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# Collateral optimisation, re-use and transformation

Developments in  
the Dutch financial sector

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*Central bank and prudential supervisor of financial institutions*

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## **Collateral optimisation, re-use and transformation**

**Developments in the Dutch financial sector**

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# Abstract

High-quality collateral is in greater demand than before the financial crisis, due to more prudent counterparty risk management as well as new regulations governing OTC derivatives and liquidity. Against this background financial institutions are currently reassessing their collateral management. Many institutions are or are considering investing in collateral information systems, optimising their collateral allocation or transforming their collateral to acquire the desired collateral assets. This study describes how the Dutch financial sector reacts to increasing collateral needs based on interviews with a select sample of banks, (pension fund) asset managers and insurance companies in the Netherlands. Collateral optimisation, re-use and transformation enable institutions to adapt to a world where collateral is in greater demand but there are also significant risks, such as new liquidity risks, greater interdependence and procyclicality. The study examines these potential risks and discusses implications for future policy.

## I. Introduction

Demand for high-quality collateral is increasing. Though an absolute shortage of high-quality liquid assets is considered unlikely, demand is outpacing supply, creating pressure on prices. Moreover, even if there is no overall shortage, individual financial institutions may still experience collateral shortfalls. Financial institutions will look for ways of using their available collateral as efficiently as possible, including the possibility to re-use or rehypothecate received collateral. If a more efficient collateral allocation proves insufficient to meet collateral needs, institutions may revert to collateral transformation trades, in which the institution (temporarily) obtains collateral of the desired type in return for assets that cannot be readily used to secure transactions. Some institutions may perform such collateral optimisation and transformation in-house, while others may engage collateral management services providers.<sup>2</sup> Market response to increased collateral scarcity has its advantages, but also entails risks for both individual financial institutions and the financial system as a whole.

This study describes how participants in the Dutch financial sector react to increasing collateral needs, it identifies the benefits and risks associated with market response, and discusses the implications for future policy. The study is based on in-depth interviews with a select<sup>3</sup> sample of seven banks, four asset managers and pension fund asset managers and three insurance companies that are active in the Dutch market.<sup>4</sup> The interview were held in the last quarter of 2013. The interviewed banks account for 85% of the Dutch banking sector in terms of balance sheet size. The pension fund asset managers and insurance companies account for 59% and 46% of their sector, respectively. This extent of market coverage allows for the generalisation of trends and developments revealed during the interviews.

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2 A working group of the Committee on Payments and Settlement Systems is currently examining collateral management services provided in the market and the risks that these services entail. This report is scheduled to be published this Summer.

3 In order to be able to generalise the results, market participants were selected to reflect the diversity in the Dutch financial system.

4 Face-to-face interviews were held with the experts in collateral (and risk) management, treasury, securities financing and derivatives. In all interviews at least two employees participated, usually one or more senior experts and the departmental head. Questions were divided into 7 main categories and within each category questions of relevance for the specific institution were raised. The answers were mapped to a table, which was checked and verified by the interviewed institution, in order to aggregate and compare answers across institutions.

Chapters 2 to 5 provide an introduction into collateral scarcity, optimization, re-use and transformation and present the results of the interviews with Dutch financial institutions. These chapters are relevant for those interested in learning more about the impact of greater collateral demand and the responses of Dutch financial institutions. Chapter 2 covers the extent to which these financial institutions experience collateral scarcity, and Chapter 3 describes the activities market participants undertake to improve their collateral information systems and their collateral allocation (collateral optimisation). Re-use and rehypothecation of collateral are discussed in Chapter 4, while Chapter 5 describes the developments in the field of collateral transformation.

Policy makers could opt to turn directly to Chapters 6 to 8, where risks and policy options are discussed. Chapter 6 focuses on the risks of the different market responses to increasing collateral scarcity. Chapter 7 includes policy recommendations relating to collateral optimisation, re-use/ rehypothecation and transformation, while Chapter 8 presents an executive summary.

