

Occasional Studies  
Vol. 13 - 3

# Central Bank CollaterALL

Jeannette Capel

DeNederlandscheBank

EUROSYSTEEM

Central bank and prudential supervisor of financial institutions

©2015 De Nederlandsche Bank n.v.

*Authors*

Jeannette Capel

The Occasional Studies aim to disseminate thinking on policy and analytical issues in areas relevant to De Nederlandsche Bank. Views expressed are those of the individual authors and do not necessarily reflect official positions of De Nederlandsche Bank.

*Editorial committee*

Jakob de Haan (chairman), Lieneke Jansen (secretary), Hans Brits, Pim Claassen, Maria Demertzis, Peter van Els, Jan Willem van den End, Maarten Gelderman.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical, photocopy, recording or otherwise, without the prior written permission of De Nederlandsche Bank.

Subscription orders for DNB Occasional Studies and requests for specimen copies should be sent to:

De Nederlandsche Bank n.v.

Communications

P.O. Box 98

1000 AB Amsterdam

Internet: [www.dnb.nl](http://www.dnb.nl)

# Central Bank CollaterALL

Jeannette Capel<sup>1</sup>

3

---

<sup>1</sup> This study has benefited greatly from discussions with colleagues at De Nederlandsche Bank and colleagues from other central banks whom I met in working groups on collateral-related issues. Several colleagues took the trouble of reading through this paper and made valuable suggestions, which helped me to improve the paper. In particular, I would like to thank Paul Bakker, Ron Berndsen, Simona Ciolca, Richard Derksen, Nynke Doornbos, Jan Willem van den End, Jon Frost, Ronald Heijmans, Richard Heuver, Rien Jeuken, Mammohan Singh, John Thoolen and Elisabeth de Vogel for their comments. Since the present study uses and builds on insights from my earlier work on collateral and liquidity issues, I am also indebted to colleagues who have actively contributed to my work over the years, in particular Anouk Levels, co-author of the two papers that formed the basis for Sections 4.1, 4.3 and 4.4.



# Contents

1.	Introduction	9
2.	Collateral policy objectives	12
2.1	Common high-level objectives	12
2.2	What entails 'adequate' risk protection?	16
2.3	When is the collateral availability 'adequate'?	17
2.4	How to get adequate risk protection and adequate collateral availability?	21
3.	Collateral policy options	23
3.1	Counterparty eligibility – narrow versus wide	23
3.2	Collateral eligibility	24
3.2.1	Which collateral to take as a lender of last resort ?	25
3.2.2	Uniform versus differentiated collateral eligibility	26
3.2.3	Narrow versus broad collateral eligibility	28
3.2.4	'Always relatively broad' versus 'narrow when possible' framework	32
3.3	Foreign collateral eligibility	34
3.3.1	Advantages and disadvantages of accepting foreign collateral	34
3.3.2	Prefer foreign cash or foreign securities as collateral?	41
3.4	Risk control measures	43
3.4.1	What can central banks do to achieve more risk protection?	43
3.4.2	Central banks and procyclicality	46
3.4.3	Internal versus external ratings	48
3.5	Transparency, efficiency and collateralization technique	51
3.5.1	Complexity versus transparency and efficiency	51
3.5.2	Disclose details (rules-based) or not (principles-based)?	51
3.5.3	Earmarked (repo-d) versus pooled (pledged) collateral	53

6	3.6	Operational arrangements for foreign collateral	56
	3.6.1	Operational arrangement for receiving foreign cash	56
	3.6.2	Operational arrangement for receiving foreign securities	57
	4.	Topical collateral policy issues	62
	4.1	Collateral supply and demand	62
	4.1.1	Collateral supply versus the sector's demand for collateral	62
	4.1.2	Collateral shortages at individual countries or institutions?	66
	4.2	Is 'bad' collateral driving out good collateral?	67
	4.3	Collateral optimization	71
	4.3.1	Definition of collateral optimization	71
	4.3.2	Benefits and risks from a central bank perspective	77
	4.4	Collateral transformation	78
	4.4.1	Definition of collateral transformation	78
	4.4.2	Benefits and risks from a central bank perspective	80
	4.4.3	Central bank – collateral transformer and market maker of last resort?	81
	4.5	Access of non-banks to central bank liquidity	83
	4.6	Collateral management services	86
	4.6.1	Activities performed by collateral management service providers	86
	4.6.2	Benefits and risks from a central bank perspective	88

4.7	Collateral re-use and collateral velocity	89	7
4.7.1	Definitions of collateral re-use, re-hypothecation and velocity	89	
4.7.2	Is collateral re-use, re-hypothecation and velocity good or bad?	92	
4.7.3	Impact of quantitative easing on collateral velocity/ scarcity	95	
4.8	Collateral footprints	98	
5.	Conclusions	101	
	References	105	





# 1. Introduction

Until the last financial crisis hit, collateral policy was not considered a core function. Most financial institutions considered it a back-office activity. Central banks, too, did not have to spend too much time on the design of their collateral policy. As trust in the financial system was high, many market participants deemed it unnecessary to have their risk exposures collateralized. In cases where they did ask for collateral, they often accepted a wide range of assets owing to the favourable credit quality assessments for many financial assets. As a result, central banks did not have to worry much about collateral and liquidity shortages in the financial system or about the potential impact of their own collateral frameworks on the financial markets.

This has all changed since the last financial crisis. Financial institutions nowadays need much more high-quality collateral, both because of greater risk aversion in financial markets and because of regulatory change such as the new liquidity standards and OTC derivatives markets reforms. At the same time, the supply of high-quality collateral has been negatively affected by asset downgrades. This has resulted in collateral shortages in central banks' local markets and frictions in the international distribution of liquidity, encouraging central banks to broaden collateral eligibility. Moreover, the financial crisis made clear that ratings from credit rating agencies and collateral haircuts (both in central bank and private transactions) can be very procyclical and strongly affect system-wide leverage. That is why new ideas have been developed as to how collateral risk management could contribute towards financial stability.

Against this background, collateral and liquidity issues have been high on the agenda of central banks in recent years. This is evident from both various policy reports on this topic published by the Bank for International

Settlements (BIS)<sup>2</sup>, the Financial Stability Board (FSB)<sup>3</sup> and the European Central Bank (ECB) or its contact group on euro securities infrastructures (COGESI)<sup>4</sup>, and research carried out by various central banks in this area.

The aim of this study is twofold: (1) to provide a good overview of central banks' collateral policies – and the changes therein – combining insights from various recent publications and (2) to sketch the important collateral and liquidity issues that central banks need to address. The idea for this study originated from the author's participation in several international working groups on liquidity/collateral issues and her own papers in this field. This experience made clear that there is currently no comprehensive overview of the insights from the different policy reports and research publications and that such an overview would be valuable. The present study aims to fill this gap by providing a high-level discussion of the main collateral issues for central bankers. The study does not go into the details of the collateral frameworks of individual central banks, although many of the practical illustrations provided originate from Eurosystem practice.

- 
- 2 For instance, the Committee on Payments and Market Infrastructures has focussed on 'cross-border collateral arrangements' (CPSS (2006)) and 'collateral management services' (CPMI (2014)) and the Committee on the Global Financial System on 'central bank operations in response to the financial turmoil' (CGFS (2008)), on 'asset encumbrance, financial reform and the demand for collateral assets' (CGFS (2013)) and, in cooperation with the Markets Committee, on 'central bank operating frameworks and collateral markets' (CGFS/MC (2015)). Finally, the Markets Committee has studied 'central bank collateral frameworks and practices' (MC (2013)) and the BIS itself provided new thinking on the lender of last resort function (BIS (2014)).
  - 3 Most relevant from a collateral perspective are the FSB's recent reports on securities financing transactions (SFT), which include recommendations for qualitative standards for haircut methodologies and numerical haircut floors for certain SFT transactions (FSB (2013b) and (2014b)), and on principles to reduce the reliance on credit rating agencies (FSB (2010) and (2014a)).
  - 4 The ECB published a comparative analysis of the collateral frameworks of different central banks (ECB, 2007 and 2009) and – together with the COGESI – of central banks' frameworks vis a vis regulatory and CCP frameworks (ECB (2013b)). The adjustments made in the Eurosystem's framework in response to the crisis were examined by the ECB in 2013a. Finally, there are recent reports of the COGESI with an assessment of the availability of collateral in the euro area (ECB (2014a)) and with recommendations for improvements in the euro repo market that could facilitate liquidity and collateral management (ECB (2014b)).

The next chapter discusses the objectives behind a central bank's collateral framework, which typically include risk protection, adequate collateral availability for counterparties, limited impact on financial markets and a simple and transparent operational framework. Chapter 3 sheds light on the different policy options that central banks have in relation to their collateral frameworks, such as a range of choices to be made on counterparty eligibility, collateral eligibility (e.g. narrow versus broad, possible acceptance of foreign collateral), risk control measures and operational issues (e.g. level of disclosure). Topical collateral and liquidity issues, including increased pressures on the availability of high-quality collateral, collateral management responses by financial institutions (such as collateral optimization and transformation and increased use of collateral management service providers) and the impact of these developments on collateral velocity, collateral scarcity and central bank policies, are discussed in Chapter 4. Chapter 5 concludes.

## 2. Collateral policy objectives

12

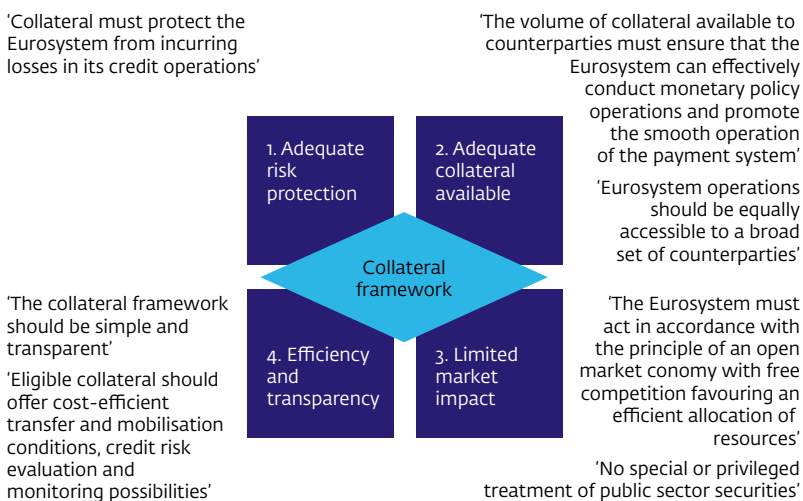
### 2.1 Common high-level objectives

Many central banks, including the Eurosystem, need to have a collateral policy since they are not allowed to lend unsecured. But even without a legal obligation, there are several reasons for central banks to require collateral and thus formulate a collateral policy (see ECB (2007) and Chailloux et al. (2008)). First of all, collateralized lending to counterparties reduces the risk of potential losses on the side of the central bank. Such losses could be detrimental to its reputation and in severe cases threaten its financial independence from the government. Moreover, collateralized lending avoids some of the complexities associated with unsecured central bank lending. Such complexities include the central bank having to exercise an inherently high level of discretion (which may be incompatible with its desire to be transparent and accountable), for example when it comes to making decisions about reducing a counterparty's credit limit or charging a higher rate (which could send unintended signals to the market). A final advantage of collateralized lending is that it allows the central bank to lend at the same rate to all counterparties, thereby contributing to a smooth transmission of monetary policy.

Several central banks have formulated guiding principles for their collateral frameworks (ECB (2007), ECB (2009) and Chailloux et al. (2008)). Although there are differences in the precise wording and in the relative importance attached to individual principles in different jurisdictions, there seems to be some consensus on four broad high-level objectives for a central bank's collateral framework (ECB (2007) and ECB (2009)). It should (1) provide adequate risk protection to the central bank, (2) leave its counterparties with adequate available collateral, (3) have a limited impact on the financial markets and (4) meet operational efficiency and transparency

requirements. As an example, Figure 1 maps the Eurosystem's guiding principles<sup>5</sup> to these four high-level objectives.

## Figure 1 High-level collateral policy objectives and the Eurosystem's guiding principles



The first high-level objective of a central bank's collateral framework is to provide **adequate risk protection** (top left in Figure 1), as this is the main reason why central banks lend against collateral. Depending on their mandate and the precise design of their policies, central banks can

<sup>5</sup> The Eurosystem does not have an explicit list of principles for its collateral framework, but they can easily be derived from the Treaty establishing the European Community and the Protocol on the Statute of the ESCB and ECB (see ECB (2009)). For instance, Article 18.1 of the Statute stipulates that lending by the ECB and the NCBs should be based on 'adequate collateral'. The term 'adequate' refers to both the need for risk protection and the requirement of sufficient collateral being available to a broad set of counterparties (ECB (2013b), p. 71).

become exposed to counterparty risks when conducting monetary policy operations, extending intraday credit to support the functioning of in the payments system and/or acting as a lender of last resort to safeguard financial stability. By requiring collateral for these transactions, central banks – like other market participants – can mitigate the risks of a possible counterparty default. But central banks, unlike other market participants, can wait quite some time before selling collateral assets in the event of a default and could therefore possibly accept less liquid forms of collateral.

Moreover, central banks pursue several public objectives, such as an effective monetary policy, financial stability and smoothly functioning payment systems. The central bank's success in attaining these objectives depends on the collateral adequacy of its counterparties, which means that central banks need to consider the possible impact of their own collateral requirements on collateral adequacy. This is another reason why central bank collateral frameworks are fundamentally different from those of other market participants. The second objective for a central bank's collateral policy is therefore that its counterparties have [adequate available collateral](#) to secure the transactions that the central bank deems desirable from the perspective of monetary policy, financial stability and payment systems policy (top right in Figure 1).

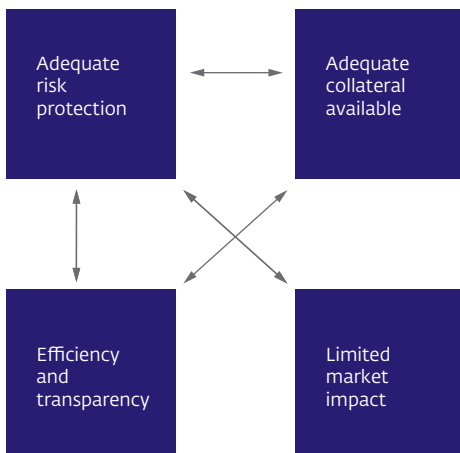
Third, central banks may seek to minimise the distorting effects of their collateral operations on relative asset prices, the allocation of credit in financial markets and market participants' behaviour, i.e. to aim for a [limited market impact](#) (bottom right in Figure 1). Some central banks (Federal Reserve, Bank of England) go one step further and explicitly aim for market neutrality (see ECB (2009)).

Finally, central banks often have [efficiency and transparency](#) as an operational objective for their collateral frameworks (bottom left in Figure 1).

A simple and efficient framework helps to ensure an acceptable operational burden for the central bank and its counterparties. Transparency contributes towards the central bank's accountability, for example by using objective and publicly available principles and criteria for collateral eligibility.

Unfortunately, there are potential conflicts between these four high-level objectives, leading to trade-offs for the central bank (Figure 2). For instance, a desire to ensure adequate collateral for counterparties may pose challenges for the central bank's own risk protection and lead to a less efficient and transparent collateral framework. Moreover, adequate risk protection by the central bank may make collateral scarcer for market participants, have a significant impact on the market, and may be in conflict with the transparency objective. The remainder of this chapter will discuss the objectives of 'adequate risk protection' and 'adequate available collateral' and their potential conflict in more detail. The objectives of

Figure 2 Conflicting policy objectives



'transparency plus efficiency' and 'limited market impact' will be addressed in Sections 3.5 and 4.8.

## 2.2 What entails 'adequate' risk protection?

Collateral will only provide adequate risk protection if it can actually cover the counterparty's obligation to the central bank when the underlying collateral needs to be sold. Therefore central banks set eligibility requirements, stating which assets they are willing to accept as collateral and under which conditions. While collateral eligibility requirements are an important instrument in risk management, central banks can also mitigate their risks by counterparty selection (e.g. only extend credit to institutions that appear financially sound) and collateral risk management (e.g. mark-to-market valuation of collateral, set haircuts and/or quantitative limits).

These three steps have a logical order (Figure 3), running from counterparty eligibility (i.e. decide on whether or not to extend central bank credit), collateral eligibility (i.e. ensure appropriate collateral from the borrower to support the loan) and risk control measures (i.e. manage the value of the collateral once the loan has been extended). The third step is necessary because collateral mitigates counterparty risk but introduces market risk

Figure 3 The three steps towards adequate risk protection





and liquidity risk embedded in the collateral assets. If the latter risks are not managed properly, the central bank is still exposed to counterparty risk. The policy choices made and procedures followed in the second and third steps define the central bank's collateral framework.

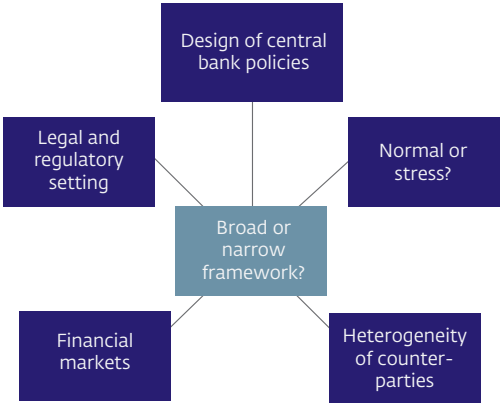
The three steps of counterparty risk management should be seen in conjunction with each other: a decision to be lenient in one step can be compensated by stricter requirements in one or two of the other steps. For instance, a central bank may want broad counterparty access as a matter of principle, which could also imply broad collateral acceptance if counterparties are heterogeneous. Such a central bank would need to rely heavily on risk control measures to limit its counterparty risk. Another example is that central banks may aim for risk equivalence (see Section 3.4), which would create a direct relationship between collateral eligibility and risk control measures.

### 2.3 When is the collateral availability 'adequate'?

The eligibility criteria and risk control measures set by the central bank do not only determine its level of risk protection, but also the amount of central bank eligible collateral that the central bank's counterparties can provide. These counterparties need this collateral to secure their transactions with the central bank. The central bank thus needs to make sure that the amount of available collateral is consistent with its monetary policy, financial stability policy and payment systems policy goals.

How broad the central bank's collateral framework should be to enable a successful conduct of central bank policies depends on a multitude of factors (see Figure 4). These are briefly sketched here; for more details see Chailloux et al. (2008), MC (2013) and CGFS/MC (2015). Some of these factors are external to the central bank (i.e. outside of its direct sphere of

Figure 4 Factors determining the breadth of the central bank’s collateral framework



influence), others internal (i.e. under the central bank’s control). As these factors differ among jurisdictions, some central banks’ frameworks are naturally broader in scope than those of others. This should be kept in mind when comparing the collateral frameworks of different central banks.

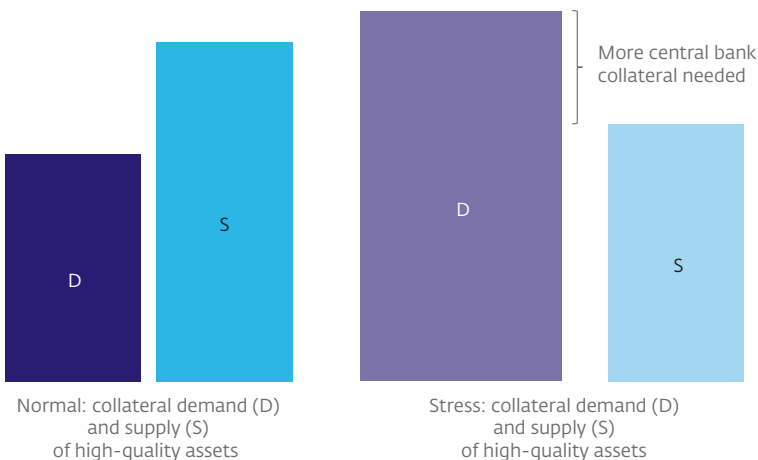
Central banks influence the design of their monetary, financial stability and payment systems policies. The logical consequence of a ‘collateral-intense’ design is that a broader collateral framework is needed. Relevant monetary policy issues are whether the economy faces a structural liquidity surplus or deficit, as this determines whether on balance the central bank needs to absorb reserves from, or provide reserves to, the market.<sup>6</sup> If there is a liquidity deficit, its expected size is relevant, which depends on possible

6 See Rule (2012) for a more elaborate discussion and CGFS/MC (2015) for some practical examples.

reserve requirements set by the central bank and autonomous factors such as foreign exchange flows and banknotes in circulation. As regards payment systems, relevant considerations are whether the large value payment system is a net or gross system (as the latter requires more liquidity), whether the system has any liquidity saving features and whether or not the central bank requires collateral for intraday credit.

Another consideration is that during periods of stress more central bank eligible collateral is needed than in normal times (Figure 5). One reason is the higher demand for collateral during stress: financial institutions typically need both more central bank liquidity (as funding through the interbank market becomes more difficult) and more collateral to secure their transactions with other market participants (who tend to set stricter collateral requirements). The other reason is collateral supply: the available

Figure 5 Broader collateral frameworks during stress



pool of assets accepted in the market as high-quality collateral usually shrinks during stress, because of asset downgrades and greater risk aversion. In the example presented here, the central bank needs to broaden its collateral framework beyond high-quality assets during stress to make sure its counterparties will still have sufficient collateral.

