (1%), the capital consumption based on the LR measure by far exceeds the risk based and economic capital that firms would allocate against a repo on government bond collateral.

The difference in the implementation of the LR and divergent standards (greater than BCBS minimum, BCBS minimum, reporting only) and the push to reach different targets over time creates different incentives across global banks to participate in repo transactions⁵⁵. The constraint from the leverage ratio creates an incentive to reduce repo activity, especially for balance sheet intensive and low margin repo activity in high rated securities such as government bonds. As any unit of balance sheet usage should be remunerated at a level at least equal to the LR times the cost of Tier 1 Capital (e.g. if the cost of Tier 1 Capital is around 10% a bank with a Leverage Ratio target of 5% should charge 50bp, i.e. 1/20 of the 10% cost of capital). The bid-offer (see table 15 below) in repo transactions at the moment is well below this threshold impacting the capability of banks to engage in repo market-making activity.

Table 15: Repo and government bond markets in Euro area countries

Country	Number of bonds	Number of on-the-run bonds	Number of auctions	Daily averages							
				Specialness		Repo trade size		Bid-ask spreads		Time to maturity	
				Mean	SD	Mean	SD	Mean	SD	Mean	SD
Austria	26	15	45	2.2	3.2	218.7	134.9	20.8	19.2	12.91	13.14
Belgium	75	26	57	2.9	3.8	261.2	198.4	11.6	10.9	9.00	10.70
Finland	19	16	6	2.6	3.9	202.2	125.1	9.1	6.2	10.24	8.62
France	234	54	205	2.1	2.6	361.9	387.8	14.0	16.9	10.21	13.00
Germany	163	46	79	3.1	4.1	629.9	606.4	13.6	16.2	8.77	10.78
Italy	199	35	223	2.2	3.9	604.5	442.4	10.1	12.0	8.15	9.73
Netherlands	64	27	34	2.8	3.7	336.2	238.7	6.6	7.7	9.04	10.58

Note: Specialness and Bid-ask spreads in basis points. Repo trade volume is in million of securities. Time to maturity is measured in number of years.
Sources: ICAP RFR, Brokertec, MTS, ESMA

Source: adopted from ESRB report: Collateral scarcity premia in euro area repo markets⁵⁶

The funding, capital and other regulatory tools add multiple layers of costs on a simple repo transaction (table 16), resulting in costs that can be in excess of returns that can be achieved in the market for repos, especially against high-quality, cash equivalent sovereign collateral. Importantly, the CGFS report⁵⁷ concluded that it is unclear that the systemic benefits from the constraints applied by the regulatory framework apply to repo transactions that use the highest quality government bonds as collateral as they tend to appreciate during stress times, reducing the perniciousness of the destabilizing mechanism described as the root causes of the financial crisis. The CGFS notes that repos backed by high-quality government bonds were relatively resilient during the crisis. They also conclude that any benefits from a reduction in repo availability might be undermined if investors substitute away from repos and into transaction structures that, themselves, create new fragilities.

55 JP Morgan Research: Repo market in Euro: a tug of war between regulation and QE

56 <https://www.esrb.europa.eu/pub/pdf/wp/esrb.wp55.en.pdf?878239b868a5d574391c5e9c2656c45e>

57 <https://www.bis.org/publ/cgfs59.htm>

Table 16: Cost of minimum capital and liquidity requirements

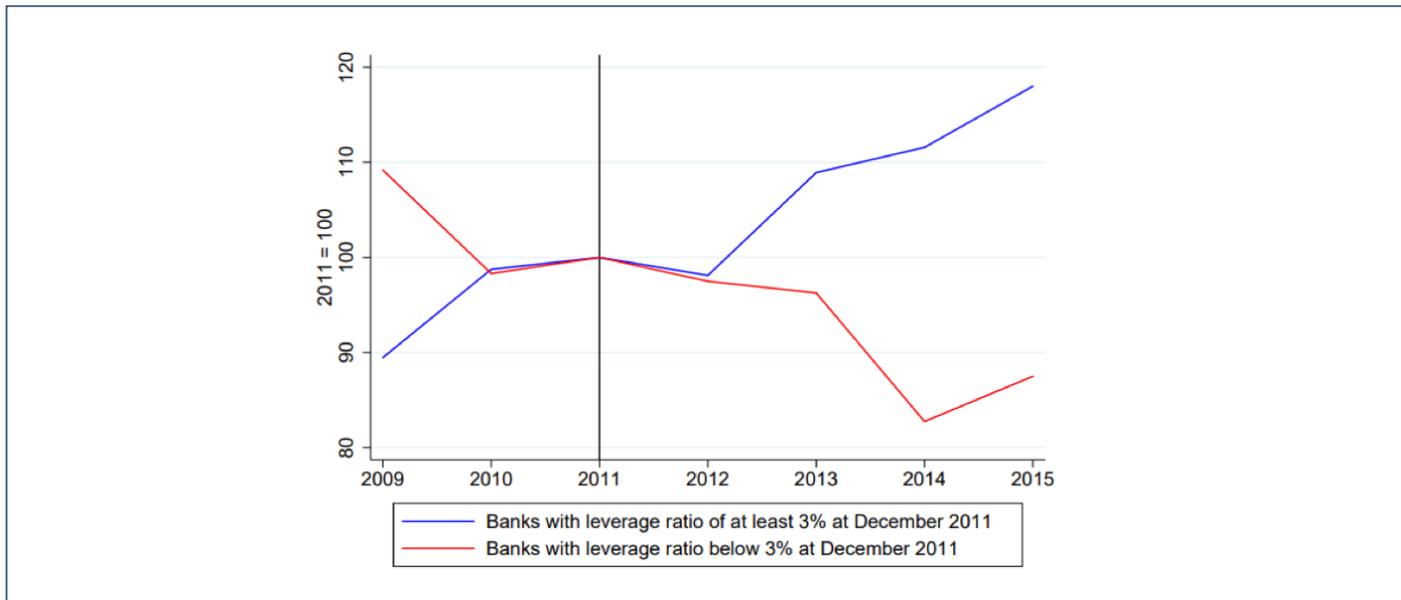
Rule	Description	Prudential Impact	Combined Spread Impact
Leverage Ratio	LR generates a capital requirement based on a non-risk-based measure of exposure. The Basel minimum standard for G-SIBs is 3% plus 50% of the applicable G-SIB surcharge.	Asset side generates leverage exposure of \$100m and resulting minimum Tier 1 capital requirement of \$4m .	42bps.
G-SIB	The G-SIB score is based on weighted systemic indicators: size, interconnectedness, complexity, cross- jurisdictional activity, and substitutability. Repo activity can impact a number of indicators within G-SIB, including size, interconnectedness and cross- jurisdictional activity	Generates ~\$0.3m in CET1 capital requirement, incremental to baseline RWA.	4bps
SA-RWA	Standardised risk-based approach to calculation of capital requirements.	SA-RWA of ~\$2.8m on asset and liability side versus ~\$0.5m under advanced RWA	5bps
NSFR	NSFR is calculated as available stable funding (“ASF”) divided by required stable funding (“RSF”). Banks are required to maintain a minimum ratio of 100%. NSFR has a punitive impact on matched book financing. Reverse repos generate up to 50% RSF, depending on the collateral, while repos do not generate an equivalent ASF benefit.	Asset generates \$10m RSF, liability generates \$0m ASF, resulting in a net funding requirement of \$10m .	5bps
TLAC	The TLAC requirement is to ensure that G-SIBs have sufficient loss absorbing and recapitalisation capacity (through eligible debt and equity) available in resolution to implement an orderly resolution.	Generates ~\$0.65m in TLAC requirement incremental to RWA and G-SIB.	3bps

Source: GFMA calculations (methodology can be found in annex A). The costs are not necessarily cumulative and depend on institution specific capital allocation processes

The impact of the LR compared to any of the other measures is particularly high for banks that are G-SIBs and subject to higher LR requirements. The Bank of England⁵⁸ analysed 12 dealer banks and their behaviour in the gilt market, based on their LR in December 2011. Table 17 below shows the significant reduction in dealer-to-client volumes by dealers that did not meet the minimum LR requirement in the run-up to the introduction of binding LR.

58 <https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2017/the-leverage-ratio-and-liquidity-in-the-gilt-and-repo-markets.pdf?la=en&hash=71FA6253382B0141771D5C8FC6C8A1AE552CE6F3>

Table 17: Dealer-to-client volume in the gilt market by dealer type



Source: adopted from Bank of England Staff Working Paper No. 690

Minimum haircuts regulation:

In addition to the existing prudential standards described above, for certain⁵⁹ non-centrally cleared repos, the international regulatory framework is intended to subject banks to a minimum haircut regime that was consulted upon by the FSB as part of the shadow banking work programme.

In December 2017, the BCBS included in the final Basel III package⁶⁰ a framework for minimum haircuts for non-centrally cleared SFTs. The purpose of this framework was to limit the amount of leverage that banks could supply to the non-regulated sector. However, as discussed more fully below, the final framework’s scope is overly broad, is unnecessarily punitive and due to a complex netting methodology can lead to anomalous results. Furthermore, the final framework did not benefit from a quantitative impact assessment that could have measured the impact of the approach taken. A more targeted, efficient and implementable minimum haircut framework may be better at addressing policy concerns.

Scope of the SFT Haircut Framework

Regulated counterparties

The minimum haircut framework focuses particularly on preventing the build-up of leverage to the non-regulated sector. It achieves this by imposing minimum haircuts on the provision of financing through SFT transactions which are not centrally cleared and in which the counterparty is a non-regulated entity. However, the description used to designate non-regulated entities---“counterparties who are not supervised by a regulator that imposes prudential requirements consistent with international norms”---is not clear and, in practice, would be restrictive and not allow for the exemption of SFTs between banks and appropriately regulated counterparties. Such counterparties may include broker-dealers, insurance companies, pension funds, 40 Act mutual funds in the US, EU regulated UCITs and other similarly structured open-ended funds. This approach may include in the framework entities with a sufficiently robust regulatory overlay which specifically prevents the build-up of excessive leverage. A more targeted approach would specifically and clearly exempt entities that are already regulated and that have regulatory restrictions on leverage. This would better target transactions with the non-regulated sector that could contribute to the build-up of excess leverage.

⁵⁹ Those non-centrally cleared repos in which financing against collateral other than government securities is provided to non-banks.

⁶⁰ <https://www.bis.org/bcbs/publ/d424.htm>

Transactions not for financing non-banks

While the minimum haircut framework seeks to limit leverage and, more specifically, “to limit the build-up of excessive leverage outside the banking system, and to help reduce procyclicality of that leverage”⁶¹, it does not sufficiently distinguish between those transactions that are financings (and, thus, increase leverage) and those that are for another purpose. Many SFTs are done not to provide finance but rather to source a specific security and these latter transactions are not clearly scoped out from the framework. The current criteria are limited and beyond the control of the banks. For example, the lender of securities must reinvest or employ cash collateral at the same or shorter maturity (not giving rise to material maturity or liquidity mismatch) and reinvest cash in other limited ways that are not in control of the bank. This unnecessarily scopes in transactions that are outside the policy concern, thus limiting these important transactions. This issue may be addressed by specifically excluding those transactions entered into to obtain a specific security and where the cash is provided to the securities lender as collateral rather than financing.

Overly punitive approach

The treatment of failures to meet SFT minimum haircuts requirements in the final haircut framework does not consider the risk-mitigation benefits of that collateral that has nevertheless been taken, but rather, it imposes unsecured loan treatment. While it is appropriate to impose some penalty and there should be strong incentives for maintaining minimum haircuts, overly punitive capital charges such as introduced by the minimum haircut framework cast an unneeded overlay on this market by taking no note of the risk-mitigating benefits of remaining collateral. Such an approach is neither warranted by the policy goals nor consistent with the overall capital framework and could unnecessarily dampen activity in these important markets.

Netting Issues

The haircut framework incorporates a mechanistic netting formula, which in some cases leads to anomalous results (see annex B for examples). In some cases it would cause a transaction that on its own would meet the requirements to rather be treated as non-compliant because of the netting calculation. This approach fails to consider and capture the range of legitimate factors that influence asset and liability collateralization practices and is fundamentally flawed. A more appropriate approach would be to develop a multi-step supervisory review process. Such an approach would consider the degree of under-collateralization in an SFT, with enhanced capital requirements scaled in proportion to the size of the short fall. This approach would both apply a penalty and incentivize proper risk management around the resulting exposure.

Collateral reuse and collateral chains:

As noted by the FSB⁶², the availability of collateral, which is driven to a large extent by regulatory requirements to post IM and VM for both cleared and non-centrally cleared derivatives is becoming increasingly important. The FSB notes that in addition to the way availability of collateral helps the general functioning of markets, the *“rehypothecation of client assets and reuse of collateral increase the availability of collateral, reduce the cost of using collateral, and consequently reduce transaction and liquidity costs”*. The significance and magnitude of the shift in collateral demand has not yet fully materialized but it can be expected that as new prudential and markets regulations come into effect market participants will be impelled to start entering into more repo and other collateral sourcing transactions.

Indeed, numerous studies have attempted to estimate whether there is an adequate supply of collateral to meet the rising demand for it, or whether there might be a shortfall. This question is yet to be answered empirically, yet with the supply of safe assets having dwindled at the same time as demand for them is rising, it is essential that high-quality collateral is managed as a scarce resource. While it appears that on an aggregate basis the amount of collateral may prove large enough to meet the demand for it, there remains a real risk of demand-supply imbalances. This will occur in cases where the right amount of the right type of collateral is unavailable at the right time, in the right place to meet the specific requirements.

Hence, it is important to ensure collateral fluidity, which allows collateral to move around the financial system in order to meet varying demand requirements across the financial markets. This is elaborated in reports such as the CICF’s Collateral Fluidity White Paper⁶³ and the ICMA ERCC’s paper “Collateral is the new cash: the systemic risks of inhibiting collateral fluidity”⁶⁴. This latter paper describes the increasing importance of collateral and calls for regulators to consider the impact of financial regulation on the

61 FSB: Transforming Shadow Banking into Resilient Market-based Finance, Strengthening Oversight and Regulation of Shadow Banking, Regulatory framework for haircuts on non-centrally cleared securities financing, 12 November 2015. <http://www.fsb.org/2015/11/regulatory-framework-for-haircuts-on-non-centrally-cleared-securities-financing-transactions-2/>

62 <http://www.fsb.org/wp-content/uploads/Re-hypothecation-and-collateral-re-use.pdf>

63 <https://www.icmagroup.org/assets/documents/Regulatory/CICF/Collateral%20Fluidity%20WP%207Nov2012.pdf>

64 <https://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/repo-and-collateral-markets/icma-european-repo-market-reports-and-articles/collateral-fluidity/>

movement of collateral, highlighting the potential risks of inhibiting collateral fluidity. The paper explains why it is that achieving an adequate degree of collateral fluidity requires the simultaneous existence of robust and efficient settlements infrastructure, as well as bank repo funding desks that are able to source, price, manage, and mobilise collateral.

With regards to collateral chains, the regulatory authorities have had mixed views on whether they present a danger to financial stability or if the chains exist. The benefits of reuse are well documented and include 1) transfer of scarce collateral that would otherwise sit idle on investor's balance sheet to generate additional return to the investor, 2) increase availability of collateral, 3) reduced transaction costs and failed transactions and 4) improve liquidity of the market. However, the systemic risks as described earlier in this paper are overestimated, particularly in relation to the concept of collateral chains. From a practitioner viewpoint, table 18 below shows the common misconceptions and how reuse and legal rights work in practice. This certainty about a buyer's right to collateral and the right of a non-defaulting party to net mutual obligations in the event of a default depend on robust contractual documentation, such as the Global Master Repurchase Agreement (GMRA), which have functioned well during the Lehman Brothers and other recent default events.

To facilitate informed debate in relation to these concerns, it is important to ensure that there is a proper understanding of what is "rehypothecation" of collateral. Rehypothecation is an alternative name for re-pledging. In the derivatives market, rehypothecation is sometimes called reuse. However, the term "reuse" is also applied in the repo market for the onward outright sale of collateral by the buyer to a third party. This has caused some confusion.

There is an important legal distinction between pledge-based rehypothecation on the one hand and the sale or use of collateral in the (non-US) repo market on the other. In a pledge, title to collateral remains with the collateral-giver. If the collateral-giver grants a right of rehypothecation to the collateral-taker, the collateral-giver remains the owner but only until the collateral-taker exercises his right of rehypothecation.

When this right is exercised, there is a material change in the legal relationship between the parties. The pledge is extinguished and the collateral-giver loses his title to the collateral, which is transferred to the third party to whom the collateral has been rehypothecated. In exchange, the collateral-giver is given a contractual right to the return of the same, or equivalent, collateral but this is unsecured (although the collateral-giver is likely to have received funding in return for giving the right of rehypothecation to the collateral-taker and, in the event of the collateral-taker's insolvency, the collateral-giver may have a contractual right of set-off of all mutual obligations to and from the collateral-taker).

In a repo, the buyer becomes the owner of the collateral at the start of the transaction and can dispose of the collateral when and as he wishes. His right of use is not a discretionary right granted by the seller. It is an automatic right arising from property ownership.

Rehypothecation is widely used by prime brokers involved in the collateralization of derivatives transactions with hedge funds. It is a practice introduced into Europe by US firms. The concept was alien to English and other European law but formally introduced in 2003 by the adoption of the EU Financial Collateral Directive. Rehypothecation is regarded by prime brokers as essential to the economics of their business. In return for rights of rehypothecation, they can offer clients cheaper funding.

Following the Lehman Brothers default in September 2008, it was discovered that this firm's operational procedures for managing rehypothecated assets were inadequate, which resulted in delays in retrieving the rehypothecated collateral. Moreover, as also highlighted earlier in this report, some clients may not have fully understood the nature of rehypothecation.

The regulation of rehypothecation differs between countries. In the US, Federal Reserve Regulation T and SEC Rule 15c3-3 limit the amount of a client's assets which a prime broker may rehypothecate to the equivalent of 140% of the client's net liability to the prime broker. In many other markets, there are no such limits. However, many other restrictions have been applied to the rehypothecation of client assets in these markets (as shown in tables 10 and 11).

The inappropriate use of the word rehypothecation in the context of non-US repo has sown confusion among regulators about the nature of repo collateralization and fed a tendency to conceive of repo as a pledge. Looking at repo through this prism, some regulators perceive systemic risk in the possibility that the return of collateral back along long chains of repos could be obstructed by the failure of one party in the chain. Such an obstruction could indeed be a problem in a chain of pledges (if such a construct were in fact feasible) as the original piece of collateral would need to be passed all the way back along the chain. In repo, however, only equivalent collateral needs to be returned and, as chains of repos are only possible with liquid collateral, the longer the chain, the more liquid the collateral and so the easier it should be to find equivalent collateral. Moreover, if a party in a chain of repos fails to return collateral, its obligation can be netted against the failed party's obligation to repay cash, which would provide the cash to the latter to try to buy the collateral from a third party. See table 18 below for the key facts and common misconceptions regarding reuse of collateral.

Table 18: Misconceptions regarding reuse and long collateral chains

Misconception	Fact
Reuse involves collateral chains	<ul style="list-style-type: none"> • Fungible assets, net settlement and close out rights break links with each transaction • No legal risk as to title
Multiple reuse of collateral increases counterparty risk	<ul style="list-style-type: none"> • Reuse is compatible with effective credit risk management, as parties' exposures are addressed by set off rights - not property rights
Assets are reused many times	<ul style="list-style-type: none"> • A large proportion of financing is executed directly with end investors. These institutions have no reuse needs; therefore, collateral is only reused once or twice
Counterparties prefer cash to non-cash collateral	<ul style="list-style-type: none"> • Many counterparties prefer non-cash collateral: <ul style="list-style-type: none"> - It removes the need to run and manage a cash reinvestment programme - It increases the correlation of borrows to the collateral received, thus potentially helping to mitigate exposures and risk in the event of a default - Collateral can be protected in safe custody, while cash at bank has credit risk

Source: AFME Shadow Banking Working Group educational presentation

The differences in legal frameworks across jurisdictions and misconceptions about the nature of collateral reuse has created challenges for global standards setting bodies such as the FSB, in their attempts to measure collateral reuse. The chosen formula simply assumes that collateral posted by a firm will be passively sourced pro rata from securities received as collateral and securities purchased outright. For example, if a firm's holdings of a bond issue came 40% from collateral received and 60% from outright purchases, then the firm is assumed to post that bond as collateral by taking 40% from those bonds received as collateral and 60% from outright purchases. The resulting rate of collateral reuse will therefore be driven as much by cash trading as by repo and so will say little about reuse.

And, IMF staff research⁶⁵ in table 19 below suggests that the decline in the collateral reuse rate, or velocity, has been arrested.

⁶⁵ <https://ftalphaville.ft.com/2018/07/10/1531202400000/Collateral-velocity-rebounds---recent-estimates-and-policy-implications/>

Table 19: Sources of pledged collateral, volume of market and velocity (2007, 2010-2017)

(In trillions of U.S. dollars; velocity in units)

Year	Sources			Volume of pledged collateral	Reuse rate (or Velocity)
	Hedge funds	Securities Lending	Total		
2007	1.7	1.7	3.4	10.0	3.0
2010	1.3	1.1	2.4	6.0	2.5
2011	1.4	1.05	2.5	6.3	2.5
2012	1.8	1.0	2.8	6.1	2.2
2013	1.85	1.0	2.85	6.0	2.1
2014	1.9	1.1	3.0	6.1	2.0
2015	2.0	1.1	3.1	5.8	1.9
2016	2.1	1.2	3.3	6.1	1.8
2017	2.2	1.5	3.7	7.5	2.0

Source: IMF

Regional divergences from global standards and regional regulation:

In addition to the global regulation that directly impacts SFT dealers and banks as counterparties to SFTs, there are numerous regional rules that impact the repo markets. For example, in the US, the G-SIB Method 2 methodology does not consider firms' LCR or NSFR compliance, meaning that liquidity risk is addressed several times through separate and unaligned rules.

In Europe, the repo market is also impacted directly by the implementation of the EU Financial Collateral Directive and by the Short Selling Regulation. There is also a multitude of other laws and regulations affecting the repo market in the EU, including the European Market Infrastructure Regulation (EMIR), the Markets in Financial Instruments Directive (MiFID) and Regulations (MiFIR) and the CSD Regulation⁶⁶. Considering the latter of these, the impact of the mandatory buy-in regime, which is one part of the settlement discipline provisions now expected to take effect in the latter part of 2020, is expected to be particularly damaging for EU SFT markets as a result of its perverse behavioural effects⁶⁷.

The concern that there may have been a regulatory overreach is reflected in ESMA's views⁶⁸ on whether any further regulation is required to manage risks that may arise from the repo markets: "Should any further measures be contemplated, ESMA considers that a rigorous impact assessment should be carried out in order to determine whether such measures would be proportionate having regard to financial stability risks covered by the already agreed reforms and the cumulative effect of regulation, in particular the impact on market liquidity and access to clearing services. The design and calibration of additional instruments should be based on clear empirical evidence and detailed analysis of the procyclical effects that are specifically related to margins and haircuts. Furthermore, given the global nature of the SFTs (in European repo markets the share of domestic transactions is only a third), the potential use of macroprudential instruments should be first agreed at international level, in order to maximise their effectiveness and minimise the risk of regulatory arbitrage, while ensuring a level playing field for market participants inside and outside the EU".