## 2. How scarce will collateral become?

Collateral is one of the most important and widespread counterparty credit risk mitigation techniques employed in wholesale markets (CGFS, 2001). Most collateral is used in secured money markets, derivatives markets, and in payment and settlement systems. Moreover, central banks require collateral to mitigate counterparty risk in their credit operations. By collateralising transactions, market participants can transform counterparty risk into market and liquidity risks, risks that may be more easily managed when uncertainty and monitoring costs are high (Mishkin, 1991, Akerlof, 1970, Geanakoplos, 2010). However, collateral will not eliminate all risks, as will be further explained in Chapter 6. Especially in times of extreme market stress, collateral values will drop, reintroducing counterparty risk in already turbulent times (Brunnermeier and Pedersen, 2008, Bottazzi et al., 2012, Adrian and Shin, 2008 and 2010). Hence, before entering into transactions, market participants should determine whether they want (and are able to) take on the ensuing credit risk. Then, they must consider the costs and benefits of collateralisation.

Demand for high-quality liquid collateral has been increasing and will continue to do so. Due to the financial crisis, market participants have become more risk averse and less inclined to provide unsecured funding, which means that financial institutions need more collateral to attract funding. New regulations will further boost demand for high-quality collateral. Following the call made by the G-20 leaders, measures have been taken to establish central counterparty (CCP) clearing of standard OTC derivatives contracts (EMIR) and to increase margin requirements on non-centrally cleared OTC derivatives, meaning that financial institutions will require more collateral for their OTC derivatives transactions.<sup>5</sup> It is crucial that CCPs are adequately collateralised given that they take on the credit risks from their clients, the potential moral hazard in this risk taking (Koepl, 2013) and the systemic importance of CCPs. The collateral posted to CCPs will also have to be of high quality. Generally speaking, CCPs require variation margin to be posted in cash. Initial margin can comprise cash but also sovereign bonds of very high credit quality.

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<sup>5</sup> How much extra collateral is needed also depends on the agreements made between financial institutions and their clearing members about their deposited collateral: is the collateral put on an individual account with the CCP (the 'individually segregated account' or ISA) or on an omnibus account (the 'omnibus segregated account' or OSA). An ISA offers better protection in case of bankruptcy of a clearing member, but offers fewer netting advantages and consequently requires more collateral.

Moreover, the Liquidity Coverage Ratio (LCR) under Basel III, which is now being introduced in stages and which will be fully obligatory from 1 January 2019, stipulates that all banks must have sufficient high-quality liquid assets on their balance sheets to be able to withstand a 30-day long stress scenario. The Basel III liquidity requirements also define which assets can be considered high-quality assets. The highest quality collateral assets comprise cash, central bank reserves, and government bonds or guaranteed bonds with a credit rating of at least AA-. Other assets such as government bonds with a slightly lower rating (up to BBB-), covered bonds, RMBSs and equities can also be included in the stock of high-quality liquid assets, but only under some strict conditions and with a higher haircut. For a comparison of the collateral frameworks of the ECB, CCPs and Basel III, see ECB (2013).

An overall shortage of collateral appears unlikely. DNB research shows that, although collateral demand growth in the euro area is outpacing supply growth, total collateral supply remains larger than total demand (Levels and Capel, 2012, see also Appendix 1). This conclusion is supported by several international studies (Houben and Slingenberg, 2013, CGFS, 2013, and ESMA, 2013). But even with sufficient collateral available on an aggregate basis, individual financial institutions may experience collateral scarcity, depending on the nature of their business and the size and composition of their liquidity buffers. The precise characteristics of the newly emerging market structure, such as the number of CCPs and their netting efficiency, will also play a major role in determining the size of possible individual collateral shortages (Heller and Vause, 2012, Sidanius and Zikes, 2012, Duffie et al., 2014). Finally, collateral problems are more likely to be experienced during periods of stress (see BCBS, 2013 for an overview of the factors relating to liquidity stress).