Moreover, the more diverse the group of counterparties and the financial assets on their balance sheets, the broader the central bank's collateral framework needs to be to give this group access to central bank liquidity. Obviously, the central bank has some decision power over the range of potential counterparties that it deals with, but the range also depends on structural factors that are external to the central bank, e.g. the extent to which the financial system is bank-based or market-based. The international orientation of its counterparties is another structural factor (if there are many international banks, the central bank may need to accept foreign collateral).

Important but largely external to the central bank are the characteristics of the country's financial markets, as these influence which assets are held by banks. More sophisticated financial systems tend to be characterised by a greater availability of high-quality assets (i.e. a higher and more diverse 'supply' of collateral), but the demand for collateral is usually higher too. Particularly relevant for a monetary union is the degree of financial market integration, as this will influence whether the central bank's counterparties hold similar or different assets.

A final important consideration is the country's legal and regulatory setting. For instance, central banks with a narrowly-defined mandate (e.g. price stability only) are more likely to have narrow collateral frameworks than central banks with multiple objectives. Moreover, there may be legal constraints on the collateral that the central bank is allowed to take

(e.g. prohibitions to use certain assets as collateral or limitations stemming from the quality of bankruptcy proceedings and length of jurisdictional procedures for collateral enforcement) or on the treatment of assets (e.g. the Eurosystem's rule that no preferential treatment should be given to government securities). Finally, regulatory requirements determine how much high-quality assets the central bank's counterparties need to secure transactions with other market participants and to hold on their balance sheets as liquid buffers.

## 2.4 How to get adequate risk protection and adequate collateral availability?

As discussed above, the objectives of 'adequate risk protection' and 'adequate collateral availability' are both essential to the central bank's *raison d'être*. It is therefore unfortunate that measures taken to ensure adequate risk protection may adversely affect the amount of collateral available to the central bank's counterparties and vice versa. For instance, an increase in the minimum rating requirements on eligible collateral assets reduces the range of assets that counterparties can use in their transactions with the central bank, while an increased collateral haircut implies that counterparties have to deliver more collateral assets to secure a transaction of a certain size. The opposite is also true: measures taken by the central bank to boost the available amount of central bank eligible collateral for its counterparties, such as an increase in the range of collateral assets accepted or a lower haircut, could have an undesired negative effect on its own level of risk protection. An important issue for central banks is thus whether and how these two important objectives for the collateral framework can be reconciled.

One way the central bank could achieve these two objectives at the same time is to expand the range of eligible collateral and to use risk control

measures (e.g. collateral haircuts) to mitigate the usually higher risk of the newly accepted assets.<sup>7</sup> If done accurately, this would create risk equivalence (after risk control measures all collateral assets would pose the same residual risk to the central bank). Basically, there are two instruments (collateral eligibility and risk control measures) to achieve the two objectives of 'adequate risk protection' and 'adequate collateral availability'. Faced with a shortage of high-quality assets in the market or in its capacity as lender of last resort, a central bank may decide to accept assets that are unacceptable as collateral in other circumstances, including assets with a credit quality below the minimum level. But it is not always necessary to make such compromises on collateral quality. As central banks, unlike other market participants, are not exposed to liquidity risk and can therefore wait patiently for the right time to sell off the collateral, they may accept as collateral financial assets of good credit quality but with a high liquidity risk, such as ABS and credit claims of high credit quality. Foreign collateral too could be less risky to central banks than to other market participants, especially if this is accepted under an agreement with a foreign central bank (see Sections 3.3 and 3.6).

---

<sup>7</sup> The Eurosystem's decisions to expand collateral eligibility during the most recent financial crisis have indeed been accompanied by an increase in the average haircut applied (see ECB (2013a) for empirical evidence).

# 3. Collateral policy options

This chapter discusses the policy choices that central banks have to make in relation to their collateral frameworks, starting with counterparty eligibility (Section 3.1), and continuing with collateral eligibility in general (Section 3.2) and foreign collateral eligibility (Section 3.3). After that, the focus is on risk control measures (Section 3.4) and operational options, such as transparency, efficiency and operational techniques (Section 3.5). Finally, the possible operational arrangements for foreign collateral are examined (Section 3.6).

## 3.1 Counterparty eligibility – narrow versus wide

Central banks need to decide which counterparties are eligible for monetary and intraday credit. With respect to monetary credit, a distinction can be made between open market operations (OMO), conducted to pursue monetary policy objectives, and standing facilities (SF), such as the marginal lending facility of the Eurosystem and the discount window of the Federal Reserve System. SF allow eligible institutions to borrow on an overnight or otherwise short-term basis to meet temporary liquidity shortages due to internal or external disruptions. Since intraday credit and SF can be essential to avoid serious liquidity problems at financial institutions and since these facilities have very short maturities, the central bank may decide that these facilities are open to a broader group of counterparties vis-à-vis the OMO.

The range of counterparties of a central bank depends to a large extent on the characteristics of the country's financial sector. For instance, the Federal Reserve System has a limited number of counterparties (primary dealers only) for its OMO, reflecting the market-based nature of its financial system, whereas the Eurosystem deals with a large and heterogeneous group of counterparties in all of its lending operations and facilities, reflecting a more bank-based financial system and a monetary

union comprising different countries (see ECB (2007) and (2009)). But within these external constraints, many central banks still have some policy discretion regarding the range of counterparties that they deal with in practice.

With respect to SF, central banks agree that relatively wide counterparty eligibility is desirable, since temporary liquidity shortages at financial institutions could otherwise develop into a financial stability issue. But central banks can decide on whether the counterparty eligibility for OMO should be equal to or more narrow than for SF. A recent report from the Bank for International Settlements (see MC (2013)) compares the collateral frameworks of twelve different central banks.<sup>8</sup> Five central banks (AU, EA, JP, SE and CH) have wide counterparty eligibility for all of their lending operations and facilities (Graph 1), whereas four central banks (CA, KR, SG and US) have narrow counterparty eligibility for OMO and wide eligibility for SF. In the remaining three countries (IN, MX and UK) counterparty eligibility also varies for the different lending operations or facilities but in a different way (see MC (2013), p. 6 for more details).

### 3.2 Collateral eligibility

As discussed above, there are natural differences between central banks as to how broad their collateral frameworks should be to ensure that counterparties have adequate collateral. However, within these external constraints, there are several policy options for central banks with respect to collateral eligibility.

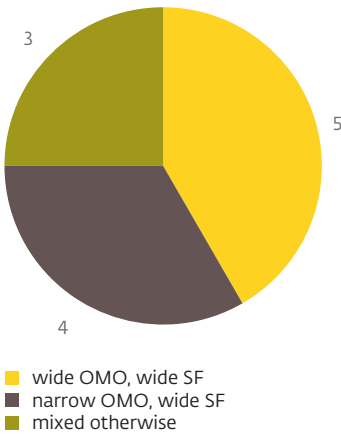
---

<sup>8</sup> The central banks of the following countries/regions participated in this survey: Australia (AU), Canada (CA), Euro Area (EA), India (IN), Japan (JP), Korea (KR), Mexico (MX), Singapore (SG), Sweden (SE), Switzerland (CH), United Kingdom (UK) and United States (US).



## Graph 1 Counterparty eligibility - Wide or narrow?

Survey of 12 central banks



Source: based on data in MC (2013)

### 3.2.1 Which collateral to take as a lender of last resort?

Collateral eligibility for emergency liquidity assistance (ELA) has been a source of debate among central banks. Bagehot's view was that the central bank in its capacity as a lender of last resort (LOLR) should lend freely to solvent but illiquid firms against good collateral at a high rate of interest. However, this view has been challenged because a decision to lend against high-quality collateral only, whatever the circumstances, is not credible during liquidity stress, when a financial institution will typically have exhausted its options to raise market funding. Given the negative impact of a bank's default on financial stability, it makes perfect sense for central banks to provide ELA against a wide range of collateral assets, provided that the beneficiary bank is solvent and that the central bank is able to understand, value and manage the assets received.

Examples show that in practice central banks have been willing to provide ELA to solvent but illiquid banks against a wide range of valuable collateral assets that are not acceptable in normal circumstances – in some cases even buildings and paintings. As collateral eligibility for LOLR is thus typically quite broad, the central bank will need to lean heavily on risk control measures such as haircuts, retaining the discretion to further strengthen these controls if the circumstances dictate so. For an overview of current insights on the central bank's LOLR-function, see BIS (2014).

### **3.2.2 Uniform versus differentiated collateral eligibility**

Turning now to 'standard' lending operations/facilities, central banks can select uniform or differentiated collateral eligibility criteria for their different operations. In this context it may be reasonable to consider conducting intraday credit operations on an unsecured basis, since intraday credit is essential for the smooth functioning of the payment system and financial stability, whereas its short term (intraday) nature limits risks to the central bank. The Federal Reserve has opted for this: uncollateralized intraday credit is possible but – in contrast to collateralized intraday credit – subject to a 50 basis points fee.

Uniform eligibility criteria for all standard lending operations/facilities have the advantages of being simpler and more efficient. However, the risks involved in individual operations/facilities and the specific counterparties that use them may be different. A differentiated collateral framework is one possible way of addressing these differences, allowing lower-quality collateral for lower-risk operations (e.g. short-term credits). An alternative way to reflect these risk differences is via the pricing mechanism. For instance, an unsecured credit or a credit secured with lower-quality collateral could be extended at a higher interest rate or fee than a well collateralized transaction.

One concrete policy decision to make is whether or not the collateral framework should be uniform for OMO and SF. Broader eligibility for SF could be justified by the often broader range of eligible counterparties (see above) and the lower risk due to the short-term nature of SF (usually overnight). For the same reasons, central banks may have broader collateral eligibility for intraday credit in the payment system than for their monetary operations. A related question, relevant for the National Central Banks (NCBs) in the Eurosystem, is whether or not to adopt the Eurosystem collateral framework for their national services. A consideration here is the loss-sharing mechanism within the Eurosystem for 'Eurosystem facilities' (monetary operations, intraday credit), which does not apply to national services.<sup>9</sup>

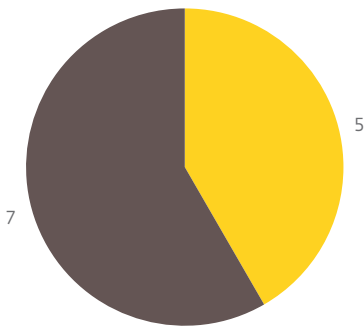
Five (AU, EA, JP, SE and CH) out of the twelve central banks participating in the abovementioned BIS survey apply uniform collateral eligibility to all their lending operations/facilities and seven central banks differentiate (CA, IN, KR, MX, SN, UK and US, Graph 2). Differentiation has become more popular, as three central banks in the last group (MX, SG and UK) had uniform collateral eligibility before the financial crisis. As expected, within the differentiated frameworks, marginal lending or liquidity insurance facilities typically allow the use of less liquid collateral, whereas routine refinancing market operations require liquid collateral (see MC (2013)).

---

9 For instance, De Nederlandsche Bank (DNB) offers to its counterparties several facilities to strengthen the safety and efficiency of payments and securities transactions in the Netherlands. The most important example is the guarantee provided by DNB, which Dutch banks can use as security for the clearing of their securities transactions and for which DNB blocks part of their collateral value. Up to 2013, there was one uniform collateral pool for these DNB facilities and the Eurosystem facilities. DNB, prompted by risk management considerations, created a separate, more stringent, collateral framework for DNB facilities in late 2013.

## Graph 2 Collateral eligibility - Uniform or differentiated?

Survey of 12 central banks



■ Uniform  
■ Differentiated

Source: based on data in MC (2013)

### 3.2.3 Narrow versus broad collateral eligibility

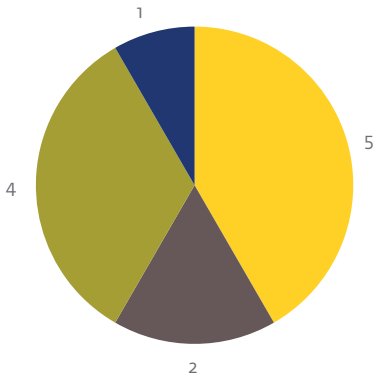
There are two dimensions in which the 'size' of a central bank's collateral's framework could be measured: (1) the range of the eligible assets focussing on issuer type and (2) the minimum credit ratings or quality standards that these assets should meet to be eligible. The first dimension could be called the breadth of the collateral framework, the second its depth (see also Challioux et al. (2008)). The breadth of the collateral framework reflects both external factors and internal policy design choices by the central bank, and it is primarily governed by the need to ensure that counterparties have adequate collateral available for the central bank to pursue its policies. Given differences in relevant external and internal factors, central banks differ in the 'natural breadth' of their collateral frameworks. Also the depth of the collateral pool can be adjusted to influence counterparties' collateral availability. During the last financial crisis, some central banks lowered rating requirements in response to their counterparties' collateral needs, while using risk control measures such as haircuts to protect themselves

against the collateral's risk. In normal times rating requirements are more generally seen as a policy instrument for risk management alongside other risk control measures. For that reason, asset eligibility in terms of rating requirements will be discussed in Section 3.4, which deals with risk control measures, while this section discusses asset eligibility in terms of asset classes.

Focussing on the range of eligible asset classes, there are two central banks (IN and SN) with narrow eligibility (primarily domestic public sector securities) and five with wide eligibility (AU, EA, JP, SE and CH, Graph 3). The other central banks have narrow eligibility for some facilities and wider eligibility for others, usually differentiating between OMO and SF (CA, KR, MX and US) but sometimes in another way (UK).

### Graph 3 Collateral eligibility - Broad or narrow?

Survey of 12 central banks



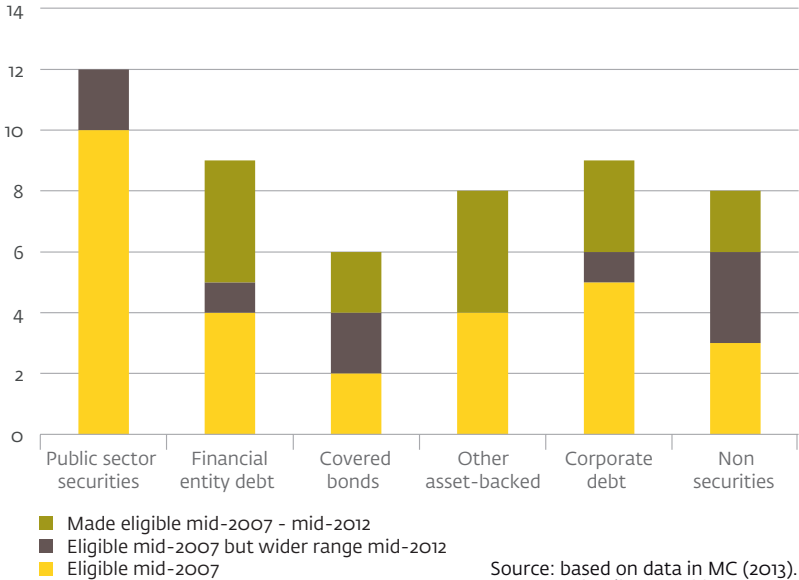
- wide OMO and SF
- narrow OMO, more narrow SF
- narrow OMO, wide SF
- mixed otherwise

Source: based on data in MC (2013)

In response to the financial crisis, many central banks have recently broadened their collateral frameworks. Public sector securities were already eligible before the financial crisis at all twelve central banks that participated in the BIS survey, but for all other asset classes (financial entity debt, covered bonds, other asset-backed securities, corporate debt and/or non-securities) eligibility has been broadened at several central banks (Graph 4, see Table 1 for more details on policies in individual countries). The latter is also true for foreign issuer and foreign currency assets, as discussed in more detail in the next section.

### Graph 4 Eligibility key asset types (July 2012)

No. of central banks (survey of 12)



Source: based on data in MC (2013). For more details see Table 1.

### Table 1 Eligibility of key asset types (end of July 2012)<sup>1</sup>

(√ = this asset type was already eligible as collateral, √+= there are more eligible sub-types of this asset now compared with mid-2007, 0 = this asset type is newly eligible since mid-2007)

	Public sector securities	Financial entity debt	Covered bonds	Other asset-backed <sup>2</sup>	Corporate debt	Non-securities <sup>3</sup>	Cross-border <sup>4</sup>	
							Issuer	Currency
Australia	√	√+	0	0	0		0	
Canada	√	√		0	√	0	√+	0
Eurosystem	√	√	√	√	√	√+	√ <sup>5</sup>	0 <sup>6</sup>
India	√					√		
Japan	√+	0		√	√+	√+	√	0
Korea	√					√		
Mexico	√	0		0	0	√	0	0
Singapore	√+						0	0
Sweden	√	0	√+	√	√		√	√
Switzerland	√	√	√		√		√+	√+
United Kingdom	√	0	0	0	0	0	√+	√+
United States	√	√	√+	√	√	√+ <sup>7</sup>	√	√

- 1 Excludes assets that were temporarily eligible during the global financial crisis, but that were no longer in July 2012.
- 2 Other asset-backed: securities such as ABS, MBS, RMBS, CMBS, ABCP.
- 3 Non-securities: assets such as loans or other credit claims that are not securitised, deposits at central banks etc.
- 4 Cross-border/Issuer : obligations issued by foreign entities, can be denominated in any currency;  
Cross-border/Currency: assets denominated in foreign currencies.
- 5 For marketable securities only; but must be issued in euro area.
- 6 There were two periods of this extension: 13 November 2008-31 December 2009 and again from 9 November 2012.
- 7 Denotes mainly the addition of Term Deposit Facility deposits (a new central bank facility) as eligible collateral for the Discount Window, not expansion of eligibility in the more traditional sense.

Source: MC (2013) p. 10

Although there are substantial differences in the breadth of the collateral frameworks of central banks, they as a group have relatively broad eligibility criteria, when compared to those of regulatory and central counterparties' frameworks (see ECB (2013b)). Of these collateral frameworks, CCPs have the narrowest, which is understandable and desirable given their role in centralising counterparty risk management. Debt securities issued by central governments and cash are commonly accepted by central banks, under regulatory frameworks, and by CCPs. Covered bonds are also widely accepted. Other marketable assets – such as debt securities issued by credit institutions, as well as corporate bonds and asset-backed securities – are accepted mainly under central bank frameworks. On the other hand, equities, bank guarantees and gold are usually not accepted by central banks, but are sometimes accepted (under certain restrictions) by regulatory frameworks and as margin by CCPs or for non-centrally cleared over-the-counter (OTC) derivatives. Non-marketable assets are only accepted by some central banks (see ECB (2013b)).

### **3.2.4 'Always relatively broad' versus 'narrow when possible' framework**

As discussed, there are natural differences in the breadth of the collateral frameworks of central banks due to external factors (Figure 2). At the same time, the central bank can influence the required breadth via the design of the central bank's policies and the counterparties made eligible, factors that are (at least partially) under the central bank's control. For instance, a central bank that wishes a relatively narrow collateral list, may lower reserve requirements to make this possible. Moreover, as collateral frameworks typically need to be broader during stress than in normal times for financial stability purposes (Figure 5), central banks can choose between either a 'fixed' relatively broad collateral framework (i.e. a framework that is broad enough for both normal times and periods of stress) or a 'variable'



framework (i.e. a framework that is narrow when possible and broadened when necessary).<sup>10</sup>

### Arguments for and against an 'always relatively broad' collateral framework

An advantage of this policy choice is that less adjustment is needed during stress, since banks already have a large range of assets that they can potentially use for central bank credit (Table 2). One disadvantage is that then 'lower quality' assets may be eligible, which necessitates more vigilant monitoring and appropriate risk control measures from central banks. Moreover, the central bank's acceptance of illiquid assets in combination with the Liquidity Coverage Ratio (LCR) will raise potential monetary policy issues, as banks may use monetary operations with the sole intention to 'swap' their LCR-ineligible assets into LCR-eligible central bank reserves. 'Always relatively broad' collateral eligibility may also clash with the central bank's objective of efficiency and transparency (Figure 2), as a broad framework tends to be complex, leading to an administrative burden (for both the central bank and commercial banks) as well as possible level playing field issues (e.g. if the central bank's haircuts do no justice to the quality differences between assets, this could benefit certain banks).<sup>11</sup> Finally, a broad list may limit the incentives for banks to manage their liquidity risk in a proper fashion and create distortions by favouring the use of illiquid assets. The result of lower liquidity discipline may be that – when

---

<sup>10</sup> Central banks with 'always broad' collateral frameworks may still need to broaden their framework further in case of extreme stress. As a result of the Eurosystem's relatively broad collateral list, it had to make fewer extensions to the list of eligible collateral than the Federal Reserve System and the Bank of England (see ECB (2009)) in the early years of the last financial crisis. But when the crisis intensified, also due to the sovereign crisis, the Eurosystem also had to broaden its collateral framework (see ECB (2013a) and Wolff (2014)).

<sup>11</sup> The Eurosystem's Additional Credit Claims (ACC) framework, which implies that some NCBs accept credit claims as collateral and others do not, can be seen as an example where broadening the framework raises complexity and risks of fragmentation in the implementation of monetary policy.

a crisis occurs – it still proves necessary for a central bank to further extend the list of eligible collateral.

