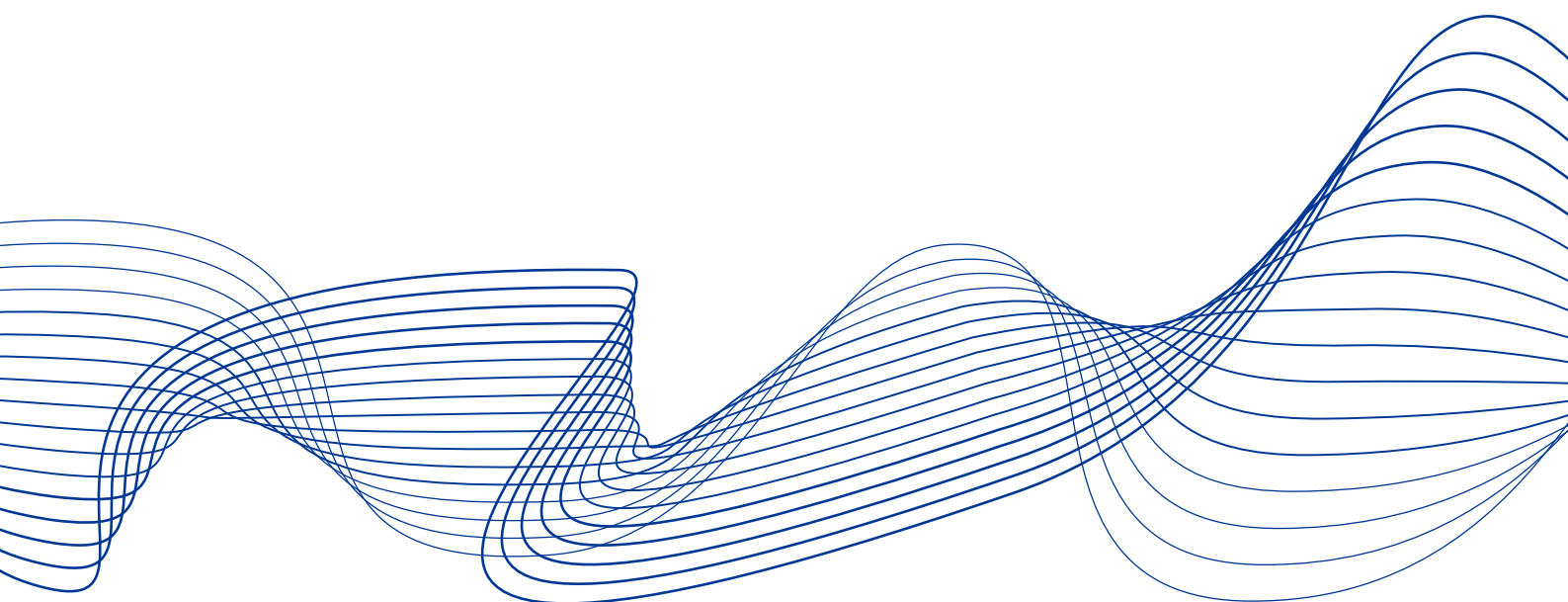


The macroprudential use of margins and haircuts

February 2017



ESRB
European Systemic Risk Board
European System of Financial Supervision

Contents

Executive Summary	4
Section 1 Introduction	9
Section 2 The role of collateral in financial risk mitigation	11
2.1 Economic function of collateral, transactions, market size and structure	11
2.1.1 Economic function of collateral	11
2.1.2 Securities financing and derivatives transactions and their uses	12
2.1.3 Market size and structure	15
2.2 Terminology, concepts and market practices	22
2.2.1 Terminology and concepts	22
2.2.2 Market practice governing collateral terms	26
Section 3 The need for macroprudential policies to mitigate systemic risk	30
3.1 Leverage, systemic risk and financial stability	30
3.2 Systemic risks from procyclical collateral requirements	30
3.2.1 Procyclicality in collateral requirements	31
3.2.2 Procyclicality in collateral requirements and the link to leverage	33
3.2.3 Procyclicality in collateral requirements and cross-asset contagion	34
3.3 Empirical evidence on the procyclicality of margins and haircuts	35
3.4 The need for macroprudential policies	39
Section 4 The Current Regulatory Framework	42
4.1 Centrally cleared transactions	42
4.1.1 Microprudential regulation of margin requirements set by CCPs	42
4.1.2 Microprudential regulation of haircut requirements set by CCPs	44
4.1.3 Sanctioning powers of the authorities	45
4.1.4 Observations on the microprudential framework for centrally cleared transactions	45
4.2 Client clearing arrangements	46
4.2.1 Observations on the regulatory microprudential framework for client clearing	47
4.3 Non-centrally cleared derivatives	47



4.3.1	Observations on the regulatory framework for non-centrally cleared derivatives	48
4.4	Non-centrally cleared securities financing transactions (SFTs)	49
4.4.1	Observations on the regulatory framework for non-centrally cleared securities financing transactions	51
4.5	Relevant sectoral regulation	52
4.5.1	Regulation of the banking sector	52
4.5.2	Regulation of non-banking sector and other measures	55
4.5.3	Observations on sectoral regulation	56
4.6	Sufficiency of the current measures with regard to mitigating procyclicality and gaps in the regulatory framework	57
Section 5 Tools		59
5.1	Objectives and features of future macroprudential tools	59
5.2	Economics of tools addressing risks in the upswing of the cycle	62
5.2.1	Fixed Numerical Floors	62
5.2.2	Time-varying add-ons to fixed numerical floors	64
5.2.3	Time-varying macroprudential margin buffer	65
5.2.4	Macroprudential collateral pool buffer	66
5.3	Economics of tools addressing risks in the downswing of the cycle	67
5.3.1	Speed limits on margin/haircut increases	68
5.3.2	Haircut and margin ceilings	70
5.4	Other tools	71
5.4.1	Admissible (variable) corridors	71
5.4.2	Incremental step up approach	71
5.4.3	Minimum amount for specific collateral (cash and/or securities)	73
5.4.4	Macroprudential restrictions on variation margin	73
Section 6 Calibration of tools		76
6.1	Overview	76
6.2	Calibration of fixed tools	77
6.3	Calibration of time-varying tools	79
6.3.1	Indicators	79
6.3.2	Thresholds	80
6.3.3	Calibration	81



Section 7 Practical Implementation	82
7.1 Regulatory arbitrage and effectiveness of tools	82
7.1.1 Avoiding regulatory arbitrage across jurisdictions	82
7.1.2 Avoiding regulatory arbitrage across products and markets	85
7.2 Interplay with existing banking regulation	86
7.3 Pass-through to non-banks	87
Section 8 Potential ways forward and conclusion	88
References	90
Members of the drafting team	93
Imprint	94



Executive Summary

1. **This report considers the use of margins and haircuts to meet macroprudential objectives.** It (i) explains the need for macroprudential policies to mitigate systemic risk from excessive leverage and procyclicality in collateral requirements; (ii) sets out how margins and haircuts could, in principle, be used as macroprudential tools; (iii) identifies and sketches out a number of potential tools; and (iv) highlights practical challenges in the implementation of such tools that require further work.
2. **Collateral is playing an increasingly important role in the post-crisis financial system.** Collateral is a structural component of securities financing transactions (SFTs) and is becoming an increasingly important feature in over-the-counter (OTC) derivatives markets. This reflects recent structural changes in the way these markets operate, such as the drive towards the mandatory central clearing of standardised OTC derivatives, and the forthcoming requirement for counterparties in bilateral OTC derivatives transactions to exchange margins.
3. **The use of collateral is governed by specific risk management practices, including margin and haircut requirements, which are the focus of this report.** Two counterparties engaging in a bilateral or centrally cleared transaction will post “margin” (i.e. collateral) to each other or to the central counterparty (CCP) in order to protect against any losses that could be incurred from their potential default. There is a distinction between “variation margin”, which is exchanged on a frequent basis to cover the current exposures arising from the gains or losses on an open transaction, and “initial margin”, which is posted at the initiation of a transaction to cover future exposures that could arise from losses on the counterparty’s position after it has defaulted. A “haircut” (i.e. a discount) will be applied to this collateral in order to protect the surviving counterparty or the CCP from a fall in the value of the defaulter’s collateral. While the report focuses on margins and haircuts, it is aware that margins form part of, and may thus interact with, CCPs’ broader risk management frameworks and the loss-sharing arrangements between CCPs and their members. Moreover, while the report considers these frameworks, its focus is not on risk mitigation at and resilience of CCPs, but how these risk management frameworks impact other market participants.
4. **Margin and haircut practices can exacerbate systemic risks, by contributing to the build-up of excessive leverage in the financial system during upswings and deleveraging during downswings.** Margins and haircuts contribute to financial stability by absorbing losses and helping to manage financial risk. However, collateral requirements may also be procyclical due to the effects of changes in asset prices on valuations: as asset prices increase, the valuations of securities that have been provided as collateral at a CCP or in a bilateral transaction increase. This means that fewer securities are required to collateralise a given exposure, thereby allowing for the build-up of leverage during upswings. Conversely, a fall in asset prices triggers automatic calls for more collateral, which might force deleveraging, thereby amplifying the effects of downswings in asset prices. This procyclicality arising from automatic valuation effects may be compounded by the characteristics of the risk-based models used by central counterparties and by participants in bilateral markets. These models generally link the calculation of margins and haircuts to price volatility, which means that margin and haircut requirements will tend to decrease when conditions in financial markets are benign, and increase when volatility rises. The procyclical aspect of margin and haircut requirements can exacerbate “leverage cycles” in which market participants use the collateral freed up by higher asset prices and lower margin and haircut requirements to increase their



borrowing and contingent commitments from derivatives, thereby accumulating financial and synthetic leverage. This process can lead to a destabilising deleveraging mechanism when asset prices fall. The reason is that firms that are faced with increasing margin calls and haircuts at the very time when the value of their collateral declines may have to close positions, thereby triggering asset fire sales.

5. **Macroprudential policy may have a role in addressing systemic risks arising from margin and haircut requirements linked to market failures.** First, macroprudential authorities can solve collective action problems that might arise during upswing phases. Owing to the competitive nature of SFT and derivative markets, individual market participants that are concerned by the build-up of excessive leverage in the financial system and that wish to charge higher margins or haircuts than required to manage the risk on their individual transactions may lose business. Second, individual market participants cannot internalise the externalities generated by margin and haircut practices. From the perspective of market participants, gradually lowering margin and haircut requirements during the upswing of asset price cycles and suddenly increasing them during downswings would be rational. However, the individual decisions of each market participant do not take into account the negative externalities associated with a system-wide change to collateral requirements, which can foster fire sales and downward liquidity spirals. Only an authority concerned with system-wide leverage and the aggregate effects of risk-mitigation measures taken by individual market participants could address these market failures. Accordingly, several international and EU bodies such as the European Central Bank (ECB), the European Securities and Markets Authority (ESMA), the Financial Stability Board (FSB), the Basel Committee for Banking Supervision (BCBS), the International Organization of Securities Commissions (IOSCO) and the ESRB have recognised that macroprudential policy could have a role to play in managing the procyclical effects of margin and haircut practices.
6. **While regulatory requirements consider procyclicality risks, there is no explicit mandate for the use of margins and haircuts to meet macroprudential objectives.** Legislation adopted in the EU has sought to ensure that counterparties in bilateral and centrally cleared markets are subject to sound margin and haircut requirements that limit the need for procyclical changes. The European Market Infrastructure Regulation (EMIR) requires CCPs to incorporate specific procyclicality-limiting tools into their margin models. However, as these tools were implemented only a short time ago, their effectiveness could not yet be assessed. And other macroprudential considerations – such as the build-up of excessive leverage – are outside the scope of EMIR. The rules governing margin and haircut practices in non-centrally cleared derivatives markets also include provisions related to procyclicality. But, as for CCPs, other macroprudential concerns are outside the scope of the regulation. In bilaterally-traded SFTs, initial margin is typically not exchanged and haircuts are currently not subject to requirements that limit procyclicality. This leaves a regulatory gap, especially with regard to risks stemming from non-bank entities that are not otherwise subject to a regulatory framework targeting their leverage. This report is a first step in approaching this issue, although its focus on margins and haircuts means that it does not consider all the aspects that affect collateral availability, such as the netting ratio of centrally cleared transactions or the “velocity” with which collateral is reused by market participants.
7. **The report considers a number of potential macroprudential tools that target margin and haircut requirements.** These tools vary in terms of potential costs and benefits as well as the knowledge required to calibrate them. They also do not always address the same objectives. The following set of potential tools first lists those tools that would primarily target the build-up of excessive leverage in the financial system during upswings. It then lists those



that would primarily target a procyclical increase in collateral requirements during downswings.

- **Fixed numerical floors for initial margins and haircuts would introduce absolute minimum requirements.** Fixed numerical floors for haircuts, such as those agreed by the FSB, would reduce leverage from SFTs and derivatives for a given amount of collateral, while fixed numerical floors for margins would increase the cost of transacting in these markets. By potentially raising margin and haircut requirements beyond the levels that market participants would choose based on their internal risk-based models and procedures, such floors might counter the build-up of excessive leverage during good times when asset prices rise and leverage is increasing. The resulting level of overcollateralisation might also contribute to reducing the increase in margin and haircut requirements during bad times, leading to less deleveraging than would otherwise take place. The calibration of fixed numerical floors requires, inter alia, knowledge about the levels of margins and haircuts that market participants would choose based on their internal risk-based models and procedures.
- **Time-varying floors on initial margins and haircuts would allow macroprudential authorities to steer haircut and margin levels in a counter-cyclical manner.** Time-varying floors could be increased when vulnerabilities in the financial system are judged to be growing, in particular when the level of leverage created from derivatives and SFTs is considered excessive, and could be removed during times of financial stress. In addition to the knowledge required to calibrate fixed numerical floors, the calibration of time-varying tools also requires the development of indicators that point to the build-up of excessive leverage, the consideration of thresholds to activate and deactivate the tool, and the acquisition of knowledge about the transmission mechanism.
- **Macroprudential margin add-ons could be an alternative approach to fixed numerical or time-varying margin floors.** Building on the existing business practices of counterparties in centrally cleared transactions, such margin add-ons could be designed as a fixed amount or percentage of the extra margin to be levied on top of existing microprudential requirements. These add-ons – which could be used in a time-varying manner – would allow for additional buffers to increase the resilience of the financial system in the event of a downswing. Being calibrated as an add-on to existing microprudential requirements, they would always ensure that buffers were built up, even if the precise level of margins and haircuts that market participants would choose was unknown ex ante. Calibration of this tool in a time-varying manner also requires the development of indicators and thresholds and the acquisition of knowledge about the transmission mechanism.
- **Macroprudential collateral pool buffers are another alternative approach to fixed numerical or time-varying margin floors.** These would allow authorities to require participants, especially in centrally cleared transactions, to deposit a certain amount of excess collateral, calculated as a percentage add-on to the total margin requirements charged to participants. As they would be applied to the total margin requirements of a participant and are therefore not based on single transactions, less detailed information would be required to calibrate them than to calibrate the more granular tools described above.
- **Margin and haircut ceilings are an ex ante cap on the maximum acceptable margin and haircut levels, inclusive of any add-ons.** The aim would be to manage procyclical effects in the downswing of the cycle by limiting the ability of counterparties to make large margin calls and haircut adjustments. This tool raises a potential conflict between microprudential and macroprudential goals as it could lead to the undercollateralisation of individual



counterparties. It could also, especially in the context of systemically important entities such as CCPs, have negative financial stability implications.

- **Speed limits on margin and haircut increases would result in a ceiling being imposed on increases in margins or haircuts over a given time period.** The aim of such a tool is to put a brake on procyclical margin calls and haircut increases in periods of market stress. Like margin and haircut ceilings, this could lead to the undercollateralisation of individual counterparties and thus raises a potential conflict between microprudential and macroprudential goals. Similarly, the deployment of such a tool could have negative financial stability implications.
 - **A number of other tools have been briefly considered.** These include margin and haircut corridors, an incremental step-up approach, required minimum holdings of certain collateral types and macroprudential restrictions on variation margins.
8. **The use of margins and haircuts to meet macroprudential objectives requires consideration of these objectives, their scope, and consistency with existing regulation and governance.** In terms of their objective, this report finds that no single tool would enable macroprudential authorities to address the externalities described above. Some of these tools might primarily target the build-up of excessive leverage in the financial system during upswings (“lean against the wind”). Having this system-wide perspective is important: the primary objective of these tools would not be to increase the resilience of individual market participants such as CCPs. Others might primarily target a procyclical increase in collateral requirements during downswings. Determining the scope of macroprudential tools is also important due to the complex interaction between collateral procyclicality and system-wide developments. The report also considers consistency with existing regulation. Macroprudential tools for margins and haircuts could seek to build on current microprudential regulation (e.g. in the context of the ongoing EMIR review) or they could be implemented as part of a separate framework. It is also important to consider the governance process for calibrating and activating tools in a transparent manner. In this context, the report identifies a choice between rules-based tools (which offer a degree of predictability and can be internalised ex ante by market participants) and discretionary tools (which may be more appropriate for addressing situations in which authorities need greater flexibility, as could be the case when systemic risks are increasing). Tools need to be designed in such a way that their effects can be passed through to non-bank entities; a particular challenge when it comes to centrally cleared markets, which are often indirectly accessed by non-banks through client clearing arrangements.
9. **The implementation of macroprudential tools for margins and haircuts also raises practical challenges.** Regulators need to be mindful of, without being limited by, the existing regulatory framework and broader international efforts including considerations of regulatory arbitrage and a level playing field. A first challenge facing any authority wishing to implement these tools would be to minimise the risk of regulatory arbitrage. Indeed, derivative and SFT markets are interconnected in a complex web, spanning national borders both within and outside the EU. To avoid shifting leverage to other areas of the financial system that have not been captured by the macroprudential measure, seeking consistency and reciprocity at EU level, as well as international level, would be a crucial element in establishing an efficient macroprudential framework. A second challenge is to ensure that macroprudential measures do not modify the relative costs of centrally cleared transactions compared to non-centrally cleared transactions to the point that incentives to encourage central clearing would be affected. Another challenge highlighted in the report is the need to assess overlaps with other



regulatory requirements. For example, minimum and time-varying margin and haircut requirements will affect the amount of liquid, high-quality assets used by banks to fulfil their LCR requirements. Last, ensuring that the measures are passed through to non-bank entities might be challenging in centrally cleared markets, as these entities currently tend to access CCPs indirectly.

10. **Against this backdrop, further empirical and conceptual analysis is needed.** The FSB haircut floors are due to be implemented in 2018. This will be an important first step in incorporating a major macroprudential concern into the regulatory framework, in which the greatest progress had previously been made in centrally cleared transactions and the least in bilateral SFTs (especially those executed outside the bank-to-bank space). It can also lay the foundations for the analysis of other macroprudential tools by providing new data, and evidence of intended and unintended effects. Another aspect of the FSB framework is that it specifically targets non-banks, which are sometimes less regulated than banks. In particular, non-banks may not have the capacity to compute, call, validate, possibly segregate, and value margins and haircuts. The EMIR experience has shown that building up such capacity – which may be required for some of the future macroprudential tools to be applied effectively across a wide range of entities – takes time. However, the complexity of the issues, interconnectedness of markets and tools, changing behaviour due to regulatory change, and lack of data noted in the previous paragraphs, mean that this report does not propose the introduction of any new tools beyond the FSB haircut framework.
11. **A programme for future work in this area could close the knowledge gaps identified in this report and contribute to the review of existing regulation.** Specifically, the objectives of the tools in terms of building resilience or “leaning against the wind” have not been established yet. The transmission between margin and haircut levels and the financial cycle, as well as the calibration of potential tools, are not well understood. Indicators pointing to the build-up of excessive leverage at the desired level of aggregation and thresholds that might signal a need for activation have not been identified. In addition, there is little knowledge about the impact of any of the tools considered, their effectiveness and potential undesirable side-effects.
12. **A possible outcome of such a programme of future work is that gaps will gradually be filled and regulation enhanced.** In terms of *gradually filling gaps*, it is likely that fixed tools that apply at a higher level of aggregation (although their implications still need further analysis) are easier to implement than time-varying tools. Such tools could be informed by, and/or build on, the FSB framework. For example, the design of the FSB framework might inform the development of minimum levels of initial margins. Moreover, as the FSB framework only applies to non-banks that receive financing, and excludes government bonds which account for the majority of SFT funding in Europe, consideration could be given to covering a wider set of asset classes and activities. Any proposals would need to take account of unintended consequences and the international regulatory landscape in this area. In terms of *enhancing existing regulation*, there is scope to develop a framework governing the use of discretionary add-ons and overcollateralisation as well as the relationship between clearing members and clients. And for non-centrally cleared SFTs and derivatives, efforts could be made at microprudential level to better mitigate any procyclical effects of margins and haircuts on these transactions, in particular by, in the first instance, adopting the FSB framework. The framework currently applied to centrally cleared transactions under EMIR – which includes specific procyclicality-limiting tools to be applied to initial margin models – could be taken as a starting point.



Section 1

Introduction

13. **The greater role of collateral in the post-crisis financial system means that the terms governing collateral requirements have implications for financial stability.** The role of collateral in the financial system has increased after the global financial crisis due to the stronger preference of market participants for conducting secured transactions as well as international regulatory reforms that resulted in the need to collateralise what had previously been uncollateralised bilateral credit exposures. In particular, the Group of Twenty (G20) post-crisis reform programme has led to the introduction of clearing obligations for standardised over-the-counter (OTC) derivatives in major jurisdictions, including the European Union (EU), and global standards for collateral requirements on non-centrally cleared derivatives transactions. These developments mean that the risk management frameworks that central counterparties (CCPs) and counterparties in bilateral transactions use to set their collateral requirements are becoming increasingly important for financial stability. In particular, it is important to ensure that changes to collateral requirements do not trigger or exacerbate stress in the financial system.
14. **Procyclical collateral requirements can lead to the build-up of excessive leverage or inadvertently trigger or exacerbate stress in the financial system.** Procyclical collateral requirements result from low margins and haircuts in “good times” (when asset prices are stable or moderately rising and volatility is low) followed by large and sudden increases in margins and haircuts during “bad times” (when asset prices are sharply falling and volatility is high). Low margins and haircuts in good times allow for the build-up of excessive leverage as counterparties have more collateral to borrow against, and reduce the resilience of market participants. If this is followed by abrupt increases to margins and haircuts during bad times, it may trigger systemic liquidity spirals in which funding and market liquidity interact. This may generate contagion and reinforce stress in financial markets, and the financial system more generally, with potential spill-overs to the real economy.
15. **Regulation introduced recently to address procyclical collateral requirements is still incomplete.** In the EU, post-crisis regulatory reforms have been agreed to enhance the capacity of banks to absorb shocks, including by strengthening the capital framework and mitigating the build-up of leverage and procyclicality. As for specific requirements in relation to collateral, the European Market Infrastructure Regulation (EMIR) contains provisions designed to reduce the incidence of disruptive or big step changes in initial margin requirements by mandating methodologies to compute margins which tend to be less vulnerable to short-term volatility swings. However, while these provisions can help to address the effects of the excessive procyclicality of collateral requirements during good times, they do not address the potentially rapid deleverage behaviours during bad times. Moreover, there are no legal requirements with respect to the distribution network of clearing services beyond the CCP, between clearing members and their clients, or in the context of trilateral arrangements. There is anecdotal evidence that contractual arrangements allow for rapid increases in margins even within the EMIR framework. This seems indicative of the fact that, because the social cost of sharp increases in margins and haircuts following a rise in volatility is only partly borne by CCPs, or by the margin caller in general, the systemic impact of these market practices is still not fully addressed by microprudential regulation. There is an even larger gap in the EU regulatory regime for non-centrally cleared transactions. In particular, no comprehensive framework is applied for non-centrally cleared SFTs at EU level.



16. **International and EU bodies have identified the possibility of addressing procyclical collateral requirements through the macroprudential use of margins and haircuts.** This includes the ECB, ESMA, ESRB, FSB, BCBS and IOSCO. For example, in its contribution to the 2015 EMIR review, the ESRB noted that authorities can have a macroprudential role in ensuring that the trade-off between the private benefits and social costs in CCPs' margin requirements *"does not result in margins being too low in periods of low volatility and high market liquidity. In the same way, the authorities can have a macroprudential role in addressing financial and synthetic leverage in the financial system"* pointing to *"conservative and potentially counter-cyclical margins and haircuts"* as possible tools (ESRB, 2015). In the context of non-centrally cleared derivatives transactions, the BCBS and IOSCO have recognised that national supervisors *"may wish to alter margin requirements to achieve macroprudential outcomes"* pointing to *"a macroprudential 'add-on' or buffer on top of baseline (or minimum) margin levels"* as one possible way of achieving this. *"Although no conclusions have been reached on this issue, the BCBS and IOSCO continue to give further consideration to the coordination issues that may arise in this respect"* (BCBS-IOSCO, 2015). And in the context of non-centrally cleared securities financing transactions (SFTs), the FSB has noted that numerical haircut floors could be used as a macroprudential tool (FSB, 2015).
17. **Although the potential for using margins and haircuts for macroprudential purposes is widely recognised from a conceptual perspective, the practical implementation will be challenging.** These challenges are both institutional and technical. Institutional challenges include situations in which the pursuit of prudent risk management practices by individual institutions (a microprudential concern) conflicts with the stability of the financial system as a whole (a macroprudential concern). Technical challenges include the choice of indicators to monitor risks; the identification of indicator thresholds to trigger the activation of such tools; the selection of the most appropriate tool (including with a view to minimising regulatory arbitrage and overlap with other tools); and the calibration of such a tool. These challenges are, however, not unique to the macroprudential use of margin and haircut requirements and have been identified – and largely overcome – in other areas of financial regulation, such as in banking. However, since margins and haircuts are often exchanged between market participants (bilateral counterparties and/or CCPs) from different jurisdictions, it becomes more difficult to define the cycle and identify its phase.
18. **This report provides a framework for how margins and haircuts could be used to address financial stability risks from procyclical collateral requirements.** It considers the different types of risks over the cycle, possible tools to mitigate such risks, and how such tools might be calibrated. It benefited from the variety of views expressed in the ESRB International Conference on the Macroprudential Use of Margins and Haircuts held on 6 June 2016.
19. **The remainder of this report is structured as follows.** Section 2 describes the role of collateral in the financial system and the terms governing collateral requirements. Section 3 describes how collateral requirements, including margining and haircut practices, can contribute to and/or amplify risks to financial stability. Section 4 sets out the ways in which existing regulation can help to mitigate these risks although the effectiveness of this regulation cannot be analysed at present. It also identifies gaps in regulation. Section 5 describes a range of potential macroprudential tools. Section 6 considers the calibration of tools, including possible indicators and methods to establish thresholds for their activation. Section 7 discusses specific issues related to the implementation of the tools including the regulatory arbitrage and in relation to existing regulation. Section 8 concludes and sets out potential ways forward.



Section 2

The role of collateral in financial risk mitigation

2.1 Economic function of collateral, transactions, market size and structure

20. **This section aims to provide a basis for understanding why collateral is important and why it is playing a much greater role in the financial system now compared to recent years.** It sets out the economic functions of collateral in counterparty credit risk mitigation and describes securities financing and derivatives transactions and how they are used. The section also describes how changes to market size and structure have resulted in collateral becoming increasingly important in the financial system.

2.1.1 Economic function of collateral

21. **Collateral addresses counterparty credit risk that arises from exposures to a counterparty in a transaction.** Collateral, or more specifically, collateralised lending, is an established technique designed to reduce the risk the lender is exposed to. Specifically, collateral provides protection to the lender against a loss that might arise from the borrower defaulting on its obligations. It is a one-way defence mechanism: when a counterparty defaults, the other counterparty can seize and sell the collateral in order to recover the loss. Collateral shifts the consequences of the default away from the lender and onto the borrower: collateral is thus a “defaulter-pays” mechanism that protects the surviving party in a transaction by absorbing losses using the collateral provided by the defaulting party. This incentivises market participants to internalise the cost of their risk-taking, which results in higher refinancing costs. Another important feature of collateralised lending is that it needs pre-existing unencumbered assets that can be pledged as collateral. Unlike an unsecured loan, collateralised lending can be seen as a form of liquidity transformation, temporarily releasing cash from a less liquid asset.
22. **Collateral has a number of operational dimensions which allow it to function as an effective counterparty risk mitigation tool.** The functional requirements of effective counterparty risk mitigation through collateral are that its value must be commensurate with the lender’s exposure, freely available to the lender in the event of a counterparty default, and sufficiently liquid, both in terms of liquidation and execution shortfall. These functional requirements introduce three operational dimensions of collateral: (1) the type and quality of collateral; (2) the coverage ratio between the value of the collateral and the value of the collateralised exposure; and (3) the maintenance of this coverage ratio around the variability of both the value of the collateral and exposure to the counterparty. These operational dimensions will be considered in more detail later.



2.1.2 Securities financing and derivatives transactions and their uses

2.1.2.1 Securities financing transactions (SFTs)

23. **SFTs comprise a variety of financial contracts such as repurchase agreements (repos), securities lending and margin lending transactions.** Under the Regulation on the transparency of securities financing transactions and of reuse (SFTR), SFTs include repurchase agreements (repos), reverse repos, buy/sell-backs and sell/buy-backs, securities or commodities lending and borrowing arrangements, and margin lending or borrowing transactions. These transactions involve the transfer of legal title to a security or basket of securities to another party for a limited period of time in exchange for the legal ownership of some collateral.¹
24. **Specific arrangements differ depending on the type of transaction.** A repurchase agreement can be seen as an arrangement that combines the sale of securities in the first leg of a transaction (usually with a spot settlement date) with a simultaneous commitment to buy back equivalent securities in the second leg of the transaction (with a future settlement date). In “classic” repos, in which income payments are transferred back to the original owner of the securities on the same day, the difference between the two prices defines the repo rate. In sell/buy-back transactions, income payments like interest or dividends are retained by the buyer of the securities, hence the repurchase price is adjusted accordingly to take this into account. Securities lending refers to transactions where a counterparty (the lender) lends securities against collateral, subject to the commitment that the borrower will return the same or equivalent securities on an agreed future date or when requested to do so by the lender. This contractual agreement entails the payment of a fee, usually charged to the borrower of the lent securities. Margin lending refers to transactions in which a counterparty extends credit to clients for the purchase, sale, carrying or trading of securities.
25. **Participation in SFT markets is driven by a variety of purposes.** A wide range of market participants, including banks, pension funds, insurance companies, asset managers, broker dealers and investment firms, operate in SFT markets. They do so in order to obtain funding, invest cash or borrow specific securities (Keller et al., 2014). In particular, repos are typically used by banks for financing purposes while securities are loaned by buy-side firms to generate extra returns. Also central banks and government debt management agencies are active participants of SFT markets for, respectively, monetary policy and public debt management purposes. Market participants borrow securities to cover short positions, avoid settlement fails and for collateral transformation such as collateral upgrade trades in which higher quality collateral is exchanged for a fee against lower grade collateral.
26. **Cash reinvestment and non-cash collateral re-use are key elements in many SFTs and enable agents to leverage their positions.** Once received as a result of a transaction, both cash or non-cash collateral may, in turn, be re-used in other transactions. This allows agents to leverage their positions. More broadly, agents who borrow securities with a view to selling

¹ Full ownership is transferred only under title transfer collateral arrangements. In the case of securities interest collateral arrangements, ownership remains with the collateral provider, but there may be a right of reuse. When this right of reuse is exercised, the collateral taker can use the collateral as if he were the full owner.



them and buying them back at a lower price at a later stage (short selling), may use the short sales proceeds as collateral to borrow yet more securities, thus leveraging the position (financial leverage). Agents who lend securities against cash may use this cash to purchase securities and lend them further (Bottazzi et al., 2012). Cash collateral reinvestment programs pool the cash proceeds from lending securities and reinvest this cash in a broad range of assets. Agent lenders² can also reinvest the cash obtained as collateral in a variety of financial instruments. In margin lending transactions, collateralised loans are usually provided to clients seeking to leverage their trading positions by borrowing money through their agent. In turn, the securities posted as collateral are generally held in margin accounts and are often re-used by financial institutions to fund the loans provided to clients.