66 <https://www.icmagroup.org/assets/documents/Regulatory/Repo/Repo-FAQs-4-December-2015.pdf>

67 <https://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/Secondary-Markets/secondary-markets-regulation/csd-settlement-discipline/>

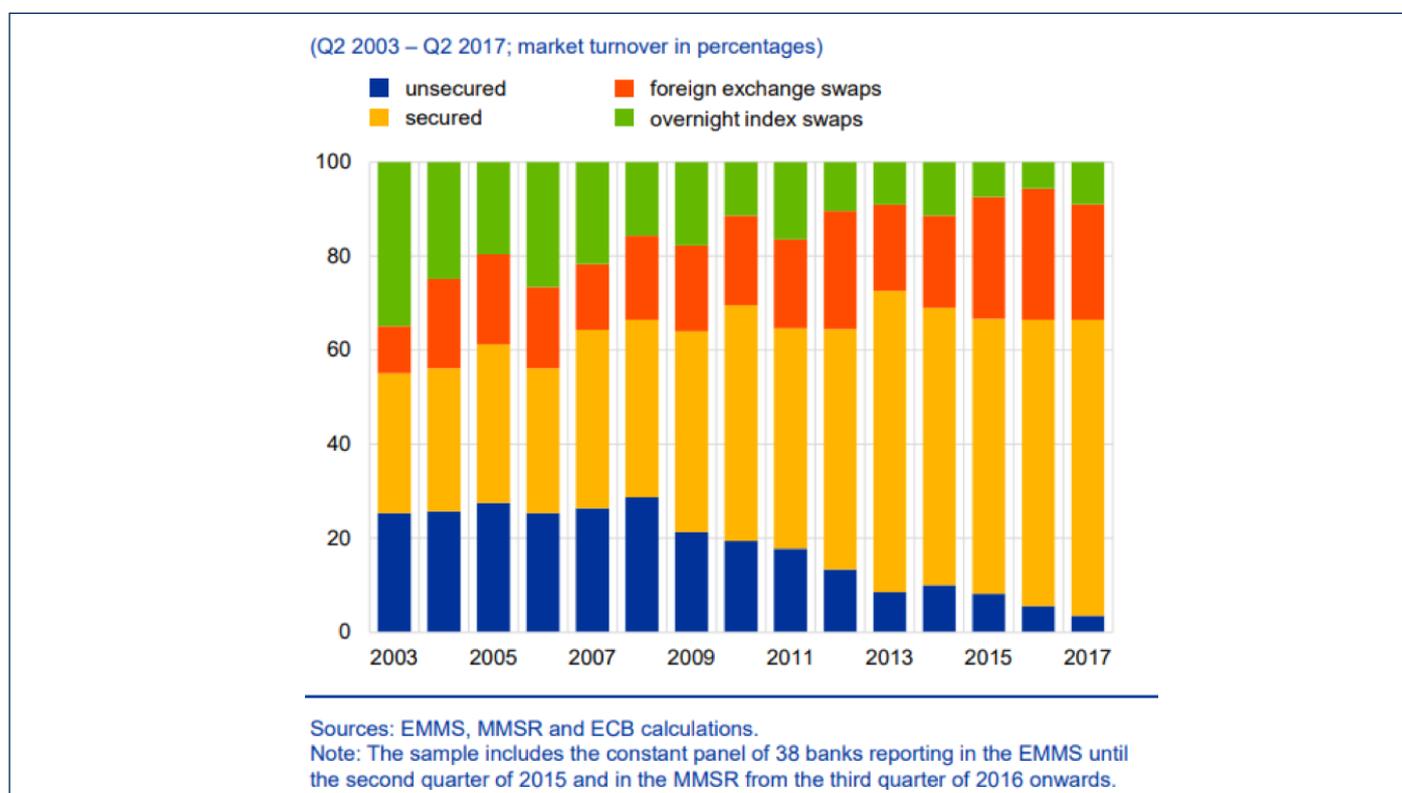
68 https://www.esma.europa.eu/sites/default/files/library/2016-1415_-_report_on_sfts_procyclicality_and_leverage.pdf

How have the markets changed subsequently?

Market participants' own changed appreciations of risks and how best to manage them, regulatory reform, central bank quantitative easing, and wider access and use of central bank repo facilities have collectively had a significant impact on functioning of the repo market. The CGFS⁶⁹ concludes that there are "two recurring themes regarding repo markets internationally. The first is that markets differ substantially in structure and functionality across jurisdictions and, in some cases, across market segments within the same jurisdiction. The second is that despite the overall stability in headline volume statistics, repo markets are currently in transition as they respond to a number of drivers such as an accommodative monetary policy and a tightening of balance sheet constraints due to a shift in market intermediaries' risk appetite following the crisis as well as to changes in the regulatory framework. The transition varies across markets, but in some jurisdictions repo market functioning has been adversely affected. The key message of the report is that policymakers should monitor closely the process of adaptation".

For example, regulation – as intended – has helped to embed a significant decline in reliance on unsecured wholesale funding (see table 20 below) in the Eurozone, which is offset by an increase in repo funding and wider use of central bank funding facilities as well as reductions in loans to deposits ratios⁷⁰ and increases in long-term funding (TLAC).

Table 20: Evolution of money market turnover in different categories in the Euro area



Source: ECB⁷¹

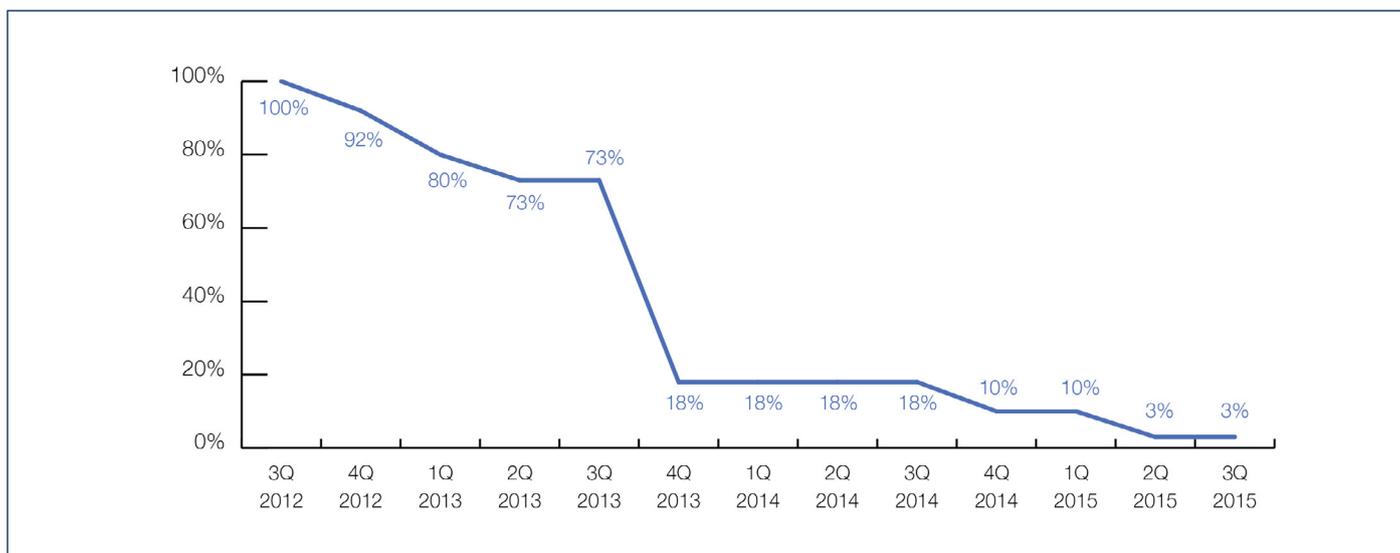
⁶⁹ <https://www.bis.org/publ/cgfs59.pdf>

⁷⁰ <https://www.euro-area-statistics.org/classic/positive-trend-in-euro-area-bank-loans-to-corporates-continues?lg=en>

⁷¹ <https://www.ecb.europa.eu/pub/fsr/shared/pdf/ecb.sfcfinancialstabilityreview201711.en.pdf?c4036661e3010f621343703496198947>

In the US, banks have also reduced their reliance on repo funding substantially after the crisis, with increases in deposit funding and liquid asset portfolios⁷². The OFR and FRBNY report⁷³ notes that the regulatory efforts have, to a degree, been successful in curtailing the dependence on repo financing as it was down to 13% of total liabilities for US securities dealers and banks after first quarter 2015, compared to 32% at its peak in 2007. With regards to other regulatory objectives in the US, table 21 below shows the impact of the tri-party repo regulation on use of intra-day credit lines, with the intra-day credit reduced to 3% of the exposure prior to its introduction in 2012.

Table 21: Intraday credit extended of US tri-party collateral



Source: FRBNY & OFR

Market participants' behaviour is partially driven by uneven regulatory incentives:

As shown in the earlier section regarding the cost of liquidity and capital regulation, the leverage ratio is the most binding constraint for low risk businesses such as secured financing. Its implementation has not been consistent or simultaneous across regions, which has resulted in significant divergence in the way banks operate in regional repo markets.

In the US, a binding LR (supplementary leverage ratio, or SLR) was implemented in 2013, and the enhanced SLR for the eight US G-SIBs in 2014. The enhanced SLR set a higher leverage-based capital requirement for the large US banks compared to the international minimum standards, with a 5% minimum SLR at the holding company level and 6% requirement at the bank level. The US SLR is in the process of being recalibrated, possibly to be aligned with the revised BCBS rule agreed in December 2017, based on 3% +50% of the bank specific G-SIB surcharge.

In the EU, the Leverage ratio was introduced in 2014, but only as a quarterly reporting requirement. As part of the ongoing revision of the Capital Requirements Regulation, the EU is transforming the reporting requirement into a constant binding constraint and including the December 2017 BCBS leverage ratio surcharge for G-SIBs. The UK implemented the leverage ratio in 2015 as a binding capital constraint and introduced a leverage surcharge of 35% of the G-SIB surcharge. The UK leverage ratio is based on a daily-average calculation.

It should be noted also that the leverage ratio also plays an important role in stress-testing (CCAR⁷⁴, SREP⁷⁵ and other similar frameworks), but that there is no international harmonization of the architecture of stress-testing, which translates into different approaches and capital surcharges across jurisdictions and supervisory authorities.

Another significant difference across jurisdictions is whether the leverage ratio must be met and reported based on end of period figures or on a daily basis. The BCBS minimum standards are applicable "at all times". However, as noted above, in the EU the leverage ratio is reported based on quarter-end figures until it has been converted into a binding capital requirement that implements the BCBS minimum standards.

72 https://www.mckinsey.com/-/media/mckinsey/dotcom/client_service/Risk/Working%20papers/48_Future%20of%20US%20funding.ashx

73 https://www.financialresearch.gov/working-papers/files/OFRwp-2015-17_Reference-Guide-to-U.S.-Repo-and-Securities-Lending-Markets.pdf

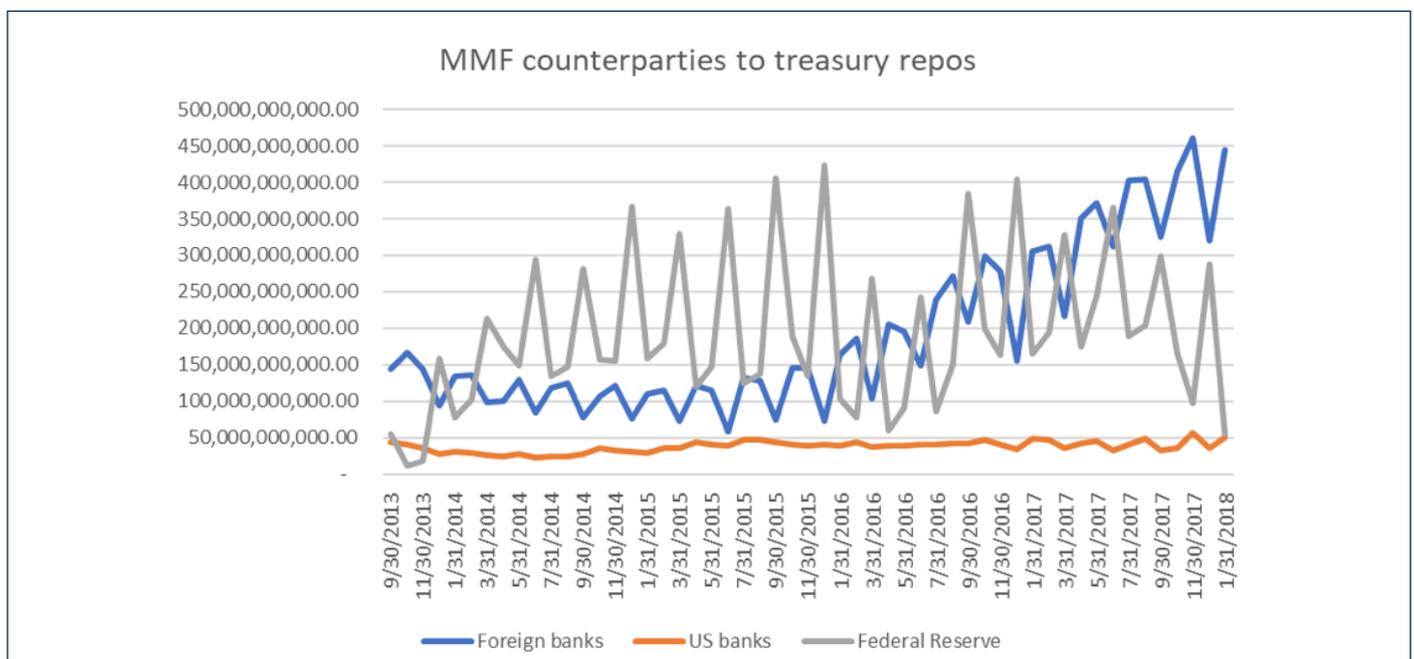
74 <https://www.federalreserve.gov/supervisionreg/stress-tests-capital-planning.htm>

75 <https://www.eba.europa.eu/regulation-and-policy/supervisory-review-and-evaluation-srep-and-pillar-2/-/activity-list/NRWsAs5hcSDu/more>

According to Bassi et al⁷⁶, the inconsistency in the level of the LR requirement creates divergent incentives across banks – resulting in varying propensity to engage in repo transactions. If a bank is bound by the LR, there is an incentive to reduce the size of the balance sheet as any additional unit of balance sheet needs to be remunerated at a rate equal to the cost of tier one capital to break even. Bassi et al find that there was an overall tendency to reduce the size of repo balance sheets in jurisdictions where the LR was implemented early, with 10% reduction in US bank balance sheets between 2012 and 2014 and 15% lower across UK banks over the same period. Over the same period, Bassi et al suggest that the increase in gross repo activity by the Euro area and Swiss banks was due to delay in implementation of the LR and that their increase in market share was due to reduced capacity at the UK and US banks. To summarise, fragmented approaches to regulation can result in ‘leakage’ effects and migration of activity.

Table 22 below demonstrates how the leverage ratio, among other factors, drives counterparty behaviour in the US market, in terms of counterparties to repo transactions by US money market funds (MMFs). While the capacity provided by the US banks has remained relatively stable over the period (US SLR was implemented in 2013), the capacity provided by foreign banks only subject to quarter-end reporting of the leverage ratio has grown. These banks expand their offering mid-quarter and scale down their repo book at quarter and year-ends. The resulting volatility in supply of private sector repo transactions with the US MMFs is currently offset by the Federal Reserve, expanding its repo balance sheet at quarter and year-ends by hundreds of billions of US dollars. Some of the US banks – to a much smaller degree – have also started offering capacity at quarter-ends.

Table 22: MMF counterparties to US Treasury repos



Sources: SEC Form N-MFP2, OFR and GFMA analysis

The fluctuations observed in some markets, such as the US Treasury repos with US Money Market Funds (MMFs), may reflect EU banks reducing their leverage exposure at period end-dates, in order to report stronger leverage ratio figures, but also the behaviour of their counterparties. Anderson and Kandrac⁷⁷ identify that the US MMFs withdraw repo funding from their regular dealer counterparties in favour of the Federal Reserve’s RRP facility due to perceived counterparty credit profile and the US MMF rules⁷⁸. Anderson and Kandrac are concerned that under stressed conditions, the MMFs could further substitute their other investments in favour of the RRP. On the other side of the coin, while Anbil and Senyuz⁷⁹ observe that the European banks’ funding to the US MMFs was reduced by 17% at reporting dates, Anderson and Kandrac show that the EU banks bridge this funding gap by adjusting their collateral and lender composition. Thus, we can conclude that while the leverage ratio is not the only factor contributing to such seasonality, it is likely to be a significant factor, alongside other seasonal and internal technical elements as suggested by Anderson and Kandrac. However, once the US operations of large foreign banks are subject to the SLR from the beginning of 2019, the volatility in capacity – driven by the foreign banks’ LR exposures – should come to an end.

In another context, table 23 below shows the percentage of repo trades that are either centrally cleared or between dealer banks. As

76 J.P. Morgan European Rates Strategy: Regulation and repo market: It does matter! February, 2016

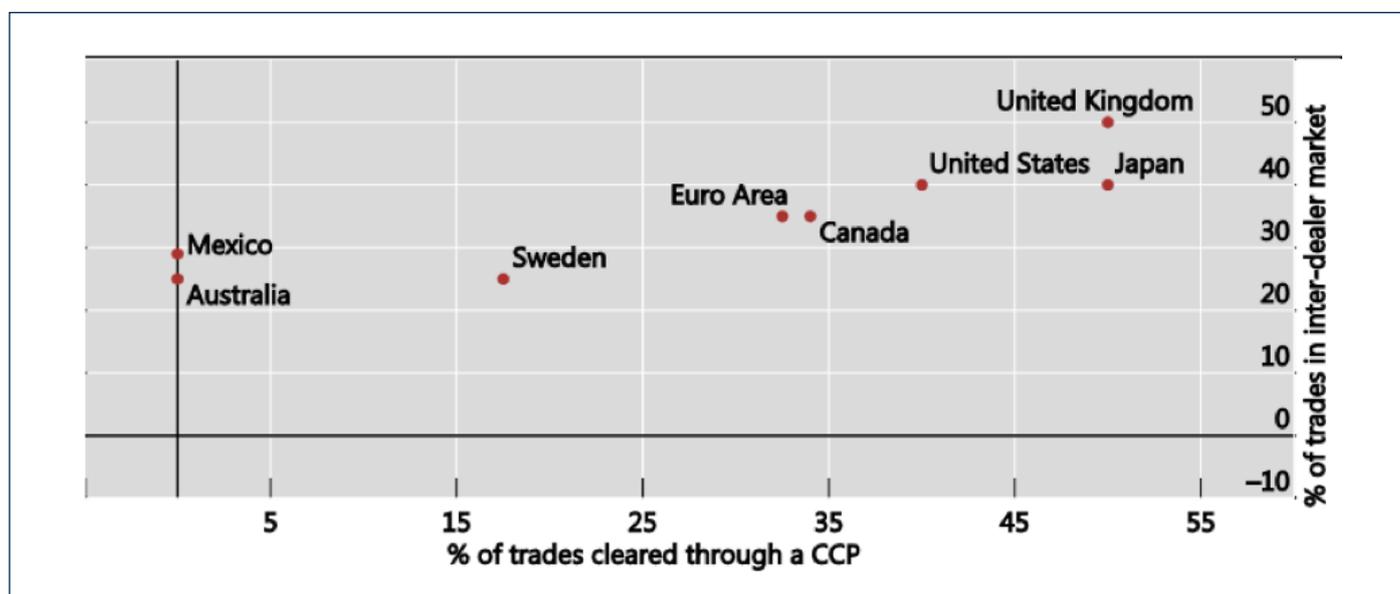
77 The Review of Financial Studies, Volume 31, Issue 9: <https://academic.oup.com/rfs/article/31/9/3643/4756472>

78 <https://www.bis.org/publ/cgfs59.pdf>

79 <https://www.aeaweb.org/conference/2018/preliminary/paper/KdB9i9QE>

the optimization of netting rules is better facilitated when counterparties are CCPs, this also translates into a structurally higher repo net leverage exposure in the EU than in the UK, Japan and the US.

Table 23: Inter-dealer and CCP-cleared trades



Source: CGFS Papers n° 59

Facing the concerns on potential window dressing, and in order to remove any potential ambiguity, the Basel Committee has reminded banks and supervisors in its newsletter n°20 that window-dressing is unacceptable: *“Window-dressing by banks is unacceptable, as it undermines the intended policy objectives of the leverage ratio requirement and risks disrupting the operations of financial markets. Banks and supervisors should ensure ongoing compliance with the Committee’s leverage ratio such that it accurately reflects the resilience of banks and to mitigate any possible disruption to the operations of financial markets that results from window dressing.”* As such, all key jurisdictions are currently moving towards or have implemented the LR as a binding constraint with the daily averaging formula applied for the reporting requirement.

Regulation and repo in a broader context:

The AFME-PwC post-crisis study, *Impact of Regulation on Banks’ Capital Markets Activities: An ex-post assessment*⁸⁰, examines how banks have actually responded to regulations ten years on from the financial crisis; and draws on data up to 2016 across 13 banks, covering approximately 70% of global capital markets activity. In summary, concerning repo, this study notes that *“More stringent liquidity and collateral requirements have also caused banks to hoard liquid assets. This reduces their availability to support other trades, such as repo transactions which then have ripple effects across other capital markets. The lack of high quality collateral could also impact liquidity in secured markets, particularly in times of stress.”* Significantly, in the study’s analysis of product level shrinkage reports that *“The rates product segment has shrunk substantially by around 47% over the period 2010 to 2016. Within this segment, the most striking is the fall in repo balances both in the EU and the RoW, which have fallen by around 70%. The repo share of total capital markets activity halved, falling from 18% to 9% over this period. This reduction in repo activity has been driven by plentiful supply of central bank liquidity, low external funding costs, regulations that constrain low risk activities (such as the leverage ratio) and lower levels of trading in other asset classes which leaves less collateral to repurchase.”*

However, in an update to their earlier study, Bassi et al⁸¹ and the CGFS⁸² observe that banks who were earlier constrained by the LR and significantly reduced their repo balance sheets have adjusted their offering and have been able to provide more capacity through netting activity. Offering repo funding to larger clients with more nettable repo assets and liabilities has become less costly in terms of LR capital, while smaller clients with less or none nettable repo transactions or ability to clear their repos are experiencing the

80 <https://www.afme.eu/en/reports/publications/impact-of-regulation-on-banks-capital-markets-activities/>

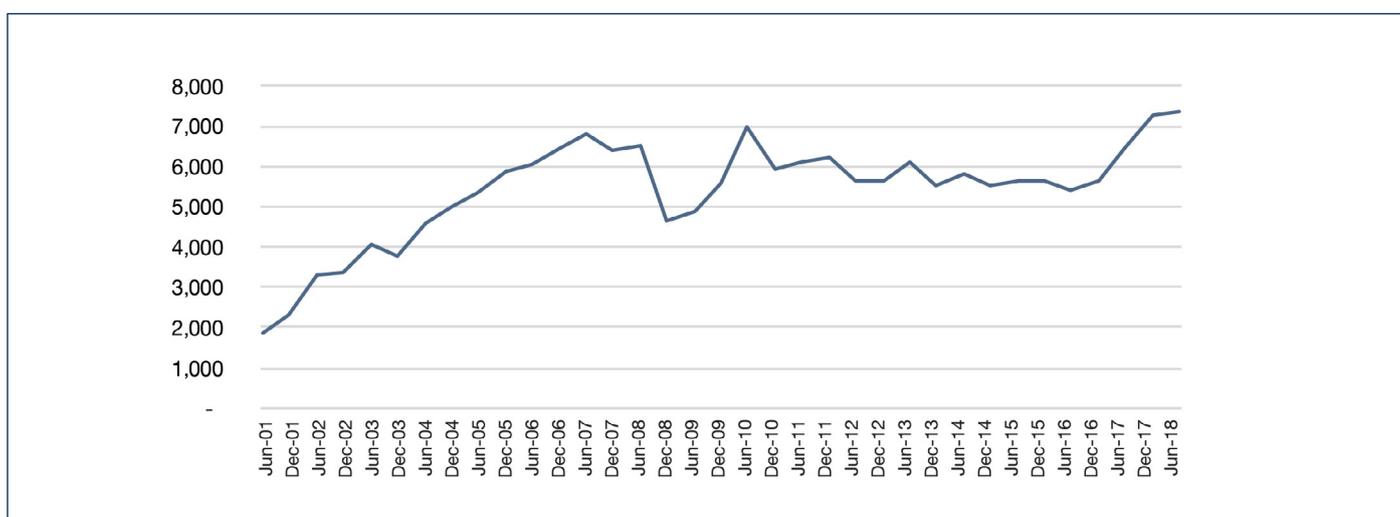
81 J.P. Morgan European Rates Strategy: Update on the repo market in Euro ahead of QE tapering, September, 2017

82 <https://www.bis.org/publ/cgfs59.pdf>

squeeze. From a broad systemic perspective, Bassi et al however worry that this increased net vs. gross repo trend across all major jurisdictions and banks will result in strong correlation in times of funding pressure.

