Shadow Banking - Minimum Haircuts on Collateral
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NOTE

Abstract
The Financial Stability Board proposes to dampen the pro-cyclicality that may be caused by changes in haircuts in repo and securities lending during a crisis, by introducing minimum standards for the calculation of haircuts, in order to stabilise them across the cycle. They are also considering putting a floor under calculations, at least on risky assets that exhibit pro-cyclicality. Higher haircuts would also help curtail the build-up of excessive leverage.
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LIST OF ABBREVIATIONS

ABS  Asset-Backed Security
AIFMD  Alternative Investment Fund Management Directive
BCBS  Basel Committee on Banking Supervision
BIS  Bank for International Settlements
CCP  Central (Clearing) Counterparty
CRR  Capital Requirements Regulation
CDO  Collateralised Debt Obligation
CDS  Credit Default Swap
CGFS  Committee on the Global Financial System
CLN  Credit-Linked Note
CLO  Collateralised Loan Obligation
CMBS  Commercial Mortgage-Backed Security
CSDR  Central Securities Depository Regulation
EBA  European Banking Authority
EMA  European Master Agreement
ETF  Exchange-traded fund
FRBNY  Federal Reserve Bank of New York
FSB  Financial Stability Board
FTT  Financial Transactions Tax
GC  General Collateral
GMRA  Global Master Repurchase Agreement
GMSLA  Global Master Securities Lending Agreement
**G20**  Group of 20

**IAS**  Information Acquisition Sensitivity

**ICMA**  International Capital Market Association

**IG**  Investment grade

**IOSCO**  International Organisation of Securities Commissions

**ISDA**  International Swaps and Derivatives Association

**ISMA**  International Securities Market Association (now ICMA)

**LCR**  Liquidity Coverage Ratio

**LGD**  Loss given default

**MBS**  Mortgage-Backed Security

**MMF**  Money Market Mutual Fund

**MTA**  Minimum Transfer Amount

**OECD**  Organisation for Economic Co-operation and Development

**Repo**  Repurchase Agreement

**RMBS**  Residential Mortgage-Backed Security

**SFT**  Securities financing transactions

**SLL**  Securities Law Legislation

**SSH**  Standard Supervisory Haircut

**TBMA**  The Bond Market Association (now SIFMA)

**T2S**  TARGET 2 Securities

**UCITS**  Undertakings for Collective Investments in Transferable Securities

**VaR**  Value-at-Risk

**WGMR**  Working Group on Margining Requirements

**WS5**  Workstream 5 (of the Financial Stability Board)
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EXECUTIVE SUMMARY

This note discusses the recommendations that were made in the consultation paper published by Work Stream 5 (WS5) of the Financial Stability Board (FSB) in November 2012 on haircuts applied to the collateral used in securities financing transactions (principally repurchase agreements (‘repos’) and securities lending). It assesses the recommendations’ effectiveness as a tool to enhance stability in the financial market and suggests answers to the questions raised by WS5 concerning the scope and market impact of the recommended measures.

A haircut is intended to hedge the credit, liquidity and other risks on a security being used as collateral by adjusting its value to reflect the potential loss arising from liquidation during a time of funding need or after a possible default by either a counterparty or the issuer of the asset. However, haircuts create problems. They represent the share of a security which cannot be funded in the repo market and requires a firm to draw on its own funds or unsecured borrowing, which increases the overall cost of funding. They also expose the borrower to the credit risk of the lender.

The FSB are concerned that changes in haircuts fuel pro-cyclicality. In buoyant markets, firms may narrow haircuts, which would amplify the expansion of credit. In a depressed market, they may widen them, which would amplify the tightening of credit. WS5 has proposed a dual approach to stabilising and controlling the level of haircuts. Firstly, it intends to introduce minimum standards for the methodologies for the calculation of collateral haircuts (Recommendation 6). Secondly, it is considering placing a floor under firms’ calculations in the form of a mandatory minimum haircut (Recommendation 7). The FSB are also considering the use of haircuts to control the build-up of leverage, in a manner similar to the use of reserve requirements in a fractional banking system.

Recommendation 6 sets out appropriate methodological approaches to calculating haircuts, and various adjustments and additional risk factors to be taken into account. WS5’s approaches do indeed reflect best practice in the market, at least where haircuts are being applied, although some further risk factors have been identified for consideration. However, haircut practices vary very widely in the European market and the need for haircuts is not accepted in low-risk transactions such as short-term interdealer repos of government securities. The role of haircuts reflects the fact that collateral is considered secondary in importance in risk management to counterparty credit risk.

Recommendation 7 makes the case for mandatory minimum haircuts for collateral that exhibits material pro-cyclicality. The FSB recognises the possible unintended consequences for market liquidity and efficiency, and asks for comments on whether mandatory minimum haircuts would be effective and workable.

Two alternative approaches have been put forward by the FSB: a High-Level Floor, set close to current market levels (or perhaps in line with the Basel Standard Supervisory Haircuts); or a Back-Stop Level Floor, set at what is judged to be a prudent level under normal conditions, above the High-Level Floor, in the expectation that the haircuts set by firms would be higher. WS5 suggests a carve-out from the High-Level approach for repos against high-quality collateral between banks and core market participants, on the same conditions as a similar carve-out from Standard Supervisory Haircuts. They also suggest exempting those securities lending transactions which do not feed pro-cyclicality or allow leverage, if these can be differentiated. Questions are also posed about the extent to which entities other than regulated financial intermediaries should be included and what securities (should government bonds be included, given that some are risky and therefore pro-cyclical, and that all can government bonds be used to leverage).
The WS5 intention to introduce minimum standards for the methodologies for the calculation of collateral haircuts is welcome and the detail of the proposal accords with best practice in the market. However, better market data will be required to support such calculations. This should become available through initiatives to improve market transparency but the market should process such data into risk statistics to avoid the perception of official approval.

The proposal for mandatory minimum haircuts is contentious. It is not clear whether it will apply only to risky securities, even though pro-cyclicality is limited to such assets, or whether it will include high-quality government securities, on the grounds that they can also be used to gain leverage. A narrow definition would tend to limit the systemic impact of the proposal, but a wide definition would impact the core funding of financial intermediaries and thus market efficiency and liquidity, as well as conflicting with other regulatory measures, such as greater collateralisation and the migration from unsecured lending.

Either way, there is not sufficient data to calibrate mandatory minimum haircuts at a level which strikes an optimal balance between dampening pro-cyclicality and the build-up of excessive leverage on the one hand and maintaining the efficiency and liquidity of the market on the other. And perhaps most problematically, there is strong evidence questioning the role of changing haircuts in feeding pro-cyclicality and a serious likelihood that mandatory minimum haircuts would be circumvented by the tightening or relaxation of other credit conditions in response to increasing counterparty credit risk and vice versa.

On the other hand, there are other tools to address pro-cyclicality and excessive leverage, that would be less disruptive to market efficiency and liquidity, in the form of more rigorous methodologies for calculating haircuts and collateral revaluation and margining procedures.

However, if minimum mandatory haircuts were to be adopted, it would be important to have an objective criterion for defining risky assets. Classification of securities by type and term to maturity is crude and inexact. A better measure would be the long-term volatility of price against a low-risk benchmark. Such an empirical risk-based metric would also avoid the need to try to carve out non-procyclical, non-leveraging securities lending transactions, given that securities lending typically relies on low-risk collateral and would automatically qualify.

The Back-Stop Level approach to minimum mandatory haircuts is the least-worst option but there is a risk that it would serve little practical purpose, unless regulators actively stop market haircuts tending down towards this floor. Back-Stop Level floors might be better used as a supervisory monitoring tool rather than a floor. Another suggestion would be to combine both options, with Back-Stop Level approach available to market participants with haircut calculation methodologies that meet the standards laid down by WS5 and the High-Level approach for those who do not. This is similar to the choice in the Basel Accord between Standardised Supervisory Haircuts and internal calculations.

The spread between the costs of secured and unsecured funding should be preserved by raising capital charges for unsecured funding in order to avoid a shift back to such funding.

Minimum mandatory haircuts should exempt transactions between regulated financial intermediaries, but this category of counterparty should be expanded to include other regulated entities who are not intermediaries. The framework should only be applied, initially at least, to transactions between regulated entities and other entities.
INTRODUCTION

Following its report of October 2011, ‘Shadow Banking: Strengthening Oversight and Regulation’,1 the Financial Stability Board (FSB) established five Work Streams to advance its proposed policy recommendations to enhance the monitoring framework and strengthen the regulation of shadow banking.2 Work Stream 5 (WS5), which is chaired by the FSB, aims at developing recommendations ‘to dampen risks and pro-cyclical incentives associated with secured financing contracts such as repos, and securities lending that may exacerbate funding strains in times of “runs”’.

On 18 November 2012, the Financial Stability Board (FSB) published a number of documents which set out the current status of the consultations and recommendations in regard to the various Work Streams.3 Final recommendations are expected to be presented to G20 in September 2013. In the report entitled ‘Consultative Document on Strengthening Oversight and Regulation of Shadow Banking: A Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos’, WS5

- set out 13 recommendations to enhance transparency, strengthen regulation of securities financing transactions, and improve market structure;
- explained the analysis and data underpinning the policy recommendations framework in this area;
- made recommendations on disclosure (Recommendations 1 to 4), reporting (Recommendation 5), haircut practices (Recommendations 6 to 7), cash collateral reinvestment (Recommendation 8), rehypothecation (Recommendations 9 and 10), valuation policies (Recommendation 11), central clearing (Recommendation 12), and changes to insolvency/bankruptcy law treatment regarding repurchase and securities lending transactions (Recommendation 13);
- posed 22 questions for consultation until 14 January 2013.

This note discusses Recommendations 6 and 7 on haircuts in Section 3.1 of the WS5 paper. It assesses the Recommendations’ suitability to address stability concerns in the financial market and suggests answers to questions 11, 12, 13, 15, and 16, concerning the scope and market impact of the Recommendations. In respect of the last question, particular attention has been paid to the practicality of the distinction by transaction type proposed by WS5, whereby securities lending transactions would be excluded according to the transaction’s purpose.

In its resolution on shadow banking,4 the Parliament notes the importance of repo and securities lending, invited the Commission to adopt measures, among other things, allowing regulators to impose recommended minimum haircuts or margin levels for the collateralised financing markets, but without standardising them; and invited the Commission to engage in a comprehensive debate on margins.

A second note being prepared for the Parliament is considering whether transactions between jurisdictions with different legal frameworks for the holding of securities can cause particular stability concerns and/or enforcement issues in case the collateral arrangement has to be exercised and whether these concerns should be recognised within such a

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1 See www.financialstabilityboard.org/publications/r_111027a.pdf. The recommendations consist of seven high-level principles for the relevant authorities and a stylised three-step monitoring process.
regulatory system of minimum haircuts, and whether open transactions should influence the level of minimum haircut or otherwise impact on the implementation of FSB recommendations.
1. HAIRCUTS (AND INITIAL MARGINS) ON COLLATERAL

**KEY FINDINGS**

- A collateral haircut (and the related concept of initial margin) is an adjustment to the market value of collateral to reflect the risk that the cash realised by the liquidation of collateral securities may turn out to be less than the quoted market value of those securities, due to issuer credit and market liquidity risks on the securities, and the operational and legal risks common to all collateral.

- Haircuts are seen as potentially useful in restraining the build-up of excessive leverage by acting in a manner similar to reserve requirements on deposits.

- Haircuts are not seen as a primary risk management tool, because collateral is judged to be secondary in importance to counterparty credit risk. The use of haircuts is also less widespread in Europe than in the US.

- Haircuts are set in a wide variety of ways. The market has tended to converge on round numbers such as 2% for government bonds. Since the crisis, some firms have referenced the ‘official’ haircuts, such as those applied by central banks and the Standard Supervisory Haircuts in the Basel Accord. Quantitative methodologies are also used, typically based on Value-at-Risk (VaR) models or techniques such as scenario analysis and simulation, which model market liquidity in terms of the holding or liquidation period. However, factors such as operational and legal risk are challenging to model and tend to be managed in other ways.

- Counterparty credit risk is not a relevant to the calculation of haircuts, but the correlation with the value of collateral (‘wrong-way’ risk) is relevant.

- The biggest challenge in calculating appropriate haircuts is the availability of market data such as price and market turnover series needed to estimate holding periods. This should be improved by regulatory initiatives to improve market transparency but the provision of risk statistics derived from such data needed to be undertaken by the private sector to avoid giving any implied official status to the numbers.

- Collateral is typically categorised by type of security, the most being government securities. However, such a system of classification needs to be used at a very general level, as each category contains a wide range of securities with very different degrees of market liquidity.

- There are limited data on the haircuts applied in the market.

- However, haircuts pose a number of problems. They expose the borrower to the credit risk of the lender and increase his overall cost of financing, while limiting his ability to borrow. Haircuts also ‘encumber’ a portion of the collateral securities, which means they would potentially not be available to recompense unsecured creditors and depositors if the borrower were to become bankrupt. And haircuts may be a source of ‘pro-cyclicality’ in that increases imposed during a falling market would reduce the funding available to borrowers, causing them to sell assets and amplify the market decline, and vice versa.
1.1. What are haircuts and initial margins?

There are two alternative manifestations of what is commonly called a ‘haircut’ on collateral. The difference is arithmetical.

A **haircut** is a percentage discount deducted from the market value of the security that is being offered as collateral in a repo.\(^5\) The formula for a haircut is:

\[
\text{Haircut} = \frac{\text{Market Value of Collateral} - \text{Cash}}{\text{Market Value of Collateral}} \times 100
\]

Haircuts are therefore expressed as the percentage difference between the market value of the collateral security and the cash to be loaned through a repo (the ‘purchase price’ of the repo). A haircut is used to calculate the cash by multiplying the market value of collateral by 1 minus the haircut (so a haircut of 5% means that a security worth 100 can be repoed out for cash of 100 \(\times (1 - 0.05) = 95\)).

An **initial margin** is a percentage premium added to the market value of the security that is being offered as collateral in a repo or securities lending transaction. The formula for an initial margin on a repo or securities lending transaction is:

\[
\text{Initial Margin} = \frac{\text{Market Value of Collateral}}{\text{Cash or Market Value of Loaned Security}} \times 100
\]

Initial margins are therefore expressed relative to a base of 100% (where an initial margin of 100% is a zero margin). An initial margin is used to calculate the market value of the securities required as collateral by multiplying it by the cash or security to be loaned (so an initial margin of 102% means that cash of 100 can be borrowed through a repo or a security worth 100 can be borrowed through a securities lending transaction against collateral of 100 \(\times 102 \% = 102\)).

Haircuts and initial margins perform the same function. They typically over-collateralise the lender in a repo or securities lending transaction, or the exposed party in a collateralised derivatives position. Initial margin rather than haircut is the concept conventionally applied to securities lending transactions and the collateralisation of derivatives.\(^6\) Both concepts are used in the repo market in Europe.\(^7\) For convenience, the term haircut will be used henceforth for both concepts.

Haircuts are often assumed to always result in over-collateralisation. This is not necessarily the case. In the repo market, when there is exceptional concern over the creditworthiness of a particular counterparty, who is nevertheless seeking to invest cash, haircuts can be negative. This means that the cash loaned through the repo exceeds the market value of the security being given as collateral. The repo can appear to be under-collateralised. In fact, the cash is collateralising the securities in this situation, as negative haircuts are intended to ensure the restoration value of the security, rather than its liquidation value. The systematic appearance of negative haircuts last happened during the Japanese banking crisis of the 1990s. There was anecdotal evidence that negative haircuts were occasionally proposed during 2007-09 but there is little evidence that they materialised. Negative

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\(^5\) For a description and comparison of repo and securities lending, see Annex III.

\(^6\) Initial margins are referred to as ‘Independent Amounts’ in the standard master agreement for derivatives published by the International Swaps and Derivatives Association (ISDA).

\(^7\) Initial margins are referred to as ‘Margin Ratios’ in the standard master agreement published by the International Capital Market Association (ICMA), which is the Global Master Repurchase Agreement (GMRA). Only the Margin Ratio is a standard feature of the 2000 and earlier versions of the GMRA. Haircuts were introduced as an alternative in the 2011 version.
haircuts do not arise in securities lending, probably because the inherently risk-averse attitude of lenders precludes them dealing with risky counterparties.8

1.2. What is the function of a haircut?

Collateral is intended to hedge the credit risk on a counterparty to whom one is lending cash or a security, and (in the case of a repo) the funding liquidity risk in making the loan. The collateral-taker has the right to liquidate and set off (net) the value of collateral against loans extended to a defaulting counterparty and (in repo) the right to sell collateral whenever he has a need for liquidity.

