FSB FINANCIAL STABILITY BOARD

Background Document

Regulatory Framework for Haircuts on Non-Centrally Cleared Securities Financing Transactions

Procyclicality of haircuts: Evidence from the QIS1

14 October 2014

Preface

Strengthening Oversight and Regulation of Shadow Banking

In response to the G20 Leaders' request at the Seoul Summit in November 2010, the Financial Stability Board (FSB) has been developing policy recommendations to strengthen oversight and regulation of shadow banking. In particular, the FSB has focused on five specific areas in which policies are needed to mitigate the potential systemic risks associated with shadow banking:

(i) to mitigate *the spill-over effect between the regular banking system and the shadow banking system*;

(ii) to reduce the susceptibility of *money market funds (MMFs)* to "runs";

(iii) to assess and align the incentives associated with *securitisation*;

(iv) to dampen risks and procyclical incentives associated with *securities financing transactions such as repos and securities lending* that may exacerbate funding strains in times of market stress; and

(v) to assess and mitigate systemic risks posed by *other shadow banking entities and activities*.

On 29 August 2013, the FSB published the report *Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos*[1] that set out policy recommendations for addressing financial stability risks in relation to securities financing transactions (the above (iv)). The report also included consultative proposals on a regulatory framework for haircuts on certain non-centrally cleared securities financing transactions.

The documents published on 14 October 2014 refine the regulatory framework for haircuts based on the analysis of consultative responses. They comprise:

- **Regulatory framework for haircuts on non-centrally cleared securities financing transactions.**[2] This document sets out the finalised regulatory framework for haircuts on certain non-centrally cleared securities financing transactions. It also includes a consultative proposal on the application of numerical haircut floors to cover non-bank-to-non-bank transactions backed by collateral other than government securities.
- **Background document on procyclicality of haircuts based on the evidence from the first stage of the quantitative impact study (QIS1).** This document examines the procyclicality of haircuts on non-centrally cleared securities financing transactions and their role during the global financial crisis based on the QIS1 data.

---

1 http://www.financialstabilityboard.org/publications/r_130829b.pdf

2 http://www.financialstabilityboard.org/publications/r_141013a.pdf

The FSB will complete its work on the application of numerical haircut floors to non-bank-to-non-bank transactions and set out details of how it will monitor implementation by the second quarter of 2015.

Background

The "shadow banking system" can broadly be described as "credit intermediation involving entities and activities (fully or partially) outside the regular banking system" or non-bank credit intermediation in short.[3] Such intermediation, appropriately conducted, provides a valuable alternative to bank funding that supports real economic activity. But experience from the crisis demonstrates the capacity for some non-bank entities and transactions to operate on a large scale in ways that create bank-like risks to financial stability (longer-term credit extension based on short-term funding and leverage). Such risk creation may take place at an entity level but it can also form part of a chain of transactions, in which leverage and maturity transformation occur in stages, and in ways that create multiple forms of feedback into the regular banking system.

Like banks, a leveraged and maturity-transforming shadow banking system can be vulnerable to "runs" and generate contagion risk, thereby amplifying systemic risk. Such activity, if unattended, can also heighten procyclicality by accelerating credit supply and asset price increases during surges in confidence, while making precipitate falls in asset prices and credit more likely by creating credit channels vulnerable to sudden loss of confidence. These effects were powerfully revealed in 2007-09 in the dislocation of asset-backed commercial paper (ABCP) markets, the failure of an originate-to-distribute model employing structured investment vehicles (SIVs) and conduits, "runs" on MMFs, and a sudden reappraisal of the terms on which securities lending and repos were conducted. But whereas banks are subject to a well-developed system of prudential regulation and other safeguards, the shadow banking system is typically subject to less stringent, or no, oversight arrangements.