27. **From an operational standpoint, SFTs can be traded bilaterally, through a third party agent (tri-party agreements), or cleared through CCPs.** When processed through a CCP, SFTs are subject to the legal requirements and risk management framework like any other product cleared by the CCP, including initial margins, haircuts, and default fund contribution for clearing members. There is no current legal requirement for market participants to opt for a specific post-trade methodology, and therefore CCP clearing is only adopted on a voluntary basis.
28. **SFT markets play a central role in the modern financial ecosystem and their functioning is crucial for financial stability.** As a source of funding for financial intermediaries, disruptions to SFT markets can have severe consequences for financial stability and the real economy (Rinaldo et al., 2016). In addition, by helping financial intermediaries conduct market-making activities, SFTs support price discovery mechanisms and secondary market liquidity for a variety of securities issued by both public and private entities (FSB, 2013). Furthermore, SFT markets represent a key channel for the monetary policy transmission mechanism, especially in jurisdictions where the repo is the tool adopted by central banks in monetary policy operations.

2.1.2.2 Derivatives

29. **Derivatives are financial transactions whose market value is derived from the value of an underlying asset.** Derivatives are usually defined as instruments with a predefined maturity, entailing an obligation to acquire or sell underlying assets or to cash settlement determined by reference to transferable securities, currencies, interest rates or yields, commodities or other indices or measures. The clearing and settlement of derivatives transactions takes place in the future (i.e. usually more than two business days after the conclusion of the transaction). An important feature of derivatives transactions is that little – relative to the notional value (principal amount) – or no capital, in the form of margin, is needed for the conclusion of the contract, thereby enabling synthetic leverage to be used. The main types of derivatives are forwards, futures, options and swaps. Forwards and futures are contracts under which two counterparties agree to exchange an underlying asset at a predetermined point in time in the future at a fixed price, as agreed on the trade date. Forwards are traded OTC and do not need to be standardised, while futures are always

² In an agency lending program, the investor appoints an agent (custody bank, asset manager or specialist firm) to lend its securities and manage the risks involved. If the agent lender acts on its own behalf and on its own book, it is the counterparty of the SFT. A lending agent is a role that is only applicable in the case of securities lending.



standardised and exchange-traded contracts. Options are asymmetric contracts, giving a counterparty (the buyer) the right to buy (call option) or sell (put option) the underlying asset during a specified period of time or at a certain point in the future at a pre-determined price (strike/exercise price), against the payment of an option premium to the other counterparty (the seller) for its obligation to act upon the buyer's request. Options are traded both OTC and on the regulated markets. Swaps are agreements under which counterparties agree to periodically exchange one cash flow stream against another on a notional principal amount, as set on the trade date.

30. **Participation in derivatives markets is driven by a variety of purposes.** Broadly speaking, derivatives can be used for hedging, speculating and arbitrage purposes. By hedging, investors can acquire protection against risks they are exposed to, such as market risks (e.g. movements in market variables – exchange rates, interest rates, equity prices, commodity prices), as well as credit risk (e.g. the default of an entity). Derivatives can also be used to speculate on the movement of a market variable or on a counterparty's creditworthiness: a speculator wishing to “make a bet” on a market movement needs to find another investor holding the opposite view, or wishing to transfer a particular risk. Lastly, derivatives can be used for arbitrage purposes, i.e. to exploit market inefficiencies that lead to differences in prices between financial markets.
31. **Derivatives can be either exchanged on a regulated market or over the counter (OTC).** Derivatives traded on an exchange are standardised, i.e. many of the terms describing the contract are pre-defined (maturity, delivery mechanism, etc.). Trading venues can be physical or (increasingly) electronic, and provide a centralised mechanism for price discovery. OTC derivatives can take the form of non-standardised, bespoke contracts, characterised in general by a lower degree of liquidity, and are primarily customised for counterparties wishing to hedge specific, complex risks. Following the 2008 financial crisis, the leaders of the G20 called on all standardised derivatives to be traded on regulated exchanges or electronic platforms, as part of efforts to increase the transparency of the derivatives markets. This requirement has been introduced in the EU via the Regulation on markets in financial instruments (MIFIR).
32. **After execution of a trade, exchange-traded derivatives are always centrally cleared, while OTC derivatives may be either centrally cleared or traded on a bilateral basis.** An increasing number of liquid and standardised OTC derivatives are being cleared through a CCP. Certain categories of OTC derivatives are subject to mandatory central clearing (following a mandate given by the leaders of the G20 in 2009 to mitigate systemic risks, EMIR implemented a central clearing obligation for the most standardised and liquid OTC derivatives). Others are centrally cleared by market participants on a voluntary basis, in order to benefit from the advantages offered in terms of multilateral netting and credit risk mitigation. Exchange-traded derivatives, on the other hand, are always cleared by CCPs (or clearing houses).³
33. **Derivatives exposures are not fixed, and can vary over the course of the life cycle of the transaction.** Compared to a typical SFT transaction, the life cycle of a derivatives trade can be long. Several months, years or decades can pass between the execution and

³ In Europe, there is an obligation to clear all exchange-traded derivatives through a CCP as of 2018 (Article 29(1) MIFIR).



settlement of a transaction. Moreover, as the value of the underlying asset changes over the life of the transaction, so do the exposures of the counterparties on either side of the transaction. Moreover, a distinctive feature of derivatives is that as the price of the underlying assets changes over time, the position of the counterparties may become interchangeable, where the one that owes money to the other (out-of-the-money) may subsequently become a creditor (in-the-money). This implies that each counterparty may be collecting collateral from the other at some point in time.

34. **Derivatives transactions can contribute to the creation of imbalances in the financial sector, via the build-up of synthetic leverage.** Synthetic leverage stems from the fact that derivatives create exposures contingent on the future value of an underlying asset, and allow counterparties to gain off-balance sheet exposures to asset classes without fully funding them (Battistini et al., 2016). Unlike cash assets, such as equities and bonds, that have a fixed supply (the total amount of the issue), derivatives are created at the point of execution, and there are no constraints in terms of overall volumes. The implication is that movements in prices of the underlying may determine the redistribution of profits and losses across the system for multiples of the underlying, due to the amplification effect created by large volumes of derivatives entered into and that have the same underlying.

2.1.3 Market size and structure

35. **In recent years, the European financial markets have undergone fundamental changes, which have resulted in collateral playing a much greater role in the financial system.** Although some of these developments pre-date the global financial crisis, such as the gradual shift towards secured funding, structural changes accelerated in the wake of the global financial crisis. In particular, a preference for collateralised lending developed, along with changes in the regulatory environment, such as the mandatory clearing of certain types of OTC derivatives that have fostered reliance on collateral.

2.1.3.1 Securities financing transactions

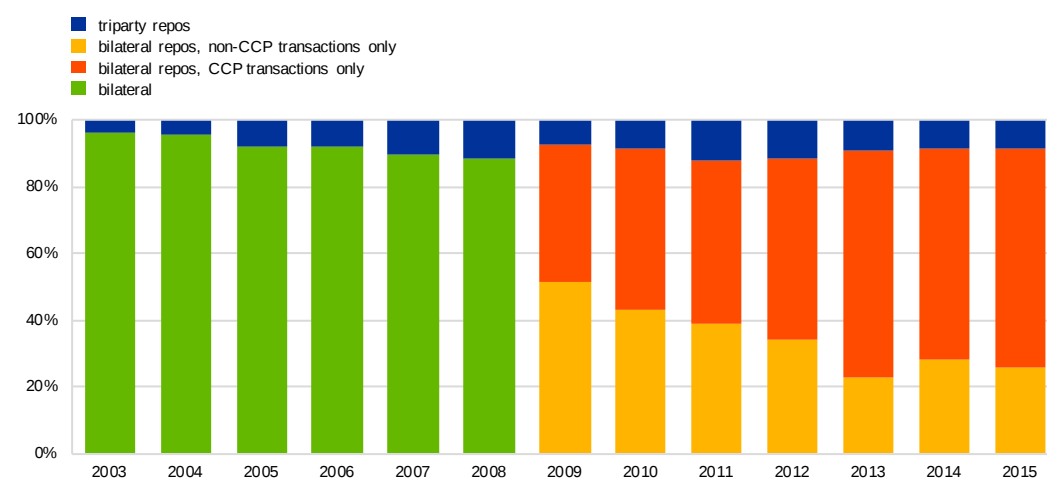
36. **At some EUR 6.1 trillion, the size of the securities financing transactions (SFT) market in Europe is large but data are incomplete.** Owing to the scarcity of official statistics, the SFT data obtained from industry surveys (ICMA, 2016 and ISLA, 2016) were primarily used in this report. These surveys provide information on repo markets, sell/buy-backs and securities lending, and report the gross amount of outstanding repos by European counterparties at around EUR 5.6 trillion and the amount of EU securities on loan at EUR 500 billion (EUR 1.8 trillion securities on loan globally). However, differences in definition and scope limit comparability across surveys. The lack of data on margin lending and transactions collateralised with commodities means that until SFTR reporting begins, any description of SFT markets will, however, be incomplete.
37. **The gross amount of outstanding repos is, at EUR 5.6 trillion, significantly larger than the amount of EU securities on loan (EUR 500 billion).** Recent data from the semi-annual survey of the European repo market conducted by the International Capital Market Association (ICMA, 2016) put the gross notional amount of repos at EUR 5.6 trillion as of December 2015. At EUR 500 billion, securities lending markets are smaller than repo markets in the EU. However, the range of participants in securities lending markets is usually broader than in repos (ISLA, 2016).



38. **SFTs are not subject to mandatory clearing, but the share of repo transactions that is centrally cleared has been increasing.** In repo markets, tighter capital requirements for banks stemming from exposures to other banks or non-banks (as opposed to exposures to CCPs) have contributed to a growing share of centrally cleared repos. This is particularly true for what are known as general collateral repos (in which a range of assets that are accepted as collateral by the majority of intermediaries is used for financing purposes at the same or very similar repo rates). According to the ECB Euro Money Market Survey (ECB, 2015a), close to 70% of euro area repo transactions (in terms of turnover) were centrally cleared in 2014 (Chart 1), while the ICMA European repo market survey (ICMA, 2016) suggests that, by notional amount, approximately 30% of all outstanding repos are centrally cleared. Comparable data for securities lending and margin lending transactions are not available. Anecdotal evidence pointing to the different uses of these transactions, as well as the structure and range of participants in securities lending markets, indicates, however, that the share of securities lending transactions that is centrally cleared is likely to be small (ESMA, 2016). In particular, as market participants would typically be either borrowers or lenders, they would obtain no benefits from multilateral netting, while the added cost of clearing trades through CCPs would reduce returns from securities lending activities. More generally, the different purposes that SFTs serve are reflected in the differences in market structures between the various segments of the SFT markets.

Chart 1

Share of centrally cleared transactions in Euro secured money markets (in %)



Source: ECB Money Market Survey 2015.

Notes: The panel comprises 98 credit institutions. Reporting of CCP-cleared transactions only started in 2009.

Repo and sell/buy-back markets

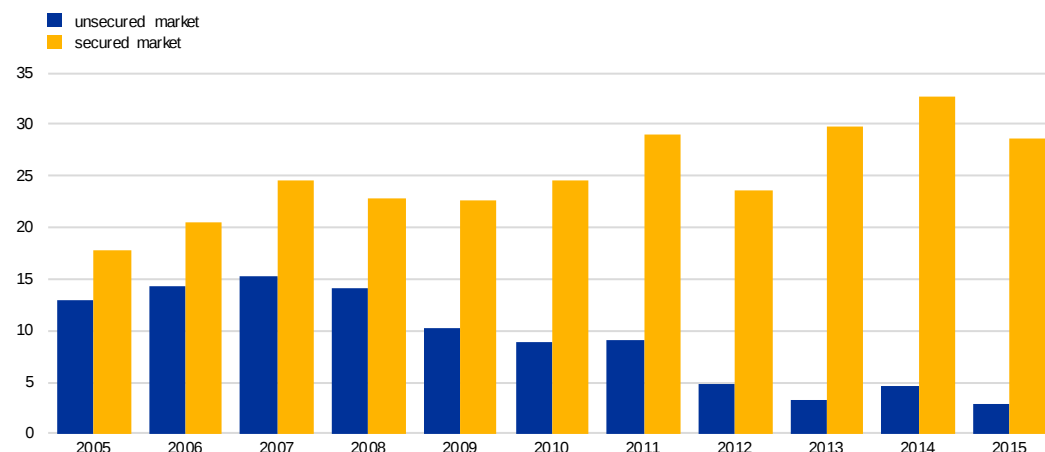
39. **Repo markets have become increasingly important as stronger reliance on secured funding, to a large extent, offset the decline in unsecured lending and borrowing.** For example, quarterly turnover in unsecured Euro money markets decreased from EUR 15.3 trillion in 2007 to EUR 2.8 trillion in 2015 (Chart 2). Over the same period, secured turnover increased from EUR 24.6 trillion to EUR 28.6 trillion. The role of repo markets may become even more pronounced in the near future, as the reference rates calculated on the basis of



repo rates are being considered as a potential substitute for benchmarks such as LIBOR or EURIBOR (Contiguglia and Osborn, 2016).

Chart 2

Secured versus unsecured money market turnover (EUR trillion)



Source: ECB Euro Money Market Survey 2015.

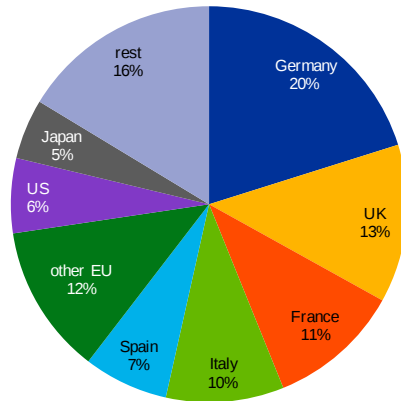
Note: Derivatives, such as overnight index swaps are excluded. The panel comprises 98 credit institutions.

40. **In Europe, around 90% of repos are collateralised with fixed income securities, with the vast majority issued by sovereigns, quasi-sovereigns or supranationals.** The ICMA survey (ICMA, 2016) shows that around 90% of repo transactions (incl. tri-party repos) in Europe are collateralised with fixed income securities, with the remainder of unknown type. In bilateral repo markets, the large majority of this is government bond collateral, and more than half originated from Germany, UK, France, and Italy (Chart 3). In the tri-party repo market segment, which accounts for around 10% of EU repo markets and which is usually used for financing purposes, the pool of collateral tends to be more diversified: sovereign debt accounts for around half of the total, compared with a combined share of 35% for transactions using corporate bonds, equities, covered bonds or securitised assets as collateral (Chart 4). The quality of the collateral in tri-party repos is high, nonetheless, with AAA and AA-rated securities making up more than 50% of the total (ICMA, 2016).



Chart 3

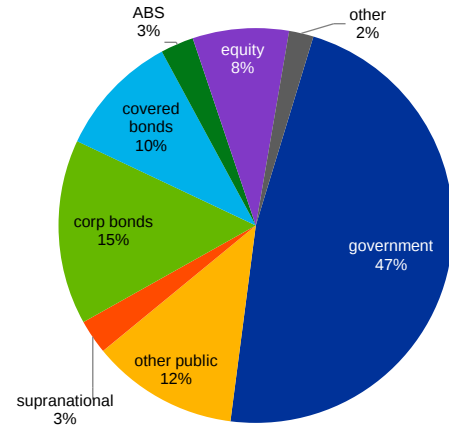
Origin of government bond collateral used in bilateral repos



Note: Share of collateral by issuer origin, data as of December 2015. Rest includes OECD, supranationals, and other fixed income. Source: ICMA (2016) and ESRB calculations.

Chart 4

Share of collateral used in tri-party repos, by asset class



Note: Share of collateral used in tri-party repos by type of collateral, data as of December 2015. ABS includes RMBS, CMBS, CDOs, CLOs. Source: ICMA (2016) and ESRB calculations.

Securities lending

41. **Government bonds account for two-thirds of EU securities on loan.** As at the end of 2015, there were around EUR 3 trillion in EU securities available for lending, including EUR 1.5 trillion in equities, EUR 1 trillion in government bonds and EUR 0.5 trillion in corporate bonds (Chart 5). The market value of EU securities on loan amounted to EUR 500 billion, two-thirds of which were government bonds and the rest mainly equities and corporate bonds (Chart 6).⁴ Thus, already one-third of all available government bonds has been used for securities lending. Other instruments such as asset-backed securities or exchange-traded funds are also sometimes borrowed.

⁴ Scope and definition differ from data reported in Keller et al. (2014) in a number of respects. For example, the data reported in Chart 5 and Chart 6 shows the value of EU securities on loan and do not include the value of EU securities borrowed to avoid double-counting. Moreover, Keller et al. (2014) report all transactions, including loans of non-EU securities.



Chart 5
EU securities available for lending (EUR bn)

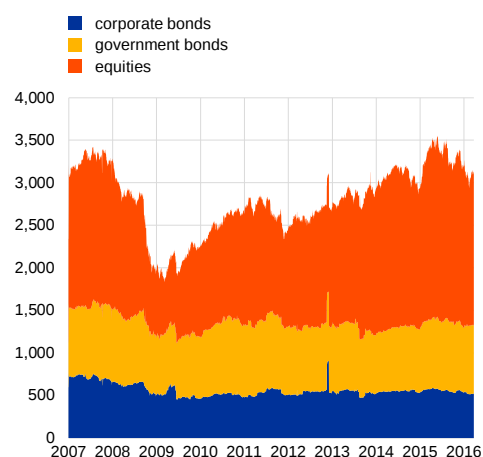
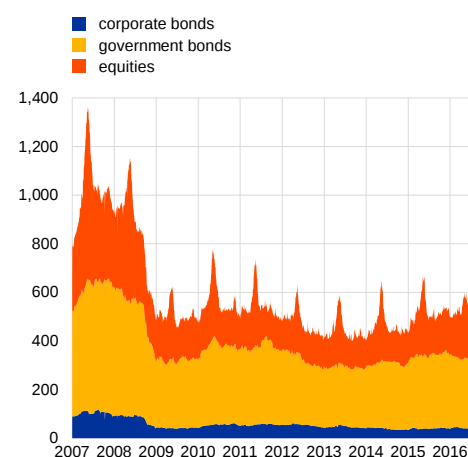
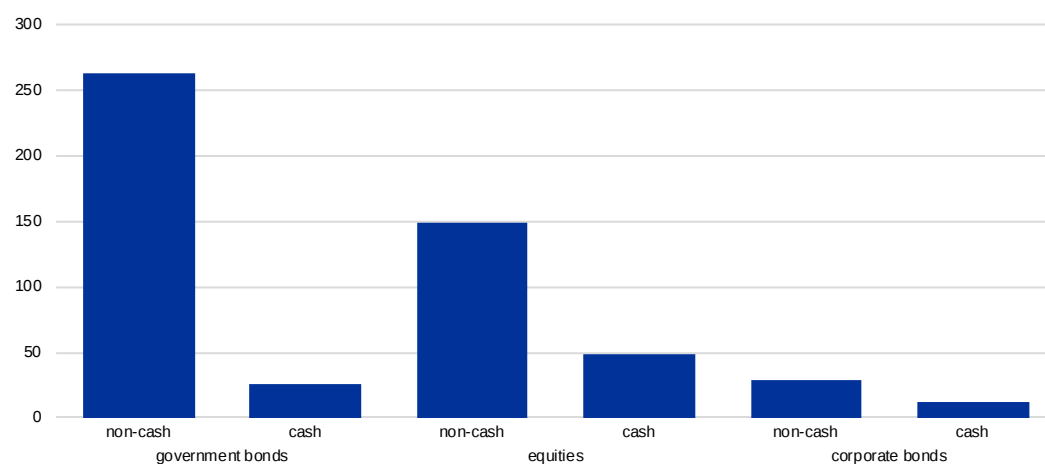


Chart 6
EU securities on loan (EUR bn)



42. **Most EU securities on loan are backed by non-cash collateral.** This is especially true in the case of EU government bond loans, where 90% of the collateral is non-cash, and to a lesser extent equity loans (Chart 7). The ISLA Securities Lending Market Report (ISLA, 2016b) shows that, as a share of non-cash collateral received globally, government bonds and equities dominate (48% and 41% respectively). Currently there are no data available on the sector of the borrowing counterparties, although feedback received from market participants suggests that a large share of transactions involve bank to non-bank exchanges.

Chart 7
Securities lending by type of collateral (EUR billion)

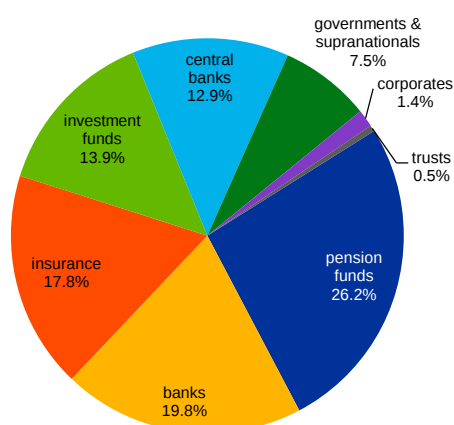


43. **The range of financial institutions involved in EU securities lending is typically broad.** For EU government bonds, institutional investors and banks account for the largest shares, with EUR 275 billion (44% of the total) and EUR 124 billion (20% of the total) respectively (Chart 8). For equities, the vast majority comes from investment funds with EUR 719 billion



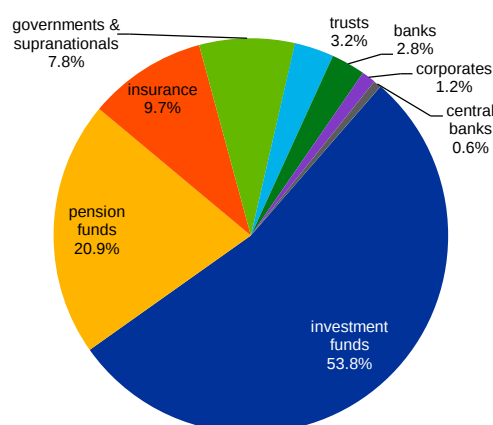
available for lending (54% of the total) (Chart 9). Public sector entities such as central banks, governments, public sector enterprises and public pension plans also participate in securities lending markets. A specific feature of securities lending markets is their reliance on agent lenders for a very large part of the market: around 75% for government bonds and 90% for equities. Agent lenders are typically large custodian banks or asset managers that lend securities held in custody, on behalf of beneficial owners.

Chart 8
EU government bonds available for lending, by type of beneficial owners



Note: Share of EU government bonds available for lending, by sector. Data shown are for 11 July 2016.
Source: ESMA (2016).

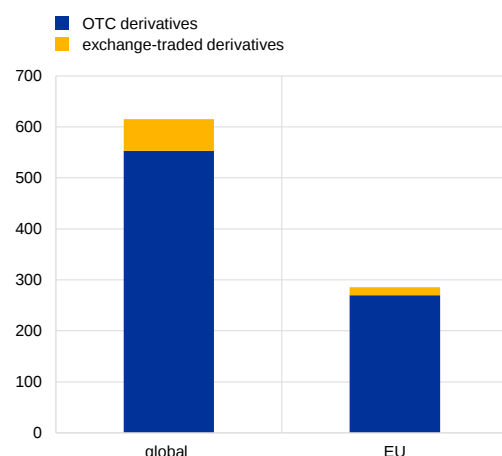
Chart 9
EU equities available for lending, by type of beneficial owners



Note: Share of EU equities available for lending, by sector. Data shown are for 11 July 2016.
Source: ESMA (2016).

2.1.3.2 Derivatives

Chart 10
Size and structure of the global derivatives market (USD trillion)



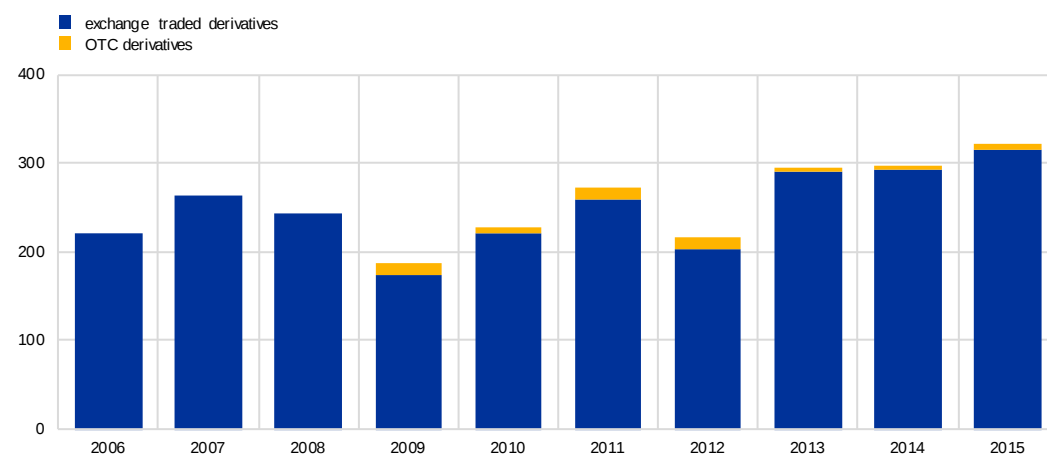
Note: Size in terms of notional amounts outstanding. Data refer to end-June 2015.
Source: ECB Financial Stability Review (May 2016).

44. At USD 615 trillion (in notional amount outstanding), the size of the global derivatives market is large, with the OTC market accounting for almost 90%. Interest rate derivatives represent the biggest category (around 83%), followed by foreign exchange derivatives (13%) and credit derivatives (2.5%), with equity and commodity derivatives jointly accounting for 1.5%. According to data from the Bank for International Settlements (BIS, 2015), the notional amount of outstanding OTC derivatives contracts was USD 553 trillion in May 2015, with Europe accounting for around 50% (Chart 10). In spite of the commitment taken by the G20 during its 2009 Pittsburgh summit to shift (standardised) OTC derivatives trading to regulated markets, the global size of the ETD market remains small, at about USD 63 trillion, with Europe accounting for around 30% (BIS, 2016).



45. **The size of the market for OTC derivatives, in terms of notional values of positions, is decreasing at global level.** The notional amount of outstanding OTC derivatives contracts decreased from USD 629 trillion in December 2014 to USD 493 trillion in December 2015 (BIS, 2015). Gross market values also dropped to their lowest level since 2007 (from USD 20.9 trillion in December 2014 to USD 14.5 trillion in December 2015). One of the main drivers of the decrease in the size of the market for OTC derivatives, in terms of the notional amounts outstanding, is the increasingly widespread use of portfolio compression, a post-trade risk reduction service that eliminates economically redundant trades in a given portfolio of OTC derivatives, leaving the portfolio unchanged in terms of risk, but reducing the number of individual contracts. This results in a reduction in the notional amounts outstanding, but not necessarily in the scale of activity.
46. **The relative weight of centrally cleared derivatives transactions has increased at global and EU level.** Unlike exchange-traded derivatives, which are systematically submitted for central clearing by the exchange, OTC derivatives transactions can (depending on the degree of standardisation of the product, the existence of a mandatory clearing obligation, and the interest of the parties) be either centrally cleared or non-centrally cleared. Focusing on the EU market, data from the European Central Bank (ECB) shows that the value of derivatives contracts cleared through CCPs in the EU increased by 37% (from EUR 227 trillion to EUR 312 trillion) over the period 2006-2014 (Chart 11) i.e. before the introduction of mandatory clearing.⁵ Moreover, within the total OTC derivatives markets, the share of centrally cleared transactions is also increasing.

Chart 11
Value of transactions cleared (EUR trillion)



Note: Annual data. LCH.Clearnet Ltd not included due to missing data.
Source: ECB SDW.

47. **Forthcoming regulation may impact the structure of the markets.** As explained in section 4, the forthcoming regulation sets backstop levels for collateral requirements in non-centrally cleared transactions while moving some transactions to CCPs, where the collateral

⁵ There are no data on LCH.Clearnet Ltd., the largest EU-based CCP, thus reducing the informative value of this source.

requirements are generally higher than in bilateral clearing. This is likely to impact the development of the market structure going forward.

2.2 Terminology, concepts and market practices

48. **This section is designed to provide the basis for an understanding of why the terms governing collateral requirements have implications for financial stability.** It sets out the terminology, how to think about margins and haircuts conceptually, and how margins and haircuts are used in practice.

2.2.1 Terminology and concepts

49. **The terms “margins” and “haircuts” are often used interchangeably but are distinct concepts related to collateral.** This report will use the term “margin” when referring to the collateralisation of an exposure to mitigate counterparty credit risk. It will use the term “haircut” when referring to the discount applied to collateral, which aims to mitigate the risk that a fall in the market value of that collateral would leave a party exposed in the event of a default by the other party. Other discounts applied to collateral and add-ons to margins will be referred to as “haircut add-ons” and “margin add-ons” respectively. These, and related terms, as well as their use in both centrally and non-centrally cleared derivatives and in SFTs are described in more detail below and summarised in Table 1 and Table 2 at the end of this section.
50. **Depending on the market segment, the quality and liquidity of assets accepted as collateral vary.** Although collateral can take the form of real assets (e.g. a property backing a mortgage), in the derivatives and SFT markets considered in this report, collateral typically takes the form of financial assets – cash or securities transferred (or pledged)⁶. Assets that meet certain criteria to be used to collateralise a transaction are referred to as “eligible collateral”. Eligible collateral mostly consists of high-quality and very liquid assets, such as cash or cash-like instruments. What constitutes accepted collateral is, in bilateral transactions, typically negotiated between counterparties within the limits set by the relevant regulation and can, depending on the transactions and counterparties involved, vary significantly; in central clearing, the collateral schedule is determined by a CCP, in accordance with the relevant regulatory framework (the EMIR in Europe).

2.2.1.1 Margins

51. **Margins are designed to protect a party against losses stemming from the default of its counterparty.** The nominal exposure to a counterparty arising from a transaction may be fixed or may vary over the term of the transaction. In a SFT, the nominal exposure might be fixed (e.g. the amount of cash lent in a repurchase agreement is fixed) or variable (e.g. the value of the securities lent in a securities lending transaction might increase over time). In a derivatives transaction, the nominal exposure would typically vary (e.g. the value of a call

⁶ An outright transfer constitutes the title transfer, i.e. the transfer of full ownership in an asset, whereas a pledge secures an obligation by creating a security interest (lien) in the collateral that is provided. The difference often depends on the design of the national securities laws.



option would rise as the value of the underlying asset increases). The margin thus needs to cover two conceptually separate risks: first, exposures that arise from current market price movements of the underlying asset (current exposures, covered by variation margin); and second, potential future exposures that might arise from execution shortfall in terms of liquidating/replacing trading positions once a counterparty has defaulted (covered by initial margin). In this sense, margins can be thought of as the pre-paid losses that a party will require from the other to protect itself from the default of the latter.