Haircuts on collateral, on the other hand, are intended to hedge the risk that the cash realised by the liquidation of collateral securities may turn out to be less than the quoted market value of those securities and the loan exposure to the borrower which the security is supposed to be collateralising. The problem is that market quotes are merely indications of the cash that is likely to be realised in an immediate sale of a standard amount of the security (its ‘normal market size’) in typically normal market conditions. In contrast, the collateral value of a security should measure the cash which one can expect to realise in a future sale of a collateral position that may be larger than normal market size into a potentially disorderly market. By applying haircuts, the quoted current market value of a security is translated into a probable future liquidation value.

The risks to which the value of a security is exposed when being used as collateral are (1) the credit risk on the issuer of the security, (2) the market liquidity risk on the security and (3) the operational and legal risks that arise from the use of any collateral.

Market liquidity risk is the possible loss in the value of a security due to (1) delays in finding buyers for a given quantity, during which time the price of the security may fluctuate due to exogenous supply and demand factors, or (2) the fall in price caused endogenously by sales of the security (‘market impact’). Market liquidity will worsen in a crisis, because there will be fewer buyers and the value of the security will become less certain and more volatile.

The operational and legal risks on collateral arise in two stages.

- Before a possible default, the value of collateral may fall relative to loan exposure. The loan exposure will increase over time.9 Such divergences should be eliminated through a margaining process.10 If there is no margining, a haircut has to be large

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8 In securities lending transactions against cash collateral, the amount of cash exceeds the value of the loaned security. This looks like a negative initial margin. However, in such securities lending transactions, it is the cash that is acting as collateral. Securities lending is driven by the supply and demand for securities, whereas repo is driven by the supply and demand for cash.

9 In the case of repos, interest will accrue to the lender. In the case of securities lending transactions against non-cash collateral, fees will accrue to the lender. In the case of securities lending transactions against cash collateral, net interest will accrue to the borrower (this can be decomposed into rebate interest accruing to the borrower and fee to the lender).

10 Margining is the periodic payment of cash or transfer of collateral between two parties to restore the initial relationship between a risk exposure and collateral. The risk exposure is a cash loan in repo, a security loan in a securities lending transaction or an in-the-money position in a derivative transaction. The collateral is securities in a repo, or either securities or cash in a securities lending transaction or collateralised derivatives position. The initial relationship between the risk exposure and collateral can be that they are equal or there can be a haircut or initial margin, which means the collateral should be greater than the risk exposure. Margining requires the risk exposure and collateral to be periodically revalued, often daily and exceptionally intra-day. If there is a material divergence between the size of the risk exposure and the value of the collateral, a margin call can be made by the party with the net exposure. Unlike haircuts, which measure potential future exposure, margins under standard master agreements such as the ICMA’s Global Master Repurchase Agreement (GMRA) are based on revaluations that measure only current exposure, ie the difference between the market value of the collateral and the exposure on the date of the calculation. No explicit account is taken of market impact, although it is open to the party marking the margin call to try to
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... enough to absorb possible price fluctuations over the entire life of the transaction. With margining, a haircut only has to absorb possible price fluctuations between periodic collateral revaluations and margin calls. Although the frequency of revaluation and the resulting margin calls may be daily, account must be taken of the interval between the collateral last being revalued and the relevant margin call subsequently being received. Currently, margin delivery can take up to two business days, where margin is given in the form of non-cash collateral (cash is delivered on the same business day). A firm making a margin call and expecting to receive non-cash margin will be uncertain during this delivery period as to what changes in its exposure have in fact been collateralised.

For example, assume a firm revalues its collateral and makes a margin call at noon on Monday. If non-cash margin delivery takes two business days, it will only know for certain late on Wednesday that it is collateralised up to noon on Monday. Assume the Monday margin call is in fact received on Wednesday. Now, assume the firm revalues its collateral and makes another margin call at noon on Tuesday. This will be due to be received on Thursday afternoon. If the party being called was to default between Tuesday and Thursday afternoon, the second margin call will not be made and the margin-taker would have an unexpected, uncollateralised additional exposure of up to almost three days (from the time of the last revaluation/margin call that was honoured at noon on Monday to Thursday afternoon). In stressed market conditions, this could be significant. The delay is illustrated in Figure 1.

- After a default, various other delays may occur. For example, a default may only be detected well after the event. The firm affected by the default will take time to arrive at a decision on how to respond to the news (as putting a counterparty into default is a very serious decision). If a decision is eventually made to put the counterparty formally into default and begin the process of closing out transactions and setting off mutual obligations, certain legal procedures may need to be pursued (eg serving a default notice). It is possible that the defaulting party or its liquidator may add further delays by challenging the action of the affected party in court. A possible sequence of delays is illustrated in Figure 2.

**Figure 1: The impact of margin delivery periods on possible delays in liquidation**

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1.3. **How are haircuts calculated?**

Before describing market practice, it is important to understand the limitations on the importance attached to haircuts by market practitioners.

First, while haircuts are a standard feature of the US repo market and (in the form of initial margins) also of the global securities lending market, they are not applied as broadly or routinely in most other repo markets, including Europe. This reflects in part the greater share of government bonds and other high quality assets in the collateral pool in Europe and the larger share of inter-dealer transactions compared with the US.

Subsequent to the 2007-09 crisis, haircuts have been applied more vigorously in Europe in those types of repo where they were already commonplace (including cases where haircuts had been cut to zero) but there is little evidence that they are being systematically extended to repos where they were not previously applied.

Second, haircuts are very much a secondary priority in the risk management of repo. The overwhelmingly priority is the creditworthiness of the counterparty.

- The reason is that, whereas the impairment of collateral (for example, by issuer default) is easily resolved under typical contractual arrangements, a default by a counterparty and the consequent liquidation of collateral exposes the non-defaulting party to market liquidity, legal and operational risks of the sort already listed. Such risks make collateral an imperfect hedge. Consequently, parties seek to reduce as much as possible the likelihood of having to resort to collateral. The more creditworthy a counterparty, the less likely collateral will have to be sold. This means that counterparty credit risk (as measured by the probability of default) is seen as the primary risk in repo. Collateral (which reduces the loss-given-default) is a mitigant or secondary defence.

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If, for example, the issuer of collateral defaults, under master agreements such as the Global Master Repurchase Agreement (GMRA), its value would be deemed to drop to zero. This would automatically trigger a margin call, which would either repay cash or provide substitute collateral acceptable to the receiving party. See the *Global Master Repurchase Agreement 2000*, TBMA/ISMA, London, 2000, 2(cc).
• There is therefore an asymmetry between choice of counterparty and choice of collateral. While it may be an acceptable business proposition to accept poor collateral from a good counterparty, it is usually not acceptable to deal with a poor counterparty solely because they can offer good collateral. The former counterparty is unlikely to default and force collateral to be liquidated, whereas the latter is likely to do so. For the same reason, haircuts on repos with the best counterparties may be zero, at least for reasonable collateral. On the other hand, many lenders in the repo market make ‘digital’ decisions about transactions (yes or no) and simply will not lend to counterparties that do not meet their credit standards, whatever collateral or haircuts are offered. The setting of haircuts for intermediate counterparties is contentious and is discussed below. The behaviour of the market for the best and worst counterparties is illustrated in Figure 3.

There is currently no industry guidance on best practice in the calculation of haircuts for secured financing transactions (SFT) --- which include repo, securities lending and margin financing --- or for the collateralisation of derivative exposures, and there is a very wide variation in market practice. The most advanced methods are proprietary.

The only broad empirical survey of current market practice in setting haircuts is that undertaken by the CGFS Study Group and published in its report of March 2010. Their report is reproduced in the box.

Figure 3: Haircuts for the best and worst counterparties
2.1.2 Processes for establishing haircuts and change drivers

The risk management unit is usually responsible for the techniques and processes that are used to establish haircuts and set other credit terms. These include both quantitative and qualitative criteria. In some cases, standard supervisory haircuts under Basel II are used. Key quantitative factors include value-at-risk (VaR), measures of the liquidity of the collateral asset and – on a more ad hoc basis – stress tests. Qualitative factors include type of counterparty, competitive pressures and client relations.

The historical time period used in determining VaR-based haircuts and margins is usually one year, but longer time periods (up to five years) were also reported as being used. VaR-based haircuts are determined by estimating risk at a 95–99% confidence level over a 10-day liquidation period. In most cases, there is an add-on to the VaR-based haircut in order to take into account liquidity risk when positions are to be unwound. Stress tests to substantiate haircut levels are generally based on a historical worst case move over 10 business days.

The credit ratings of the collateral assets and, in some cases, the counterparty credit ratings are monitored on an ongoing basis. A rating downgrade of an asset in the collateral pool could lead to a review of its collateral eligibility. Less liquid securities, such as emerging market and high-yield bonds, are only financed for very few, highly rated counterparties. Haircuts on these securities are conservative and include a historical 10-day worst case move and significant liquidity add-ons.

In practice, the haircut-setting process reflects the need to balance market and counterparty risks and business interests. While the risk management unit would argue for higher haircuts, trading desks would argue in favour of lower margins in order to remain competitive. Overall, market participants generally tried to observe the haircuts set by their competitors. For some asset classes, haircut schedules published by central banks were a helpful benchmark against which to assess levels.

Prior to the crisis, competitive pressures influenced the level of haircuts in some business areas. Indeed, competitive pressure had been particularly strong in firms that relied on securities financing as a major source of revenue, or in business lines (such as prime brokerage) that used lower haircuts to attract business. During the crisis, the risk managers were given more control, and this led to a number of assets not qualifying as eligible collateral.

The key drivers of the increase in haircuts or even the ineligibility of some assets as collateral were market illiquidity, valuation uncertainty and counterparty credit concerns. Revisions took the form of ad hoc increases in individual haircuts or the blanket introduction of multipliers.

Increased volatility of market prices also contributed to greater haircuts, though participants in some markets said that it did not contribute materially. Portfolio margining models, often used in prime brokerage, might have been expected to generate volatile margins that responded to changes in market volatility and correlation. However, the majority of such models appear to have used volatility assumptions backed out from historical stressed periods rather than the most recent data so that, for more liquid asset classes such as G7 government bonds and equities, haircuts changed only modestly.‘

Source: CGFS. 12

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There appear to be three broad approaches to calculating haircuts:

- Many market participants have traditionally converged on round numbers such as 2% (for domestic or the best foreign government bonds), 5% and 10%. In the securities lending market, initial margins of 102% and 105% (equivalent to haircuts of 1.96% and 4.76%, respectively) were, and to some extent remain, an industry standard for good quality fixed-income collateral. In European tri-party repo, haircuts (in the form of initial margins) are compiled by the selective addition of fixed percentage components for currency, rating or asset type, term to maturity and country of issue. The individual components appear to be round numbers, suggesting limited quantitative estimation.

- Some market participants are guided by official haircut schedules or data. Since the crisis, attention has been paid to the haircuts applied by central banks to the collateral they accept in their market operations and the Standard Supervisory Haircuts in the Basel Accord. In the US, the Federal Reserve Bank of New York (FRBNY) surveys and publishes data on the haircuts being imposed in the US tri-party repo market for different classes of collateral. This data may be used as guidance by at least some market participants.

- Quantitative methodologies for calculating haircuts follow the standard approaches to calculating market risk:
  - Value-at-Risk (VaR) models based on historic data. VaR is the product of two variables, the size of exposure and forecast security price volatility, and a parameter, the required confidence interval. The estimate of historic price volatility has to be projected into the future, which can be done through a range of techniques running from simple linear extrapolation to statistical models of the behaviour of volatility. The measurement of historic price volatility requires a decision on two more parameters: the period of time which it is assumed would be needed to liquidate or close out a position (holding period); and the number of days for which price changes are to be measured (observation period). The holding period is used as a proxy for market liquidity risk. Liquid securities that can be assumed to be readily saleable would be given a holding period of only one day (ie price changes would be measured over 24 hours). Securities are judged to be more illiquid would be given longer holding periods. Regulators usually specify at least five days. The choice of observation period has to balance the desire for long runs of data to reduce randomness against the risk of structural changes in market behaviour over the longer term.
  - VaR models not based on historical data. This involves using implied volatilities from exchange-traded options. However, traded options are only available and liquid for a few government bonds.
  - Non-parametric techniques which may or may not be based on historical data. These include scenario analysis, historical simulations and stochastic techniques such as Monte Carlo analysis (multiple random simulations).

Haircut models have to factor into their calculations or scenarios, not just the volatility of the price of securities but also, in the case of multicurrency transactions, exchange rates. In VaR models, this is done by the calculation of diversified VaRs, which incorporate correlations between the various prices.

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13 According to the December 2012 ICMA European repo market survey, about 58% of European repo collateral is estimated to be in currencies other than the euro, of which, some 14% is denominated in pounds sterling. In addition, about 61% of the cash in European repo is euro and some 13% is sterling.
Issuer credit risk is typically applied as an add-on that is calculated as the default risk on the security (i.e., the product of the issuer’s probably of default and the loss-given-default on the security).

Risk factors such as operational and legal risks do not appear to be modelled, given the challenge in quantifying such risks. Operational risks tend to be managed by the implementation of prudent procedures, often following industry guidance, such as that published for the European repo market by the ICMA’s European Repo Council (ERC).14 Discrete legal risks such as those posed by a lack of documentation are often factored in by making increasing haircuts by a round amount estimated judgementally. Otherwise, legal risks tend to be managed by legal analysis and the use of legal documentation or, in jurisdictions where the legal risks are perceived to be too great, by dealing through offices in other jurisdictions or not dealing at all.

Under the Basel Accord, supervisors require financial collateral to be subject to a haircut in order to assess the degree of credit risk mitigation for the purpose of calculating the loss-given-default (LGD) used in regulatory capital requirements. Firms that meet certain operational standards are permitted to make their own estimates or use their own VaR model.

Own estimates are based on market price and foreign exchange volatility, without correlations being taken into account. For investment-grade securities (rated BBB-/A-3 or higher), estimates must be produced for relevant categories based on type of issuer, rating, residual maturity and modified duration. For sub-investment grade securities and equity, estimates must be produced for each individual security.

Firms who are allowed to employ an internal market risk model and other firms accepted by national supervisors are allowed to use VaR models to calculate the haircuts to be taken from financial collateral for regulatory purposes, subject to further special conditions.

The principal challenge in calculating haircuts is calibrating the variables, particularly the appropriate duration of the collateral liquidation period, and the trade-off between the liquidation period and the market impact of liquidating large concentrated collateral positions (the quicker the sell-off, the lower the price). This requires data that is currently very difficult and often impossible to source at the level of individual securities, which means that even quantitative methodologies have to rely on expert judgement.

The availability of the market data needed to better estimate risk statistics (e.g., price series and market turnover) should be improved by initiatives to improve market transparency, including the proposed repo trade repository. However, consideration needs to be given as to how far raw data collected centrally under such initiatives are processed for publication by the public sector. The production and publication of risk management statistics would give rise to the risk of such numbers being seen to have regulatory status, encouraging firms to unduly rely on them, promoting ‘herding’ in market behaviour. It might also create a moral hazard for regulators. Historic data, no matter how accurate about the past, is not necessarily a guide to the future, so will turn out to be wrong at some stage. It would therefore be advisable for officially-collected raw market data (suitably aggregated to protect individual contributor confidentiality) to be sold to specialist private sector market data firms for processing into risk statistics. Such an arms-length relationship would reduce the temptation for users to believe that such statistics have some official status. A competitive market for such information would also encourage innovation in risk management.

Even in firms where there is a well-developed quantitative methodology for calculating haircuts, the front office often still has considerable discretion to vary calculated numbers. Some degree of judgement is inevitable, given the inherent limitations on quantitative methodologies, particularly where there are so many variables to be considered, many of which are not easily quantified. Modelling is by its nature a simplification and is over-reliant on past behaviour. This means there is always room to dispute projections of the future. Such fundamental obstacles are only slowly ameliorated as the methodology improves. However, the biggest obstacle to the quantitative estimation of haircuts is the lack of data of sufficient granularity. But this is only one reason why there is so much scope for discretion in amending estimated haircuts. The front office has to take into account the value of the business relationship and competition for the business of its counterparties. A number of responses to the FSB consultation stressed the need for firms to have commercial flexibility in setting haircuts.

One risk factor that should not be factored into the calculation of haircuts, at least where it is applied to an individual transaction, is the credit risk on the counterparty. The issuer credit risk, market liquidity risk and operational and legal risks on the same security should not vary between different counterparties, so why should the haircut? A haircut does not work like a credit premium, which is a payment by a portfolio of debtors that collectively compensates a lender for the possible default of one or some of the debtors and is estimated using their probabilities of default. While haircuts do generate a return to the lender (in that he receives excess collateral which he can sell short or against which he can borrow or, in the case of cash collateral, which he can reinvest), there is no evidence to suggest that they are calculated to yield an appropriate credit premium. Moreover, any surplus remaining after the liquidation of collateral cannot be retained by the non-defaulting party and so does not represent contingent additional compensation for bearing default risk. Standard finance theory would suggest that, if lenders were concerned about default and having to liquidate collateral, their risk aversion and the price risk would simply be factored into the repo rate.