The objective of the FSB's work is to ensure that shadow banking is subject to appropriate oversight and regulation to address bank-like risks to financial stability emerging outside the regular banking system while not inhibiting sustainable non-bank financing models that do not pose such risks. The approach is designed to be proportionate to financial stability risks, focusing on those activities that are material to the system, using as a starting point those that were a source of problems during the crisis. It also provides a process for monitoring the shadow banking system so that any rapidly growing new activities that pose bank-like risks can be identified early and, where needed, those risks addressed. At the same time, given the interconnectedness of markets and the strong adaptive capacity of the shadow banking system, the FSB believes that policies in this area necessarily have to be comprehensive.

---

[3] Based on such features, some authorities or market participants prefer to use other terms such as "market-based financing" instead of "shadow banking". The use of the term "shadow banking" is not intended to cast a pejorative tone on this system of credit intermediation. However, the FSB is using the term "shadow banking" as this is the most commonly employed and, in particular, has been used in the earlier G20 communications.

Table of Contents

Introduction

Summary results from the first stage of the quantitative impact study (QIS1) on the proposed framework for numerical haircut floors on non-centrally cleared securities financing transactions have been published in the FSB document on 29 August (hereafter the August 2013 Report).[4] This document aims to extend the analysis of QIS1 data to examine the procyclicality of haircuts and its role during the global financial crisis.

The procyclicality of haircuts has been documented widely in the academic literature. However, most of the existing literature is focused on the US market and based on somewhat limited data sets. The QIS1 exercise provides a unique global data set to study the behaviour of the repo market during the crisis on a global scale.

In particular, the QIS1 data set offers a perspective on the following key questions:

- **Are haircuts procyclical?** - Gorton and Metrick (2011) presented evidence that repo haircuts increased in the US bilateral repo market during the crisis. However, Copeland, Martin and Walker (2011) found that investors in the US tri-party repo market tended to stop lending completely rather than increasing haircuts during the crisis.[5]
- **Did the repo market play an important role in securitisation and shadow banking in the run-up of the crisis?** - Adrian and Shin (2009) showed that repo transactions accounted for most of the procyclical adjustment of the leverage of investment banks in the US. However, Krishnamurthy, Nagel and Orlov (2012) found that the contraction of repos as an available funding source for financing non-Agency MBS/ABS prior to the crisis appeared small for the shadow banking system as a whole.

Our preliminary findings are summarised below. Please note that due to the limited size of the sample, any results derived from it should be interpreted with caution.

- **Are haircuts procyclical? -** The data set reflects that **haircuts increased significantly during the crisis, especially for loans to non-banks where the collateral was non-government securities.** However, **the evidence is mixed regarding whether haircuts decreased in a procyclical manner after the crisis.** Nevertheless, the data set demonstrates the existence of significant differences in haircut movements across different currencies and market segments.
- **Did the repo market play an important role in securitisation and shadow banking in the run-up of the crisis?** - Our estimates show that the reduction in total repo funding was significant in both absolute terms and as a percentage of bank lending to non-banks, but the reduction in repo funding against private-label securitisation was small as a percentage of total securities outstanding.

---

[4] See Annex 3 of the FSB August 2013 Report (http://www.financialstabilityboard.org/publications/r_130829b.pdf).

[5] Note that the QIS1 data set focuses on funding provided by banks while the US tri-party repo market is primarily used by dealers to obtain funding according to Copeland, Martin and Walker (2011).