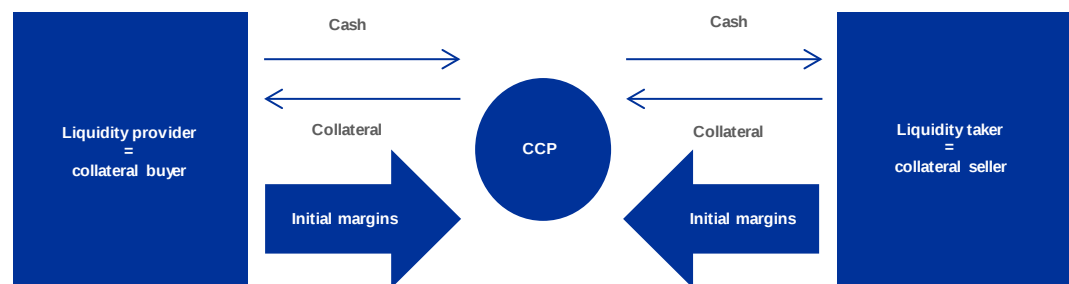
52. **Current exposures that have arisen from a change in prices in a transaction are usually covered through “variation margin”.** Variation margining is typically provided in cash of the same currency denomination as the underlying exposure. The cash is collected on a regular basis (typically daily) by calculating net mark-to-market gains or losses on trading positions. Variation margins thus act as a pay-as-you-go mitigation of counterparty risk, routinely offsetting imbalances as they arise, and preventing any build-up of uncollateralised exposures. Because of its nature as a loss-offset, variation margin, even when not in the form of cash, is freely usable by the collecting counterparty; the collecting counterparty typically re-hypothecates non-cash collateral. As one counterparty's gain is another counterparty's loss, variation margins are one-way only, from the counterparty bearing the loss (out-of-the-money) to the creditor counterparty (in-the-money); and the sum of all variation margins paid and received by all counterparties across the system is zero. Variation margins effectively collateralise outstanding profits and losses imbalances throughout the system.
53. **Future exposures that can arise from movements in prices in a transaction after a counterparty has defaulted are covered through “initial margin”.** Initial margin typically takes the form of cash or highly liquid securities with little credit and market risk, as required by regulation. It is collected when initiating a transaction with a view to covering losses that might arise from market price movements between the time the variation margin was last exchanged and the time the defaulting participant's positions can be hedged or liquidated. This period is known as the “liquidation period” or the “margin period of risk”. Through initial margin, each counterparty provides the other with pre-paid losses for closing out trading positions in the event of a default. For this protection to be two-way, symmetrical and effective, initial margins, when exchanged, cannot offset each other, and must be segregated.
54. **Margins are an essential part of the risk management of CCPs and will also become mandatory in bilateral derivatives transaction.** A CCP interposes itself between the two transacting parties, becoming the seller to the buyer and the buyer to the seller through a process called “novation” (or through an “open-offer” system), thereby replacing the web of bilateral transactions with a hub-and-spoke structure that has the CCP at the centre. CCPs deliver multilateral netting of bilateral exposures, because each trading entity faces a single counterparty, and all positions by any counterparty can be netted, regardless of whom they originally traded with. Margins play a critical role in the risk management of CCPs, which act as principals to all cleared transactions. CCPs rely on frequent exchanges of variation margins. Variation margins are recirculated throughout the system of the members, and in this case, the CCP acts as a mere pass-through by redirecting cash flows across the system, with a zero-sum impact. Initial margins, however, are collected unilaterally by the CCP, and will be used to maintain the variation margins payment on the positions of the defaulting members until such positions are closed out. The exchange of margins will also become mandatory in bilateral derivatives transactions as further described in Section 4.
55. **The default fund is another essential part of the risk management framework of CCPs and its possible interaction with margins needs to be considered.** While margins are the



first line of defence in the “waterfall” of CCPs, the default fund – a pool of contributions by clearing members for use in the event of excess losses due to one or several member default(s) – also plays an important role. Through the mutualisation of losses via the default fund, CCPs combine the defaulter-pays risk framework with survivor-pays aspects. CCPs have some degree of freedom in designing their waterfall resources, i.e. whether they collect higher initial margins and lower default fund contributions or lower initial margins and higher default fund contributions. While this report focuses on the use of margins and haircuts to meet macroprudential objectives, for CCPs there is a possible interaction with the default fund that needs to be considered. While the waterfall also contains own funds of the CCP (skin-in-the-game), the regulatory capital has to cover credit, counterparty, market, operational, legal and business risks, which are not already covered by the default waterfall resources, and the costs of winding down a CCP. Compared to the volume of transactions, CCPs have little capital to fall back on.

56. **Reflecting the different nature of exposures, margining arrangements differ depending on the type of transaction and clearing arrangement.** The use of variation and initial margin for centrally cleared and non-centrally cleared derivatives transactions is typically deployed to counteract the changes in current and future exposures associated with the derivatives’ life cycle. Initial and variation margin are also exchanged in centrally cleared SFTs albeit that they typically address changes in nominal exposure but could reflect changes in the value of the collateral securing a given nominal exposure. If, for instance, the values of the collateral in a centrally cleared repo transaction fall, the CCP might ask for additional cash in variation margin to ensure it has enough collateral to cover its exposure. (Figure 1 illustrates the initial margin provision in a centrally cleared repo transaction). An exchange of initial margin or variation margin is not stipulated in non-centrally cleared SFTs, although counterparties will sometimes contractually agree to make a “margin call” if the fall in value of the collateral securing a transaction is so large that the haircut no longer sufficiently covers the risks.

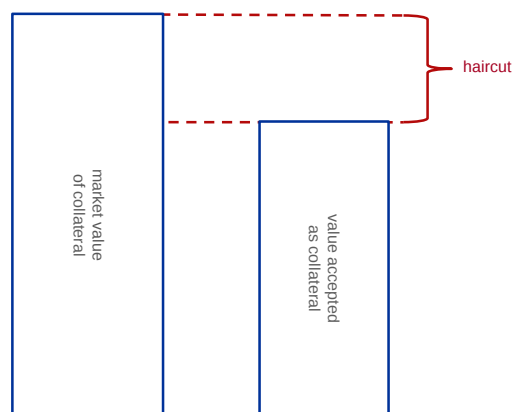
Figure 1
Illustration of initial margin provision in a CCP-cleared repo



Source: Miglietta et al. (2015).

2.2.1.2 Haircuts

Figure 2
Illustration of collateral haircut



Source: ESRB.

57. **In order to account for the risk that the market value of the collateral falls, a “haircut” is applied to the collateral.** The market value of non-cash collateral (or cash collateral denominated in a currency other than the exposure being collateralised) will typically fluctuate over time. If the market value of the collateral falls after the borrower has defaulted and the collateral needs to be liquidated, this exposes the lender to the risk that the proceeds from the sale of the collateral will be insufficient to recover the loss. To mitigate the risk of execution shortfall in liquidating the collateral, the amount that is recognised as collateral is typically less than the market value of the collateral (Figure 2). This discount to the market

value of collateral is functionally similar to the down-payment in a mortgage loan secured against a property and is referred to as a “haircut”. In securities lending transactions, established market practice is that the market value of collateral received has to be higher than that of the security being lent and the overcollateralisation, while conceptually a haircut, is referred to as “margin”.

58. **Unlike margins, haircuts are specific to the collateral posted. For centrally cleared transactions, haircuts are defined in CCP rule books.** In bilateral markets, master agreements used by counterparties typically contain a Credit Support Annex which clearly specifies type, credit quality and applicable haircuts for all eligible collateral. In many cases there are specific minimum standards below which counterparties are required to promptly replace collateral that is no longer deemed acceptable.

2.2.1.3 Haircuts, margins and leverage

59. **Financial leverage is constrained by the haircut percentage applied to collateral and margin amount.** This holds true provided that market participants are unable to fund assets through unsecured borrowing. For example, Brunnermeier and Pedersen (2009), in considering the margin borrowing on securities, note that haircuts on securities must be financed with a market participant’s own capital. Securities bought by a market participant can be used as collateral in SFTs to obtain financing. But the market participant cannot borrow an amount equal to the market value of the security due to the haircut. For example, given a haircut of 10%, the borrowing capacity of an owner of a single security worth EUR 100 would be limited to EUR 90. This implies that in a market where unsecured funding is not available, the total haircut on all positions of a given market participant cannot exceed the market participant’s capital at any time. Thus, similar to reserve requirements in fractional reserve banking, haircuts constrain the degree of financial leverage, with higher haircuts imply lower financial leverage and vice versa. A similar argument can be made for the need to provide initial margin in centrally cleared transactions.
60. **Synthetic leverage is constrained by the amount of initial margin applied on a derivatives transaction.** Initial margins act as a limit on the amount of synthetic leverage that



can be created with a given amount of equity (Breuer, 2002, Battistini et al., 2016). For example, a margin requirement equal to 2% of the value of a futures contract implies a maximum leverage ratio of 50. The higher the value of the initial margin compared to the value of the contract, the lower the amount of leverage that can be created via a derivatives trade. The effects of margins are compounded with the leverage-reducing effects of haircuts when non-cash collateral is posted to fulfil margin obligations.

Table 1
Comparison of terminology used

Economic concept \ Transaction type	Derivatives	Repo	Securities lending	Mortgage Loan
Collateral	Cash / securities 5 (potential future exposure = 100)	Securities 100	Cash / securities 100	Real estate 100
"Loan"	Notional amount 95	Cash 95	Securities 95	Cash 95
"Own capital"	Cash / securities 5	Cash 5	Cash / securities 5	Real estate 5
Terminology	Initial margin 5.3% Independent amount 5.3%	Haircut 5% Discount 5%	Margin 105.3% Overcollateralisation 105.3%	Down payment 5% Loan-to-value (LTV) 95%
Leverage (Debt / Capital)	19x	19x	19x	19x

Source: Adapted from a presentation given by Tomas Garbaravičius (Lietuvos bankas) at the ESRB Conference on "The Macroprudential use of Margins and Haircuts" on 6 June 2016.

Table 2
Use of margins and haircuts in centrally and non-centrally cleared derivatives and SFTs

	Centrally cleared	Non-centrally cleared
Derivatives	Initial margin Variation margin Collateral haircut	Initial margin Variation margin Collateral haircut
SFTs	Initial margin Variation margin Collateral haircut	Collateral haircut (1)

Source: ESRB.

Note: (1) The concept of a collateral haircut in non-centrally cleared SFTs is for some SFTs referred to as margin (see also Table 1).

2.2.2 Market practice governing collateral terms

- Market practices governing collateral terms can differ depending on the type of transaction and whether or not transactions are centrally cleared.** The Committee on the Global Financial System (CGFS) provides a detailed overview on market practices of collateral terms based on bilateral interviews with market participants (CGFS, 2010). More recently, ESMA met with industry associations and market participants to gather information on existing market practices on SFT haircuts (ESMA, 2016). Moreover, CPMI-IOSCO has recently surveyed how CCPs apply new rules on calibration, which were introduced in the regulation following the crisis (CPMI-IOSCO, 2016b). These reports confirm that practices can differ depending on the type of transaction and clearing arrangements. Moreover, before the



financial crisis and the increased sophistication and greater use of margining techniques by the industry, the distinction between initial and variation margins was somewhat blurred. Market intelligence suggests that counterparties would typically class themselves as between buy-side and sell-side, with the buy-side perceived as the risk to the sell-side. Margins, in the form of commingled initial and variation margins, were called by the sell-side from buy-side clients (one-way margining) with rather crude methodologies and updated only infrequently.

2.2.2.1 Initial margin

62. **CCPs calibrate initial margins for derivatives and SFTs based on internal risk-based models.** CCPs use a range of models to calibrate initial margins based on historical data. Most EU CCPs use variants of Value at Risk (VaR) models, including Expected Shortfall (ES) models, or the Standard Portfolio Analysis of Risk (SPAN) model. As the volatility of the underlying transaction is a key determinant of possible future exposures in the event of a default by a clearing member, it is a key input into these models. As a result, these models typically indicate higher initial margin requirements during periods when volatility is high relative to its historical average and lower margin requirements during periods when volatility is low relative to its historical average. Although there are minimum regulatory standards on how to calculate initial margins (see Section 4), the margin requirements calculated by CCPs for identical financial instruments and trading portfolios can vary as a result of differing modelling assumptions and choices (e.g. the degree to which short term volatility is reflected in the calculation of the margin, the choice of a confidence level that is higher than the minimum requirements, the share of risk covered by default fund contributions, and the choice of risk factors included in the model).
63. **The initial margin requirement for centrally cleared repo transactions is generally small compared to a centrally cleared derivatives transaction.** This reflects the intrinsic features of the transaction (exchange of typically highly liquid and high-quality collateral against cash). However, it may still constitute a significant cost. Miglietta, Picillo, and Pietrunti (2015) find that the effect a 100-basis-point variation in the initial margin on the cost of funding observed in the general collateral segment of the Italian MTS Repo market is equal to approximately three to four basis points, on average. These costs might in some cases be counterbalanced by benefits stemming from multilateral netting of transactions and, consequently, lower capital requirements. Most CCP-cleared repos are negotiated on electronic repo trading venues but repos negotiated directly between counterparties or via a voice broker can also be cleared by a CCP (CPSS, 2010).
64. **Following the future entry into force of the EMIR requirements for non-centrally cleared derivatives transactions, counterparties in these transactions will calibrate initial margin based on minimum regulatory standards.** Mandatory margin requirements are due to come into effect for these transactions in 2017. Internal initial margining models in bilateral markets follow the same principles as in centrally cleared markets (although they are designed to provide a higher level of coverage, reflecting the heightened risk in non-centrally cleared markets): potential future exposure is calculated based on historical data, which means that a rise in the short-term volatility of the underlying transaction results in an increase in potential future exposure in the event of a counterparty default, leading to higher initial margins. As is the case for centrally cleared transactions, initial margins on identical non-centrally cleared portfolios can differ (in spite of mandatory minimum requirements) as a result of model choices and assumptions. Moreover, counterparties can also use a standardised approach for the calculation of initial margins.



65. **Initial margin may include various add-ons.** Initial margins may include add-ons, such as concentration add-ons aimed at addressing the concentration of a participant's position, or creditworthiness add-ons aimed at providing extra coverage for counterparties with a higher probability of default. The sum of initial and add-on margins is sometimes referred to as total margin requirement.

2.2.2.2 Haircuts

66. **CCPs calibrate haircuts on collateral for derivatives and SFT transactions to cover the potential change in its value under stressed market conditions.** Similarly to initial margins, CCPs calibrate their haircuts on the basis of the asset's historical price volatility (with standard VaR models being the most frequently used). Requirements for the calculation of haircuts are not as prescriptive as the equivalent requirements for margins: EMIR requires CCPs to include stressed periods in the calculation of their haircuts, but does not prescribe minimum parameters for the model calibrations (such as a minimum lookback period). Furthermore, some CCPs use different haircuts depending on the timespan since the last available market price. That means, if a security is traded only irregularly, higher haircuts might apply on this less liquid security. In a nutshell, this means that CCPs may apply different haircuts for the same asset. CCPs differ in the frequency with which they assess (and if necessary, adjust) their collateral haircuts. However, haircut adjustments can be performed more frequently in periods of stress, where the valuation of the collateral exhibits greater volatility.
67. **Counterparties in non-centrally cleared derivatives will be able to calibrate haircuts based on risk-based models or schedules.** Under the terms of the draft technical standards adopted by the European Commission in October 2016, participants in bilateral derivatives markets will have a choice between two approaches when calculating the adjusted value of their collateral: either using the standardised haircut schedule presented in the draft technical standards, or using their own estimates, based on internal models. If the latter approach is used, the draft technical standards set out a number of minimum conditions to be met, such as the frequency with which haircuts must be updated (once every three months, or sooner if volatility changes materially), the internal review process to be followed, and the minimum variables to be applied when calibrating the models (99% confidence level, 10-day liquidation period etc.).
68. **Haircut-setting practices in non-centrally cleared SFTs differ across markets and participants, but haircuts are generally fixed over the tenor of the transaction.** ESMA (2016) provides market intelligence on haircut-setting practices. It reports that haircuts are agreed contractually before execution of the trade and cannot change for the entire duration of the transaction, therefore they need to be sufficiently high to cover potential large price declines, including in securities lending markets where the transaction lengths often span several months. However, haircuts may change when market participants enter into new transactions. In repo markets, where transaction lengths are often short, haircut movements are thus more frequent than in securities lending markets where transactions tend to be longer. The volatility of haircuts is also reported to differ between market segments and to depend on the price level of the securities – percentage point changes in haircuts tend to be larger for lower-priced securities than for higher-priced securities. The methodologies used for calculating haircuts can be qualitative, quantitative or a combination of the two. The factors and complexity of methodologies vary greatly from one firm to another. A single firm may rely on quantitative methods for conventional transactions but qualitative methods for others (e.g.



bespoke transactions, or trades with non-banking counterparties). In securities lending markets, some market participants rely on haircut grids from which traders can deviate up to a certain percentage, depending on the liquidity and credit quality of the collateral.

69. **Haircuts may include various add-ons to address risks inherent in the collateral.** Add-ons include elements for concentration and wrong-way risk. Add-ons for concentration risk are designed to mitigate the risk from concentrated exposures to a single issuer or correlation risk between securities or asset classes. They provide additional protection as – in the event of a counterparty default – selling a large amount of the same or similar collateral in a short space of time might trigger an adverse price effect. Add-ons for wrong-way risk are designed to mitigate the risk that the value of the collateral provided by a counterparty would fall as a result of that counterparty defaulting. Such a correlation between the value of the collateral and the creditworthiness of the counterparty providing the collateral could result from the collateral provider performing important functions in the securities pledged as collateral.
70. **Haircut add-ons are also used to address risks not inherent in the collateral.** While haircuts relate conceptually to the risk that the market value of the will collateral fall, CGFS (2010) and ESMA (2016) noted that, in practice, haircut add-ons are also used to differentiate between counterparties according to their perceived creditworthiness. In addition, haircut add-ons may reflect operational risks and legal risks related to identifying when a counterparty is in default and its collateral can be seized for liquidation. More generally, overall haircut levels may reflect competitive pressure and may, in non-centrally cleared transactions, take into consideration specific client relations and negotiation between counterparties.



Section 3

The need for macroprudential policies to mitigate systemic risk

3.1 Leverage, systemic risk and financial stability

71. **The build-up of excessive leverage within the financial system is a major source of systemic risk.** It amplifies direct and indirect contagion channels and is thus an important issue for financial stability considerations. The impact of leverage on systemic risk has been analysed in several academic studies and is generally recognised by academia. In an empirical study, Schularick and Taylor (2012) analyse a large historical dataset covering 14 developed countries over 140 years. They document a large increase in leverage after WWII and an uncoupling of money and credit. They show that expansion of the financial system and the increase in leverage is sometimes associated with financial instability. Dées (2016) analyses the link between the financial cycle and the business cycle in a global VAR model with data from 38 countries from 1987 until 2013. The study finds a large and persistent influence of financial variables on real economic fluctuations. Brunnermeier and Sannikov (2014) build a continuous-time macroeconomic model with a financial sector and heterogeneous agents. The model dynamics show that systemic (endogenous) risk builds up in times of low exogenous risk due to the increase of leverage. Moreover, the model shows non-linear dynamics. It enters a crisis state when large shocks hit the economy after a build-up period of leverage and systemic risk. This crisis state shows high persistency due to the deleveraging of the financial system. These findings in the economic literature suggest that macroprudential policy should be concerned with the changes in leverage within the financial system.

3.2 Systemic risks from procyclical collateral requirements

72. **This section sets out the systemic risks stemming from procyclicality in collateral requirements.** It describes the nexus between the inherent procyclicality in collateral requirements, margin and haircut practices, and leverage and how they can reinforce each other to lead to negative asset price spirals and deleveraging. In doing so, it mainly draws on the work of the following influential studies which have focused on various aspects of this nexus: Brunnermeier and Pedersen (2009) find that procyclicality in margins can force capital-constrained borrowers to fire-sell assets in order to meet higher collateral requirements in volatile markets and thus create a liquidity spiral. Geanakoplos (2010) shows that system-wide leverage tends to increase in periods of optimism and that the interplay between volatility, increasing haircuts and losses by highly leveraged investors amplifies negative effects on asset prices. Acharya and Viswanathan (2011) argue that deleveraging is particularly large when adverse shocks happen in good economic times, as the low cost of short-term debt in good times induces highly leveraged financial institutions to enter the market, and which are forced to deleverage once the ability to roll over short-term debt is restricted by a declining economic outlook. Gai, Haldane and Kapadia (2011) show how market concentration and network complexity can further amplify these effects.



3.2.1 Procyclicality in collateral requirements

73. **Collateral requirements are inherently procyclical due to collateral valuations; a mechanism that is reinforced by margining and haircut practices.** Procyclicality has a number of aspects that are closely interlinked and feed into each other. While Section 4 and Section 5 consider in more detail which of these aspects are being and/or could be addressed by microprudential rules and macroprudential policy respectively, this section refers to procyclicality in a broader context. In particular, the term procyclicality is used as shorthand for the mutually reinforcing mechanisms that amplify fluctuations in financial markets, which, in turn, may result in negative feedback loops with the real economy. Collateral valuations and margining and haircut practices are part of these mutually reinforcing mechanisms.
74. **Even if margins and haircuts were fixed, collateral requirements would be inherently procyclical because of the effects of changes in asset prices on valuations.** As asset prices rise, the valuations of securities that have been provided as collateral increase. This means that a smaller nominal quantity of securities is required to collateralise a given cash equivalent. This frees up collateral for use in other transactions. For example, assuming a 5% haircut, 20 securities each worth EUR 5 can support borrowing of EUR 95. If the price of the securities rose by 5% to EUR 5.25, the same EUR 95 of borrowing could be supported by 19 securities or, alternatively, the 20 securities would now collateralise borrowing EUR 99.75. Conversely, a fall in asset prices will trigger equivalent calls for more collateral to compensate for the lower valuation. This automatic valuation mechanism in the upswing and downswing of the “asset price cycle” is in itself procyclical, as it applies to all non-cash collateral. With the new regulation, the quantitative importance of this mechanism might grow in the future.⁷
75. **Risk models used to calibrate margins and haircuts reinforce these procyclical changes in collateral requirements.** As described in Section 2, CCPs use, and counterparties in bilateral transactions may use, risk-based models to set margin and haircut requirements. Changes to one or more input variables of these models lead to an equivalent cyclical adjustment of margins or haircuts. Such mechanical adjustments are an important tool for CCPs and counterparties to mitigate risk in cleared transactions and do not have to be harmful for the financial system per se. The models used are, however, typically based on a positive correlation between the price volatility of the underlying transactions and the level of margins and haircuts, and a negative correlation with market liquidity. As initial margins are set to cover losses associated with the liquidation or hedging of a defaulted counterparty's portfolio, they tend to be higher when markets are less liquid. Similarly, for collateral haircuts, the default risk of the collateral issuer and the market risks to the collateral's liquidation value are positively correlated with price volatility and negatively correlated with market liquidity. Consequently, margins and haircuts will be reduced in the upswing of the asset price cycle when volatility is low and market liquidity high, and raised in the downswing of the asset price cycle when volatility increases and market liquidity dries up. Some margin and haircut add-ons are similarly procyclical as they are often linked to the creditworthiness of counterparties, which will tend to be higher during the upswing than the downswing of the asset price cycle. Risk models used to calibrate margins and haircuts thus reinforce the procyclical effects of

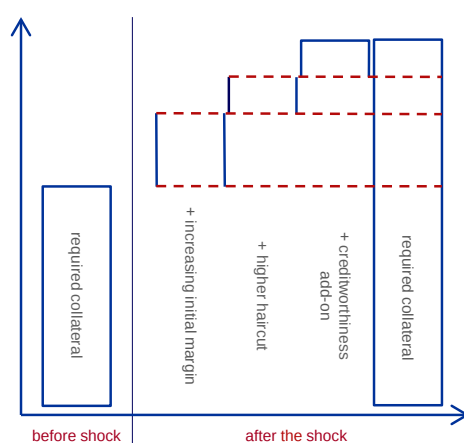
⁷ The mechanism will be impacted by the gradual introduction of the clearing obligation, the introduction of mandatory initial margin exchange in bilateral derivatives, and the implementation of the payment of variation margin for non-centrally cleared derivatives, which contains provisions for non-cash variation margins.



changes in collateral requirements in the financial system. These procyclical spirals are described by Brunnermeier and Pedersen (2009) with a particular focus on the interaction between funding liquidity and market liquidity.

76. **Asset price changes and margin and haircut practices can interact in complex ways.** When the changes in value of the collateral used in derivatives or centrally cleared transactions are highly correlated with the changes in value of the underlying asset, then asset price changes and margin and haircut practices interact to amplify procyclicality in collateral requirements. If the initial margin in an interest rate swap is provided in the form of government collateral, volatility and liquidity levels in government bonds will simultaneously impact margin levels, collateral valuations and haircuts on collateral. Similar dynamics would apply if the initial margin in a centrally cleared repo transaction secured by French government bonds is provided in the form of Italian government bonds. In stable markets, margins will be low, haircuts reduced and leverage levels will tend to be high. However, when a shock materialises, the impact will be a compounded synchronous increase in margin levels, additional margin calls to replenish depleted collateral, and increased haircuts.
77. **Competitive pressure can be a contributing factor to procyclicality in collateral requirements. Market participants may try to grow their business by reducing haircuts when market conditions improve.** Similarly, in the upswing of the asset price cycle, CCPs might have an incentive to reduce margins and haircuts to attract more clearing volumes. Minimum calibration requirements set out in regulation are designed to address the risks that CCPs would try to “undercut” each other to gain business and EMIR requires all CCPs to take precautions for procyclical spikes. Nevertheless, based on US data, Abruzzo and Park (2016) indicate that competition among CCPs can be a significant driver of margin levels and Krahnen and Pelizzon (2016) point to the risk of competition between CCPs. Competitive pressures would contribute to the system-wide build-up of leverage and increasing the potential for sudden and sharp spikes in initial margins, haircuts and/or margin add-ons during the downswing of the asset price cycle.

Figure 3
The impact of a shock on total collateral required by CCPs



Notes: In this stylised example, the vertical axis represents CCP collateral requirements and the horizontal axis measures time. When asset prices fall, additional collateral will be required to account for the effect of lower asset prices, higher initial margins, higher haircuts on collateral and potential creditworthiness add-ons.
Source: ESRB.

78. **Taken together, changes in initial margins, haircuts and creditworthiness add-ons can lead to significant changes in collateral requirements.** The combined impact of possible procyclical changes in collateral requirements on the total collateral requirements faced by CCPs' clearing members is illustrated in Figure 3, which shows an example where initial margins, haircuts and creditworthiness add-ons are increased simultaneously due to an external shock.



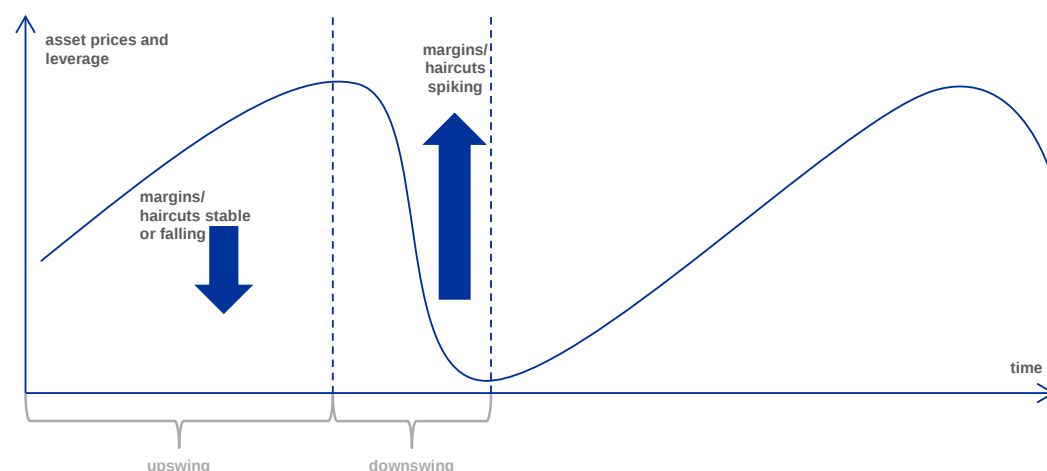
3.2.2 Procyclicality in collateral requirements and the link to leverage

79. **Procyclicality in collateral requirements can foster excessive leverage in the upswing of the asset price cycle.** Geanakoplos (2010) describes an environment of exuberance during an upswing of the asset price cycle, in which market participants use the collateral freed up by higher asset prices and/or lower haircuts and margins to borrow cash to purchase further assets. In doing so, they drive up asset prices further, which, in turn frees up more collateral. In this “leverage cycle”, market participants can thus constantly increase their financial leverage as more cash can be borrowed for the same amount of collateral, while they can also increase their synthetic leverage through further contingent commitments from swaps, futures and other derivatives. In addition, increasing risk appetite and the search for yield behaviour of market participants may fuel the build-up of collateralised borrowing and derivatives exposures.
80. **Procyclicality in collateral requirements can lead to a painful deleveraging process in the downswing of the asset price cycle.** As asset prices fall, market participants must start to post more collateral to meet margin calls, due to the fall in collateral values, increased initial margins and/or haircut increases. As a result, they might be forced to close out positions, which could result in further falls in asset prices and further margin calls in a self-reinforcing downward spiral. Especially highly leveraged firms, be they banks or non-banks, are susceptible to even small changes in asset prices and may often depend on the continuous renewal of short-term debt. If these firms are forced to close out trading positions or sell collateral in order to meet margin calls, it could lead to severe asset fire sales at dislocated prices and a long and painful deleveraging process (Shleifer and Vishny, 2011). This effect is likely to be greater, the greater the amount of financial and synthetic leverage. Cont and Schaanning (2015) show that fire sales of assets due to deleveraging can further depreciate asset prices and lead to losses in other portfolios. Such price-mediated contagion can affect all financial institutions and therefore poses a risk to the stability of the financial system.
81. **Procyclicality in collateral requirements and leverage reinforce each other creating feedback loops.** The increased leverage during the upswing of the asset price cycle and procyclical collateral requirements set the scene for fire sales and a painful deleveraging process during the downswing of the asset prices cycle. Procyclicality in collateral requirements thus not only feeds on itself during the upturn and the downswing of the asset price cycle but links both phases. This is also shown by Acharya and Viswanathan (2011), who argue that deleveraging and asset price falls are particularly large when adverse shocks follow times when leverage has been high. Figure 4 provides a stylised example of the movement in collateral requirements, margins and haircuts over the asset price and leverage cycle.



Figure 4

Collateral requirements, margins and haircuts over the asset price and leverage cycle



Source: ESRB.