However, there is empirical evidence to suggest that the size of haircuts does in practice vary with counterparty credit risk in normal market conditions. A Study Group of the BIS Committee on the Global Financial System (CGFS) reported in March 2010 that, on the basis of bilateral interviews in various financial centres with market users (including banks, prime brokers, custodians, asset managers, pension funds and hedge funds), ‘To control for counterparty risk in secured lending business, repo dealers and prime brokers either increase haircuts or lower available credit risk limits [...]’.15 Dang, Gorton and Holmström (2011) note that haircuts for the same type of (structured security) collateral of the same rating differ between types of repo counterparty.16 Nevertheless, the correlation has been found to be weak.

A link between the size of haircuts and counterparty credit risk does make sense, where the market impact of the liquidation of collateral would be significant because of the scale of collateralised borrowing by a particular counterparty against a particular security or class of security. In this case, counterparty credit risk feeds into market liquidity risk, which is relevant to the size of haircuts. Such a situation would occur where the counterparty was systemically important and/or the collateral constituted a significant share in the market for an illiquid asset, or where there was a significant correlation between counterparty creditworthiness and collateral value (wrong-way risk). But it would not be justified to link

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haircuts directly to counterparty credit risk. Further background to this debate is given in Annex I.17

If repo lenders are concerned about wrong-way risk, rather than counterparty credit risk, this would explain why counterparty credit risk is not directly relevant to the calculation of haircuts even though counterparty credit risk is the primary concern of repo lenders. The best counterparts have a zero correlation with the value of collateral and no haircut would be justified because no default is expected and therefore no prospective need to liquidate collateral. In the case of the worst counterparts, who are excluded from business, a haircut of 100% is a proxy for the business decision not to deal with them.

1.4. Typical collateral

The most critical risk factor in the calculation of haircuts, which is market liquidity risk, varies systematically between types of security. Consequently, haircuts are typically differentiated by type of security. This system of classification reflects general differences in issue size, complexity (more complex structures appeal to fewer investors), size of investor base (depth of natural demand), typical investor (retail v institutional, real v leveraged money) market microstructure (degree of price transparency, existence of market-makers or regular dealers), initial term to maturity (short-term securities have less price sensitivity and tend to trade more frequently) and age (older bonds tend to become more illiquid), as well as the influence of issuer credit risk on liquidity (investors are reluctant to buy risky issues). The benchmark or ‘on-the-run’ bonds issued by major creditworthy governments can trade in tens or even hundreds of millions and many times a day, reflecting generally larger issue size, plain structure, wide and largely institutional demand, strong market-maker support and superior creditworthiness. Senior investment-grade corporate bonds (ie rated BBB- or above) tend to trade in lots of one or two millions and every few days, reflecting generally smaller issue size, tailored structures, narrower investor bases, fewer regular dealers and lower creditworthiness. Equities included in market indexes trade in the tens of thousands but many times a day, largely reflecting smaller issue size, higher price transparency and larger retail participation.

However, within each category of security, there are considerable differences in liquidity. For example, there will be highly significant differences in liquidity between government bond markets. The government bond markets of small countries tend to be much less liquid than those of larger countries, even if they are of comparable credit quality. But even within the same government bond market, benchmark issues are considerably more liquid than other, ‘off-the-run’ issues, as reflected in significant liquidity premiums. Consequently, there are wide overlaps between categories in terms of their liquidity. When comparing two types of security with generally different degrees of market liquidity, the less liquid category usually includes securities with deeper liquidity than many securities in the general more liquid category. The classification of securities into types is therefore a blunt and often misleading proxy for market liquidity and needs to be used cautiously.

Subject to that caveat, however, there is a broad concentration of collateral in the more liquid categories of security. This is illustrated in Table 1, which offers a simplified overview of the types of security commonly employed as collateral in the main collateralised markets. The range of collateral is wider in the repo market, as this is a financing market and all dealer and leveraged investor transactions need financing. In contrast, securities lending and the collateralisation of derivatives exposures are purely about hedging

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counterparty credit risk. However, while the repo market finances a wide range of collateral, it is overwhelmingly concentrated in higher quality and more liquid securities.

A useful perspective on the composition of repo collateral is also available from the survey of the main tri-party repo agents in Europe included in the ICMA’s semi-annual European repo market survey. Tri-party repo is a preferred location for the trading of non-government collateral in Europe, as the tri-party agents offer economies of scale in settling and managing this type of collateral. It should be noted, however, that since the crisis there has been a significant substitution of non-government securities by government securities. Prior to 2007, government securities accounted for only about 20-25% of European tri-party repo collateral.

Table 1: A simple classification of collateral by type and collateralised market

<table>
<thead>
<tr>
<th>Type of security</th>
<th>Repo</th>
<th>Securities lending</th>
<th>Collateralisation of derivatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>cash</td>
<td>n/a</td>
<td>from 25% in Europe to 80-95% in US and 97% in Japan</td>
<td>predominant</td>
</tr>
<tr>
<td>letters of credit</td>
<td>no</td>
<td>US</td>
<td>no</td>
</tr>
<tr>
<td>government bonds</td>
<td>81% in Europe, 57% or less in US</td>
<td>predominant form of non-cash collateral but limited to high quality issuers and excluding non-OECD</td>
<td>predominant but limited to high quality issuers and excluding non-OECD</td>
</tr>
<tr>
<td>high grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sovereign</td>
<td>less than 5% in Europe, 5% in US</td>
<td>65-70%</td>
<td></td>
</tr>
<tr>
<td>supranational</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>agency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>equity</td>
<td>less than 5%</td>
<td>25-30%</td>
<td></td>
</tr>
<tr>
<td>IG non-financial institutions</td>
<td>less than 5%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>IG financial institutions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>covered bonds</td>
<td>less than 10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMBS</td>
<td>less than 5% in Europe, 29% in US</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMBS</td>
<td>less than 5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABS</td>
<td>less than 1%</td>
<td>little or no use as collateral</td>
<td></td>
</tr>
<tr>
<td>CDO, CLO, CLN, etc</td>
<td>less than 1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>money market</td>
<td>less than 1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>high yield</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETF &amp; other funds</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>credit claims</td>
<td>less than 1%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: European repo data is from ICMA European repo market survey for December 2012 and US data is from the FRBNY for primary dealers (www.newyorkfed.org/markets/primarydealers.html). ‘Sovereign’ means government securities issued in a foreign currency. IG means investment grade (BBB- or above).

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18 Tri-party repo is a bilaterally-negotiated transaction for which settlement and management (including the selection of collateral and revaluation and margin calls) is outsourced to a third-party agent. In Europe, the principal tri-party agents are Bank of New York Mellon, Clearstream Bank Luxembourg, Euroclear Bank, JP Morgan and Sega Intersettle. In the US, the tri-party agents are Bank of New York Mellon and JP Morgan. According to the ICMA’s semi-annual European repo market survey, tri-party in Europe accounts for about 10% of the repo market. In the US, it is thought that tri-party may account for 60% or more of that repo market.
Figure 4: European tri-party repo collateral


Note: 'Backed' means asset-backed securities (ABS) and mortgage-backed securities (MBS). 'Supra' means supranational and includes multilateral development banks (MDB) and institutions such as the European Stabilisation Mechanism (ESM). 'Subnational' means regional governments and public agencies such as export credit agencies.
1.5. **Typical haircuts**

There are very few empirical surveys of haircuts in the repo and securities lending markets. One of the more comprehensive was conducted by the BIS Committee on the Global Financial System for June 2007 and June 2009.\(^{19}\) The results are reproduced in Table 2. It is important to note that this survey amalgamated data from the US and Europe.

| Table 2: Typical haircut on term securities financing transactions (CGFS survey) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| In per cent                        |                                     |                                     |                                     |                                     |                                     |                                     |
|                                     | June 2007                           | June 2009                           |                                     |                                     |                                     |                                     |
|                                     | Prime\(^1\)                        | Non-prime\(^2\)                    | Unrated\(^3\)                      | Prime\(^1\)                        | Non-prime\(^2\)                    | Unrated\(^3\)                      |
| G7 government bonds                 |                                     |                                     |                                     |                                     |                                     |                                     |
| Short-term                         | 0                                   | 0                                   | 0.5                                 | 0.5                                 | 1                                   | 2                                   |
| Medium-term                        | 0                                   | 0                                   | 0.5                                 | 1                                   | 2                                   | 3                                   |
| US agencies                        |                                     |                                     |                                     |                                     |                                     |                                     |
| Short-term                         | 1                                   | 2                                   | 3                                   | 1                                   | 2                                   | 3                                   |
| Medium-term                        | 1                                   | 2                                   | 3                                   | 2                                   | 5                                   | 7                                   |
| Pfandbrief                          | 0                                   | 0                                   | 1                                   | 1                                   | 2                                   | 8                                   |
| Prime MBS                          |                                     |                                     |                                     |                                     |                                     |                                     |
| AAA-rated                           | 4                                   | 6                                   | 10                                  | 10                                  | 20                                  | 30–100                              |
| AA- and A-rated                    | 8                                   | 12                                  | 25                                  | 100                                 | 100                                 | 100                                 |
| Asset-backed securities            | 10                                  | 20                                  | 20                                  | 25                                  | 50                                  | 100                                 |
| Structured products (AAA)          | 10                                  | 15                                  | 20                                  | 100                                 | 100                                 | 100                                 |
| Investment grade bonds             |                                     |                                     |                                     |                                     |                                     |                                     |
| AAA- and AA-rated                  | 1                                   | 2                                   | 5                                   | 8                                   | 12                                  | 15                                  |
| A- and BBB-rated                   | 4                                   | 7                                   | 10                                  | 10                                  | 15                                  | 20                                  |
| High-yield bonds                   | 8                                   | 12                                  | 20                                  | 15                                  | 20                                  | 40                                  |
| Equity                              |                                     |                                     |                                     |                                     |                                     |                                     |
| G7 countries                       | 10                                  | 12                                  | 20                                  | 15                                  | 20                                  | 25                                  |
| Emerging economies                 | 15                                  | 20                                  | 35                                  | 20                                  | 25                                  | 40                                  |

\(^1\) Prime counterparty. \(^2\) Non-prime counterparty. \(^3\) Hedge funds and other unrated counterparties.

**Source:** CGFS.

Some central banks publish their haircut schedules. The ECB schedule is reproduced as Table 3 for the main categories (there are separate schedules for ‘inverse floaters’ and non-marketable assets such as credit claims).\(^{20}\)

Central clearing counterparties (CCP) also publish haircut schedules for the much narrower range of collateral that they will accept. See Tables 4 and 5.


\(^{20}\) ‘Inverse floaters’ are floating-rate notes (FRN) on which the variable coupon resets at a lower rate as interest rates rise and vice versa.
Table 3: Haircut schedule for assets eligible for use as collateral in Eurosystem market operations

<table>
<thead>
<tr>
<th>Credit quality</th>
<th>Residual maturity (years)</th>
<th>Category I</th>
<th>Category II</th>
<th>Category III</th>
<th>Category IV</th>
<th>Category V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steps 1 and 2</td>
<td>A- to AAA</td>
<td>0.7</td>
<td>0.7</td>
<td>0.25</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>0-1M</td>
<td>1.1</td>
<td>1.1</td>
<td>0.5</td>
<td>1.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3M</td>
<td>2.25</td>
<td>3.1</td>
<td>0.75</td>
<td>3.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9M-11/4Y</td>
<td>3.75</td>
<td>3.6</td>
<td>1.25</td>
<td>3.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/4Y-2Y</td>
<td>3.5</td>
<td>3.8</td>
<td>1.5</td>
<td>3.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-31/4Y</td>
<td>5</td>
<td>4.7</td>
<td>2.15</td>
<td>4.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31/4-43/4Y</td>
<td>7</td>
<td>6.6</td>
<td>3.2</td>
<td>6.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43/4-7Y</td>
<td>9.5</td>
<td>8.1</td>
<td>4</td>
<td>8.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-10Y</td>
<td>11.8</td>
<td>8.3</td>
<td>4.25</td>
<td>9.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-15Y</td>
<td>14.7</td>
<td>11.45</td>
<td>6.4</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;15Y</td>
<td>17.9</td>
<td>18.0</td>
<td>10</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>15.85</td>
<td>15.85</td>
<td>5</td>
<td>5.38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: European Central Bank.  
Note: Category I is central government and central bank debt. Category II is local and regional government debt, jumbo covered bonds, agency debt and supranational debt. Category III is traditional covered bank bonds, structured covered bank bonds, multi-cedulas and corporate and other debt. Category IV is other bank debt. Category V is asset-backed securities (ABS).

Table 4: Haircut schedules for European central counterparties (CCP) for major government securities

<table>
<thead>
<tr>
<th>Credit quality</th>
<th>Residual maturity (years)</th>
<th>Category I</th>
<th>Category II</th>
<th>Category III</th>
<th>Category IV</th>
<th>Category V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steps 3</td>
<td>BBB to BBB+</td>
<td>0-1Y</td>
<td>1.25</td>
<td>1.25</td>
<td>1.75</td>
<td>0.25</td>
</tr>
<tr>
<td>1-3Y</td>
<td>3</td>
<td>3.5</td>
<td>3.75</td>
<td>0.88</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3-7Y</td>
<td>6</td>
<td>7.75</td>
<td>7.75</td>
<td>1.63</td>
<td>1.88</td>
<td>2.1</td>
</tr>
<tr>
<td>7-11Y</td>
<td>7.75</td>
<td>10.25</td>
<td>9.5</td>
<td>2</td>
<td>2.5</td>
<td>2.7</td>
</tr>
<tr>
<td>11-30Y</td>
<td>10.5</td>
<td>13</td>
<td>9.75</td>
<td>5</td>
<td>4.5</td>
<td>5.6</td>
</tr>
<tr>
<td>&gt;30Y</td>
<td>16.45</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>5.38</td>
</tr>
</tbody>
</table>

Source: Various CCPs.

Table 5: Haircut schedules for European central counterparties (CCP) for corporate securities

<table>
<thead>
<tr>
<th></th>
<th>CC&amp;G</th>
<th>Eurex</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3Y</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>3-5Y</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>5-7Y</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>7-10Y</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>&gt;10Y</td>
<td>30</td>
<td>38</td>
</tr>
</tbody>
</table>

Source: Various CCPs.

A schedule of haircuts has been prescribed by the Basel Accord as Standard Supervisory Haircuts for institutions calculating the credit risk mitigation provided by eligible financial collateral under the Standardised Supervisory Approach. This is reproduced as Table 6. The use of these haircuts is limited to transactions which are being revalued and, if necessary, margined daily. It also assumes a 10-day holding period. There is an additional 8% haircut for cross-currency repos and securities lending transactions. On the other hand, there is provision for national supervisors to carve out repos and securities lending transactions and apply a zero haircut, where the counterparty is a ‘core market participants’ and the collateral is a security issued by a government or public sector entity (PSE) qualifying for a zero right weight under the Standardised Approach and certain other conditions are met (eg same currency, overnight or revalued/margined daily).

Table 6: Standard Supervisory Haircuts applicable to financial collateral under the Standardised Supervisory Approach under Basel III

<table>
<thead>
<tr>
<th>Issue rating for debt securities</th>
<th>Residual Maturity</th>
<th>Sovereigns</th>
<th>Other Issuers</th>
<th>Securitisation Exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA to AA-/A-1</td>
<td>&lt;1 year</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>&gt;1 year &lt;5 years</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>&gt; 5 years</td>
<td>4</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>A+ to BBB-/</td>
<td>&lt;1 year</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>A-2/A-3/P-3 and unrated bank securities</td>
<td>&gt;1 year &lt;5 years</td>
<td>3</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>&gt; 5 years</td>
<td>6</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>BB+ to BB-</td>
<td>All</td>
<td>15</td>
<td>Not Eligible</td>
<td>Not Eligible</td>
</tr>
<tr>
<td>main index equities</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>other equities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCITS/mutual funds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash in the same currency</td>
<td>Highest haircut applicable to any security in fund</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: BIS.22

Gorton and Metrick famously acquired a database of haircuts from a US broker-dealer for structured security collateral (eg CDO, CLO).23 These haircuts changed dramatically during the 2007-09 crisis and their analysis of this behaviour observed has been the intellectual wellspring of the proposal for a mandatory minimum haircut, see Figure 5.