#### Arguments for and against a 'narrow when possible' collateral framework

Important advantages of this policy option are the incentives towards proper liquidity management by banks and its countercyclical impact, the latter stemming from the fact that other market participants will be inclined to relax their collateral requirements in good times and tighten them during a crisis (Chailloux et al.( 2008)). Other advantages are: easier risk management in normal times, a lower administrative burden (for both commercial banks and central banks), greater transparency and fewer possibilities for arbitrage, which contributes to a level playing field. Finally, 'narrow when possible' collateral eligibility would lower the probability that monetary policy operations are 'misused' by financial institutions to become LCR-compliant. Disadvantages of this option are that some banks may not have enough collateral for central bank credit and that central banks need to make explicit decisions on the broadening of the list – i.e. on 'changing gears' – when a crisis occurs. To avoid ad hoc decisions in a crisis situation, which could entail operational and legal risks, central banks could make ex ante decisions on how to 'change gears' when needed. For instance, a decision to start accepting new assets during stress would usually carry higher operational risks than an ex ante decision to relax certain concentration limits in a crisis situation.

### 3.3 Foreign collateral eligibility

#### 3.3.1 Advantages and disadvantages of accepting foreign collateral

Internationally active banks may experience cash or security mismatches during times of stress. In the case of a cash mismatch the bank has a shortage of cash in one currency and plenty of cash (or the ability to raise this cash) in another currency, whereas in case of a security mismatch the

Table 2 'Always relatively broad' or 'narrow when possible' collateral eligibility?

	Broad collateral list	Narrow collateral list
Advantages	<ul style="list-style-type: none"> <li>+ Wide range of financial institutions can get access to monetary and intraday credit</li> <li>+ Less need to 'change gears' in case of a financial crisis</li> </ul>	<ul style="list-style-type: none"> <li>+ Gives banks proper incentives for adequate liquidity risk management</li> <li>+ Counterweight against procyclicality</li> <li>+ Risk management less of an issue for the central bank</li> <li>+ Less complexity and lower administrative burden</li> <li>+ More transparent, fewer level playing field issues</li> <li>+ Less impact of LCR on monetary policy</li> </ul>
Disadvantages	<ul style="list-style-type: none"> <li>- Impact of the LCR on monetary policy</li> <li>- Risk management issues for central bank</li> <li>- Complexity and administrative burden</li> <li>- Possible level playing issues</li> <li>- Disincentive for proper liquidity risk management by financial institutions</li> </ul>	<ul style="list-style-type: none"> <li>- Requires 'changing gear' in crisis situation, which may lead to ad-hoc decisions and operational/legal risks for central bank</li> <li>- Some banks may face difficulties in acquiring enough central bank liquidity with their collateral pool</li> </ul>

Source: Capel (2011)

bank has enough securities available but they are located in the 'wrong' country. A bank needs to resolve such cash and securities mismatches immediately to avoid that they develop into more serious liquidity problems. In normal times solutions can usually be found easily, as banks may obtain the required cash or securities from other market participants.

Solutions can become difficult, however, during a financial crisis when frictions in the international distribution of liquidity may occur. Foreign collateral acceptance by central banks can then contribute to financial stability. As phrased by the Committee on the Global Financial System: 'Channels for distributing liquidity across borders may become impaired in times of financial turmoil. To prepare for that possibility, central banks should take steps to strengthen their capacity to counter problems in the international distribution of liquidity. Possible steps include establishing or maintaining standing swap lines among themselves and accepting – or developing and maintaining the ability to accept – foreign currency denominated assets or obligations booked abroad as collateral in their operations' (CGFS (2008)).

This advantage should be weighed against the main disadvantage of a central bank's acceptance of foreign collateral, namely 'moral hazard': financial institutions may be discouraged to find their own solutions for their international liquidity mismatches and become dependent on the central bank. One solution for this moral hazard problem is to accept foreign collateral on an emergency basis only, without pre-committing to such acceptance. The political dimension is important too: the acceptance of foreign collateral would support the international role of the currency of another country relative to the own currency.

There are other advantages and disadvantages of foreign collateral eligibility too, but these depend on the characteristics of the foreign collateral (Table 3, based on Capel (2013)). Collateral is 'foreign' or 'cross-border' if, from the perspective of the central bank accepting the collateral, one or more of the following aspects is foreign (CPSS (2006), p. 1):

(1) the currency of denomination, (2) the jurisdiction in which the assets are issued and (3) the jurisdiction in which the assets are located or safe kept.<sup>12</sup>

An advantage of central bank eligibility of collateral that is foreign in currency and/or issuer, but domestic in location, is that more collateral becomes available at home. This has positive effects on the central bank's monetary policy, payment systems policy and financial stability policy.<sup>13</sup>

If collateral is located abroad, there may still be a positive impact on monetary and payment system policy but this is not necessarily the case. A crucial factor is then the swiftness and reliability of the operational arrangements for cross-border collateral transfer (see Section 3.6) and the extent to which emerging liquidity needs can be foreseen (the need for overnight and intraday credit, for instance, is often difficult to predict exactly). The impact on financial stability policy is even more ambiguous and depends on the possible incentives given to financial institutions to economise on their overall collateral portfolio by maintaining a single, global pool, and on the prevailing nature of financial stability shocks (mainly global or mainly institution- or country-specific).

Disadvantages to the central bank are the additional risks introduced by foreign collateral: foreign currency collateral gives rise to exchange rate risk on the collateral portfolio, collateral issued abroad involves legal risk as well

---

<sup>12</sup> Collateral can thus be 'foreign' in three different aspects. To keep the discussion theoretically 'pure', each aspect is discussed separately as it embodies specific risks for the central bank. In reality, of course, collateral is often foreign in several aspects at once. Insight into the influence of such collateral on the central bank's tasks can then be obtained by 'summing' the effects of two or three aspects of foreignness.

<sup>13</sup> As financial institutions will have more opportunities to select collateral at – for them – lower cost, they may be expected to pledge more collateral at their central bank, giving them greater access to monetary operations (which contributes to a more effective monetary policy), intraday credit (which could prevent hitches in payment systems) or emergency liquidity (which could help in the event of a negative financial stability shock).

**Table 3 Advantages and disadvantages of different types of foreign collateral**

Overall advantage: financial stability during crisis				Overall disadvantage: moral hazard and possible political dimension	
Advantages per type				Disadvantages per type	
Foreign aspect	Effect on available collateral	Impact on central bank's monetary policy(MP), payment systems policy (PS), financial stability policy (FS)		Main risk(s) for central bank	Risk management options
Currency	Positive	MP PS FS	Positive Positive Positive	Exchange rate risk	Haircuts, margin calls, restrict eligibility to countries with a sound macroeconomic policy
Issuer	Positive	MP PS FS	Positive Positive Positive	Legal risk  Operational risk	Make good procedural agreements, make use of local legal expertise. Only accept assets that are operationally similar to domestic assets
Location	May be positive, but not sure	MP  PS  FS	Positive (if credit need is foreseeable) Limited (intraday credit need is often not foreseeable) Ambiguous depends on incentives to economise and nature of shocks)	Operational risk  Legal risk	Go for reliable and fast operational agreements; consider time zone problems, especially if the collateral is required for acute liquidity needs Clear legal agreements with familiar jurisdictions

Source: Capel (2013)

as possible operational and tax complications and, finally, collateral located abroad creates mainly legal and operational risks. Legal risks arise because it takes special expertise and extra time to ascertain whether the collateral meets the statutory quality arrangements and to limit any legal problems when the collateral needs to be sold off. Operational risks relate to the possible adjustments that have to be made in systems and operational

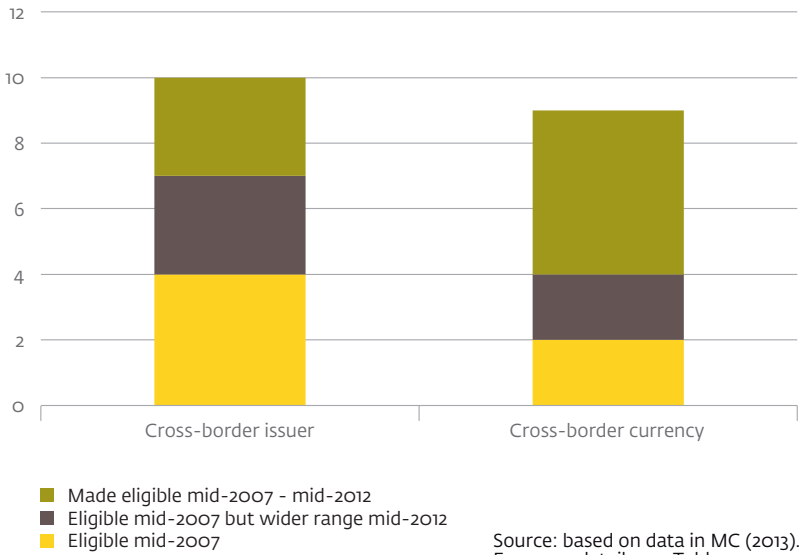
procedures to administer foreign collateral at home and, moreover, to bottlenecks that may occur in the cross-border transfer of collateral once arrangements are in place (see Section 3.6 for a discussion of possible arrangements and their risks).

The risk management implications of these risks differ. Exchange rate risk can be managed relatively easily by hedging, accepting 'hard' currencies only, applying extra haircuts or by using margin calls. Legal and operational risks are usually more difficult to cope with, but arrangements that build on local legal expertise in familiar jurisdictions and that enable reliable and rapid operations could bring such risks back to acceptable levels. Finally, it should be noted that domestic collateral comes with risks too. If domestic high-quality collateral is scarce (e.g. due to downgrades during stress or due to a small market size), it may be better from a risk management perspective to accept high-quality foreign collateral, like e.g. Switzerland is doing, than to lower quality requirements on domestic collateral.

Whereas there were just a few central banks accepting foreign or cross-border collateral before the financial crisis, it is now more common practice. Nine out of twelve central banks accept assets denominated in a foreign currency, whereas ten accept collateral that is issued abroad (see Graph 5, refer to Table 1 for more detail). The conditions for accepting foreign collateral vary widely. For instance, Switzerland's collateral framework is wide in terms of foreign eligible issuer types and currencies, but rather strict in terms of rating requirements, whereas the Eurosystem accept a very wide range of marketable assets issued abroad as long as the issuer is from the euro area. Moreover, some central banks accept foreign cash as collateral, usually on an emergency-only basis to address moral hazard concerns. For instance, during the most recent financial crisis many central banks, including the ECB and Fed, entered into inter-central bank swap agreements or came to emergency liquidity arrangements on the

### Graph 5 Foreign collateral eligibility (July 2012)

No. of central banks (survey of 12)



basis of cash collateral.<sup>14</sup> One example of regular acceptance of foreign cash is the Scandinavian Cash Pool (SCP), operated by Denmark, Sweden and Norway. The SCP enables liquid assets held at the central bank of one of these three countries (i.e. cash collateral) to be used for obtaining

<sup>14</sup> For instance, De Nederlandsche Bank (DNB) has such agreements in place with the Hong Kong Monetary Authority (HKMA) and the Monetary Authority of Singapore (MAS). The arrangements entail that a Dutch bank with sufficient collateral pledged to DNB, could – subject to prior agreement of HKMA or MAS and after applying a haircut – obtain liquidity in Hong Kong or Singapore dollars from HKMA or MAS, for which DNB credits the latter’s euro account in TARGET2. The arrangements are reciprocal so that – subject to prior agreement between DNB and the ECB – Hong Kong or Singapore banks could ask for emergency liquidity in euros on the basis of collateral pledged to HKMA or MAS. Other NCBs within the Eurosystem have similar arrangements in place.



intraday credit from the central bank of one of the other two. This SCP was set up when the Scandinavian currencies began to participate in CLS, and Scandinavian banks suddenly needed much more intraday liquidity.

### 3.3.2 Prefer foreign cash or foreign securities as collateral?

#### Relative advantages and disadvantages of foreign cash

If a central bank decides to accept foreign collateral, it needs to consider whether this should be foreign cash and/or certain foreign securities. Compared to foreign securities, foreign cash collateral brings three main benefits to a central bank (Table 4). First, its main risk is exchange rate risk, which is well understood and can be managed through relatively

Table 4 Foreign cash or foreign securities?

	Foreign cash	Foreign securities
Advantages	<ul style="list-style-type: none"> <li>+ The main risk i.e. (exchange rate risk) is relatively easy to manage</li> <li>+ Relatively straightforward operational arrangements</li> <li>+ Enables relatively fast cross-border transfers</li> <li>+ Easy to obtain for counterparties</li> </ul>	<ul style="list-style-type: none"> <li>+ No impact on foreign liquidity and foreign monetary policy</li> <li>+ Will not be interpreted as a foreign exchange intervention or distort private swap markets</li> <li>+ Is cheaper for counterparties (especially if less liquid assets can be used)</li> </ul>
Disadvantages	<ul style="list-style-type: none"> <li>– Possible effect on foreign liquidity and foreign monetary policy</li> <li>– Central bank swaps may be misinterpreted as foreign exchange intervention and could distort the private swap market</li> <li>– Relatively costly for counterparties</li> </ul>	<ul style="list-style-type: none"> <li>– Complex operational arrangements</li> <li>– Cross-border securities transfers can be slow</li> <li>– Not only exchange rate risk for the central bank, but also legal and operational risks.</li> <li>– Counterparties' access may be limited</li> </ul>

Source: Capel (2011)

straightforward risk control measures. Second, cash arrangements are less complex and therefore easier to implement than securities arrangements, since all the central bank needs is an account with a foreign bank or foreign central bank (see Section 3.6 for more details). Finally, cash transfers can be arranged much faster than securities transfers, possibly even on a same-day basis if the operating hours of the two payment systems concerned have sufficient overlap. From the perspective of the counterparty, foreign cash arrangements are attractive because foreign cash is relatively easy to come by (while obtaining suitable foreign assets may be more difficult).

Disadvantages of foreign cash collateral are the possible impact on foreign currency liquidity and the demand for foreign currency, which could affect the monetary policy of another country. Moreover, if inter-central bank swaps are used as an operational model (see section 3.6), the central bank's action may be misinterpreted as a foreign exchange intervention, and there is a risk of crowding out the private swap market.<sup>15</sup> A final disadvantage of foreign cash is that it is potentially costly for the counterparty (particularly if used as collateral for longer-term lending and if interest rates are high).

#### Relative advantages and disadvantages of foreign securities

Advantages of accepting foreign securities over foreign cash include cost efficiency for the counterparty, especially if the central bank accepts less liquid assets as collateral, and the absence of a direct impact on foreign currency liquidity or foreign monetary policy. In addition, a central bank's action cannot be misinterpreted as a foreign exchange intervention or distort private swap markets.

---

<sup>15</sup> The aim of inter-central bank swaps is to remedy problems in the international distribution of liquidity, its consequence is that central banks accept a foreign currency credit at another central bank as collateral (see Section 3.6 for more details).

Disadvantages include more complex operational arrangements (see Section 3.6) and the possibly significant amount of time needed before the counterparty can deliver its securities to the central bank. The latter may rule out using foreign securities for central bank credit on a same-day basis. Third, partly as a result of the previous two, foreign securities are riskier for a central bank than foreign cash, as there are also legal and operational risks in addition to foreign exchange risk. A final disadvantage of securities as compared to cash is that some counterparties may face difficulties in acquiring suitable foreign assets.

## 3.4 Risk control measures

### 3.4.1 What can central banks do to achieve better risk protection?

A central bank's level of risk protection is determined by counterparty eligibility, collateral eligibility and risk control measures (Figure 3). However, eligible counterparties are typically selected with a broader view than risk management alone.<sup>16</sup> The same holds true for the breadth of the collateral framework (i.e. eligible assets in terms of asset type), which is primarily determined by the need to ensure that eligible counterparties have adequate collateral available to carry out any necessary operations with the central bank. Hence, in practice, central bank risk management often leans heavily on quality standards (e.g. minimum credit ratings) for eligible assets (i.e. the depth of the collateral framework) and subsequent risk control measures taken. Risk neutrality (the concept that, once risk control measures have been implemented, all its collateral assets should carry the same residual risk) could be an objective for the central bank. This would result in a level playing field for all eligible assets and would avoid any unintended market distortions. Risk neutrality can be achieved by

---

<sup>16</sup> For instance, one of the Eurosystem's guiding principles is to give a broad set of counterparties equal access to Eurosystem operations.

44 using market-based prices and by letting haircuts reflect the actual credit, market and liquidity risk (see below).

Many central banks have broadened and/or deepened their collateral frameworks in response to the financial crisis and have tightened risk control measures to remain adequately protected against risks. For instance, the average haircut applied to counterparties' collateral within the Eurosystem increased steadily between 2008 and 2013, reflecting changes in the eligibility criteria that allowed counterparties to pledge collateral assets with a riskier profile than prior to 2008 (ECB (2013a), p. 82 and Wolff (2014)).

Central banks that lend against collateral may still incur a financial loss if the following two adverse events were to take place: first, the counterparty defaulting on its obligation to the central bank lender and, subsequently, the value of the collateral turning out to be insufficient to cover the borrower's obligation once the central bank sells the underlying collateral. Insufficient collateral value could be caused by (1) credit risk and (2) market and liquidity risk on the collateral.

Credit risk on collateral stems from the fact that the issuer of the security – or the debtor of the claim – used as collateral could default too, which would imply a 'double default' (i.e. of the central bank's counterparty and of the collateral asset's issuer or debtor). Central banks can minimise the probability of such a double default by restricting eligibility to assets of high credit quality and prohibiting that loans are collateralized with assets issued by the borrower (or by entities with close financial links to the borrower). Another measure to reduce credit risk is to apply concentration limits to the use of certain riskier collateral asset types or to the amount of collateral assets from the same issuer, debtor or guarantor (Table 5).

## Table 5 Central bank options to achieve better risk protection

	<u>Policy options</u>	<u>Central bank considerations</u>
Counterparty eligibility	<ul style="list-style-type: none"> <li>■ Conducting operations with high credit quality counterparties only</li> <li>■ Limits on counterparty exposure depending on credit quality</li> </ul>	<ul style="list-style-type: none"> <li>■ May clash with possible objective of broad counterparty access</li> <li>■ Could send unintended signals to the market</li> <li>■ May be inefficient from a policy perspective (monetary, financial stability and payments policy)</li> </ul>
Collateral eligibility	<ul style="list-style-type: none"> <li>■ Restrict the range of eligible asset types (Narrow collateral framework)</li> <li>■ Raise rating requirements on eligible assets ('Shallow' collateral framework)</li> </ul>	<ul style="list-style-type: none"> <li>■ Broader framework may be needed to ensure that counterparties have adequate collateral available.</li> <li>■ Same for deeper framework</li> <li>■ Avoid over-reliance on credit rating agencies</li> </ul>
Risk control measures	<ul style="list-style-type: none"> <li>■ Prohibition of self-issued or closely linked collateral</li> <li>■ Concentration limits</li> <li>■ Marking-to-market/variation margining</li> <li>■ Valuation haircuts</li> <li>■ Initial margin</li> </ul>	<ul style="list-style-type: none"> <li>■ Broader framework may be needed to ensure that counterparties have adequate collateral available.</li> <li>■ Aim for stable through-the-cycle haircuts</li> <li>■ Avoid 'overly' procyclical initial margins</li> </ul>

The collateral's market and liquidity risk arise from possible declines in collateral value between the counterparty's default and when the central bank can sell the collateral. Market risk is the risk of a lower market value of collateral due to exogenous price declines, whereas liquidity risk refers to the potentially negative impact on the market price induced by the collateral portfolio's liquidation. Market and liquidity risk can be reduced considerably by following best practices in the valuation of assets and applying risk control measures. Best practices consist of so-called 'variation margining', i.e. daily marking to market of the collateral's value and making margin calls as soon as they are needed.<sup>17</sup> Risk control measures could include valuation haircuts to collateral values, i.e. deductions (expressed as percentages) from the asset's market value to cover normal daily price fluctuations due to market and liquidity risk.<sup>18</sup> A similar control measure is an initial margin requirement, which requires counterparties to pledge extra collateral upfront to cover the collateral portfolio's market and liquidity risk after a possible default. Finally, concentration limits could not only help to reduce the collateral's credit risk, as mentioned above, but also contribute towards reducing market and liquidity risks.

### **3.4.2 Central banks and procyclicality**

An important question for central banks is how to make the trade-off between their own risk protection and the avoidance of procyclicality during a financial crisis. Procyclicality refers to the mutually reinforcing interactions between the financial and real sectors of the economy that

---

<sup>17</sup> If securities markets are efficient and liquid, the market price tends to be the best indicator of the asset's value. In the absence of such markets, theoretical valuation models can be used.

<sup>18</sup> For the purpose of defining adequate valuation haircuts, market risk is measured by asset price volatility (and usually calculated with the Value-at-Risk or VaR), while liquidity risk is expressed in terms of the time required for an orderly realisation of the asset's value. See Rule (2015) for a discussion of different risk management techniques and examples from Bank of England practice.

tend to amplify business cycle fluctuations and cause or exacerbate financial instability. Given the role of central banks in promoting financial stability, they could be expected to refrain from procyclical behaviour. Yet, some procyclicality is inevitable for central banks that adhere to best practices in collateral management: marking-to-market (variation margining) implies that central banks need to make extra margin calls when asset prices fall. This has a procyclical impact: counterparties are asked to provide more collateral when pressures on the available stock of high-quality collateral are already high.