3.2.3 Procyclicality in collateral requirements and cross-asset contagion

82. **Collateral eligibility criteria give rise to a number of contagion channels by which shocks can spread across assets within and outside the collateral pool.** Not all assets are accepted as collateral in all transactions. Some assets or asset classes might, de jure or de facto, not be eligible in any kind of transaction, while others might be accepted as collateral in some transactions but not in others. For example, in Europe, CCPs are required by regulation to accept a specific pool of collateral that predominantly consists of cash and government bonds. This means that irrespective of their market value, there is an implicit hierarchy of assets that depends on their eligibility as collateral in a range of transactions. This hierarchy is based on the breadth of acceptance, with cash and liquid short-term government bonds with high credit ratings being ranked at the top while less liquid and less highly rated assets are ranked lower. Market participants wishing to use their portfolio of assets in the most efficient way would consider this implicit hierarchy of assets and asset classes when deciding how to collateralise a given transaction. This can result in shocks spreading across assets within and outside the collateral pool.
83. **If the pool of eligible collateral is large, shocks spread across assets within the pool.** If the pool of eligible collateral is large, price pressures in any specific issue may result in a shift away from that issuer in terms of collateral acceptability, causing a sell-off to replace it with other collateral. This may trigger idiosyncratic market behaviour, with liquidity spirals and negative feedback loops in the lower-ranked assets, and price increases in higher-ranked assets. This is in contrast to a situation in which the eligible collateral base is narrow where margin calls resulting from decreasing prices will prompt market participants to buy more of the same securities to answer the increased margin calls, acting as a homeostatic regulator on prices. However, shocks may spread asymmetrically even within a small pool.
84. **If the pool of accepted collateral is restricted, shocks can spread to asset classes outside the collateral pool.** While theoretically any financial instruments could collateralise a derivatives contract and many financial instruments are used in SFTs, the pool of assets that can be described as eligible collateral is prescribed by regulation, and is often restricted to



ESRB

The macroprudential use of margins and haircuts

The need for macroprudential policies to mitigate systemic risk

higher-quality and more liquid assets. From this eligible collateral, only a smaller fraction is perceived by counterparties as acceptable collateral. Moreover, the breadth of collateral used in non-centrally cleared transactions is larger, when compared to centrally cleared transactions. This asymmetry may represent a conduit for volatility and liquidity events on the collateral asset pool to have system-wide impacts on initial margin requirements, and therefore leverage, in a wide range of unrelated asset classes. The typical example is government bonds, which underpin a large number of collateral arrangements (Molteni, 2015). A shock in government bonds will impact on initial margin for most contracts, whether directly related to government bonds or only indirectly. If market participants are consequently forced to close out such contracts, contagion could spread to asset classes outside the collateral pool. This effect is magnified in cases where counterparties progressively restrict the pool of accepted collateral to the most highly-ranked assets, shifting eligibility criteria up the collateral hierarchy. This leads to a reduction in the overall collateral pool, with agents progressively exhausting accepted collateral stocks.

85. **Transactions by market participants to optimise the collateral value of their asset portfolio increase interconnectedness and possibly procyclicality.** Market participants have a financial incentive to optimise the collateral value of their asset portfolio. For instance, if a specific asset has a lower haircut if it is used in a repo arrangement than if it is used as collateral for a derivatives transaction, agents willing to undertake a derivatives contract might – instead of posting their asset as collateral – use the same asset to obtain cash in a repo arrangement and then post the obtained cash as collateral for the derivatives contract. In other words, market participants might use strategies to optimise the collateral value of their portfolio by transforming lower ranked assets in SFT transactions into higher ranked assets (Ebner et al., 2016). Such chains of collateral transformation create interconnectedness between asset classes and counterparties. They can also contribute to contagion across asset classes and increase procyclicality. For example, during a downturn of the asset price cycle market participants may no longer be able to roll over transactions that have previously enabled them to transform lower ranked collateral through SFTs. This might force them to close out underlying positions in other asset classes due to a lack of accepted collateral.

3.3 Empirical evidence on the procyclicality of margins and haircuts

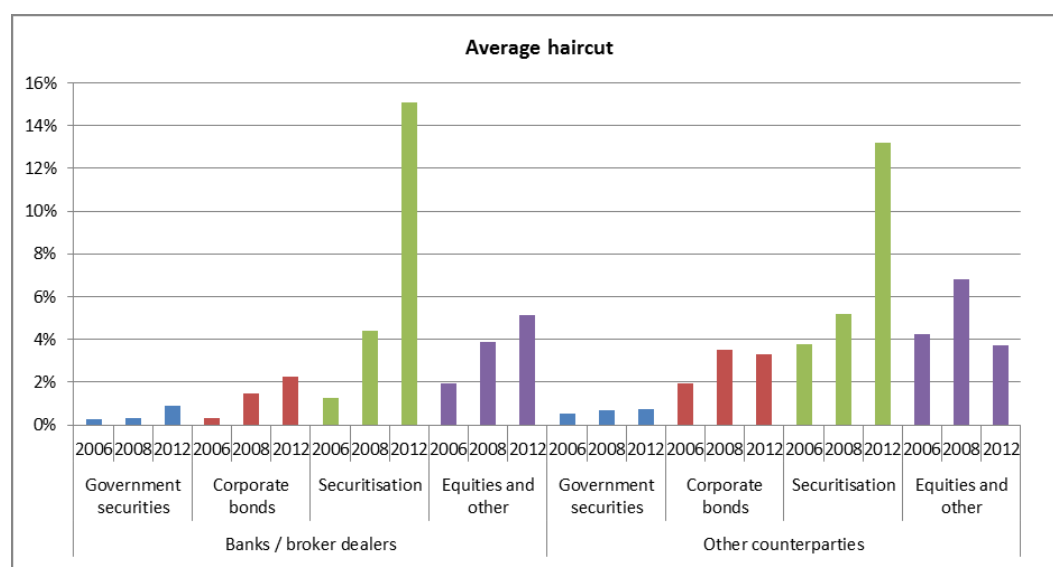
86. **This section discusses which elements of the different mechanisms set out in the previous section have already been observed in the past.** There is clear evidence on cyclical movements in haircuts and margin requirements but no clear-cut evidence on the question of how, and to what extent, margins and haircut movements may have reinforced the amplitude of asset price, leverage and financial cycles and ultimately interacted with business cycles. There is ample empirical evidence on some of the elements feeding into the different, and plausible, dynamics described above. In particular, there is clear evidence on cyclical movements in haircuts and margin requirements. Moreover, for specific cases there is some empirical evidence on how these cyclical movements contributed to self-reinforcing mechanisms. On the question of how, and to what extent, margins and haircut movements may have reinforced the amplitude of asset price, leverage and financial cycles and ultimately interacted with business cycles, clear-cut evidence is, however, largely missing. This is at least partly due to the lack of data or the impossibility of linking different data sources. For instance, it is (currently) not possible to determine the exact way in which market participants reacted to sudden movements in haircuts for particular asset classes, by e.g. reducing collateralised trades and/or shifting to other collateral sources (possibly using collateral



upgrade transactions) and to what extent monetary policy measures helped dampen some of the reinforcing mechanisms. Moreover, some of the data at hand is, to some extent, outdated since certain measures to limit procyclicality have been introduced through regulation in the meantime. More recent and comprehensive evidence would be beneficial to analyse the need for macroprudential policies as well as the impact of the microprudential rules already implemented.

87. **There is clear empirical evidence on the cyclicity of haircuts.** A quantitative impact study performed by the FSB collected data on haircuts from banks and broker dealers as well as other counterparties for the years 2006, 2008 and 2012. Chart 12 presents the average percentage haircuts for different types of collateral on reverse repos denominated in euro. Prior to the global financial crisis in 2006, haircuts were set at low levels for all types of collateral. Subsequently, haircuts were increased significantly in 2008 for most collateral types. Haircuts on securitisations were raised even further from 2008 to 2012 as the market remained illiquid. Focusing on haircuts for asset-backed securities (ABS), collateralised debt obligations (CDOs) and credit default swaps (CDSs), Gorton and Metrick (2012) find that haircuts on some repos were increased significantly during the period of spiking volatility in 2007-2008 as the financial crisis unfolded (Chart 13). While haircuts on both subprime and non-subprime collateral were close to zero in January 2007, they were raised to an average of 45% in late 2008 when markets became more volatile. At the peak of the crisis, many assets were not accepted as collateral, which can be considered as a 100% haircut. This was predominantly driven by the flight of foreign financial institutions, hedge funds, and other lightly regulated cash pools withdrawing repo agreements (Gorton and Metrick, 2015). Armakolla et al. (2016) investigate the European repo market, where most trades are cleared centrally, and find that repo haircuts on government bonds were increased significantly for the countries affected by the sovereign debt crisis (Chart 14).

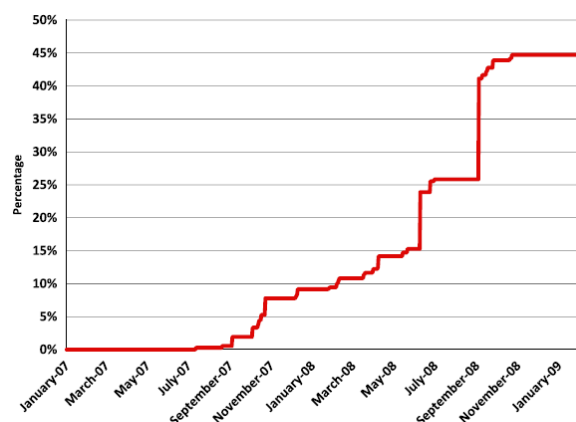
Chart 12
Average haircuts by asset classes in euro



Notes: The QIS1 template asked firms to report the outstanding amount of reverse repos, broken down by counterparty type, collateral type and haircut levels, as at end-Sept. 2006 (pre-crisis), end-Sept. 2008 (crisis) and end-Sept. 2012 (post-crisis).
Source: FSB (2014): Procyclicality of haircuts: Evidence from the QIS1.



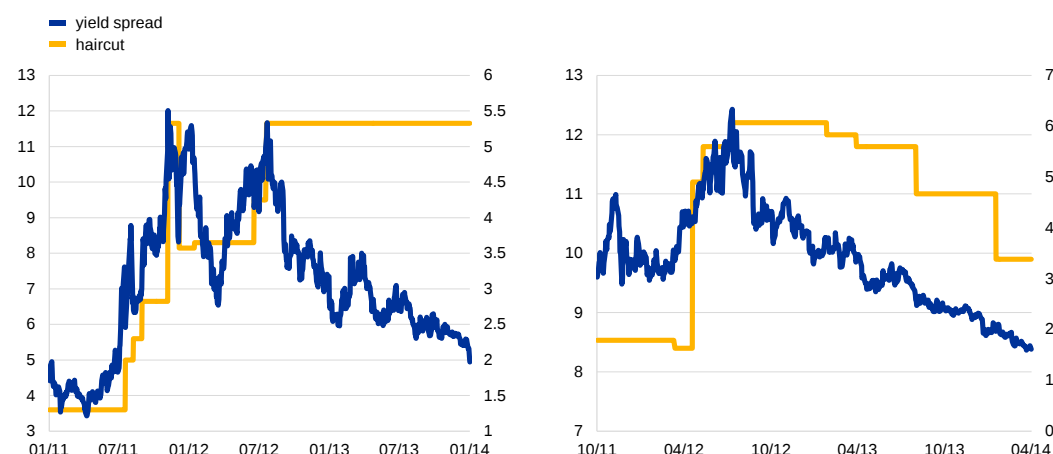
Chart 13
The repo-haircut index



Notes: Average haircut for collateral used in repo transactions, not including US treasury securities
Source: Gorton and Metrick (2012).

Chart 14
Haircuts and yield spreads of Italian and Spanish 10-year government bonds

(y-axis: haircut in percent (left-hand scale); yield spread in percentage points (right-hand scale))



Notes: The left-hand panel shows spreads of Italian and the right-hand panel shows spreads of Spanish government bonds on 10-year German government bonds.

Source: Armakolla et al. (2016).

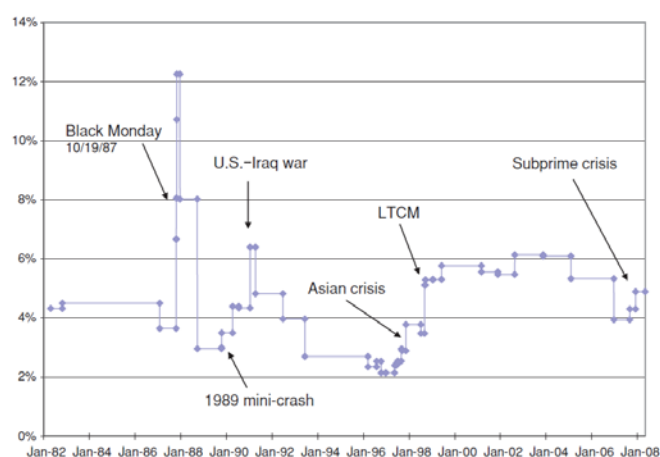
88. **There is also evidence that high haircuts for specific forms of collateral led to funding stress in the recent financial crises.** High haircuts reduce market participants' recourse to liquidity and their ability to service withdrawals and maturing liabilities. Such funding stress was visible in the United States, when repo haircuts on ABS, CDOs and CDSs increased sharply (Gorton and Metrick, 2009, 2012). Such stress was also observed in Europe as evidenced by special policy operations conducted by several central banks in Europe. For example, in 2008, the European Central Bank introduced non-standard measures, including the extension of the list of eligible collateral accepted in the euro system refinancing operations to support financing conditions and credit flows to the euro area economy (Cour-Thimann and Winkler, 2013). In the same year, the Bank of England introduced the Special



Liquidity Scheme to improve the liquidity position of the UK banking system by helping banks finance assets that they were unable to sell or use in SFTs (John et al., 2012).

89. **Similar empirical evidence is available for margins: Margin requirements are cyclical and this can contribute to procyclical developments.** The positive correlation between initial margins and market volatility in centrally cleared markets is well established by a wide range of empirical evidence for Europe and the United States. Hardouvelis and Theodossiou (2002), using US data from 1934 to 1987, demonstrate inter alia that higher initial margin requirements during periods of stable or increasing stock prices are associated with lower subsequent price volatility. Hedegaard (2011) shows that initial margins at US CCPs are primarily determined by contract-specific and overall market volatility and finds evidence for a strong positive correlation between the average initial margins on centrally cleared commodity futures and the average daily volatility of the underlying contracts between 2000 and 2011. This is consistent with the findings of Brunnermeier and Pedersen (2009), who illustrate that initial margin requirements on S&P 500 futures were increased sharply in 1987, 1990, 1998 and 2007 during events associated with high market volatility (Chart 15).

Chart 15
Margins for S&P 500 futures



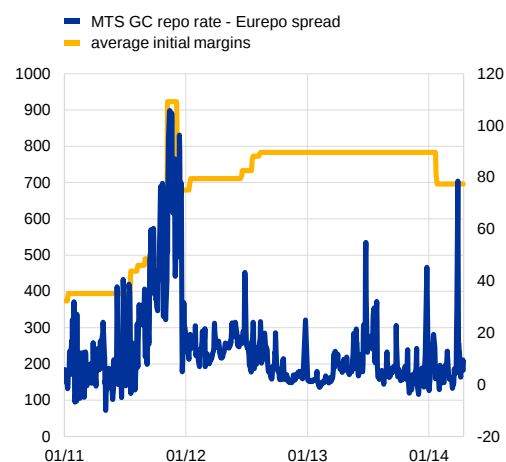
Notes: Margin requirements on S&P 500 futures for members of the Chicago Mercantile Exchange as a fraction of the value of the underlying S&P 500 index multiplied by the size of the contract.

Source: Brunnermeier and Pedersen (2009) Market Liquidity and Funding Liquidity.

90. **The pace of adjustments of initial margin requirements to volatility is asymmetrical and may be impacted by competitive pressure.** Considering centrally cleared repos, Miglietta et al. (2015) show that increasing spreads between Italian government bonds and other European bonds during the sovereign debt crisis in late 2011 led to rapidly increasing initial margins on Italian repos (Chart 16). While the rise in initial margins occurred immediately after spreads increased, margins decreased only slowly as spreads narrowed. Abruzzo and Park (2014) analyse empirically the determinants of initial margin changes based on data for futures cleared at one of the largest global CCPs. The sample covers up to 13.5 years of historical observations with a cut-off date in mid-2013. The paper finds that initial margins are adjusted asymmetrally to changes in volatility; initial margins are raised quickly following spikes in volatility and reduced only gradually when volatility declines. As already mentioned, the analysis also shows that competition across CCPs on overall clearing volume is an important driver of margin changes.



Chart 16
Average margins and spreads on the Italian Repo Market



Notes: In the graph, a daily average of initial margins applied to different maturity buckets are plotted (yellow line, left-hand scale) along with the daily average spread between MTS GC Repo rates and Eurepo rate (blue line, right-hand scale). Data are in basis points.
Source: Miglietta et al. (2015).

91. **There is empirical evidence linking rising leverage, a rise in asset prices and increases in the volume of SFTs.** Adrian and Shin (2010) analyse the reactions of financial intermediaries to changes in their net worth, and the market-wide consequences of such reactions. They first document the positive correlation between balance sheet size and leverage for US security broker dealers.⁸ It can be seen that leverage is strongly procyclical (which means that, in all cases, leverage is large when total asset growth is large) for these institutions, and that the margin of adjustment on the balance sheet is through repos and reverse repos. They then analyse the aggregate consequences of procyclical leverage and document evidence that expansions and contractions of balance sheets have asset pricing consequences through shifts in risk appetite. When balance sheets expand through the increased collateralised lending and borrowing by financial intermediaries (through

repos), the newly released funding resources chase available assets for purchase. The increased funding for asset purchases results in a generalised increase in prices and risk appetite in the financial system. All in all, the paper further supplies empirical support to the leverage cycle model by Geanakoplos (2010).

3.4 The need for macroprudential policies

92. **This section sets out the role that macroprudential policy could play in addressing the systemic risks identified and considers the high-level design features of possible macroprudential tools.** In the following section, we will describe why these risks can neither be addressed by market participants through their self-interest nor by microprudential regulation through well-designed rules. In contrast, macroprudential policy is well-placed to address market failures.
93. **Macroprudential policy can address collective action problems and externalities that cannot be internalised by market participants or through microprudential regulation.** By definition, microprudential regulation – which is specifically designed to enhance the resilience of individual institutions – is not designed to address the risks resulting from collective self-referential behaviour. Such concerns related to market failures are well understood in the context of EU banking sector regulation, where in order to achieve resilience and robustness within the financial system, the regulatory focus on individual institutions (the microprudential framework) has been complemented by a system-wide perspective (the macroprudential

⁸ The authors examine the quarterly changes in the balance sheets of the (then) five major US investment banks. The data are from the regulatory filings with the U.S. Securities and Exchange Commission (SEC) on their 10-K and 10-Q forms.



framework). Macroprudential policy takes into account the interactions among individual financial institutions, as well as the feedback loops of the financial sector with the real economy, with the aim of calming booms and softening busts.

94. **Collateral requirements and margin and haircut practices may give rise to collective action problems.** The previous sections showed that the inherent procyclicality of collateral requirements can lead to leverage cycles as collateral is released into the financial system during the upswing of the asset price cycle and removed from it during the downswing of the asset price cycle. Even if individual market participants are concerned about a build-up of excessive leverage in the financial system or certain segments of it, they would be unable to take action. The reason is that any market participant who would charge higher margins or haircuts than required to manage their individual risk would lose business in a competitive market. In the context of the banking sector, this collective action problem has been epitomised in the run-up to the global financial crisis by the CEO of Citigroup, who noted: “When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you’ve got to get up and dance. We’re still dancing.”⁹
95. **Collateral requirements and margin and haircut practices may also give rise to externalities.** The previous sections showed that risk management practices can lead to situations where margins and haircuts are gradually reduced during the upswing of the asset price cycle before being significantly and suddenly increased during the downswing of the asset price cycle. Such changes are rational from the perspective of individual counterparties setting the margins and haircuts, and are an inherent part of a sound risk management framework of individual market participants. However, the individual decisions of each market participant do not take into account the negative externalities associated with a collective system-wide change to collateral requirements (such as fostering the build-up of excessive leverage in good times or fire sale externalities in times of stress). Rule-based microprudential regulation can help mitigate some of the risks associated with such market failure but cannot comprehensively address the build-up of leverage in the financial system.
96. **The relevance of margin and haircut requirements in achieving macroprudential objectives is recognised by standard-setters and authorities at European and international level.** At European level, the ESRB recognised in its recommendation on intermediate objectives and instruments of macroprudential policy that margins and haircuts can play a role in mitigating and preventing excessive maturity mismatch and market illiquidity (ESRB 2013). While EU regulation that addresses the procyclicality of initial margins and haircuts set by CCPs is already in place with EMIR, the efficiency of these requirements is still untested due to the short timeframe since their implementation, and the need to improve the provisions addressing procyclicality is recognised in the EU (ECB (2015), ESMA (2015) and ESRB (2015a)). Moreover, it has been proposed that further consideration is given to the possibility of giving authorities a mandate to set margins and haircuts above the levels set by CCPs and market participants in non-centrally cleared transactions (ECB (2015) and ESRB (2015a)). At international level, BCBS-IOSCO (2015) have proposed introducing margining requirements on non-centrally cleared derivatives transactions to reduce systemic risks and promote central clearing, while the FSB (2015) is recommending the introduction of minimum standards for the methodologies used to calculate haircuts, and the application of numerical

⁹ [Financial Times](#), 9 July 2007.



haircut floors on non-centrally cleared SFTs as a back-stop to limit the build-up of leverage and reduce the procyclicality of that leverage. The potential for applying margins and haircuts in a time-varying and pre-emptive manner for macroprudential outcomes has also been noted by international standard-setting bodies (e.g. BCBS-IOSCO, 2015). Similarly, FSB (2015) notes that numerical haircut floors may be used as a macroprudential tool, while recognising that further work is needed to calibrate triggers for changes in the floors and the magnitude of changes.



Section 4

The Current Regulatory Framework

97. **This section sets out the microprudential regulatory framework pertaining to margins and haircuts and determines where systemic risks identified in Section 3 are insufficiently addressed.** Regulatory progress to limit the procyclical effects of margins and haircuts has been made at international level.¹⁰ Many elements of these reforms have been implemented in the EU via the EMIR¹¹ framework. There is, however, no unified regulatory framework at EU level that governs the settings of margins and haircuts for all non-centrally and centrally cleared transactions, derivatives and SFTs. Reflecting this, this section is structured, according to the EU regulatory landscape, by clearing arrangement – centrally cleared, client clearing and non-centrally cleared – and, in relation to the latter, further distinguishes between derivatives and SFTs. Other regulations designed to mitigate the type of risks identified in Section 3, in particular the build-up of excessive leverage, are identified. Lastly, gaps and weaknesses in the EU regulatory framework are identified, forming the basis for the rest of the report.

4.1 Centrally cleared transactions

98. **The regulation of CCPs and their risk management practices has been strengthened since the global financial crisis.** This has been brought about by the global Principles for Financial Market Infrastructures (hereinafter the “PFMI”)¹² and, in the EU, by EMIR. In particular, EMIR and the related delegated legislation contain several provisions concerning the calculation of margins and haircuts. Although they are microprudential standards, some elements have a macroprudential dimension as they are designed with the objective of promoting stability and efficiency in the provision of FMI services to financial markets.

4.1.1 Microprudential regulation of margin requirements set by CCPs

99. **The PFMI, published by CPMI¹³ and IOSCO in 2012, establish global prudential standards for the prudent risk management of individual CCPs.** Under Principle 6 (“Margin”), CCPs are required to cover their potential future exposure to participants in the interval between the last margin collection and the close-out of positions following a participant default. This is done via initial margins, which should be calibrated to cover at least 99% of potential future exposures; rely on conservative estimates of the time horizons for the effective hedging or close-out of the particular types of products cleared by the CCP (including in stressed market conditions); and account for relevant risk factors (i.e. price volatility and others) and portfolio effects across products. CCPs should also mark to market trading

¹⁰ This includes the FSB’s *Regulatory Framework for Haircuts on Non-centrally Cleared Securities Financing Transactions*, the BCBS-IOSCO’s *Margin Requirements for Non-centrally Cleared Derivatives*, and the CPMI-IOSCO’s *Principles for Financial Market Infrastructures*.

¹¹ Regulation (EU) No. 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories, OJ L 201, 27 July 2012, p. 1–59 (EMIR).

¹² CPSS-IOSCO, *Principles for financial market infrastructures*, April 2012.

¹³ Named Committee on Payment and Settlement Systems (CPSS) at the time.



positions and collect variation margin at least daily. In August 2016, CPMI-IOSCO released a consultative report on the resilience and recovery of CCPs, providing further guidance on certain aspects of CCP risk management, including further detailed and granular guidance on how to mitigate the potential procyclical effects of margin and haircut policies.

100. **The PFMI prudential standards are implemented in the EU via EMIR.** EMIR requires the degree of coverage to be achieved by initial margins to “be sufficient to cover potential exposures that the CCP estimates will occur until the liquidation of the relevant positions”¹⁴ and should meet certain minimum requirements defined in the EMIR RTS No. 153/2013 (“The EMIR RTS”¹⁵).
 - *percentage*: margins should cover historical market moves with at least 99.5% confidence for OTC derivatives, and 99% confidence for financial instruments other than OTC derivatives;
 - *time horizon for the calculation of historical volatility*: CCPs should calculate potential exposures based on data covering at least the latest 12 months (including periods of stress);
 - *time horizon for the liquidation period*: margins should cover historical market moves with the required confidence level over at least five business days for OTC derivatives, and one or two business days for financial instruments other than OTC derivatives¹⁶.
101. **Beyond these minimum requirements, the EMIR RTS require CCPs to consider all relevant factors when calibrating their margin models.** This includes, in particular (i) the complexity, volatility and liquidity of the financial instruments; (ii) the range of market conditions captured by the chosen historical look-back period; and (iii) the estimated time needed to design and execute the hedging or liquidation strategy for a given class of financial instruments.
102. **Provided that the measures do not interfere with prudential risk management considerations, global and EU rules also aim to reduce the procyclicality of initial margins.** The PFMI state that margin models should limit the need for destabilising procyclical changes to the extent practicable and prudent. EMIR requires competent authorities and ESMA to adopt measures to prevent and control possible procyclical effects in risk management practices adopted by CCPs, to the extent that a CCP’s soundness and financial security is not negatively affected¹⁷. This is further reflected in Article 41(1) of EMIR, which stipulates that the CCP needs to regularly “*monitor and, if necessary, revise the level of its margins to reflect current market conditions taking into account any potentially procyclical effect of such revisions*”.

¹⁴ Article 41 of EMIR.

¹⁵ Articles 24, 25 and 26 of Commission Delegated Regulation (EU) No. 153/2013 of 19 December 2012 supplementing Regulation (EU) No. 648/2012 of the European Parliament and of the Council with regard to regulatory technical standards on requirements for central counterparties, OJ L 52, 23 February 2013, p. 41–74 (the “EMIR RTS”).

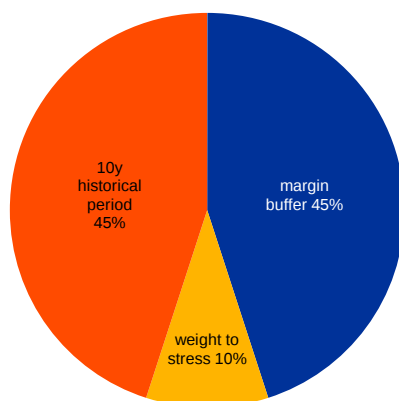
¹⁶ See Commission delegated regulation of 21/4/2016 amending Delegated Regulation (EU) No. 153/2013 as regards the time horizons for the liquidation period to be considered for the different classes of financial instruments.

¹⁷ Recital 68 and Article 41(1) of EMIR.



Chart 17
Usage (%) of EMIR procyclicality treatment options across CCPs and products

((a) margin buffer 45% (blue); (b) 25 % weight to stress 10% and (gold); (c) 10y historical period 45% (orange))



Source: ESMA (2015).

103. Under the EMIR RTS, CCPs must consider the potential procyclical implications of their risk management decisions.

For this purpose, the EMIR RTS specify three options¹⁸ for how a CCP can take into account the potential procyclicality of margin requirements. The first option (a) is a margin buffer, which can be temporarily exhausted in periods when calculated margin requirements are rising significantly. The second option (b) assigns at least a 25% weighting to stressed observations in the look-back period, while the third option (c) applies a margin floor calculated on a ten-year historical look-back period. A CCP must employ at least one of the three options. Chart 17 provides an overview on the usage of EMIR procyclicality treatment options, with the majority of CCPs either using option (a) or (c).

4.1.2 Microprudential regulation of haircut requirements set by CCPs

104. **The PFMI require CCPs to establish stable and conservative haircuts that are calibrated to include periods of stressed market conditions (to the extent practicable and prudent) in order to reduce the need for procyclical adjustments.**¹⁹ Under the provisions of EMIR and the accompanying regulatory technical standards, CCPs are obliged to value clearing members' collateral at least daily and to use prudent haircuts which "*reflect the potential decrease of the value of the collateral over the interval between its last revaluation and the time by which the collateral can reasonably be assumed to be liquidated under stressed market conditions*" in order to "*avoid large and unexpected adjustments to the amount of the collateral required*"²⁰. This means that haircuts must be calculated taking into account average volatility over a longer period of time. This limits procyclical effects since haircuts will not react as fast to changes in volatility in comparison to a model where only current volatility is considered.
105. **To take the possible procyclical effects of haircut changes into consideration, the EMIR RTS require CCPs to include historical price volatility from stressed market conditions in their haircut calculations.** The EMIR RTS provide CCPs with significant discretion in implementing these requirements. They do not indicate precisely how to incorporate stressed conditions or what criteria should be taken into account when rating the issuers' creditworthiness (Article 41 of the EMIR RTS state that the CCPs "*shall not fully rely on*

¹⁸ Article 28(1) of the EMIR RTS.

¹⁹ Principle 5 of the PFMI.

²⁰ Recital 39 and 40 of the EMIR RTS.



external opinions” and need to “take into consideration the risk arising from the establishment of the issuer in a particular country”). The EMIR RTS do not define rules regarding look-back periods to be taken into account when estimating stress, nor do they stipulate pre-defined minimum haircuts.

4.1.3 Sanctioning powers of the authorities

106. **National competent authorities (NCAs) can exercise sanctioning powers if CCPs’ haircut and margin requirements no longer meet the conditions set by EMIR.** NCAs are responsible for authorising CCPs to provide services in the EU. As part of this, NCAs review CCP margin and haircut frameworks and assess their compliance with the provisions of EMIR. Similarly, any subsequent significant changes to these models and parameters are also subject to authorisation by NCAs. If the NCA considers that the CCP’s haircut and margin requirements no longer meet the conditions set by EMIR, it can request that the CCP reviews its models and parameters and carries out the necessary changes. The failure to take remedial action could result in a withdrawal of authorisation which usually needs approval by the members of its supervisory college.²¹ However, other than the above-mentioned choice between alternative margin calculation methodologies described in section 4.1.1, EMIR contains no specific requirements or quantitative test to assess whether or not margin methodologies can be deemed as procyclical.

4.1.4 Observations on the microprudential framework for centrally cleared transactions

107. **EMIR does not provide competent authorities with a mandate to impact the level of CCP margins and haircuts for explicitly macroprudential objectives such as limiting procyclical leverage.** Although EMIR contains provisions designed to reduce procyclical changes in margins and haircuts, they should only be adopted to the extent that a CCP’s soundness and financial security is not negatively affected. Moreover, the EMIR provisions consider only the aspect of procyclicality and do not consider other macroprudential concerns like the build-up of unsustainable leverage in the financial system or the effects of rapid deleveraging.
108. **The ESRB has previously opined that the overall anti-cyclical equipment of EMIR could be reinforced.** In particular, an ESRB Report on the efficiency of margining requirements to limit procyclicality and the need to define additional intervention capacity in this area (“the ESRB Report”)²² proposed that authorities could have a macroprudential role in addressing financial and synthetic leverage in the financial system or parts of the financial system, and stated that this could be done through the ability to set conservative and potentially counter-cyclical margins and haircuts for centrally (and non-centrally) cleared transactions. Specifically, the ESRB noted that NCAs should be given the power to set “margin and haircut requirements that go beyond the minimum requirements set by EMIR, after appropriate

²¹ Article 20 of EMIR.