In Europe, recent data point to the repo market potentially having made progress in assimilating the changes which have been thrust upon it. For instance, ICMA's most recent repo market survey⁸³ shows a growth in the aggregate volume of outstanding repo and reverse transactions (see table 24 below). It is worth noting that in contrast to the AFME-PwC report, the ICMA report captures both repo and reverse repo transactions grossed up whereas the AFME-PwC report includes net repos only in the trading book (not including for example group treasury repos). The scope of the latest ICMA study is 62 offices of 59 financial groups, mainly banks, whereas the AFME-PwC report included 13 banks.

Table 24: Total gross repo business by ICMA survey participants



Source: ICMA European repo market survey number 35

From the monetary policy standpoint, Duffie and Krishnamurthy⁸⁴ observe that the monetary policy passthrough efficiency into repo markets is significantly degraded by the leverage ratio. While they also highlight that the LCR can further raise the dispersion in money market rates by reducing the effective supply of safe assets, they believe that the impact will not be significant until the interest rates are higher. In addition, policies such as the US money market fund reform increases rate dispersion between government bonds (increased demand) and private debt (decreased demand), further reducing monetary policy passthrough efficiency. In terms of solutions, Duffie and Krishnamurthy offer improvements in the repo market infrastructure to free-up balance sheet capacity at regulated broker-dealers and/or alternatively to adjust the treatment of US government securities in the leverage ratio.

Repo market volatility and moving to new near Risk-Free Reference Rate benchmarks:

Interbank offered rates (IBORs) play a central role in financial markets, and act as reference rates to hundreds of trillions of US dollars (or dollar equivalents) in notional amount of derivatives and trillions of dollars in bonds, loans, securitisations and deposits. They are used by most market participants, ranging from banks that provide credit to businesses and households to derivatives market makers, as well as central banks that transmit their monetary policy through financial markets. The dependence on IBORs by all sectors of the financial markets is changing, however, as the significant decline in unsecured bank funding markets continues.

The UK FCA has agreed with the panel of 20 banks that contribute data for the LIBOR rate that underpins the vast majority of derivatives contracts globally that they will continue to provide data to support the benchmark until the end of 2021. However, significant work has been conducted by global regulators and the public-/private-sector RFR working groups to identify alternative, RFRs and plan for a transition to those rates as appropriate.

A June 2018 report⁸⁵ by AFME, ICMA, ISDA, SIFMA and SIFMA AMG shows that even sophisticated market participants remain

83 <https://www.icmagroup.org/assets/documents/Market-Info/Repo-Market-Surveys/No-35-June-2018/ICMA-European-repo-market-survey-number-35-conducted-June-2018.pdf>

84 <https://www.gsb.stanford.edu/sites/gsb/files/publication-pdf/in-september-8-2016-bw.pdf>

85 <https://www.afme.eu/en/reports/publications/ibor-global-benchmark-transition-report/>

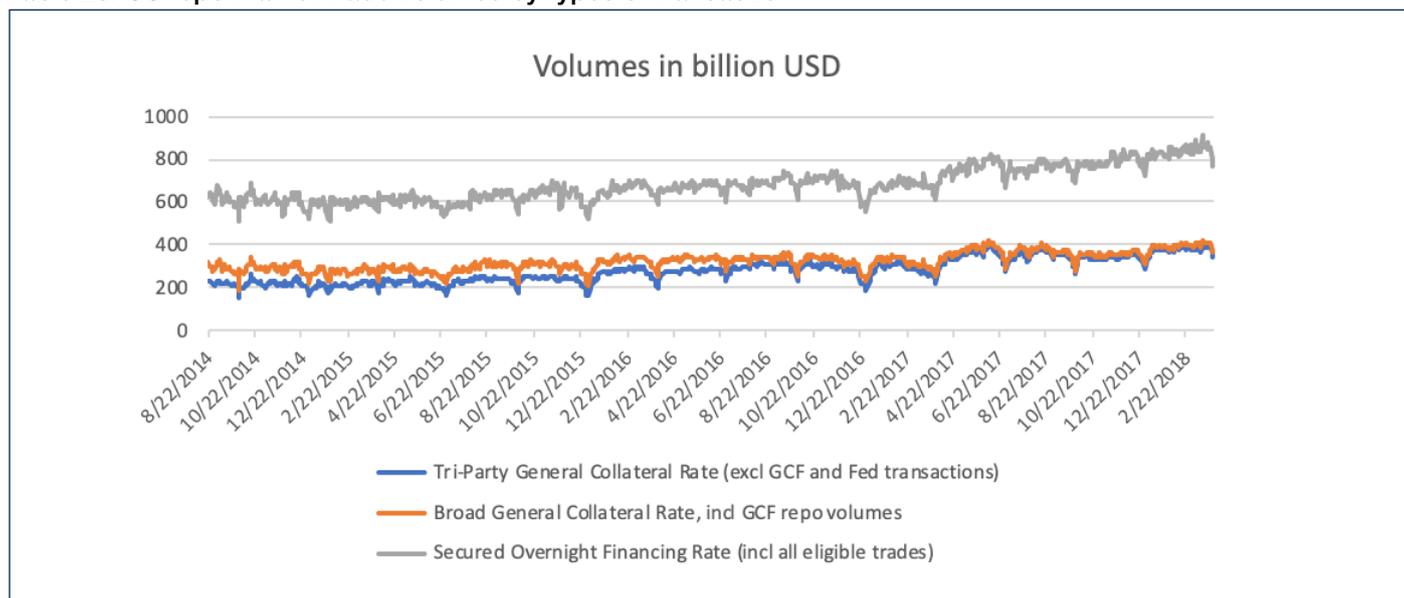
unsure about the desired end state of the transition and how well the markets will function. According to the report that surveyed over 150 market participants in 24 countries, the key to the transition is the need for market participants to develop new cash products and liquidity in derivatives and futures referencing the RFRs.

However, while the AFME, ICMA, ISDA, SIFMA and SIFMA AMG report provides broad guidance on the key elements of the transition to RFR's, it does not address the vulnerabilities of the potential underlying RFRs that typically depend on repo market transactions.

While this report has reviewed bank balance sheet capacity constraints driven mainly by the LR, other forces have significant impacts on the way the repo markets operate as well as the purpose of it.

In the US, the Alternative Reference Rates Committee was put in charge by the Federal Reserve Board and Federal Reserve Bank of New York in cooperation with the U.S. Department of the Treasury of finding a replacement for the US dollar LIBOR rate. It decided in June 2017 that Secured Overnight Financing Rate (SOFR) would replace the US dollar LIBOR. The New York Federal Reserve Bank describes the SOFR as a broad measure of the cost of borrowing cash overnight collateralized by Treasury securities. The SOFR includes all trades in the broad general collateral rate repos and bilateral Treasury repurchase agreement (repo) transactions cleared through the Delivery-versus-Payment (DVP) service offered by the Fixed Income Clearing Corporation (FICC), which is filtered to remove a portion of transactions considered "specials" (a specific bond trading at a premium compared to general collateral of similar asset quality). The volumes for eligible SOFR trades are nearly ten times the interbank loan volumes that are eligible for the LIBOR rate in USD, as observed by the Federal Reserve Bank of St. Louis⁸⁶ (see tables 25 and 26 below).

Table 25: US repo market trade volumes by types of transaction



Source: New York Federal Reserve Bank, GFMA analysis

86 <https://fred.stlouisfed.org/series/IBLACBW027NBOG>

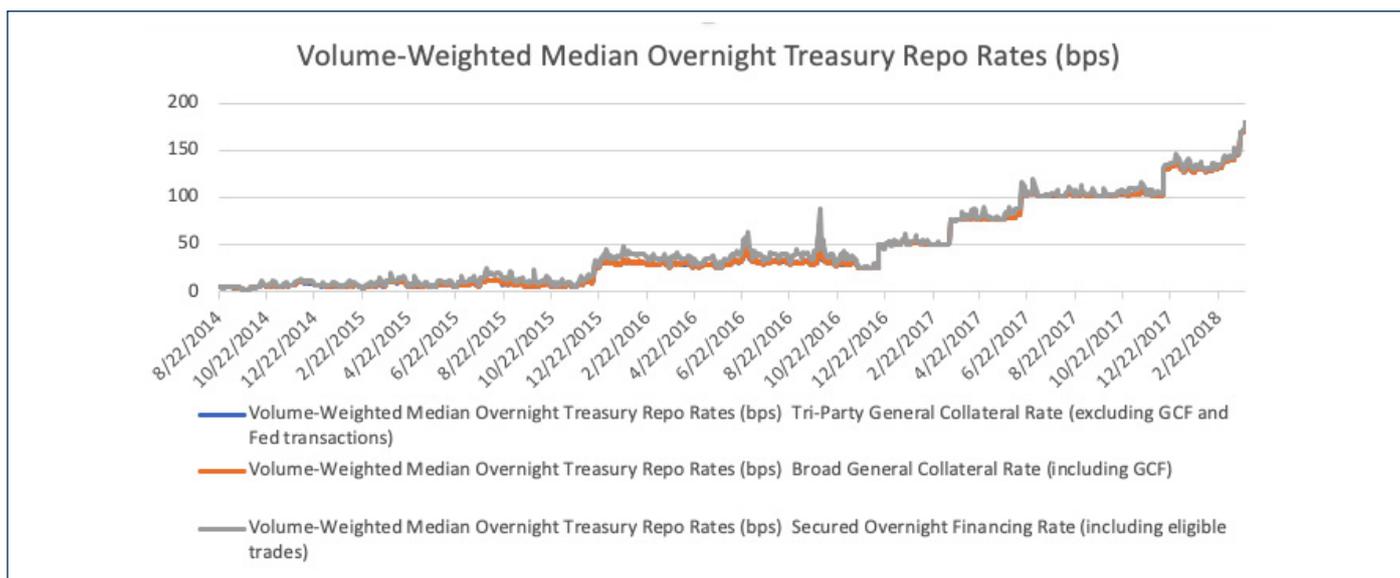
Table 26: Interbank loans in the US by all commercial banks



Source: St. Louis Federal Reserve Bank⁸⁷

With regards to the rates observed for the SOFR in the US, table 27 below shows the relative stability of the SOFR, apart from quarter-end spikes. According to the Federal Reserve⁸⁸, these spikes (largely excluding specials) are a result of including bilateral inter-dealer DVP trades in the data. While inclusion of DVP repos generally increase the SOFR by 2-5 basis points, the Federal Reserve observes that “June 30 and September 30, 2016 were occasions when the inclusion of seasoned DVP repo trades caused a significant deviation in rate 3, the rate that includes trades with the Federal Reserve. On those dates, the rate 3 median fell to 25 basis points due to very large take up of the ONRRP. When seasoned DVP repo is included, the additional volume of DVP repos at higher rates prevented the overall median rate from falling by as much, providing some counterbalance to the large increase in trades with the Federal Reserve”. This data suggests that while the market appears to function well most of the time, there are capacity constraints at quarter-ends that also extend to the inter-dealer market (similar to MMF counterparties as shown earlier in this report).

Table 27: Volume-weighted median overnight treasury repo rates



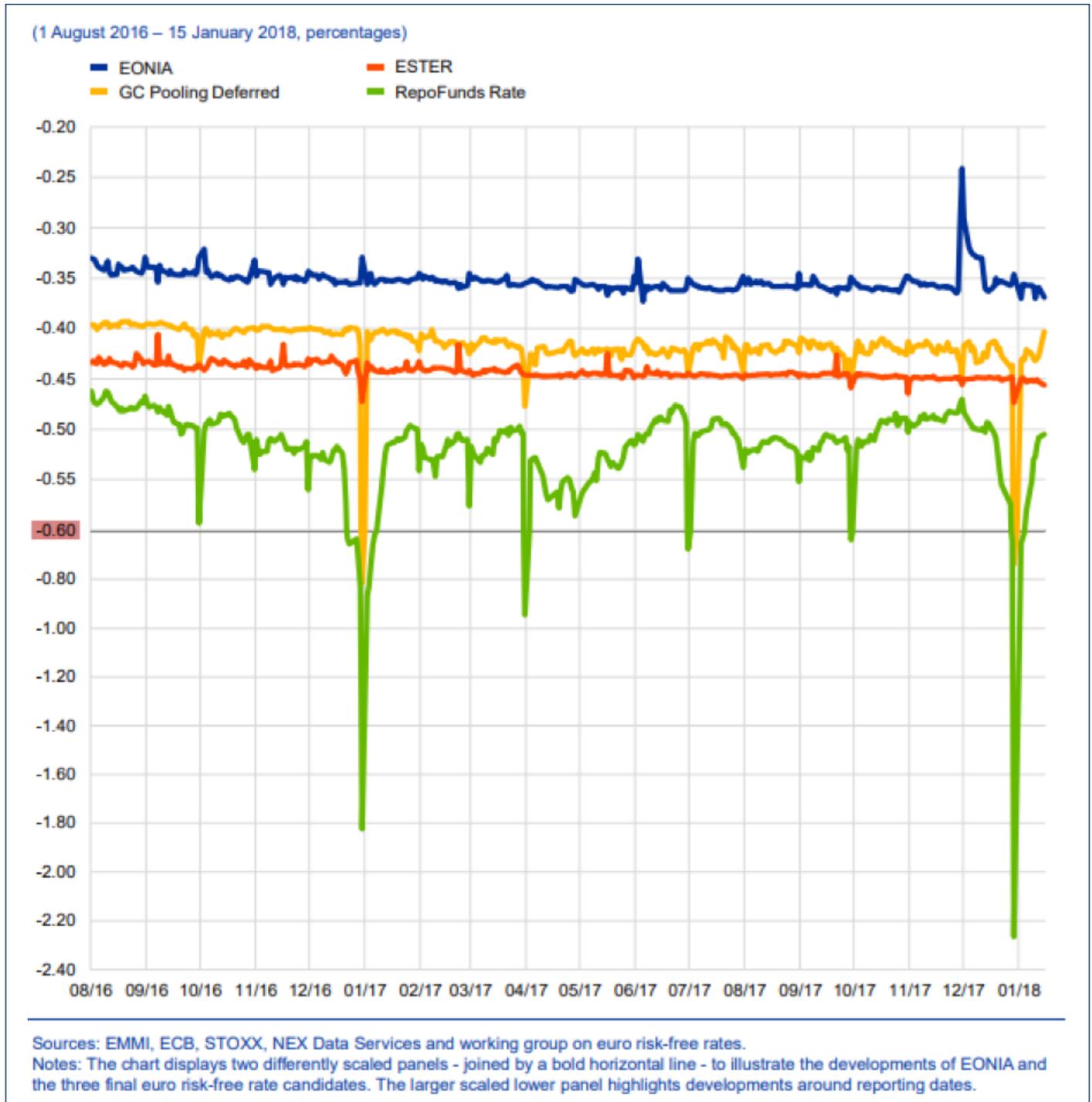
Source: New York Federal Reserve Bank Data and GFMA analysis

⁸⁷ <https://fred.stlouisfed.org/series/IBLACBW027NBOG>

⁸⁸ <https://www.federalreserve.gov/econresdata/notes/feds-notes/2017/cleared-bilateral-repo-market-and-proposed-repo-benchmark-rates-20170227.html>

In Europe, there are similar issues with specialness and quarter- and year-end peaks, but perhaps more pronounced than in the US market. The spikes at quarter- and year-ends can be seen quite clearly in table 28 below, prepared by the ECB⁸⁹ in context of work to determine what should be the euro near RFR.

Table 28: EONIA and the final Euro RFR candidates



Source: Adopted from the ECB's first RFR consultation paper

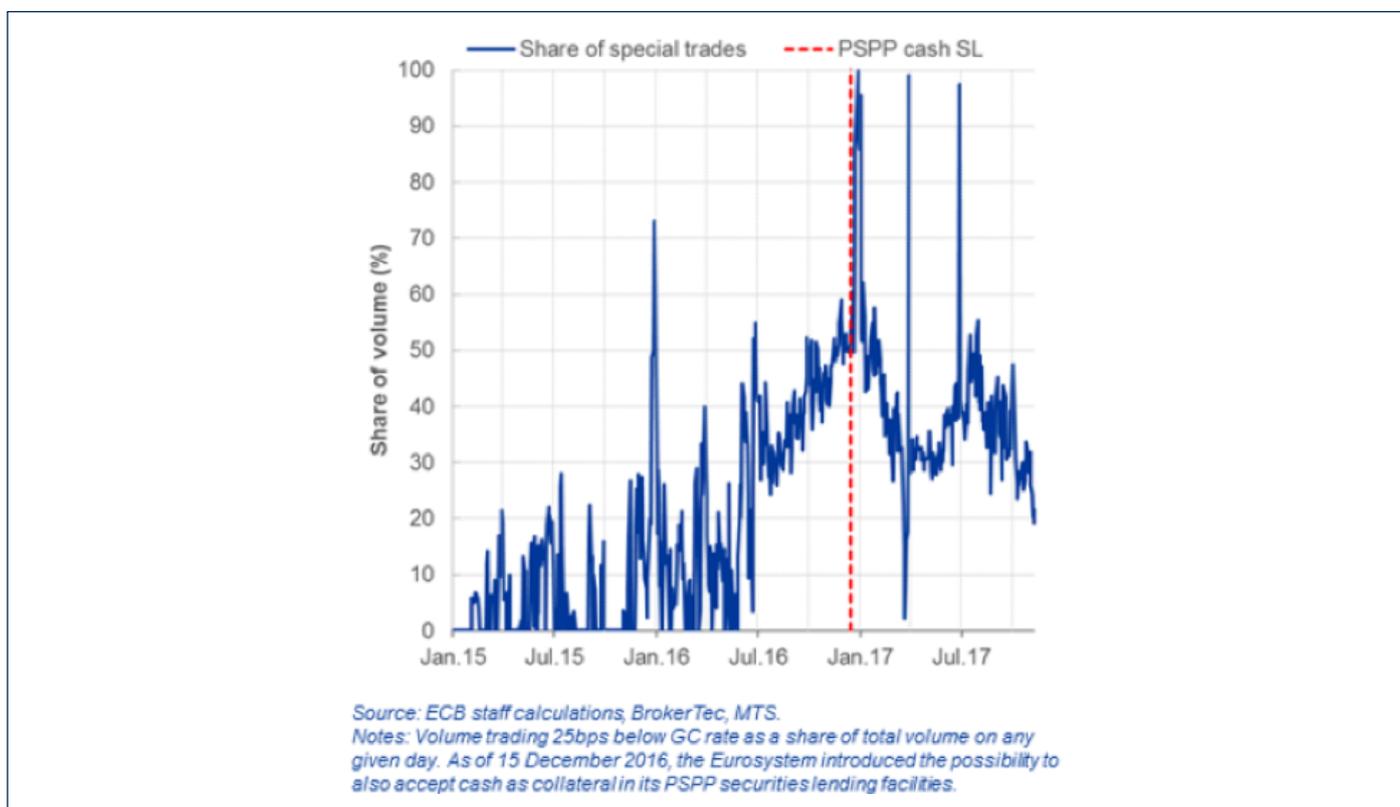
89 https://www.ecb.europa.eu/paym/pdf/cons/euro_risk-free_rates/consultation_details_201806.en.pdf

Compared to the evolution of the unsecured benchmarks, EONIA and ESTER, over time, the two secured benchmarks, GC Polling Deferred and RepoFunds Rate, both show marked volatility – most especially at year-ends 2016 and 2017, but also at quarter ends (see table 28 above); and this was a factor in the market’s decision to select ESTER as the euro near risk free-rate. ICMA has written detailed reports⁹⁰ examining the European repo market conditions at these two year-ends, which point to the impact of regulation as one key factor contributing to this volatility. Most notably, many market participants are currently only required to comply with leverage ratio requirements on a quarterly basis, thus allowing greater capacity in the repo market between reporting dates. In terms of the year-ends, banks also optimize their balance sheets for other reasons, such as the G-SIB categorisation, tax levies and contributions to resolution funds that are in many jurisdictions all based on the year-end balance sheets.

The quarter-end figures demonstrate that when you fully apply the regulation the market is at a different level than when you do not. So, whilst philosophically it is positive that steps are being taken to shift to a leverage regime based upon quarterly averages instead of actuals, this change in requirements needs to be approached with a degree of caution. As shown earlier in this report, the US repo market has become highly dependent on the Federal Reserve’s intervention at quarter- and year-ends. It would clearly take some capacity out of the market both in Europe and the US if euro area banks attempt to further reprice LR based capital to such an extent. That would force buy-side firms to seek other alternatives, likely leaving them with more risk, so a better calibrated treatment of repo is required in the calculation. Furthermore, central banks that already provide significant repo capacity at quarter-ends could be stuck with large balance sheets in support of the private sector market, even if otherwise their objective was to shrink their market operations.

With regards to specialness in the European repo market, the ECB’s asset purchase programme resulted in a higher degree of specialness during the European sovereign risk crisis in 2011 due to scarcity of high-quality collateral⁹¹. While the purchases were conducted on the cash market, the impacts were directly transferred to the repo market. This scarcity has persisted since, with the ECB estimating that 30% of German bunds traded as specials in 2017 on average (see table 29 below). However, it is clear from the data that the specialness of the German collateral has started to decline since the ECB started accepting cash collateral in its securities lending programme (PSPP).