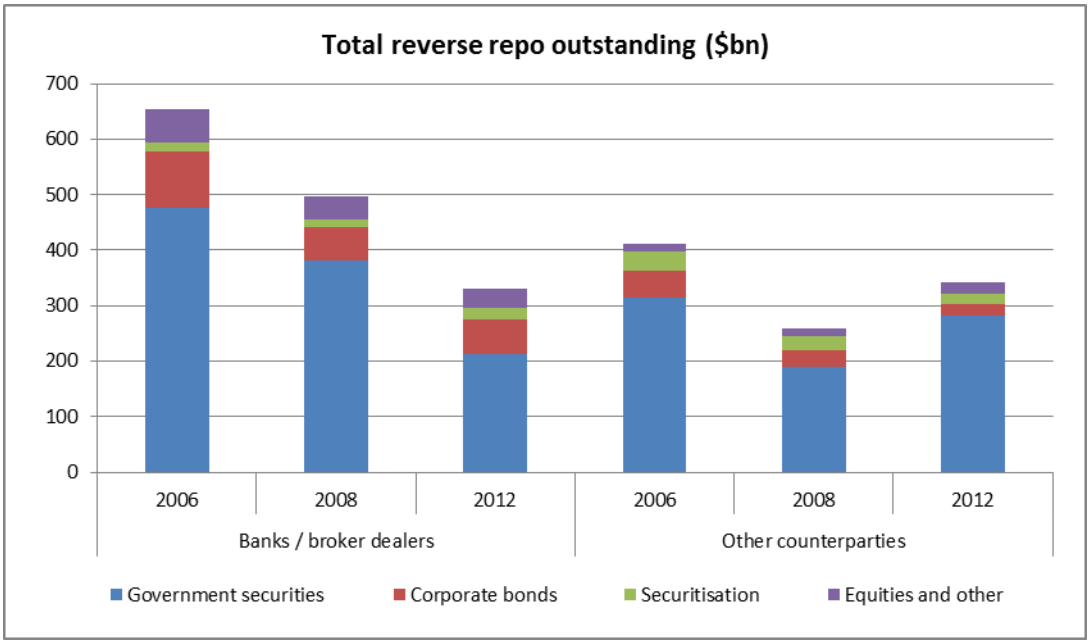
1. Data summary

The QIS1 template asked firms to report the outstanding amount of reverse repos, broken down by counterparty type, collateral type and haircut levels, as at end-Sep 2006 (pre-crisis), end-Sep 2008 (crisis) and end-Sep 2012 (post-crisis). In the rest of this document, unless otherwise specified, we will refer to the QIS1 reporting dates as 2006, 2008 and 2012.

The FSB also **asked firms to only report their reverse repos, i.e. where they lend cash to banks and non-banks against collateral**, as the primary focus of the QIS1 was to calibrate a proposal for numerical haircut floors on financing provided by banks to non-banks. Centrally-cleared transactions were excluded.

The sample used in this document includes 11 global financial intermediaries (banks and securities broker-dealers) from 9 jurisdictions[6] that reported data for all three reporting periods. We have checked the robustness of the results with regard to institution-specific effects to ensure that the main results continue to hold after excluding transactions with zero haircuts (see August 2013 Report for details on the potential miss-reporting of transactions with zero haircuts).

The following chart provides an overview of the QIS1 data. Overall, total reverse repos reported by sample firms declined from $1,065 billion in 2006 to $756 billion in 2008 and $673 billion in 2012. However, the amount of reverse repos to non-bank counterparties actually increased between 2008 and 2012, exceeding the amount of reverse repos to banks, which continued to decrease during the same period. The decreasing amount of reverse repos to banks might reflect the high amount of excess liquidity injected into the system by central banks.



[6] Australia, Brazil, Germany, France, Italy, Japan, Netherlands, UK and US.