Central banks can reduce the procyclicality of their own collateral policy in two ways. The first is to opt for a 'narrow when possible' collateral framework, as this would make eligibility countercyclical (see Section 3.2). This is reinforced by the fact that broader collateral frameworks typically include lower-quality assets, whose risks are more difficult to predict, so that during a downturn central banks may find it necessary to make procyclical adjustments to haircuts or other control measures. Secondly, central banks may lower the procyclicality of their discretionary risk control measures by aiming for stable through-the-cycle haircuts and avoiding 'overly' procyclical initial margins. Indeed, central banks represented in the Committee on the Global Financial System (CGFS (2010)) and in the Financial Stability Board (FSB (2014b)) call upon market participants in repo, securities lending and OTC derivatives markets to make sure that their haircuts and initial margins are not overly procyclical. Market participants are, for instance, expected to adopt haircut methodologies that limit the extent to which haircuts decline in benign market environments, thereby mitigating the magnitude of the potential increase in volatile markets. It therefore makes sense for central banks to set a good example.

Finally, given their financial stability mandate, it is important that central banks not only reduce the procyclicality of their own collateral policy, but also take measures to bring down procyclicality and leverage within the financial system as a whole. Important recent measures taken are the FSB's recommendations regarding qualitative standards for haircut methodologies and numerical haircut floors for certain securities financing transactions (FSB (2014b)). The existing preferential treatment of government securities as collateral and its impact on procyclicality and leverage is an area where further progress could be made.

### **3.4.3 Internal versus external ratings**

Central banks need to be aware not only of undue procyclicality in their risk control measures, but also of possible procyclicality in their quality assessment of collateral assets. This could easily occur if external ratings, i.e. ratings from credit rating agencies (CRAs), play too dominant a role in assessing risks. During the most recent financial crisis, the overreliance on CRA-ratings led to herding behaviour and abrupt sell-offs of securities when they were downgraded ('cliff effects'). This amplified procyclicality (see FSB (2010) and (2014a)). The FSB therefore issued Principles in 2010 in order to reduce reliance on these external ratings. One of these Principles called upon central banks to make their own credit judgements and rely more on internal ratings or risk assessments (see Box 1). But there are disadvantages for the central bank too: it will need to build up the necessary expertise to make reliable credit quality assessments and any mistake made, especially if ratings are disclosed (see next section), could negatively affect its reputation.

In July 2012, five out of twelve central banks relied on external ratings (AU, CA, SE, CH and US) and an equal number on internal ratings (JP, KR, SN, MX and UK, Graph 6). The euro area uses both in a common risk framework, whereas India does not use ratings at all (since eligible



## Box 1 Principle III.1 on central bank operations:

Central banks should reach their own credit judgements on the financial instruments that they will accept in market operations, both as collateral and as outright purchases. Central bank policies should avoid mechanistic approaches that could lead to unnecessarily abrupt and large changes in the eligibility of financial instruments and the level of haircuts that may exacerbate cliff effects.

Central banks should avoid mechanistic use of CRA ratings by:

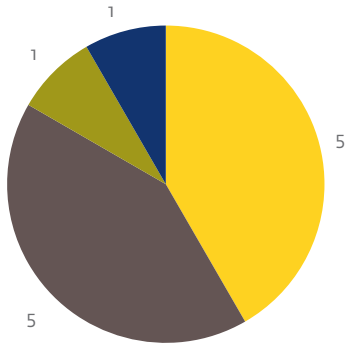
- except when infeasible, making independent determinations of whether a financial instrument should be eligible in its operations (both by being prepared to reject assets offered as collateral or for outright purchase despite their external ratings and by assessing whether any external rating change should lead to a change in a financial instrument's eligibility or haircut);
- reserving the right to apply risk control measures such as additional haircuts to any individual financial instruments or classes of collateral based on an internal risk assessment; and
- reserving the right to apply additional risk control measures such as additional haircuts to any individual financial instrument that has not been subject to an internal risk assessment by the central bank.

Source: FSB (2010), p. 3

collateral comprises mostly domestic sovereigns). In a peer review report of the FSB Principles for Reducing Reliance on CRA Ratings (FSB (2014a)) it was noted that many central banks have expanded their own credit risk assessment capabilities and are using multiple indicators for determining

## Graph 6 External or internal ratings?

Survey of 12 central banks



- external
- internal
- both (common framework)
- not applicable

Source: based on data in MC (2013)

creditworthiness. Yet, almost all central banks continue to use CRA ratings in some way to determine eligibility of securities, issuers and counterparties, although the degree and frequency vary across jurisdictions and activities (FSB (2014a)). Many central banks have recently made progress toward developing internal credit risk assessments or intend to do so in the near future. Some central banks, however, have no ambition in this area, usually because they consider their own use of CRA ratings to be non-mechanistic and therefore acceptable.

## 3.5 Transparency, efficiency and collateralization technique

Apart from the substance of the collateral framework, which is determined by counterparty eligibility (Section 3.1), collateral eligibility (Sections 3.2 and 3.3) and risk control measures (Section 3.4), there are several operational issues that central banks have to consider. Important issues are the transparency and efficiency of the collateral framework as well as the choice of collateralization technique. These issues are discussed below. Moreover, central banks accepting foreign collateral need to choose an appropriate operational arrangement, whose different options are presented in Section 3.6.

### 3.5.1 Complexity versus transparency and efficiency

Many central banks broadened and/or deepened collateral eligibility in response to the financial crisis to assure their counterparties of enough available central bank eligible collateral. This broadening and deepening, in turn, required a strengthening of central banks' risk control measures to assure an adequate degree of risk protection. As a result, the collateral frameworks of central banks have become much more complex. Particularly in rules-based systems, where granular decisions are made on the eligibility of individual assets and their correspondent risk control measures, this has negatively affected the central bank's transparency and efficiency, one of the high-level collateral policy objectives.

### 3.5.2 Disclose details (rules-based) or not (principles-based)?

Central banks, with just some minor exceptions, tend to be quite transparent about the general characteristics of their collateral frameworks: eligibility criteria (such as security type, issuer type and currency denomination) as well as general risk control features (such as the schedules of haircuts or initial margins) are almost always published (see MC (2013), p. 14).

But views are mixed as to whether central banks should also disclose the actual eligibility of individual securities and the effective haircuts (including any discretionary variations applied to them).

A central bank's decision on whether or not to disclose details on the eligibility of individual assets is closely related to the question as to whether asset eligibility should be rules-based or principles-based. A rules-based collateral list indicates which individual assets are accepted by the central bank as collateral, and under which conditions. Its counterparties then have detailed information on which assets are eligible, enabling them to make well-informed choices. Disadvantages include that, if circumstances change, the collateral list needs to be adjusted and that suspension of central bank eligibility of specific assets could send unintended signals to the market. Another disadvantage of a rules-based framework is that it can be quite complex, particularly if the central bank has a broad collateral framework (see above). A rules-based framework thus provides detailed information, however, it is not necessarily transparent.

A principles-based framework is simpler and more flexible than a rules-based framework. If circumstances change, central banks can change the details of the collateral assets they accept without explicit notification. This tends to make a principles-based framework more cost efficient. This simplicity, however, also has a price: counterparties may not be sure whether their specific assets will be accepted as collateral by the central bank and there is less scope to tailor the eligibility conditions to the characteristics of individual assets.

A related transparency issue is whether the central bank should disclose the details of its risk control measures. An advantage of disclosure is again that it enables counterparties to make well-informed collateral decisions, as they know exactly which conditions they face. The main disadvantage

is that it may influence credit quality assessments by market participants (who may decide to use the central bank's risk management measures instead of making their own risk assessments) and even feed speculation if the central bank tightens its risk control measures. One important factor influencing disclosure practice is the central bank's approach towards credit risk assessment. Unsurprisingly, central banks using internal ratings are on the whole more reluctant to publish, in real time, any changes in the eligibility of individual securities and/or any changes in risk control measures (see MC (2013), p. 15). Finally, central banks that decide to disclose the details of their risk control measures need to retain some room for discretion. During a financial crisis instantaneous adjustments in risk control measures may be necessary, e.g. a supplementary haircut may have to be imposed on grounds of prudence.

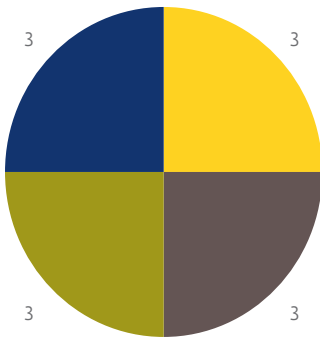
Three central banks (AU, SE and CH) of the twelve in the survey publish details on both the eligibility of individual assets and discretionary haircut changes. Three central banks (EA, SG and UK) publish (or make available on request) details on assets eligibility but not on discretionary changes in haircuts (Graph 7). The remaining six central banks (CA, IN, JP, KR, MX and US) do not publish any specific details. Some of these central banks (IN, KR and MX) view detailed disclosure as 'non-applicable' (see MC (2013), p. 14 for details), for instance because they accept a narrow set of – mostly domestic sovereign – securities, reducing the need to publish details about individual securities.

### **3.5.3 Earmarked (repo'd) versus pooled (pledged) collateral**

Another operational issue is the collateralization technique used by the central bank: earmarking or pooling. Earmarking implies that the central bank assigns the collateral assets provided by the counterparty to a certain credit operation. In a pooling system, the collateral value of the pool as a whole, rather than specific assets, protects the credit granted to the

## Graph 7 Details published?

Survey of 12 central banks



- yes
- yes eligibility, no haircuts
- no
- not applicable

Source: based on data in MC (2013)

counterparty. Pooled collateral is often provided to the central bank on the basis of a pledge, while earmarked collateral is provided using a repo. After all, in repos it is operationally easy to establish a direct link between the collateral provided and the credit operation for which it is used, while this is more difficult in pledges. However, it is also possible to earmark pledged collateral for a specific operation or to combine repo'd collateral into a collateral pool.

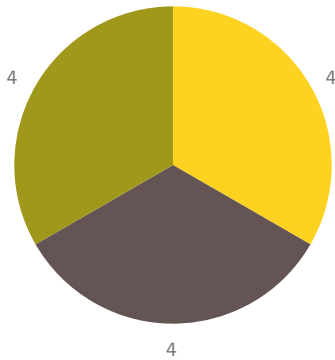
An advantage of pooling is that it encourages counterparties to pledge extra collateral to the central bank as a precautionary measure. This overcollateralization offers extra protection to the central bank and the counterparty in case of market turbulence. A repo, which implies title transfer of the assets, is often preferred in countries where pledged collateral gives legal uncertainties in the event of a counterparty default,

which is why such countries tend to earmark. Another advantage of earmarking is that counterparties only provide collateral when needed, enabling them to use their available collateral more efficiently.

According to the BIS survey of twelve central banks, four central banks use pooled systems (EA ,<sup>19</sup> JP, SE and UK <sup>20</sup>) and four manage collateral using earmarked systems (AU, IN, MX, and SN, Graph 8) The remaining four (CA, KR, CH and US) have earmarked collateral for OMO while pooling collateral for SF.

### Graph 8 Earmarked or pooled?

Survey of 12 central banks



- (mostly) pooled
- earmarked
- earmarked OMO, pooled SF

Source: based on data in MC (2013)

<sup>19</sup> The Banco de España (BdE) works with both earmarked and pooled collateral, but is moving towards pooling.  
<sup>20</sup> The Bank of England used to earmark collateral but uses pooling as of October 2014.

## 3.6 Operational arrangements for foreign collateral

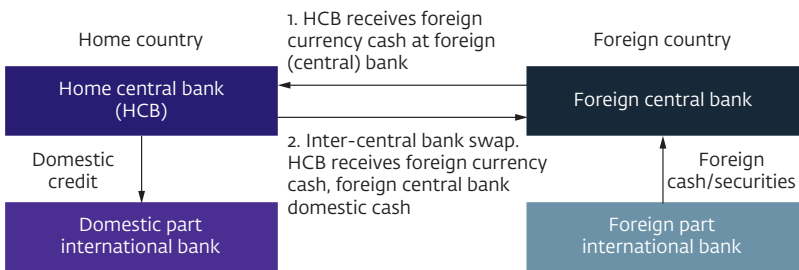
### 3.6.1 Operational arrangements for receiving foreign cash

Central banks that have decided to accept foreign collateral (see the relevant considerations in Table 3) in the form of foreign cash (see considerations in Table 4), will have to set up an operational arrangement for receiving foreign cash as collateral. Various operational arrangements are possible. A simple arrangement is one where the home central bank holds an account – to receive foreign currency cash – with a correspondent foreign commercial bank. However, this exposes the central bank to counterparty risk. A safer arrangement is therefore one in which the foreign central bank acts as a correspondent.

Two operational arrangements for receiving foreign cash collateral can be distinguished: an emergency liquidity arrangement and an inter-central bank swap. To discuss these, consider a domestic entity in urgent need of domestic credit but having only foreign cash available (or foreign securities which it can use to raise foreign cash). An emergency liquidity arrangement between the home and foreign central bank is one way to tackle the problem. The foreign central bank would take the required collateral from the foreign part of the international bank and credit the account of the home central bank. The latter can then, after applying a possible haircut on the foreign cash received, extend credit to the domestic part of the firm (see Figure 6). An alternative arrangement to deal with liquidity stress is to establish an inter-central bank swap line. In that case the foreign central bank receives a domestic currency loan from the home central bank, and lends the amount received to the international bank. As collateral on its loan, the home central bank receives a credit on its account with the foreign central bank.



Figure 6 Cash arrangements (1. Liquidity arrangement and 2. swap)



Source: adapted by author from CPSS (2006)

The operational differences between these two solutions are small. Both arrangements are relatively straightforward and can be implemented swiftly. Pre-signed agreements between central banks have the advantage of ensuring everyone is ready to act if a crisis occurs, but come at the price of potentially stronger moral hazard. One difference is that a liquidity arrangement is unlikely to be misinterpreted as a foreign exchange intervention. Another is that it will not distort private swap markets. The arrangements can also differ with respect to the central bank extending the loan to the commercial bank (the home central bank in case under the liquidity arrangement described above, and the foreign central bank under the swap arrangement).

### 3.6.2 Operational arrangements for receiving foreign securities

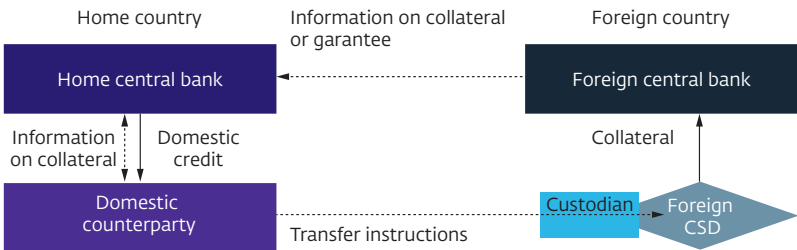
Central banks that are willing to accept foreign securities collateral have five possible arrangements open to them. To illustrate these, consider the case of a domestic counterparty that urgently needs liquidity from its home central bank, but that only has unencumbered foreign securities (held at the foreign central securities depository) as collateral. The basic operational

question is how these foreign securities can be transferred to a securities account of the home central bank.

The first two arrangements are built on cooperation with the foreign central bank. In the **correspondent central banking model (CCBM)** the foreign central bank acts as a correspondent or custodian for the home central bank, a model used within the Eurosystem. Once the domestic central bank has been informed by the foreign central bank that the latter has received the securities on its behalf, it can extend the domestic currency loan on the basis of this collateral (see Figure 7 for a simple representation). The **guarantee model** is technically very similar to the correspondent central banking model (see also Figure 7), the main difference being that the home central bank does not receive (information on) foreign collateral, but an inter-central bank guarantee instead.

Advantages of these two arrangements are that, in principle, no new infrastructure is needed and only some investments have to be made in legal opinions, internal resources and IT. Moreover, the involvement of

**Figure 7 Security arrangements with cooperation of the foreign central bank**



Source: adapted by author from CPSS (2006)

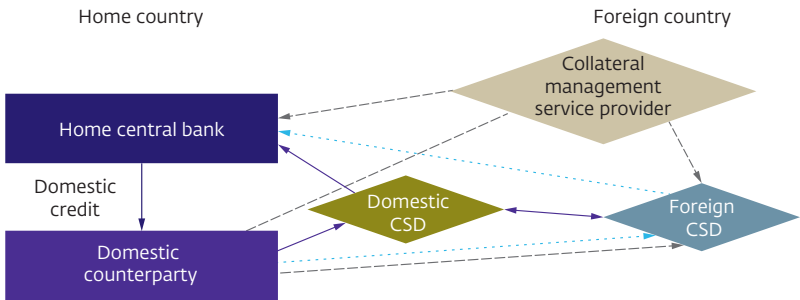
the foreign central bank reduces risks for the domestic central bank. Legal risks are likely to be lowest for the guarantee model (under which the central bank does not own foreign collateral), but are probably also limited under the CCBM as a central bank can usually get legal advice from its colleague abroad when needed (e.g. on the valuation of the securities or on procedures if the collateral needs to be sold off). Operational risks are relatively low for these arrangements because they do not require new infrastructure and do not involve any dependency on other, unknown systems or entities (see below).

Involvement of the foreign central bank is not necessary. [Links between securities settlement systems \(SSS\)](#), often operated by CSDs, create another possibility for a cross-border transfer of securities. In that model the counterparty organises that its securities in the foreign CSD are transferred to the domestic CSD's account with the foreign CSD and, subsequently, the domestic CSD credits the home central bank's accounts (purple solid lines in Figure 8).<sup>21</sup> Another alternative is [remote access](#). If both the counterparty and the home central bank have remote access to a foreign CSD, the counterparty can send its transfer instruction directly to the foreign CSD, which transfers the securities to the home central bank's account (blue dotted lines in Figure 8). Under the last possible operational arrangement, the home central bank and its counterparties are both connected to a [Collateral Management Service Provider \(CMSP\)](#), which could be located in any country (the home country, the foreign country or a third country). A CMSP manages collateral transfers between collateral-demanders and collateral-suppliers, such as a triparty collateral service operated by an (I)CSD or custodian (see Section 4.6 for more details). In this

---

<sup>21</sup> Note that within the Eurosystem the go-live of TARGET2-Securities will raise the efficiency of collateral transfers through these links.

## Figure 8 Security arrangements without involvement of the foreign central bank



Source: adapted by author from CPSS (2006)

case the counterparty instructs the CSD to transfer the securities to the CMSP. The latter transfers these to the account of the home central bank (grey dashed lines in Figure 8).

These three operational arrangements (links between SSS, remote access and a CMSP) entail some costs for the central bank. Establishing the necessary connections will require no initial investment (links between SSS) or only a limited investment (remote access and interface to CMSP), but the central bank will need to invest in know-how on foreign securities and, in the case of remote access, on processes at the foreign SSS. In the case of a CMSP, the central bank pays (possibly high) service costs. A more significant issue than these costs is that these three arrangements make the provision of domestic liquidity dependent on processes that are possibly beyond the central bank's control. Although links between securities settlement systems must comply with international standards, it is not certain that the central bank can enforce compliance with these

standards and that these links can be relied on.<sup>22</sup> In the case of remote access, the home central bank would need to be well informed about the functioning of the foreign SSS (to limit operational risks) and will want to ascertain that the foreign SSS is subject to adequate oversight. In the case of a foreign CMSP, the home central bank should be aware of the operational and legal risks involved and be able to manage these, but the oversight instruments and the influence over the CMSP may be limited. These are risks that should be carefully considered.

While an overall assessment can only be made after detailed consideration of the characteristics of the different arrangements, it seems that in most cases legal and operational risks are lower where cooperation between central banks is sought.

---

<sup>22</sup> Within the Eurosystem securities settlement systems of (I)CSDs are assessed under the Eurosystem's User Assessment Framework (UAF) to determine their eligibility for use in Eurosystem credit operations. Also the links between these systems are periodically assessed.

# 4. Topical collateral policy issues

62

This chapter discusses topical policy issues that are currently highly relevant for the central bank's collateral policy. One such topic is whether the increased demand for high-quality collateral leads to collateral scarcity, as some market participants currently fear. The answer to this question is very important for central banks because they can only pursue their monetary policy, financial stability policy and payment system policy goals if their counterparties have enough central bank eligible collateral. If central banks decide to broaden or deepen their collateral framework in response to increased demand for collateral, this could negatively affect the quality of collateral pledged to them, and risk control measures may be called for. Moreover, the strategies adopted by financial institutions to cope with an increase in demand for high-quality collateral, such as collateral optimization and transformation, with or without the assistance of collateral management service providers, raise possible financial stability concerns for central banks. Other topical policy questions for central banks include whether there are exceptional circumstances in which central counterparties and other non-banks could be made eligible for central bank emergency lending, and whether central banks should encourage or discourage collateral re-use and collateral velocity. Finally, central banks are now paying more attention to the impact they have on collateral markets, i.e. their 'collateral footprint'. These topical themes are discussed below.

## 4.1 Collateral supply and demand

### 4.1.1 Collateral supply versus the sector's demand for collateral

The demand for high-quality liquid collateral has increased substantially since the financial crisis, leading to concerns among some market participants that high-quality collateral is becoming scarce. One driver is that financial institutions need more collateral to attract funding as market participants have become more risk averse and thus less willing to provide unsecured funding. Other drivers include the new regulations for

over-the-counter (OTC) derivatives transactions<sup>23</sup> and the Basel III liquidity standards, which are boosting financial institutions' demand for high-quality collateral. As central banks consider it very important that there is 'adequate collateral availability' for their counterparties (see Section 2.2), the issue of possible collateral scarcity has led to a debate among central banks and other authorities, encouraging further analysis of the issue (e.g. CGFS (2013) and IMF (2012)). The first quantitative estimates of collateral demand and supply, which focused on the euro area, can be found in Levels and Capel (2012), with some updates in Capel and Levels (2014). A more global perspective on the scarcity issue and the related issue of asset encumbrance was taken by the Committee on the Global Financial System (CGFS (2013)).