Indeed, it seems quite plausible that market participants will encounter shortages of specific collateral assets in the coming years. OTC-derivatives reforms will increase institutions' need for cash- and non-cash collateral. Because pension funds and insurance companies hold little cash due to the nature of their business, these institutions 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. Shortages of non-cash collateral can also be a problem for funds that mainly invest in illiquid assets. The interviewed asset managers and pension fund asset managers in the Netherlands all expect to experience such a qualitative shortage of high-quality collateral. Insurance companies are more confident about their future collateral adequacy: two out of three interviewed insurance companies expect to have sufficient collateral.

Banks may also face shortages of specific liquid assets, for instance if their current liquidity buffers do not meet the criteria of Basel III's LCR. Two of the interviewed banks indicate that their liquidity buffers will be sufficient to cover their collateral needs under the new regulatory setting, but only after having made

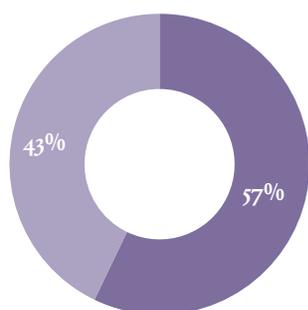
some adjustments, while one bank found it difficult to assess its future collateral adequacy since the regulations have not yet been finalised. The remaining four interviewed banks indicate that their liquidity buffers will be sufficient to cover their future collateral needs and that no adjustments will be required. Interestingly, all banks expect an increase in collateral scarcity at the aggregate level, but none of them expects to encounter severe difficulties in making the required adjustments to the own collateral portfolio.

Both banks and non-banks expressed concerns about the risk of shortages due to CCPs and general clearing members (GCMs) making sudden and unanticipated changes to their collateral frameworks. If CCPs and GCMs redefine their eligibility criteria during market stress, financial institutions need to adjust their liquidity buffers quickly in order to meet margin calls when due. This can be difficult when market liquidity is drying up. Overall, market participants find it difficult to estimate whether their liquidity buffers will be adequate over the next couple of years, because some details of the regulations have as yet to be finalised. For banks this is a special challenge given the interplay between (i) new derivatives regulations (in particular new initial margin requirements for non-cleared derivatives), (ii) Basel III's LCR, (iii) recovery and resolution planning and (iv) bank structural reforms such as the Barnier proposal.<sup>6</sup>

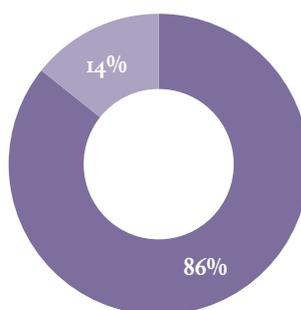
**Figure 1 Expected future collateral adequacy**

*Do you expect your liquidity/collateral portfolio to be adequate?*

*If you expect your collateral portfolio to be inadequate, or if the situation is unclear, what is the nature of the (possible) shortage?*



■ Adequate ■ Unclear



■ Qualitative shortage ■ Quantitative shortage

Note: the graphs are based on the response of the total sample of 14 institutions, including eight banks, three pension fund asset managers and asset managers and three insurance companies.

<sup>6</sup> This proposed legislation is the EU's equivalent of the Volcker and Vickers rule (see EC 2014).

### 3. Collateral optimisation

Collateral optimisation includes all activities that a financial institution undertakes to make more efficient use of its existing portfolio of collateral assets. An advantage of collateral optimisation is that it enables institutions to manage risks more effectively. For banks this could lead to lower funding costs (and thus higher profits) or boost their ability to attract extra liquidity if needed. Pension funds and insurance companies can also benefit from collateral optimisation, since they will need more collateral in the future because of mandatory central clearing of standard derivatives contracts and more stringent collateral requirements for bilateral transactions. A final and important advantage of collateral optimisation is that it may lower the institution's need for costly and potentially risky collateral transformation services. Besides these advantages, there are also risks to collateral optimization (to be discussed in Chapter 6).

A prerequisite for collateral optimisation is that institutions have a thorough understanding of their available collateral assets, the costs and uses of these collateral assets and counterparty collateral requirements. Having this overview, they can take steps to actually optimise their collateral by: (i) improving the allocation of collateral assets and (ii) making more effective use of market infrastructures. The next subsection describes the changes that Dutch financial institutions expect to make to their information systems. The subsequent sections discuss their collateral optimisation practices.