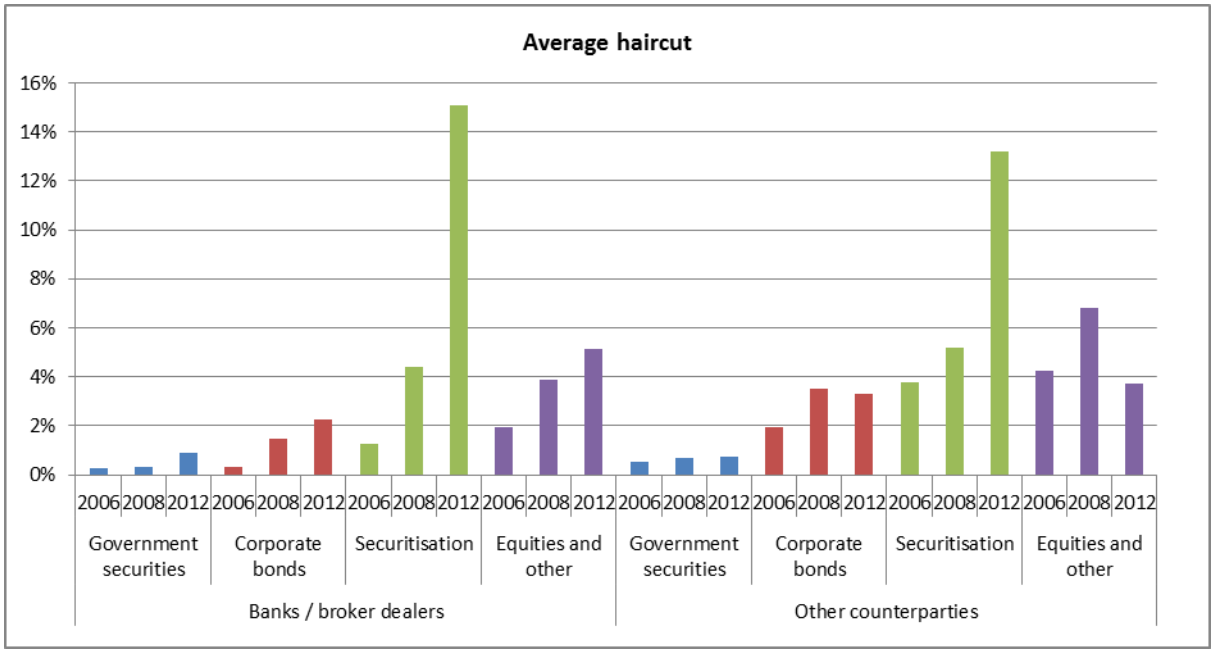
In terms of collateral, government securities [7] remain the most widely-used collateral throughout the sample period. During the crisis, the amount of reverse repos to banks decreased for all collateral types. However, reverse repos to non-banks backed by government securities and equities actually increased after the crisis.

We also performed a linear regression on the data, the results of which can be found in Annex 2. Specifically, the results show that the following transactions tend to have significantly higher haircuts:

- Transactions conducted in 2008 and 2012
- Transactions conducted in USD
- Transactions with hedge funds
- Transactions collateralised by equities and securitisations
- Transactions collateralised by instruments with a residual maturity greater than 5 years

2. Does QIS1 data support the theory that haircuts are procyclical?

The weighted-average haircuts[8] applied to reverse repos of QIS1 participating firms, broken down by counterparty and collateral type, are shown in the chart below. We can see that haircut levels and dispersion increased dramatically for all collateral types except government securities during the sample (i.e. also during the crisis). After the crisis, haircuts on private-label securitisation collateral continued to increase as that market remained illiquid. However, haircuts on equities collateral posted by non-bank counterparties decreased significantly after the crisis.



[7] Government securities include government-sponsored securitisation.

[8] We assumed that the average haircuts are at the mid-point of each individual haircut bucket.

The QIS1 data set reflects that haircuts on reverse repos to non-banks were not always greater than those to banks, especially after the crisis. This information was contrary to the general expectation that banks would be considered to be the more creditworthy counterparties.

Overall, the QIS1 data set suggests that **haircuts did increase during the crisis, especially for loans to non-banks against securities other than government securities and government-sponsored securitisations.**[9] However, **the data sample is mixed regarding whether haircuts decreased procyclically after the crisis.** These indications are broadly true across different currencies (see Annex 1). Haircuts on EUR transactions against securitisation collateral did not increase significantly until 2012; this may reflect the timing of the Eurozone sovereign crisis. Also the QIS1 data reflects that USD transactions have higher haircuts than others for government and corporate bond collateral but not for securitisation and equity collateral.

3. Does the QIS1 data support the theory that the repo market played an important role in securitisation and "shadow banking" in the run-up to the crisis?

Due to data confidentiality (i.e. all QIS1 data are anonymised), we cannot compare the reduction in the amount of reverse repos reported by sample banks with their balance sheet variables. However, assuming that the sample of firms that participated in QIS1 is representative of the global market, we can use non-private aggregated data to gauge the importance of the contraction in the repo market during the crisis.