²² ESRB Report on the efficiency of margining requirements to limit procyclicality and the need to define additional intervention capacity in this area, July 2015.



involvement of macroprudential authorities". The report also noted that such tools should build on the existing regulatory framework and that the set of existing tools and regulations should be considered as a whole in order to achieve consistency of the framework across different sectors.

4.2 Client clearing arrangements

109. **In terms of margins and haircuts, client clearing arrangements are closer to bilateral relationships for non-centrally cleared transactions than to that of a CCP vis-à-vis its members.** In Europe, most of the transactions involving a CCP, a clearing member and a client are based on the "principal to principal model". This model is characterised by two separate legal relationships: one between the clearing member and the CCP and the other between the clearing member and the client. The transactions underlying these relationships are exactly matched but the parties assume opposite positions in the transactions. In terms of margins and haircuts, the relationship of the client facing the clearing member within a clearing arrangement more closely resembles a bilateral relationship for non-centrally cleared transactions than the direct relationship between the CCP and the clearing member.
110. **In the absence of a legal framework for the setting of margins for client clearing, clearing members determine their own requirements.** Although EMIR requires CCPs to collect margins from a clearing member for all exposures belonging to the clearing member's own account and any client account, it does not mandate the clearing member to collect margins from its clients. In the absence of a legal framework, clearing members determine their own requirements. Such bilateral agreements are also not covered by the ESAs' joint²³ draft regulatory technical standards²⁴ for risk mitigation techniques for OTC derivatives contracts not cleared by a CCP²⁵ (the "NCCD RTS").²⁶ In particular, no legal obligations are specifically provided for minimum margin requirements and haircuts; the clearing member is theoretically allowed to fund client margins in full. In addition, no provision prescribes lists of accepted collateral, nor is a mandatory frequency for the collection of margins defined.
111. **Common market practice for clearing members is to collect margins from clients to cover client positions at CCP level.** This is set out in the client clearing agreement between the parties involved, which are framed in accordance with national laws. Specific circumstances can be laid down in the contractual agreements where the clearing member may require clients to provide more collateral or higher margin than those required by the CCP in relation to its transaction with the clearing member. The client-to-clearing member set-up can therefore be described as a bilateral contract where the clearing member is allowed to re-use client collateral (to the CCP, for the purpose of covering clients' positions).
112. **The absence of a framework for the setting of margins has important implications from the perspective of procyclicality.** Legally, there is no constraint on the level of margins that

²³ Joint Committee of the European Supervisory Authorities (ESAs), namely EBA, ESMA and EIOPA.

²⁴ Developed under EMIR, Article 11(15)(a).

²⁵ Final Draft Regulatory Technical Standards on risk mitigation techniques for OTC-derivative contracts not cleared by a CCP under Article 11(15) of Regulation (EU) No. 648/2012 (the "NCCD RTS").

²⁶ The NCCD RTS were adopted by the European Commission on 4 October 2016 and are to take effect 20 days after publication in the Official Journal of the EU.



the clearing member can call from its clients and there is anecdotal evidence that clearing members apply multipliers to the CCP margin calls, which can be in the region of 200%-300%, when calling clients. Additionally, clearing arrangements may contain clauses enabling clearing members to discretionally increase margins up to 500% of the CCP margin levels. This has important implications from the perspective of procyclicality. Furthermore, this might introduce significant frictions in the transmission mechanism, potentially undermining the effectiveness of any macroprudential tool directed at influencing leverage in the non-banking sector.

4.2.1 Observations on the regulatory microprudential framework for client clearing

113. **Client clearing is not adequately covered by the current regulatory framework.** Owing to the discretionary nature of contractual arrangements between clearing members and their clients, client clearing seems to be an area where both leverage and procyclicality effects can occur. Furthermore, it is not adequately covered by the current regulatory framework.
114. **More guidance on the issue is needed at international level.** The PFMI framework is also silent in terms of relationship between clients and their clearing members. This is an issue that may require consideration at international level.

4.3 Non-centrally cleared derivatives

115. **The EMIR framework is the reference legislation for non-centrally cleared derivatives.** Under EMIR, counterparties are obliged to centrally clear certain classes of OTC derivatives contracts through CCPs or, when they are not centrally cleared, to apply risk mitigation techniques.²⁷ These risk mitigation requirements include the exchange of collateral by bilateral margining. To further specify these requirements, the NCCD RTS were developed by the ESAs.
116. **The ESAs took into consideration the need to ensure consistency at international level on margin models, the eligibility of collateral, operational processes and risk management procedures.** The NCCD RTS implement the BCBS-IOSCO framework for margining requirements for non-centrally cleared derivatives and the BCBS Guidelines for managing settlement risk in foreign exchange transactions,²⁸ while taking into account the specific characteristics of European financial markets. It introduces a number of requirements to mitigate microprudential risk, in particular, mandatory daily exchange of variation margin, two-way mandatory exchange of initial margins, list of eligible collateral, mandatory minimum haircuts and a ban on re-hypothecating initial margin collateral.
117. **Detailed requirements on the methodologies for calculating initial margin minimum amounts are set out in the legislation.** Two approaches are allowed, namely a standardised approach, consisting of a table with set parameters based on the asset class and maturity of

²⁷ Article 11(3) of EMIR.

²⁸ BCBS, Supervisory guidance for managing risks associated with the settlement of foreign exchange transactions, February 2013, available at: <http://www.bis.org/publ/bcbst73.htm>.



the OTC derivatives, and an initial margin model (i.e. internal model) approach. Furthermore, the NCCD RTS provide requirements on the construction, calibration and validation of initial margin models²⁹. Although there is no set review requirement under the NCCD RTS, these models are subject to supervisory scrutiny under CRD IV. The qualifying feature is that models must be calibrated on a data set between three and five years³⁰ containing at least 25% of data representative of a period of significant financial stress.³¹

118. **The NCCD RTS also deal with eligibility and the treatment of collateral³² and introduce a ban on re-hypothecating initial margin collateral.** Eligible collateral is broader than that admissible for central clearing. The NCCD RTS prescribe concentration limits to the collateral pool. Furthermore, the collecting counterparty is not allowed to rehypothecate, repledge or otherwise re-use non-cash collateral collected as initial margin under the NCCD RTS³³.
119. **Minimum requirements for the calibration of haircuts are also in place.** The admissible haircut methodologies are either the methodology in line with a standardised table with minimum values by asset type, credit quality, and maturity (as set out in Annex II of the NCCD RTS) or calculations based upon own volatility estimates. The parameters of own estimates models³⁴ are defined in the NCCD RTS. Similarly to minimum requirements for the calibration of initial margin, Annex III of the NCCD RTS prescribes features of the own estimates model which reduce the response of haircuts to sudden price movements. These are, however, less stringent than for initial margin setting, and are designed to force counterparties to adjust haircuts periodically.

4.3.1 Observations on the regulatory framework for non-centrally cleared derivatives

120. **The combined impact of the above requirements is a framework in which all counterparties to non-centrally cleared derivative transactions must exchange margins.** All collateral collected must be valued daily based on market prices, and is subject to minimum mandatory haircuts.³⁵ This includes variation margin as well as initial margin balances. Minimum margin levels and haircuts are designed to be inelastic to short-term price movements. There are no limitations or prohibitions on margin or haircut levels in excess of those computed based on the minimum calibration requirements, or on the size of add-ons and overcollateralisation.
121. **Although this brings non-centrally cleared derivatives close to the standards applied to centrally cleared transactions, concerns remain regarding unintended consequences.** Concerning procyclicality, the requirement of daily valuation of the collateral³⁶ creates a direct

²⁹ Section 4 of the NCCD RTS.

³⁰ Article 16(1) of the NCCD RTS.

³¹ Article 16(2) of the NCCD RTS.

³² Section 5 of the NCCD RTS.

³³ Article 20 of the NCCD RTS.

³⁴ Article 22 of the NCCD RTS.

³⁵ The only collateral exempt from mandatory haircuts is cash collateral denominated in the same currency as the primary exposure. If the initial margin is collected in cash in another currency, a currency mismatch haircut applies.

³⁶ Article 19(1)(a) of the NCCD RTS.



link between asset prices, collateral valuation and – combined with the daily exchange of margin – subsequent margin calls. The price transmission mechanism is thus instantaneous. The NCCD RTS regulate the procedures for replacing collateral that has been downgraded, allowing for up to two months³⁷, but there is no similar allowance for loss of value of collateral. Counterparties may increase haircuts (unspecified) for downgraded collateral during the substitution period³⁸.

122. **Collateral valuation and revaluation practices for bilateral transactions can amplify procyclical effects.** Daily collateral revaluation is also applied by CCPs. However, CCP users can benefit from the application of wide netting arrangements, which results in a single variation margin figure being generated across all transactions for each member. In a bilateral context, there may not be the same level of recourse to netting, resulting in potentially more significant variation margin shifts, thus potentially further amplifying procyclical effects. Greater use of central clearing would reduce these effects.
123. **Procyclical effects are not dealt with to the same extent as for centrally cleared derivatives transactions.** Current regulation for non-centrally cleared derivative transactions is specific in terms of minimum requirements for initial margin calculations, and takes account of procyclicality considerations. However, the requirements for variation margin are less stringent. They are also less stringent than the corresponding provisions applicable to CCPs. There is thus scope to strengthen the arrangements for calculating margin requirements for non-centrally cleared derivatives. Moreover, there is no regulation that addresses potential risks from procyclicality arising from the use of margin add-ons in centrally or non-centrally cleared transactions.

4.4 Non-centrally cleared securities financing transactions (SFTs)

124. **At international level, the FSB issued its framework for haircuts on non-centrally cleared SFTs with the primary aim of strengthening the oversight and regulation of shadow banking activities.** The FSB's framework is designed to limit the build-up of excessive leverage outside the banking system, and to help reduce procyclicality of that leverage.
125. **The FSB framework comprises two complementary elements.** These are: (i) qualitative standards for the methodologies that firms should use to calculate collateral haircuts in all non-centrally cleared SFTs; (ii) a framework of numerical haircut floors (shown in Table 3) for non-centrally cleared SFTs in which financing is provided to non-banks and collateral differs from government debt securities.³⁹ It is important to note that the FSB's framework is not intended to set mandatory standards for market participants.

³⁷ Article 7(5)(b) of the NCCD RTS.

³⁸ Article 7(5)(d) of the NCCD RTS.

³⁹ Pursuant to the **FSB framework**, non-centrally cleared securities financing transactions performed in any operation with central banks are outside the scope of application of the minimum haircuts. Cash-collateralised securities lending transactions where the primary motive is not to provide financing also fall outside the scope.



Table 3

Numerical haircut floors for securities-against-cash transactions

Residual maturity of collateral	Haircut level	
	Corporate and other issuers	Securitised products
≤ 1 year debt securities, and Floating Rate Notes (FRNs)	0.5%	1%
> 1 year, ≤ 5 year debt securities	1.5%	4%
> 5 years, ≤ 10 year debt securities	3%	6%
> 10 year debt securities	4%	7%
Main index equities	6%	
Other assets within the scope of the framework	10 %	

Source: FSB (2015).

126. **The aim of the qualitative standards developed by the FSB is to mitigate potential procyclical fluctuations in haircuts.** Market participants are incentivised to use the qualitative standards developed by the FSB as guidance, for their own analysis as to the appropriate level of collateral haircuts and margins. Numerical haircut floors, on the other hand, are intended to serve as backstops against the build-up of excessive leverage, and to reduce procyclicality.
127. **Whereas qualitative standards apply to all SFTs, and include recommendations on potential add-ons, the framework of numerical haircut floors applies only to certain types of SFTs.** It is applied to: i) non-centrally cleared transactions; ii) transactions between banks and non-banks, or between non-banks and non-banks only; iii) collateral other than government bonds; iv) financing transactions where financing is provided to (and not received from) non-banks; v) non-cash collateral transactions with a back-to-back repo transaction.
128. **The FSB considers three alternative approaches for the implementation of the regulatory framework.** These are: (i) an entity-based regulatory approach; (ii) a product-based (market) regulatory approach; (iii) a hybrid approach combining these two. In addition, the FSB makes specific recommendations to the BCBS and national or regional authorities to take certain actions to enhance the regulatory framework on non-centrally cleared SFTs. It recommends that the BCBS reviews the capital treatment of SFTs in the Basel III framework incorporating the numerical haircut-floor provisions. National and regional authorities should: 1) set and review the quality standards for the methodologies used to calculate collateral haircuts and margins to reduce their procyclicality; 2) implement the framework of numerical haircut floors, as reviewed by the BCBS, based on their assessment of scale and materiality of SFTs; 3) assess the suitability of the adopted approach for implementing the haircut floors framework.



129. **The SFTR did not implement FSB recommendations on haircuts, and contains few provisions that could restrain excessive procyclicality and leverage.**⁴⁰ In addition, the SFTR does not provide for mandatory margin requirements or haircut levels, since its primary aim is to foster the transparency of SFTs by increasing the reporting requirements for counterparties (see recital (7) of the SFTR). In fact, while centrally cleared SFTs – as in any other centrally cleared transaction – are subject to the regulatory requirements laid down for CCP margins and haircuts, the parties enjoy contractual freedom under non-centrally cleared SFTs.⁴¹
130. **There are differences of views as to what extent the FSB recommendations should be implemented in Europe.** The Commission is required to submit a report to the Parliament and the Council by 13 October 2017, assessing the progress in international efforts to mitigate the risks associated with SFTs, including the FSB's recommendations, and on the appropriateness of those recommendations for Union markets. Against this backdrop, ESMA, in cooperation with EBA and the ESRB, submitted a report to the Commission, the European Parliament and the Council on 4 October 2016, assessing: a) whether the use of SFTs leads to the build-up of significant leverage that is not addressed by existing regulation; b) where appropriate, the options available to tackle such a build-up; c) whether further measures to reduce the procyclicality of that leverage are required. On some issues, including in its recommendations, the ESMA report takes different views to those expressed in the ESRB opinion.⁴²

4.4.1 Observations on the regulatory framework for non-centrally cleared securities financing transactions

131. **The regulatory framework is weakest for bilateral SFTs in terms of haircuts and the risk of procyclical behaviours and leverage build-up.** When compared to centrally cleared transactions and non-centrally cleared derivatives, there are no regulatory requirements for the haircuts for bilateral SFTs. This means that leverage build-up is not constrained by market-based regulation. Moreover, there are no requirements in terms of the calibration of haircuts. Finally, there are no specific requirements on the type and quality of admissible collateral, leading potentially to liquidity spirals and sell-offs.
132. **SFTs must be considered within the existing regulatory framework applicable to the parties engaging in these transactions.** The conclusions above cannot be drawn in isolation. Collateralised lending was, until recently, mainly conducted by credit institutions, including with regard to leverage (see further below). However, other parties, in particular asset managers and corporate treasurers, are increasingly participating in the collateralised lending market, and not just as borrowers but also as lenders, competing functionally with banks. The reference is to asset managers/funds and other intermediaries that are considered

⁴⁰ As part of transparency requirements, the SFTR obligates the counterparties to SFTs to provide their consent to the re-use of the collateral they post. Refusal to give such consent, depending on market participants' discretion, has the potential to limit, to a certain extent, the build-up of system-wide leverage. However, pursuant to the SFTR, separate consent is not required if the collateral is provided by way of title transfer, which to a large extent is current market practice in the EU.

⁴¹ There is also no requirement in terms of margin or haircuts levels in Directive 2002/47/EC on Financial Collateral Arrangements.

⁴² The views of the ESRB and the ESMA are set out in detail in ESRB (2016c) and ESMA (2016).



to be part of a less regulated sector. The next section therefore considers the regulatory framework governing the behaviour of credit institutions, asset managers/funds and other intermediaries, to identify whether there are provisions, not specific to SFTs, which nonetheless impact and somehow offset the lack of specific regulation.

4.5 Relevant sectoral regulation

133. **No EU sectoral measures directly address the subject of the calibration of margins and haircuts for the purposes of individual transactions.** However, a number of provisions are aimed at mitigating procyclicality and the build-up of excessive leverage. Relevant regulation in both the banking and non-banking sectors is described in brief below.

4.5.1 Regulation of the banking sector

134. **Following the financial crisis, Basel III was designed to strengthen global capital and liquidity requirements for banks in order to enhance their capacity to absorb shocks.**⁴³ The measures are in the process of being implemented in the EU through the CRR/CRD IV Framework.⁴⁴ In addition to strengthening the resilience of individual banks from a microprudential perspective, these reforms include several macroprudential instruments designed to build system-wide resilience, smooth the financial cycle and address risks across the banking sector, along with risks arising from the interconnectedness of financial institutions.
135. **The new requirements consider systemic aspects.** They operate in accordance with the general principle that levels of capital and liquidity should be set with regard not only to the position of the individual banks, but also to the overall position of the financial system and the importance of banks in the financial system. These requirements, coupled with the proposed introduction of the leverage ratio⁴⁵ as a backstop to risk-based capital measures, are proposed to strengthen the capital framework by increasing the quality and quantity of capital that banks are required to hold and the framework for ensuring the resilience of banks to funding stress.
136. **First, the new arrangements ensure that the capital base reflects risks arising from SFTs and other business activities.** In particular, the new framework increases capital requirements for counterparty credit exposures arising from banks' use of derivatives and SFTs. This can also include non-banks if they are counterparties to banks. The framework might mitigate the build-up of leverage by disincentivising institutions from entering into SFTs where collateral takes a form other than cash or government or other securities within the meaning of Article 197(1)(b) CRR (and therefore eligible for a 0% risk weight).

⁴³ **The Basel III package.**

⁴⁴ Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms (CRR) and Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms (CRD IV).

⁴⁵ **The Basel standard.**



137. **Second, the capital conservation buffer⁴⁶ (CCoB) and the countercyclical buffer⁴⁷ (CCB) are intended to ensure that the banking sector as a whole has sufficient capital to absorb losses.** Both buffers have to be met with Common Equity Tier 1. Their main aim is to dampen the consequences of stress in the financial system. The CCoB may be breached during times of stress. However, capital conservation measures (such as limits on distributions) apply until compliance is restored (Article 141 CRD). The CCB is designed to deal with the cyclical behaviour of the financial sector, and its main objective is to build up a capital buffer in times of expansion that can subsequently be used in a downturn, thus limiting the probability of a credit crunch. Under this framework, authorities can impose a CCB on banks, which typically varies between zero and 2.5%⁴⁸ of risk-weighted assets to address excessive credit growth where this is considered to present system-wide risk. The bank-specific CCB rate reflects the geographical composition of the institution's credit exposures as it is calculated as the weighted average of the CCB rate that applies in the jurisdictions where the relevant credit exposures of the institution are located (Article 140 CRD). Other buffers, calibrated commensurate to their impact of failure on the financial system and the economy, further strengthen the resilience of banks.⁴⁹
138. **A simple, transparent, non-risk based leverage ratio is intended to mitigate the build-up of leverage in the banking sector.** More precisely, this ratio is designed to reinforce the risk-based capital requirements in the upswing of the financial cycle and mitigate the likely destabilising risk of deleveraging in downswings. The ratio is defined as the capital measure⁵⁰ (the numerator) divided by the exposure measure⁵¹ (the denominator). On 3 August 2016, the EBA published a report, pursuant to Article 511 CRR, considering whether a granular approach should be adopted (rather than a blanket 3% minimum) for the ratio.⁵² On a basis of an analysis of different business models (e.g. cross-border universal banks, local universal banks, small banks etc.), the EBA concluded that a mandatory ("Pillar 1") minimum level of 3% should generally apply to all credit institutions, and that higher leverage ratio requirements in the case of GSIs may be warranted. Taking account of this report, the Commission is expected to report to the European Parliament and the Council on the impact and effectiveness of the leverage ratio, together with a potential legislative proposal on the introduction of one or more levels of the ratio.
139. **To ensure banks have more resilient funding arrangements, the Liquidity Coverage Ratio (LCR) will require banks to ensure that they have sufficient high quality liquid assets (HQLA) to survive an acute short-term stress scenario.**⁵³ The LCR is the ratio of a credit institution's buffer of "liquid assets" to its "net liquidity outflows" over a 30 calendar day

⁴⁶ The CCoB of 2.5% of risk-weighted assets must be met with Common Equity Tier 1, and applies in addition to minimum regulatory capital requirements (Article 129 CRD).

⁴⁷ See Article 130 CRD.

⁴⁸ The CCB can be set at a higher level, but automatic reciprocity only applies to buffer rates of up to 2.5%.

⁴⁹ See Articles 131 and 133 CRD.

⁵⁰ Defined as the Tier 1 capital of the risk-based capital framework.

⁵¹ Generally, this should follow the accounting value with specified exceptions – in particular, the netting of loans and deposits is not allowed.

⁵² **The EBA's report.**

⁵³ See **Article 460 CRR and Commission Delegated Regulation (EU) 2015/61 of 10 October 2014** to supplement Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirements for credit institutions.



stress. The LCR will be set at a minimum level of 100%, when fully implemented, i.e. a bank will be required to hold sufficient liquid assets (i.e. freely transferable assets that can be converted quickly into cash in private markets within a short time frame and without significant loss in value) to meet its net liquidity outflows during the stress period.

140. **For the purposes of calculating the amount of liquid assets, banks are required to apply specific haircuts to different categories of liquid asset.**⁵⁴ In accordance with Article 418 CRR, the haircuts reflect at least the duration, the credit and liquidity risk and typical repo haircuts in periods of general market stress. As such, the haircuts are more stringent the lower the liquidity classification of the assets. Where a bank uses assets as collateral for a repo transaction, the assets will be encumbered and cannot qualify as liquid assets for the LCR, whereas assets received by a bank in the context of a reverse repo can qualify and will be subject to haircuts. Also, the amount of outflows and inflows in the LCR from secured transactions are dependent on the haircuts applied on the underlying collateral (i.e. the higher the haircut, the higher the outflow rate). Accordingly, a bank will need to consider the implications for the LCR when considering whether to enter into such transactions.
141. **To further strengthen the liquidity framework, the Commission is mandated to assess the appropriateness of implementing net stable funding requirements by end-2016.** The EBA has recommended the introduction of the Net Stable Funding Ratio (NSFR), which would require banks to maintain a stable funding profile in relation to the composition of their assets and off-balance sheet activities in the context of a one-year time horizon.⁵⁵ The EBA has published a report on the NSFR⁵⁶ which contains a proposal for the calibration of the NSFR and an assessment of its impact on the risk profile of institutions by business model, financial markets, the economy and bank lending. As regards trading activities, including derivatives and SFTs, the EBA found no significant empirical relationship between the NSFR and these activities, and noted that “banks seem to be able, on average, to increase their NSFR without in parallel decreasing these trading activities”. The required stable funding by the securities held is linked to the LCR haircuts applied.
142. **In addition to these measures (and others, e.g. large exposures regime), and those where policy development continues (e.g. credit risk), Member States and authorities can apply other measures to address the build-up of excessive leverage.** For instance, some national authorities have introduced additional macroprudential tools for banks, such as loan to value (LTV), loan to income (LTI), debt service to income (DSTI) and debt to income (DTI) limits in relation to residential real estate loans. The ESRB and other authorities have also considered extending these tools to commercial real estate as well as those currently on loans provided for residential housing, by insurers and credit funds. These measures are

⁵⁴ See Articles 9 to 13 of Commission Delegated Regulation (EU) 2015/61.

⁵⁵ The NSFR is defined as the amount of available stable funding (ASF) relative to the amount of required stable funding (RSF). The ASF is defined as the portion of capital and liabilities expected to be reliable over a one-year time horizon. This is calculated taking account of the carrying value of an institution's capital and liabilities multiplied by an ASF factor. For instance, a 0% ASF factor is applied to derivatives liabilities net of derivatives assets. The RSF is a function of the liquidity characteristics and residual maturities of the various assets held by that institution as well as those of its off-balance sheet (OBS) exposures. Again, this is calculated by assigning the carrying value and then multiplying by the relevant RSF factor. In calculating NSFR derivative assets, collateral received in connection with derivative contracts may not offset the positive replacement cost amount, regardless of whether or not netting is permitted under the bank's operative accounting or risk-based framework, unless it is received in the form of cash variation margin and meets other specified conditions. In addition, an RSF of 20% of total net derivatives liabilities is required.

⁵⁶ [The EBA's report.](#)



intended to limit overall leverage in areas such as real estate, where stress had a significant impact on banking sector resilience during the crisis.

143. **Finally, a number of other provisions in the CRR/CRD refer to the concept of haircuts.**

Some examples include Article 323 CRR, which allows institutions to recognise insurance, subject to appropriate discounts and haircuts, mitigating operational risks. However, these provisions do not constitute a framework for calculating margins and haircuts for transactional or macroprudential purposes.

4.5.2 Regulation of non-banking sector and other measures

4.5.2.1 Collective Investment Schemes and Alternative Investment Funds

144. **The legal frameworks for investment funds have macroprudential features that can mitigate procyclical dynamics, such as excessive credit growth and leverage.** Neither the framework for Undertakings for Collective Investment in Transferable Securities (UCITS)⁵⁷ nor the framework for Alternative Investment Funds (AIFs)⁵⁸ provides specific provisions governing collateral requirements. However, some provisions concerning maximum leverage can have the same effect as margin requirements. Although there is no limitation on the extent to which a manager of AIFs may employ leverage within the individual AIFs under its management, the AIF Managers' Directive requires that competent authorities can set limits on the leverage levels of AIFs managed by an AIF manager when there is evidence of a build-up of systemic risk. In the case of UCITS, the UCITS Directive includes specific limits on leverage. UCITS may borrow up to a limit of 10% of their net assets, and only on a temporary basis, for example for liquidity management purposes. Also, exposures related to derivatives and SFTs cannot exceed the total net value of the portfolio. This means that leverage from borrowing, derivatives and SFTs cannot exceed 2.1 times the UCITS Net Asset Value. Finally, paragraph 43 of ESMA's Guidelines on ETFs and other UCITS prescribes that collateral collected in the course of OTC derivative and SFT transactions must be of high quality, liquid, and that "assets that exhibit high price volatility should not be accepted as collateral unless suitably conservative haircuts are in place". It does, however, not set out quantitative requirements for setting haircut levels. Reference is made in paragraphs 45 and 46 to the need for liquidity stress test and haircut policies to be in place, but without specific quantitative requirements.

⁵⁷ Directive 2009/65/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS).

⁵⁸ Directive 2011/61/EU of the European Parliament and of the Council of 8 June 2011 on Alternative Investment Fund Managers and amending Directives 2003/41/EC and 2009/65/EC and Regulations (EC) No 1060/2009 and (EU) No 1095/2010.



4.5.2.2 Insurance

145. **The Solvency II⁵⁹ regime for insurance and reinsurance includes elements that can address macroprudential risks.** In particular, unlike Solvency I, Solvency II requires both assets and liabilities to be marked-to-market⁶⁰. Solvency II also explicitly asks supervisors to consider the procyclical effects of their actions “in times of exceptional movements in the financial markets”. ESRB (2015b) discusses how the Solvency II framework could be further enhanced from a macroprudential perspective.

4.5.3 Observations on sectoral regulation

146. **Newly introduced banking regulation addresses some of the concerns highlighted for transactions undertaken by banks.** The measures described above for banks, in particular the strengthened risk-weighted capital requirements, are intended to act as a strong disincentive for banks (and non-banks if they are counterparties to banks) to enter into SFT transactions involving collateral other than cash and securities within the meaning of Article 197(1)(b) CRR, and eligible for a 0% risk weight, which might help limit the build-up of leverage in bank and non-bank counterparties. Other reforms are expected to help control the build-up of leverage in the banking sector arising from SFTs and other transactions. Although bank sectoral regulation can therefore be expected to have a significant impact on the behaviour of banks in entering such transactions and, in addition, encompasses measures to mitigate macroprudential risks, the effectiveness of the measures taken are yet to be seen, as this will take at least a complete financial cycle.
147. **The regulation of other types of entities also helps address some of the risks, yet gaps remain.** Therefore, as these gaps exist, there is scope to introduce specific regulatory provisions, with a view to covering activities carried out outside the banking perimeter.

⁵⁹ Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II).

⁶⁰ However, insurance companies can use transitional measures, thereby postponing the implementation of Solvency II until 2032. Not all insurance companies therefore currently apply marked-to-market valuation.



4.6 Sufficiency of the current measures with regard to mitigating procyclicality and gaps in the regulatory framework

148. The key features of the current EU regulatory framework are summarised in Table 4.

Table 4
EU regulatory framework

Transaction type		Regulation: Margin calculation	Regulation: Haircut calculation	Procyclicality: Mitigants	Add-Ons
Centrally cleared		Yes	Yes	Yes	No
Non-centrally cleared	Derivatives	Yes	Yes	No	No
	SFTs	N/A	No	No	N/A
Client clearing		No	No	No	No

Source: ESRB.

149. **The ESRB Report on the efficiency of margining requirements to limit procyclicality (ESRB 2015a) notes that the elements in EMIR designed to limit procyclicality of CCP margins could be enhanced.** The ESRB acknowledged that in the short period over which EMIR provisions have been implemented, no significant evidence of procyclical implications stemming from margining requirements of EU CCPs had emerged. However, it noted that EMIR provides CCPs with discretion in implementing the requirements on procyclicality, and that there are no regulatory requirements addressing the potential strong correlation between margins and haircuts during a stress scenario. Furthermore, EMIR does not provide a specific framework to mitigate procyclicality arising from “add-ons” that CCPs often apply to initial margins. These add-ons are usually based on risk factors other than the volatility of a single or a group of financial instruments, and, in many cases, are applied to individual clearing members. Where linked to changes in a clearing member’s creditworthiness, add-ons can potentially result in an additional request for collateral just when a clearing member’s access to funding markets is curtailed.
150. **Taking stock of these issues, the ESRB Report proposed more stringent rules.** In particular, it proposes the implementation of binding guidance with regard to the three options for tackling procyclicality defined under Article 28 of the EMIR RTS, so as to ensure that the tools are implemented consistently, that stress periods are appropriately defined, and that the provisions do not result in an insufficient level of margins. The ESRB Report also suggested providing less flexibility to CCPs in calibrating collateral haircuts (for instance by defining a minimum length for the look-back period), requiring CCPs to produce a documented policy on their overall tolerance for procyclicality, introducing more granular expectations for CCPs to be transparent to their members about their anti-procyclicality requirements, and introducing a clear definition of procyclicality in EMIR.
151. **The findings of this report so far confirm the conclusions of the ESRB Report, but also identified further missing elements:**
- In the context of cleared transactions, a lack of an explicit and well-defined mandate in EMIR providing competent authorities with a mandate to impact the level of CCP margins and haircuts for explicitly macroprudential reasons.
 - In the context of client clearing, a lack of a regulatory framework governing the relationship between the clearing member and its clients, in particular in terms of provision of credit for the



purpose of posting margins (leverage), type and quality of admissible collateral, and use of discretionary add-ons and overcollateralisation (procyclicality).

- In the context of bilateral OTC derivatives, a lack of a regulatory framework mitigating the procyclical effects of collateral price fluctuations or downgrades, which could potentially trigger liquidity spirals and contagion effects.
- In the context of SFTs, the lack of minimum requirements in terms of haircuts and admissible collateral, comparable to those in place for CCPs and non-centrally cleared OTC derivatives.