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22 See [www.bis.org/publ/bcbs189.pdf](http://www.bis.org/publ/bcbs189.pdf).

Since 2012, the Federal Reserve Bank of New York (FRBNY) has been publishing monthly snapshots of the US tri-party repo market, specifically, the market values and haircuts on the seventh business day of each month. See Table 7.

Table 7: US tri-party repo haircuts statistics published by the FRBNY

<table>
<thead>
<tr>
<th>Asset Group</th>
<th>Cash Investor Margin Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10th Percentile</td>
</tr>
<tr>
<td>ABS (Investment &amp; Non Investment Grade)</td>
<td>5.0%</td>
</tr>
<tr>
<td>Agency CMOs</td>
<td>2.0%</td>
</tr>
<tr>
<td>Agency Debentures &amp; Strips</td>
<td>2.0%</td>
</tr>
<tr>
<td>Agency MBS</td>
<td>2.0%</td>
</tr>
<tr>
<td>CMO Private Label (Investment &amp; Non Investment Grade)</td>
<td>3.0%</td>
</tr>
<tr>
<td>Corporates Investment Grade</td>
<td>3.0%</td>
</tr>
<tr>
<td>Corporates Non Investment Grade</td>
<td>3.0%</td>
</tr>
<tr>
<td>Equities</td>
<td>5.0%</td>
</tr>
<tr>
<td>Municipality Debt</td>
<td>0.0%</td>
</tr>
<tr>
<td>US Treasuries Strips</td>
<td>2.0%</td>
</tr>
<tr>
<td>US Treasuries excluding Strips</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

Source: FRBNY.25

Note: These data are for 9 May 2013.

Analysis of US tri-party repo haircuts by the FRBNY showed that haircuts vary widely between investors but are notably static, even during the 2007-2009 crisis.26 It was also

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noted that tri-party haircuts were not very granular. The analysis suggested that the reputation of the borrower (who would typically be a dealer) was as important as the type of collateral in setting haircuts. Many investors only deal with borrowers with minimal perceived credit risk, suggesting that this made haircuts irrelevant, allowing them to be set at a uniform level across asset classes. At this extreme, tri-party repos seem to be managed like unsecured loans. The stability of haircuts in US tri-party repo has been attributed to: the long-term nature of borrower-investor relationships; the short-term nature of most tri-party repo; and the unwillingness of some investors to take possession of collateral in a default (many investors, notably money market mutual funds cannot take longer-term securities onto their balance sheet, so would seek to withdraw funding from a counterparty that becomes uncreditworthy, which means that haircuts are likely to be unimportant for this type of investor).

The FRBNY study on US tri-party repo also noted that, in the bilaterally-settled repo market, dealers vary haircuts to bilateral clients much more readily than haircuts change in tri-party repos. This was seen as reflecting dealers’ expertise in asset management and their ability to hold and liquidate assets efficiently. It was also noted that dealers actively used haircuts to generate additional profit by charging larger haircuts to counterparties to whom they were lending (and taking collateral) than they had to pay to counterparties from whom they were borrowing (and giving collateral). This may explain why the use of haircuts is more common than in Europe, where the bulk of the repo market is interdealer.

In securities lending, haircuts (in the form of initial margins) traditionally have not varied much over time or between types of collateral, although the range of collateral and counterparties accepted by securities lenders has been much narrower than for repo. Possibly for that reason, haircuts in securities lending tended to reflect not risk but loan size. Haircuts in securities lending can also be influenced by the impact of new collateral on the overall composition of the collateral portfolio received from a given borrower. This reflects the nature of the beneficial owners, who are investment managers such as pension funds and insurance companies. Explicit methodologies may include diversified VaRs. Since the crisis, haircuts in securities lending are reported to have become more sensitive to the type of security offered as collateral and its residual term to maturity.

In practice, it appears that haircuts imposed in the market tend to stop at about 40%, at which point collateral simply becomes ineligible. Where haircuts of 40% or more are quoted, as with the quotation of very wide bid-offer spreads in a stressed market, the quote seems to be a gesture made on the assumption that the counterparty will not be willing to transact on such disadvantageous terms. It is seen as better for the long-term relationship to allow the counterparty to refuse the terms offered than for the quoting party to have to refuse outright to deal.

1.6. Some problems posed by haircuts

Haircuts are usually set so that the cash being loaned through a repo is less than the market value of the collateral, that is, they typically result in over-collateralisation. In this case, there is a bias against the borrower of cash, who is forced to take credit risk on the lender and to accept greater liquidity risk by giving up additional collateral.

In addition, a haircut is seen as an encumbrance of the assets of the borrower. This means that the borrower could not liquidate or repo out collateral given as a haircut if he needed liquidity. And in the event of a default by the borrower, at least some of the assets tied up in a haircut would be lost during liquidation and would therefore not be available to

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recompense unsecured creditors and depositors in bankruptcy proceedings. Asset encumbrance is a matter of increasing concern to regulators.27

A haircut also represents a share of the value of an asset which cannot be funded in the repo market and therefore requires a firm to draw on its own funds or borrow in the unsecured market. The use of own funds or unsecured borrowing increases the overall cost of funding the asset and limits the leverage available to a borrower. Regulators see value in haircuts as a means of preventing the build-up of excessive leverage by acting in a manner similar to reserve requirements in a fractional banking system. This is one of the arguments in favour of mandatory minimum haircuts.

On the other hand, regulators are concerned that changes in haircuts fuel ‘pro-cyclicality’. Pro-cyclicality is the amplification of cyclical fluctuations in asset values by the effect of price changes feeding back into margins and haircuts, and thus into the leverage available to firms and the demand for assets. In buoyant markets, over-confidence due to rising asset prices and competition for business may induce firms to narrow haircuts on new repos, increasing the collateral value of securities and collateralised borrowing, which would amplify the expansion of credit. In a depressed market, as asset prices fall and firms become more risk averse, they may widen haircuts on new repos, reducing the value of collateral and collateralised borrowing, which would amplify the tightening of credit. This concern is also behind the recommendations on haircuts in the WS5 paper.

2. **MINIMUM STANDARDS FOR CALCULATING HAIRCUTS**

### KEY FINDINGS

- The minimum standards for calculating haircuts recommended by the FSB do reflect best market practice. However, market practice in Europe varies very widely. Moreover, the use of haircuts in the European repo market is selective.

- The minimum standards should recommend that firms calculating haircuts consider some additional factors such as the delivery period for margins, the existence of legal documentation, thresholds for margin calls, margin disputes and delivery failures.

#### 2.1. WS5 Recommendation 6

In its Consultative Document of November 2012, WS5 recommended that:

*Recommendation 6: Regulatory authorities should introduce minimum standards for the methodologies that firms use to calculate collateral haircuts. Those guidelines should seek to minimise the extent to which these methodologies are pro-cyclical. Standard setters (e.g. BCBS) should review existing regulatory requirements for the calculation of collateral haircuts in line with this recommendation.*

The aim of the recommendation is that haircuts should be sufficiently deep to limit their potential pro-cyclicality, in other words, any propensity to narrow in bullish markets and widen in bearish markets, thereby amplifying the cyclical relaxation or restraint of the supply of credit and feeding back positively into market sentiment. This means that haircuts should be stable across a market cycle and possible periods of stress. Specifically, WS5 recommend that haircuts should be sufficiently deep to absorb the maximum expected decline in the market value of a piece of collateral over a conservative holding period. This is the interval of time over which one could confidently expect to be able to liquidate that collateral and close out the relevant repo (the liquidation or holding period).

The minimum standards proposed by WS5 for the methodologies to be used by market participants to calculate haircuts are:

- A value-at-risk (VaR) calculation adjusted for market liquidity risk by the use of an extended liquidation period reflecting the ‘expected liquidity of the asset in stressed market conditions’, as indicated by proxy measures of market liquidity such as trading volume and market depth. Price volatility is to be estimated using an observation period that includes at least one stress episode and to a high level of confidence (at least a 95<sup>th</sup> percentile confidence interval on a one-tailed basis).

- Where historical data is unavailable or unreliable, simulation techniques (scenario analysis or stochastic modelling).

- Alternatively, where historical data is unavailable or unreliable, a resort to proxy data from a comparable type of asset, suitably adjusted for basis risk.

WS5 recommended that an adjustment be made to the above calculations to reflect the impact on the market value of collateral of the possible widening of bid-offer spreads during a crisis and ‘pricing uncertainty’, which is assumed to mean abnormal price behaviour such as ‘gapping’ (sudden and erratic fluctuations).
In addition, WS5 recommended that account be taken of certain additional risk factors, ‘where relevant’. These are set out and discussed in Table 8.

**Table 8: Additional risk factors suggested by WS5 for haircut calculations**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>additional liquidity risk of large concentrated collateral positions</strong></td>
<td>Holdings of a security or (where a class of securities is relatively homogenous) holdings of a class of security that are larger than normal transaction size will take longer to liquidate and/or will depress the price (market impact). Such risks would be reflected in a longer holding period in haircut calculations.</td>
</tr>
<tr>
<td>‘wrong-way’ or correlation risk between the value of the collateral and the default risk on the counterparty</td>
<td>This risk proved to be a serious problem during the European sovereign debt crisis. A prime example was Greece. The exposure of Greek banks to the Greek government meant that repos with Greek banks against Greek government securities would have suffered from a correlated deterioration. As argued in section 1.3, wrong-way risk may be the reason for the (weak) correlation between haircuts and counterparty credit risk that has been observed by bodies such as CFGS.</td>
</tr>
<tr>
<td>asset classification of the collateral</td>
<td>This has been discussed in section 1.4. Asset classification is one of the most common ways of differentiating securities in terms of market liquidity (along with remaining to term to maturity) but needs to be used cautiously given the the wide range of securities within each class.</td>
</tr>
<tr>
<td>issuer credit</td>
<td>If the credit of the issuer of collateral affects the credit of the repo or securities lending counterparty, this becomes wrong-way risk. A default by the collateral issuer would trigger a margin call on the collateral-giver.</td>
</tr>
<tr>
<td>residual term to maturity</td>
<td>Longer terms to maturity increase the price sensitivity of fixed-income securities to changes in yields. This is measured by modified duration and similar statistics.</td>
</tr>
<tr>
<td>price sensitivity</td>
<td>This is measured by modified duration and similar statistics. It tends to be correlated to the remaining term to maturity and coupon. The price sensitivity of longer-term securities militates against their routine use as collateral.</td>
</tr>
<tr>
<td>optionality</td>
<td>Where the returns on or the term to maturity of a security are subject to options that can be exercised by the investor or issuer, or a security has significant convexity, the behaviour of the price of the security can be leveraged and much more non-linear, meaning large, sudden changes in value. The most common example is the prepayment risk in mortgage-backed securities (MBS).</td>
</tr>
<tr>
<td>structural complexity</td>
<td>In addition to embedded optionality, securities can be structured through the embedding of non-optional derivatives (eg interest rate swaps in inverse floaters) and tranching to differentiate the order in which different groups of investor receive the flow of returns and repayments (eg some asset-backed and mortgage-backed securities).</td>
</tr>
<tr>
<td>expected liquidity in stressed conditions</td>
<td>Some types of security, eg bonds issued by creditworthy governments, can be expected to remain liquid in stressed conditions or even benefit from a flight to quality. But most securities will suffer from impaired liquidity depending on the credit of the issuer, their transparency (a problem for structured securities) and underlying market microstructure (particularly the presence of market-makers or the number of regular dealers). Most equity performed well in the crisis because of the small deal size, wide investor base and order-driven nature of the market.</td>
</tr>
<tr>
<td>frequency of collateral valuation and margining</td>
<td>As discussed in section 1.2. The more frequent the revaluation of collateral and margining, the less need for a haircut.</td>
</tr>
<tr>
<td>foreign exchange risk</td>
<td>This risk is relevant in cross-currency repos, where the denomination of the cash is different from that of the collateral. Cross-currency repos tend to be arranged for US dollar funding. Where the party offering a cross-currency repo hedges the currency risk with FX swaps, the problem stems from possible mismatches in margin calls. For example, a bank providing US dollars to a customer against euro-denominated collateral, who matches this cross-currency repo with a euro repo and EUR/USD FX swap, is exposed to the risk that a change in the EUR/USD rate might generate a margin call to/by the customer but would have no impact on euro repo and so give rise to a basis risk.</td>
</tr>
</tbody>
</table>
2.2. **WS5 Question 11**

‘Q11. Are the factors described in section 3.1.2 appropriate to capture all important considerations that should be taken into account in setting risk-based haircuts? Are there any other important considerations that should be included? How are the above considerations aligned with current market practices?’

The methodologies recommended by WS5 represent current best practice in the market, at least where haircuts are currently applied, and were generally supported by respondents to the FSB consultation paper. All the additional ad hoc factors, except foreign exchange risk and wrong-way risk, are essentially considerations in setting the liquidation period. Foreign exchange risk and wrong-way risk would be factored into the VaR calculation as correlated variables.

In terms of the comprehensiveness of the additional ad hoc risk factors listed by WS5, consideration should also be given to the following operational factors:

2.2.1. **Delivery period for non-cash margin**

As argued in section 1.2, the exposure of a collateralised party to fluctuations in the price of collateral securities is not limited to the length of the liquidation period between an event of default and the completion of collateral sales. Account must also be taken of the interval since collateral was last revalued and a margin call made which has been received. During this interval, parties would be exposed to changes in the value of collateral. The time it takes for margin to be delivered can make this interval significant.

Margin delivery periods are being shortened by improvements in internal systems within financial institutions. However, the fragmentation of the European clearing and settlement infrastructure is a major obstacle, but should be alleviated by official initiatives such as Target 2 Securities (T2S), the EU Central Securities Deposit Regulation (CSDR) and the proposed EU Securities Law Legislation (SLL).

2.2.2. **Legal documentation**

An essential requirement for effective collateralisation is the use of legally enforceable written contracts\(^{28}\) such as the Global Master Repurchase Agreement (GMRA) published by the International Capital Market Association (ICMA) and the European Master Agreement (EMA). Without such documentation, the right to set off the value of collateral against an exposure to a defaulter is more open to challenge in law. Such challenges would delay set-off and the valuation of collateral for that purpose, potentially increasing the exposure. The lack of a legally enforceable master agreement should therefore be reflected in haircuts. This is in fact a common market practice.

The bulk of repos in Europe are now documented under recognised standard master agreements, but there is still a significant volume of undocumented repos, particularly cross-border with jurisdictions lacking adequate legislation on collateral rights and netting, or with less sophisticated and occasional customers.\(^{29}\)

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\(^{28}\) In parallel with this note, a separate note is being compiled for the Parliament on related legal issues. These are whether WS5’s Recommendation 7 has addressed all the relevant factors in designing, and the potential obstacles to the correct functioning of, such a regulatory regime (questions 14 and 17), in particular, whether transactions between jurisdictions with a different legal framework for the holding of securities can cause particular stability concerns and/or enforcement issues in case the collateral arrangement has to be exercised and whether these concerns should be recognised within such a regulatory system of minimum haircuts. The note will also examine if the fact that a transaction is open should influence the level of minimum haircut or otherwise impact on the implementation of WS5’s recommendations.

\(^{29}\) The ICMA European repo market survey for December 2012 put the percentage of outstanding repo contracts that were undocumented at about 2% of the survey sample, which was equivalent to EUR 108 billion. Given
2.2.3. Minimum Transfer Amounts (MTA)

This is a threshold, agreed between counterparties, usually written into their master agreement, setting a minimum size below which net margin (the net sum of the gross margins on individual repos) is not called. In theory, an MTA is a trade-off between credit exposure and operational cost, given that small margin calls are relatively expensive to make. The current consensus MTA in Europe is EUR 500,000.

In principle, MTAs are a justifiable expedient, but it is questionable whether the operational cost of calling a margin, even in the order of EUR 500,000, is as high as the default risk on an exposure of this size. MTAs significantly above this level should be challenged. Under Basel I, high MTAs were sometimes used to avoid margining. Consequently, they are still treated cautiously in repo industry margining guidance and in standard repo master agreements (eg the GMRA does not include a provision for an MTA, which has to be written into the agreement as a supplementary term). Notwithstanding that MTAs are now subject to regulatory capital charges as unsecured exposures and even though MTAs apply at the collateral portfolio level, while haircuts typically apply to individual transactions, high MTAs should be reflected to some extent in haircuts.

2.2.4. Frequency and duration of margin disputes

Disagreements about the calculation of margin calls can delay margin payments and transfers, and increase the credit exposure of one party to another, even if only temporarily. Margin disputes tend to escalate in stressed market conditions, as prices become difficult to observe. Where there is a high frequency of disputes over margin calls with a particular counterparty and such disputes are not settled rapidly, consideration should be given to a deeper haircut.