Table 29: German collateral trading special (percentage points)



Source: Benoît Cœuré, Member of the Executive Board of the ECB, at the ERCC General Meeting on “The repo market: market conditions and operational challenges”⁹²

90 <https://www.icmagroup.org/assets/documents/Regulatory/Repo/ICMA-ERCC-year-end-report-2016-AndyHill-020317.pdf> and https://www.icmagroup.org/assets/documents/Regulatory/Repo/ICMA-ERCC_2017-year-end-report_Final-150118.pdf

91 <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2065.en.pdf>

92 https://www.ecb.europa.eu/press/key/date/2017/html/ecb.sp171114_1.en.html

While the reasons for the high specialness in the European repo markets are multi-faceted, including increased demand for high-quality collateral driven by derivatives IM and VM, LCR and NSFR requirements, as well as scarcity driven by ECB purchases, the outcome of high level of specialness is worrying the authorities. Benoît Cœuré from the ECB notes that “*Extreme specialness may result in serious market malfunctioning, with investors choosing to strategically fail to deliver*”. European Systemic Risk Board⁹³ also concludes that without easy access to high-quality collateral, market makers and other participants would find it costlier to trade. This in turn would have negative impacts on financial stability due to reduced market liquidity, and to real economy through frictions in bond market financing costs and reduced bank lending due to higher funding costs.

Elsewhere, Switzerland’s National Working Group concluded that their clear preference⁹⁴ was to use secured repo rate (SARON) as the Swiss RFR. In its assessment, the Swiss National Bank (SNB) concluded that:

- Adoption of the repo reference rate will improve the monetary transfer mechanism (SNB can only transfer policy via the repo market) and boost the overall repo market. the Swiss Reference Rates represent a kind of barometer with which it can gauge conditions on the Swiss franc money market in real time. This allows it to better monitor developments on the money market and, consequently, to optimise the timing of interest rate steering operations;
- Systemic stability depends on an efficient repo market and the SNB wants to encourage interbank financing through the repo market to ensure flow of liquidity during financial crises;
- Secured RFR will provide market participants with clear cost/benefit benchmarks for liquidity management;
- the rates will provide a stable benchmark for financial instruments which are not priced on the basis of a variable credit risk and liquidity premium; and
- The Swiss reference rate is based on real transactions and quotes from around 150 banks with significant volume advantage over LIBOR rates, with non-binding prices from a 12-bank panel. The repo volumes are also more resilient during crises.

In the UK and Japan, the working groups established to choose their market specific benchmarks decided to opt for unsecured rather than secured benchmarks, even though the repo market would provide much higher volumes of observable transactions. In Japan, the Study Group on RFRs⁹⁵ concluded that the GC repo as an alternative benchmark had three undesirable characteristics:

- has a tendency to have larger swings at quarter-ends than other candidates;
- is influenced by supply and demand of the bond market; and
- includes skewed rates caused by a particular type of transaction such as GC-SC spread transactions.

The Bank of England also concluded that an unsecured benchmark is less susceptible to volatility due to collateral scarcity and thus follows more closely the Bank of England rate⁹⁶.

To conclude, there are significant divergences between regions on the preferred near risk-free benchmarks, driven by different factors and events observed in the wholesale markets. While the current state of the repo market, the associated spikes at reporting days and increased “specialness” of a large proportion of the government bond universe in certain markets have clearly influenced decision-makers who chose not to use secured benchmarks, in other jurisdictions the clear benefit of much higher volumes than in the unsecured market, observability of prices and resilience of the market during crisis periods made the repo market-based secured rates the preferred choice. Bearing in mind that the unsecured wholesale lending market has all but disappeared and that the near RFRs will likely need to evolve over time, it is critical to ensure the soundness and efficiency of repo markets as this is in the best interest of all stakeholders and of financial stability across the globe.

How have the changes affected clients?

The key questions regarding how these changes have impacted clients have been subject to some analysis by the regulatory authorities. A recent Bank of England study⁹⁷ on the interaction of capital regulation and dealer-client repo intermediation in the UK concludes that dealers subject to binding LR requirements consistently reduced repo volume they accepted from small clients compared to peers not subject to a binding LR. To a lesser extent, the paper also discovers that banks reduce their repo offering to clients with whom they had weak relationships. Meanwhile, larger clients with strong relationships with the banks were unimpacted

93 <https://www.esrb.europa.eu/pub/pdf/wp/esrb.wp55.en.pdf?878239b868a5d574391c5e9c2656c45e>

94 https://www.snb.ch/en/mmr/speeches/id/ref_20090825_tjn_1/source/ref_20090825_tjn_1.en.pdf

95 <https://www.boj.or.jp/en/paym/market/sg/rfr1612c.pdf>

96 <https://www.bankofengland.co.uk/-/media/boe/files/markets/benchmarks/sonia-as-the-risk-free-reference-rate-and-approaches-to-adoption.pdf>

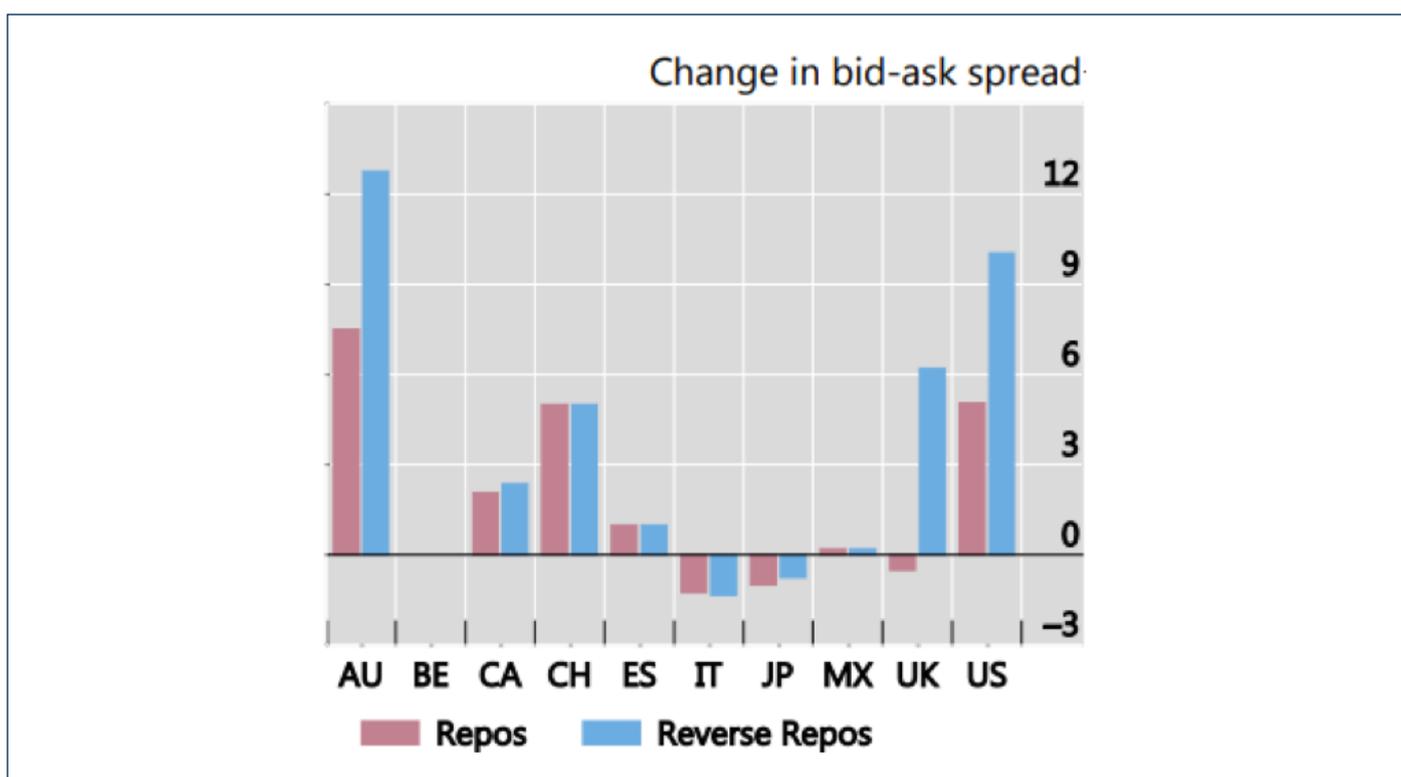
97 <https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2018/repo-market-functioning-the-role-of-capital-regulation.pdf?la=en&hash=0BD96B4EC9E90C4F91E1102CF19DEA4598E1F037>

by the change. The clients who were subject to downscaling of repo offering by dealers also experienced a reduction in frequency of transactions and increase in repo rates offered but – perhaps reflecting the LR’s lack of risk sensitivity – neither haircuts nor maturities were seemingly affected by the new regulatory requirement.

In terms of identifiable costs, the CGFS study⁹⁸ identified that bid-ask spreads have increased in some jurisdictions much more than in others from 2014 to 2016 (see table 30 below). The changes in spreads reflect the divergences in introducing the LR, as well as other factors in Australia, mainly driven by increased demand from non-residents to fund trading activities such as FX swap and bond futures markets arbitrage⁹⁹. The report also identifies that the regulation has increased pricing volatility for end-users placing cash in the repo markets and that in some markets there are persistent quantity constraints. According to the report, further costs to the real economy may also arise during stressed periods due to reduced intermediation capacity, which in turn may create frictions in the cash and derivatives markets.

In the Euro area, the ECB¹⁰⁰ has observed that for overnight contracts on German collateral, there is a noticeable premium attached to centrally cleared repos. While clearing clearly adds to costs of transactions and in theory cleared repos should thus be more expensive than bilateral repos, the ECB states that the premium is driven by the capital costs associated with the LR. Effectively, there is more balance sheet capacity available and at lower cost, as long as the repos are cleared and thus can be more easily netted against other trades with the same CCP. This suggests that smaller end-users who cannot clear repos have lower access to and increased cost of financing or sourcing collateral through the repo market.

Table 30: Change in bid-ask spreads 2014 - 2016



Source: CGFS report

98 <https://www.bis.org/publ/cgfs59.pdf>

99 <https://www.rba.gov.au/publications/bulletin/2016/sep/5.html>

100 https://www.ecb.europa.eu/press/key/date/2017/html/ecb.sp171114_1.en.html

Pension funds have noted in an ICMA report¹⁰¹ that they are increasingly confronted with higher collateral obligations alongside shorter settlement cycles, whilst at the same time their ability to generate adequate collateral is being limited by market circumstances and regulation. They are significant users of OTC derivatives, with the aim being to stabilize their coverage ratio. Hence, increased margining requirements are a significant consideration for them and, in this context, they need to be able to borrow and lend cash, in any amount at any given point in time, to be able to meet collateral calls.

This creates a key liquidity risk which pension funds need to take full responsibility to mitigate, within the constraints of the market and regulation, especially during times of stress. This has led pension funds to investigate new ideas such as peer-to-peer trading and access to cleared repo, to improve access to transformation. Both such approaches are very much in development for non-banks and yet have many barriers to entry, whether from an operational, legal or counterparty perspective. Other alternatives, such as holding excess cash or generating cash via a fire-sale, will have a significant negative impact on pensioners future retirement incomes.

Furthermore, between 5% and 6% of the size of the global market for SFTs is estimated to be attributable to the insurance industry¹⁰², although it is thought that their actual participation level could be even higher. Insurers use SFTs for a variety of purposes that benefit their clients and shareholders – these can be largely grouped into three categories: risk reduction, collateral transformation and yield enhancement.

In the context of insurers' risk-reducing activities, the consequence of less reliable or less liquid SFT markets is a need for insurers to hold increased short-term cash balances, to reduce exposures to volatile SFT markets¹⁰³. This on the one hand increases bank counterparty risk as the idle balances then need to be held on bank accounts and on the other hand decreases investment returns. Similarly, lower capacity of SFT markets to allow for efficient collateral transformation forces insurers to consider adapting the way they invest – thus, assuming deviations from the optimal asset allocation and desired ALM position, the impact of which is a reduced return on investment for client and insurer alike. And, deterioration in the risk/reward profile and cost/income ratio for SFTs forces insurers to re-evaluate their own role in the market. The absence of additional yield, which they would seek to earn in the SFT market by lending out otherwise dormant securities on a fully collateralized basis to SFT market participants, has its most deleterious impact on long-term saving products.

Alternative products:

The increased cost of repo transactions as described in the cost of regulation section above, is influencing choices that clients can make as well as the product offering of banks. More specifically, the significant cost of leverage ratio requirements on repo is driving activity towards netted (often CCP cleared) repo as discussed earlier in this paper, or less balance sheet intensive products – or towards products that are not intermediated by banks, such as peer-to-peer platforms.

As mentioned earlier in this study, derivative and repo transactions are treated differently in the exposure measure calculation of the leverage ratio. The CGFS report¹⁰⁴ identifies that there are two types of structures that provide similar benefits for clients as repo transactions, without the bank balance sheet implications of principal repo. According to the CGFS, derivatives structures, such as total return swaps or contracts for difference allow banks to stand in between two repo counterparties on a fully matched basis, without incurring the notional based balance sheet increase. Some respondents to the CGFS survey noted that TRS structures could provide more advantageous pricing due to the limited balance sheet increase. Additionally, a J.P. Morgan research paper¹⁰⁵ suggests that there is some evidence of synthetic financing and collateral optimization through collateral swaps, such as collateral upgrades, gaining popularity. Anecdotally, collateral swaps seem more likely to directly deliver the benefits of a repo transaction (apart from funding) than other more complicated derivative structures.

However, agency structures are a much more direct alternative to principal repo in the bank intermediated market than derivatives structures. Under such structures (agency repo or agency securities lending) banks can intermediate between counterparties as an agent rather than as principal, which results in lower LR charge while still incurring credit risk capital charges stemming from the guarantee provided to the cash lender on the performance of the cash borrower. As can be seen in table 14 above, the internal models-based credit risk charge is significantly lower than the leverage ratio charge.

In terms of funding costs, the ECB¹⁰⁶ expects that the impact from the NSFR on short-term repo is reckoned to be lower supply, reducing volumes and increasing the price. However, the NSFR will also apply a funding cost on derivatives liabilities, and therefore the relative advantage of derivatives transactions over repos in terms of funding costs will depend on the way the NSFR is implemented.

101 https://www.icmagroup.org/assets/documents/Regulatory/Quarterly_Reports/ICMA-Quarterly-Report-Q2-2017.pdf (at page 19)

102 Source: ISLA biannual survey, and assuming the participation of insurers in repo is comparable to the participation in securities lending.

103 https://www.icmagroup.org/assets/documents/Regulatory/Quarterly_Reports/ICMA-Quarterly-Report-First-Quarter-2018.pdf

104 <https://www.bis.org/publ/cgfs59.pdf>

105 JP Morgan European Rates Strategy: Regulation and repo market: It does matter!, February, 2016

106 <https://www.ecb.europa.eu/press/key/date/2017/html/sp170126.en.html>

Finadium¹⁰⁷ assessed the incentives that bank regulation produces for securities lending businesses in the US and concluded that the difference in bank capital outcomes stemming from the use of the comprehensive approach for credit risk due to the Collins floor (securities lending) versus use of SA-CCR for economically equivalent swap transactions has already resulted in a transition towards synthetic finance in prime brokerage business. Finadium's report points out that such unbalanced regulatory treatment that favours synthetic transactions is likely to result in a loss of liquidity in the underlying markets and swaps being margined and settled based on less liquid underlying reference prices.

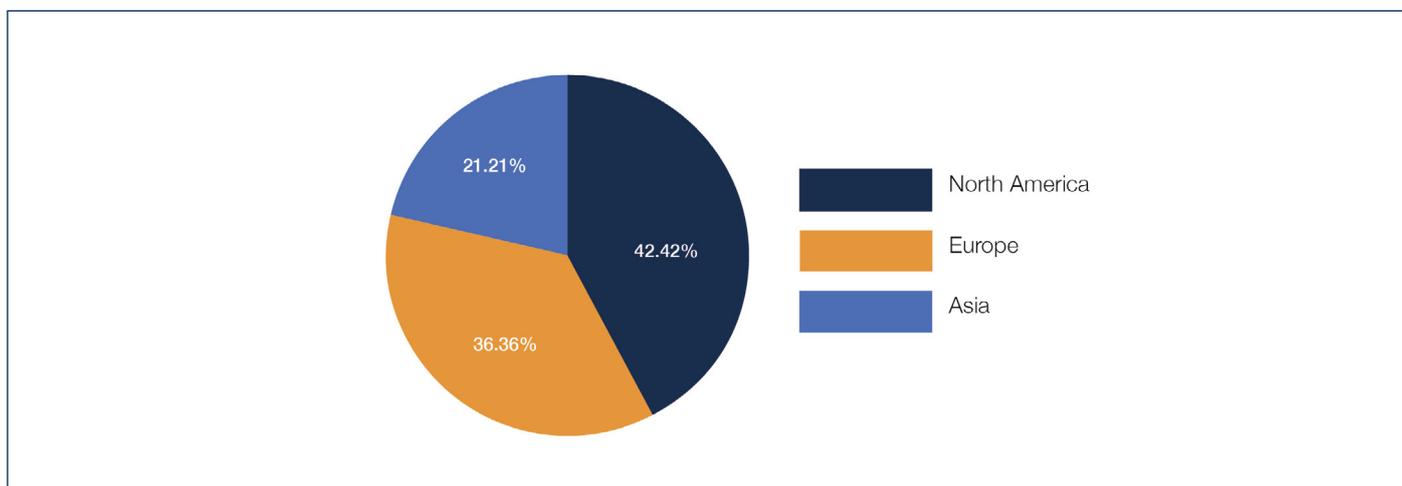
To conclude, the analysis points to significant changes in the market in terms of product and platform development, as well as pricing and access, in which regulation plays a very important role by changing product economics. It is also clear that the adjustment has not yet run its course and that the markets are still in flux, pending on implementation of several parts of the overall regulatory package.

107 Finadium: Securities Lending, Market Liquidity and Retirement Savings: The Real World Impact, November, 2015

Survey analysis

To better understand how the SFT markets are functioning at the moment, how they are evolving and what are market participants concerns regarding future stress events, a survey was run in September 2018 for the purposes of this report. The survey was distributed to designated senior market practitioners of the GFMA member firms (including ASIFMA and SIFMA repo committees), as well as from ICMA's European Repo and Collateral Council (ERCC). The survey had 33 responses across North America, Europe and Asia (table 31).

Table 31: Survey responses by region

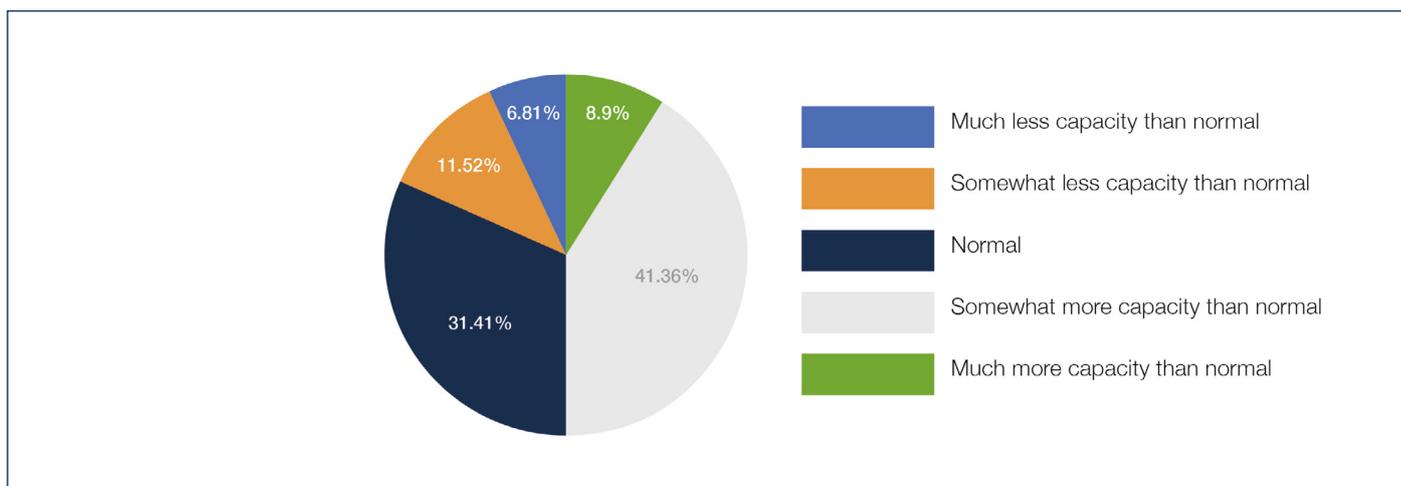


Market development:

The survey asked the respondents to state their views on current repo market liquidity and their expectations for market liquidity in 2020 for various asset classes, including investment grade (IG) and high-yield (HY) government bonds, IG and HY corporate bonds, equities and IG and HY securitisations. As a benchmark of “normal conditions”, the survey used average liquidity over 2010 - 2015 period to avoid comparing the current conditions with unsustainable market conditions pre-crisis but also to reflect the changes in the regulatory and market landscapes over a longer period of time.

Overall, the results indicate that the markets are functioning well at the moment (table 32), with the vast majority of responses suggesting that the capacity is “normal” or that there is “somewhat more capacity than normal”. With regards to repo market conditions at asset class level, the views are broadly similar, with a level of bifurcation resulting in higher capacity for IG and HY government bonds, HY corporate bonds and equities, while there is no material difference between capacities for HY and IG securitisations.

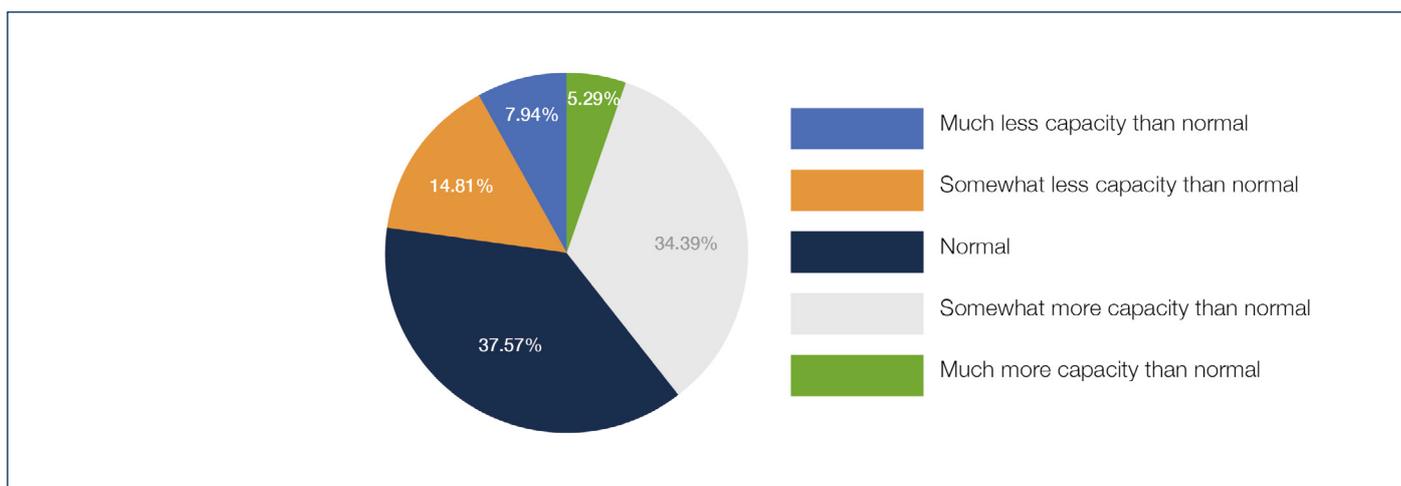
Table 32: Responses to current capacity of repo markets across all asset classes



However, annex C shows that the picture is not as homogenous across the regional markets. Generally, European practitioners have a more negative view on market capacity than their Asian and particularly North American counterparts.

In terms of expectations what the repo market capacity will be like in 2020, the picture is broadly the same at global cross-asset class level, with slightly less positive overall picture (table 33).