#### 3.1 Information is key to collateral optimisation

An advanced collateral management system provides an accurate overview of:

- *Collateral positions*, i.e. the assets on the balance sheet that may be used as collateral. This requires both an inventory of existing collateral assets that are kept at different locations (custodians, central securities depositories or CSDs) and an overview of illiquid assets that can potentially be converted into eligible collateral by means of securitisation.<sup>7</sup>

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<sup>7</sup> If these assets are held on-balance, this would lead to increasing asset encumbrance (see CGFS, 2013).

- *Collateral costs*, i.e. the total costs involved in the use of different assets as collateral. These costs are partly explicit, such as those of acquiring collateral (if the institution does not have sufficient eligible collateral on its balance sheet and is consequently required to source it in the market, or create collateral by securitising its own assets) and the costs of transferring different types of collateral to the counterparty. Other costs are implicit, such as the opportunity costs of not being able to put assets given as collateral to other uses.
- *Collateral requirements* of the institution's different counterparties. The institution has to take stock of which assets are eligible as collateral with which parties, which haircuts are attached and how high possible limits are.
- *Settlement procedures*, i.e. the exact procedural steps required to transfer or pledge collateral assets to a counterparty. This includes information on where potential collateral assets are kept (CSDs or custodians) and the procedures to be followed in case these assets are to be used as collateral.

Dutch financial institutions have indicated that changing rules and increased collateral demand create a need for more detailed collateral information (Figure 2). Banks<sup>8</sup>, pension fund asset managers and insurance companies<sup>9</sup> intend to improve their collateral management systems and to reduce the fragmentation of information within their organisation.

### 3.2 Efficient allocation of collateral (reducing internal collateral fragmentation)

Given that financial institutions need collateral for many different financial transactions, an important question is how decisions are made on which collateral to use in individual transactions. Fragmentation of a financial institution's collateral portfolio over its different traders, desks, business lines or geographical/legal entities (fragmentation within the organisation, 'internal fragmentation') may lead to a less than optimal allocation of collateral. One unit may for instance decide to give high-quality collateral to a counterparty with low collateral requirements, whereas

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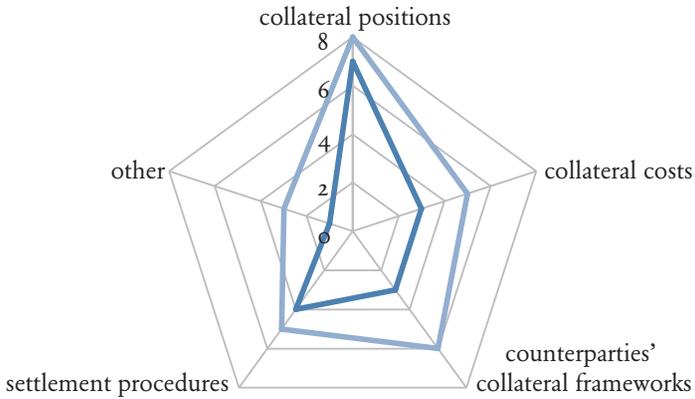
8 Banks have indicated that collateral positions can be retrieved from their collateral systems, but that information on the opportunity costs of different types of collateral and on counterparty collateral requirements is not part of those systems. Some banks say that this has never been a problem, as they only used cash collateral and/or had sufficiently high liquidity buffers so that trade-offs or opportunity costs of collateral were never an issue. Mandatory central clearing and complying with the LCR's requirements complicates matters and make banks more collateral constrained. In response, two banks have already extended their collateral information systems to include collateral costs, collateral frameworks of counterparties and settlement procedures. One bank indicated that it has had insight into these four aspects for some time. Another two banks expect to include collateral costs in the coming years and three banks would like to bring the collateral frameworks of their counterparties into focus (an action mainly driven by mandatory clearing of derivatives via CCPs).