2.2.5. Frequency and duration of failures to deliver non-cash margin

Failure to deliver securities being posted as margin increases the credit exposure of one party to another. In markets where the rate of fails is high or rapidly increasing, as is likely in stressed market conditions due to reduced market liquidity, or in business relationships which are characterised by frequent and extended fails, both of the original collateral and/or any subsequent non-cash margins.

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that the survey is focused on sophisticated international repo dealers, it likely understates the share of undocumented repos. See ‘European repo market survey, Number 24 – conducted December 2012’, ICMA, London, March 2013.
3. SHOULD MINIMUM HAIRCUTS BE MANDATED?

KEY FINDINGS

- It is not clear how much impact the FSB proposal for mandatory minimum haircuts will have in the European market given the preponderance of high-quality collateral, assuming that the proposal is limited to risky assets.

- The proposal will add to the expense of funding and drag on the efficiency and liquidity of the market, as well as conflicting with the regulatory objective of greater collateralisation. It may also shift borrowing back towards the unsecured market.

- A serious objection to mandatory minimum haircuts is that changes in haircuts did fuel pro-cyclicality in the 2007-09 crisis and so the proposal would prove ineffective in a future crisis while imposing immediate costs on the market.

- The use of asset types and remaining term to maturity as criteria for identifying risky assets is crude and often inaccurate. Risk should be measured in terms of the long-term volatility of prices against a low-risk benchmark.

- The High-Level approach to minimum mandatory haircuts is likely to encourage the market to gravitate to these floors as ‘de facto’ standards. The Back-Stop Level approach is therefore the least-worst option but may not achieve the objective of reducing pro-cyclicality and excessive leverage unless regulators enforced standards in the calculation of haircuts. The Back-Stop Level floors could be used as a monitoring tool here, rather than as a limit. Alternatively, the High-Level and Back-Stop Level approaches could be combined, with the latter available to firms meeting certain standards in the way they calculate haircuts and the former for all others. This compromise would be similar to that available in the calculation of haircuts for the adjustment of loss-given-default under Basel.

- The proposal to exempt securities lending transactions which do not contribute to pro-cyclicality or leverage from minimum mandatory haircuts would be difficult to implement.

- While transactions between regulated financial intermediaries should be exempt from mandatory minimum haircuts, other regulated entities should be exempted as well. The most efficient and simplest application would be at the interface between the regulated and ‘shadow banking’ sectors.

3.1. WS5 Recommendation 7

While the wider adoption of more rigorous haircut calculation methodologies should help stabilise haircuts across market cycles and during periods of stress, WS5 recommends that mandatory minimum haircuts should be imposed on risky assets being used as collateral in order to provide floors under market calculations. They are concerned, however, about the impact on the efficiency of the market and the effectiveness and practicability of the recommendation.

‘Recommendation 7: In principle, there is a case for introducing a framework of numerical floors on haircuts for securities financing transactions where there is material procyclicality.
Such floors would work alongside minimum standards for the methodologies that firms use to calculate collateral haircuts. However, the FSB should be mindful of possible unintended consequences for market liquidity and the functioning of markets. The FSB should consult on whether a framework of numerical floors would be effective and workable in achieving the policy objectives. This would include consultation on the levels and the scope of application of such framework by counterparty, collateral, and transaction type (see sections 3.1.4 - 3.1.5).

It is worth emphasising that the recommendation is only for risky assets, as it is fluctuations in credit and liquidity risk premia that are capable of exaggerating the natural cyclicality of the market. The yield on a risk-free asset does not incorporate a risk premium and the yield on a low-risk asset incorporates an insignificant and typically stable premium. Therefore, risk-free or low-risk assets should not exhibit ‘material’ pro-cyclicality. WS5 cites corporate and securitised bonds as examples of risky assets.

The recommendation also applies only to ‘securities financing transactions’ or ‘security-for-cash’ trades. This would encompass repo and synthetic equivalents, but not securities lending against non-cash collateral and, subject to certain conditions (see 3.1.4(i) of the WS5 paper), securities lending against cash collateral. It is unclear whether the recommendation would apply to secured loans (where the cash lender receives a security interest or pledge, rather than legal and beneficial title to the collateral, as in repo). If secured loans are exempt, this could give rise to regulatory arbitrage, in that the market might migrate from repo to the Security Financial Collateral Arrangements envisaged under the Financial Collateral Directive 2002/47/EC.

WS5 emphasise that mandatory minimum haircuts would be floors under market-determined levels. They identify the challenges in setting such floors as:

- Ensuring that the floors do indeed act as minimum levels and do not become ‘de facto market standards’. This outcome would discourage research, experimentation and innovation in the haircut calculation methodologies of market participants.

- Achieving an appropriate balance between simplicity and granularity. The limits to categorisation by type of security has been discussed in section 1.4. On the one hand, simplicity facilitates implementation and monitoring. On the other hand, granularity is needed to ensure that the floors accurately reflect relative levels of risk. The problem is that overlarge categories of collateral will contain a wide range of risks and corresponding returns, but will impose a common haircut and corresponding regulatory cost on all securities within the same category. This would create an undesirable incentive to use the riskiest and highest-yielding collateral within each category of collateral, the so-called ‘cheapest-to-deliver’. Such an incentive would distort market behaviour and encourage greater risk-taking.

WS5 proposes two alternative types of mandatory minimum haircut.

- **High-Level floors.** The floors would be set ‘at relatively high levels that may typically be closer to actual market practices in normal times’. One possibility raised by WS5 is to use the Basel III Standard Supervisory Haircuts (SSH) for secured financing transactions (see Table 9 below). In effect, the current regulatory capital charge that really applies where the haircut imposed by a firm is shallower than the relevant SSH would be replaced by a simple prohibition on such shallower haircuts.

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30 Risk-free assets behave cyclically, but pro-cyclicality is about the amplification of these cycles.

Table 9: Basel Standard Supervisory Haircuts as High-Level floors

<table>
<thead>
<tr>
<th>Residual maturity of collateral</th>
<th>Haircut level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sovereign</td>
</tr>
<tr>
<td>≤ 1 year debt securities, and FRNs</td>
<td>0.5%</td>
</tr>
<tr>
<td>&gt; 1 year, ≤ 5 years debt securities</td>
<td>2%</td>
</tr>
<tr>
<td>&gt; 5 years debt securities</td>
<td>4%</td>
</tr>
<tr>
<td>Main index equities</td>
<td>15%</td>
</tr>
<tr>
<td>Other equities</td>
<td>25%</td>
</tr>
<tr>
<td>UCITS/Mutual funds</td>
<td>Look-through or highest haircut applicable to any security in which the fund can invest</td>
</tr>
</tbody>
</table>

Source: FSB.

- Back-Stop Level floors. The floors would be set at levels below those ‘that would be used by a prudent market participant in normal times’ but above the levels to which haircuts contracted at the height of the pre-crisis boom. WS5 proposes to consult on both sets of levels. Under this approach, firms would be allowed to set haircuts shallower than the Basel III SSH (subject to a regulatory capital charge) but not shallower than the Back-Stop Levels. WS5 offer an illustrative example of a Back-Stop Level schedule using floors set at 50% of the Basel III SSH. This appears to be an arbitrary choice. An appropriate level will have to be set by reference to the results of the consultation exercise being conducted by WS5 on the general level of haircuts prior to the 2007-09 crisis and the levels judged prudent in ‘normal times’. The only practicable approach may be to use the minimum and maximum haircuts over a period of several years prior to 2007 that were set by major firms who have been employing rigorous quantitative methodologies.

3.2. The pros and cons of the High-Level Approach

The advantages perceived by WS5 of the High-Level approach are:

- High Level floors would be based on conservative parameters: daily valuation and margining, a 10-business day holding/liquidation period and a 99% confidence interval.

- The approach would be broadly consistent with the standardised haircut schedule proposed by the BCBS/IOSCO joint Working Group on Margining Requirements (WGMR) for non-centrally cleared derivatives. This is important because ‘synthetic’ repos and securities lending transactions can be constructed using derivatives such as total return swaps and options. On the other hand, consistency does not mean precise equivalence. WS5 note that the WGMR proposals are intended to incentivise the central clearing of OTC derivatives, that there are differences in margining practices between derivatives and securities financing transactions, and that the WGMR is recommending that initial margins be segregated (which changes the economics).

- The Basel III SSH include a carve-out for repos between banks and core market participants that satisfy conditions such as both exposures and collateral being cash or government bonds with a zero risk weight under the Standardised Approach, where national/regional supervisors wish. This allows collateral that does not contribute to pro-cyclicality to be exempt from mandatory minimum haircuts.
The disadvantages perceived by WS5 of the High-Level approach are:

- If could suffocate market liquidity in the repo market, and the secondary market in securities which depend on repo, by significantly raising the cost of funding. Precise calibration would be vital.

- Given that High-Level floors would ‘bite’ more on transactions, a simple schedule of mandatory haircuts would be more likely to distort market behaviour in the selection of collateral by encouraging use of the ‘cheapest-to-deliver’. WS5 fear this would create pressure for the elaboration of a more granular and complex approach.

- It is more likely to become the ‘de facto market standard’ for haircuts.

- Eligible market participants may increase their use of central banks, where the latter offer shallower haircuts. It is undesirable, for reasons of long-term economic efficiency, to short circuit the money market (unless one wished to substitute a centrally-planned command economy for the market). The use of central banks as structural funding sources would also complicate the implementation of monetary policy. This has been made clear in comments by central banks on the potential impact of the proposed Financial Transactions Tax (FTT) on the repo market.  

3.3. The pros and cons of the Back-Stop Level Approach

The advantage of the Back-Stop Level approach is that it encourages market participants to set their own haircuts. The disadvantage is that it leaves more room for pro-cyclicality in haircuts.

WS5 suggests delineating the scope of Back-Stop Level minimum mandatory haircuts in terms of transaction type, counterparty type and collateral type. In each case, there are a number of options.

3.3.1. Transaction type

The recommendation is to apply floors only to ‘securities financing transactions where the primary motive is financing, rather than to lend/borrow specific securities’ in order to ‘mitigate the potential negative impact of minimum haircuts on [...] securities lending [...] in particular in cases where current regulation prohibits certain types of securities lenders from lending without receiving haircuts’  

(the problem here being that a mandatory minimum haircut would reduce the cash side of the transaction, whereas cash in a securities lending transaction is the collateral and needs to be greater than the value of the security in order to provide protection to the lender). 

Securities lending against cash collateral would be exempt provided (1) the purpose of the transaction is to borrow the securities and (2) the lender reinvests the cash collateral in a separate reinvestment fund and does not use it to finance the assets being lent.

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34 The range of transaction types that fall under the rubric ‘securities financing transactions’ are: (1) repos, which are exchanges of securities for cash; (2) securities lending transactions, which are exchanges of securities for other securities, cash or letters of credit; and (3) margin financing, under which a purchaser of securities (typically equity) borrows a percentage of the cost of the purchase from the broker selling the securities to him.
3.3.2. **Counterparty type**

The options are to apply floors to all qualifying transactions between:

- All types of counterparty.
- Regulated financial intermediaries on the one hand and other entities on the other hand, and between pairs of other entities, but not between pairs of regulated entities.
- Regulated financial intermediaries on the one hand and other entities on the other hand.

3.3.3. **Collateral type**

The issue here is whether or not to exclude government securities. Some members of WS5 have argued that government securities were not necessarily risk-free and so could contribute to pro-cyclicality and all government bonds can be used to leverage. Others supported exclusion on the grounds that government repo market were core funding markets and central to monetary policy implementation, and exclusion would be consistent with the zero-haircut carve-out under Basel III.

3.4. **WS5 Question 12**

‘Q12. What do you view as the main potential benefits, the likely impact on market activities, and possible unintended consequences of introducing a framework of numerical haircut floors on securities financing transactions where there is material procyclicality risk? Do the types of securities identified in Options 1 and 2 present a material procyclical risk?’

The main potential benefits of minimum mandatory haircuts include the potential to reduce excessive leverage and liquidity transformation, and pro-cyclical feedback in markets in illiquid securities. However, the fact that the bulk of the repo market in Europe is against government and high-quality private collateral (eg covered bonds and residential MBS) means that the systemic impact of mandatory minimum haircuts on risky assets will be limited.\(^{35}\)

In terms of the likely impact on market activities, mandatory minimum haircuts would make the financing of less liquid securities more expensive. This will increase the cost of such securities and of the activities they finance, including securitisation.

Possible unintended consequences depend on the scope of the definition of risky assets. If this is drawn too widely, it could act as a drag on the ability of firms to access core funding through the repo market as well as inflict damage to market liquidity and the viability of collateralisation, not just of lending through repo but also the collateralisation of other exposures. This would undermine the general regulatory thrust to enhance the safety of the financial market through greater resort to collateralisation.

Another serious unintended consequence of mandatory minimum haircuts may be to shift some funding out of repo and back towards unsecured sources, as a result of the increase in the relative cost of secured funds. One respondent to the FSB consultation argued that inconsistency with the Basel III Liquidity Coverage Ratio (LCR) might have the same effect. The LCR allows 100 % of unencumbered Level 1 assets to be counted towards liquidity. If these assets were to be subject to mandatory haircuts, it could become cheaper to fund them in the unsecured market. Given the lack of resilience of unsecured funding, such a

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\(^{35}\) A measure of the share of government bonds in the European repo market is given by the semi-annual ICMA European repo market survey. In December 2012, 81.3 % of the EU-originated collateral reported in the survey was of government bonds. A similar percentage (84 %) of Australian repo over 2011-12 was against central or state government bonds. The figure for the Japanese repo market is over 97 %.
shift would clearly contradict the regulatory agenda, which is to encourage (and sometimes mandate) collateralisation.

An unexpected outcome of minimum mandatory haircuts, and possibly the most serious practical objection to the idea, is that they would largely fail in dampening the pro-cyclicality of risky assets. This is because many credit terms other than haircuts are relevant in determining the effective supply of leverage to market participants. To control counterparty credit risk, repo market users can also reduce or cut credit limits and/or shorten the term of lending. Indeed, reducing credit limits, shortening terms and ultimately pulling credit lines tends to be the first line of defence for secured lenders, just as it is the unsecured lenders. This behaviour was observed by the CGFS Study Group in its analysis of the crisis of 2007-09. Increases in haircuts during the crisis were found to have varied considerably across financial instruments, business lines and type of counterparty. The variation of other credit terms has the same potential pro-cyclical effects on financial markets as those attributed to market-driven haircuts. The role of haircuts in the crisis is discussed in more detail in Annex II.

Do the types of securities identified in the two options (High-Level and Back-Stop Level approaches) present a material pro-cyclical risk (sovereign, corporate and other issuers, and securitised products)? The problem is that the categories are widely drawn. Categorisation for risk management purposes in terms of simple asset type has limitations and is valid only in terms of the broadest risk/return characteristics. There are risk-free and risky government securities, low-risk and high-risk corporate bonds, and low-risk and high-risk securitised bonds in the same categories. Given the pivotal role of repo for the efficiency of the financial markets, it is essential that mandatory minimum haircuts are imposed as narrowly as possible, which means no wider than the riskiest assets. This means they should not apply to high-quality sovereigns, corporate or asset-backed securities, but should apply, for example, to low-quality sovereigns. As pro-cyclicality operates through fluctuations in risk premia, categorisation needs to be done in terms of some measure of credit and liquidity risk.

For policy reasons, credit risk can no longer be measured using commercial credit ratings and there is no satisfactory rating system for liquidity risk. An objective alternative criterion is needed. The only feasible option would appear to be calibration in terms of the long-term volatility of spreads to a risk-free rate. Regulators would have to choose this benchmark and set the margin beyond which an asset is classed as risky. As there is strictly no such thing as a risk-free rate, it is inevitable that the benchmark will in fact have to be the least risky asset or assets. However, using a relative benchmark is inevitable and not a fundamental problem, provided the least-risky asset or assets are of low absolute risk.

Categorisation of collateral in terms of remaining term to maturity is also questionable. The Basel SSH were developed to measure credit risk, which increases with term. However, the link to market liquidity risk, which is main factor in haircuts, is not so clear. The suggestion above could overcome the need for maturity categorisation.

Some respondents to the FSB consultation paper argued that the need for minimum mandatory haircuts is less compelling than the need for robust daily collateral valuation and margining procedures. Inefficient margining contributed to pro-cyclicality during the crisis of 2007-09, as lenders rushed to ‘catch up’ with the deterioration in the market by making large margin calls. Haircuts become less important as margining becomes more frequent.