Section 5

Tools

5.1 Objectives and features of future macroprudential tools

152. **A potential future macroprudential toolkit could conceptually take several forms and consist of a range of different elements.** While the general mechanisms by which procyclicality in collateral requirements can induce systemic risks are, at least in theory, well understood, several fundamental questions on the goals and features of the macroprudential toolkit to address such risks still have to be answered. These questions pertain to a number of interrelated dimensions: i) Objective: should macroprudential tools build resilience of the financial system or “lean against the wind”?; ii) Scope: how specifically or broadly should risks be targeted?; iii) Consistency: how should the macroprudential tools interact with microprudential tools; iv) Transmission channel: how would margin and haircut setting affect the relevant cycle(s); v) Governance: should the tools be rules- or principles-based?
153. **Objective: specific macroprudential tools might be better placed to correct different externalities related to the upswing and the downswing of a cycle.** Macroprudential tools are developed to address market failures, stemming from various financial frictions and market imperfections that exist even when all other policies, including microprudential supervision, function effectively. However, it is unlikely that individual policy tools can address all externalities. For example, some macroprudential tools analysed in this report seem to be better suited to containing the build-up of leverage during the expansionary phase (see in particular Section 5.2), whereas other tools would be more focused on dampening the excess deleveraging in the contractionary phase of a cycle (see in particular Section 5.3). Although the distinction is not perfect, because there are interrelations in the sense that a tool designed for the upswing of the cycle has repercussions on events during the downswing, and vice versa, it is still helpful in order to systematically analyse the mode of operations for any proposed tool. Thus, the remainder of this section will discuss each tool in the context of the phase of the cycle which it is primarily intended to target.
154. **Macroprudential tools could either be aimed at increasing the system-wide resilience for the downturn phase or trying to “lean against the wind”.** Macroprudential tools could be designed to increase the overall resilience of the financial system by introducing structural changes and the build-up of “buffers” for possible future adverse scenarios in the downturn or, more ambitiously, they could be designed to actively influence leverage, asset prices or even financial cycles and respond to external shocks. Designing tools that influence the financial cycle, however, would require a more thorough understanding of the relevant transmission mechanisms, i.e. on how exactly cyclical collateral requirements are linked to these broader cycles, and to what extent a macroprudential tool could influence them.
155. **Scope: macroprudential tools could either address specific developments that might feed systemic risk or they could focus on aggregate developments.** As discussed above, the cyclicity of margins can ultimately, through different channels and interacting with other developments, influence the financial cycle as a whole, interact with the business cycle and thus unfold its procyclical impact. Given these complex transmission mechanisms, existing microprudential tools could be enhanced, and/or macroprudential tools could be added to counter specific developments, such as “excessive movements in margins and haircuts”, that increase the risk of financial instability. Alternatively, tools towards margins and haircuts could



be, as mentioned above, designed to address developments at a higher level of aggregation, such as dampening the build-up of system-wide leverage. In this context, they might be used in tandem with other macroprudential tools. However, the current practice, as highlighted in Section 4, seems to favour piecemeal solutions, along the lines of centrally cleared versus non-centrally cleared transactions as well as derivatives versus SFT transactions. The currently proposed FSB framework of minimum floors for non-centrally cleared markets is such an example. Although they might offer the advantages of addressing specific issues, the different requirements could be associated with certain drawbacks, particularly in terms of possible regulatory arbitrage (see Section 7).

156. **The majority of policy options analysed in this report would address initial margins and haircut practices at single transaction level, but a few alternatives are also proposed.**

Some alternative options target variation margins or suggest a change in current market practices. Moreover, most of the tools presented in this report are applied at individual transaction level; however, different approaches, such as at the collateral pool, are also analysed.

157. **Consistency: fitting the tools into the existing regulatory framework is a major challenge, since discordance between microprudential and macroprudential policies might occur.**

Macroprudential tools could either be closely linked to already existing microprudential regulation, e.g. by setting, for macroprudential reasons, additional requirements for and/or limits to market participants' collateral practices. Alternatively, one could try to separate as much as possible micro- and macroprudential tools. This would help to clarify responsibilities for the final outcome of policy actions. However, macroprudential tools tend to be more effective when used in conjunction and in coordination with microprudential policies, as the two policies can be mutually reinforcing in achieving their overall objectives. Conversely, tools like speed limits and ceilings might in some cases reduce the resilience of individual market participants, by requiring the counterparties to set margins and haircuts below the levels their internal models would suggest. The application of these tools is thus associated with a significant drawback of conflicting requirements by microprudential and macroprudential policymakers.

158. **One possible way of coping with the discordance of microprudential and macroprudential policies is the introduction of soft macroprudential tools.**

Hard macroprudential tools are binding, and their application is prescribed by law. As such, they intervene directly in the business activities of financial market players, and their non-fulfilment may trigger sanctions by supervisors. In contrast, soft tools take the form of guidance or recommendations; however, market participants are not tied by their application. As such, their effectiveness is dependent on the market's willingness to adhere to these rules. However, this willingness is likely to be reduced, the higher the degree of inconsistency and contradiction between macroprudential and microprudential rules. Most of the existing macroprudential tools have been constructed as hard tools, but soft tools have at times been applied as complementary tools in cases where hard rules are less effective.

159. **Transmission mechanisms:** the transmission channels from margin and haircut setting to the relevant cycle(s) must be examined, also with a view to considering the likely effectiveness of different tools. In the context of CCPs, this includes considering the interaction of the tools described with CCPs' broader risk management frameworks and the loss sharing arrangements between CCPs and their members in the waterfall.

160. **Governance: for each future tool, it must be decided whether it should be more rules-based or discretionary in nature.** It should be noted that there is in practice no clear



separation between rules-based and discretionary tools, but rather a continuum of possible combinations of rules-based and discretionary elements (so-called “guided discretion”). In terms of their application, the fixed tools are more easily governed by rules. Fixed tools are static in time and easier to calibrate, however given their static nature, they might be ineffective when circumstances are changing rapidly. Time-varying tools might require more discretion, e.g. when deciding on when to increase the requirement or when to release a buffer. Thus, time-varying tools allow for countercyclical adjustments, but they also require sound and transparent principles to be designed to govern them.

161. **Further elements beyond these dimensions need to be considered, such as the number of tools applied.** There is no ideal policy tool that which would address all externalities. Each tool has different advantages and limitations, with alternative policy tools often being complementary. Therefore, a combination of different tools could very likely provide an optimal solution to the problem of correcting multiple externalities. However, the capacity of multiple tools to address different externalities needs to be assessed against the increased complexity of the framework. A single tool might be less effective; however, this drawback needs to be weighed against the ease of calibrating, communicating and assessing the effectiveness of such a macroprudential framework.
162. **Some tools may mitigate more than one externality, and are therefore likely to form the core of any macroprudential policy framework.** Tools applied during an upswing help dampen procyclicality, and often lead to a build-up of additional buffers, which could be released in a downswing. On the other hand, there is little experience or evidence regarding tools’ effectiveness (see Box 1 for a historical example). Market participants might take precautionary measures during the upswing, but they might also fail to internalise the consequences of risk-taking, and thus may need to adjust by shedding assets ex-post in the event of a negative aggregate shock. A specific category in this respect is combined tools, which bring together elements that mandate both the lower and the upper limits to margins and haircuts throughout the cycle (see Section 5.4).
163. **Mapping macroprudential tools according to different dimensions helps to identify their benefits and shortcomings, and to draw a comparison with any alternative policy intervention.** A range of macroprudential tools related to haircuts and margining requirements can potentially be used to mitigate cyclical variations in financial stability risks. They could be further classified according to the different dimensions described above. Moreover, each policy option is associated with different costs and trade-offs, e.g. in terms of complexity of the calibration process (see Section 6). Along the vertical axis, Table 5 below covers the set of tools that are introduced and discussed in the remainder of Section 5, and along the horizontal axis, it gives an overview of how they might be best classified across the proposed dimensions. The preferred use of policies and their final design could however differ from the scenarios presented in Table 5, as they might need to be adapted to particular circumstances.



Table 5
Classification of tools according to different dimensions

Policy tools		Scope		Objective	Consistency	Governance
		Could target financial cycle?	Applied at single transaction level?			
Upswing	Fixed numerical floors	No	Yes	resilience	++	rules
	Time-varying add-ons to floors	Yes	Yes	response/resilience	+	discretion
	Macroprudential margin add-ons	Yes	Yes	response/resilience	+	discretion
	Restrictions on collateral composition	No	No	resilience	+	rules
	Collateral add-ons	Yes	No	response/resilience	++	discretion
Downswing	Fixed ceilings	No	Yes	response	-	rules
	Speed limits	No	Yes	response	-	rules/discretion
Ambivalent	Admissible corridors	No	Yes	resilience	-	rules
	Incremental step-up approach	No	Yes	resilience	-	rules/discretion
	Restrictions on variation margins	No	Yes	resilience	-	rules

Source: ESRB.

Note: "++", "+" and "-" indicate the degree of consistency with microprudential regulation. The objectives can be understood as follows: "Response" refers to the aim of macroprudential tools to address specific developments that affect systemic risk while "resilience" refers to the aim to increase overall resilience of the financial system.

5.2 Economics of tools addressing risks in the upswing of the cycle

5.2.1 Fixed Numerical Floors

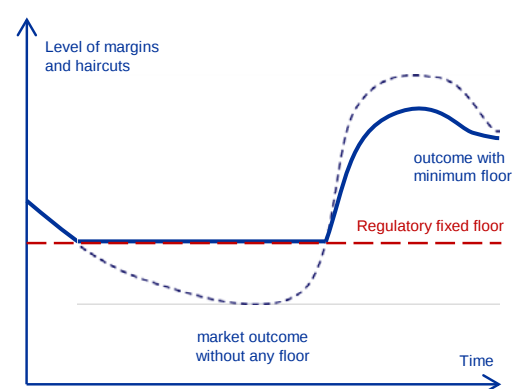
164. **Fixed numerical floors for initial margins and haircuts have been already used as macroprudential tools; however, their application could be broadened.** Building on the discussion in the context of SFTs at the FSB and the minimum requirements on initial margins and haircuts in the context of the OTC derivatives regulation (see Section 4.3 on NCCD), it was recognised that margin and haircuts practices could give rise to possible systemic risks where contributing to induce excessive procyclicality. Therefore, it is worth studying the various possibilities for macroprudential intervention. The introduction of fixed numerical floors on a broad, comprehensive basis for many or all financial transactions, both centrally cleared and non-centrally cleared, might be worth exploring in order to limit these systemic risks.
165. **Fixed numerical floors can limit the build-up of excessive leverage in periods of favourable market conditions, making the financial system more resilient to future stress.** Fixed numerical floors would introduce an absolute minimum level, which would be required permanently on both haircuts and initial margins. Fixed numerical floors for haircuts on collateral can reduce the amount of secured (e.g. repo) financing that can be obtained with a given amount of collateral in favourable market conditions. Hence, for a given amount of equity, fixed numerical floors for haircuts limit the amount of financing that can be obtained for an investment in the security used as collateral. Likewise, fixed initial margin floors can reduce the build-up of synthetic leverage via derivatives, as such transactions might become more costly if collateral requirements increase. The higher the initial margin is set on a derivative transaction, the higher the amount of collateral the investor needs to post, and hence the



smaller the exposure that can be created with a given amount of equity. Fixed numerical floors for initial margins can be combined with fixed numerical floors for haircuts on non-cash securities used as collateral for posting margin.

166. **Fixed numerical floors have the potential to prevent excessive procyclical changes in collateral requirements.** As illustrated in Figure 5, fixed numerical floors would, all other factors being equal, result in haircuts and margins being higher in good times. They would act as a limit to relatively low levels of margins and haircuts, which market participants may otherwise set to trade SFTs and derivatives.

Figure 5
Stylised example of fixed numerical floors



Source: ESRB.

167. **Though being primarily targeted to reduce the build-up of leverage during the upswing, fixed numerical floors may also indirectly affect the downswing.** To the extent that fixed numerical floors limit the build-up of excessive leverage in good times, market participants would need to de-leverage to a smaller extent when volatility increases. With less liquidity pressure in the collateral markets, the increase in volatility might also be less pronounced than otherwise would have been the case. This would feed into collateral haircuts and/or initial margins, which would increase by less (Figure 5). Accordingly, the associated negative externalities may be less pronounced.

168. **The calibration of fixed numerical floors is important for the tool to be effective.** A precondition for fixed numerical floors to be effective is that the floor levels are calibrated to be binding in prolonged periods of underestimated risks, which often show in periods of rising asset prices with low volatility. If numerical floors are fixed at a lower level than the margin or haircut minima actually applied, they would fail to have any impact.
169. **The application of fixed numerical floors incurs additional costs, particularly in terms of higher collateral needed and the impact on the aggregate demand for collateral.**⁶¹ While fixed numerical floors reduce the amount of transactions that can be financed with a given pool of assets compared to a situation with very low levels of initial margins and haircuts, the effect on indebtedness is a priori unclear. Actors with loose leverage constraints (in the sense of indebtedness), such as hedge funds, might actually increase indebtedness to finance higher margin requirements.
170. **There might also be a risk that market participants perceive regulatory fixed numerical floors as prudent levels for initial margins and haircuts.** As such, they could set initial margins or haircuts lower than they would have done in the absence of the fixed numerical floors. This discretion should however be limited by the existing prudential regulation. Furthermore, market participants may be cautious with regard to increasing collateral requirements when the floors are binding, as it could be interpreted as a sign of stress and

⁶¹ This might also have an impact on asset encumbrance and could therefore be to the disadvantage of unsecured investors as presented in Ahnert et al. (2016).

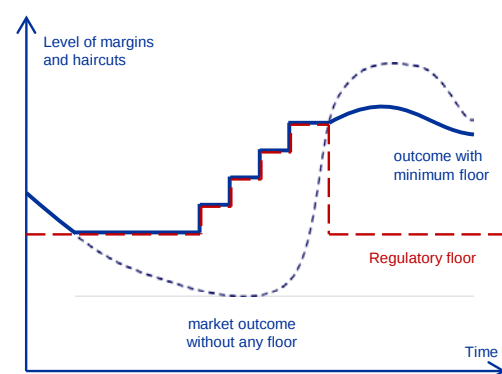
further exacerbate or trigger market uncertainty. As conducting derivative transactions becomes more costly when collateral requirements are sharpened, market participants might hedge risks less often and expose themselves to risks that were previously avoided.

171. **High fixed numerical floors for initial margins and haircuts may also impact the price and liquidity of assets.** Numerical margins or haircuts floors that are much higher than those that would be applied by CCPs or market participants in non-centrally cleared transactions would significantly increase costs, and could reduce trading activity. Moreover, in SFT markets, haircuts are part of the price discovery mechanism. Constraints on the freedom of market participants to adjust haircuts may thus be reflected in prices or in other terms of the transaction, which in turn may affect asset liquidity.

5.2.2 Time-varying add-ons to fixed numerical floors

172. **Time-varying add-ons to fixed numerical floors could potentially be used as active macroprudential tools to address financial and synthetic leverage at activity level and to counter procyclicality of margins and haircuts.** Besides the structural dimension, which is addressed by the fixed numerical floors, the systemic risk also has a time dimension, which refers to the build-up of risks over time, and could be better addressed by time-varying tools. As illustrated in Figure 6, the time-varying add-ons build on the fixed numerical floors, which aim at protecting margins and haircuts from falling to excessively low levels.

Figure 6
Stylised example of time-varying floors



Source: ESRB.

173. **When vulnerabilities to the financial system are judged to be growing, time-varying add-ons could be gradually increased.** In good times, which are marked by low market volatility and high market liquidity, time-varying add-ons can be set above zero. Moreover, when the level of leverage created with SFTs and derivatives is considered excessive, they could be gradually increased. This step would increase the amount of collateral needed to roll-over or enter new transactions, hence it would act as a brake to further increases in leverage.

174. **Though time-varying add-ons are intended to be binding primarily in the**

upswing, they may indirectly have a positive effect on downswings as well. They further limit the need of procyclical margin calls and haircut increases. Given the higher amount of collateral for a given set of transactions, spikes in volatility and risk aversion may lead to less pronounced procyclical increases in collateral haircuts, and require institutions to post less additional collateral. Hence, liquidity pressure in the collateral markets may be less severe compared to a situation in which haircuts and margins may increase from excessively low levels.

175. **In periods of financial distress, the time-varying add-ons could be removed to avoid any unwarranted procyclical effects.** With this active policy, regulators ensure that they are not reinforcing or adding to the stress in the market by tying up more collateral than required by the market participants. Concerns related to additional build-up of leverage are not expected to be relevant in such circumstances, and therefore the case for time-varying add-



ons would cease to exist. It can be expected, however, that higher volatility and risk aversion would lead endogenously to haircuts and margins above the fixed numerical floors foreseen by the regulation as the minimum levels.

176. **The drawbacks and/or costs associated with this tool are higher than for fixed numerical floors.** First, as the add-ons would be applied primarily during the upswing, more collateral would have to be held during this period and the price discovery mechanism would be further constrained. Moreover, the application of the tool faces additional challenges, in particular the question as to when to change the add-on levels. This would require indicators to be monitored, and these would likely only be available with a time lag, and could lead to additional costs of complying with new reporting requirements. Third, in order to avoid unnecessary liquidity pressures, the announcement period for changes in the time-varying add-ons should leave counterparties enough time to provide sufficient collateral. Fourth, the reduction of time-varying add-ons introduced by authorities might not be adopted by market participants if there was market pressure for retaining such add-ons as additional (“voluntary”) buffers. Finally, with regard to CCPs, their use of add-on margins (e.g. whether they could reinvest cash margins in repos as they currently do with “normal” initial margins) would need to be clarified.

5.2.3 Time-varying macroprudential margin buffer

177. **Macroprudential margin buffer represents a slight variation of the previous tool with respect to margins; however it comes with the positive feature of not interfering in margin setting decisions.** Building on the idea that a key motivation of macroprudential intervention is the creation of additional financial buffers in the system to absorb losses and mitigate stress, it might be worthwhile giving macroprudential authorities the possibility of imposing time-varying macroprudential buffers on top of the microprudential margins set by EMIR for CCPs and bilateral counterparties.
178. **Time-varying macroprudential margin buffers do not require any predefined fixed numerical floor and are independent from actual margin levels.** Contrary to the previous tool, this tool would take the margins calculated by the CCPs or bilateral counterparties as given, and add an extra margin for macroprudential purposes. This could be done in the form of a fixed amount or of a percentage extra margin on top of the initial and/or the add-on margin requirements. The positive feature of this tool is that it is not part of the microprudential risk management, e.g. the CCPs’ waterfall, and hence, would not interfere with the risk framework of a CCP or a bilateral counterparty. Instead, it fully respects the “base margins” calculated in line with the minimum stress testing and default fund requirements.
179. **The macroprudential margin buffer would help to build additional buffers in a countercyclical manner; however, this would come with some additional costs.** The macroprudential buffer would be higher in good times and would be dropped in stress situations. Whereas time-varying add-ons combined with fixed numerical floors establish the lowest level that margins are allowed to fall to, a macroprudential margin buffer could introduce safeguards that are in principle independent from the microprudential calculation of margins. However, the time-varying implementation will face the same difficulties as other time-varying tools pointed out in this report. Moreover, similar to the case of time-varying add-ons to fixed numerical floors, consideration needs to be given of how CCPs would be allowed to utilise the additional margin.



180. **The tool could be imposed broadly or on specific financial instruments.** As in the case of fixed numerical floors and related time-varying add-ons, the time-varying margin buffer might be introduced for specific financial instruments, complete asset classes or all transactions that are traded and cleared, and could therefore target risks of unsustainable financial and synthetic leverage.
181. **One possible variation of the time-varying macroprudential margin buffer would be to impose it on microprudential haircut setting.** An extension of this tool might take the form of an additional haircut for macroprudential purposes, which would also result in additional buffers being established.

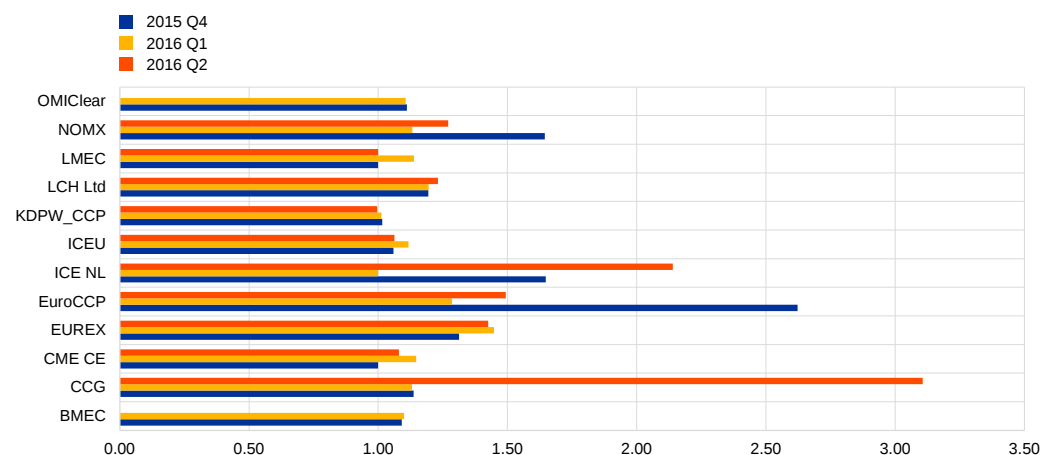
5.2.4 Macroprudential collateral pool buffer

182. **A macroprudential collateral pool buffer would come on top of the aggregate collateral requirements for all centrally cleared transactions.** Like the previous tool, the macroprudential collateral pool buffer would not interfere with the risk practices and margin settings of CCPs. Furthermore, it is indifferent to actual levels of margins and haircuts, and would come on top of them. Hence, it maintains a clear distinction between the microprudential process of setting margins and the macroprudential buffer that is independently set on top. However, instead of looking at individual transactions, which is the case of time-varying macroprudential buffer, this tool could only be applied at the level of the overall collateral pool.
183. **The tool would build on existing market practices.** As shown in Chart 18, it can be observed for several CCPs in the EU that at the aggregated level, some clearing members have the tendency to provide more collateral than actually demanded to fulfil total margin requirements. This overcollateralisation can buffer changes in the trading positions (which result in higher total margin requirements) as well as changes in the initial margins, in the value or in the haircuts of the provided collateral. By overcollateralising, clearing members avoid margin calls that could be accompanied by funding and liquidity pressure in distressed times. It should be noted, however, that the chart only shows the theoretical capacity of all members together, not the real capacity of individual members, to respond easily to higher margin requirements. It should also be considered that the overcollateralisation at CCPs may be due to a variety of reasons, including the search for “safe havens” (CCPs might be perceived as such in distressed circumstances) for cash deposits.
184. **It might be desirable to make the described voluntary overcollateralisation binding for all clearing members and bilateral counterparties by means of a macroprudential tool.** This potential macroprudential tool might be charged as a percentage add-on on the clearing members total margin requirements, and thus more collateral would have to be pledged. Furthermore, it could in parallel be introduced in the non-centrally cleared space so that counterparties to bilaterally cleared trades have to exchange a higher amount of collateral. If applied equally in both the centrally cleared and bilateral transactions, this approach would avoid any disincentives for clearing financial instruments at a CCP. As more collateral is required, the build-up of financial and synthetic leverage would be restricted, and therefore the procyclical effects would be dampened.
185. **Such a tool would have the advantage of being comparatively simple to calibrate.** The tool is not based on individual transactions, unlike time-varying macroprudential buffers, which are based on individual transactions or specific trading positions. This comes with the additional advantages that the tool is easily applicable even in cases of portfolio margining.



Moreover, as overcollateralisation is already taking place in practice at some CCPs, the additional costs of the introduction of such a macroprudential tool would be minor compared to other possible macroprudential usages of margins and haircuts.

Chart 18
Degree of Overcollateralisation



Source: CPMI-IOSCO public quantitative disclosure framework.

Note: Overcollateralisation was measured as a ratio of total initial margin held over total initial margin required.

186. **The macroprudential collateral pool buffer would be designed as a time-varying tool with the aim of counteracting procyclical effects.** As such, the collateral pool buffer would be released in a downswing, thus absorbing the stress that results from increasing microprudential margin and haircut practices. Otherwise, clearing members would be required to provide additional collateral or to liquidate positions in the event that microprudential collateral requirements are increased and the macroprudential collateral buffer stays constant.

187. **Some drawbacks are also associated with macroprudential collateral pool buffers.** Because collateralisation is conducted on a portfolio basis, the macroprudential collateral pool buffer would only come on top of the overall collateral. This tool could not therefore be used to target developments in specific financial instruments or asset classes. Moreover, the time-varying implementation is likely to face the same difficulties as pointed out above, and overcollateralisation might produce a chunk of dead weight costs, increasing the potential scarcity of collateral in the financial system. In addition, switching from voluntary overcollateralisation to a requirement for overcollateralisation for macroprudential purposes might be temporarily interpreted as sending the wrong signals about the risk management and/or pricing of financial products. Moreover, like the other time-varying tools discussed, consideration needs to be given as to how CCPs would be allowed to utilise the additional collateral.

5.3 Economics of tools addressing risks in the downswing of the cycle

188. **Procyclical developments can also be observed in the downswing of the cycle.**

Naturally, both the upswing and the downswing phases of the (financial/asset price) cycle are interconnected, and hence influence each other. If margins and haircuts are set (too) low in good times and are followed by abrupt increases in margins and haircuts due to higher volatility in times of stress, this could trigger further price corrections and systemic liquidity

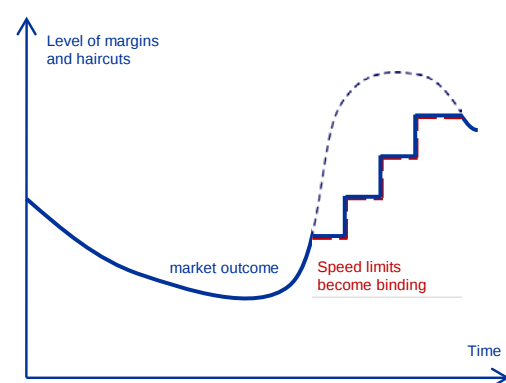


spirals, generating contagion and reinforcing stress in the financial system. The aforementioned price corrections and the following downward spirals will be more pronounced in a highly leveraged environment compared with a financial system with less leverage.⁶² Hence, in addition to the tools covered in the previous section, potential tools aimed at influencing the margin and haircut setting of market participants and CCPs, primarily during the downswing of the cycle, should also be considered. This section presents the basic concepts of speed limits, as well as margin and haircut ceilings as macroprudential tools. However, in contrast to the tools presented so far, the following could lead to the undercollateralisation of the counterparties involved. In the case of CCPs, this could undermine their resilience to stress.

5.3.1 Speed limits on margin/haircut increases

189. **Speed limits as a macroprudential tool would address the procyclicality of margins and haircuts primarily during the downswing of the cycle.** The tool would impose a ceiling on increases in margins or haircuts over a given time period. Therefore, it does not restrict the upper level of margins and haircuts, but the speed at which they are increased to this level. Figure 7 illustrates a stylised example of a cycle with binding speed limits to the level of margins and haircuts. Assuming that market participants in bilaterally cleared trades and CCPs have not anticipated the upcoming stress and therefore would have increased margins or haircuts sharply in the absence of macroprudential regulation, the introduction of speed limits results in a more gradual increase in margins and haircuts. This may, all other factors being equal, reduce the negative impact of higher collateral requirements by reducing the liquidity pressure on counterparties, and could therefore be beneficial for financial stability.

Figure 7
Stylised example of speed limits on margins and haircuts (speed limits not anticipated by the market)



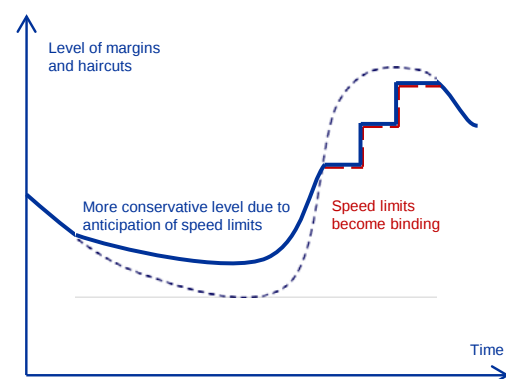
Source: ESRB.

190. **The introduction of speed limits on margin and haircut increases could incentivise CCPs and counterparties in bilateral transactions to set more conservative margins and haircuts during good times.** To ensure that speed limits are not too restrictive in times of stress and to reduce the risk of being temporarily undercollateralised, market participants may set margins and haircuts more conservatively in good times (see Figure 8). Similarly, counterparties may start raising margins and haircuts earlier than they would do otherwise to have fewer exposures temporarily undercollateralised. This would also be beneficial from a financial stability perspective, as the relative increase of margin and haircut requirements in times of stress

⁶² Highly leveraged firms in particular, both banks and non-banks, are susceptible to even small changes in asset prices, and may often depend on continuous renewal of short-term debt. If these firms are forced to close out trading positions or sell collateral in order to meet margin calls, it could lead to severe asset fire sales at dislocated prices. The sharp price decrease will most likely spread across asset types and maturities, leading to further fire sales by other highly leveraged entities. Such a short-term correction could end in a long and painful deleveraging process.

would be lower. However, it would restrict market participants' ability to freely set margins and haircuts in accordance with the levels calculated mechanically from internal models, including based on regulatory-mandated minimum standards.

Figure 8
Stylised example of speed limits to margins and haircuts (speed limits anticipated by the market)



Source: ESRB.

191. Speed limits could lead to undesirable undercollateralisation and reduced SFT activity. This tool would deliberately overwrite microprudential risk management rules for a short period of time for the sake of the overall financial system. As a consequence, market participants and CCPs might be forced to temporarily set collateral requirements lower than envisioned by their risk models or the relevant microprudential regulation, and would be undercollateralised for a while. In the case of SFTs, haircuts often do not change during the length of the transaction, but when the transaction is rolled over. Therefore, speed limits could prompt market participants to reduce their supply of financing or securities in order to avoid the risk of becoming undercollateralised.

- 192. A restricted application of speed limits might conform more to the microprudential framework.** Speed limits could be applied only to those elements of the total margin requirement that are not already sufficiently covered by the procyclicality limiting framework, such as add-ons. CCPs and, to a lesser degree bilateral counterparties, already have measures in place to set margins in a less procyclical way. However, these do not apply to add-ons, which are an important component of risk management practices and those most likely to shoot up significantly during a deleveraging phase. Applying speed limits to the add-ons would achieve the objective of dampening the spike in margin calls without compromising the existing microprudential framework. However, as add-ons are often an integral part of a CCP's margin framework, concerns of undercollateralisation would persist.
- 193. Speed limits could have destabilising effects on the market if applied as hard tools, and their impact on the behaviour of market participants remains unclear, given that they are untested.** Even though speed limits might have less of an impact if market participants anticipate the setting of speed limits, this tool could nevertheless lead to temporary undercollateralisation of market participants or CCPs, or to reduced trading volumes. First, the resilience of CCPs and counterparties in non-centrally cleared trades may be reduced, as binding limits would leave the counterparties with undercollateralised exposures. This could create legal issues concerning the liability for default losses if they materialise in situations of macroprudentially enforced undercollateralisation. Second, counterparties may not be willing to conclude or clear trades in periods where the speed limits for margins and haircuts are binding. This might hinder hedging risks when most relevant. Lower trading volumes in times of stress would therefore negatively affect market liquidity. Third, counterparties might have an incentive to reduce the length of financial contracts in order to avoid negative effects from speed limits. Lastly, serious financial stability implications could arise in the event that a CCP were to default due to undercollateralisation. This would carry serious reputational and conceivably financial risks for regulators, as part of the liability for the CCP's risk management



framework is transferred to the authorities. Therefore, speed limits might – if considered – be most suitable as soft tools, such as non-binding recommendations or guidance.