Table 33: Responses to expected market capacity in 2020 across all asset classes



As can be seen in annex C, the deterioration is mainly attributable to, and is much more significant on a regional level, to European practitioners. The key reasons for the regional divergences mentioned by the survey respondents, particularly in relation to European repo market liquidity included:

- Averaging of the LR in the EU would bring it in line with the UK and US leverage ratio frameworks;
- Brexit related adjustments such as contract repapering, legal entity realignment, potential migration of services from for example LCH Ltd to LCH SA, adjustment to new internal models and reduced capital availability (from 3rd country firms) in continental entities will reduce market capacity;
- TARGET2-Securities (T2S) settlement framework¹⁰⁸: whilst in the long term convergence into T2S should make the eco-system more efficient (less need to realign collateral, more intraday liquidity efficiency, more balance sheet netting and settlement in central bank money) there are a number of challenges in achieving it; these challenges in the short term may create additional need for resources, especially intraday liquidity at a time when there is already a big need to compress its usage.

108 <https://www.ecb.europa.eu/paym/t2s/html/index.en.html>

Elsewhere, survey participants pointed out that regional implementation of the NSFR, and potential deviations from the BCBS standard may lead to differences in market capacity across regions.

The importance of factors behind worsened market capacity are summarised in table 34 below. There are some interesting regional divergences, reflecting different states of regulatory and monetary policy cycles, as well as other region-specific factors.

While many North American respondents thought that most of the regulatory restrictions are already priced in, European and Asian respondents expected regulation to continue to have a more significant impact on the SFT markets than any other factor. However, expectations of further regulatory restrictions ranked relatively high across all jurisdictions and participants from Europe and Asia mentioned that their higher scores for reduction in wholesale banks' capacity is driven by regulation. Interestingly, reduced client demand (discussed further in the section on client activity below) ranked relatively high in North America and Asia, but it was not seen as a key factor in Europe. North Americans also ranked revisions to central bank activity lower than the other regions, both in terms of QE and access to central bank repo facilities, perhaps reflecting the shift in economic cycle and easily accessible CB repo facility.

In terms of an open field question on changes to regulation that will impact the market capacity, there were clear regional specificities, especially in Europe. Several European respondents mentioned the combination of NSFR, as well as SFT Regulation (SFTR) reporting requirements (see¹⁰⁹ for background) and Central Securities Depositories Regulation (CSDR) mandatory buy-in rule (see¹¹⁰ for background), which are regional requirements. In particular, respondents noted that the upcoming implementation of the NSFR with asymmetric repo funding requirements, combined with the mandatory buy-in requirements will further hinder the flow business. Separately, US respondents highlighted that the securitisations risk retention rules make it more difficult for securitisation sponsors to repo finance the retained portfolios. This is caused by the rule not allowing banks to transfer the credit risk in the retained portfolios without a full recourse (see¹¹¹ for background).

Table 34: Key factors behind worsening market capacity/liquidity (average score amongst respondents on a scale from 1 to 10)

Causes	Regions:		
	Asia	Europe	North America
Exit/reduced capacity by wholesale banks	5.00	4.13	3.50
Worsened financial condition of market participants	3.00	3.38	3.75
Worsened economic situation	3.33	2.13	3.00
Impact of regulation	6.50	6.75	5.25
Expectation of regulator restrictions	4.33	4.50	4.67
Limited client demand	5.50	3.38	5.50
Changes in market structure (e-trading, clearing, settlement)	3.67	3.38	3.67
QE/central bank interventions	5.33	4.75	3.00
Revisions to scope of parties that can use central bank repo facilities	3.80	2.71	1.50
Expectation of regulatory restrictions	4.75	5.20	4.00

109 <https://www.bloomberg.com/professional/blog/say-hello-sftr-new-regulatory-challenge-faced-firms-eu/>

110 https://www.icmagroup.org/assets/documents/Regulatory/Secondary-markets/CSDR-Settlement-Regulation/ICMA--CSDR-Mandatory-Buy-ins-Impact-Study_Final-240215.pdf

111 <https://www.morganlewis.com/pubs/credit-risk-retention-financing-threading-the-needle>

The responses to key factors driving capacity expansion are summarised in table 35 below. The two key factors across all of the regions are entry of less regulated participants and change in the capital allocation costs for the business. While entry of less regulated entities is self-explanatory, the capital allocation factor is somewhat more complex. Market participants explained that repo dealer balance sheets became more expensive during the period when a large proportion of dealer banks were bound by LR based capital requirements, particularly in 2016 (re: the cost of regulation on repo earlier in this paper). Since then, adjustments to the risk-based requirements and increased capital buffers have resulted in the risk-based capital requirements becoming the binding capital constraint again, releasing more balance sheet capacity to offer LR intensive products such as repo. This is particularly on short-term basis – as repo capacity can be unwound quickly to earn an additional yield during a period of low returns for a large number of banks.

Elsewhere, improved economic conditions, as well as financial conditions of market participants ranked high in all regions. Market supporting action by the central banks also ranked high as a factor for improved repo market liquidity, particularly in Asia. Surprisingly, technological changes such as electronic trading, more efficient settlement systems and clearing ranked relatively low, compared to other factors. In addition, several respondents mentioned that delays in implementing the NSFR are helping to maintain the repo market capacity.

Table 35: Key factors behind improvements in market capacity (average score amongst respondents on a scale from 1 to 10)

Causes	Regions:		
	Asia	Europe	North America
Entry by new, less regulated, participants	7.67	5.33	7.10
Improved economic situation	6.83	5.33	6.40
Improved financial condition of market participants	7.33	6.00	6.30
Regulatory relief	4.83	5.25	3.20
Expectation of regulatory relief	4.40	4.75	4.40
Change in capital allocation to the business (e.g. bank earlier bound by leverage ratio-based capital returning to bound by risk-based capital requirements).	7.50	7.25	5.10
Changes in market structure (e-trading, clearing, settlement)	3.83	3.50	4.70
QE/central bank interventions.	6.00	4.75	5.50
Revisions to scope of parties that can use central bank repo facilities	3.67	2.33	4.67

Client activity:

This section of the survey assesses several key areas of business activity and how regulation is driving choices, such as:

- The mix of secured financing and alternative derivative based products across the end-user landscape and what are the alternative products;
- How regulation, client requirements and market developments are driving the business; and
- What regulations and/or other factors are likely to further change the business landscape.

Product mix

Annex D demonstrates the split of product use by client type and region, by percentage of responses in each percentile range. While broker-dealers use all of the products, repo, securities lending and collateral swaps across all jurisdictions, hedge fund activity varies more across the regions. It is most varied in Asia, whereas particularly in Europe but also in North America hedge funds use mainly repo for financing requirements. Asset managers and pension funds on the other hand have very similar profiles across the jurisdiction, commonly using all three product types. Corporates in Europe and Asia use mainly repo for funding, whereas in North America they also use securities lending and swap products.

The survey responses also showed that the differences between client segments are driven by ability to net repo transactions (gross vs. net), with access to clearing also a prominent driver for lower cost and continuous access to repo. The responses suggested that for buy-side clients with no nettable repo balances, “platinum account” status or access to clearing, the alternatives to repo are:

- Sponsored repo models¹¹², whereby non-clearing members can access cleared repo through a sponsor (clearing member);
- Peer-to-peer repo, bypassing regulated intermediaries;
- Prime brokerage (including collateral management and funding), which is a more expensive and broader product;
- Structured contingent liquidity facilities;

Some responses suggested that funds can instead of accessing funding through the markets retain more cash/remain underinvested or delay payments to avoid need for short-term financing. For larger fund managers, running an internal cash pool for such situations was also suggested as a solution. More broadly, respondents did acknowledge that there can be shortages and pricing pressures for clients without “platinum account”. Some respondents also suggested that in the near future, there will be a centrally cleared standardised product with standardised documents.

The alternative products for larger corporates that would normally do reverse repos with their banks to reduce counterparty credit risk (compared to unsecured deposits) can alternatively park their money with a money market fund, buy T-bills, or access reverse repo through a sponsored clearing model.

Regulation, client requirements and technology

In terms of regulation, the survey asked what are the key regulatory constraints that will further change the business landscape. The responses to known regulatory constraints are summarised in the pie charts in annex E, which shows that the respondents rated implementation of the NSFR as the most impactful regulation (67% said it is fairly or very important). The leverage ratio, with 61% rating it fairly or very important came second, as it only applies as an upcoming regulation to regions where it is yet to be implemented. In addition, 46% of the respondents rated the minimum SFT haircuts regime as either fairly or very important. Lastly, market transparency and reporting requirements were ranked fairly or very important by 30% of the respondents (Europeans rating it more important than representatives from other regions).

Respondents also had an opportunity to highlight other regulations (global or regional). Several respondents noted the G-SIB buffers and that the haircuts regime may be very impactful, if the scope of transactions is not defined better. Regionally, only European respondents had concerns with regional regulation, mainly stating that the SCDDR mandatory buy-in and fail penalty mechanics may will have a negative impact on market liquidity. Some respondents also mentioned bank levies (taxes based on the size of the balance sheet).

The survey also asked if regulation is driving product offering and/or client behaviour. Respondents highlighted that client behaviour is impacted directly and indirectly by regulation as plain vanilla short-dated trades are becoming less of an option. Subsequently, collateral upgrades (swaps) in term are becoming more common due to lower impact of liquidity regulations (NSFR). In the securities lending market, respondents highlighted that securities borrowers do look to source securities from lenders (beneficial owners) that are more capital efficient from credit risk perspective.

While technology and alternative products, according to the survey responses in the previous section do not play a big part in driving the capacity increase, it was clear from the survey responses that changes to practices is very important from operational and competitive client facilitation perspectives. The key developments and how survey respondents ranked them are shown in tables 36 – 39 below.

¹¹² e.g. <https://www.lch.com/services/repoclear/repoclear-ltd/enhancements/sponsored-clearing>

Table 36: Emergence of central collateral management desks that cut across SFT and derivatives collateral management

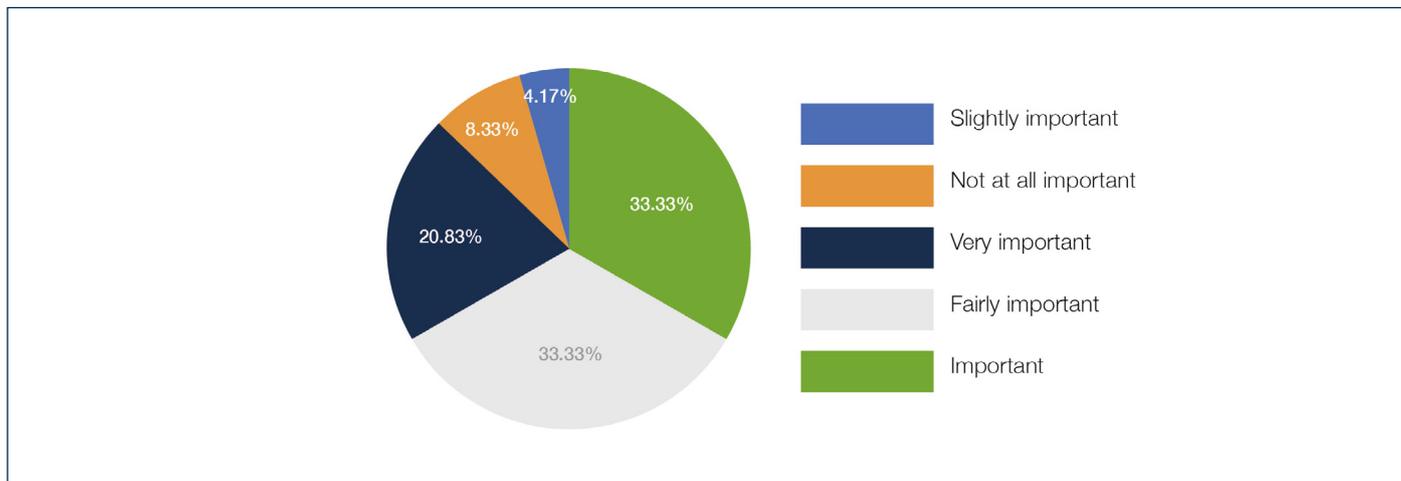


Table 37: Tri-party flows across SFT and derivative margin accounts for a more streamlined process and operational efficiency

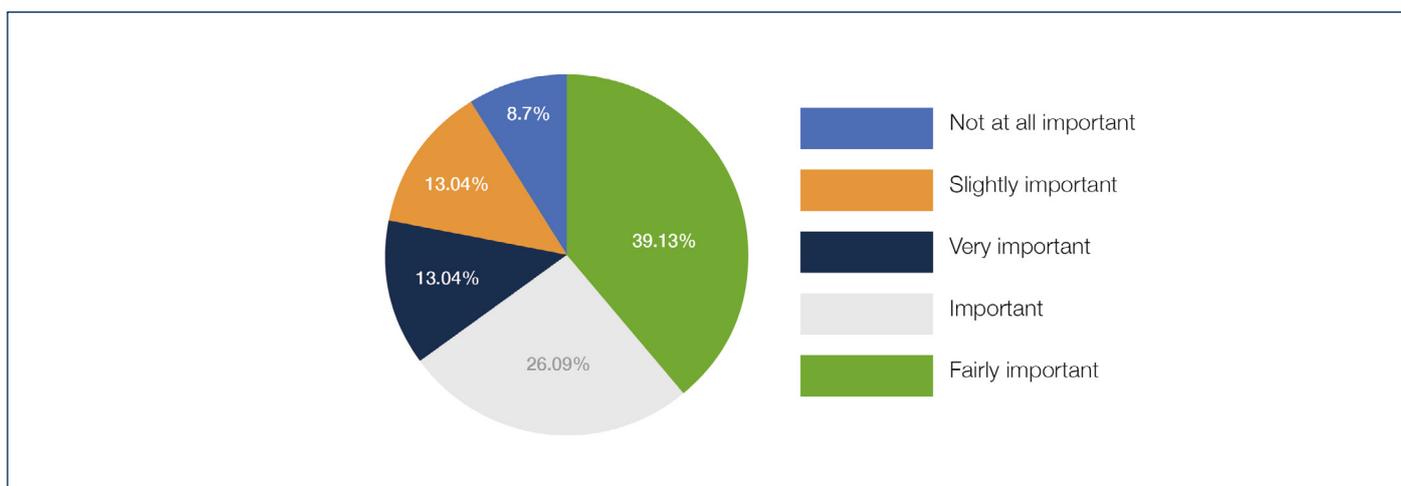


Table 38: Increase in collateral swaps/other alternative product trading

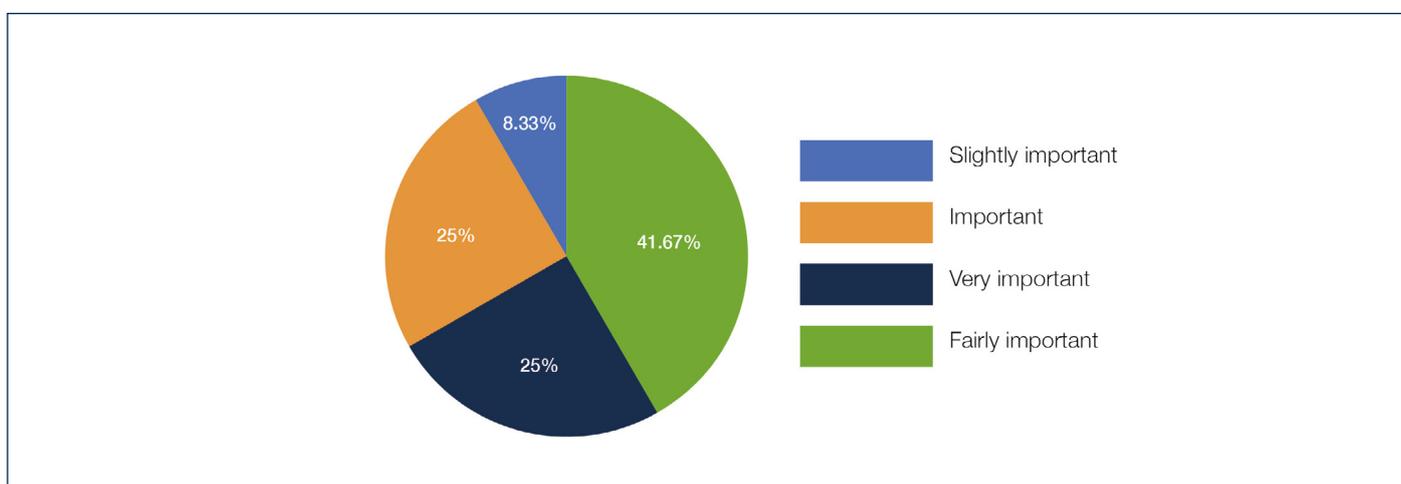
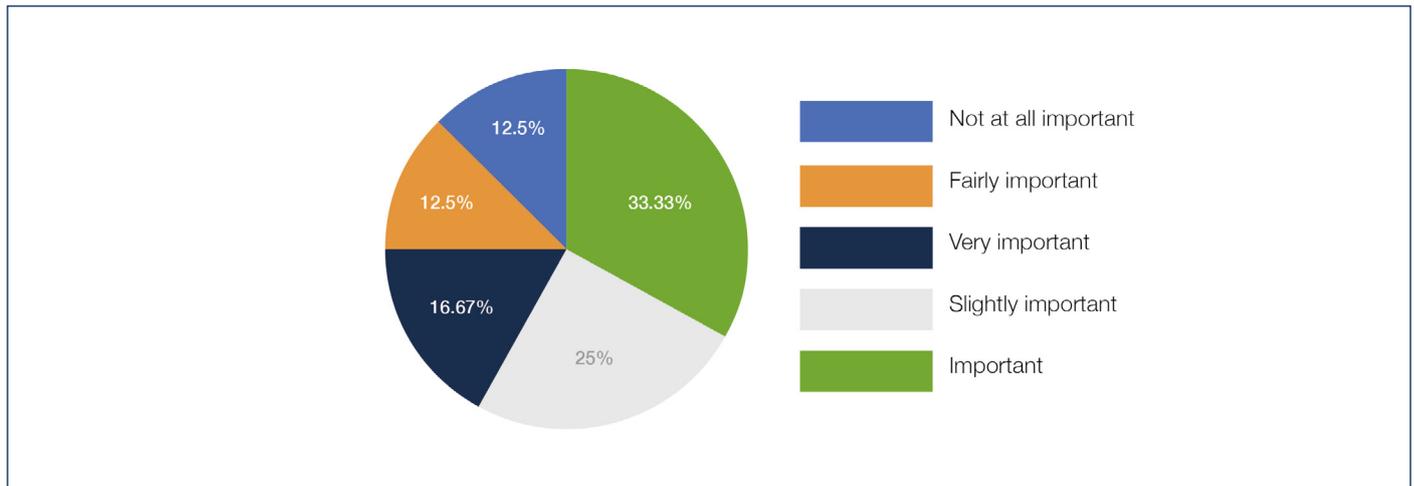


Table 39: New offerings by CCPs that provide clients with direct access to cleared repo



The responses clearly demonstrate that alternative products are the most important factor for the development of banks' repo businesses, while some respondents noted that there is anecdotal evidence from some buy-side and sell-side firms of product push for balance sheet and cost efficiency. In addition, direct CCP access and development of more efficient ways to combine increasingly linked derivatives margin and secured financing businesses were also deemed important, with many platforms and venues marketing their products for new clearing participants as more efficient ways to trade. In terms of internal efficiencies in SFT trading and collateral management across derivatives and SFTs, table 40 below shows that there is a clear trend towards improving operational and client platform efficiencies.

Table 40: Trends in collateral management and repo business interconnectedness

How interconnected are your collateral management and repo (and securities lending) businesses in 2018				
Row Labels	Asia	Europe	North America	Grand Total
1. Not linked at all	1	1	1	3
2. Somewhat interconnected		3	1	4
3. Fairly connected	3	1	3	7
4. Well connected	1	3	6	10
5. Most transactions are connected	1			1
Grand Total	6	8	11	25

How interconnected you expect your collateral management and repo (and securities lending) businesses to be in 2020				
Row Labels	Asia	Europe	North America	Grand Total
1. Not linked at all	2	1	1	4
2. Somewhat interconnected		2		2
3. Fairly connected	1		1	2
4. Well connected	2	2	8	12
5. Most transactions are connected	1	3	1	5
Grand Total	6	8	11	25

Contractual changes

The survey requested feedback on whether the changing regulatory landscape for non-credit institutions (such as asset managers, pension funds and insurance companies), including margin rules and liquidity and capital requirements have increased requirements for non-standard credit support annexes (CSAs) within the client contracts and longer-term facilities to manage funding requirements. The respondents offered a mixed picture, with some banks reporting a significant increase in requests for non-standard CSAs as well as for longer-term funding facilities, while others noted either that they have not observed a significant demand yet or that they have not observed the trend at all.

Those that reported increases in demand for non-standard CSAs and funding facilities due to non-bank liquidity regulation commented that the rush to revise CSAs and to have access to sufficient cash facilities is further amplified by the simultaneous implementation of the international margin regulation/requirements.

Impact of minimum haircuts

The survey asked if practitioners were concerned about the impacts of the minimum SFT haircuts rules, which will be implemented as part of the final Basel III package (see section above for background) on their businesses and broader markets. Respondents highlighted that the scope of types of transactions and counterparties is too broad. They had concerns across a few key themes:

1. The main concern is that it impacts securities borrowing transactions given that for those transactions the bank would generally pay rather than collect a haircut. The rules could result in material impacts on the liquidity of primary (cash) markets as sourcing of securities through stock borrows for market making would be negatively impacted. This can in turn result in increased bid-offer spreads and costs to end investors;
2. There is a need to ensure that “financial institutions” that can use the transactions for leverage and are unregulated are appropriately identified as some should be excluded from the scope to avoid unintended negative consequences to parties that were not targeted by the FSB in its shadow banking work;
3. The framework should apply some degree of credit for haircuts that are under the designated minimum instead of the extremely punitive treatment as fully uncollateralized; and
4. The scope of the rules could result in less intermediation by banks and thus further transfer of activity outside the regulated sector.

Securities lending

This section of the survey asked about the key trends in securities lending and if regulation is having an impact on lender and borrower behaviour. Broadly, respondents highlighted that LCR, credit risk and single counterparty credit limits in combination with significant pricing pressure are already squeezing out mid-tier participants, with only systemically important institutions and less regulated entities left intermediating in this market. Based on the responses, the borrowers and agents are already working constructively on CCP cleared products to reduce risk weighted assets accrued through securities lending activity. The key consideration from counterparty credit risk perspective in the tri-party market is how to decompose the exposure to underlying instruments and counterparties.