QIS1 participating firms reported a reduction of $309 billion, or a 29% decrease, in the amount of reverse repos outstanding between end-Sep 2006 and end-Sep 2008. According to the ICMA European Repo Market Survey (hereafter ICMA Repo Survey), the total amount of reverse repos transactions by banks in Europe declined by €849 billion (or 27%) between end-2006 and end-2008; this is in line with the QIS1 data.[10] Similarly, based on US Primary Dealer Statistics[11], the total amount of reverse repos fell by more than $1,074 billion (or 29%) between end-2006 and end-2008. These numbers suggest that **the contraction in the repo market during the crisis was substantial in both absolute and relative terms**.

---

[9] Regression results in Annex 2 show that haircuts in 2008 and 2012 are significantly higher than in 2006.

[10] http://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/short-term-markets/Repo-Markets/repo/

[11] The Primary Dealer data will likely underestimate the size of the US repo market because non-dealer banks are not included.

		Europe (ICMA Repo Survey, €bn)	US (Primary Dealer Data, $bn)
Total reverse repos	2006	3,170	3,478
	2008	2,321	2,404
Reverse repos to non-banks (estimated)	2006	1,222	1,341
	2008	797	825
Reverse repos against private-label securitisation (estimated)	2006	92	101
	2008	38	39
Change in reverse repos between 2006 and 2008		849	1,074
Change in reverse repos to non-banks between 2006 and 2008		425	515
Banks' loans to other financial institutions in 2006 (ECB)		2,080	-
Change in reverse repos against private-label securitisation in 2006-2008		55	62
Private-label securitisation outstanding in 2008 (AFME/SIFMA)		1,738	4,566

The relative reduction during the crisis was larger for repo funding to non-banks than to banks, as the data shows. Between end-Sep 2006 and end-Sep 2008, QIS1 participating firms reported a 24% decrease in reverse repos to banks ($158 billion) and a 37% decrease in reverse repos to non-banks ($151 billion). Applying the same percentages to the ICMA Repo Survey data and US Primary Dealer Statistics, the reduction in reverse repos to non-banks would be €425 billion for Europe and $515 billion for the US, as shown in the table above. For Europe, **this reduction was more than 20% of European banks' loans to other financial institutions in 2006**.[12]

Similarly, we can estimate the reduction in reverse repos against private-label securitisation during the crisis. Between end-Sep 2006 and end-Sep 2008, QIS1 participating firms reported a 60% decrease in reverse repos against private-label securitisation ($19 billion). Based on this we can estimate that the total reduction in reverse repos against private-label securitisation would be €55 billion for Europe and $62 billion for the US. For comparison, the amount of private-label securitisation outstanding was €1.7 trillion for Europe and $4.6 trillion for the US at end-2008. Therefore **the reduction in reverse repos against private-label securitisation seems small as a percentage of total securities outstanding.**[13] This appears consistent with the findings of Krishnamurthy, Nagel and Orlov (2012).

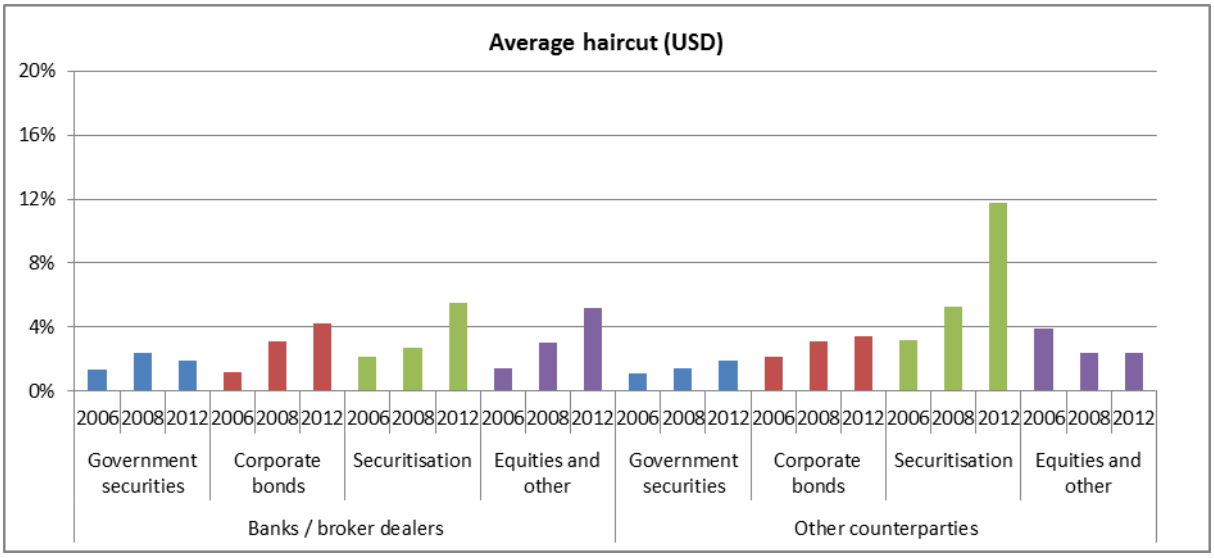
[12] http://sdw.ecb.europa.eu/browse.do?node=2018811