Available estimates reveal that concerns about an absolute shortage of high-quality assets appear unjustified. Data presented in the CGFS study suggest that the liquidity standards and OTC derivatives reforms together could generate an additional collateral demand worldwide of about \$4 trillion, whereas the supply of high-quality collateral assets, 'narrowly' defined by the outstanding amounts of AAA- and AA-rated government securities, increased by \$10.8 trillion between 2007 and 2012. Other 'broader' measures suggest even greater increases in collateral supply.

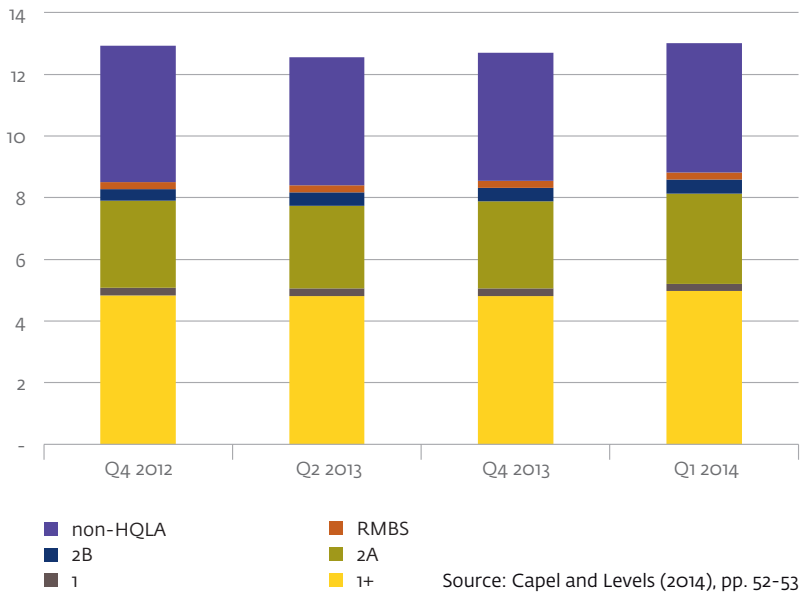
More detailed estimates for the euro area show that total supply remains more than double total demand, supporting the conclusion above that an absolute shortage of high-quality collateral is unlikely, although – in contrast to the global CGFS data – euro area collateral demand growth is outpacing supply growth. Graph 9 shows the development of collateral supply in the euro area, measured as collateral value after haircut, ranging from the highest quality of collateral assets (labelled 1+ and 1)

---

23 See Anderson and Jøeveer (2014) for an overview of the academic literature on the implications of central counterparty clearing for the use of collateral.

### Graph 9 Estimated supply high-quality collateral

EUR trillion

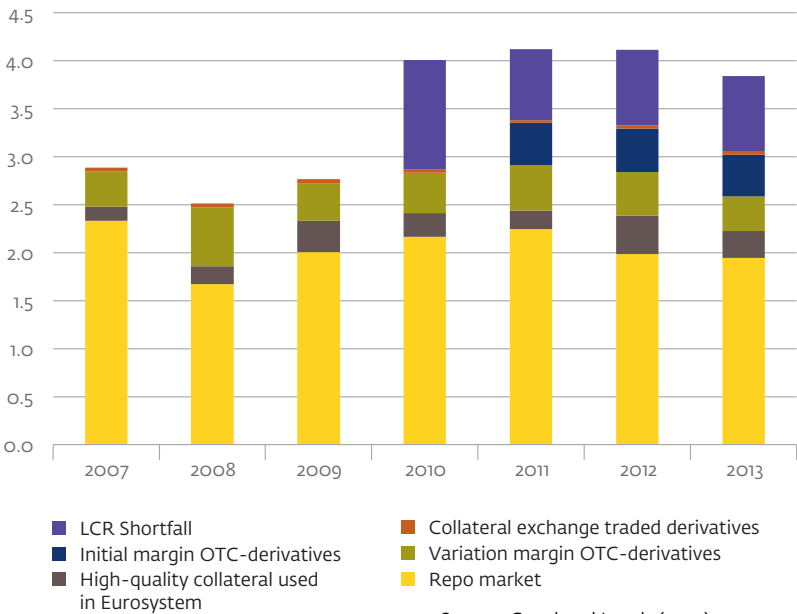


to assets that are of sufficiently good quality to be accepted as collateral by the Eurosystem but that are not generally considered high-quality liquid assets (HQLA) by market participants (labelled non-HQLA and RMBS). This graph shows that the supply of high-quality collateral (categories 1+ to 2B) increased by approximately EUR 320 billion between the fourth quarter of 2012 (no data available before 2012) and the first quarter of 2014, amounting to EUR 8.6 trillion. Graph 10 shows a rough estimate of the demand for high-quality collateral in the euro area between 2007 and 2013, assuming full and immediate effectiveness of the liquidity standards



## Graph 10 Estimated demand high-quality collateral

EUR trillion



Source: Capel and Levels (2014), pp. 52-53

and OTC derivatives regulation in 2010. The demand fluctuates around EUR 4 trillion between 2010 and 2013, which is almost 40% above the collateral requirement at the end of 2007 (of EUR 2.9 trillion).

So far, this discussion on collateral scarcity has focused on aggregate developments in collateral demand and collateral supply, concluding that there is enough supply of high-quality assets to meet collateral demand. But if the available high-quality assets cannot be transferred by the financial institutions that need them, or if they are transferable but

not in an efficient way, collateral scarcity could still be an issue. In other words, apart from aggregate collateral demand and supply, the 'velocity of collateral' is important too in determining how scarce high-quality collateral is in practice. Section 4.7 discusses collateral velocity and its relation to collateral re-use and collateral re-hypothecation, as well as quantitative easing's impact thereon.

#### **4.1.2 Collateral shortages in individual countries or institutions?**

Even if there is enough collateral available in the worldwide financial system, individual countries or financial institutions could still experience collateral shortages. The Committee on the Global Financial System observes that the collateral adequacy varies markedly across jurisdictions and that in some countries temporary shortages of high-quality collateral may occur, for instance in countries with low levels of outstanding government debt or in countries where this debt is perceived risky by market participants (CGFS (2013)). Moreover, in countries where the overall amount of available collateral is adequate, there may be individual financial institutions experiencing collateral scarcity, depending on the nature of their business and the size of their liquidity buffers. Finally, there may be individual institutions that do not have an issue with the size of their collateral portfolio but with its composition. Such collateral mismatches are quite plausible because of two recent regulatory initiatives: the liquidity coverage ratio (requiring banks to hold strictly defined buffers of high quality liquid assets) and the obligation to clear via central counterparties (CCPs) for standard OTC derivatives contracts (implying that financial institutions need more cash and highly liquid assets to fulfil margin requirements imposed by the CCP).

Based on interviews with Dutch financial institutions, Capel and Levels (2014) report that most institutions expect their collateral portfolios to be adequate in size but they are not so sure about the adequacy of their

composition. In particular, pension funds and life insurance companies (institutions that hold little cash owing to the nature of their business) indicate that they may run short of cash and other liquid assets when central clearing of standard OTC derivatives contracts and stricter collateral rules for bilateral arrangements enter into force. In normal circumstances and genuine crisis situations, these institutions will find it easy to raise the required cash or obtain other liquid collateral because they typically have large portfolios of longer term high-quality assets to secure a loan. But it is conceivable – in extreme circumstances – that such institutions, although financially sound, would not be able to raise private sector liquidity. This could jeopardise financial stability due to, for instance, forced fire sales of assets, triggering the question whether there could be exceptional circumstances in which non-banks could be eligible for emergency liquidity assistance from the central bank. Section 4.5 discusses this question.

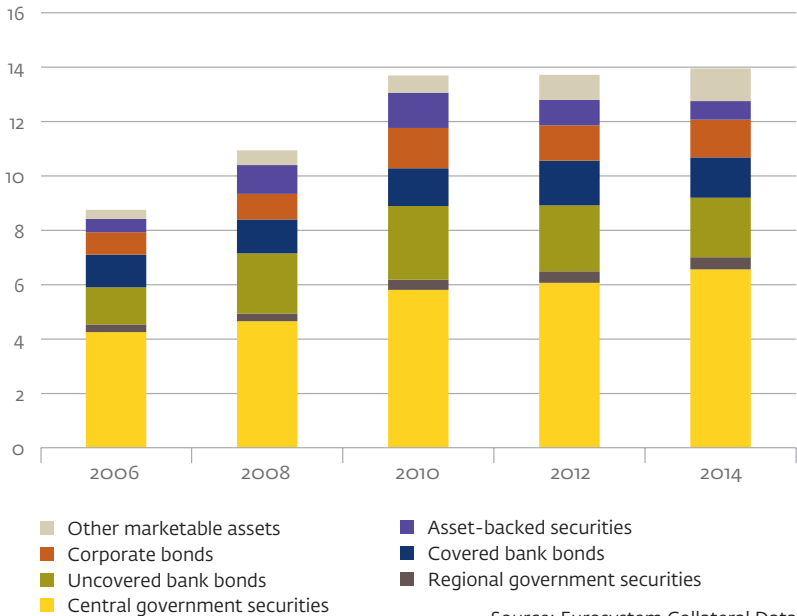
## 4.2 Is 'bad' collateral driving out good collateral?

Many central banks offer broad collateral eligibility relative to regulatory frameworks and central counterparties (ECB (2013)), as well to market participants in e.g. the interbank repo market. This means that there is a tendency to provide lower quality assets to the central bank in order to reserve the higher quality assets for other purposes. This tendency will increase if financial institutions face a potential shortage of high-quality collateral, affecting particularly central banks with broad and deep collateral frameworks. The possible decline in the average quality of central bank collateral has been called 'Gresham's law of collateral' by Chailoux et al. (2008), analogous to Gresham's 'bad money drives out good money' money law.

When comparing the composition of the marketable assets that are **eligible** within the Eurosystem (Graph 11) to the composition of assets that are

### Graph 11 Eurosystem eligible marketable collateral

EUR trillion



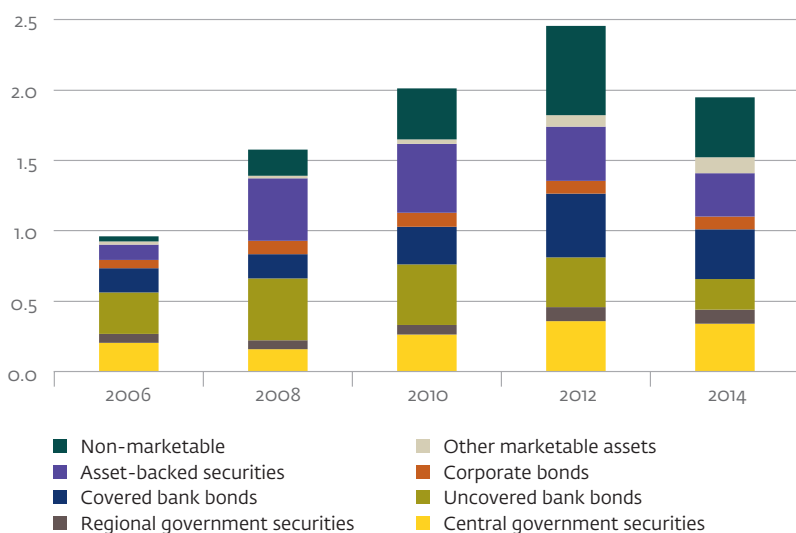
Source: Eurosystem Collateral Data ([ecb.europa.eu/mopo/assets/charts/html/index.en.html](http://ecb.europa.eu/mopo/assets/charts/html/index.en.html))

actually put forward as collateral<sup>24</sup> (Graph 12) to the Eurosystem, reveals a clear trend among counterparties to put forward collateral assets to the Eurosystem that are not eligible (or only eligible with severe haircuts) elsewhere. In particular, note that the share of non-marketable assets in collateral put forward has increased steadily between 2004 and 2012, although this trend has reversed somewhat in recent years (Graph 13).

<sup>24</sup> The term 'collateral put forward' reflects that most of the Eurosystem central banks use pooling as a collateralization technique (see Section 3.5), which does not allow for direct inferences on the collateral actually used by counterparties.

## Graph 12 Eurosystem total collateral put forward

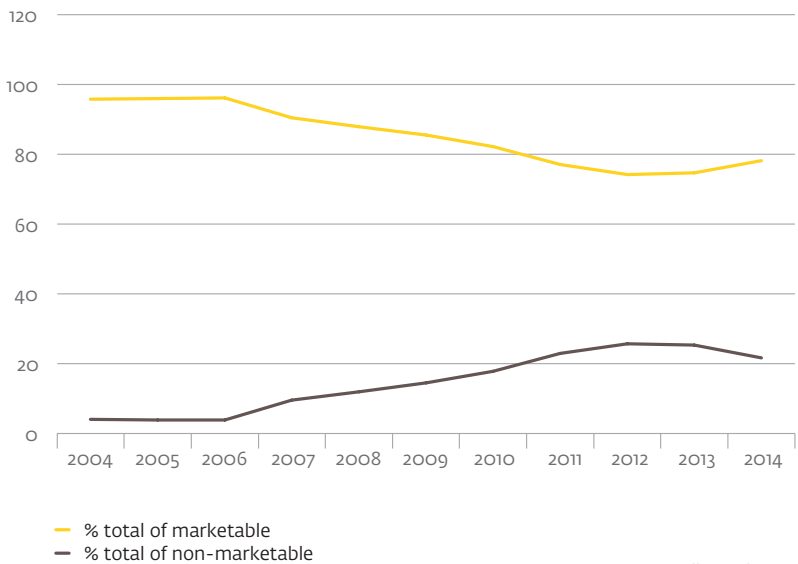
EUR trillion



Source: Eurosystem Collateral Data  
([ecb.europa.eu/mopo/assets/charts/html/index.en.html](http://ecb.europa.eu/mopo/assets/charts/html/index.en.html))

Also striking are the relative **under**representation of central government securities in marketable collateral assets put forward (relative to their share in eligible marketable assets, Graph 14) and the relative **over**representation of both covered bank bonds and asset-backed securities (again relative to eligibility shares, Graph 15 and 16). This reflects the fact that central government securities (if of good quality) are generally eligible as collateral under central banks' frameworks, regulatory frameworks and CCP frameworks, whereas covered bonds and asset-backed securities are often not accepted outside central banks or only under strict conditions or limits (see ECB (2013b), pp. 54-55).

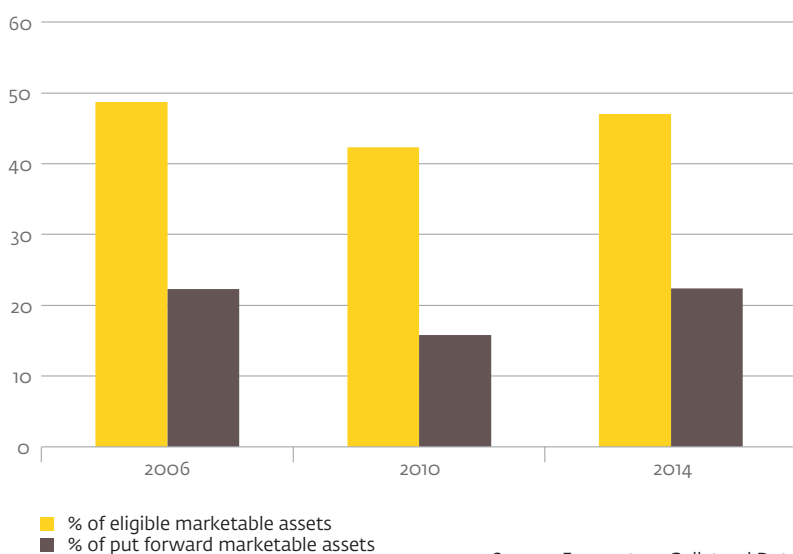
### Graph 13 Use of marketable and non-marketable assets



Source: Eurosystem Collateral Data  
 (ecb.europa.eu/mopo/assets/charts/html/index.en.html)

The relatively high share of asset-backed securities and covered bank bonds has implications for the required risk control measures (Section 3.4), given that these markets are often less liquid and more volatile than those of government securities. Moreover, the value of non-marketable assets needs to be assessed separately, as there are no market prices available.

Graph 14 Central government securities (eligibility versus put forward)



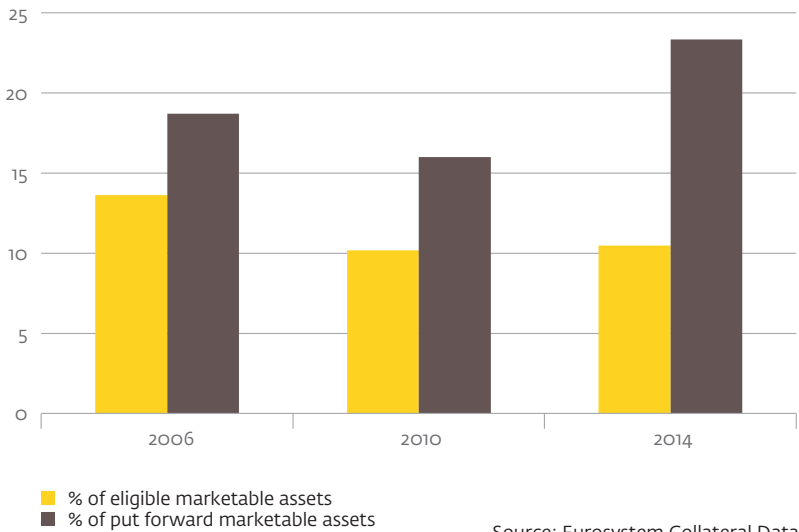
Source: Eurosystem Collateral Data  
([ecb.europa.eu/mopo/assets/charts/html/index.en.html](http://ecb.europa.eu/mopo/assets/charts/html/index.en.html))

## 4.3 Collateral optimization

### 4.3.1 Definition of collateral optimization

As the demand for high-quality collateral has increased sharply in recent years, collateral management has become a greater priority for financial institutions and new strategies have been developed to reduce the probability or size of collateral shortages (see Capel and Levels (2014) and Euroclear (2015) for an overview of new developments in collateral management). One strategy is collateral optimization, which can be defined as the actions undertaken to make the best possible use of the existing portfolio of collateral assets. A first step towards collateral

Graph 15 Covered bank bonds (eligibility versus put forward)



Source: Eurosystem Collateral Data ([ecb.europa.eu/mopo/assets/charts/html/index.en.html](http://ecb.europa.eu/mopo/assets/charts/html/index.en.html))

optimization is a professional collateral information system that provides an up-to-date overview of all the assets that can be used as collateral, their costs, the collateral requirements of the firm’s counterparties and all relevant procedures. When such an overview is available, firms can take further steps to improve their collateral allocation.

An important step towards collateral optimization is to reduce the fragmentation of the collateral over different ‘pockets’ and to create a common collateral pool. The cause of collateral fragmentation can be internal or external to the firm. A possible internal reason is that, until recently, many firms saw collateral management as a back-office



Graph 16 Asset backed securities (eligibility versus put forward)

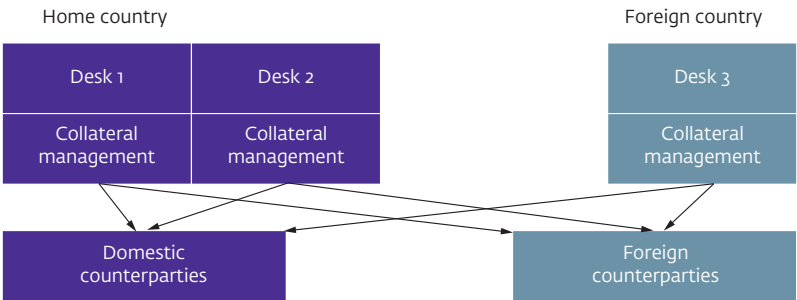


Source: Eurosystem Collateral Data  
([ecb.europa.eu/mopo/assets/charts/html/index.en.html](http://ecb.europa.eu/mopo/assets/charts/html/index.en.html))

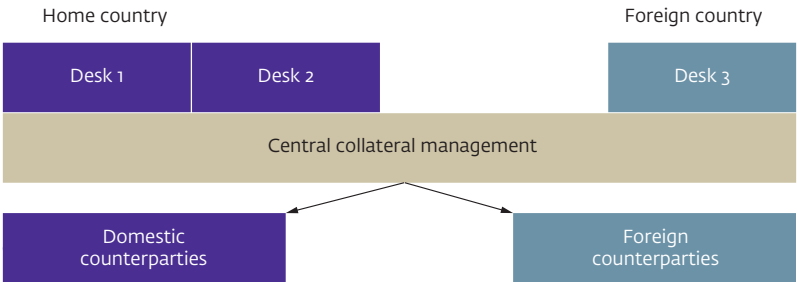
activity and different business lines or desks were responsible for their own collateral management (Figure 9, [upper panel](#)). In times of possible collateral shortages, however, such an internal structure is inappropriate as it leads to suboptimal collateral use at the company level (e.g. one desk may face a collateral shortage at the same time that another has a surplus). Central collateral management (Figure 9, [lower panel](#)) brings internal collateral fragmentation to an end. Firms can either arrange this central collateral function in-house or outsource this to a collateral management service provider.