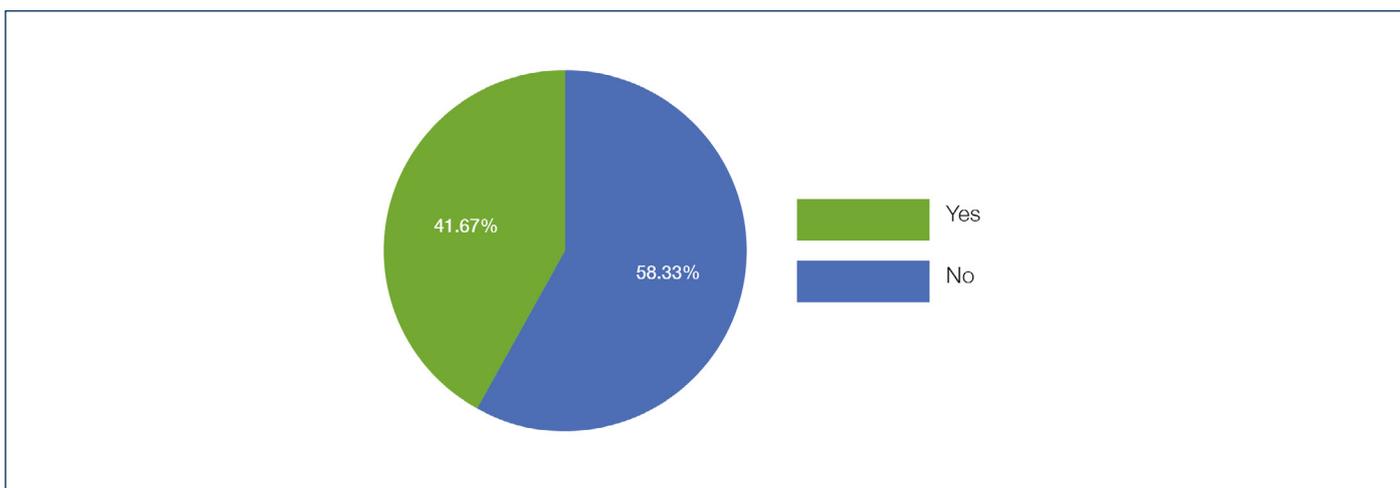
With regards to regulations that are yet to be implemented, several respondents mentioned that the NSFR will make certain types of transactions such as collateral swaps less attractive due to the lack of available stable funding generated by those transactions. The minimum SFT haircuts regime was also considered to be highly impactful, as it may introduce a very punitive cost for regulated banks who borrow securities from lenders – effectively making securities borrowing an unviable option – that can have a significant impact on the way markets function.

European respondents also mentioned the same concerns they had for repos – that the SFTR and CSDR buy-in provisions will result in liquidity squeeze in the market as cost pressures and potential penalties may limit some parties’ interest in intermediating in this market. Elsewhere, North American respondents highlighted that there are some potential relaxations to the US 15c-33 rules, allowing for equity to equity trades, as well as some expectations that the regional LR requirements may be revised down to be consistent with the BCBS minimum standards.

Technological disruptions

As can be seen in table 41, majority of respondents do not expect significant disruptions in the SFT markets resulting from new technology. However, almost 42% expected disruptions to occur in the near future. One overarching comment was that centrally cleared, standardised repo solutions with all the relevant collateral movements and reporting plugged in and standard documentation will emerge in the near future. There may be much more appetite for this and the hurdle might be much lower with more clients having to get involved in collateral posting for standard initial margin model (SIMM) purposes. In essence, this captures many of the other comments, which included distributed ledger technology for clearing, settlement and operations, E-trading and direct-to-customer (D2C) automation, AI and machine learning. Additionally, respondents highlighted that peer-to-peer solutions bypassing regulated entities will become more popular due to potential cost efficiency.

Table 41: Do you expect any disruptive changes caused by new technology to emerge in the near future that may change how the market operates?



Market conditions and pricing:

This section of the survey had open questions only. Survey respondents were asked to provide their views on thematic questions raised by market observers and other stakeholders, as well as questions stemming from the secondary research of this paper.

Respondents were asked about the general perception in the industry that repo market liquidity has fallen, which seems to contradict the story indicated by certain common measures, such as bid-ask spread, market depth, volume and trade size. The feedback clearly indicated two important points. Firstly, a clear distinction needs to be drawn between stressed and non-stressed market conditions. Seemingly healthy conditions being observed are no measure of the health of these markets under stress conditions. And, secondly, the liquidity which is being observed is heavily concentrated in the short-dated end of the market, with very little liquidity in term.

European survey responses evidenced concerns about market distortions at quarter- and year-ends, noting that this gives rise to divergences between implied and real repo rates; and stems from balance sheet cost impacts arising from periodically applied regulatory constraints coupled with QE related impacts, related to the availability of high-quality collateral. Such capacity constraints were also noted in Asia, but North American respondents generally reported lesser concerns in this regard.

Another survey question prompted respondents to comment on the ease of access to central bank facilities, which is reported to be easiest in North America. The relative ease of borrowing collateral from the Federal Reserve has helped to keep repo rates more stable, especially in face of market capacity constraints around reporting dates. North American respondents also noted that specialness is not prevalent in US Treasuries, which have if anything been less prone to specialness in recent times, while in Europe and Asia, specialness has become more prevalent in government bonds, driven by QE related asset purchases alongside increasing demand prompted by regulatory requirements.

Asked to consider the possible interaction between these concerns and the current moves to adopt new near risk-free overnight rates respondents highlighted their believe that RFRs based on secured transactions are preferable to those based on unsecured transactions. It was generally indicated that the shift to new RFRs should not in itself significantly impact repo markets, albeit that there are likely to be some consequential impacts as markets adapt.

Across all regions, respondents reported that one-sided users enjoy less, or more expensive access to repo dealers' balance sheet capacity, in comparison to those market users whose business flow provides, or can be structured in order to provide, netting opportunities. This focus on netting gives rise to an increase in the ratio between gross flows and their netted impact.

Allied to this, respondents also reported that dealers' focus on balance sheet efficiency is leading them to grow their use of TRS, with a range of buy-side clients willing to participate – including because where they are themselves leveraged investors the use of TRS also benefits them. MMFs are not among those involved in this development, but North American respondents did highlight that they are beneficiaries of efforts to find suitable ways to invest cash as an alternative to placing it in repo markets. Meanwhile, in Europe, where the cost and difficulty of sourcing collateral is relatively higher, there is a heightened focus on transaction structure to maximise efficiency and use client relationships more fully as an alternative to the regulated bank sector.

Stressed conditions:

This section of the survey looked at the key drivers for systemic concerns that relate to functioning of the repo market.

Practitioners key concerns with regards to systemic fragility

The data in annex F indicates that the key systemic concerns relate to limited system-wide capacity due to regulated broker dealers' potential lack of capacity to provide repo financing to the market. This was driven by LR and NSFR constraints that may cap capacity, with 73% of respondents rating the LR constraint during stress as moderately or very high, with 64% rating the same for NSFR. The next highest-ranking concern related to alternative products that may prove to be less liquid than repo at times of stress, with 33% of respondents rating that they are (mainly) moderately or (minority) very concerned about this illiquidity.

On the other hand, 29% of participants reported that they are moderately concerned about availability of high-quality collateral in case of increased demand driven by VM/IM or funding requirements at turbulent times. Respondents noted that there is a need for further capacity as IM and HQLA liquid asset buffer requirements are up while market participation is lower due to need to drive LR based balance sheet consumption. Separately, some responses highlighted that they were concerned about any changes in central bank eligible collateral amid market volatility, which could reduce the availability of funding.

North American respondents were less concerned about availability of eligible collateral (evidenced by cheapening of treasuries compared to overnight index spread) than European and Asian participants who perceive that there is a higher risk that the capacity may not meet the demand. Respondents noted that the supply and demand in a "rates up" environment is untested. EU participants highlighted that there is some dependency by certain banks on the ECB's long-term facilities and that changes in access/conditions of these facilities can have an impact in market capacity. In a broader context, some respondents reported a specific concern (globally) as to what is the future availability of central bank short-term lending facilities as they may be required under stressed scenarios.

In terms of institutional stability, the survey asked whether respondents thought that there are financial stability risks that stem from regulated bank and standalone, non-bank broker-dealer funding pressures. For regulated bank broker-dealers, 50% of respondents said that they are slightly concerned, while 27% said that they are moderately concerned and 23% were not concerned at all. In terms of non-bank broker dealers, 64% were slightly concerned, 18% moderately concerned and 9% very concerned and not concerned at all.

Procyclicality of margin and haircuts under crisis scenarios

Some stakeholders from regulatory authorities have raised a concern regarding the procyclical nature of regulatory margin requirements. As a significant proportion of the IM and VM is sourced through the repo market and the emergence of centralized repo and margin collateral desks, it was deemed important to understand the systemic concerns that practitioners have in relation to derivatives margining. The survey explored this concern by prompting responses on whether margining may lead to destabilizing outcomes during stress events and followed by asking a question if any adverse outcomes from procyclical margin requirements under stressed conditions can be mitigated.

The key concern highlighted by respondents with regards to procyclicality of IM and VM requirements related to clearing. Respondents were concerned that CCPs' ability to unilaterally increase haircuts for IM, VM and default fund contributions with limited notice and transparency of margin calculation methodologies. Elsewhere, respondents raised a concern that increased competition in 2018 has led to lower haircut requirements by some market participants and that changes in market conditions could result in sharp change in those haircuts.

In response to mitigating factors for margin procyclicality, respondents suggested that there should be an appropriate framework for minimum qualitative and quantitative standards for haircuts, which must be appropriately structured to eliminate anomalous results and properly account for factors such as counterparty risk, nature and value of collateral received, transaction structure, and the application of portfolio margining. Respondent also noted that contractual speed limits (at which the haircuts can be increased) can help reduce sudden shocks to system-wide VM demand – one noting that there is no systemic mitigant, but institution specific dynamics, either capricious or long-term and stable approach, will play an important role under stressed scenarios.

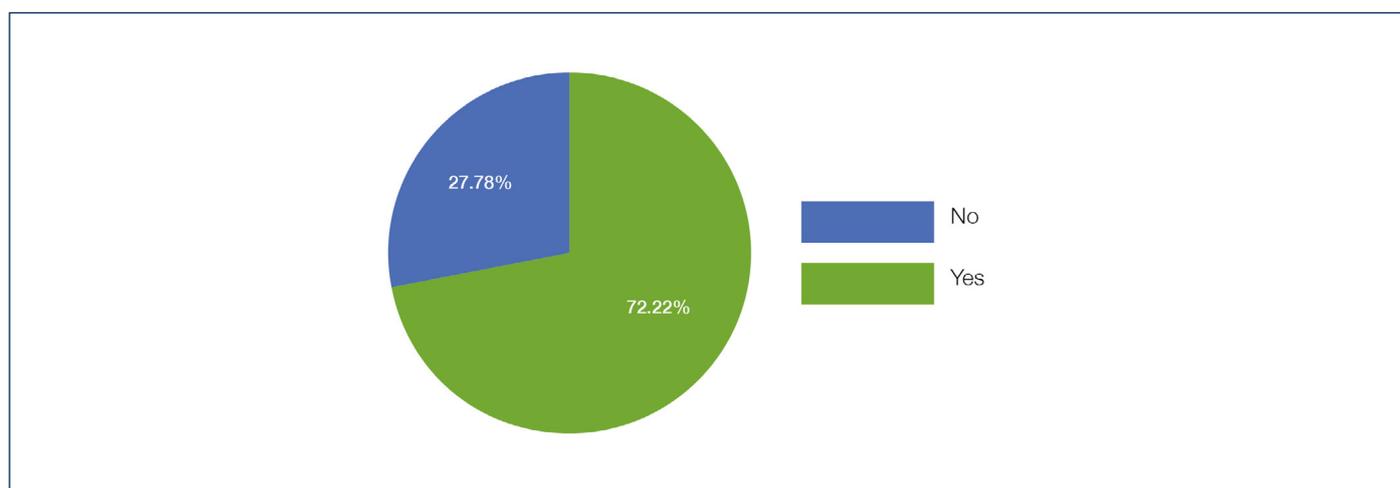
Systemic concerns regarding the BCBS minimum SFT haircuts regime

Many stakeholders had noted their significant concerns regarding the minimum SFT haircuts rules introduced in the final Basel III package. The survey asked respondents an open question if the rules posed any systemic risks. Respondents broadly commented that it is unlikely to result in systemic concerns on its own. However, given the lack of clarity on scope of application to counterparties and transactions, the haircuts regime could have a detrimental impact on repo market capacity if the disruptions for key market participants are significant. Market participants also noted that if the minimum haircuts rules replace independent liquidity and credit evaluation, it may become more of a systemic concern. Market participants also worried that it may further push intermediation away from the regulated financial sector.

QE, central banks and the new benchmark rates

Survey respondents were asked if they believed that central banks are realistically able to shrink their balance sheets and exit their reverse repo programmes. While the majority (72%) expected that they could do so, there were significant diversions across the regions. While the North American were most positive about the markets' ability to operate without CB support, the Asian respondents were least optimistic. While a respondent from NA was not sure if central banks can exit their reverse repo facilities completely, she/he noted that the market's reliance on them has decreased as evidenced by the significant reduction in use of the Federal Reserve Bank's RRP facility. A European respondent meanwhile noted that there is likely to be a significant market impact if these programmes are withdrawn and could cause deviation from base-rate unless other mitigating programmes are put in place. Similarly, Asian respondents mentioned that the CB operations are just too large for the private sector to assume, given the LR and NSFR driven private sector repo market constraints.

Table 42: Are central banks realistically able to exit their reverse repo programmes and their balance sheets in more general?



Survey respondents were also asked if they had any concerns regarding how the benchmark rates behave under stressed conditions. Some respondents suggested that policymakers should be made aware of the risks that have been put on the funding market due to regulation reducing capacity which could lead to volatility. The respondents suggested that there is a need for balance sheet capacity to build a term repo market. While many thought that the unsecured benchmarks will be much more volatile during stress, at the moment there is no alternative for pricing term premium into financial products due to lack of term repo market.

Conclusions and recommendations

It is clear from the primary and secondary research that regulation is a key driver of changes in the way the repo and broader SFT markets operate today and how they will evolve in the near future. While the markets have thus far proved resilient, they are still some way from reaching a new normality, with regional markets at different stages of that evolution reflecting divergent implementation of regulatory reforms on different timelines. This in turn influences the need for central banks to step in and provide capacity particularly at key reporting dates, such as year-ends when multiple regulatory and other measures such as bank levies encourage banks to reduce balance sheet capacity allocated to low-risk/low return activity. This is of particular concern given the need for the private sector to absorb the unwind of QE programmes over the coming years.

The impact of future regulatory reform is a key concern across all jurisdictions. The implementation of forthcoming regulations such as the NSFR and the SFT minimum haircuts framework could further constrain capacity, to the detriment of the market. Without revisions, the SFT haircuts framework would increase SFT RWAs by 61% under the advanced and 63% under the standardised approach compared to the current RWAs for the same risk, with over half of that impact coming from securities borrowing. This would have detrimental impacts on the repo and securities lending markets:

- Securities lenders may have to accept significantly lower returns for their portfolios due to lower demand;
- Dealer banks may not be able to provide the same level of liquidity in case their ability to borrow securities to meet client demand is limited due to the haircut rules;
- Short-sellers may need to seek for alternative ways to “short” securities and improve the price discovery process;
- Increased costs and reduced capacity for transacting with regulated counterparties could ultimately lead to increased costs for investors in pension funds and mutual funds.

Recommendations

The report’s findings suggest the need for several policy revisions and that further work needs to be conducted in recalibrating the global prudential standards, without sacrificing safety and soundness, to ensure better functioning of the repo and broader SFT markets for the benefit of the wider global economy:

- The FSB and BCBS should review the coherence and calibration of the post-crisis regulatory framework, particularly pertaining to how it impacts the repo market. As evidenced in the literature and the primary research, particularly the treatment of repo transactions backed by the highest quality government bonds should be reviewed in order to ensure that the private sector market has the capacity to absorb QE unwind and to operate without significant reliance on central banks during normal and stressed market conditions. The key review focus areas should be:
 - Treatment of high-quality government bonds repos in the leverage ratio; and
 - Treatment of repos in the NSFR framework.
- The minimum SFT haircuts regime should be reviewed in order to avoid significant disruptions to the repo and securities lending market. The following clarifications would limit the negative spill-over effects without compromising the objectives of the FSB and BCBS:
 - Provide further clarity on international level on the exclusion of transactions with regulated entities, which have statutory limits on their use of leverage. Otherwise the regional implementation of the rule may result in further regulatory fragmentation;

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- Exclude securities borrowing transactions that are not financing transactions as the purpose of the transaction is to borrow a specific security and for which the banks receive a “negative haircut”.
 - The borrows should not be included in the minimum haircuts calculation when the borrows can be demonstrated to support current or anticipated demand or when adequate client representations of the collateral management process are obtained. To facilitate this, there should be a read-across to the original FSB exemption from representations for short-term client facilitation.
 - The exemption should apply without the need to seek representation for securities sourced through agent bank lending programmes that manage the collateral reinvestment without any provision of leverage to the lender; and
 - Consider a more risk-sensitive approach instead of ignoring 100% of the collateral when minimum haircuts are not met.

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Annex A:

Assumptions for the regulatory cost analysis

Rule	Assumptions
LR	<ul style="list-style-type: none"> • Basel methodology. • Assumes 0% haircut on the repo, resulting in no SFT add-on for the leverage ratio. • Cost of Tier 1 capital, 10.5%
G-SIB	<ul style="list-style-type: none"> • Basel methodology • G-SIB's RWA is \$1.5tn • Cost of Common Equity Tier 1 capital, 12%
SA-RWA	<ul style="list-style-type: none"> • Basel methodology • Counterparty is non-sovereign, non-bank • Cost of Tier 1 capital, 10.5%
NSFR	<ul style="list-style-type: none"> • Basel methodology • Counterparty is non-bank financial • Long Term Debt funding cost 50bps
TLAC	<ul style="list-style-type: none"> • Basel methodology • Assumes Tier 1 requirement already covered by G-SIB + RWA • G-SIB bucket is 2.0% • TLAC cost (proxy for Long Term Debt cost), 4%

Annex B:

Examples of anomalous outcomes resulting from the application of the Minimum SFT Haircuts formula

SFT Haircut Floors: Netting Set Examples

Positive Value = Exposure/Provides Leg
 Negative Value = Collateral/Receives Leg
 Collateral A has a 6% haircut floor

Portfolio Haircut:

$$\frac{\sum C_t - \sum E_s}{\sum E_s} \geq f_{\text{Portfolio}}$$

Portfolio Floor:

$$f_{\text{Portfolio}} = \left[\left(\frac{\sum E_s}{\sum E_s \times (1 + f_s)} \right) / \left(\frac{\sum C_t}{\sum C_t \times (1 + f_t)} \right) \right] - 1$$

Netting Set 1 - Low Haircuts					
	Cash	Collateral A	Haircut	Floor	Pass/Fail
Repo (out of scope)	-98	100	-2%	N/A	N/A
Reverse Repo (in scope)	100	-103	3%	6%	Fail
Net trades	Cash	Collateral A	Haircut	Floor (f)	
Net Trade	2	-3	50.0%	6.0%	Pass

Net lent (Es)	2
Net borrowed (Ct)	-3
fs (net lent floor)	0%
ft (net received floor)	6%
Es/(Es*(1+fs))	1
Ct/(Ct+(1+ft))	0.943396
Divide then - 1	6.0%

Netting Set 1 demonstrates that low haircuts on both the in-scope and out-of-scope transactions can result in a large haircut on a net basis that exceeds the floor, highlighting the illogical outcomes of the framework

Netting Set 2 - Weighted Towards Repos					
	Cash	Collateral A	Haircut	Floor	Pass/Fail
Repo (out of scope)	-1000	1065	-6%	N/A	N/A
Reverse Repo (in scope)	100	-112	12%	6%	Pass
Net trades	Cash	Collateral A	Haircut	Floor	
Net Trade	-900	953	-5.6%	-5.7%	Pass

Net lent (Es)	953
Net borrowed (Ct)	-900
fs (net lent floor)	6%
ft (net received floor)	0%
Es/(Es*(1+fs))	0.943396
Ct/(Ct+(1+ft))	1
Divide then - 1	-5.7%

Netting Set 2 shows that because the in-scope reverse repo is part of a netting set with a large out of scope repo, the amount of collateralization required to pass the haircut floor on the reverse repo (12%) is considerably higher than standard market practices

Netting Set 3 - Weighted Towards Reverse Repos					
	Cash	Collateral A	Haircut	Floor	Pass/Fail
Reverse Repo (in scope)	1000	-1060	6%	6%	Pass
Repo (out of scope)	-100	107	-7%	N/A	N/A
Net trades	Cash	Collateral A	Haircut	Floor	
Net Trade	900	-953	5.9%	6.0%	Fail

Net lent (Es)	900
Net borrowed (Ct)	-953
fs (net lent floor)	0%
ft (net received floor)	6%
Es/(Es*(1+fs))	1
Ct/(Ct+(1+ft))	0.943396
Divide then - 1	6.0%

Netting Set 3 demonstrates that despite the in-scope reverse repo exceeding the haircut floor in isolation, when combined with a significantly smaller out-of-scope repo transaction, the net effect results in a haircut below the floor

Netting Set 4 - Error					
	Cash	Collateral A	Haircut	Floor	Pass/Fail
Repo (out of scope)	-100	104	-4%	6%	Pass
Reverse Repo (in scope)	100	-107	7%	N/A	N/A
Net trades	Cash	Collateral A	Haircut	Floor (f)	
Net Trade	0	-3	-100.00%	#DIV/0!	Error

Net lent (Es)	0
Net borrowed (Ct)	-3
fs (net lent floor)	0%
ft (net received floor)	6%
Es/(Es*(1+fs))	#DIV/0!
Ct/(Ct+(1+ft))	1
Divide then - 1	#DIV/0!