9 Pension fund asset managers and insurance companies want to make collateral costs, counterparty collateral frameworks, and settlement procedures more transparent. These changes are mainly prompted by derivatives reforms and imminent collateral shortfalls. Pension fund asset managers are considering using external service providers, but hesitate to do so because the services currently being developed by third parties are still having teething problems.

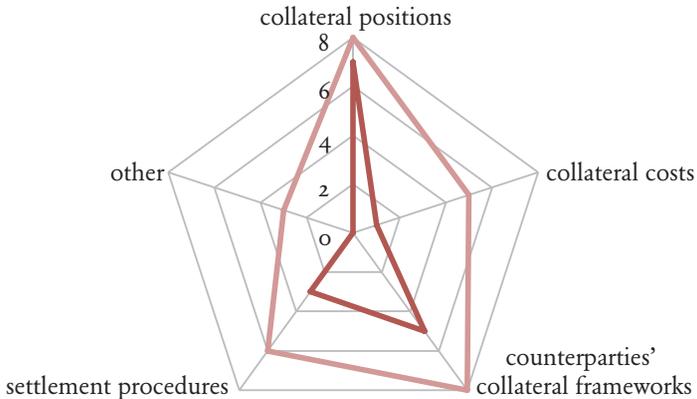
**Figure 2 Developments in collateral information systems**

The dark lines indicate which features are included in financial institutions' current collateral information systems, while the lighter lines indicate in which areas they are considering improvements. The y-axis indicates the number of participants in the survey that gave a particular answer. The total sample in this and all subsequent figures consisted of seven banks and seven other financial institutions. Please note that for 'collateral positions' the y-axis indicates a larger number of institutions than the number of institutions that were in the sample. This is due to the fact that an institution that already has insight into its collateral positions is considering further improvements.

**Banks**



**(Pension fund) asset managers and insurance companies**



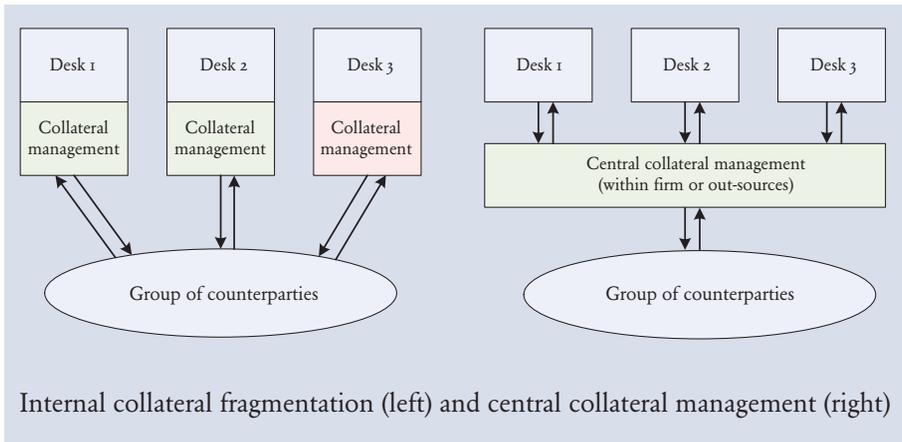
another unit in the same institution may urgently need collateral of this quality. Collateral optimisation is about first reducing fragmentation and then applying optimisation techniques to put collateral to the most efficient use (see Box 1).