194. **Costs and benefits of speed limits have to be carefully weighed against each other.** Given the challenges, the calibration of speed limits would need to strike a balance between their potential benefits in terms of reducing procyclicality, and the risk that a temporary ceiling to the level of margins and haircuts may result in undercollateralised exposures or a significant reduction in SFT activities.

5.3.2 Haircut and margin ceilings

195. **Haircut and margin ceilings are an alternative macroprudential tool designed to address the procyclicality of margins and haircuts, primarily during the downswing of the cycle.** Such ceilings would take the form of a cap on the maximum levels of margins that CCPs and counterparties can call from each other or on the haircuts that are applied on collateral. It might happen that during stressed conditions, margin and haircut increases are too large, and display destabilising and potentially procyclical spikes. Crucially, these spikes typically do not originate from increases in margin or haircut calculations, which remain fairly stable due to the current regulatory constraints (e.g. as in EMIR), but are rather mainly fuelled by increases in discretionary components, like add-ons and client specific buffers. This could potentially be addressed by directly limiting the overshooting phenomena by imposing a cap on the maximum acceptable margin and haircut levels, inclusive of any additional discretionary component.
196. **Haircut and margin ceilings have similar drawbacks to speed limits.** First, margin and haircut ceilings set by macroprudential authorities might be wrongly mistaken as a signal that authorities would know the fair value of trading positions and collateral better than the market. Setting a fixed maximum level of margins or haircuts would essentially mean setting a hard price for counterparty creditworthiness and market volatility risk. However, the tool would not be designed with a view to setting the “right” haircut for specific types of collateral or the “right” initial margin for a given trading position, but with a view to limiting the rise in margins and haircuts for macroprudential considerations when the cycle turns. Second, a fixed maximum level of margins or haircuts could lead to undercollateralisation of market participants or CCPs. As described above, this could be beneficial for financial stability, since margins and haircuts are not increased in an excessive procyclical way in times of stressed market conditions. However, this could also have a negative impact on markets, in the same way as speed limits. For example, a CCP could exclude certain asset from the list of eligible collateral, thus forcing the clearing member holding such assets to sell them in order to generate cash collateral. This would be counterproductive in terms of financial stability. Third, there might be legal issues concerning the liability for losses if they were to materialise when forcing CCPs or counterparties in bilaterally cleared trades to be undercollateralised. Such a threat to the resilience of individual market participants or to CCPs must therefore be well founded on severe concerns for financial stability, and any loss sharing would have to be clarified well in advance.



5.4 Other tools

197. **There are a number of further ideas on the use of margins and haircuts that may be well suited for macroprudential or system-wide policy considerations.** As presented in this section, authorities could address macroprudential issues and thereby foster the overall stability of the financial system by influencing certain elements of risk management practices – such as the collateral pool itself – or by demanding a change in current market practices with respect to initial and variation margins.
198. **For the time being, the following outline on further tools should be seen as initial brainstorming and a non-exhaustive enumeration.** Further analysis on each of the following tools would be required, including a careful assessment of all possible direct and indirect consequences, like the creation of new potential risks, changes in the behaviour of market participants as well as an analysis on whether deploying them in isolation or rather as part of a package of measures would deliver the desired outcomes.

5.4.1 Admissible (variable) corridors

199. **Admissible corridors combine different macroprudential policy measures in a single tool.** The tool would allow haircuts and margins to be set only in a predefined range or corridor. This would combine the policy tools of fixed numerical floors with ceilings, and would function like a guardrail at motorways, only allowing them to move in a prescribed corridor. Similar to both single tools, the corridor could be adapted (raised or lowered) to new situations, and therefore made time-variable.
200. **Admissible corridors would tackle the systemic risks over the complete cycle, but would also come with all the drawbacks associated with the single tools.** This potential new tool would aim to combine the approaches of floors and ceilings, e.g. setting margin and haircuts not too low but also not too high, and thereby reducing procyclical developments and the build-up of excessive leverage. Additionally to the combined benefits of floors and ceilings and in contrast to single tools, this tool would be in place in all parts of the cycle, and not only focus on the downswing or upswing. However, this tool also combines the possible disadvantages of the two single tools, such as higher collateral requirements in upswing periods, but being potentially undercollateralised in downswing periods.

5.4.2 Incremental step up approach

201. **The incremental step up approach would be a macroprudential requirement to fix a margin requirement for a specific counterparty – or a haircut on a specific collateral posted – for a specific time frame.** As described above, the amount of initial margin is fixed at the inception of a cleared transaction, but might change over time due to significant changes in the input variables of the risk management model (e.g. volatility spikes). In contrast to only addressing the overall level of haircut and margin requirements, authorities could influence other parts of the margining process in bilaterally or centrally cleared trades. One possible macroprudential measure could be to fix the margins or haircuts for some weeks or for the complete duration of the agreement. In this way, the market could be left free to set initial margins and haircuts on a contractual basis, above a minimum base threshold represented by a minimum margins and haircut framework (e.g. as in EMIR). Any change in



the level of margins and haircuts, however, would apply only to new trades going forward, as it is already current market practice in some SFTs. So, trading portfolios will have to be split and margined separately with the constant margin parameters of each trading day respectively. Changed haircuts will only be applied on newly provided collateral, whereas the haircut on already posted collateral will not be adapted to the new haircut level. The outcome would be a slow-moving aggregated collateral demand, which imbeds incentives not to set levels too low in good times (to avoid the risk of not being able to raise them during stressed periods) or too high in a crisis (due to the fear of being unable to readjust and becoming uncompetitive thereafter).

202. **A variation of the incremental step up approach would be to impose mandatory notice periods.** The above is an example of a fully rule-based approach. To introduce regulatory discretion, a variation of the same concept could be considered: imposing mandatory notice periods for any changes in initial margin, collateral haircuts and add-ons applied. The tool would require a minimum time (at least days rather than hours) between the notification and the actual point in time before a counterparty could impose increases (or decreases) of margin or haircut levels. This would be simpler to implement because it applies to the entire portfolio at one time, and does not introduce differential treatment within the same netting set. It could also be easier to enforce than other tools, because in both cases, at least one of the counterparties would have an interest in policing the other. The tool would consist in setting the notice period: lengthening in anticipation of shocks, preventing brusque upswings, and shortening in times of release, when the market wants to quickly return to lower levels. Hence, this tool could be especially helpful in (anticipation of) downswing phases by preventing sudden increases in margin and haircut requirements, and therefore reducing the need for fire sales, and hence procyclical effects in stressed phases. However, it also influences collateral in upswing phases in which margin and haircut requirements are lowered too quickly. When there are (timely) restrictions in upswing phases with regard to the setting of margins and haircuts, the situation is equal to a buffer of additional collateral and reduces the build-up of leverage in the financial system, since otherwise released collateral is not invested in risky assets.
203. **The drawback of these solutions is the radical transformation in the risk management framework that the implementation of this tool would require.** Especially when considering contracts with very long durations such as derivatives, both the incremental step-up approach and mandatory notice periods would demand dramatic changes in terms of the modelling and pricing of risk. Moreover, the empirical effects of delaying an adjustment of margins and haircuts are unclear, and fully based upon behavioural assumptions. It could happen that as stressed above, such tools smoothen periods of overshooting, if upon termination of the contracts, the markets have calmed again. However, delaying a margin and haircut increase could also lead to even stronger sell-offs if volatility and uncertainty continue to prevail in the markets upon the termination of contracts. Another possible and undesirable reaction could be a shift to more short-term contracts, because market participants would wish to avoid being unable to change collateral practices for long-term contracts. So, such an intervention in the individual risk management of market participants or CCPs might threaten their resilience, due to potential temporary undercollateralisation (similarly to speed limits), and must therefore be well founded on severe concerns for financial stability.



5.4.3 Minimum amount for specific collateral (cash and/or securities)

204. **Minimum requirements on the composition of the collateral portfolio, which is used to secure financial transactions, could be introduced in order to dampen leverage in the financial system.** There could be situations in which the macroprudential authorities may wish to use haircuts to prevent a further increase of leverage in the financial system. Market participants might be able to circumvent these regulatory efforts by pledging or selling the securities elsewhere, and use the received cash as collateral instead. A macroprudential requirement to have a minimum share of specific collateral would reduce the possibility of this regulatory arbitrage, as well as limit the pool of available collateral that can be transformed, limiting leverage levels in the system. Hence, authorities' macroprudential measures could be more effective. In addition, cash has a stable market value compared to securities. Hence, a minimum share of cash in the collateral portfolio can lower the pressure on CCPs and market participants to liquidate collateral abruptly in stress periods, and hence reduce the risk of fire sale externalities. Therefore, this potential tool could stabilise the financial system, especially in downswing periods. This argument only holds true, however, under the assumption that CCPs and bilateral counterparties do not reinvest the cash collateral in a procyclical manner. The strongest restriction would be a requirement to demand that the additional cash consists of central bank money that only can be deposited at central banks. One drawback of such a macroprudential tool is that it reduces the flexibility enjoyed by market participants in deciding which collateral they want to provide. It could also lead to increased contagion effects, as all market participants have to invest in the same collateral class (e.g. government bonds).

5.4.4 Macroprudential restrictions on variation margin

205. **The current way variation margin is calculated and exchanged can lead to procyclical effects.** While so far, the main focus in this report has been on influencing elements of initial and add-on margin requirements, the daily exchange of variation margin should also be taken into consideration, as it comprises enormous amounts of cash. It is a one-sided transfer from market participants with incurred losses to market participants with incurred gains on their centrally and bilaterally cleared trading portfolios, and can impose huge funding and liquidity constraints on certain market participants, especially in stress situations with high volatility.⁶³ Some market participants have criticised the OTC derivatives markets reforms because – in their eyes – they replace counterparty risk with liquidity risks. Given the way variation margin is calculated, its potential procyclical effect will be generated automatically, since more variation margin will be exchanged as prices become more volatile. The need to pay large amounts of variation margin could come on top of increased initial margins and losses in the value of collateral portfolios due to higher haircuts and dropping security prices. However, the effect is not equally distributed among market participants. While all market participants face higher initial margins in periods of stress, only some of them have to pay variation margins.
206. **One possible idea would be to calculate the variation margin obligation weekly instead of daily.** The daily exchange has been introduced as a measure to avoid the build-up of high claims over a certain period. This is particularly true in times when movements are high and one-directional, leading to a build-up of a high claim during a week. However, market price

⁶³ Mandatory exchange of VM is prescribed from 1 March 2017 in the coming RTS on NCCD.



changes are often reverted to a certain extent on the next trading day(s), and therefore the amount of variation margin for five trading days would be less than the accumulated absolute amount of variation margins for these five days, as some netting of gains and losses might be possible. In this case, macroprudential restrictions on variation margin might be beneficial mainly in times of stress when volatility typically rises, and hence, when market participants are potentially faced with high variation margin payment obligations.

207. **Another way would be to postpone the exchange of the variation margin for trading day T from T+1 to T+2 or T+3.** Currently, the variation margin is calculated on end-of-day market prices on T, and must be paid in the early hours of T+1. With a postponement, market participants would have more time to seek finance for their variation margin obligation, but the collecting counterparty would be exposed to higher risks.
208. **The intention would not be to suspend variation margin exchange.** This macroprudential tool would simply redesign the frequency of readjustment of the imbalances, and by doing so, it would increase the counterparty credit risk, using it as a reservoir to temporarily store liquidity pressures that are not released onto the market.
209. **Macroprudential restrictions on variation margins present several drawbacks.** Interfering in the current way variation margin is calculated and exchanged would deviate from internationally agreed standards (e.g. PFMI and NCCD), and would intervene in the current risk management of CCPs. It would also lead to substantial overall higher initial margin requirements, given the fact that the initial margin protects the counterparty from market fluctuations until the next exchange of variation margin occurs. Therefore, such a change of current market practices must be well founded on concerns for financial stability. Moreover, the same considerations as above concerning participants' behaviour may hold true in that it is unclear a priori whether this would lead to a smoothening, or whether it might actually increase funding pressures at one point in time and increase uncertainty. Furthermore, given the unequal distribution of costs, this tool could address the liquidity constraints at the level of sender of the variation margin, but the longer calculation periods for variation margins reduce the level of liquidity on the side of the receiver of the variation margin. Like previous tools, it could lead to an undercollateralisation for a certain time, exposing the macroprudential authorities both to potential compensation claims and reputational damage should a default occur.

Box 1

US experience on initial margin requirements for margin trading (Regulation T)⁶⁴

The stock market bubble of 1927-1929 and the subsequent "Great Crash" of 1929 were accompanied by the extraordinary growth and subsequent contraction of trading on margin, i.e. buying stocks on borrowed money and using the stock as security for the loan. The Crash and the Great Depression led the United States Congress to pass the Securities Exchange Act of 1934, which granted the Federal Reserve Board (FRB) the power to set initial margin requirements on national exchanges. The introduction of this law had three major purposes: to reduce "excessive"

⁶⁴ This box is to a large extent based on Section 2 of Brumm et al. (2015).



credit in securities transactions, to protect buyers from too much leverage, and to reduce stock market volatility (see, for example, Kupiec, 1998). In that sense, the Securities Exchange Act contained some elements that can be considered to be of a macroprudential nature. The FRB subsequently established Regulation T to set minimum margins for partially loan-financed transactions of exchange-traded securities. Regulation T therefore covers a subset of SFT transactions discussed in this report.

While the initial margin⁶⁵ has been held constant at 50% since 1974, the FRB frequently changed initial margin requirements in the range of 50-100% from 1947 to 1974. During this time, the Board viewed margin requirements as an important policy tool. The introduction and frequent adjustment of the initial margin prompted the creation of sizable literature on the effects of Regulation T. In an early contribution, Moore (1966) claims that the establishment of margin requirements did not have the desired effect. He argues that a major reason for the regulation's failure was that investors could avoid its impact by substituting other forms of borrowing for margin loans. Summarising the empirical literature, Kupiec (1998) concludes that "there is no substantial body of scientific evidence that supports the hypothesis that margin requirements can be systematically altered to manage the volatility in stock markets. The empirical evidence shows that, while high Regulation T margin requirements may reduce the volume of securities credit lending and high futures margins do appear to reduce the open interest in futures markets, neither of these measurable effects appears to be systematically associated with lower stock return volatility". In a similar study, Fortune (2001) argues that even though some studies suggest that the effect of margin loans on stock return volatility is statistically significant, such effects are much too small to be of economic significance. He also reiterates Moore's (1966) conjecture that investors substitute margin loans with other debt.

The empirical analysis of Regulation T in Hardouvelis and Theodossiou (2002) and in Hardouvelis (1990) provides an exception to the mainstream opinion, finding that increasing margin requirements in normal and bull periods significantly lowers stock market volatility, but that no relationship can be established during bear periods. The authors' policy recommendation is to set margin requirements in a countercyclical fashion as to stabilise stock markets.

⁶⁵ For example, a "50%" margin means that if an investor wanted to buy an equity worth US\$100, he could only borrow US\$ 50 and would have to finance the remaining part from his own funds. In that sense, the term "margin" as defined under Regulation T is identical to the definition of "haircut" used in this report.



Section 6

Calibration of tools

6.1 Overview

210. **The calibration of macroprudential tools depends on their complexity.** As discussed in the previous section, macroprudential tools can take a fixed form and a time-varying form. Both types of tool present different challenges in terms of calibration, with the time-varying tool raising additional implementation issues. In particular, questions related to the identification of indicators to monitor market conditions, the design of thresholds for activating the tool and defining the extent to which it should be varied need to be considered. Furthermore, clear communication is important, particularly if a time-varying tool were to be tightened. For example, if a fixed numerical floor were to be increased, there would need to be a time period between the announcement of the measure and its implementation such that counterparties would have sufficient time to source the extra collateral needed without creating severe liquidity pressure. The remainder of this section will discuss tools in the context of whether they are envisaged as fixed or time-varying tools.
211. **Unlike other sectors, there are few examples of using margins and haircuts to meet macroprudential objectives.** The introduction and frequent adjustment of initial margin requirements in the US by the Fed under Regulation T (see Box 1) can be seen as an early example of the use of margins to achieve macroprudential objectives. There are some more recent examples of calibrating fixed tools for margins and haircuts, such as the FSB framework for haircuts on non-centrally cleared SFTs and the BCBS-IOSCO framework for non-centrally cleared derivatives. Time-varying tools have been implemented by macroprudential authorities in other areas (e.g. the countercyclical capital buffer), but there are no examples of a time-varying tool being calibrated for margins and haircuts.
212. **Data availability and quality pose a challenge in terms of making macroprudential tools operational.** The data necessary to calibrate tools is either not readily available, its coverage is too short or its quality is poor. The FSB and the BCBS-IOSCO frameworks relied on ad hoc data collections to calibrate the level of margins or haircuts. Such one-off data collections are time-consuming and costly, and the data provided can be patchy. As new, more granular data becomes available, such as EMIR trade repository data, macroprudential tools should become easier to calibrate.
213. **The analytical framework also has gaps.** As highlighted in the previous sections, the use of margins and haircuts to meet macroprudential objectives is intended to address the excessive build-up of leverage and the procyclicality of margin and haircut setting. However, these higher-level policy objectives need to be broken down into a set of quantifiable, lower level objectives. Moreover, the analytical framework which would link a given tool to these lower level objectives, including the channels of transmission through the financial system, has not yet been detailed.
214. **Further work on identifying indicators and thresholds is warranted.** As recommended by the ESRB (ESRB, 2013), a two-step approach could be applied, in which the high-level objectives are first broken down into a handful of intermediate, not necessarily quantitative objectives that capture specific aspects of the high-level objectives. In the second step, tools that can be used to pursue these objectives are selected. To activate such tools, indicators that measure the build-up of specific risks need to be identified and indicator thresholds that



signal the need to potentially activate a tool need to be established. Indicators could be based on aggregate (macro) variable, system-wide metrics of risk or granular variables. These three categories represent different trade-offs between the availability of data and the analytical link between indicators, tools and objectives.

215. **In this context, this section considers the existing experience, and sets out a general approach to calibrate fixed and time-varying tools.** While reference to the calibration of individual tools in Section 5 is made, this section does not provide calibration for specific tools. It should be noted that implementation of the tools is a process, in which judgement on how to calibrate a tool is formed and adapted over time.

6.2 Calibration of fixed tools

216. **Setting the tool at the “right” level is a challenge.** A floor that was set so low that it would not be binding would have no impact on aggregate conditions. In contrast, a floor that was set so high that it would result in excessive margins/haircuts through most of the cycle would create high deadweight losses by placing undue collateral constraints on market participants (overcollateralisation). Analogously, a ceiling which is set too low would interrupt the smooth functioning of the market, whereas if set too high, it would not bind market participants. Thus, the key challenge in calibrating the various tools is to determine the level of margins/haircuts that mitigate the procyclicality of collateral requirements and avoid excessive overcollateralisation or undercollateralisation. It is also important to consider differences in how fixed tools should be calibrated for different asset classes and across cleared and un-cleared markets to avoid regulatory arbitrage.
217. **Recent global initiatives provide a benchmark for how numerical minimum floors can be calibrated.** In particular, the FSB framework for haircuts on non-centrally cleared SFTs and the BCBS-IOSCO framework for non-centrally cleared derivatives are both worth exploring. In order to assess the potential impact and unintended costs of a floor, the FSB launched a two-stage quantitative impact study (QIS). The first stage (April-June 2013) consisted of collecting detailed historical haircut data from a small pool of large financial intermediaries globally, so as to calibrate the proposed minimum haircuts. The second stage (November 2013-January 2014) aimed at assessing the scope and quantitative impact of the consultative proposals on a wider set of market participants, including medium-sized banks, broker-dealers, agent-lenders and non-bank entities. These frameworks are interesting also with respect to other fixed tools discussed in Section 5, albeit that the specific calibration of these tools has not been explored.
218. **The FSB framework for non-centrally cleared SFTs decided on the calibration by weighing the relative merits of granularity and simplicity for a numerical floor.** Too much simplicity may not effectively disincentivise the use of risky collateral, so it was concluded that the floors should be risk-based, but not too granular. The FSB guidance also explicitly recognised that countercyclical variation of the tools would be a possible extension, noting that further work would be needed to refine how this would be implemented.
219. **The BCBS-IOSCO framework for non-centrally cleared derivatives includes a proposal for calibration by taking into account the two underlying benefits of margin requirements for bilateral trades.** The level of margin was calibrated taking into account the two underlying benefits of the margin requirements for non-centrally cleared derivative trades – systemic risk reduction and promotion of central clearing. On the former, baseline margin is calibrated relative to the current and potential exposure posed by particular derivatives



transactions. On the latter, baseline margin is calibrated relative to the costs of executing the same or similar transactions in a centrally cleared market.

220. **The approach that has been taken under EMIR for centrally cleared transactions is also of relevance from the macroprudential perspective.** EMIR prescribes that CCPs set minimum parameter values for their risk models used for the purpose of calibrating minimum margin requirements for centrally cleared transactions, e.g. minimum margin period of risk, historical look-back period, confidence level. This approach might not be suitable for a macroprudential framework. In particular, intervening directly in the calibration of margin and haircut parameters would be complex, as different variations of models are used by market participants and CCPs (sometimes multiple models are used at a single CCP). This means that changes to margin model parameters may differ across models in how they impact margins and ultimately leverage in the financial system. A macroprudential benchmark model for individual financial instruments would need to follow a different approach. For example, fixed numerical floors based on the unconditional distribution of returns (e.g. using all available data instead of a limited lookback period) could be considered.
221. **Experience shows that defining the floors using transparent, uniformly comparable metrics is crucial.** For haircuts, the floor would be defined in percentage points of the mark-to-market value of the collateral, while for initial margins the floors could be defined in percentage points of each single asset or of the portfolio value. This approach would provide an objective and comparable metric across all transactions, irrespective of the margining model used by the counterparties or CCPs. Calibrating the tool in this manner may raise certain operational challenges, as expressing margins and haircuts as a percentage of notional exposure or mark-to-market value is not the methodology used in most margin/haircut models currently applied by market participants and CCPs.
222. **The calibration of tools addressing primarily downswings requires additional considerations regardless of whether they would be used as fixed or time-varying tools.** From a theoretical point of view, the calibration could be approached by differentiating which part of increasing margins and haircuts can be attributed to a rational anticipation of higher volatility and deteriorating creditworthiness, and which part stems from less rational fears and market frictions. In this context, the tools set out in Section 5.3 could be employed to temporarily restrain sudden spikes in margins and haircuts to the levels that are consistent with rational expectations. This approach could mitigate the excessive procyclicality of margins and haircuts in times of stress, while at the same time reducing the risk of leaving counterparties with undercollateralised exposures. However, while appealing in theory, identifying which proportion of increasing margin and haircuts can be attributed to rational factors is very challenging. Although mathematical models can be employed to potentially identify overreactions, such estimations are inherently complex and require considering the particularities of different transactions. Specifically, the results from a rational expectation analysis may differ depending on the volatility and the liquidity of the collateral posted as well as the credit quality of the counterparties involved. Another approach would be to focus on temporary restraints on the most abrupt margin and haircut increases that have been observed in the past. That is, to perform a historical-based calibration. This implementation scheme would result in a temporary mechanism that might be activated in order to restrain and/or smooth procyclical behaviour in haircuts and margins. The rationale to put the focus on extreme events is that these tail risks are rarely anticipated, and accounted for, by market participants, and thus have particularly strong destabilising effects.



6.3 Calibration of time-varying tools

223. **Macroprudential authorities can use time-varying tools to counter cyclical risks.** With regard to any time-varying macroprudential tool, a key question for policymakers is which indicators should be monitored in order to determine when risks are building up. In answering the questions, macroprudential authorities could seek to address some of the limitations of current risk models used by market participants. These models tend to calculate initial margins and haircuts on derivatives and SFTs on the basis of the volatility (both past and current) of the asset class underlying the transaction. For example, initial margin on equity derivatives will be calculated based on volatility in a particular equity market. Certain add-ons are also calculated for liquidity, concentration risk etc. A time-varying macroprudential tool might take into account a broader set of indicators covering the relevant cycle, along with terms and conditions governing collateral. Relying on a broad set of indicators might make it possible to detect the build-up of systemic risk, such as unsustainable leverage, in the economy, which could present itself before volatility in a particular asset class. Time-varying margins and haircuts based on this broad information set may be an effective tool in curtailing system-wide leverage and mitigating the propensity for procyclical changes. They may, however, also give rise to risks that need to be considered. For example, time-varying margins might make pricing models of CCPs and other market participants even more complex, thereby increasing operational risk.

6.3.1 Indicators

224. **In line with established macroprudential tools, a key set of “core” indicators could be chosen in order to guide policy.** There will be some overlap with indicators used for other macroprudential tools. For example the credit-to-GDP gap, which is the common reference guide for authorities setting the countercyclical capital buffer, will be useful in reading the stage of the overall financial cycle. In addition, many authorities publish aggregate data on asset prices and market volatility.⁶⁶ As a guiding principle, observable, measurable variables (such as asset price growth, market volatility) will lead to more predictable and consistent outcomes than unobservable variables (such as market sentiment). Some examples of indicators are given in Table 6.
225. **The aim of the indicator set is to establish a macroprudential “dashboard” which signals the build-up of risk.** For some series, a lower value will indicate growing risks – for example, low lending spreads may provide evidence of risk taking. The dashboard could be monitored continuously by policymakers. However, such a dashboard leaves room for a considerable amount of discretion, as each policymaker may have a different stance on the most important indicators or the number of indicators that need to be flagged before risks are considered to be elevated.
226. **Depending on the objectives, different indicators and their aggregation will be needed.** Different aggregations would be necessary depending on the type of cycle which is considered – e.g. asset price cycles will involve more fast-moving indicators compared to a leverage cycle.

⁶⁶ See for example, [Norges Bank](#) and [Bank of England](#).



Table 6
Potential Indicators

	Source of Systemic Risk			
	Asset Price Cycles	Market Volatility/Risk Appetite	Leverage/Financial cycles	Procyclicality
Examples of indicators (non-exhaustive)	commodity/equity price index and price/earnings ratios	VIX/measures of realised volatility	Credit Gap/growth: disaggregate for banks and non-banks	Measure of Procyclicality (Speed limit metric e.g. n-day movement in margin)
	CDS aggregate Index (e.g. Markit Itraxx Europe)	Credit availability	Weighted average leverage at banks / non-banks	Sector Interconnectedness or concentration (e.g. may increase susceptibility to fire sales)
	IRS Index	Corporate bond spreads/lending spreads	Measure of Shadow Banking Sector synthetic leverage (data gap)	Cross-sector contagion (liquidity weighted portfolio overlaps)

227. **The aggregation of individual indicators provides a broad perspective.** While each individual indicator may provide relevant information about a particular risk, it is difficult to put an array of contrasting messages together into a clear picture. Hence, a choice of aggregation technique is important. Aikman et al. (2015) discuss a number of methods of aggregation combining indicators of financial sector vulnerability, non-financial sector imbalances and risk appetite. The paper also presents heat maps and radar charts to assess the current state of affairs. Such a system could be adapted for indicators that might inform the use of margins and haircuts for macroprudential objectives. It may also be necessary to distinguish whether there should be a different set of aggregate indicators in cleared and non-cleared markets.
228. **There is some burgeoning evidence that aggregate indicators may play a role in improving the performance of margin coverage in centrally cleared derivatives.** Battistini et al. (2016) show that, in terms of margin volatility and correlation with the financial cycle, a countercyclical margin buffer, which is based on aggregate measures of the credit cycle, can outperform mitigants in EMIR.⁶⁷ Extending such analysis to considering the pass-through of an increase in margin on aggregate leverage or the probability of a destabilising fire sale would provide valuable insights for the possible use of macroprudential margin tools.

6.3.2 Thresholds

229. **Thresholds could be based on historical distributions or equilibrium values.** Once indicators are selected, the next step is to identify thresholds which will be used to activate and deactivate a time-varying tool. A time-varying macroprudential tool could then be implemented as an absolute or a percentage add-on to existing margin or haircut requirements.
230. **Based on the data history, the level of risk in a given sector could be measured.** Averaging over the values in a given sector (e.g. asset prices) would be one way to measure the overall level of risk. The decision on the activation/deactivation threshold impacts how often the tool is used and under which circumstances. Two approaches could be used for defining the activation/deactivation thresholds, either selecting the appropriate percentile or using early warning properties of each indicator. As to the former, if one believes that the tool

⁶⁷ For more information on a framework for evaluating EMIR tools, see Murphy et al. (2016).



should be active when risks are normal, then it should switch on at the 50th percentile of its past distribution (or at a “medium” level of risk). However, if the tool should only be used when risks are elevated, then it would be activated at, say, the 70th percentile. Alternatively, the activation/deactivation thresholds could be based on early warning properties of risk indicators. This could be achieved by AUROC analysis, as cited in academic literature on banking crises, whereby a threshold is selected based on early warning performance and a policymaker’s preferences in the trade-off between false alarms and missing a stress event (see, for example Drehmann and Juselius, 2014).

231. **Rather than setting thresholds based on the past, another approach is to consider the level of indicators relative to their equilibrium values.** This may be appealing if a policymaker were to believe that there have been structural changes in the economy and the past is no longer a good indicator of the future. In practice, this method would require a model for over/undervaluation in asset classes or a method for determining equilibrium values. For instance, nominal credit growing at a much faster rate than GDP may be an indicator of imbalances. Furthermore, an error correction model may be of use in predicting when a large correction (and hence volatility) may be likely.

6.3.3 Calibration

232. **Calibration of a time-varying tool could be based on policymaker judgement or a more “mechanical” link to risk indicators.** A mechanical calibration of a time-varying add-on/buffer would involve an aggregate or subset of the aggregate indicators.
233. **The time-varying tool would be correlated in some way to risk indicators.** Calibration would involve decisions on: (i) switch-on point: what level will the add-on/buffer be set at when it is switched on?; (ii) gradient: how will the level of the add-on/buffer change as risks change? Will it increase linearly as risks move for instance from the 60th to 70th percentile, and how quickly will it do so?; (iii) maximum value: what will the level of the add-on/buffer be when risks are at their 100th percentile?
234. **In terms of practical application, time-varying tools addressing primarily the upswing could be calibrated as explained above.** For example, the macroprudential collateral pool buffer could be calibrated by identifying a set of volatility and stress indicators or by calculating the principle components of a set of indicators. Furthermore, a threshold could be set. The macroprudential collateral pool buffer must then be covered by collateral as long as the indicator remains under the threshold. If the indicator exceeds the threshold, clearing members could exhaust the buffer until the indicator falls back under its threshold again. Alternatively, clearing members could be allowed to fall below the macroprudential collateral pool buffer for some time during a month (similarly to the requirement of minimum reserves by the Eurosystem, which only has to be fulfilled on average each month), or they could be given some time (e.g. 2-3 days) to re-establish the overcollateralisation in the event that the buffer is exhausted.



Section 7

Practical Implementation

235. **The use of margins and haircuts to meet macroprudential objectives should seek to minimise the risk of regulatory arbitrage and ensure complementarity with other regulatory measures, including incentives for central clearing.** So far, this report has identified issues that may arise from the use of margins and haircuts to mitigate systemic leverage and procyclicality, analysed existing regulation, and considered a number of possible policies to address potential regulatory gaps. This section will focus on how these policies could be implemented, as well as on the issues arising from putting them into practice.