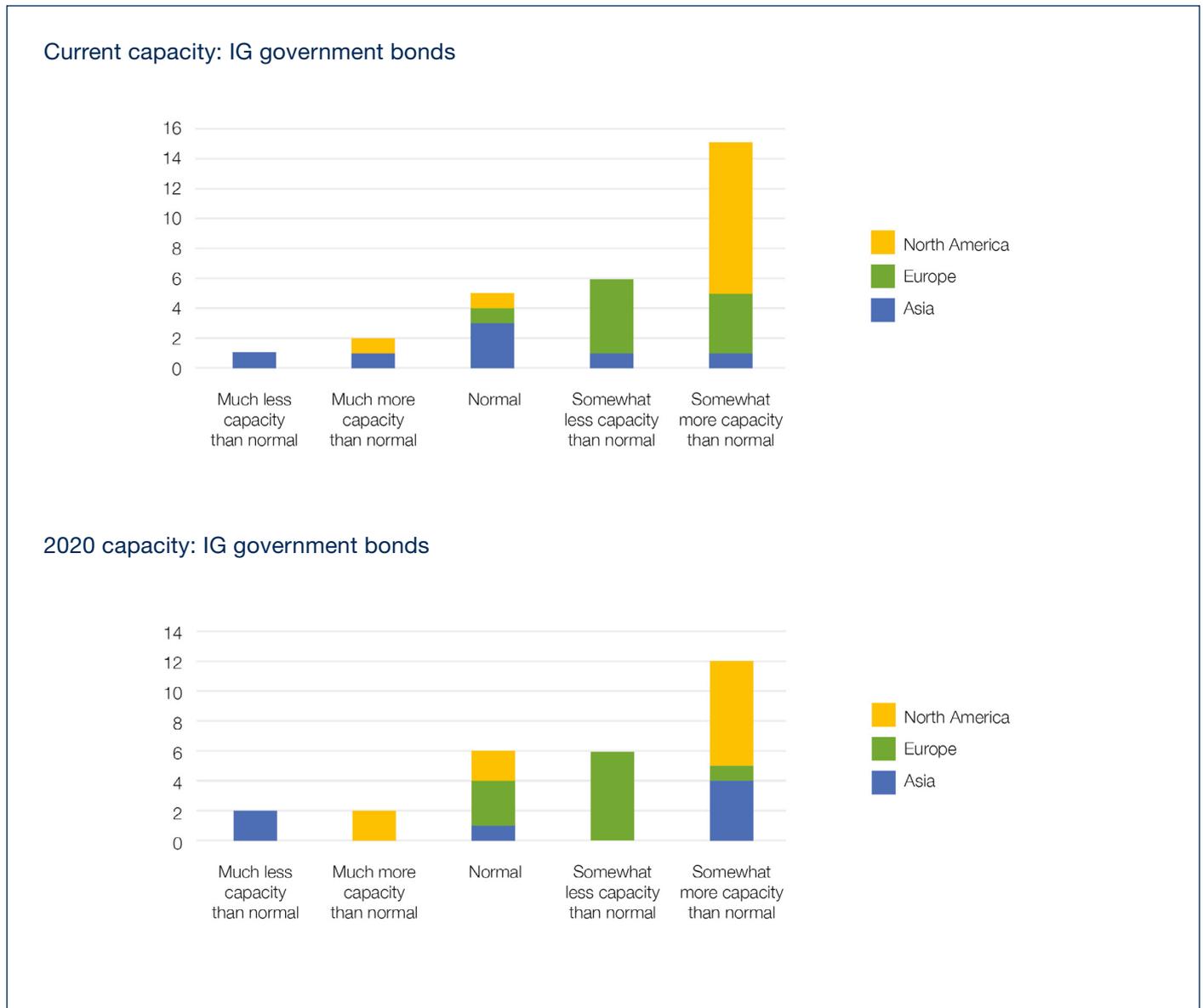
Netting set 4 highlights a mechanical problem in the netting formula when the bank provides and receives equal amounts of cash, creating a computational error on a net basis

Annex C:

Survey results broken down by product and region

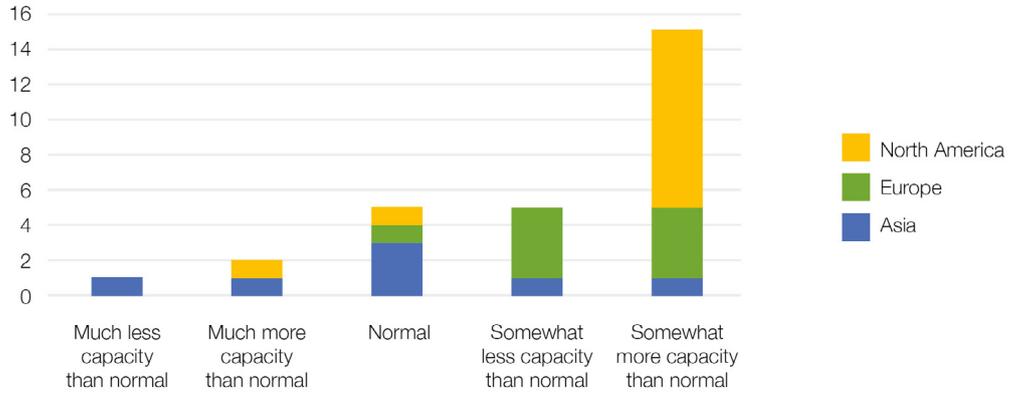
Survey: Regional cut of asset class level current and future market capacity results

Investment grade government bonds:

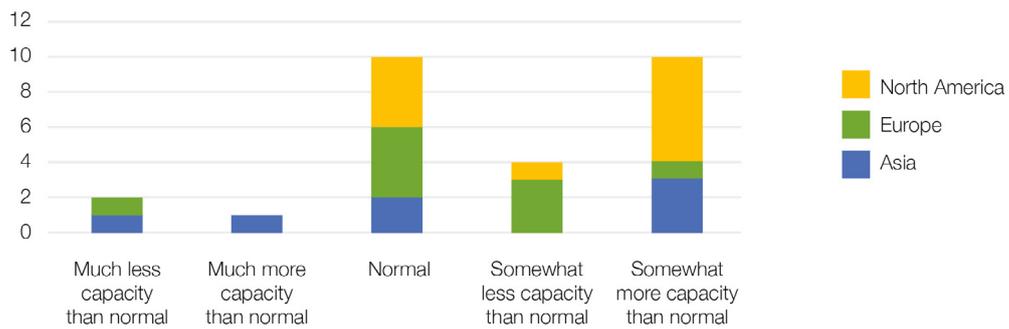


High-yield government bonds:

Current capacity: HY government bonds

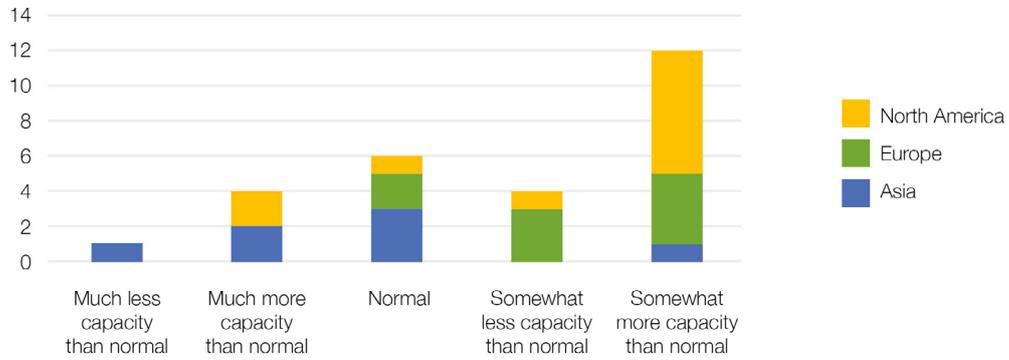


2020 capacity: HY government bonds

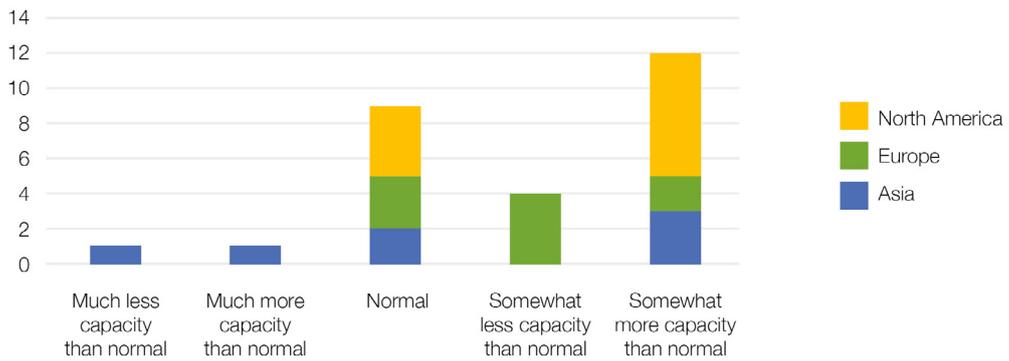


Investment grade corporate bonds:

Current capacity: IG corporate bonds

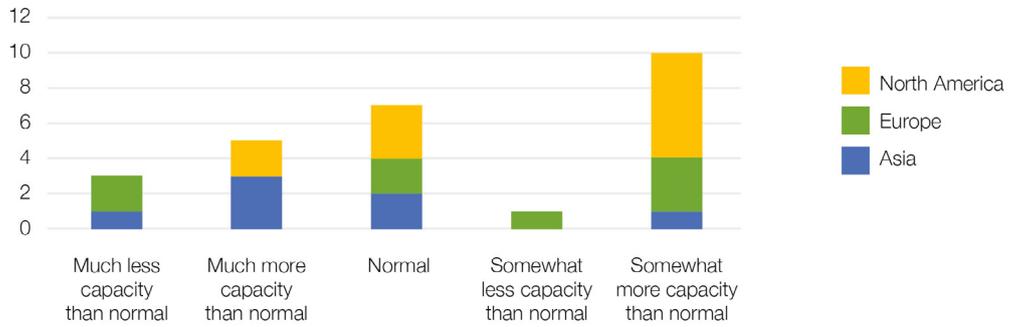


2020 capacity: IG corporate bonds

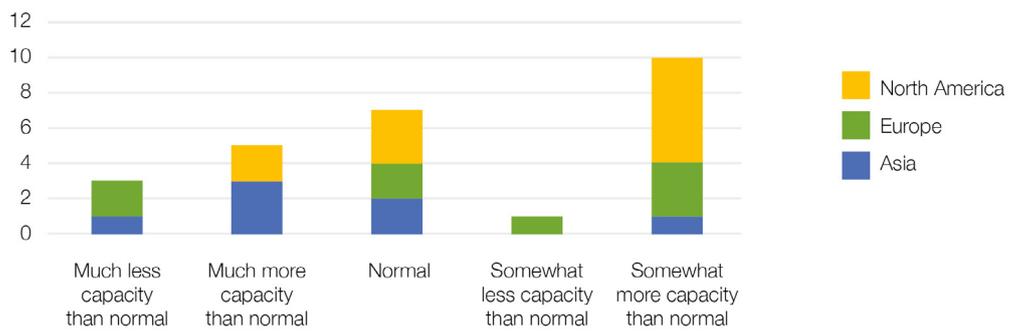


High-yield corporate bonds:

Current capacity: HY corporate bonds

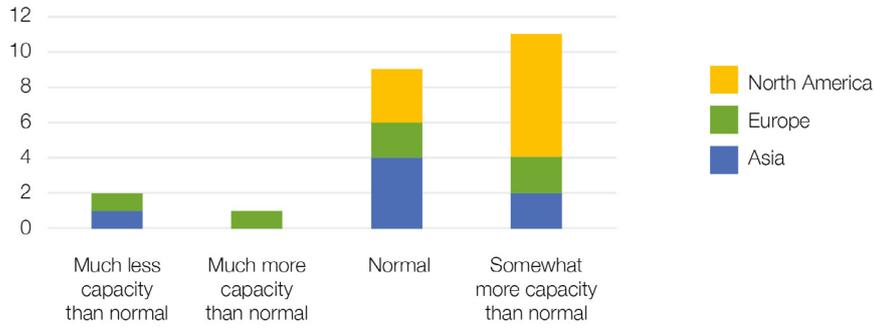


2020 capacity: HY corporate bonds

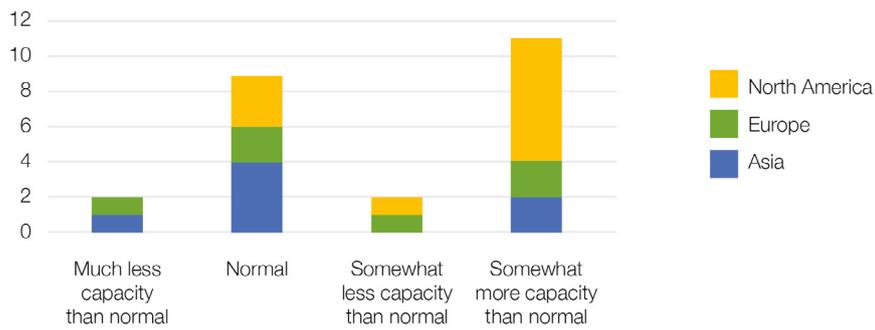


Equities:

Current capacity: equities

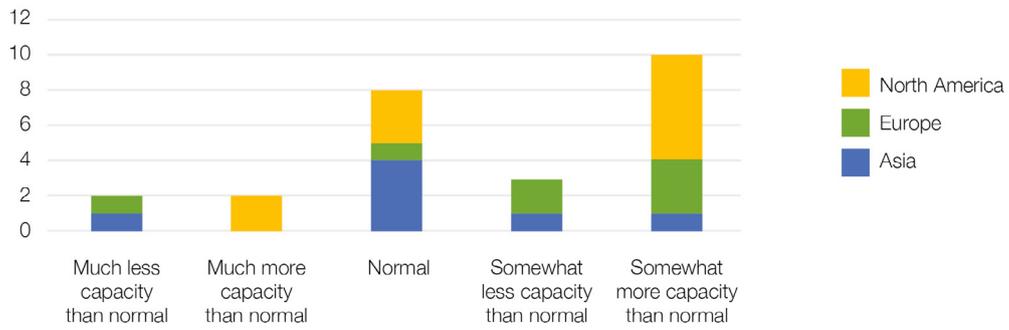


2020 capacity: equities

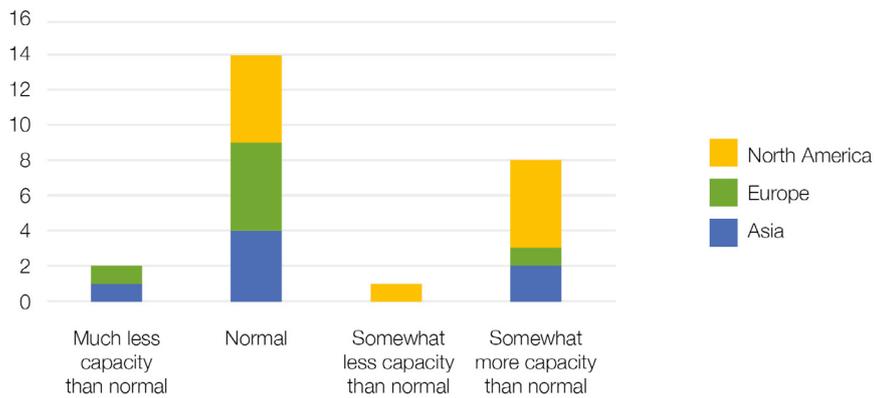


Investment grade securitisations:

Current capacity: IG securitisations

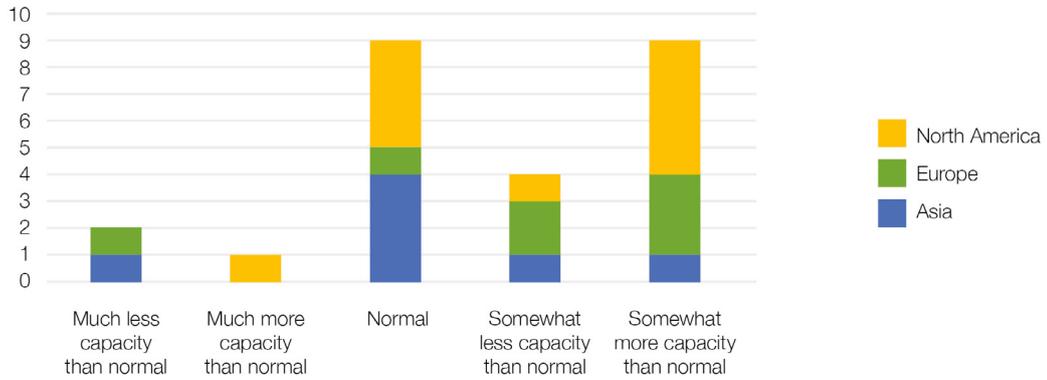


2020 capacity: IG securitisations

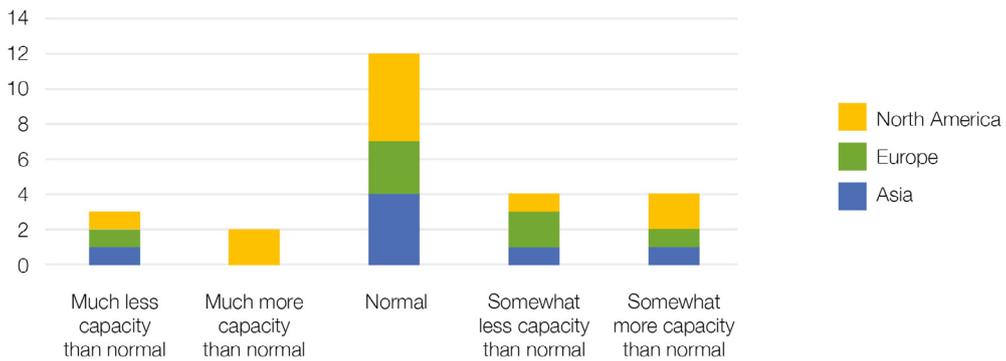


High-yield securitisations:

Current capacity: HY securitisations



2020 capacity: HY securitisations



Annex D:

Use of repos, securities lending and collateral swaps by region and client segment (percentage of responses in each category)

Broker-dealers	Product				Hedge funds	Product			
Region	Percentage	Repo	Securities lending	Swaps	Region	Percentage	Repo	Securities lending	Swaps
Asia	0-20%	0%	17%	0%	Asia	0-20%	17%	33%	67%
	21-40%	50%	50%	67%		21-40%	33%	33%	33%
	41-60%	33%	0%	33%		41-60%	33%	17%	0%
	61-80%	17%	33%	0%		61-80%	17%	17%	0%
	81-100%	0%	0%	0%		81-100%	0%	0%	0%
Europe	0-20%	25%	50%	25%	Europe	0-20%	25%	100%	100%
	21-40%	25%	25%	25%		21-40%	50%	0%	0%
	41-60%	25%	25%	50%		41-60%	25%	0%	0%
	61-80%	25%	0%	0%		61-80%	0%	0%	0%
	81-100%	0%	0%	0%		81-100%	0%	0%	0%
North America	0-20%	29%	67%	17%	North America	0-20%	29%	100%	83%
	21-40%	29%	17%	67%		21-40%	14%	0%	0%
	41-60%	0%	17%	17%		41-60%	14%	0%	17%
	61-80%	43%	0%	0%		61-80%	14%	0%	0%
	81-100%	0%	0%	0%		81-100%	29%	0%	0%

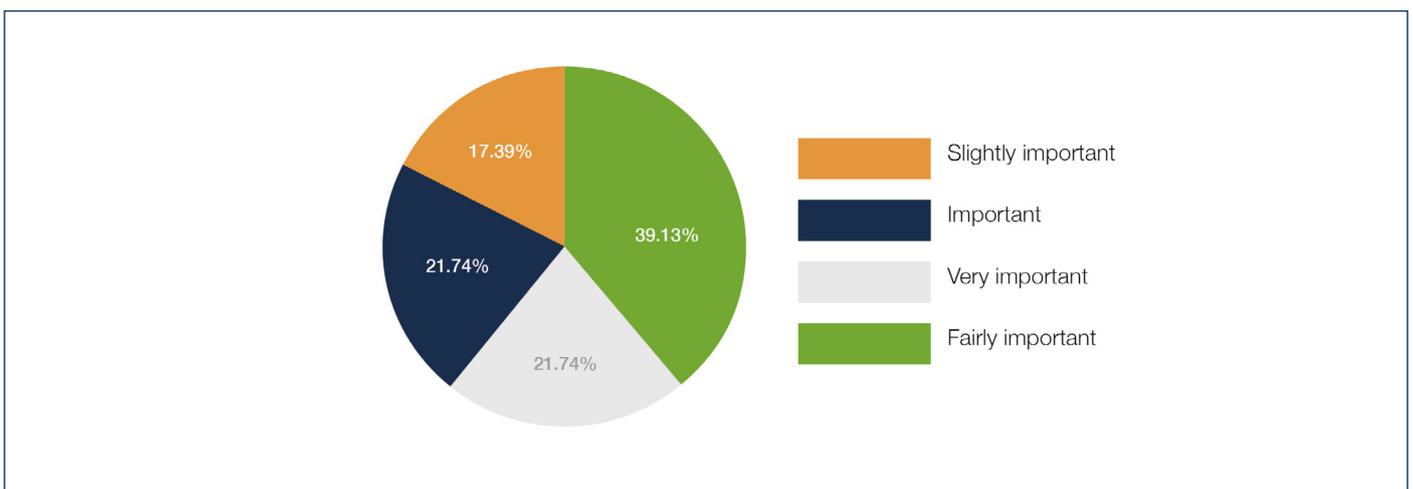
Fund managers	Product				Pension funds	Product			
Region	Percentage	Repo	Securities lending	Swaps	Region	Percentage	Repo	Securities lending	Swaps
Asia	0-20%	50%	43%	83%	Asia	0-20%	50%	67%	83%
	21-40%	33%	43%	17%		21-40%	33%	17%	17%
	41-60%	0%	14%	0%		41-60%	17%	17%	0%
	61-80%	17%	0%	0%		61-80%	0%	0%	0%
	81-100%	0%	0%	0%		81-100%	0%	0%	0%
Europe	0-20%	50%	75%	50%	Europe	0-20%	0%	75%	75%
	21-40%	50%	25%	50%		21-40%	100%	25%	25%
	41-60%	0%	0%	0%		41-60%	0%	0%	0%
	61-80%	0%	0%	0%		61-80%	0%	0%	0%
	81-100%	0%	0%	0%		81-100%	0%	0%	0%
North America	0-20%	67%	67%	33%	North America	0-20%	29%	83%	67%
	21-40%	33%	33%	50%		21-40%	43%	17%	33%
	41-60%	0%	0%	17%		41-60%	29%	0%	0%
	61-80%	0%	0%	0%		61-80%	0%	0%	0%
	81-100%	0%	0%	0%		81-100%	0%	0%	0%

Corporates	Product			
Region	Percentage	Repo	Securities lending	Swaps
Asia	0-20%	67%	100%	100%
	21-40%	17%	0%	0%
	41-60%	17%	0%	0%
	61-80%	0%	0%	0%
	81-100%	0%	0%	0%
Europe	0-20%	75%	100%	100%
	21-40%	25%	0%	0%
	41-60%	0%	0%	0%
	61-80%	0%	0%	0%
	81-100%	0%	0%	0%
North America	0-20%	57%	83%	50%
	21-40%	14%	17%	33%
	41-60%	29%	0%	17%
	61-80%	0%	0%	0%
	81-100%	0%	0%	0%

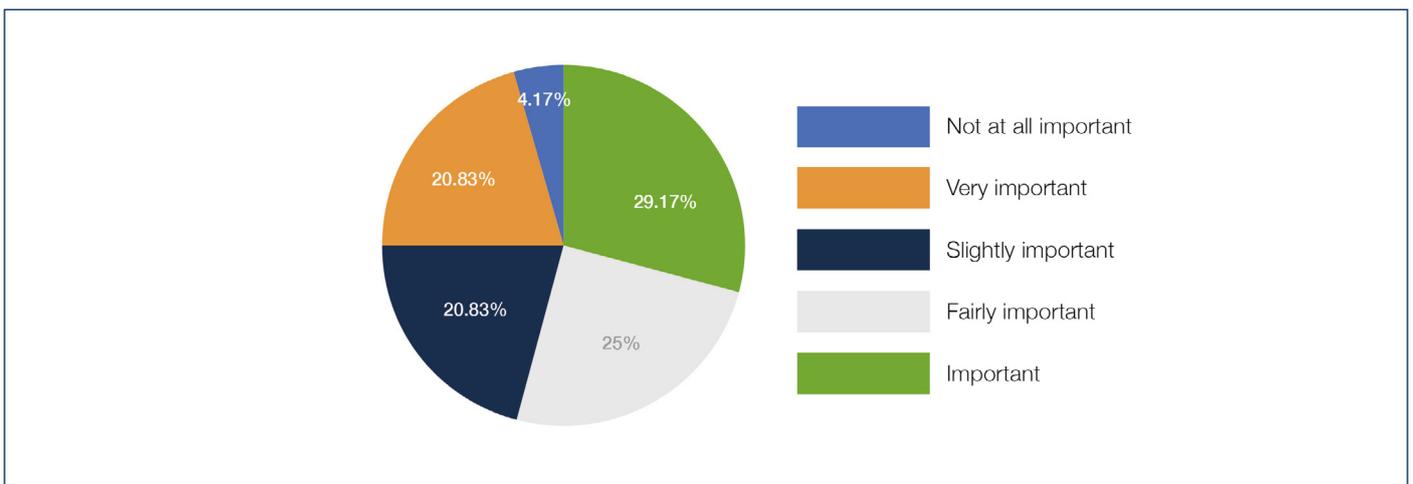
Annex E:

Regulatory constraints: What are the key regulatory constraints that will further change the business landscape

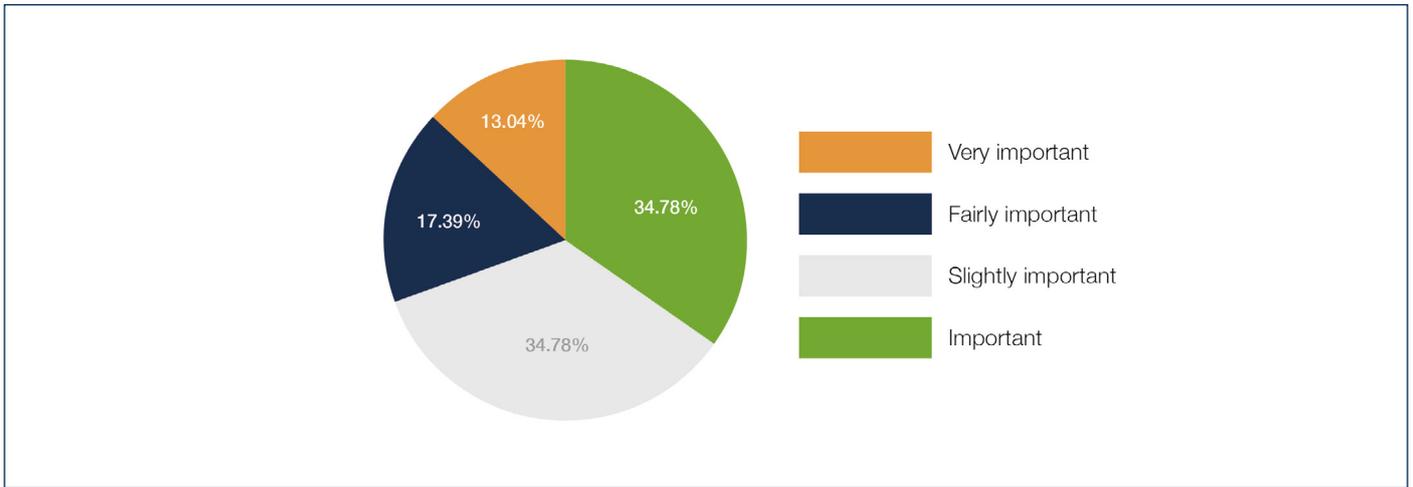
1. Leverage ratio (in jurisdictions where it has not been implemented yet)



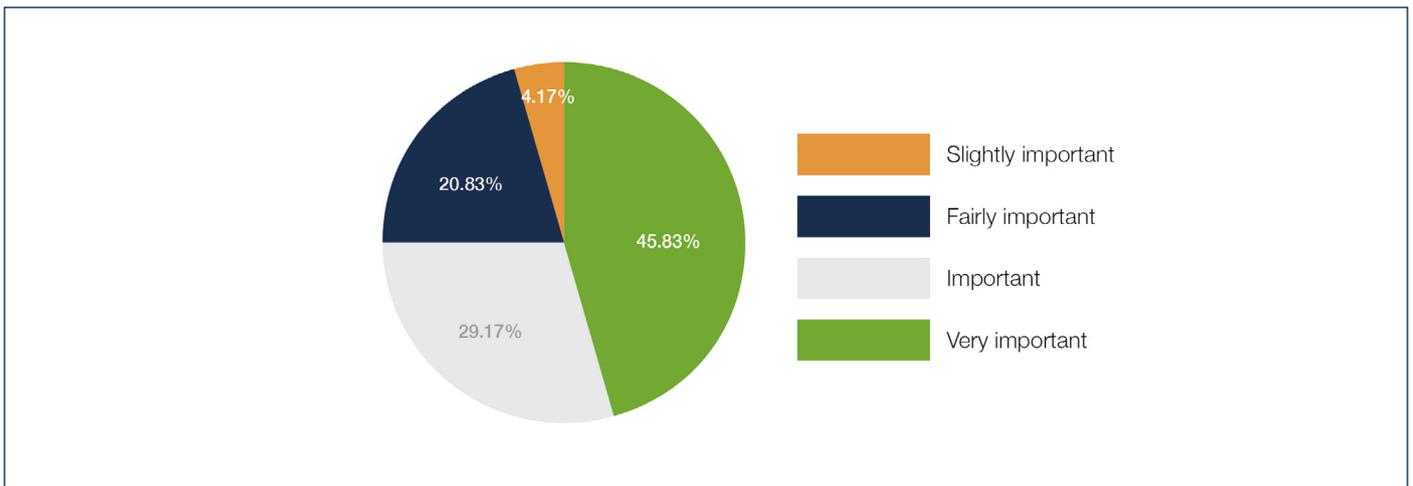
2. SFT minimum haircuts



3. Market transparency/reporting requirements



4. NSFR implementation

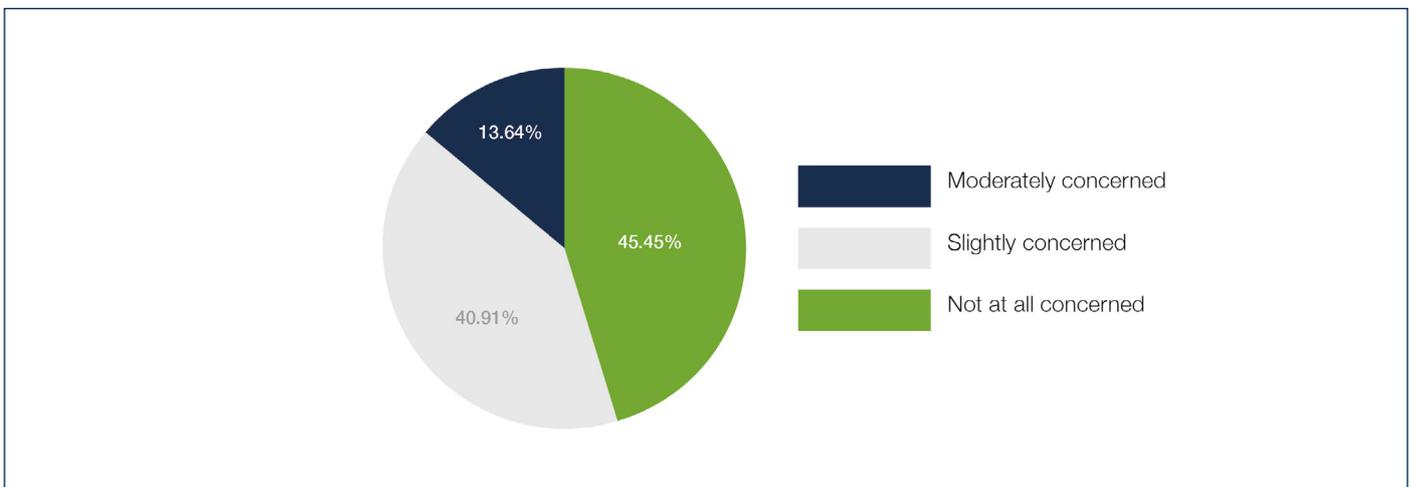


Annex F:

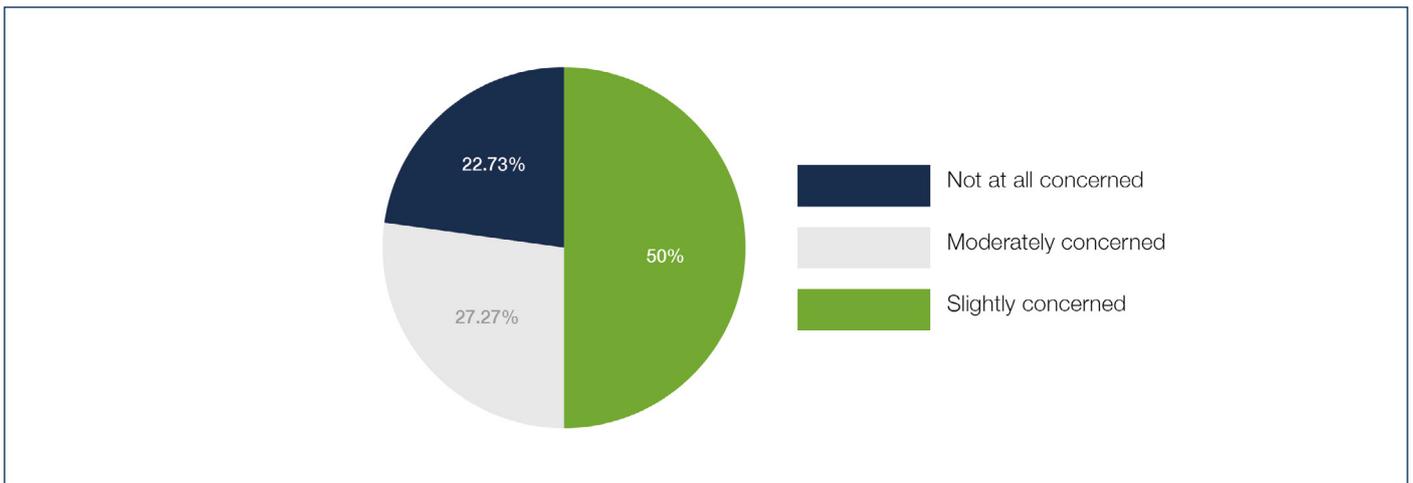
Stressed conditions – industry concerns

What are your main systemic funding concerns?

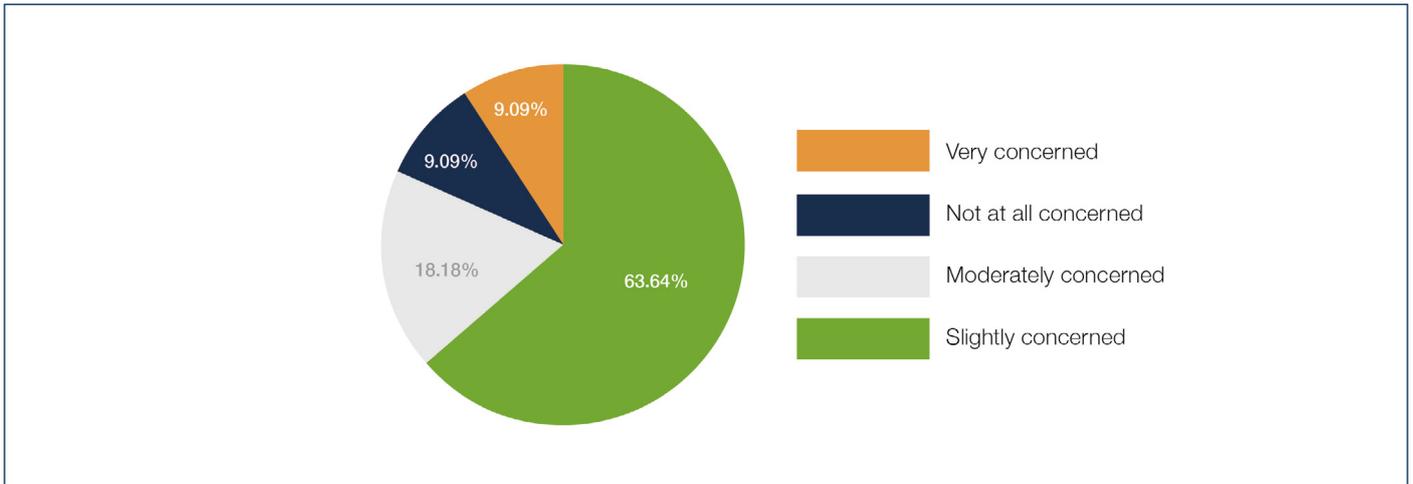
Client access to cash for funding VM through repo



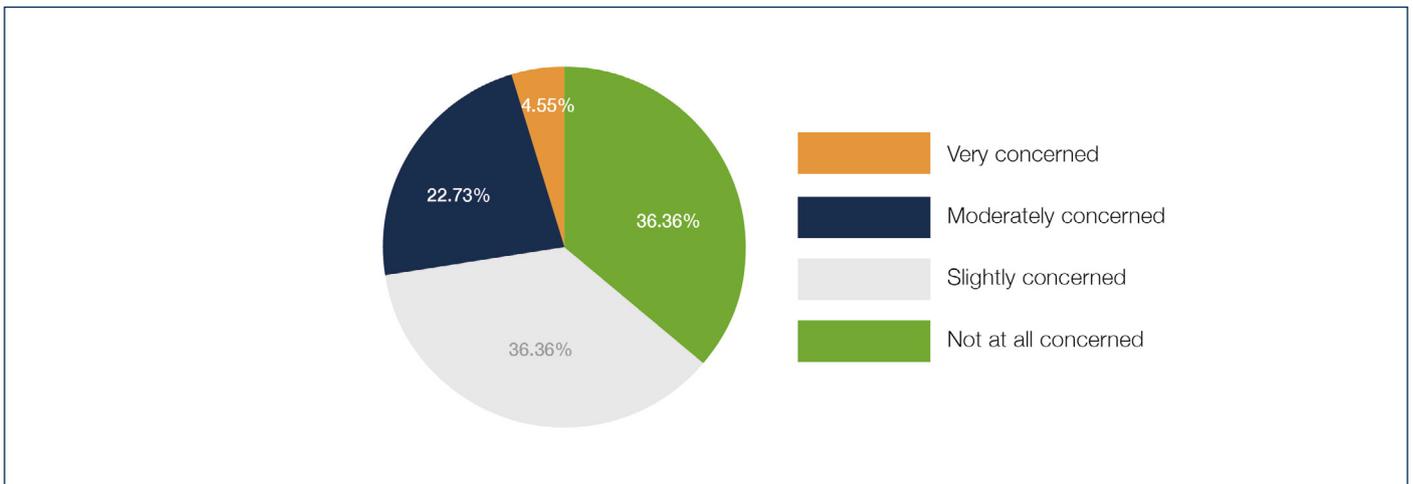
Regulated bank broker-dealer funding



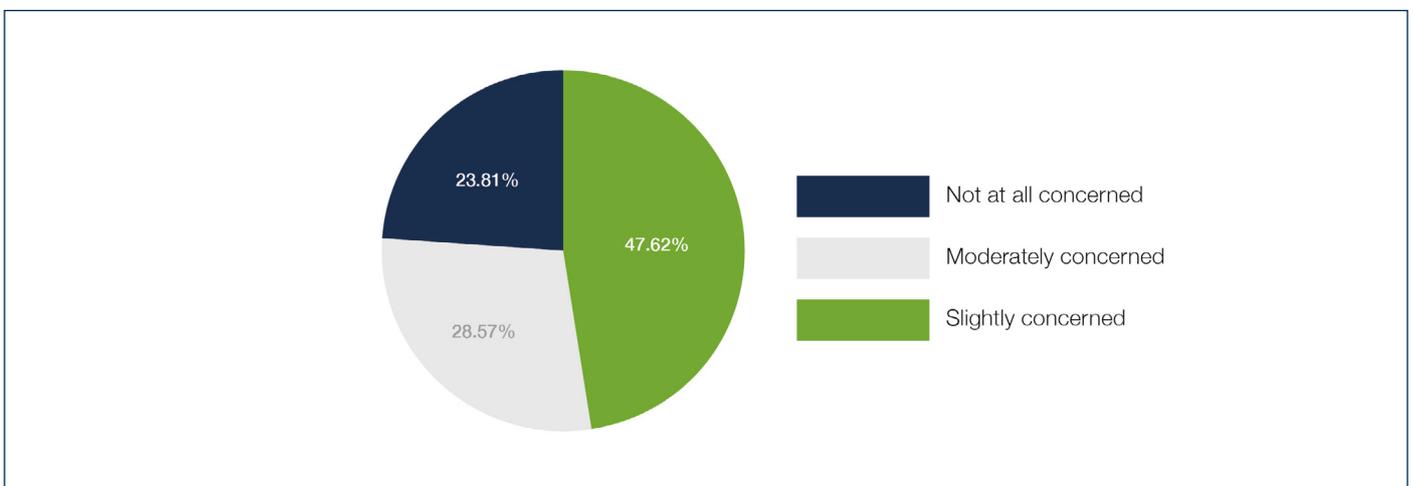
Non-bank broker-dealer funding



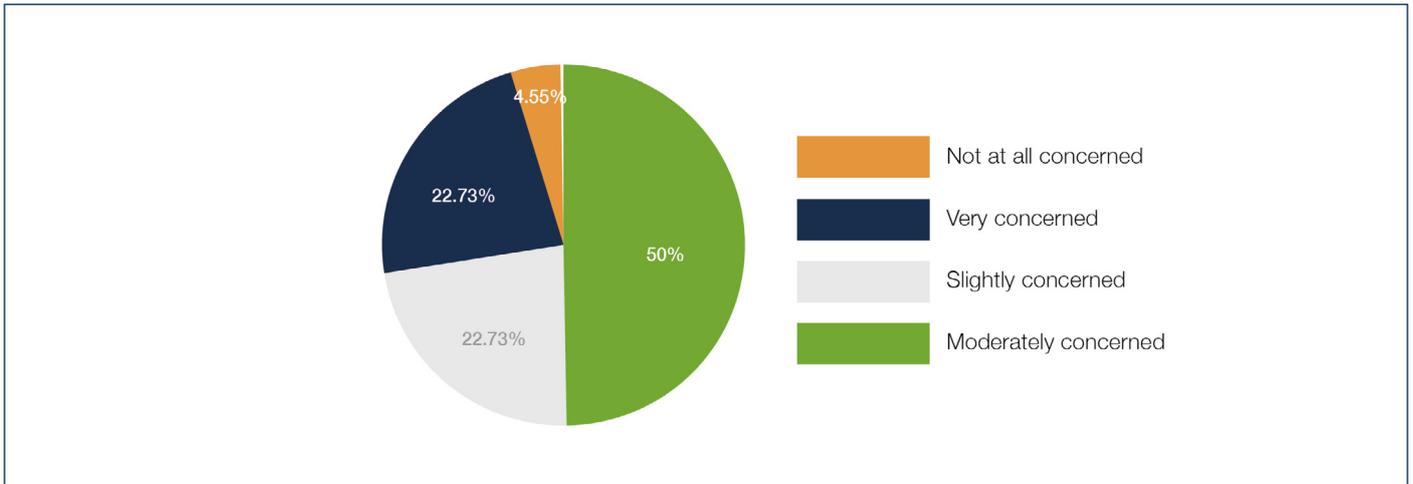
Increased SFT haircuts for lower quality collateral that is widely rehypothecated/funded through repo



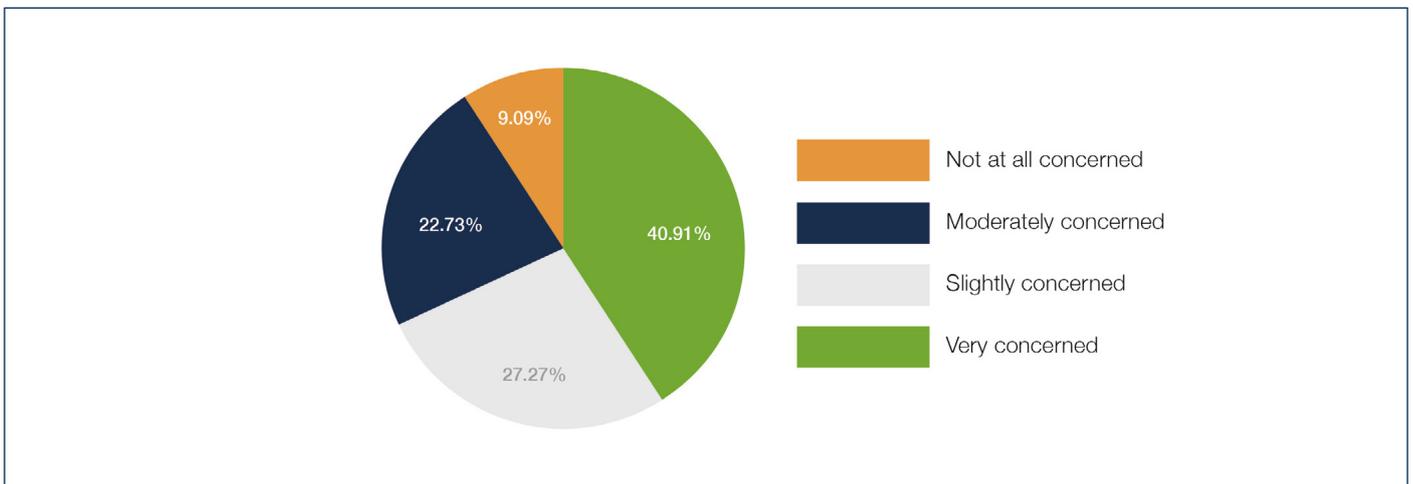
Reduction in availability of eligible collateral or increase in demand



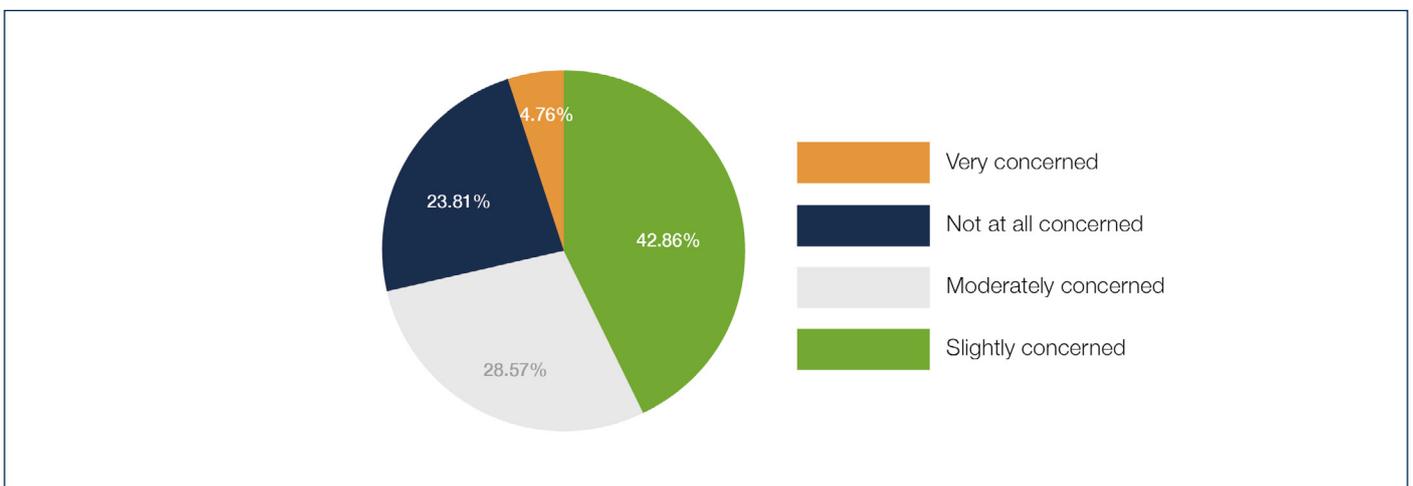
Systemwide repo funding capacity due to LR constraint



Systemwide repo funding capacity due to NSFR constraint



Alternative products to repo that are less liquid



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The ICMA European Repo and Collateral Council (ICMA ERCC) is a special interest group established under the auspices of ICMA to bring together the major institutions active in Europe's cross-border repo and collateral markets.

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