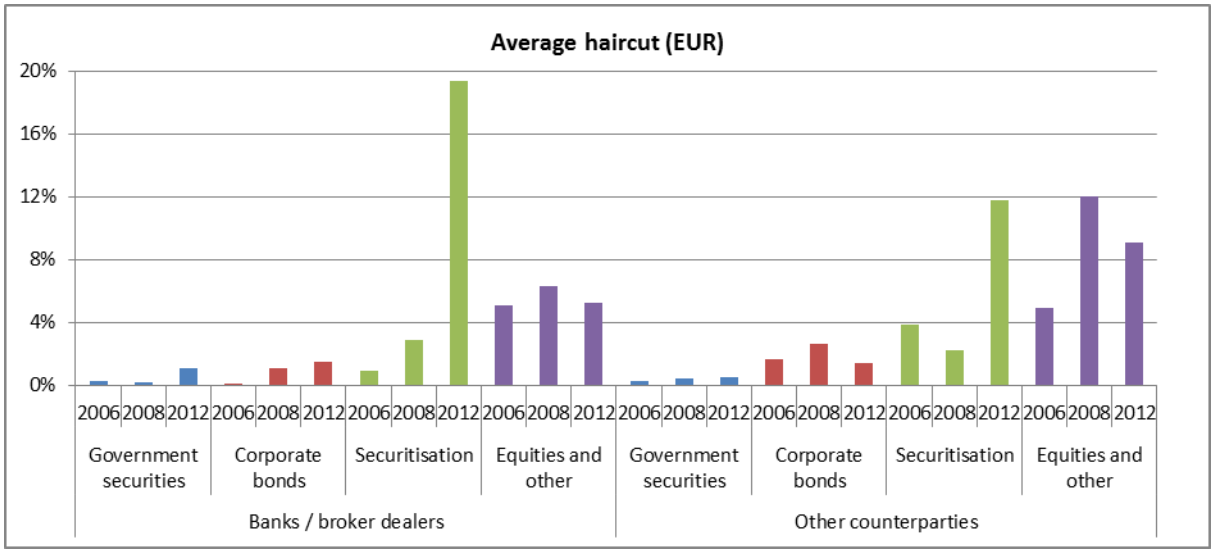
[13] www.afme.eu/WorkArea/DownloadAsset.aspx?id=5288