Respondents to the FSB consultation paper were split between those who argued for global consistency and those who felt that repo markets were too heterogeneous for the simple framework being proposed.
3.5. **WS5 Question 13**

‘Q13. Do you have a view as to which of the two approaches in section 3.1.3 (option 1 – high level – or option 2 – backstop) is more effective in reducing procyclicality and in limiting the build-up of excessive leverage, while preserving liquid and well-functioning markets?’

The High-Level approach is more likely to dampen pro-cyclicality and the build-up of leverage but is too risky in terms of unintended consequences for the efficiency of the financial market of making many transactions uneconomic and distorting market behaviour in favour of riskier assets within each category. High-Level floors are also likely to undermine measures to improve the internal haircut calculation methodologies of market participants by setting ‘de facto standards’, as feared by WS5. Better internal methodologies are desirable because they reinforce a more rigorous risk management culture within firms and a self-regulating market (albeit within a firm regulatory framework) should be more efficient, as pricing and other terms would be more responsive to the vast range of different business requirements of market users than a simplistic regulatory framework would allow. There would also be less incentive for regulatory arbitrage.

The effectiveness of the alternative Back-Stop Level approach would depend on how successful regulators are in encouraging wider adoption of more rigorous haircut calculation methodologies by market participants. The question needs to be asked: what if some market participants fail to implement more rigorous haircut calculation methodologies? What incentive is there to improve practice and what is the sanction for failure?

The Back-Stop Level approach received the overwhelming support of respondents to the FSB paper, on the grounds that it preserved market participants’ flexibility to set haircuts appropriate to particular transactions and was more likely to avoid setting a ‘de facto’ standard.

3.6. **WS5 Question 14**

‘Q14. Are there additional factors that should be considered in setting numerical haircut floors as set out in section 3.1.3?’

It has already been argued that mandatory minimum haircuts should not apply to risk-free or low-risk collateral. It may be worth noting that the CGFS Study Group came to a similar conclusion when they proposed a different way of stabilising haircuts. Their idea was for countercyclical add-on’s to capital charges on secured lending, in order to boost regulatory haircuts during up-cycles, in order to dampen pro-cyclicality. However, they proposed to exempt those interbank repos which ‘contribute positively to market efficiency and where the financing of the collateral is not the motivation for the transaction’. This included overnight interbank lending collateralised by very high-quality liquid assets (typically those recognised as core liquidity in micro-prudential liquidity standards), as the purpose of the transaction would be the rebalancing of short-term payment flows, and the collateral would be solely serving the purpose of supporting the creditworthiness of the borrower.

The need to preserve an adequate cost differential with unsecured funding was raised in section 3.4. Placing too high a floor under the cost of secured financing may shift some funding out of repo and back towards unsecured sources, which would clearly contradict regulatory strategy, which is to encourage (and sometimes mandate) collateralisation.

A number of respondents to the FSB consultation expressed concern that the recommendation for a mandatory minimum haircuts was proceeding despite a paucity of evidence for pro-cyclicality and a lack of empirical data on haircuts.
It has been explained earlier that haircuts occasionally go ‘negative’ for valid reasons of counterparty credit risk. However, mandatory minimum haircuts would prohibit ‘negative’ haircuts.

3.7. **WS5 Question 15**

‘Q15. In your view, how would the numerical haircut framework interact with model-based haircut practices? Also, how would the framework complement the minimum standards for haircut methodologies proposed in section 3.1.2?’

If the haircut calculation methodologies of market participants are required to use a conservative holding/liquidation period, an observation period that includes at least one stress episode and a high level of confidence, and provided the Back-Stop Level floors are accurately calibrated (using a methodology to a consistent standard), then calculated haircuts should be well above Back-Stop Level floors.

In practice, however, competitive pressures and the wish to foster business relationships is likely to force haircuts down towards the floors during up-cycles in the market. As asked in 3.5.1, the question then is what if some market participants fail to implement more rigorous haircut calculation methodologies? What incentive is there to improve practice and what is the sanction for failure?

Use of High-Level floors is more likely to see haircuts in the market hitting those floors, particularly as there is no incentive or sanction to discourage the tendency to treat such floors as ‘de facto’ standards.

3.8. **WS5 Question 16**

‘Q16. In your view, what is the appropriate scope of application of a framework of numerical haircut floors by: (i) transaction type; (ii) counterparty type; and (iii) collateral type? Which of the proposed options described above (or alternative options) do you think are more effective in reducing procyclicality risk associated with securities financing transactions, while preserving liquid and well-functioning markets?’

3.8.1. **Transaction type**

The exclusion of securities lending against non-cash collateral is logical, given that such transactions do not contribute to leverage or pro-cyclicality. However, securities lending against cash collateral has contributed to leverage through the reinvestment of cash collateral, for example, in money market funds. The criteria of purpose and place of reinvestment suggested by WS5 would not preclude this contribution to leverage.

Moreover, not all the leverage resulting from securities lending against cash collateral contributes to the systemic risk of over-leveraging. Some securities lending is being undertaken, not only to earn a fee, but also to borrow cash collateral to re-use as collateral with central clearing counterparties (CCPs), which typically only accept cash as variation margin. The use of cash collateral for this purpose is reported to be increasing among non-bank financial institutions such as pension funds and insurance companies, which have found it increasingly difficult and expensive to continue their previous practice of borrowing

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36 Securities lending against non-cash collateral is simply an exchange of two securities or baskets of securities. Neither party borrows cash, so there is no leverage, as indicated by the fact that there is no effect on the size of the balance sheet of either (merely a change in the composition of their assets). For the same reason, there is also no pro-cyclicality, as this effect depends on the amplification of the market cycle by increasing or decreasing the financing capacity of lenders through increasing or decreasing the amount of cash which can be borrowed against a given piece of collateral through changes in risk premia, as reflected in collateral value and haircuts.
Shadow Banking – Minimum Haircuts on Collateral

Cash for use as collateral in the unsecured money market. This use of securities lending may become too costly under the WS5 recommendation.

It also needs to be recognised that repo and securities lending are analogous instruments, both legally and economically, which means there are overlaps in the motives of the two types of transaction. Thus, the purpose of a repo is not always to borrow cash and the purpose of a securities lending transaction is not always to borrow a security. Just as securities lending transactions can be used to borrow cash (see above), so repos can be used to borrow securities. The owner of a security can (1) lend into the securities lending market against non-cash collateral and receive a lending fee, or (2) lend into the securities lending market against cash collateral and keep a portion of the reinvestment income on the cash equal to the lending fee, or (3) sell the security into the repo market for cash at a rate which is lower than the standard repo rate by an amount equal to the fee in the parallel securities lending market. If securities lending where the primary motive is to lend/borrow specific securities is to be excluded from mandatory minimum haircuts, why not securities-driven repos? Not to do so would disrupt and distort collateral trading, as there are good reasons for some market participants to want to use the repo market rather than the securities lending market.37

The problem for WS5 is then to distinguish such securities-driven repos from cash-driven repos. This would have to be done on a transaction-by-transaction basis, by comparing the repo rate on each repo with the so-called ‘general collateral’ or GC repo rate that is prevailing at the same time for the same category of collateral. GC repos are transactions against securities which are generally accepted as collateral at the same repo rate. Such collateral can be substituted for each other without changing the the repo rate and repos against such collateral are therefore driven by the supply and demand for cash, rather than the precise identity of the security provided as collateral. In contrast, where a repo is driven by the need to borrow a particular security, the demand for that security will be such that the borrowing party has to offer cash at a rate below the GC repo rate in order to attract sellers. Such repos are called ‘specials’. However, identifying specials is not straightforward, because of practical difficulties with the benchmark concept of the GC repo rate. There is no consensus on the methodology of how to fix the GC repo rate and liquidity is insufficient in longer terms and in most non-government securities to provide a reliable basis for fixing. Moreover, since 2010, the GC repo market in the Euros has fragmented between countries, meaning that there are several GC repo rates in the same currency.

3.8.2. Counterparty type

A major concern expressed by respondents to the FSB consultation has been was the cumulative burden of minimum mandatory haircuts and other regulations such as Basel III, the Dodd-Frank Act and the Alternative Investment Fund Management Directive (AIFMD), which are also addressing the issues of leverage and pro-cyclicality, as well as potential conflicts. For this reason, Option 1 - to apply floors to all qualifying transactions between all types of counterparty - was the least popular.

37 Firms sometimes prefer to use the repo rather than the securities lending because the repo market: typically provides fixed-term financing (whereas standard securities lending transactions are on an open basis); accepts a wide range of collateral, particularly fixed-income securities and securities that are not in special demand because of the investment characteristics but can function as good collateral; is larger and more liquid; and has a more diverse range of institutions participating, which enhances liquidity. On the other hand, firms may prefer to use securities lending because the securities lending market is the preferred habitat of end-investors such as pension funds and insurance companies and provides greater depth in equity. Moreover, securities lending can be against non-cash collateral, which means there is no leverage of the balance sheet, while the open basis of standard securities lending transactions allows lenders to recall securities ahead of corporate events and income payments triggering tax charges.
Option 2 - imposing mandatory minimum haircuts on transactions between regulated financial intermediaries on the one hand and other entities on the other hand, as well as between pairs of other entities - would exempt transactions between regulated financial intermediaries from mandatory minimum haircuts on the grounds that their liquidity and leverages are already directly regulated.

Option 3 - imposing mandatory minimum haircuts only on transactions between regulated financial intermediaries on the one hand and other entities on the other hand – would exempt transactions between pairs of regulated financial intermediaries but also between pairs of other entities.

The exclusion of transactions between regulated intermediaries under Options 2 and 3 would rely on Basel III Leverage Ratio to restrain the build-up of excessive leverage and on the Basel III Liquidity Coverage Ratio to ensure adequate liquidity. Both measures should moderate pro-cyclicality, given that excessive leverage amplifies the impact of pro-cyclicality and inadequate liquidity aggravates the need to deleverage in a crisis. The exclusion of regulated financial intermediaries is also consistent with the focus of the FSB on shadow banking, including the link between traditional and shadow banking. And there is a risk that trying to regulate the same problem with two distinct policy instruments would make the calibration of both policies difficult, possibly resulting in an unintended cumulative effect.

In responses to the FSB, many regulated entities who are not intermediaries (eg UCITS) have questioned why they should be subject to mandatory minimum haircuts on the grounds that some are also subject to direct appropriate regulation of liquidity and leverage, and in many cases have naturally low levels of leverage. It may therefore be appropriate for WS5, in consultation with regulators, to reconsider whether there is a case for widening the exclusion proposed under Options 2 and 3 beyond regulated financial intermediaries.

Option 2 would seem to balance prudence and efficiency. However, it is not clear how practical it is to regulate transactions between other entities and how significant are transactions not involving regulated financial intermediaries on at least one side.

Option 3 is the simplest and, although it would allow regulatory arbitrage (migration of activity from the regulated sector to unregulated entities), may not be imprudent at this time given the insignificance of transactions not involving regulated financial intermediaries on at least one side. It could therefore be considered as a temporary option, subject to the monitoring of the distribution of market activity.

3.8.3. Collateral type

Given the pivotal importance of the repo market to the efficient functioning of the financial market and the flow of collateral into risk management, it is clearly vital that mandatory minimum haircuts do not damage the liquidity of that market by imposing burdensome costs that are not justified by clear gains in financial stability. The core and bulk of most repo markets is government bond collateral. Where those securities are risk-free or low-risk, they pose little danger of pro-cyclicality. Issues of leverage are being addressed through other regulations, principally Basel III. Although this applies only to banks and securities firms, they are major sources of credit and other sources (money market mutual funds and other non-bank institutions performing bank-like functions, ie ‘shadow banks’) are being brought within the regulatory perimeter. It seems prudent, therefore, particularly given the uncertainty about the impact of mandatory minimum haircuts, to limit them to risky assets. This means exempting repos against high-quality government bonds. As
suggested in 3.4.1, differentiation of securities in terms of quality would probably have to be done in terms of the long-term volatility of spreads to the least-risky benchmark rate.

3.9. Recommendations

Mandatory minimum haircuts are intended to apply only to risky securities, given that procyclicality is limited to such assets. This argues for a narrow definition of risky assets. However, the fact that low-risk assets, such as high quality government securities, can be used to gain leverage argues for a wide, if not all-encompassing, definition.

If the definition is too narrow, given that the collateral employed in the European repo and securities lending markets is largely government and other high quality securities, the systemic impact of mandatory minimum haircuts and its ability to dampen pro-cyclicality would be questionable. But if the definition is too wide, there must be serious concern about the impact on the core funding of financial intermediaries and thus on the efficiency and liquidity of the market. In addition, this measure would contradict other regulatory measures, such as greater collateralisation and the migration away from unsecured lending.

Either way, we do not have sufficient data about the past behaviour of haircuts to set mandatory minimum haircuts at a level which strikes an optimal balance between dampening pro-cyclicality and the build-up of excessive leverage on the one hand and maintaining the efficiency and liquidity of the market on the other.

Even more problematically, no matter how narrow or wide the scope of mandatory minimum haircuts, there is strong evidence questioning the role of changing haircuts in feeding pro-cyclicality and therefore a serious likelihood that mandatory minimum haircuts would be circumvented by the tightening or relaxation of other credit conditions in response to increasing counterparty credit risk and vice versa. This means that a large quantum of liquidity would be removed from the market and significant friction imposed on its performance for little or no gain in financial stability.

Moreover, there are other tools to address pro-cyclicality and excessive leverage. Enforcing the adoption of more rigorous methodologies for the calculation of haircuts and improving collateral revaluation and margining procedures is likely to be effective in dampening pro-cyclicality but less disruptive to market efficiency and liquidity. And direct regulatory limits on leverage offers greater certainty than the indirect, unproven and questionable mechanism of minimum mandatory haircuts.

However, if minimum mandatory haircuts are to be adopted, it would be important to have an objective criterion for defining risky assets. The classification of securities by type and term to maturity is crude and inexact, and will distort market pricing and behaviour. A better measure would be the long-term volatility of price against a low-risk benchmark, with regulators setting a margin beyond which a security is judged risky. Such an empirical risk-based metric would also avoid the need to try to carve out non-procyclical, non-leveraging securities lending transactions, given that securities lending typically relies on low-risk collateral.

Of the two approaches proposed, the Back-Stop Level approach is the least-worst option but there is a serious risk that it would serve little practical purpose, unless regulators respond actively to market haircuts tending down towards this floor by strongly encouraging more rigorous haircut calculations methodologies. However, this suggests that Back-Stop Level floors might just as effectively be used as a supervisory monitoring tool. This would have the advantage of minimising the risk of unintended consequences for market efficiency and liquidity which would be posed by any automatic limits.
Another suggestion would be to combine both approaches, with Back-Stop Level approach available to market participants with haircut calculation methodologies that meet the standards laid down by WS5, but the High-Level approach for those who do not (including firms who lack a business case for investing in more sophisticated methodologies). This approach is similar to the distinction in the Basel Accord between the use of Standardised Supervisory Haircuts on one hand and the Own Estimates and VaR Model approaches on the other. As mentioned in section 1.3, firms that meet certain operational standards can be permitted by national supervisors to make their own estimates or use their own VaR models to calculate regulatory haircuts.

If mandatory minimum haircuts are to be implemented, consideration needs to be given to the effect on the relative costs of secured and unsecured funding. It may be necessary to consider raising regulatory capital charges for unsecured funding to avoid a shift back to such funding.

There is a case for any framework of minimum mandatory haircuts to exempt transactions between regulated financial intermediaries, given that their liquidity and leverage will be regulated under measures introduced under Basel III, which should moderate the potential for pro-cyclicality in their business. But it may also be appropriate to expand this category to include other regulated entities who are not intermediaries, where they are also subject to direct regulation of leverage and liquidity, or have naturally low levels of leverage. The framework should only be applied, initially at least, to transactions between regulated entities and other entities. This interface is currently the most critical for the flow of credit to and from the shadow banking sector and is the simplest to regulate.
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ANNEX I: SHOULD HAIRCUTS REFLECT COUNTERPARTY CREDIT RISK?

A study of repo transactions by US money market mutual funds (MMF) by Fitch Ratings concludes that ‘it does not appear that MMF haircuts are particularly sensitive to the identity of the repo counterparty’, although they caution that ‘determining whether haircuts are sensitive to counterparty risk is difficult to examine statistically, since the most active repo market borrowers are highly rated financial institutions, and it would be difficult to control for the quality of collateral when comparing haircuts across different institutions. Nevertheless, Fitch’s tentative research on this topic does not appear to indicate a link between haircuts and counterparties for MMF repo transactions. This finding is consistent with Fitch’s understanding of the risk-management practices of several MMFs that participate as repo lenders in tri-party markets. These funds make a binary “yes/no” decision about whether or not to transact with a particular financial institution [...]. The funds thus calibrate haircuts based on the potential price volatility of the collateral, rather than on the financial strength of the repo counterparty’.