### **Box 1 Reducing internal collateral fragmentation (in-house or with service provider)**

Collateral optimisation activities are aimed at reducing *internal* or *external* fragmentation of collateral. Internal fragmentation occurs when collateral is managed at business unit or business line level. For instance, a financial institution can have a treasury, a securities lending, and a derivatives desk that all manage liquidity and collateral individually. This could lead to situations in which one desk faces a shortage of collateral assets (desk 3 in the figure below), while another has an underused collateral pool (desks 1 and 2). The department facing a shortage may revert to the market to source the necessary liquidity, unaware that liquidity is lying idle elsewhere in the organisation. A central collateral management unit reduces internal fragmentation of collateral by (i) providing a complete overview of all available (potential) collateral assets, and (ii) allocating these assets as efficiently as possible, taking the needs of different business lines, counterparty requirements, and netting possibilities into account. The business lines can then conduct their transactions using the collateral as advised by the central unit. This central collateral management function can be developed internally by the financial institution itself, but it can also be outsourced to a collateral service provider. This could be an (I)CSD<sup>10</sup> or a custodian<sup>11</sup>, which could potentially act as a tri-party agent. The service provider can inform the financial institution about optimal allocation (informational services), or it can execute optimal transactions on behalf of the financial institution (transactional services). Dynamic optimisation is often achieved through the services of tri-party agents. These agents guarantee to the collateral acceptant that it at all times has collateral that meets its requirements, while the financial institution retains the option to make mid-term adjustments to the collateral in question if desired.

10 A central securities depository (CSD) is an entity that: 1) enables securities transactions to be processed and settled by book entry, 2) provides custodial services (e.g. administration of corporate actions and redemptions) and 3) plays an active role in ensuring the integrity of securities issues. Securities can be held in a physical (but immobilised) form or in a dematerialised form (whereby they exist only as electronic records). An ICSD (international central securities depository) is a CSD that was originally set up to settle Eurobond trades, and is now also active in the settlement of internationally traded securities from various domestic markets, typically across currency areas. At present, there are two ICSDs located in EU countries: Clearstream Banking in Luxembourg and Euroclear Bank in Belgium (see ECB glossary).

11 A custodian is an entity, often a credit institution, which provides securities custody services to its customers. These services comprise the holding and administration of securities and other financial instruments owned by a third party (see ECB glossary).



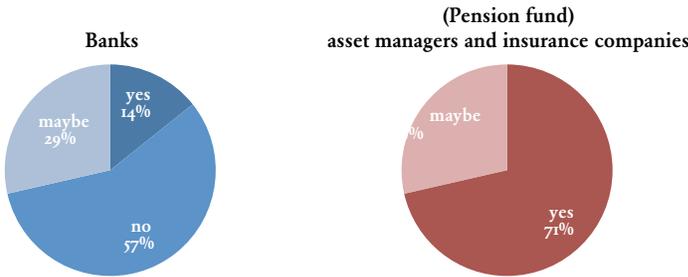
There are more and less advanced forms of collateral optimisation.

- *Business line optimisation.* The simplest form is providing ‘cheapest-to-deliver’ collateral assets at business-line level based on the demands made by the individual counterparties. In this form of collateral optimisation, different collateral portfolios continue to exist within the institution (‘internal fragmentation of collateral’).
- *Central collateral management.* For more complex financial institutions, however, there is generally value in centralising the available collateral assets for the different business lines and entities. The assets may then be allocated optimally across the different units and counterparties from a centrally managed ‘collateral hub’.
- *Incorporating future collateral needs and dynamic optimisation.* The most advanced methods of collateral optimisation not only take account of the institution's current collateral requirements, but also consider future needs and their implications for the collateral portfolio. Another advanced form is dynamic optimisation, whereby collateral may be adjusted during the life of the transaction, providing it continues to satisfy the requirements of the accepting party.

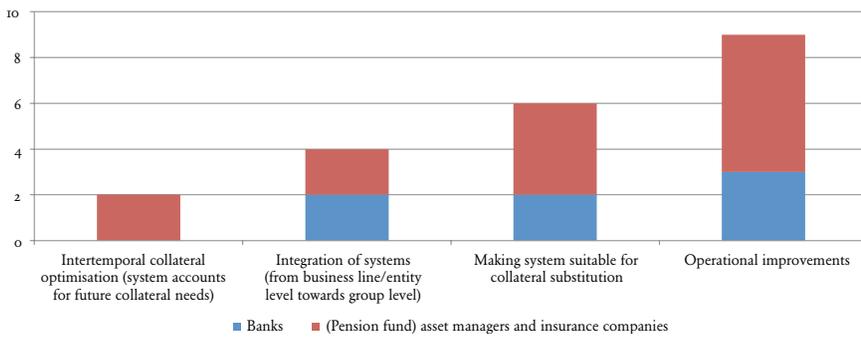
Dutch financial institutions seek to improve their collateral allocation. While pension fund asset managers and insurance companies have some catching up to do compared to banks, the latter also see further room for improvement (Figure 3). The majority of Dutch banks interviewed take steps to optimise their collateral allocation, usually aiming for optimisation at the group level. Most of these banks also actively consider future collateral needs when allocating collateral (usually to assure that the buffers remain sufficient in the light of future needs) and make use of opportunities to substitute collateral during the life of a transaction. None of them engages in fully-fledged dynamic collateral optimisation, however, where collateral is frequently substituted and reallocated in order to reduce costs or