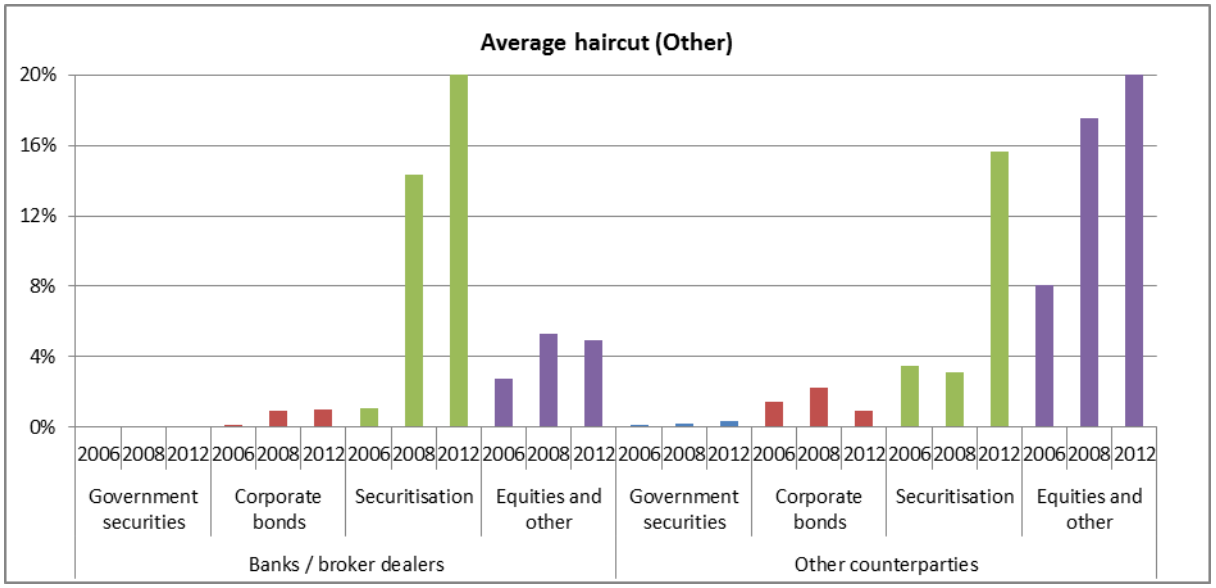
4. Conclusion

Based on the QIS1 data, there is some evidence that **haircuts did increase during the time period captured in the data set. But the evidence is mixed regarding whether haircuts decreased procyclically after the crisis.** Prior to the crisis, the repo market was characterised by a large share of bank lending to non-banks, whereas reverse repos against private-label securitisation only accounted for a small percentage of total securities outstanding. The QIS1 data set seems to be representative in the sense that aggregated numbers are generally in agreement with other surveys such as the ICMA Repo survey.

Annex 1: Average haircut by currency







Annex 2: OLS Regression output

Note: sample weighted by the average log of volume. P-values significant at 10% are highlighted in red. Coefficients are in percentage points. 2006, USD, banks / broker dealers, government bond is used as constant. Government bonds include (i) highly rated sovereign debt, (ii) other sovereign debt and (iii) government sponsored securities. The average (median) haircut reported is 3.2% (1.2%).

Variable	Coefficient	Standard Error
> 5 year	0.01**	0.002
> 1 year, ≤ 5 year	0	0.003
2008	0.005*	0.003
2012	0.013**	0.002
EUR	-0.009**	0.003
GBP	-0.008**	0.003
Other currencies	-0.004*	0.002
Hedge funds	0.018**	0.004
Pension funds / Insurance companies	0	0.005
Other Counterparties	0.002	0.002
Equities	0.014**	0.004
Securitization	0.019**	0.004
Corporate	0.003	0.003
Other Collateral	0.004	0.003
Constant	0.013**	0.003
Number of observations: 1049		
Adj. R-Square: 0.123		

* p < 10%, ** p < 5%

Annex 3: References

Adrian, Tobias, and Hyun Song Shin (2009), Money, Liquidity and Monetary Policy, *American Economic Review*, 99, 600-605

Copeland, Adam, Antoine Martin and Michael Walker (2011), Repo Runs: Evidence from the Tri-Party Repo Market, *Federal Reserve Bank of New York Staff Report* No. 506[14]

Financial Stability Board (2013) *Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos*[15]

Gorton, Gary, and Andrew Metrick (2011), Securitized Banking and the Run on Repo, *Journal of Financial Economics*, Vol. 104, Issue 3, June

Krishnamurthy, Arvind, Stefan Nagel and Dmitry Orlov (2014), Sizing up Repo, *Journal of Finance, forthcoming*

[14] http://www.newyorkfed.org/research/staff_reports/sr506.pdf

[15] http://www.financialstabilityboard.org/publications/r_130829b.pdf