It is easier to see how counterparty credit risk feeds into haircuts in exceptional circumstances. Where the probability of default and the likelihood of having to liquidate collateral are remote, no haircut is typically imposed. Similarly, where a counterparty is very highly rated, it may be able to repo out collateral that buyers would not accept from lesser-rated counterparties, in other words, the (effective) haircut switches from 100% for lesser-rated counterparties to less than 100% or even zero for highly-rated counterparties.

At the other extreme, where there is an element of systemic risk - either the counterparty is very large and/or market liquidity has already been critically impaired by a loss of confidence - the liquidation of collateral is likely to have a market impact far greater than that of normal cash market transactions, which would justifiably impose a special haircut. In addition, negative haircuts (ie under-collateralisation) have been observed for poorly-rated buyers in the context of systemic instability.

However, there is empirical evidence to suggest that the size of haircuts do vary with counterparty credit risk in normal market conditions. A Study Group of the BIS Committee on the Global Financial System (CGFS) reported, on the basis of bilateral interviews in various financial centres with market users (including banks, prime brokers, custodians, asset managers, pension funds and hedge funds) that, ‘To control for counterparty risk in secured lending business, repo dealers and prime brokers either increase haircuts or lower available credit risk limits [...]’.  

Dang, Gorton and Holmström (2011) note that haircuts for the same type of (structured security) collateral of the same rating differ between types of repo counterparty. However, Dang, Gorton and Holmström (2009) appear to dismiss counterparty credit risk as an explanation for haircuts in favour of collateral risk. They argue instead that a repo haircut amounts to a tranching of the collateral security, which is done in order to restore its ‘information-insensitivity’ and thereby its liquidity. Information-insensitivity means that there are no ‘informed traders’ in a market, in other words, parties with better information about the expected value of the asset being traded. Where traders have the same

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39 Fitch Ratings, ‘Repo Emerges from the “Shadow”’, 3 February 2012, p. 3.
40 BIS (CGFS), ‘The role of margin requirements and haircuts in procyclicality’ Paper No.36, Basel, March 2010.
information, or degree of ignorance, they can trade without extensive due diligence, but without fear of finding themselves up against a better informed trader (the problem of 'adverse selection'). They are therefore more willing to trade. Symmetric information or ignorance therefore promotes liquidity. But even with adverse selection, the preferential ranking of senior debt securities minimises the loss to the buyer in the event of bad news and the fixed maximum pay-off limits the claim on the seller in the event of good news. These constraints minimise the incentive to acquire private information (that is, perform due diligence). Normally, that incentive is less than the cost of acquiring private information, which makes debt securities the type of instrument which is the least sensitive to public information. But debt is not riskless and a systemic shock can raise levels of risk enough to make debt securities information-sensitive (it becomes worthwhile to acquire private information by performing due diligence), which causes illiquidity. Information-insensitivity might be restored by taking a haircut. It is argued that a haircut corresponds to the junior tranche or equity residual of a debt security, the existence of which means that the repo seller (just like a security issuer) is being forced to hold more equity in the collateral, thereby reducing the risk for the repo buyer (security investor).

Dang et al (2009) regard the impact of counterparty credit risk on haircuts as a puzzle, on the grounds that standard finance theory would suggest that, if repo buyers were concerned that the seller might fail, causing them to have to sell the collateral, their risk aversion and the price risk would simply be factored into the repo rate.

Dang et al (2011) develop a model in which the haircuts on (structured) securities offered as collateral are a function of the ‘information acquisition sensitivity’ (IAS) of a security and the probabilities of default of both parties to a repo. IAS measures the ‘tail risk’ of a security, that is, the expected losses on a collateral security when its liquidation value has fallen below the outstanding repurchase price. This is equivalent to the incentive of potential buyers to acquire private information about the likely value of the security. The intuition is that higher haircuts reduce the amount that a repo seller can borrow, which increases its probability of default, which causes buyers to increase the haircuts imposed on the seller, which reduces the amount it can borrow, and so on, in a negative feedback loop. Increases in the probability of default of the seller increase the risk to the buyer and therefore its probability of default (when it needs to borrow subsequently). The negative feedback loop is triggered by an increase in the IAS of the collateral security due to the arrival of news about the probable value of that security. Dang et al demonstrate (at least for their data sample) that their model explains the weak correlation between haircuts on the one hand and default probabilities of the parties and the rating of the collateral on the other hand.

Dang et al (2011) go on to develop a fundamental hypothesis about the nature of repo and role of haircuts. First, they argue that the right to repurchase collateral makes repo an inherently attractive way of raising cash compared to temporary asset sales (that is, a cash or outright sale of securities). In an asset sale – where there is no obligation for the buyer to sell the security back to the seller at the same price at which he initially bought it – there is a chance that the buyer will have bargaining power and demand a higher price. Borrowers therefore have an incentive to borrow through repo, where the repurchase price is fixed. In this sense, Dang et al see haircuts on repo as protecting the borrower. Second, they argue that a haircut provides an incentive to lenders to lend through repo rather than through temporary asset purchases, by incentivising borrowers to repurchase collateral and repay lenders (where they are able) because it is in his best interest to repurchase the collateral having sold it at below its market value. Dang et al suggest that the seller’s incentive to repurchase can eliminate the buyer’s incentive to acquire information, which would create adverse selection in subsequent trading, and therefore makes repo inherently more liquid.
ANNEX II: THE ROLE OF HAIRCUTS IN THE 2007-2009 CRISIS

In a review of the academic literature on haircuts, the CGFS Study Group argues that recent studies have formalised long-standing insights about the potentially destabilising influence of secured lending and how, in particular, haircuts may contribute to a pro-cyclical expansion of leverage and liquidity during boom times and accelerate the contraction of leverage and liquidity during downturns through mechanisms such as asset price spirals. However, the Study Group notes the highly simplified and stylised nature of the models explored by academics. While the models focus on haircuts, many other credit terms are also relevant in determining the effective supply of leverage to market participants. To control for counterparty credit risk, repo market users also reduce or cut credit limits and/or shorten the term of lending. Indeed, anecdotal evidence suggests a contraction of credit limits and terms is often the first line of defence. Where haircuts were raised during the crisis, this varied considerably across financial instruments, business lines and type of counterparty. The Study Group therefore concedes that, while in the models, credit supply invariably responds to adjustments in haircuts, the effects may be less clear in the presence of other credit terms which are simultaneously adjusting.

The Study Group also recognises the paucity of empirical evidence on margining practices and the failure to directly examine the causality between haircuts and asset prices. They observe that there is some indirect empirical support of the hypothesis that there is a negative relationship between haircuts and asset prices. They suggest that the pro-cyclical nature of secured lending terms provides some support for the assumptions made in more recent models that study the interaction between margin requirements and asset price dynamics, but note that these models do not capture all the relevant market mechanisms (that is, they assume that changes in haircuts are the sole response to a deterioration in counterparty credit risk).

A paper by Andrew Haldane at the Bank of England and others constructs a theoretical model of a banking network, interconnected through unsecured interbank lending and secured funding markets. Although the purpose of the model is to look at the link between systemic liquidity crises and interconnectedness as measured by the structural characteristics of concentration and complexity, the motive force of the model is changes to haircuts. One of the key channels for the contagion that propagates a crisis is the hoarding of liquidity in the secured funding market when haircuts rise. The model is used to test various policy options, in particular, the imposition of a minimum haircut. A haircut of 20% is found to reduce the probability of a liquidity crisis to very low levels, but even a low mandatory haircut is shown to have a dramatic effect on market stability.

However, Haldane does concede that ‘we have little theoretical understanding of how haircut-based policies might affect banks’ behaviour. And we have little empirical case law on the implementation of these policies. For example, haircut policy might be circumvented by banks substituting towards unsecured finance. So any quantitative calibration of the effects of a haircut-based policy rule is necessarily tentative.’

One of the most influential academic papers in the regulatory debate on the pro-cyclicality of haircuts has been that by Gorton and Metrick (November 2010). They argue that the

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financial crisis of 2007-08 was akin to a traditional banking panic but was precipitated by a run on the repo market, which they describe as being part of the ‘securitised banking’ market. Securitised banking is the business of packaging and re-selling loans, with repo as the source of funding. Gorton and Metrick propose that deepening haircuts (in response to collateral securities becoming information-sensitive due to an unspecified shock) reduced the value of collateral to such an extent that it enforced massive deleveraging in the financial system. Firms from which repo funding was progressively withdrawn by the imposition of higher and higher haircuts were forced to deleverage by selling assets. The resulting fire sales amplified the crisis and aggravated the crisis. The importance attached to Gorton and Metrick derives in large part from the empirical evidence they employ in the form of a set of data series on collateral haircuts taken on 10 classes of structured securities by a large but anonymous US broker-dealer between 2007 and 2009.

One shortcoming with Gorton and Metrick’s data is that it only includes structured securities (ABS, RMBS, CMBS, CLO and CDO). Gorton and Metrick mistakenly believe that the collateral used in the US repo market “very often” is securitised bonds. They offer no data on US Treasuries, which constitutes the largest pool of repo collateral in the US, and ignore evidence from the tri-party market, which may have accounted for 50-60 % of outstanding US repo.46 This is significant because, although the Task Force on Tri-Party Repo Infrastructure (2009) concluded that ‘tri-party repo arrangements were at the center of the liquidity pressures faced by securities firms at the height of the financial crisis’, they concluded that the available data suggested that margins in the tri-party repo market did not increase much during the crisis, if at all. They observed that, ‘It appears that some tri-party repo investors prefer to stop financing a dealer rather than increase margins to protect themselves’. This point was also made by the CGFS Study Group. Gorton and Metrick ignore the reduction or closing of credit limits and the shortening of lending. There is also no recognition of the evaporation of unsecured credit. They are therefore simply incorrect to attribute the entire deleveraging of the US financial system and loss of liquidity in the US money market to the dynamics of the repo market in form of deepening haircuts.

While Gorton and Metrick’s analysis may have overestimated the impact of haircuts in the US market, it also says little about the European repo market, which has a very different structure to the US market.

- Over 80 % of collateral in the European repo market is government securities. Structured securities are a small component. Most structured securities in the European market are managed as tri-party repos. ICMA data suggests such collateral accounts for no more than 10 % of tri-party repo, which itself is less than 12 % of the wider European repo market.

- The US market is largely overnight, whereas in Europe, only 18.3 % of outstanding contracts were one-day maturities in June 2007 (ICMA survey). In a market dominated by one-day maturities, margin maintenance is redundant. Valuation changes will be reflected entirely in adjustments to haircuts, which also factor in forward-looking risks, making for potentially more abrupt changes in collateral value than margin calls. In a market like Europe, the extended maturity distribution means margin maintenance is more significant and will mute the impact of margin calls.

It is therefore a serious mistake to extrapolate certain events in one part of the US credit repo into the European repo market. This can be demonstrated by quantifying the impact of changes in haircuts in the European market.

46 In assessing the share of tri-party settlement in the US repo market, account needs to be taken of the fact that many repo transactions are netted across central clearing counterparties before settlement.
The problem with all the models of haircut-imposed pro-cyclicality is that they have not been calibrated against reality. It is possible to make a rough estimate of the likely impact over 2007-09 of changes in haircuts in the European repo market using the results of the ICMA’s semi-annual European repo market survey for June 2007 and June 2009, and the CGFS Study Group survey of haircuts. The following conservative assumptions are made:

- Government securities accounted for 83.7 % of EU-originated collateral in June 2007 and 81.2 % in June 2009. We assume that these proportions are representative of the whole market. We also assume that the split between short and medium-term government securities is 50:50. The proportion of government securities in tri-party repo collateral was 43.6 % in June 2007 and 53.0 % in June 2009, while the overall share of tri-party was 11.8 % and 11.1 %, respectively. This component has been deducted from the 83.7 % and 81.2 %. Thus, the following division of holdings of government securities are assumed for June 2007 and June 2009:
  - short-term government securities settled bilaterally: 36.7 %, 34.7 %
  - medium-term government securities settled bilaterally: 36.7 %, 34.7 %
  - government securities settled tri-party: 5.1 %, 5.9 %
- Pfandbrief accounted for 2.3 % of all bilaterally-settled collateral in June 2007 and 1.6 % in June 2009.
- Equity accounted for 1.6 % of all bilaterally-settled collateral in June 2007 and 0.7 % in June 2009.
- Equity was 21.0 % of tri-party collateral in June 2007 and 8.6 % in June 2009.
- All tri-party government collateral is assumed to be medium-term.
- All tri-party non-government fixed-income collateral (35.4 % in June 2007 and 49.9 % in June 2009) is assumed to be A or BBB-rated.
- Non-government bilaterally-settled collateral (5.7 % in June 2007 and 11.3 % in June 2009) is assumed to be A or BBB-rated.
- Equity is assumed to have been issued by G7 firms.
- All counterparties are assumed to be non-prime.

The estimates are shown in the table.

**Table 10: Estimate of the likely impact over 2007-09 of changes in haircuts/initial margins in the European repo market**

<table>
<thead>
<tr>
<th></th>
<th>Jun-07</th>
<th></th>
<th></th>
<th>Jun-09</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>haircut</td>
<td>% market share</td>
<td>after haircut</td>
<td>haircut</td>
<td>% market share</td>
<td>after haircut</td>
</tr>
<tr>
<td>bilateral short-term govis</td>
<td>0 %</td>
<td>41.9 %</td>
<td>41.9 %</td>
<td>1.0 %</td>
<td>40.6 %</td>
<td>40.2 %</td>
</tr>
<tr>
<td>bilateral medium-term govis</td>
<td>0 %</td>
<td>36.7 %</td>
<td>36.7 %</td>
<td>2.0 %</td>
<td>34.7 %</td>
<td>34.0 %</td>
</tr>
<tr>
<td>bilateral covered bonds</td>
<td>0 %</td>
<td>2.3 %</td>
<td>2.3 %</td>
<td>2.0 %</td>
<td>1.6 %</td>
<td>1.6 %</td>
</tr>
<tr>
<td>bilateral equity</td>
<td>12 %</td>
<td>1.6 %</td>
<td>1.4 %</td>
<td>2.0 %</td>
<td>0.7 %</td>
<td>0.6 %</td>
</tr>
<tr>
<td>other credit repo</td>
<td>7 %</td>
<td>5.7 %</td>
<td>5.3 %</td>
<td>15.0 %</td>
<td>11.3 %</td>
<td>9.6 %</td>
</tr>
<tr>
<td>tri-party govis</td>
<td>0 %</td>
<td>5.1 %</td>
<td>5.1 %</td>
<td>2.0 %</td>
<td>5.9 %</td>
<td>5.8 %</td>
</tr>
<tr>
<td>tri-party fixed income</td>
<td>7 %</td>
<td>4.2 %</td>
<td>3.9 %</td>
<td>15.0 %</td>
<td>4.3 %</td>
<td>3.6 %</td>
</tr>
<tr>
<td>tri-party equity</td>
<td>12 %</td>
<td>2.5 %</td>
<td>2.2 %</td>
<td>20.0 %</td>
<td>1.0 %</td>
<td>0.8 %</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td><strong>100.0 %</strong></td>
<td><strong>98.8 %</strong></td>
<td><strong>after haircut</strong></td>
<td><strong>100.0 %</strong></td>
<td><strong>96.1 %</strong></td>
<td><strong>after haircut</strong></td>
</tr>
<tr>
<td><strong>change</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>-2.7 %</strong></td>
</tr>
</tbody>
</table>

**Source:** ICMA. Comotto, R., ‘Haircuts and initial margins [...]’, p. 20.
It can be seen that, even on the basis of conservative assumptions, the impact on the value of collateral of changes in haircuts is less than 3%, which is insignificant in terms of the scale of deleveraging seen over the same period (e.g. the headline totals of the ICMA survey dropped by 28.1%, from a peak of EUR 6,775 billion in June 2007 to EUR 4,868 billion in June 2009, and the maximum fall was 31.6% to December 2008). Although the estimations are necessarily approximate, the difference is of an order of magnitude, which seriously calls into question haircut spiral models such as Gorton and Metrick’s as a feasible explanation for the market crisis of 2007-09.47

These doubts have been reinforced by a study by Krishnamurthy, Nagel and Orlov, who make the point that ‘much of the discussion of the repo market has run ahead of our measurement of the repo market.’48 They have derived a new data set from regulatory and industry sources on investment in the US repo market by money market mutual funds and securities lenders cash reinvestment desks. These institutions are estimated to have provided some two-thirds of the cash borrowed by shadow banks in the US repo market in 2007.