**Figure 3 Trends in collateral allocation**

*Do you intend to improve your collateral allocation system in the next few years?*



*If yes/maybe, in which areas do you want to improve your system?*



generate additional profits.<sup>12</sup> Banks that are not optimising their collateral allocation say that they post all collateral in the form of cash and/or have sufficiently high liquidity buffers, i.e. they have no need for optimisation. However, banks that made a choice between posting cash- or non-cash collateral have generally analysed the opportunity cost of using either type of collateral. Especially the larger and organisationally more complex banks have recently improved their collateral allocation procedures or intend to do so. Integration of information systems, which is considered a real challenge, is said to be their main priority since this is a prerequisite for better allocating collateral across entities, business lines and

<sup>12</sup> The reasons for this are quite diverse. Some institutions argue that profiting from arbitrage opportunities would not fit their risk management principles (i.e. they consider it prudent to have excess liquidity), while others see little room for arbitrage given the composition of their liquidity buffers or because the term of their collateralised transactions is too short for dynamic allocation to be useful.

counterparties. A few banks are considering using or increasing the use of tri-party service providers. Perceived advantages of such services are: efficient collateral allocation, substitution possibilities, reduced operational risk and catering to their customers' demands.

The majority of pension fund asset managers currently does not actively optimise collateral allocation, either because they use collateral for derivatives transactions only (so that there are no opportunity costs associated with the use of assets as collateral) or because they have sufficiently large portfolios of high-quality liquid assets at their disposal (so that there is no need to optimise their collateral assets). Moreover, asset managers usually cannot optimise collateral across accounts because these are separately managed on behalf of different clients. All asset managers take future collateral needs into account to determine the required size of their liquidity buffers, however. Similar to banks, this does not include dynamic optimisation for the purpose of generating extra profits. All asset managers and pension fund asset managers seek to enhance their collateral allocation in response to the EMIR/WGMR derivatives reforms. In the future, pension funds will have to deal with the different collateral frameworks of various CCPs and general clearing members. This creates a need for pension funds to allocate available collateral assets more effectively. The foreseen changes to collateral management systems include integrating various business line systems, making the system suitable for margining and cash settlement and making the system decide which counterparty to use in derivatives transactions based on counterparties' collateral frameworks and netting possibilities.

Insurance companies currently do not optimise the allocation of collateral, because they only use cash collateral for OTC derivatives transactions. They do, however, take future collateral needs into account in their liquidity assessment and collateral tools. All insurance companies interviewed intend to enhance their collateral management systems in preparation for EMIR. Integrating systems and making systems suitable for collateral substitution and internal collateral transformation are among the expected changes.

### **3.3 Improving access to collateral (reducing external collateral fragmentation)**

By integrating collateral information systems and by reducing internal collateral fragmentation, important steps can be made towards improving collateral efficiency. Internationally active financial institutions may, however, also be constrained by the external fragmentation of their collateral. Part of this fragmentation is inevitable as banks need to hold liquidity buffers in different jurisdictions due to regulatory requirements. But external fragmentation also occurs because these institutions use central security depositories (CSDs) and custodians in different countries for the administration and safekeeping of their securities, making it difficult or time