7.1 Regulatory arbitrage and effectiveness of tools

236. **Regulatory arbitrage reduces the effectiveness of tools.** One policy objective is to mitigate the risk of regulatory arbitrage across jurisdictions. Another objective should be to ensure that the tools are applied consistently across both the centrally cleared and bilateral markets, and do not provide incentives to shift away from central clearing. The design of the tools will need to reflect the specific characteristics of both markets.
237. **Avoiding regulatory arbitrage is a complex objective, and proves challenging in every field of financial regulation.** The following sections highlight some of the issues that have been identified with regard to the tools discussed in this report, and provide some preliminary, high-level ideas for addressing them. Because the purpose of this report is not to provide a definitive regulatory proposal, solutions are presented in a simplified manner, and the many complex issues arising from their implementation are not discussed at length. Further analysis is needed in order to determine their practicality and efficiency, and to assess their potential side effects.

7.1.1 Avoiding regulatory arbitrage across jurisdictions

238. **As Section 2 shows, users of clearing services, OTC derivatives and SFTs are interconnected in a complex web, spanning national borders both within and outside of the EU.** It is necessary to consider how macroprudential authorities can implement policies to address risks in their domestic markets while minimising spillovers or the creation of unintended consequences in other jurisdictions; and conversely, how neighbouring countries can mitigate unintended consequences of third-country policies affecting their jurisdiction. This is not simply a problem of coordinating the timing of the deployment of tools, but also of designing the tools in a way that ensures they can be used in an effective and targeted way.
239. **The introduction of macroprudential requirements could result in market participants shifting their business to other jurisdictions in order to avoid additional costs in clearing.** For example, introducing a macroprudential tool on all transactions cleared by a domestic CCP might not produce an optimal outcome from a macroprudential perspective. While this could be less of a concern for smaller CCPs primarily serving domestic participants and markets, which are less exposed to cross-border competition, it could be relevant for larger CCPs that often compete for business in the same asset classes, sometimes on a global basis. In order to ensure the effectiveness of macroprudential measures, it might therefore be preferable to follow an approach that is competitively neutral from the perspective



of the infrastructure that intermediates these transactions, i.e. which does not change the cost of clearing through one CCP relative to another located in a different jurisdiction, and avoids arbitrage opportunities.

240. **Moreover, different jurisdictions may require different macroprudential measures at different points in the financial cycle.** In the context of centrally cleared transactions, the application of measures to a CCP with a globally diverse membership could have unintended effects for entities established in other jurisdictions, by impacting levels of leverage or building resilience against procyclicality in a way that may not be in line with the macroprudential needs in that jurisdiction. Thus, if no other CCP is providing clearing services in that asset class, the imposition of a macroprudential measure by a macroprudential authority might have a detrimental effect on other jurisdictions (e.g. those that are at a different point in the cycle) by constraining financial activity.
241. **One possible approach could be for CCPs to tailor their margining and haircut practices to the macroprudential requirements affecting counterparties established in specific jurisdictions.** If such an approach is to be further explored, authorities need to keep in mind some of its potential limitations and unintended consequences – on top of the practical implementation difficulties that may arise. One such effect might be to change the balance between “defaulter-pays” and “survivor-pays” within a CCP’s default waterfall (by increasing the margin requirements on certain clearing members), thus affecting incentives within its risk management framework (although it should be noted that some CCPs already apply country-specific add-on margins for clearing members from certain jurisdictions with high country risk). Alternatively, the macroprudential authority could require counterparties from its jurisdiction to respect the macroprudential requirements, on top of their obligations vis-a-vis the CCP (as is described in more detail below). There is also a risk that clearing members established in several jurisdictions might be able to circumvent the requirements through the use of intra-group transactions (this would favour larger clearing members with a global presence over smaller ones). Finally, like any macroprudential measure, the application of such tools could create additional regulatory costs for clearing members affected by the measure vis-à-vis those not affected.
242. **Another approach could be to focus on the counterparties themselves, rather than the infrastructures through which they clear their transactions.** Specifically, national macroprudential authorities could be provided with the power to set macroprudential tools, e.g. fixed numerical margin and haircut floors, for the centrally cleared transactions entered into by domestic counterparties, irrespective of their choice of CCP. Participants from a particular jurisdiction would be affected regardless of the CCP through which they choose to clear a particular product or asset class. This would remove competitive pressures between infrastructures and jurisdictions, and solve the institutional design problems mentioned above.
243. **When following such an approach, CCPs would not themselves be required to apply the tools.** Clearing members from a particular jurisdiction would be required to post collateral that is at least sufficient to meet the minimum requirements set by their macroprudential authority. If the margin requirements received from a CCP were lower than the minimum set by their national macroprudential authority, they would have the obligation to post additional collateral until the minimum was met. The CCP could continue to calculate its margins and haircuts according to its internal modelling, and would theoretically not be affected by macroprudential decisions – assuming that a number of implementation difficulties were addressed. It is likely that in this case, higher margins and haircuts requirements would not



only be applied by CCPs to their clearing members, but also by clearing members to their clients from a jurisdiction where the macroprudential measures are implemented.

244. **Implementation of this infrastructure neutral approach is only discussed here at a high level, and the practical and conceptual difficulties it could generate would need to be analysed further.** For example, a specific custody and investment regime for macroprudential add-ons on collateral posted by clearing members would need to be agreed, and would need to clarify whether CCPs would be entitled to count this excess collateral as part of their default waterfalls. The role of CCPs in monitoring whether their clearing members are meeting their local macroprudential requirements would also need to be clarified. Lastly, the impact of the measure on indirect participants to central clearing (i.e. clients) would need to be analysed in more detail.
245. **One necessary pre-requisite for applying either of these approaches would be to ensure international consistency through reciprocal agreements between jurisdictions.** Authorities would recognise the right of relevant third-country authorities to mandate macroprudential margins or haircuts for their domestic counterparties. If applied in the centrally cleared space only, this could also disincentivise central clearing where not already mandated.
246. **Applying macroprudential instruments to non-centrally cleared transactions might be more straightforward, and might give less rise to regulatory arbitrage risks.** A macroprudential authority could, for example, impose a numerical margin floor on all relevant trades involving an entity from its own jurisdiction to meet macroprudential objectives. This measure would apply to the collateral posted by domestic counterparties, regardless of the jurisdiction in which the trade is booked, and of the other counterparty's home jurisdiction. Unlike in the case of centrally cleared transactions, domestic banks would not be able to avoid this requirement by conducting their business in another jurisdiction. A decision by a macroprudential authority to implement a tool on all trades within its jurisdiction would directly impact leverage and conditions in its own country, which is what macroprudential authorities seek to address. The process of implementing this approach would also be similar to that described above, whereby participants must ensure they meet macroprudential margin and haircut requirements for every transaction they trade bilaterally. A similar approach has been discussed for the FSB minimum haircuts framework for non-centrally cleared SFTs and margin requirements stemming from the BCBS-IOSCO framework for non-centrally cleared derivatives transactions. This framework could be amended so that each participant has responsibility for implementing the decision of a national authority. Here too, conceptual and practical difficulties would need to be closely examined. For example, international banking groups might be able to circumvent the requirements by accumulating leverage within a jurisdiction where macroprudential requirements are lower or non-existent, and transferring this leverage to another entity in the group via an intragroup transaction.
247. **International consistency through reciprocal agreements between jurisdictions worldwide would be beneficial also for non-centrally cleared transactions.** Counterparties might wish to circumvent macroprudential regulation by relocating to another jurisdiction entirely. However, for most firms, the cost of relocating to another jurisdiction would outweigh the benefits of lower margins requirements. However, a reciprocal regime, agreed at international level, would help ensure that the application of macroprudential measures in one jurisdiction would not give incentives to relocate.
248. **Macroprudential measures for non-centrally cleared transactions could build on the BCBS-IOSCO framework for the treatment of margins.** The BCBS-IOSCO framework



addresses the shortcoming in bilateral OTC derivatives (when compared to centrally cleared derivatives trades and the role played by a CCP in particular), namely inadequate collateralisation. The BCBS-IOSCO framework contains requirements for the treatment of margin that is collected. In particular, initial margin collected should be held in such a way as to ensure that: (i) the margin collected is immediately available to the collecting party in the event of the counterparty's default; (ii) the collected margin must be subject to arrangements that protect the posting party to the extent possible under applicable law in the event that the collecting party goes into bankruptcy. Given that these arrangements will be in place for non-centrally cleared derivatives, it should be possible for macroprudential measures to build upon this framework and to be collected in the same way.

7.1.2 Avoiding regulatory arbitrage across products and markets

249. **The introduction of any new tools should not impact the relative cost of transacting in different markets in a way that disincentivises central clearing.** One of the objectives set by the G20 during the Pittsburgh summit of 2009 was for all standardised OTC derivatives contracts to be cleared via CCPs. Subsequent international and European standards (the CPMI-IOSCO PFMI, the BCBS-IOSCO margin requirements for non-centrally cleared derivatives, EMIR) sought to incentivise recourse to central clearing by setting higher requirements for bilateral transactions. The use of margins or haircuts to meet macroprudential objectives should avoid shifting the relative cost of centrally cleared transactions vs. bilateral transactions to the point where this would disincentivise central clearing.
250. **The risks of disincentivising central clearing would depend on the types of macroprudential tools used and the way in which they were calibrated across different products and markets.** The margin requirements set by EMIR for non-centrally cleared transactions are higher than for centrally cleared ones (see Section 4). Applying a uniform buffer or add-on across centrally cleared and non-centrally cleared products would therefore not affect the relative costs of transacting in both markets, and would ensure incentives in favour of central clearing are maintained. Unlike a uniform buffer or add-on, applying a uniform floor might equalise the costs of centrally cleared vs non-centrally cleared transactions. In the case of floors, it could therefore appear preferable for national macroprudential authorities to set higher macroprudential requirements for non-centrally cleared derivatives and other relevant transactions.
251. **Introducing a macroprudential tool for a specific instrument or asset class could prove challenging, due to the manner in which margin requirements are calculated across portfolios.** CCP margins are meant to cover clearing members' net exposures across several instruments, including cash transactions, derivatives transactions and SFTs. Consequently, the introduction of macroprudential tools for specific financial instruments (even if done uniformly across the centrally and non-centrally cleared world) may have consequences that could go beyond their intended target, by also increasing the cost of transacting in other asset classes, especially in the case of cross-product and portfolio margining.
252. **The introduction of macroprudential tools in a particular asset class poses particular challenges.** It could result in counterparties increasing their leverage in a non-affected asset class (if substitutable), which may have a negative impact on financial stability. This may be particularly true for participants not using derivatives for hedging purposes, but for speculative purposes. A similar point can be made regarding the types of transactions, where divergences



in the rules applied to derivatives and to SFTs could result in market participants shifting their activities in favour of one type of transactions for arbitrage reasons.

253. **A further risk lies in substitution possibilities.** Higher margins on certain derivatives might be circumvented by purchasing the underlying assets (e.g. bonds, equities, commodities). Higher margins on SFTs might be circumvented by using other financial tools. Macroprudential authorities would need to ensure the use of macroprudential tools does not result in systemic risk being shifted to another sector via cross-product arbitrage, or to another market. Here too, calibrating the tools such that they do not affect market dynamics in a manner detrimental to financial stability will be challenging.
254. **Regulatory arbitrage and unintended consequences are well-known challenges for policy design.** This section has shown that the use of margins and haircuts to meet macroprudential objectives poses challenges and that the macroprudential tools explored in Section 5 would need to be examined further in this light. An important conclusion is that macroprudential tools should be designed in a way to minimise cross-border, cross-product and cross-market arbitrage, and that following their implementation, developments need to be monitored. Consistency and reciprocity at international level has an important role to play.

7.2 Interplay with existing banking regulation

255. **There is interplay between the use of margins and haircuts to meet macroprudential objectives and certain aspects of banking regulation which could impact market dynamics.** Margins posted as collateral, for both cleared and non-cleared transactions, are normally required to be liquid and of high quality. These are the same requirements as for the assets included in the liquidity coverage ratio (LCR). However, when a bank uses assets as collateral, they become encumbered and cannot qualify as liquid assets for the purposes of meeting the LCR. Thus, a bank faces a trade-off with regards to how it wants to utilise its liquid, high-quality assets. Any use of margins and haircuts to meet macroprudential objectives that would lead to margins and/or haircuts being set at a higher level than would otherwise be the case would thus place additional demands on banks' pools of liquid and high-quality assets. This could have an impact on banks' willingness to enter into derivatives and SFTs, resulting in implications for market liquidity and monetary policy implementation, which would need to be considered in the design of any new regime.
256. **Fixed numerical floors are one example of interplay with banking regulation, and the operation of certain prudential requirements may have to be reviewed.** Fixed numerical haircut floors can help reduce deleveraging during a downswing in asset prices, as haircuts may increase less than would otherwise have been the case. In the context of banking regulation, this would create some overlap with the LCR, which is designed to ensure that banks have a liquidity buffer available during periods of idiosyncratic or market-wide stress. More generally, it is important to recall that the LCR is calibrated to take account of firm and market-wide stress scenarios. The CRR envisages that the haircuts applied for the purposes of calculating the LCR should reflect those applied in stressed repo markets. The intention of the legislator was to discount the potential loss of value of the underlying collateral if sold or repoed under stress. Therefore, the application of fixed numerical floors, for the purposes of controlling the level of leverage and addressing procyclicality, would have implications for the calculation of the LCR, which relies on repo market haircut rates, potentially necessitating a fundamental review of the liquidity regime.



7.3 Pass-through to non-banks

257. **Targeting the build-up of leverage in the less regulated non-banking sector could be one objective of a macroprudential framework for margins and haircuts.** While banking leverage is already covered by a series of regulatory requirements (see Sections 4.3.1 and 7.2), there is currently no comprehensive toolkit to address the build-up of leverage in all parts of the non-banking sector, especially for certain activities of so-called shadow banks. Macroprudential tools targeting margins and haircuts in SFT and derivatives transactions would aim to fill this gap. It is therefore important to ensure these tools effectively target non-bank entities.
258. **Macroprudential authorities might face challenges in ensuring their measures for CCPs are effectively passed through to non-bank entities.** Shadow banks can access centrally cleared derivatives and SFT markets often only indirectly, although certain CCPs are beginning to offer specialised, direct clearing services for non-bank entities. The membership requirements and the costs of maintaining an active clearing membership mean that non-bank entities are often only able to access central clearing services indirectly through the services of larger, direct clearing members. This means that in order to affect the leverage build-up by non-bank entities, the clearing members would need to pass on any costs imposed by macroprudential measures to their clients. However, as explained in Section 4.2, there is currently no clear regulatory framework governing the collateral relationship between clearing members and their clients. While anecdotal evidence suggests that clearing members frequently multiply the margin requested by the CCP when charging their clients, there might also be cases where clearing members could elect to cover a fraction of margin costs themselves in order to attract client business in a competitive market. All in all, in the absence of a framework governing the clearing member-client collateral relationship, the macroprudential authorities would face challenges when seeking to predict or monitor the effect of their macroprudential measures on non-banks accessing CCPs indirectly.
259. **A better understanding of the network through which non-banks participate in derivatives and SFT markets is needed.** The example above, based on the specific case of centrally cleared markets, illustrated a more general point: the effective targeting of shadow banking leverage requires an in-depth understanding of the manner in which these entities access SFT and derivatives markets. Without such an understanding, there is a risk that macroprudential measures may overshoot or undershoot, thereby affecting their efficiency and creating potential knock-on effects for financial stability. How this could be achieved and whether, for example, trade repository data might help in developing this understanding needs to be investigated further.



Section 8

Potential ways forward and conclusion

260. **Leverage cycles and procyclical behaviours are complex phenomena; related financial stability risks have to be further analysed and cannot be addressed with a single tool.**

The dynamics of the build-up phase of leverage differ from those in the deleveraging phase; and the procyclical effects of margin and haircut practices also differ during those phases. Moreover, the transmission mechanism from margin and haircut setting to the financial or asset price cycle is not well understood. The report identifies a number of tools, all of which should in principle be able to address specific undesirable effects. But a single tool that would enable macroprudential authorities to comprehensively address all such effects throughout the phases of the leverage cycle has not been identified. A set of tools is therefore likely to be needed to tackle procyclicality and the system-wide build-up of excessive leverage comprehensively. Having this system-wide perspective is important: the primary objective of these tools would not be to increase the resilience of individual market participants such as CCPs.

261. **The previous sections noted a number of challenges, in particular:**

- **The tools considered may have side effects, and their application comes at a cost.** For example, there could be tension between tools that build system-wide resilience and those that instead “lean against the wind”. Policies designed to strengthen the stability of the financial system may at times be at odds with microprudential goals. This tension will be largest for tools such as speed limits or ceilings, which would interfere with the prudent risk management of individual market participants, especially CCPs. This suggests that such tools – if considered – would likely need to be based on rules such that they can be internalised ex-ante by market participants in order to minimise disruptions to their risk management practices.
- **The calibration of tools is hampered by data gaps and the transitioning to a new regulatory framework.** Markets need time to complete the transition to the new regulatory landscape brought about by EMIR and new banking sector regulation, and to adjust to its effects. In particular, the mandatory clearing of interest rate swaps and credit default swaps is gradually coming into force, and will extend until the end of 2018; and the mandatory exchange of variation margin for non-centrally cleared derivatives is scheduled for March 2017. These regulatory requirements will have a major impact in terms of volumes and types of collateral exchanged and the number and breadth of entities involved, which in turn will likely cause changes to collateral flows. This means that analysis on derivative markets cannot fully rely on data collected before this transition. Data will, however, start to become available over the coming years. This is also the case as regards data on SFTs, with the entry into force of the SFTR. Furthermore the impact of new banking sector requirements (enhanced capital requirements, the Leverage Ratio, LCR and NSFR) will impact behaviour.
- **Derivatives and SFT markets are porous, and there is a high degree of complementarity and scope for substitution between eligible collateral across products and asset classes.** The policy implication is that a localised application of tools – to a specific market, entity or an asset class – may not yield the desired effects in terms of impact, due to market practices such as collateral optimisation and transformation. This suggests that the scope should be as wide as possible, with the coverage extended to non-banking entities and activities, and a broad range of asset classes.



- **There is an open question regarding the authority/(ies) that should be called upon to trigger a specific tool.** The answer to this question may depend on what the tool is, what its objectives are, how broad the scope is, and what the trade-offs and undesirable side effects may be. The policy implication is that the analytical work on specific tools needs to be concluded before a particular governance structure is advocated.
262. **Against this backdrop, further empirical and conceptual analysis is needed.** The FSB haircut floors are due to be implemented in 2018. This will be an important step in addressing a gap in the regulatory framework, in which the biggest progress has previously been made in centrally cleared transactions, and the least in bilateral SFTs (especially those executed outside the bank-to-bank space). It can also lay the foundations for analysis of other macroprudential tools by providing new data, and evidence on intended and unintended effects. Another aspect of the FSB framework is that it is specifically targeted at non-banks, which are sometimes less regulated than banks. In particular, they may not have the capacity to compute, call, validate, possibly segregate, and value margins and haircuts. The EMIR experience has shown that building up such capacity – which may be required for some of the future macroprudential tools to be applied effectively across a wide range of entities – takes time. However, the complexity of the issues, the interconnectedness of markets and tools, evolving behaviour from regulatory change, and the lack of data noted in the previous paragraphs, mean that this report does not propose the introduction of any new tools beyond the FSB framework.
263. **A programme for future work in this area could close the knowledge gaps identified in this report and contribute to the reviews of existing regulation.** Specifically, the objectives of the tools in terms of building resilience or “leaning against the wind” have not been established, yet. The transmission between margin and haircut levels and the financial cycle, as well as the calibration of potential tools, are not well understood. Indicators pointing to the build-up of excessive leverage at the desired level of aggregation and thresholds that might signal a need for activation have not been identified. In addition, there is little knowledge about the impact of any of the tools considered, their effectiveness and potential undesirable side effects.
264. **A possible outcome of such a programme of future work is that gaps will gradually be filled and regulation enhanced.** In terms of *gradually filling gaps*, it is likely that fixed tools that apply at a higher level of aggregation (albeit that their implications still need further analysis) are easier to implement than time-varying tools. Such tools could be informed by and/or build on the FSB framework. For example, the design of the FSB framework might inform the development of minimum levels of initial margins. Moreover, as the FSB framework only applies to non-banks that receive financing and excludes government bonds which account for the majority of SFT funding in Europe, consideration could be given to covering a wider set of asset classes and activities. Any proposals would need to take account of unintended consequences and the international regulatory landscape in this area. In terms of *enhancing existing regulation*, there is scope to develop a framework governing the use of discretionary add-ons and overcollateralisation as well as the relationship between clearing members and clients. And for non-centrally cleared SFTs and derivatives, efforts could be made at a microprudential level to better mitigate any procyclical effects of margins and haircuts on these transactions, in particular by, in the first instance, adopting the FSB framework. The framework currently applied to centrally cleared transactions under EMIR – which includes specific procyclicality-limiting tools to be applied to initial margin models – could be taken as a starting point.



References

- Abruzzo, N. and Park, Y.H. (2014), "**An Empirical Analysis of Futures Margin Changes: Determinants and Policy Implications**", Discussion Paper No 2014-86, Board of Governors of the Federal Reserve System (US).
- Acharya, V.V. and Viswanathan, S. (2011), "Leverage, moral hazard, and liquidity", *The Journal of Finance*, Vol. 66, No 1, pp. 99-138.
- Adrian, T. and Shin, H.S. (2010), "Liquidity and leverage", *Journal of Financial Intermediation*, Vol. 19, No 3, pp. 418-437.
- Aikman, D., Kiley, M.T., Lee, S.J., Palumbo M.G., Warusawitharana, M.N. (2015), "**Mapping Heat in the U.S. Financial System**".
- Armakolla, A., Douady, R., Laurent, J.P. and Molteni, F. (2016), "**Repurchase agreements and systemic risk in the European sovereign debt crises: the role of European clearing houses**".
- Battistini, N., Grill, M., Marmara P. and van der Veer, K. (2016), "**A case for macroprudential margins and haircuts**", Special Feature A in *ECB Financial Stability Review*, May, pp. 110-119.
- BCBS (2013), "**Supervisory guidance for managing risks associated with the settlement of foreign exchange transactions**", February.
- BCBS-IOSCO (2015), "**Margin requirements for non-centrally cleared derivatives**", March.
- BIS-CGFS (2010), "**The role of margin requirements and haircuts in procyclicality**", Paper No 36, Committee on the Global Financial System, March.
- Breuer, P. (2002), "Measuring off-balance-sheet leverage", *Journal of Banking & Finance*, Vol. 26, No 2, pp. 223-242.
- Brumm, J., Grill, M., Kubler, F. and Schmedders, K. (2015), "Margin regulation and volatility", *Journal of Monetary Economics*, Vol. 75, pp. 54-68.
- Brunnermeier, M.K. and Pedersen, L.H. (2009), "Market liquidity and funding liquidity", *Review of Financial studies*, Vol. 22, No 6, pp. 2201-2238.
- Brunnermeier, M.K. and Sannikov, Y. (2014), "A macroeconomic model with a financial sector", *American Economic Review*, Vol. 104, No 2, pp. 379-421.
- CGFS (2010), "**The role of margin requirements and haircuts in procyclicality**", CGFS Papers No 36, Bank for International Settlements.
- Contiguglia, C. and Osborn, T. (2016), "**Beyond Libor: what reform plans mean for swap users**", March.
- CPSS-IOSCO (2012), "**Principles for financial market infrastructures**".
- CPMI-IOSCO (2016a), "**Resilience and recovery of central counterparties (CCPs): Further guidance on the PFMI**", Consultative Report, August.
- CPMI-IOSCO (2016b), "**Implementation monitoring of PFMI: Level 3 assessment – Report on the financial risk management and recovery practices of 10 derivatives CCPs**", August.
- Cont, R., and Schaanning, E. (2015), "Fire sales, endogenous risk and price-mediated contagion", Working Paper, Imperial College London.



- Dées, S. (2016), "**Credit, asset prices and business cycles at the global level**", *Working Paper Series*, No 1895, ECB.
- Duffie, D., Scheicher, M. and Vuilleme, G. (2015), "Central clearing and collateral demand", *Journal of Financial Economics*, Vol. 116, No 2, pp. 237-256.
- Drehmann, M. and Juselius, M. (2014), "Evaluating Early Warning Indicators of Banking Crises: Satisfying Policy Requirements", *International Journal of Forecasting*, Vol. 30, No 3, pp. 759-780.
- Ebner, A., Fecht, F. and Schulz, A. (2016), "**How central is central counterparty clearing? A deep dive into a European repo market during the crisis**", Discussion Paper No 14/2016, Deutsche Bundesbank.
- European Central Bank (2015a), "**Euro money market survey**".
- ECB (2015), "**ECB response to the European Commission's consultation on the review of the European Market Infrastructure Regulation (EMIR)**".
- ESMA (2015), "**EMIR Review Report No 2 – Review on the efficiency of margining requirements to limit procyclicality**".
- ESMA (2016), "**Report on securities financing transactions and leverage in the EU**".
- ESRB (2013), "Recommendation of the European Systemic Risk Board on intermediate objectives and instruments of macroprudential policy", ESRB/2013/1, *Official Journal of the European Union*.
- ESRB (2015a), "**Report on the efficiency of margining requirements to limit procyclicality and the need to define additional intervention capacity in this area**".
- ESRB (2015b), "**Report on systemic risks in the EU insurance sector**".
- ESRB (2016a), "**Macroprudential policy beyond banking: an ESRB strategy paper**".
- ESRB (2016b), "**EU Shadow Banking Monitor**".
- ESRB (2016c), "**ESRB opinion to ESMA on securities financing transactions and leverage under Article 29 of the SFTR**".
- FSB (2014), "**Background Document: Regulatory Framework for Haircuts on Non-Centrally Cleared Securities Financing Transactions. Procyclicality of haircuts: Evidence from the QIS1**".
- FSB (2015), "**Regulatory framework for haircuts on non-centrally cleared securities financing transactions**".
- Gai, P., Haldane, A. and Kapadia, S. (2011), "Complexity, concentration and contagion", *Journal of Monetary Economics*, Vol. 58, No 5, pp. 453-470.
- Geanakoplos, J. (2010), "The leverage cycle", *NBER Macroeconomics Annual 2009*, Vol. 24, pp. 1-65, University of Chicago Press.
- Gerding, E.F. (2011), "Credit Derivatives, Leverage, and Financial Regulation's Missing Macroeconomic Dimension", *Berkeley Business Law Journal*, Vol. 8.
- Gorton, G. and Metrick, A. (2012), "Securitized banking and the run on repo", *Journal of Financial Economics*, Vol. 104, No 3, pp. 425-451.
- Gorton, G. and Metrick, A. (2015), "**Who Ran on Repo?**".



Gregory, J. (2014), "Central counterparties – Mandatory Clearing and Bilateral Margin Requirements for OTC Derivatives", Wiley Finance Series.

Hardouvelis, G.A. and Theodossiou, P. (2002), "The asymmetric relation between initial margin requirements and stock market volatility across bull and bear markets", *Review of Financial Studies*, Vol. 15, No 5, pp. 1525-1559.

Hedegaard, E. (2011), "How margins are set and affect asset prices", Job Market Paper.

International Capital Market Association (2016), "**European repo market survey**", No 30.

International Securities Lending Association (2016), "**ISLA securities lending market report**".

John, S., Roberts, M. and Weeken, O. (2012), "**The Bank of England's Special Liquidity Scheme**", *Quarterly Bulletin*, pp. 57-66, Bank of England.

Keller, J., Bouveret, A., de Rossi, F., Liu, Z., Mazzacurati, J., Molitor, P., Picillo, C., Söderberg, J. and Theal, J. (2014), "**Securities financing transactions and the (re)use of collateral in Europe**", *Occasional Paper Series*, No 9, ESRB, September.

Krahnen, J.P. and Pelizzon, L. (2016), "**'Predatory' Margins and the Regulation and Supervision of Central Counterparty Clearing Houses (CCPs)**", SAFE White Paper No 40, September.

Miglietta, A., Picillo, C. and Pietrunti, M. (2015), "**The impact of CCPs' margin policies on repo markets**", Working Paper No 515, Bank for International Settlements.

Molteni, F. (2015), "Liquidity, Government Bonds and Sovereign Debt Crises", CEPII research center.

Murphy, D., Vasios, M. and Vause, N. (2014), "**An investigation into the procyclicality of risk-based initial margin models**", Financial Stability Paper No 29, Bank of England.

Murphy, D., Vasios, M. and Vause, N. (2016), "**A comparative analysis of tools to limit the procyclicality of initial margin requirements**".

Cour-Thimann, P. and Winkler, B. (2013), "**The ECB's non-standard monetary policy measures the role of institutional factors and financial structure**", *Working Paper Series*, No 1528, European Central Bank.

Schularick, M. and Taylor, A.M. (2012), "Credit booms gone bust: monetary policy, leverage cycles, and financial crises, 1870-2008", *American Economic Review*, Vol. 102, No 2, pp. 1029-1061.

Shleifer, A., and Vishny, R. (2011), "Fire Sales in Finance and Macroeconomics", *Journal of Economic Perspectives*, Vol. 25, No 1, pp. 29-48.

Wendt, F. (2015), "**Central Counterparties: Addressing their Too Important to Fail Nature**", Working Paper No 15/21, International Monetary Fund.



Members of the drafting team

Steffen Meusel
BaFin

Onofrio Panzarino
Banca d'Italia

Stefania Matteucci
Banca d'Italia

Pierangela Soda
Banca d'Italia

Tânia Pinheiro
Banco de Portugal

Cian O'Neill
Bank of England

Christina Fritz
Bank of England

Stephanie Tristram
Banque de France

Maud Abdelli
Banque de France

Samira Bourahla
Banque de France

Cian Murphy
Central Bank of Ireland

Giuseppe Insalaco
Central Bank of Ireland

Evin O'Reilly
Central Bank of Ireland

Ricardo Crisóstomo
CNMV

Thomas Droll
Deutsche Bundesbank

Martin Ockler
Deutsche Bundesbank

Moritz Seidel
Deutsche Bundesbank

Moritz Voelkerling
Deutsche Bundesbank

Manuel Wiegand*
Deutsche Bundesbank

Elisabeth Noble
EBA

Koen van der Veer
ECB

Michael Grill
ECB

Pierre Marmara
ECB

Julien Mazzacurati
ESMA

Claudia Guagliano
ESMA

Alexandr Palicz Maxim
Magyar Nemzeti Bank

Bjørn Bakke
Norges Bank

Nathalie Sørhaug
Norges Bank

Reinhardt Seliger
Oesterreichische Nationalbank

Henrik Hansen**
ESRB Secretariat

Sarah Lapschies
ESRB Secretariat

Lucia Orszaghova
ESRB Secretariat

Elisabeth Tietz**
ESRB Secretariat

Frederik Weber**
ESRB Secretariat

Olaf Weeken
ESRB Secretariat

* Contribution received while member of staff of Deutsche Bundesbank

** Contribution received while members of staff of the ESRB Secretariat

Imprint

European Systemic Risk Board, 2017

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.esrb.europa.eu

All rights reserved. Reproduction for educational and non-commercial purposes is permitted provided that the source is acknowledged.

The cut-off date for the data included in this report was 15 December 2016.

ISBN 978-92-95210-03-5
DOI 10.2849/494519
EU catalogue No DT-01-17-119-EN-N