Krishnamurthy et al calculated that only some 3% non-Agency MBS and ABS were financed by repo bought by money market mutual funds and securities lenders. Most of their repo collateral was US Treasuries or Agencies (80% for money market mutual funds and 65% for securities lenders). The ABCP market was a far more important source of funding for shadow banking, accounting for some 22%. Moreover, between Q2 2007 and Q2 2009, of the contraction of USD 1.4 trillion in the short-term funding of non-Agency MBS and ABS by money market mutual funds and securities lenders, only about 10% was due to reductions in purchases of repo against such collateral. Reduced purchases of ABCP and sales of holdings of structured securities were far more significant. In addition, the contraction in ABCP purchases started earlier than the reduction in repo, which was largely delayed until Q1 2008, after the rescue of Bear Stearns. And while there was a deterioration in repo terms (rates, maturities and haircuts) for structured security collateral, there was no contraction in purchases of repo against Treasuries and Agencies. The conclusion is that repo was not key to the funding of shadow banking and had a modest impact on changes in aggregate funding conditions.

The contraction between Q2 2007 and Q2 2009 in purchases of repo by money market mutual funds and securities lenders was of repo against structured securities. This was undoubtedly serious for the firms most reliant on such assets. However, these firms were also perceived as the riskiest in the market (as measured by 5-year CDS spreads), so the loss of access to repo funding may have been a symptom of deeper problems rather than the cause of their difficulties. In contrast to repo against structured securities, repo funding from money market mutual funds and securities lenders for other dealers against Treasury and Agency collateral actually expanded over the same period. Krishnamurthy et al also note that Bear Stearns and Lehman Brothers lost repo funding against Treasury and Agencies only in the days immediately prior to bankruptcy. This is not the behavior of unstable funding.

The current debate also ignores evidence, often from official sources, that initial margins/haircuts on the bulk of collateral did not change significantly during 2007-09, whereas much research into the crisis uncritically accepts that ‘haircuts exhibit cyclical

47 The impact of increases in haircuts could be amplified if one assumes that the initial haircut/initial margin absorbs the entire equity of the seller and therefore cannot be increased to fund the increase in haircut. However, this constraint is unlikely to be binding in practice on most institutions.

behavior.⁴⁹ Krishnamurthy et al observed no increase in haircuts on Treasury and Agency collateral. Moreover, in the tri-party market, they measured only modest increases in haircuts for structured securities and corporate bonds, from 3-4 % in 2007 to 5-7 % in 2009, compared to the changes in Gorton and Metrick’s data for structured securities in the bilateral repo market, which showed haircuts often rising from 0 % to in excess of 50 %. The evidence is that, rather than increasing haircuts, market users initially responded to the crisis by reducing or withdrawing credit lines, shortening the terms for which they were willing to lend and narrowing the range of eligible collateral. In this respect, the response was very similar in character to that of the unsecured market, except that the protection offered by collateral can be expected to have mitigated the overall reaction of the repo market.

The empirical evidence therefore strongly argues against the hypothesis that initial margins/haircuts were the principal driver of deleveraging in the crisis. And, if initial margins/haircuts were not the principal driver of deleveraging in the crisis, the idea of mandatory through-the-cycle initial margins/haircuts to obviate the need for dealers to raise initial margins/haircuts in a crisis is clearly redundant.

ANNEX III: WHAT IS A REPO? WHAT IS A SECURITIES LENDING TRANSACTION?  

Repo

Repo is a generic name for both repurchase agreements and sell/buy-backs. In a repo, one party sells an asset (usually fixed-income securities) to another party at one price at the start of the transaction and commits to repurchase the asset from the second party at a different price at a future date or (in the case of an open repo) on demand. If the seller defaults during the life of the repo, the buyer (as the new owner) can sell the asset to a third party to offset his loss. The asset therefore acts as collateral and mitigates the credit risk that the buyer has on the seller.

Although assets are sold outright at the start of a repo, the commitment of the seller to buy back the assets in the future means that the buyer has only temporary use of those assets, while the seller has only temporary use of the cash proceeds of the sale. Thus, although repo is structured legally as a sale and repurchase of securities, it behaves economically like a secured deposit (and the principal use of repo is in fact the borrowing and lending of cash).

The difference between the price paid by the buyer at the start of a repo and the price he receives at the end is his return on the cash that he is effectively lending to the seller. In repurchase agreements, this return is quoted as a percentage per annum rate and is called the repo rate. Although not legally correct, the return is usually referred to as repo interest.

An example of a repo is illustrated below.

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51 Repos are sometimes known as sale-and-repurchase agreements. In some markets, the name ‘repo’ can be taken to imply repurchase agreements only and not sell/buy-backs. Repurchase agreements are also known as class repo.

52 To be precise, the seller commits to buy back equivalent assets, which means the same type but not specifically the same asset (eg the same bond issue but not the same certificate numbers).
The buyer in a repo is often described as doing a reverse repo (ie buying, then selling). A repo not only mitigates the buyer’s credit risk. Provided the assets being used as collateral are liquid, the buyer can also refinance himself at any time during the life of a repo by selling or repoing the assets to a third party (he would, of course, subsequently have to buy the same type of collateral back in order to return it to his repo counterparty at the end of the repo). This right of use therefore mitigates the liquidity risk that the buyer takes by lending to the seller. Because lending through a repo exposes the buyer to lower credit and liquidity risk, repo rates should be lower than unsecured money market rates.

**Securities lending**

Securities lending and repo have many similarities and can often be used as substitutes for each other.

In a securities lending transaction in the international market, as in repo, one party gives legal title to a security or basket of securities to another party for a limited period of time, in exchange for legal ownership of collateral. The first party is called the ‘lender’, even though he is transferring legal title to the other party. Similarly, the other party is called the ‘borrower’, even though he is taking legal title of the security.

The collateral in securities lending can either be other securities or cash (securities lending against cash collateral looks very much like a repo). The borrower pays a fee to the lender for the use of the loaned security. However, if cash is given as collateral, the lender is obliged to reinvest the cash for the borrower and to ‘rebate’ an agreed proportion of the reinvestment return back to the borrower. In this case, the lender usually deducts the borrowing fee from the rebate interest that he pays to the borrower, rather than paying it separately, so the fee is implicit in the rebate rate.

A key difference between repo and securities lending is that most repo is for general collateral (GC) and is therefore motivated by the need to borrow and lend cash, while securities lending is typically driven by the need to borrow securities. But there is therefore an overlap between securities lending and the ‘specials’ segment of the repo market, which is also driven by the demand to borrow securities.

Another important difference is that the repo market overwhelmingly uses bonds and other fixed-income instruments as collateral, whereas the core of the securities lending market is equities.

Because securities lending transfers not only the legal ownership of equities, but also the attached voting rights and corporate actions, it has become convention in the securities lending market for loaned securities to be subject to a right of recall by the lender, so that he can recover securities if he wishes to exercise his voting rights or respond to corporate events. In contrast, unless a right of substitution is specifically agreed between the parties at the point of trade, repo does not allow a seller to recall his securities during the life of a transaction.

The repo market in Europe is represented by the European Repo Council (ERC) of the International Capital Market Association (ICMA), which publishes the most widely-used model legal contract for international repos, the Global Master Repurchase Agreement (GMRA). The securities lending market in Europe is represented by the International Securities Lending Association (ISLA), which publishes the most widely-used model legal contract for international securities lending, the Global Master Securities Lending Agreement (GMSLA).
ANNEX IV: THE IMPORTANCE OF THE REPO MARKET

The repo market is pivotal to the efficient functioning of almost all financial markets. Its importance reflects the wide range and fundamental nature of its functions:

- **Providing an efficient source of money market funding.** By offering deposits secured against liquid high-quality assets, by diversifying the credit exposure of cash investors beyond the banking sector and by disintermediating traditional but less competitive financial channels, the repo market mobilises cheaper and deeper funding for financial intermediaries, which in turn lowers the cost of financial services to investors and issuers. In contrast to the unsecured deposit market, the European repo market can also provide liquid longer-term funding which has been growing over time and has proved much more resilient during episodes of market turbulence.

- **Providing a secure home for liquid investment.** The capacity of repo, collateralised by liquid high-quality securities, to mitigate risk is particularly valued by risk-averse end-investors seeking a secure, liquid investment for temporary cash balances and working capital.

- **Broadening and stabilising the money market.** The collateralised nature of repo allows a wider array of borrowers and lenders into the wholesale money market than just commercial banks. The resulting breadth and diversification creates a deeper and more robust market, which facilitates liquidity management between financial intermediaries and reduces systemic risk. In a financial crisis, the repo market also mitigates risk by providing more reliable access to longer-term funding, particularly through CCP-cleared repos, whereas unsecured longer-term funding (to the extent it exists) tends to evaporate. Although the repo market was not immune to the disruption triggered by the default of Lehman Brothers in 2008, it did not suffer a seizure and has helped to avoid total and unsustainable dependence on central bank liquidity.

- **Facilitating central bank operations.** The repo market provides a ready-made collateral management framework without which central banks would not be able to implement monetary policy so efficiently under normal market conditions and act as lenders of last resort so swiftly during periods of market turbulence. Central bank repo feeds seamlessly into the commercial repo market.

- **Hedging primary debt issuance.** In the primary debt market, repo allows dealers to fund their bids at bond auctions and underwriting positions in syndicated bond issues at reasonable cost, thereby providing cheaper and less risky access to the capital markets for issuers. Primary dealers and other underwriters also rely on the repo market to hedge the underwriting risk on new debt. Thus, a long position in a new issue can be hedged by taking an off-setting short position in an existing issue with similar risk characteristics. The delivery of securities into the short position is covered by borrowing in the repo market. Alternatively, a long position in a new issue can be hedged by taking a short position in an existing issue or in a related derivative instrument such as a bond future or interest rate swap (which will ultimately be hedged by someone else borrowing in the repo market). Without hedging, bond issuance would be riskier for underwriters and therefore more expensive for issuers. The primary market function of repo will become increasingly important over the next

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few years, given the quantity of debt which European governments and banks are expected to have to issue.

- **Ensuring liquidity in the secondary debt market.** Liquidity in the secondary market for securities depends upon primary dealers and other market-makers being willing to quote prices continuously to investors.
  
  o To quote selling prices continuously to investors, market-makers often hold inventory from which to sell to investors on demand. But if an investor wishes to buy an issue which market-makers do not hold in their inventory, and they cannot or do not wish to purchase immediately from someone else in the market, market-makers can only be sure of their ability to deliver to the investor if they are able to borrow that issue in the repo market. The liquidity thus provided by market-makers reduces risk for investors by allowing them to buy on demand, which in turn reduces the cost of borrowing for issuers. The alternative would be for the market-maker to hold a larger inventory, which would raise the cost of market-making and therefore the cost of debt to issuers and investors. Several debt management agencies offer special repo facilities to market-makers to allow them to borrow whenever the available supply in the market is inadequate.
  
  o To quote buying prices continuously to investors, market-makers rely on their ability to hedge temporary accumulations of long positions by taking short positions in issues with similar maturities, which means borrowing in the repo market, or in a related derivative instrument such as a bond future or interest rate swap, which will ultimately be hedged by someone else borrowing in the repo market. Without the ability to cover the temporary short positions created by selling issues not held in inventory, as well as the deliberate short positions taken to hedge temporary long positions, market-making would be constrained to a rigid matched-book style of activity and secondary market liquidity would suffer. Portfolio management by investors would be made more difficult and debt securities would become a less attractive investment, raising the cost of debt to issuers.

- **Hedging and pricing derivatives.** The use of repo to fund long positions and cover short positions in underlying securities is fundamental to the hedging and pricing of derivatives, which are the essential tools of risk management for both financial intermediaries and end-users of the financial markets, including official debt and reserve management agencies. Indeed, an active repo market is an absolute prerequisite for liquid markets in derivative instruments. Attempts to establish new derivatives markets, exchange-traded or over-the-counter (OTC), have foundered where there have been no active repo markets.

- **Fostering price discovery.** The enhanced liquidity generated by repos in the primary and secondary markets for securities fosters the trading and arbitrage which helps equilibrate imbalances between the supply and demand of securities, and facilitates their correct valuation, which generates the smooth and consistent yield curves that are essential for the accurate pricing of other financial instruments, and thus the efficient allocation of capital by financial markets.

- **Preventing settlement failures.** Repo plays a mundane but nonetheless critical role in supporting the day-to-day operational efficiency of securities markets by allowing issues to be borrowed in order to ensure timely onward delivery, where short positions have arisen unintentionally, usually because of unexpected lags between inward and outward deliveries of securities, infrastructure frictions or the tight supply of particular issues. The facility to overcome such delivery failures is important
because of the persistence of national barriers to efficient cross-border clearing and settlement in Europe.

- **Preventing market 'squeezes’**. By allowing the borrowing of securities, repo helps to prevent or contain the ability of individual institutions to ‘squeeze’ individual securities by cornering supply, thereby exacerbating imbalances between supply and demand. Squeezes can lead to settlement failures and disorderly markets. They can also fuel the volatility of yields, as well as creating large and persistent distortions in the yield curve. This would deter investors and intermediaries from participation in the market and confuse price discovery. Frequent settlement fails could lead to ‘buy-ins’ being exercised against intermediaries, the cost of which might cause them to cease providing liquidity to the market.\(^{54}\)

- **Permitting faster settlement times**. The role of repo as a means of borrowing securities has been, and will continue to be, crucial in allowing settlement periods to be shortened in order to reduce systemic risk in securities settlement systems. Faster settlement leaves less time for delivery problems to be corrected and therefore requires an efficient source of securities borrowing to prevent delivery failures. The European Commission is proposing that bond settlement periods in the EU should be compressed from T+3 to T+2.

- **Allowing more efficient collateral management**. Trading in the repo market is key to the valuation and management of collateral, and allows collateral resources to be more fully mobilised and efficiently allocated. Collateral management is becoming ever more important. Demand for collateral for use in payments and settlement systems, as well as in the exchange-traded and OTC derivatives markets, is being compounded by regulatory pressure on market users to hold larger liquidity reserves and make greater use of (collateralised) central clearing counterparties (CCPs), at the same time as a loss of confidence in some sovereign debt is creating uncertainty over the future supply of high-quality collateral.

- **Allowing more efficient employment of capital**. The global economic impact of the increasing regulatory risk capital charges introduced since the 1980s was mitigated by the more efficient use of capital that was allowed by the underlying shift from unsecured to secured financing. The capital efficiency of repo will become even more important in the future as regulators increase capital charges and impose new liquidity requirements.

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\(^{54}\) A ‘buy-in’ is a process whereby a buyer of a security that has not been delivered by the seller, appoints a third party to buy in the security on his behalf. Any cost over and above the original purchase price is charged to the failed seller.
ANNEX V: DIFFERENCES BETWEEN THE US AND EUROPEAN REPO MARKETS

There are important differences in the way that repo works in Europe compared with the US, and between the structure and operation of the two markets.

In Europe, repo transfers legal title to collateral from the seller to the buyer by means of an outright sale (also known as a *true sale*). Under New York law (the predominant jurisdiction for US repo), transferring title to collateral is difficult. Instead, collateral is exempted from certain provisions of the US Bankruptcy Code, in particular, the automatic stay on enforcement of collateral in the event of insolvency. However, the resulting rights are deemed to be much the same as those achieved by an outright sale.

Repo agreements under New York law also include a fall-back provision, in the event that a buyer’s rights to collateral prove not to be enforceable in law, of re-characterising repo as secured lending. Such a fall-back provision does not work in England.

In contrast to the European repo market, the US market is dominated by tri-party repo, where post-trade collateral selection, management and settlement are outsourced to an agent. Tri-party repo may account for something in the order of two-thirds of the US party, whereas it is around 10-12% of the European market. The US tri-party market connects dealers with customers, in particular, money market mutual funds and securities lending agents reinvesting cash collateral. The customer sector of the repo market is therefore far larger in the US than in Europe, where the bulk of activity is interdealer.

The US repo market has traditionally had a shorter average maturity than the European market.

Government securities are the predominant form of collateral in both markets, but more so in Europe. In the US, it is though that government securities account for 60% or more of the repo market, whereas in Europe, the ICMA repo survey suggests government securities are over 80%. Of course, government security collateral in Europe is composed of the issues of all European countries. Fragmentation means less liquidity (a feature that has become more pronounced following the crisis, as many banks repatriated cross-border activities). And fragmentation extends to the settlement infrastructure, which makes collateral management in Europe far more challenging.

The non-government collateral sector of the US repo market is dominated by government-guaranteed Agency unsecured and mortgage-backed securities. In Europe, comparable collateral is provided by covered bonds and mortgage-backed securities, but they form a smaller and much more heterogeneous segment of the repo market. On the other hand, equity provides more collateral for the repo market in Europe.

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