## Figure 9 Collateral optimization – reducing internal collateral fragmentation

With internal collateral fragmentation



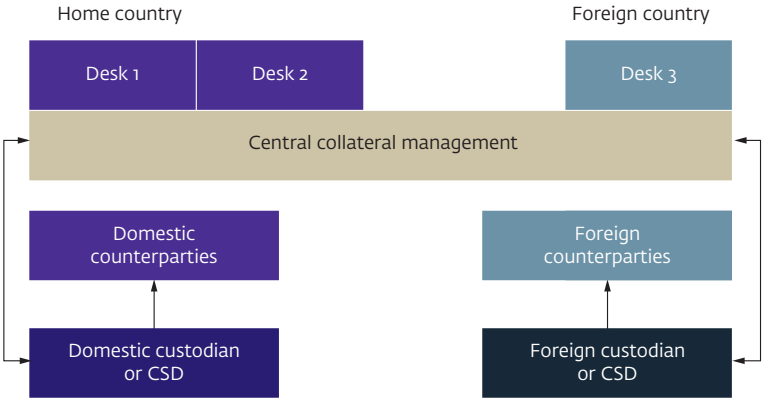
Without internal collateral fragmentation



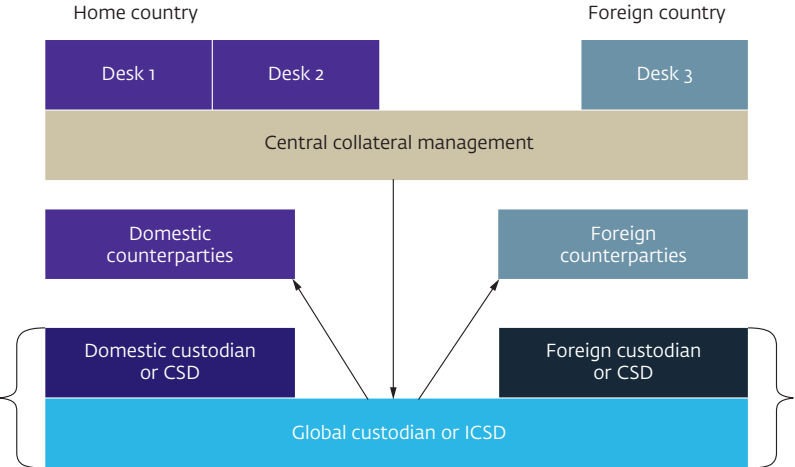
An external reason for collateral fragmentation is that internationally active banks have securities at home and abroad, which are usually kept by custodians or in central securities depositories (CSD) in different countries (Figure 10, upper panel). The firm's counterparties, on the other hand, will often not have accounts at all these custodians or CSDs. This leads to inefficiencies in the use of collateral. For instance, it can be quite difficult or time consuming to use assets kept in the home

# Figure 10 Collateral optimization – reducing external collateral fragmentation

With external collateral fragmentation



Without external collateral fragmentation



country's CSD to collateralize transactions with a counterparty abroad. This 'external' fragmentation problem can be solved by a global custodian or an international securities depository (ICSD), acting as a triparty agent.<sup>25</sup> These large institutions have links with and accounts at many national CSDs and custodians, whereas many counterparties, especially the larger ones, tend to have accounts at these ICSDs and global custodians too. This facilitates cross-border collateral use. In the example here, the financial institution could then transfer assets held in the home CSD to the ICSD's or global custodian's account and the latter would keep these assets in the foreign counterparty's name (Figure 10, [lower](#) panel).

Once the financial institution has created a central collateral pool from different 'pockets' where possible, it can improve the assignment of collateral to the different counterparties using optimization rules. Optimization rules ensure that higher quality assets or specific assets are reserved for counterparties requiring these assets, not assigned to counterparties that are happy to accept other collateral too. Examples of optimization rules are 'cheapest to deliver', 'customer preference' (where the firm prioritises its list of counterparties and assigns collateral according to counterparty ranking) or 'deliver least-eligible collateral first'. Some financial institutions have developed their own optimization algorithms or purchased third party software programs to achieve 'in-house' collateral optimization, while others engage a collateral management service provider to achieve optimization on their behalf.

---

<sup>25</sup> This situation is highly relevant for Europe, where the custody of securities resides in national CSDs that usually only provide accounts to institutions registered in that country, inhibiting cross-border use of collateral. Triparty agents can facilitate this for their clients. The largest triparty agents in Europe are Euroclear, Clearstream Luxembourg, Bank of New York Mellon, JP Morgan and SIS.

### 4.3.2 Benefits and risks from a central bank perspective

Collateral optimization has advantages but disadvantages too, as discussed in Capel and Levels (2014). Advantages are that financial institutions will use their available amount of collateral more efficiently and manage their risks more effectively, lowering their funding costs and raising their ability to attract extra liquidity if needed. Collateral optimization may also lower a financial institution's need for costly and potentially risky collateral transformation services (see next section). These are advantages to the central bank too: the direct consequence of more efficient use of available high-quality collateral by its counterparties is that – other things being equal – there is less need for the central bank to broaden or deepen its collateral framework and less need to worry about collateral transformation activity.

Disadvantages of collateral optimization are the risks involved (Table 6). One consequence of the creation of a central collateral pool out of fragmented collateral 'pockets' is that financial institutions may be incentivised to economise on the overall size of their collateral buffers, leading to too low collateral buffers with the liquidity risk involved. Another source of risk lies in the interdependencies created, internally (as different departments within the financial institution become dependent on the smooth functioning of a central collateral department) and possibly externally too (if the institution uses the collateral management services of a custodian or ICSD). These external interdependencies may bring concentration risk, since there are just a few big global custodians and ICSDs, providing collateral management services (see also Section 4.6). Finally, the interdependencies just described and the use of optimization rules/algorithms leads to greater complexity, giving rise to operational risks. A specific risk for the central bank is that collateral optimization may lead to lower quality collateral being put forward to the central bank, as discussed above, which could affect its levels of risk protection.

To conclude, collateral optimization can be beneficial for central banks, but there are potential liquidity, concentration and operational risks too. If these risks become significant, central banks and financial supervisors need to consider policy measures (Table 6). To mitigate liquidity risk and the risks embodied in internal dependencies, regular liquidity stress tests and business continuity plans could be made compulsory. The risks entailed in external dependencies could be reduced by the obligation to make good service level agreements and to establish, via standards and good oversight thereon, prudent collateral management within and robust links between financial market infrastructures.

## 4.4 Collateral transformation

### 4.4.1 Definition of collateral transformation

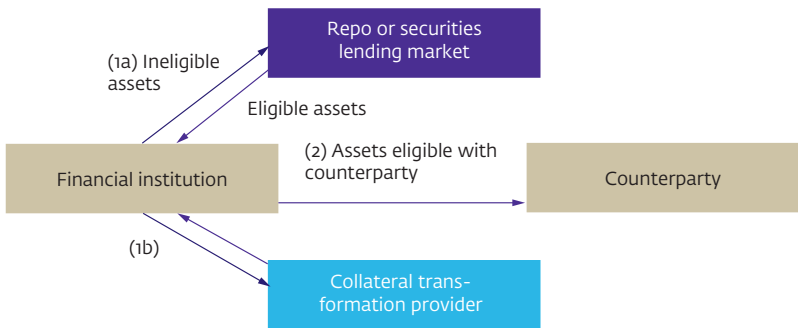
If after collateral optimization there still is a danger of collateral shortages, financial institutions can conduct collateral transformation. Collateral transformation (also called collateral swaps or collateral upgrade) refers to transactions that are initiated to obtain specific assets for collateral purposes. Whereas collateral optimization aims to use the **existing** asset portfolio in the best possible way, with collateral transformation the portfolio is **adjusted** to obtain collateral of the desired type. Collateral transformation is possible for financial institutions with a sufficiently large overall collateral portfolio, but without sufficient assets accepted as collateral by its counterparty (e.g. cash or high-quality government bonds for CCP use). Such an institution can directly enter the repo market or securities lending market to obtain the eligible assets, if it is active in these markets. If not, it may approach a collateral transformation provider (e.g. a bank acting as custodian or general clearing member) to arrange a collateral swap (Figure 11).

## Table 6 Risks of collateral optimization and collateral transformation and policy options to mitigate these risks

Main risks	Collateral optimization	Collateral transformation	Policy options to mitigate risks
Too low or unstable collateral buffers (liquidity risk).	Optimization may incentivise institutions to hold too little collateral.	Collateral upgrades may be unavailable during market stress.	Perform regular liquidity stress tests and take into account that collateral upgrades are 'unstable' liquidity sources.
Procyclicality (reinforces liquidity risk)	Not applicable.	Buyer of collateral transformation may face roll-over risk or unfavourable renewal conditions during stress.	Minimum standards for haircut setting and minimum haircut floors for certain transactions (see FSB (2014)). Ensure that central counterparties and general clearing members set stable through-the-cycle haircuts. Institutions to have strong and stable liquidity buffers.
Greater interdependence and complexity.	Central collateral management creates internal interdependence, engaging collateral service providers creates external dependence. More interdependence between financial market infra-structures (FMIs). Optimization models also create complexity.	External dependence on other market participants to obtain the desired collateral type. Concentration risks emerge if transformation is provided by a small number of large institutions.	Make adequate business continuity and recovery/resolution plans to respond to high internal dependence and complexity. Make senior managers understand (possible risks of) complex optimization models. External dependency on other financial institutions to be reflected in adequate service level agreements. Monitor possible concentration risks. Perform stress tests on different entities in the collateral chain. Overseers to ensure that links between FMIs are robust (i.e. that Principle 20 of the principles for FMIs (PFMIs) is respected). Possible need for more guidance by overseers on appropriate collateral management of FMIs if FMIs receive collateral that is transformed 'downstream' (Principle 5 of the PFMIs).
Increased counterparty risk and related risks	Not applicable.	Supplier collateral transformation may face counterparty and liquidity risk during market stress.	Ensure that institutions are able to bear the liquidity and counterparty risk (i.e. have sufficient buffers) when offering a collateral upgrade.

Source: Capel and Levels (2014), where more details can be found.

Figure 11 Collateral transformation



#### 4.4.2 Benefits and risks from a central bank perspective

Collateral transformation by financial institutions brings both benefits and risks. One of the advantages is that transformation enables a more efficient allocation of scarce collateral assets, since institutions with naturally low liquid buffers, such as pension funds or life insurance companies, can acquire the necessary liquidity when needed. Without collateral transformation they would be forced to hold more cash, affecting the return on their investments. At the same time, the financial institutions with idle liquidity find it profitable to lend cash or securities to others. An efficient allocation of liquidity ensures that liquidity is put to use where it is most needed, which is desirable to the central bank from the perspective of monetary policy transmission.

Collateral transformation is risky because the availability of collateral upgrades is highly procyclical: easy to obtain in normal times, but potentially impossible or very difficult/expensive during stress (Table 6). This makes liquidity obtained via collateral transformation an unstable source of liquidity for financial institutions, exposing them to liquidity risk. The maturity mismatch reinforces this: the desired collateral is usually



needed for a longer time than the typical maturity of repo and securities lending transactions so that these transactions need to be rolled over. Overreliance on collateral transformation as a source of liquidity can thus lead to a drying up of liquidity during stress. Financial institutions may also be exposed to higher operational risks because of their dependency on other market participants, and concentration risks may arise if there is a relatively small number of institutions providing transformation services. Finally, suppliers of collateral upgrades need to be mindful of the counterparty and liquidity risks they take upon them.

Whereas in normal times collateral transformation can contribute towards an efficient allocation of liquidity and monetary policy transmission, its potential 'fickleness' during stress is an important financial stability concern to central banks. Possible policy measures to address this concern include the obligation for financial institutions to perform regular liquidity tests in which collateral upgrades are considered an unstable liquidity source (Table 6). Moreover, the procyclicality within the financial system can, for instance, be reduced by encouraging the use of conservative through-the-cycle haircuts.

#### **4.4.3 Central bank - collateral transformer and market maker of last resort?**

A final consideration for central banks is that they, although this may not be their intention, act as important collateral transformers too. Collateral frameworks of central banks are usually broader than regulatory frameworks and frameworks of CCPs (ECB (2013b)). As a consequence, financial institutions may use assets that are not commonly used as collateral in the market to obtain cash from the central bank and then use this cash to fulfil a CCP's margin requirements or another collateral obligation in the market. Central banks also become de facto collateral transformers when banks use their lending facilities and thereby acquire

central bank reserves in order to remedy shortfalls in their liquidity coverage ratio. This opportunity emerges from the fact that these central bank reserves, to the extent that they can be drawn down in times of stress, may be counted as high quality liquid assets (HQLA), whereas non-HQLA can be used in these central bank lending facilities. Central banks with broad and deep collateral frameworks are likely to be more significant collateral transformers.

This leads to the question whether there are circumstances in which central banks should stand ready to act as market makers of last resort to support a minimum level of market liquidity in key financial markets. In view of the increased reliance on collateralized funding, which implies that liquidity conditions are primarily determined by the availability of collateral assets, it has been suggested that central bank collateral transformation could become an integral part of its lender of last resort (LOLR) functions (BIS (2014), p. 6). Given the comparative advantage of central banks in taking collateral (due to their expertise, economies of scale, absence of counterparty risk for borrowers, and a longer time horizon, etc.), they could, in principle, ensure that collateral already accepted in the market remains liquid by standing ready to establish a floor under the prices of collateral assets. Such operations could contribute towards financial stability in times of stress, but carry within them the danger of moral hazard. Market maker of last resort activity by central banks, if any, would thus need to be carefully designed and limited to truly exceptional circumstances.<sup>26</sup>

---

<sup>26</sup> As proposed by Tucker in BIS ((2014), p. 39), a central bank 'could be authorised to act as a market maker of last resort in exceptional circumstances, where a viable market had closed due to coordination problems, where the objective was to catalyse a re-entry of market-makers, and where the operation was expected to be short-lived and where there would be material costs to the economy of not intervening. But central banks should not put a floor on asset values that is invariant to fundamentals'.

## 4.5 Access of non-banks to central bank liquidity

As discussed above, banks do not really have to be concerned about mismatches in their collateral portfolio: as long as the size of their portfolio of central bank eligible collateral is sufficient, they can participate in the central bank's lending facilities to obtain liquidity that can be used as cash collateral. In case of severe stress, illiquid but solvent banks can apply for central bank emergency liquidity assistance using other collateral. But for non-banks, which do not have access to the central bank, there is no such safety net. For them it can become problematic during periods of severe stress to overcome collateral mismatches or to obtain emergency liquidity, even if there are no doubts about their solvency and even if they have sufficient other high-quality collateral available. A topical policy question is therefore whether there are circumstances under which certain non-bank counterparties could also be eligible for central bank liquidity. This question has gained importance due to the increased systemic importance of central counterparties (CCPs) following the G20's decision to make central clearing obligatory for all standard OTC derivatives contracts.

During the last financial crisis CCPs played a stabilizing role in the financial markets as they were able to cope with the default of clearing members and meet their obligations. However, it also became clear that the dependency of CCPs on commercial banks for their liquidity can make them vulnerable in times of stress. Hence, central banks have considered whether CCPs could be eligible for certain central bank services to reduce their dependence on commercial banks. Such services could include direct access to central bank payment systems, collateral services, intraday liquidity and overnight or emergency liquidity (see Wendt (2015)).

The issue of possible access to central bank emergency liquidity proved to be the hardest nut to crack, since a pre-commitment by central banks to provide liquidity support could prompt moral hazard behaviour by CCPs and their clearing members. To address this issue, central banks represented on the Economic Consultative Committee<sup>27</sup> have agreed to a 'regime that ensures there are **no technical obstacles** for the timely provision of emergency liquidity assistance by central banks to solvent and viable CCPs, without pre-committing to the provision of this liquidity' (see FSB (2013a), p. 48 for the full text of the ECC's statement). Such a regime reflects that it remains the responsibility of CCPs to have adequate private sector liquidity available for all currencies in which they clear<sup>28</sup> so that they can handle, even in stressed market conditions, the default of the largest clearing member(s), as is outlined in the CPSS-IOSCO Principles. But the regime also acknowledges that there could be extreme circumstances, when private sector liquidity arrangements are no longer available and when a forced sale under fire sale conditions by the CCP of its collateral assets to manage a member default would disrupt asset markets. Under such circumstances central banks may wish to provide a solvent CCP with emergency liquidity, taking its assets as collateral (see Tucker (2013)). The removal of technical obstacles just means that central banks are legally and operationally prepared for such a possibility, so that no precious time is lost if such extreme circumstances occur. Several central banks have recently taken measures to achieve this, see e.g. the measures announced

---

27 The Economic Consultative Committee includes all Board member Governors of the Bank for International Settlements and the BIS General Manager.

28 This may require additional new measures to strengthen the capacity of CCPs to deal with a clearing member's default. One such measure could be a 'variation margin gains haircut' or VMGH, as proposed in Singh (2015b). This VMGH implies that part of the profits from the clearing members that benefited from the market movements would be used to cover the losses caused by the default.

by the ECB and the Bank of England (BoE) to enhance financial stability in relation to centrally cleared markets in the EU.<sup>29</sup>

A related question is whether there could be circumstances under which non-bank end-users of derivatives without access to central bank emergency liquidity could get such access. This question arises because their liquidity management will also be strongly affected by mandatory clearing by CCPs and the latter's strict risk management and collateral requirements. These end-users will have to ensure adequate private sector liquidity support to be able to meet margin calls from their clearing member, even during stress. But, just as in the case of CCPs, central banks may have sympathy for the idea that there could be extreme circumstances, in which private sector liquidity is insufficiently available and in which a forced fire sale of the institution's asset portfolio has system wide ramifications, that could justify emergency liquidity assistance to such entities. This could be the case if such entities serve important public goals and are structurally solvent (like pension funds). Again, a case-by-case approach, and thus no pre-commitment to such liquidity assistance, would have the advantage of limiting potential moral hazard.<sup>30</sup> As with the banking sector, which benefits from the public subsidy of the lender

---

29 On 29 March 2015 the ECB and the BoE announced that (1) the ECB and the BoE have agreed enhanced arrangements for information exchange and cooperation regarding UK Central Counterparties (CCPs) with significant euro-denominated business and (2) the ECB and the BoE are extending the scope of their standing swap line in order, should it be necessary and without pre-committing to the provision of liquidity, to facilitate the provision of multi-currency liquidity support by both central banks to CCPs established in the UK and euro area respectively. It was emphasised also that CCP liquidity risk management remains first and foremost the responsibility of the CCPs themselves. See [ecb.europa.eu/press/pr/date/2015/html/pr150329.en.html](http://ecb.europa.eu/press/pr/date/2015/html/pr150329.en.html)

30 In BIS (2014), a lender of last resort regime for non-banks is suggested by Tucker. His idea is that (1) non-banks running a quasi-banking business entailing material maturity or liquidity mismatches should be recast as banks or change their business and that (2) the remaining non-banks should face 'constructive ambiguity' in that they would not only need to be solvent but, in addition, their distress would need to pose a serious threat to systemic stability. See for further details BIS ((2014), p. 39)

of last resort but is subject to intrusive prudential supervision, there is an intellectual case to be made for any institution with access to the lender of last resort function being subject to (potentially strict) regulation.

## 4.6 Collateral management services

### 4.6.1 Activities performed by collateral management service providers

As described above, many financial institutions are currently interested in collateral optimization and transformation due to the increased demand for high-quality collateral and the possible risk of collateral shortages. Financial institutions have several options for 'in-house' collateral optimization and transformation. They can develop proprietary systems for optimal collateral allocation, purchase third party software with optimization algorithms and conduct their own repo and securities lending transactions to transform their collateral when needed. Many financial institutions, however, prefer to use the services of specialised collateral management services providers. For cross-border collateral optimization, as illustrated in Figure 10, the services of a global custodian or ICSD are indispensable.

The increased interest in collateral management services has stimulated the BIS to perform a stocktaking exercise of the current and foreseen range of collateral management services and to examine whether these services lead to any increased or new settlement-related risks (CPMI (2014)). The study identifies five groups of initiatives undertaken by service providers in the area of collateral optimization. First, global custodians and ICSDs are establishing partnerships and building tools to aggregate information on available collateral assets so that they can provide their clients with a good overview of their collateral portfolio. As discussed above, financial institutions may have their collateral in different places and may not have a total overview of their collateral portfolio. A second group of initiatives consists of the establishment of partnerships and the building

of tools by global custodians and ICSDs to effectively aggregate available securities through collateral movements. These initiatives provide solutions for the problem of external collateral fragmentation, as was illustrated in Figure 10 above. Thirdly, some collateral management service providers without proprietary optimization algorithms are improving their collateral management services by acquiring the technology through partnerships with service providers that do have proprietary systems. A fourth initiative consists of efforts to improve existing optimization tools. Historically, these tools used simple rules such as (i) cheapest to deliver and (ii) customer preference. Recent improvements include multifactor optimization (in which additional criteria can be considered such as transaction costs, tax implications and concentration issues, etc.) and the building in of functionality that gives information on how the existing pool of assets could be changed to better meet obligations. Finally, there are innovations to address segregation requirements, such as a 'quad-party model' which makes it easier for buy-side customers such as pension funds that typically do not have direct access to a CCP to deliver collateral to the CCP via its custodian instead of via the clearing member.

With respect to collateral transformation services, the service providers interviewed by the BIS indicated that they do not plan to deliver such services in a principal role and that so far the demand by market participants for such services had been muted. Possibly, a more significant market for collateral transformation services could develop in the future when more transactions fall under the central clearing obligation or when the yields curve steepens (prompting financial institutions to hold fewer liquid assets). But there is also the possibility that CCPs will accept a broader list of collateral in the future, which would lower the need for collateral transformation.

#### **4.6.2 Benefits and risks from a central bank perspective**

Collateral management services deliver clear benefits to market participants. By providing market participants with better tools to identify (through aggregation of information) and move securities (through the aggregation of available securities), participants should be able to fulfil their collateral obligations faster. Moreover, by using (better) optimization rules, they can do this in a more efficient way. Consequently, financial institutions will be able to solve their collateral issues more easily, contributing to financial stability. Finally, financial institutions' ability to use the available securities in different locations more efficiently may boost the liquidity in a number of markets.

But collateral management services also come with risks. These risks are familiar to central banks in the sense that there is nothing new in the transactions initiated and markets used, since transactions are just being outsourced to collateral management service providers. However, existing risks are likely to become more significant. Operational risks, for instance, are likely to increase due to outsourcing and due to the fact that collateral will be moved around more frequently. This may necessitate stricter requirements for business continuity planning, the robustness of operational links and the timeliness of collateral information (to avoid that transactions are initiated on the basis of outdated information). Using collateral management services also raises concentration risk since they are provided by a limited number of large service providers (custodians, ICSDs). A disruption at, or default of, one of them would affect core collateral functions in a significant part of the market. Finally, collateral management services providers offer their clients collateral optimization and collateral transformation. These activities entail risks, as has been discussed above, in particular liquidity risk (compounded by procyclicality in case of collateral transformation) and the risks caused by greater complexities and interdependencies (Table 6).



## 4.7 Collateral re-use and collateral velocity

### 4.7.1 Definitions of collateral re-use, re-hypothecation and velocity

Collateral re-use and collateral re-hypothecation refer to cases where financial institutions can use the collateral received from others for their own transactions. Sometimes the two terms are used interchangeably, but formal definitions differ. The Financial Stability Board, for instance, has a broad definition of 're-use' (i.e. any use of securities delivered in one transaction in order to collateralize another transaction) and a narrow definition of 're-hypothecation' (i.e. the re-use of client assets only). Others have a more narrow definition of 're-use' (i.e. cases where collateral is posted on the basis of title transfer and the collateral is then used again by the recipient) and a broader definition of 're-hypothecation' (i.e. cases where the collateral is first pledged by the original collateral provider and then with his consent is re-pledged by the first collateral recipient), which would not only include re-hypothecation of client assets but also that of margins in non-cleared derivatives transactions.<sup>31</sup> This study defines re-hypothecation as the use of collateral pledged by another party, and uses re-use in the broadest sense (i.e. all forms of re-use including re-hypothecation).

Collateral velocity (Singh (2011) and (2013)) is another closely related concept, reflecting the efficiency with which available assets can potentially be used or re-used as collateral.<sup>32</sup> It is determined by: (1) the share of the total available stock of high-quality assets that can potentially be used or

---

<sup>31</sup> Such transactions are usually governed by an ISDA Master Agreement and an ISDA Credit Support Annex (CSA), which stipulates how the receiving party may use the collateral and thus also whether or not re-hypothecation would be allowed.

<sup>32</sup> A full overview of collateral velocity and its relation to market infrastructures is provided in Singh (2015a), which integrates and further builds on ideas developed in his earlier papers.

90 re-used as collateral and (2) the potential speed or efficiency of this use or re-use. Put simply: collateral velocity is the result of (1) the share of assets that can potentially move to become collateral and (2) the speed with which they can move.

The first aspect reflects that, at any moment in time, not all available high-quality assets can actually be used as collateral, i.e. the effective supply of collateral is lower than the total amount of available assets. One reason is that financial institutions need to hold unencumbered buffers of high-quality liquid assets on their balance sheets (e.g. to comply with the liquidity coverage ratio requirement). Another reason is that not all collateral recipients may – or may be able – to bring this collateral back into circulation. For instance, CCPs will not re-use the initial margins posted to them and central banks will not bring the collateral provided to them back into circulation (unless they have a securities lending programme). Such collateral is 'silo-ed' in the words of Singh (2013b) and has a velocity of zero, lowering the average velocity in the financial system. Moreover, there are regulatory restrictions on the re-hypothecation of client assets (FSB (2014b)) and of the initial margins for non-centrally cleared derivatives (CPSS/IOSCO (2013)). It is difficult to estimate which share of high-quality assets cannot be used as collateral. Market participants in the euro area believe this to be at least 25%, with the actual percentage likely to be higher for certain market participants and sectors, especially during times of stress (ECB (2014a)).

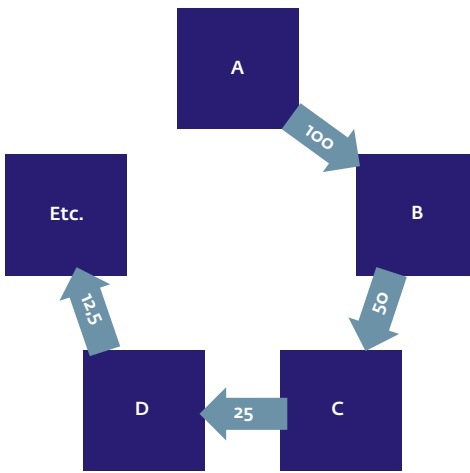
The second aspect, which is called 'collateral fluidity' by ICMA (ICMA (2014)), takes into account that the assets that may be used as collateral cannot always be used efficiently. To perform a role as collateral, it is paramount that assets can be quickly mobilised. In practice, however, there are inefficiencies in post-trade infrastructures that inhibit the use of available collateral assets to their full extent, such as the need

to hold collateral at different CSDs leading to collateral fragmentation (see Figure 10) and slow settlement arrangements, especially in a cross-border context. The latter consideration is especially relevant for Europe due to its pre-euro legacy of different national financial market infrastructures, leading to substantial barriers to efficient cross-border settlement. These barriers were identified in the Giovannini Report in 2001 (Giovannini (2001)) and some of these still exist today.

The re-use and velocity of collateral act as a 'collateral multiplier' and are therefore highly relevant in the debate on possible collateral scarcity. The size of the collateral multiplier ( $cm$ ) depends on the re-use rate ( $r$ ):  $cm=1/(1-r)$ . For instance, if in practice 50% of collateral is re-used, assets worth € 100 billion could in practice collateralize transactions worth € 200 billion (Figure 12). The collateral multiplier is then 2, implying that collateral is re-used once on average.

Empirical data show that there is much more collateral **eligible** for re-use and re-hypothecation than there is **actually** re-used or re-hypothecated. A recent survey by the European Systemic Risk Board (ESRB) on securities financing transactions, based on a sample of European banks and agent lenders, finds that on average 94% of collateral used in these transactions is **eligible** for re-use, whereas the average **actual** re-use rate is around 50% (ESRB (2014)), given the ESRB's estimate of the collateral multiplier of around 2. Although the ESRB uses a somewhat different methodology, its estimated velocity is close to Singh's (2013b) estimates of collateral velocity at the largest international banks (2.2 in 2012, down from 3 in 2007). According to the ISDA Margin Survey (2014) of the non-cleared OTC derivatives market, 99% of cash collateral, 85% of government securities collateral and 55% of other securities are **eligible** for re-hypothecation, whereas respectively 87%, 45% and 30% of these assets are **actually** re-hypothecated (ISDA (2014)). This reflects the so-called fungible

Figure 12 The collateral multiplier



Suppose bank B receives assets worth € 100 billion from bank A as collateral for a loan. With a re-use rate of 50%, bank B would use € 50 billion (e.g. to collateralize a derivatives transaction with bank C), C would use € 25 billion with bank D, etc. In the limit, this would add up to € 200 billion.

character of cash and the more liquid nature of markets for government securities as compared to those for other assets.

#### 4.7.2 Is collateral re-use, re-hypothecation and velocity good or bad?

The main benefit of collateral re-use is that it lowers overall collateral needs and lowers pressure on the existing stock of collateral, since with re-use a pool of assets of a certain value can secure a greater amount of exposures. Too much restrictions on collateral re-use could make collateral scarce, cause global financial lubrication to decline and affect monetary policy (Singh (2011)). However, this benefit of collateral re-use comes at the price of a build-up of leverage, which – if too high – can be a financial

stability concern, particularly within the shadow banking system (as banks are subject to a leverage ratio).<sup>33</sup> It is for this reason that the FSB proposed minimum standards for haircuts on securities financing transactions (SFT) and numerical haircut floors for certain SFT-transactions (FSB (2014b)). Collateral re-use thus has an important benefit (i.e. more efficient use of possible scarce collateral) and an important risk (i.e. financial system leverage, particularly outside the banking sector) that should be weighed against each other. Therefore, a policy response by authorities could be to put restrictions on collateral re-use in high-risk cases and to allow it or even stimulate it in low-risk cases.

Collateral re-hypothecation on the whole brings higher risks than other forms of collateral re-use due to the interdependencies and liquidity risks created. In fact, the risks of collateral re-hypothecation are quite similar to those of collateral transformation discussed in Table 6. Collateral re-hypothecation creates interdependence because the same collateral assets are used to secure transactions by different participants and possible uncertainties can emerge as to whom owns what, creating uncertainties and risks if collateral is recalled or transactions unwound.<sup>34</sup> To address such risks, the FSB introduced principles for the regulation of re-hypothecation of client assets (FSB (2013b), p. 19), whereas the BCBS and IOSCO introduce important restrictions on re-hypothecating collateral collected from customers as initial margin for non-centrally cleared derivatives (BCBS/IOSCO (2013) and (2015), pp. 21-22).<sup>35</sup> Collateral re-hypothecation also

<sup>33</sup> Re-hypothecation and re-use of scarce collateral play an important role within the shadow banking system (see Singh and Aitken (2010)) and Claessens et. al. (2012)).

<sup>34</sup> Re-use of collateral obtained from repos and securities lending transactions also create interdependencies, but here the risks are lower since these transactions are on the basis of title transfer and the counterparty has the obligation to remit equivalent collateral at the end of the contract.

<sup>35</sup> In addition, some countries have national limits on re-hypothecation. In the United States, for example, there is a limit on re-hypothecation for broker-dealers at 140% of the customer's debit balance.

leads to liquidity risk. This is amplified by procyclicality: during stress the perception of institutions' creditworthiness can deteriorate very quickly, leading to a possible withdrawal of re-hypothecation rights and subsequent funding problems at institutions that have fallen out of favour. Problems at one or several institutions may infect the whole system: as collateral velocity decreases, so will market liquidity, which may in extreme cases cause markets to dry up.<sup>36</sup> Hence, financial institutions could be required to perform regular liquidity stress tests and take into account that re-hypothecated collateral is an 'unstable' liquidity source. Given these risks it seems unlikely that collateral re-hypothecation, while positively contributing to collateral re-use and thereby lowering pressures on high-quality assets, is the best answer to possible concerns of collateral scarcity.

A better response by central banks is to stimulate collateral velocity directly via the two aspects discussed above. First, as they are significant collateral takers, central banks could make a positive contribution to the effective available supply of collateral by engaging in securities lending when there are signs of collateral shortages. Second, central banks could support initiatives that facilitate a more efficient use of collateral in an international setting. For instance, collateral management services provided by (I) SDs and global custodians reduce the need for collateral buffers in multiple jurisdictions (see Figure 10) and could be supported, provided that the correspondent risks (Section 4.6) are managed well. Moreover, especially within the euro area, further measures could be taken to remove infrastructural impediments to an efficient flow of collateral. Important steps have already been taken, including the recent improvements in the

---

<sup>36</sup> This actually happened right after the bankruptcy of Lehman Brothers, when far fewer parties were prepared to allow re-hypothecation. As a consequence, a large number of US dealers ran into liquidity problems and the Fed was forced to introduce a back-stop credit facility for dealers (see C. Monnet (2011) and Singh and Aitken (2010)).

Eurosystem's own collateral management services<sup>37</sup> and the construction of TARGET2Securities (T2S), which will essentially make cross-border securities transactions as efficient as domestic transactions and enable collateral and liquidity savings (see e.g. Weller (2012)). But notwithstanding this progress, market participants still observe infrastructural issues that hamper the efficient use of the euro area repo market for collateral and liquidity management purpose ((ECB (2014), Euroclear (2015) and ICMA (2014)).<sup>38, 39</sup>

#### 4.7.3 Impact of quantitative easing on collateral velocity/scarcity

Given the importance of collateral velocity for alleviating possible collateral scarcity, an important question is how collateral velocity is affected by the quantitative easing (QE) currently conducted by several central banks (e.g. Fed, Eurosystem, BoE, Japan). QE means that a central bank, in order to increase the money supply and bring inflation closer to the target rate, purchases pre-announced amounts of government securities or other securities from commercial banks and other private institutions, for which these institutions receive deposits (i.e. cash) in return. As a consequence,

---

37 First, the Eurosystem removed the so-called repatriation requirement from its Correspondent Central Banking Model or CCBM in May 2014 (this requirement implied that assets held in another euro-area country could only be used as collateral if they were first transferred or 'repatriated' to an account maintained by the local national central bank in the 'issuing' securities settlement system). Second, the support of cross-border triparty collateral management services went live in September 2014, offering Eurosystem counterparties the ability to manage their overall collateral holdings in a more flexible and efficient manner and to flexibly switch their collateral between central bank refinancing and interbank market financing. Both these initiatives contribute towards a more efficient use of available collateral.

38 In interviews with markets participants collateral mobility was considered the highest ranked challenge to effective collateral management (Euroclear (2015))

39 In particular, the following issues have been identified by market participants: (1) the limited operating hours of CSD settlement links in central bank money, (2) a lack of flexibility in cross-border settlement arrangements in commercial bank money, (3) ineffective triparty settlement interoperability and lack of cross-border standardization for end-of-day treasury adjustments in central bank money (see ECB (2014b), which also makes suggestions for solutions).

a larger share of the available government securities (or other securities purchased) will be held on the balance sheets of central banks, which could negatively affect collateral velocity, make high-quality collateral scarce and have consequences for monetary policy, as discussed in Singh (2013a) and (2013b). However, collateral scarcity is not a necessary consequence of QE. First of all, central banks typically take measures to minimise the unintended consequences of QE. For example, their purchase programmes may include limits on their exposures to specific assets or issuers. They may also engage in securities lending to make assets available in market segments, whenever there are signs of potential shortages (see Coeuré (2015) for details on the Eurosystem's QE and securities lending in this context). Moreover, while QE negatively affects the amount of available government bond collateral, it creates new cash collateral. Hence, an overall collateral shortage will only occur if the 'collateral services' or 'pledgeability' of the government bonds sold is deemed higher than that of the cash received. Market evidence suggest that, while cash collateral is still used widely and predominantly in some markets (e.g. in the OTC derivatives market cash collateral has an 80% share (ISDA (2014))), both banks and buy-side institutions are increasingly seeking to pledge and receive securities as collateral (Omgeo (2015)).

Financial market data provide some evidence that quantitative easing has made non-cash collateral scarcer, since the spread between interest rates on the unsecured and secured money markets has been increasing.<sup>40</sup> Graph 17 presents evidence for the euro area: the spread between Eonia (the Euro OverNight Index Average, a weighted average of the overnight unsecured lending transactions in the euro interbank market) and the GC Pooling rate (the market benchmark index for the secured general

---

<sup>40</sup> If collateral becomes scarcer, collateral received by the cash lender would have a greater value to the lender, justifying a lower secured interest rate as compared to the unsecured rate.



### Graph 17 Impact of quantitative easing on collateral velocity/scarcity

EUR trillion



collateral market) has increased steadily since mid-2014. This increase can be attributed to the extended refinancing operations (such as VLTROs and TLTROs), which lower the amount of available collateral for euro area market participants, and to the Eurosystem’s public sector purchase programme (PSPP), launched in the first quarter of 2015. For a discussion of the impact of QE in other countries and the impact on collateral scarcity see Singh (2013b).

## 4.8 Collateral footprints

QE and the use of other unconventional policy tools by central banks, as well as the increased demand for collateral assets by market participants due to changing market practices and new regulations, has sparked new interest among central banks in the impact that they may have on collateral markets. Via the design and implementation of their operational frameworks, central banks affect these markets in various ways, both intentionally and unintentionally. Yet many central banks have a limited market impact as a high-level objective for collateral policy (Chapter 2).

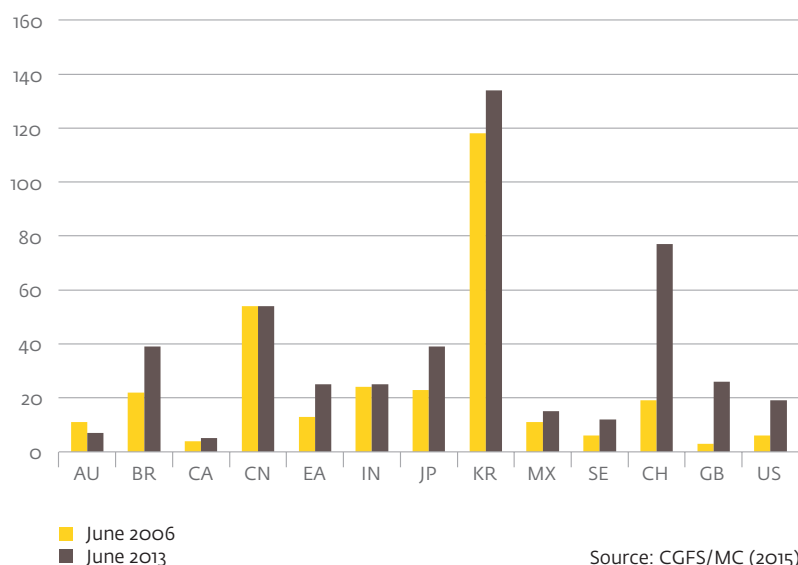
A recent report by the BIS provides insights into how central bank operating frameworks could affect collateral markets and vice versa (CGFS/MC (2015)).<sup>41</sup> In particular, central banks can influence collateral markets through the so-called scarcity and structural channels. The **scarcity channel** refers to the impact of central bank operations – via their effect on the available amount of collateral or its composition in the market – on the prices, rates, and price volatility of collateral assets. The **structural channel** refers to the impact central banks could have on the functioning of collateral markets by designating eligible securities, implementing changes in clearing and settlement systems or providing other infrastructure support. The report discusses the potential impact of the different design options in central banks' collateral policy domains – i.e. counterparty eligibility, collateral eligibility, haircuts and other risk control measures and operational parameters (see Chapter 3) – on collateral markets via the scarcity and structural channel. Empirical evidence from case studies and surveys/interviews conducted with market participants support the conclusion that through these design options central banks have the potential to influence collateral markets in a variety of ways.

---

<sup>41</sup> See also Nyborg (2015), which argues that the Eurosystem's collateral framework impairs market discipline.

## Graph 18 Central bank assets

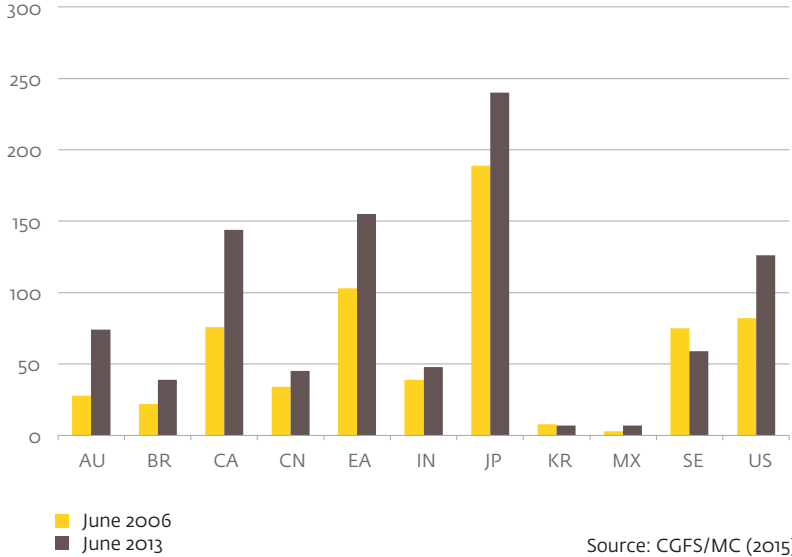
Percentage of GDP



One important lesson is that the collateral footprints of central banks are bound to be (much) larger in crisis times than in normal times. In normal times central banks tend to operate at the margin and on a limited scale. As a result, their 'collateral footprint' would usually be small, with 'market neutrality' being a feasible objective, although also in normal times central bank may take actions that do influence collateral markets. During a crisis central banks tend to play a more significant role in collateral markets, both intentionally (e.g. central banks may decide to influence the functioning of collateral markets by broadening their collateral frameworks) and unintentionally (e.g. the much larger scale of their operations could have unintended side effects on collateral markets that have to be managed).

### Graph 19 Central bank eligible assets

Percentage of GDP



Hence, during a crisis there is a need to carefully monitor the impact of central bank operations on collateral markets, particularly in relation to unconventional monetary policies and the eventual exit from those policies (CGFS/MC (2015)).

That central banks have assumed a more prominent role relative to the overall size of the economy can be illustrated by the development in central bank assets as a percentage of GDP, which has increased in almost all countries between 2006 and 2013 (Graph 18). The growth in central bank eligible assets (again as a percentage of GDP) provides evidence as to how central banks have responded to recent tensions in collateral markets by broadening their collateral frameworks (Graph 19).

# 5. Conclusions

Collateral policies of central banks have never attracted so much attention as in recent years. The surge in demand for high-quality assets by financial institutions and the unprecedented monetary policy measures taken by central banks in response to the financial crisis have led to a lively debate at central banks about how best to design their own collateral policies, about the impact of central banks' collateral policies on major collateral markets, and about current developments in collateral management by financial institutions. This study aims to bring together all the main insights on central banks' collateral policies, hence its name CollaterALL. For this purpose, it draws upon policy reports by central banks and other authorities as well as relevant research articles on collateral and liquidity issues published in recent years.

101

Central banks typically have high-level objectives when formulating their collateral policies. A very important objective is that its collateral policy should provide the central bank with adequate risk protection. This is of course the reason why central banks lend on a secured basis. Another essential objective for the central bank is that the collateral policy should leave its counterparties with enough available central bank eligible collateral. This enables the central bank to pursue its own monetary, payments and financial stability policy goals. Finally, many central banks aim to have no more than a limited impact on financial markets, and to realise a collateral framework that is both operationally efficient and transparent.

Achieving these four high-level objectives can prove to be a considerable challenge, especially in times of crisis, when market participants face shortages of high-quality collateral. To pursue monetary and financial stability goals during a crisis, central banks may therefore need to broaden or deepen their collateral frameworks, possibly resulting in a lower level of risk protection, reduced efficiency and transparency of their

collateral frameworks and larger 'collateral footprints' on private markets. Part of the answer to these conflicting objectives may lie in a central bank's unique characteristics as compared to other collateral takers. Central banks are not exposed to liquidity risk and can build on cooperation with other central banks, which means that they are in a better position to accept less liquid or foreign assets of high credit quality. But if central banks need to compromise on credit quality to assure collateral availability in the market, they could impose stricter risk control measures to ensure that their risk protection remains at an acceptable level.

There are significant differences in the 'natural breadth' of the collateral frameworks of different central banks, complicating international comparisons. This breadth is determined not only by the state of the economy but also by the design of central bank policies, the group of counterparties that the central bank deals with, the characteristics of the country's financial markets and the legal/regulatory setting that it operates in. Some of these factors are within the central bank's own control (e.g. some central bank policies are more 'collateral intense' than others), but others are not.

When designing their collateral policy, central banks need to make choices in four domains: counterparty eligibility (who will be lent to?), collateral eligibility (against which assets?), risk control measures (under which conditions?) and operational features (such as collateralization technique and transparency). Evidence presented in this study shows that central banks have made quite different choices in these four domains, with – for instance – counterparty eligibility and collateral eligibility ranging from narrow to broad. But there is a number of topical policy issues in these four domains that are relevant to all central banks. For example, all central banks need to have an opinion about whether their collateral framework should be 'always relatively broad' (to accommodate possible

future stress) or 'narrow when possible'. Central banks also need to have a view about whether or not they want to accept foreign cash or securities as collateral and – if so – under which arrangement, how to deal with procyclicality and external ratings in their risk management, and whether or not to disclose the eligibility of individual assets and details of their risk control measures. This study presents recent insights into these matters and other topical policy issues, outlining the pros and cons of different policy options available.

Central banks nowadays operate in a very different 'collateral space' than before the financial crisis due to the enormous increase in demand for high-quality collateral. Although estimates reveal that collateral shortages at the macro level are unlikely (as collateral supply is still well above collateral demand), there are individual countries and individual financial institutions facing collateral scarcity. Moreover, there are indications that quantitative easing and other unconventional monetary policy measures have made non-cash collateral scarcer. Financial institutions are currently adopting strategies to cope with scarcer high-quality collateral, such as collateral optimization and collateral transformation, possibly with the help of collateral management service providers. Collateral re-use raises collateral velocity in the financial system, thereby reducing pressures on the available stock of high-quality collateral, but also creates new financial stability risks, particularly when it involves re-hypothecation.

This new collateral space raises a number of topical policy issues for central banks. First, central banks with broad or deep collateral frameworks may need to reconsider their own risk management, given that financial institutions will be incentivised to put forward lower-quality collateral to these central banks. Second, given that central banks can only pursue their monetary, payments and financial stability policies if their counterparties have enough available collateral, they need to respond

to signs of possible collateral scarcity in their markets. Broadening their own collateral framework, which most central banks have already done, or reducing the 'collateral intensity' of their own policies, e.g. by lowering reserve requirements, could solve some collateral concerns for banks. Contributing towards greater collateral velocity could also be part of the central bank's response. This contribution could comprise engaging in securities lending to ease emerging shortages of specific collateral assets, or supporting initiatives to improve the efficiency of cross-border collateral use. Third, given central banks' broader responsibility for financial stability, they have to be aware of potential risks to financial stability arising from new collateral management strategies adopted by financial institutions and take appropriate measures when these risks are significant. Collateral transformation and collateral re-hypothecation, in particular, could create serious liquidity risks, which are amplified by both procyclicality and potentially risky interdependencies within the financial system. Finally, again from a financial stability perspective, central banks could examine whether there are exceptional circumstances that would justify certain solvent and viable non-bank entities getting access to central bank emergency liquidity. With respect to CCPs, central banks are already taking measures to establish a regime of 'no technical obstacles'. Such solutions could potentially avoid fire sales by solvent systemically important non-banks in times of stress. At the same time, there are important moral hazard considerations. They underline the need for constructive ambiguity and potentially for complementary policies such as stricter regulation of those entities which may benefit from such central bank liquidity.



# References

Anderson, R. W, and K. Jöeveer (2014). *'The economics of collateral'*. Financial Markets Group Discussion Paper No. 732, London: London School of Economics. [lse.ac.uk/fmg/workingPapers/discussionPapers/fmgdps/DP732-final.pdf](http://lse.ac.uk/fmg/workingPapers/discussionPapers/fmgdps/DP732-final.pdf)

Bank for International Settlements (BIS, 2014). 'Re-thinking the lender of last resort', BIS Papers No. 79. Bazel: BIS. [bis.org/publ/bppdf/bispap79.pdf](http://bis.org/publ/bppdf/bispap79.pdf)

Basel Committee on Banking Supervision and Board of the International Organization of Securities Commissions (BCBS/IOSCO 2013, revised 2015). *'Margin requirements for non-centrally cleared derivatives'*. [bis.org/bcbs/publ/d317.pdf](http://bis.org/bcbs/publ/d317.pdf)

Capel, J.J. (2011). 'Banks' international liquidity management in the future: what role can financial market infrastructures play?'. *Journal of Payments Strategy & Systems*, 5(1), pp. 17-29.

Capel, J.J. (2012). *'Central banks and international liquidity: a call for action'*, *Journal of Payments Strategy & Systems*, 5(4), pp. 347-359.

Capel, J.J. (2013). *'Central banks and foreign collateral'*, *Journal of Financial Market Infrastructures*, 1(4), pp. 31-49.

Capel, J.J. and A.L. Levels (2014). *'Collateral optimisation, re-use and transformation – Developments in the Dutch financial sector'* Amsterdam: De Nederlandsche Bank (DNB), Occasional studies: Vol. 12(5). [dnb.nl/binaries/415234\\_DXo\\_DNB\\_OS\\_12-05\\_eng-WEB\\_tcm46-309555.pdf](http://dnb.nl/binaries/415234_DXo_DNB_OS_12-05_eng-WEB_tcm46-309555.pdf)

Chailloux A., Gray, S. and R. McCaughrin (2008). '*Central bank collateral frameworks: Principles and policies*', IMF Working Paper, WP/08/222, Washington: IMF. [imf.org/external/pubs/ft/wp/2008/wpo8222.pdf](http://imf.org/external/pubs/ft/wp/2008/wpo8222.pdf)

Claessens, S. Z. Pozsar, L. Ratnovski and M. Singh (2012). '*Shadow banking: Economics and policy*', IMF Staff Discussion Note SDN/12/12, Washington: IMF. [imf.org/external/pubs/ft/sdn/2012/sdn1212.pdf](http://imf.org/external/pubs/ft/sdn/2012/sdn1212.pdf)

Coeuré, B. (2015). 'Embarking on public sector asset purchases'. Speech at the second international conference on sovereign bond markets, Frankfurt, 10 March 2015. [ecb.europa.eu/press/key/date/2015/html/sp150310\\_1.en.html](http://ecb.europa.eu/press/key/date/2015/html/sp150310_1.en.html)

Committee on the Global Financial System (CGFS, 2008). '*Central bank operations in response to the financial turmoil*', CGFS Papers No. 31, Basel: BIS. [bis.org/publ/cgfs31.pdf](http://bis.org/publ/cgfs31.pdf)

Committee on the Global Financial System (CGFS, 2010). '*The role of margin requirements and haircuts in procyclicality*', CGFS Papers No. 36, Basel: BIS. [bis.org/publ/cgfs36.pdf](http://bis.org/publ/cgfs36.pdf)

Committee on the Global Financial System (CGFS, 2013). '*Asset encumbrance, financial reform and the demand for collateral assets*', CGFS Papers No. 49, Basel: BIS. [bis.org/publ/cgfs49.pdf](http://bis.org/publ/cgfs49.pdf)

Committee on the Global Financial System and Markets Committee (CGFS/MC, 2015). '*Central bank operating frameworks and collateral markets*', CGFS Papers No. 53, Basel: BIS. [bis.org/publ/cgfs53.pdf](http://bis.org/publ/cgfs53.pdf)

Committee on Payments and Market Infrastructures (CPMI, 2014). '*Developments in collateral management services*'. Basel: BIS. [bis.org/cpmi/publ/d119.pdf](http://bis.org/cpmi/publ/d119.pdf)

Committee on Payment and Settlement Systems (CPSS, 2006). '*Cross-border collateral arrangements*', Basel: BIS. [bis.org/cpmi/publ/d71.pdf](http://bis.org/cpmi/publ/d71.pdf)

Committee on Payment and Settlement Systems and Technical Committee of the International Organization of Securities Commissions (CPSS/IOSCO, 2012). '*Principles for financial market infrastructures*'. Basel: BIS. [bis.org/cpmi/publ/d101a.pdf](http://bis.org/cpmi/publ/d101a.pdf)

Euroclear (2015). '*Collateral management in Europe: Searching for central intelligence*', Euroclear: Brussels. [euroclear.com/en/campaigns/collateral-management-in-europe-Aite-Paper.html](http://euroclear.com/en/campaigns/collateral-management-in-europe-Aite-Paper.html)

European Central Bank (2007). '*The collateral frameworks of the Federal Reserve System, the Bank of Japan and the Eurosystem*', ECB Monthly Bulletin, October 2007, pp. 85-100, Frankfurt: ECB. [ecb.europa.eu/pub/pdf/other/pp85-100\\_mb200710en.pdf](http://ecb.europa.eu/pub/pdf/other/pp85-100_mb200710en.pdf)

European Central Bank (ECB, 2009). '*The collateral frameworks of the Eurosystem, the Federal Reserve System and the Bank of England and the financial turmoil*', Frankfurt: ECB. [ecb.europa.eu/pub/pdf/scpops/ecbocp107.pdf](http://ecb.europa.eu/pub/pdf/scpops/ecbocp107.pdf)

European Central Bank (ECB, 2013a). '*The Eurosystem collateral framework throughout the crisis*', ECB Monthly Bulletin, July 2013, pp. 71-86, Frankfurt: ECB. [ecb.europa.eu/pub/pdf/other/art1\\_mb201307en\\_pp71-86en.pdf](http://ecb.europa.eu/pub/pdf/other/art1_mb201307en_pp71-86en.pdf)

European Central Bank (ECB, 2013b). '*Collateral eligibility requirements – a comparative study across specific frameworks*', Frankfurt: ECB. [ecb.europa.eu/pub/pdf/other/collateralframeworksen.pdf](http://ecb.europa.eu/pub/pdf/other/collateralframeworksen.pdf)

European Central Bank (ECB, 2014a). '*Collateral eligibility and availability – Follow-up to the report on collateral eligibility requirements – a comparative study across specific frameworks dated July 2013*', Frankfurt: ECB. [ecb.europa.eu/pub/pdf/other/cea201407en.pdf](http://ecb.europa.eu/pub/pdf/other/cea201407en.pdf)

European Central Bank (ECB, 2014b). '*Euro repo market: improvements for collateral and liquidity management*', Frankfurt: ECB, [ecb.europa.eu/pub/pdf/other/erm201407en.pdf](http://ecb.europa.eu/pub/pdf/other/erm201407en.pdf)

European Central Bank (ECB, 2015). '*Guideline of the European Central Bank on monetary policy instruments and procedures of the Eurosystem (last version 02.04.2015)*', Frankfurt: ECB. [ecb.europa.eu/ecb/legal/pdf/oj\\_jol\\_2015\\_091\\_r\\_0002\\_en\\_txt.pdf](http://ecb.europa.eu/ecb/legal/pdf/oj_jol_2015_091_r_0002_en_txt.pdf)

European Systemic Risk Board (ESRB, 2014). '*Securities financing transactions and the (re)use of collateral in Europe*, Occasional Paper Series No. 6. [esrb.europa.eu/pub/pdf/occasional/20140923\\_occasional\\_paper\\_6.pdf](http://esrb.europa.eu/pub/pdf/occasional/20140923_occasional_paper_6.pdf)

Financial Stability Board (FSB, 2010). '*Principles for reducing reliance on CRA Ratings*', [financialstabilityboard.org/wp-content/uploads/r\\_101027.pdf?page\\_moved=1](http://financialstabilityboard.org/wp-content/uploads/r_101027.pdf?page_moved=1)

Financial Stability Board (FSB, 2013a). '*OTC Derivatives Market Reforms – Third progress report on implementation*'. [financialstabilityboard.org/wp-content/uploads/r\\_120615.pdf](http://financialstabilityboard.org/wp-content/uploads/r_120615.pdf)

Financial Stability Board (FSB, 2013b). '*Strengthening oversight and regulation of shadow banking – Policy framework for addressing shadow banking risks in securities lending and repos*', [financialstabilityboard.org/wp-content/uploads/r\\_130829c.pdf?page\\_moved=1](http://financialstabilityboard.org/wp-content/uploads/r_130829c.pdf?page_moved=1)

Financial Stability Board (FSB, 2014a). '*Thematic review on FSB principles for reducing reliance on CRA ratings – Peer review report*'. [financialstabilityboard.org/wp-content/uploads/r\\_140512.pdf](https://www.financialstabilityboard.org/wp-content/uploads/r_140512.pdf)

Financial Stability Board (FSB, 2014b). '*Strengthening oversight and regulation of shadow banking - Regulatory framework for haircuts on non-centrally cleared securities financing transactions*'. [financialstabilityboard.org/wp-content/uploads/r\\_141013a.pdf](https://www.financialstabilityboard.org/wp-content/uploads/r_141013a.pdf)

Fuhrer, L.M., B. Guggenheim and S. Schumacher (2015). '*Re-use of collateral in the repo market*', Swiss National Bank Working Papers 2/2015. [snb.ch/n/mmr/reference/working\\_paper\\_2015\\_02/source/working\\_paper\\_2015\\_02.n.pdf](https://www.snb.ch/n/mmr/reference/working_paper_2015_02/source/working_paper_2015_02.n.pdf)

The Giovannini Group (Giovannini, 2001). '*Cross-border clearing and settlement arrangements in the European Union*' Brussels [ec.europa.eu/internal\\_market/financial-markets/docs/clearing/first\\_giovannini\\_report\\_en.pdf](https://ec.europa.eu/internal_market/financial-markets/docs/clearing/first_giovannini_report_en.pdf)

International Capital Market Association (ICMA, 2014). '*Collateral is the new cash: the systemic risks of inhibiting collateral fluidity*'. Zurich: ICMA [icmagroup.org/Regulatory-Policy-and-Market-Practice/short-term-markets/Repo-Markets/icma-european-repo-market-reports-and-white-papers/collateral-fluidity/](https://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/short-term-markets/Repo-Markets/icma-european-repo-market-reports-and-white-papers/collateral-fluidity/)

International Monetary Fund (IMF, 2012). '*Safe assets: Financial system cornerstone?*', Washington: IMF, Global Financial Stability Report Chapter 3. [imf.org/External/Pubs/FT/GFSR/2012/01/pdf/c3.pdf](https://www.imf.org/External/Pubs/FT/GFSR/2012/01/pdf/c3.pdf)

International Swaps and Derivatives Association (ISDA, 2014). '*ISDA Margin Survey 2014*'. [isda.org/functional-areas/research/surveys/margin-surveys/](https://www.isda.org/functional-areas/research/surveys/margin-surveys/)

Levels, A.L. and Capel, J.J. (2012). 'Is collateral becoming scarce? – Evidence for the euro area'. DNB Occasional studies 10(1) [dnb.nl/binaries/DNB\\_OS\\_1001\\_WEB\\_tcm46-268455.pdf](http://dnb.nl/binaries/DNB_OS_1001_WEB_tcm46-268455.pdf) and *Journal of Financial Market Infrastructures* 1(1): 29-53.

Markets Committee (MC, 2013). 'Central bank collateral frameworks and practices', Basel: BIS. [bis.org/publ/mktco6.pdf](http://bis.org/publ/mktco6.pdf)

Monnet, C. (2011). 'Rehypothecation', *Business Review* 2011(4) [phil.frb.org/research-and-data/publications/business-review/2011/q4/brq411\\_Rehypothecation.pdf](http://phil.frb.org/research-and-data/publications/business-review/2011/q4/brq411_Rehypothecation.pdf)

Nyborg, K.G. (2015). 'Central bank collateral frameworks', Centre for Economic Policy Research Discussion Paper Series No. 10663.

Omgeo, 2015. 'The opportunity in non-cash collateral – A buy & sell side perspective', [omgeo.com/page/noncash\\_collateral](http://omgeo.com/page/noncash_collateral)

Rule, G. (2012). 'Collateral management in central bank policy operations', Handbook No. 31, London: Bank of England. [bankofengland.co.uk/education/Documents/ccbs/handbooks/pdf/ccbshb31.pdf](http://bankofengland.co.uk/education/Documents/ccbs/handbooks/pdf/ccbshb31.pdf)

Singh, M. (2011). 'Velocity of pledged collateral: Analysis and implications', International Monetary Fund WP/11/256. [imf.org/external/pubs/ft/wp/2011/wp11256.pdf](http://imf.org/external/pubs/ft/wp/2011/wp11256.pdf)

Singh, M. (2013a). 'The changing collateral space', International Monetary Fund WP/13/25. [imf.org/external/pubs/ft/wp/2013/wp1325.pdf](http://imf.org/external/pubs/ft/wp/2013/wp1325.pdf)

Singh, M. (2013b). 'Collateral and monetary policy', International Monetary Fund WP/13/186. [imf.org/external/pubs/ft/wp/2013/wp13186.pdf](http://imf.org/external/pubs/ft/wp/2013/wp13186.pdf)

Singh, M. (2015a). *'Collateral and financial plumbing'*. London: Risk Books.

Singh, M. (2015b). *'Limiting taxpayer "puts": an example from central counterparties'*, *Journal of Financial Market Infrastructures* 3(3): 1-15.

Singh, M and Aitken, J. (2010), *'The (sizeable) role of rehypothecation in the shadow banking system'*, International Monetary Fund WP/10/172, [imf.org/external/pubs/ft/wp/2010/wp10172.pdf](http://imf.org/external/pubs/ft/wp/2010/wp10172.pdf)

Tucker, P. (2013). *'Central counterparties in evolving capital markets: safety, recovery and resolution'* Banque de France Financial Stability Review 17, [bankofengland.co.uk/publications/Documents/speeches/2013/speech650.pdf](http://bankofengland.co.uk/publications/Documents/speeches/2013/speech650.pdf)

Weller, B. (2012). *'T2S benefits: much more than fee reductions'*. T2S Special Series No. 1. Frankfurt: ECB. [ecb.europa.eu/paym/t2s/pdf/specser/T2S\\_SpecialSeries\\_final\\_01.pdf](http://ecb.europa.eu/paym/t2s/pdf/specser/T2S_SpecialSeries_final_01.pdf)

Wendt, F. (2015). *'Central counterparties: Addressing their too important to fail nature'*. International Monetary Fund WP/15/21, [imf.org/external/pubs/ft/wp/2015/wp1521.pdf](http://imf.org/external/pubs/ft/wp/2015/wp1521.pdf)

Wolff, G. B. (2014). *'Eurosystem collateral policy and framework: Was it unduly changed?'*, Bruegel Policy Contribution, Issue 2014/14. Brussels: Bruegel. [scribd.com/doc/246841693/pc-2014-14-pdf](http://scribd.com/doc/246841693/pc-2014-14-pdf)

DeNederlandscheBank

EUROSYSTEEM

De Nederlandsche Bank n.v.  
P.O. box 98, 1000 AB Amsterdam  
+31 (0) 20 524 91 11  
dnb.nl