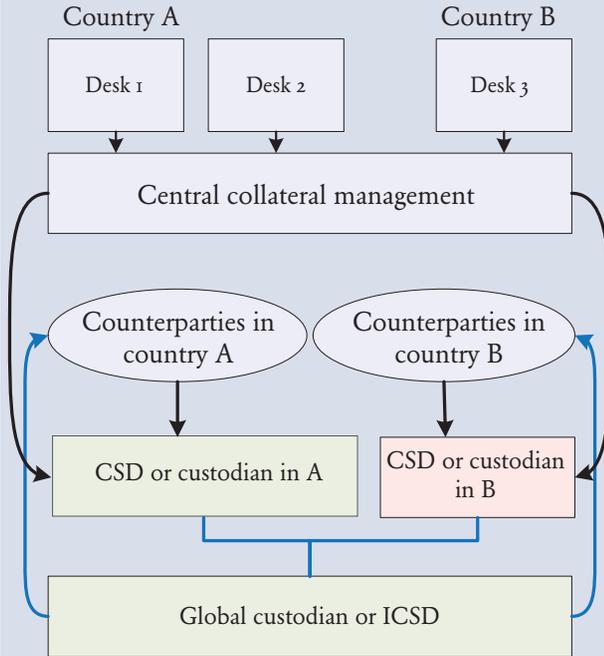
consuming to use cross-border assets as collateral for some counterparties, so that in practice collateral assets are mostly used within their silo. This inhibits an efficient allocation of collateral. Global custodians and international CSDs (ICSDs) can offer valuable collateral services, as they have both accounts and operational links with national CSDs and other custodians, and connections to a broad international group of counterparties. Two examples of such services are Clearstream's *global liquidity hub* and Euroclear's *collateral highway*. The idea behind this is that financial institutions will be offered quicker and easier access to their assets held in different places, enabling more efficient use of these assets as collateral (see Box 2). In this context two recent Eurosystem initiatives to improve its collateral management services (the Correspondent Central Banking Model or CCBM) should also be mentioned, as these allow euro-area banks to use their cross-border collateral more efficiently for Eurosystem credit operations. These initiatives are the removal of the repatriation requirement (in May 2014) and the introduction of the possibility of using cross-border tri-party services (later this year).<sup>13</sup>

The lion share of banks in our sample uses the services of custodians or ICSDs (other than pure custody services). The reasons given are the swift and efficient allocation of securities, and the possibility to substitute collateral assets during the term of a transaction. Banks that refrain from using these services consider their business too small for the benefits to outweigh the costs. Only one bank intends to increase its use of custodians or ICSDs to improve its collateral allocation. Others find their access to foreign market infrastructures sufficient. Asset managers and pension fund asset managers on the other hand see an increased need for the services of custodians and ICSDs and expect to use these services more intensively. The derivatives reforms will force them to post more non-cash collateral (initial margin and excess margin), which makes efficient and safe allocation of securities more important. Moreover, the use of these market infrastructures gives pension funds easy access to counterparties. The need to reduce external collateral fragmentation seems to pertain more to pension fund asset managers than to insurance companies. Despite the benefits of custodians or ICSDs, many market participants hesitate to make use of the new services emerging in the market. High costs and teething problems seem to be deterring them.

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<sup>13</sup> Within the CCBM Eurosystem, counterparties can use their eligible marketable assets to obtain monetary credit or intraday liquidity in another euro-area country as collateral, but so far the assets had to be transferred first to an account maintained by the local national central bank in the 'issuing' securities settlement system (the repatriation requirement).

**Box 2 Reducing external collateral fragmentation  
(using collateral service provider)**



This figure presents an international bank active in country A and country B. Even if this bank manages its collateral centrally, it would need to keep some securities at the CSD of country A (or a custodian with an account at this CSD) and others in country B. Now suppose the bank has abundant collateral in country A, but a shortage in country B. Using country A's assets to collateralise a transaction with a counterparty in country B can be difficult and time-consuming if the latter does not have an account with country A's CSD or the international bank's custodian in country A. Global custodians and ICSDs can offer a solution, as they have accounts and links with many national CSDs and custodians, while the larger counterparties tend to have accounts with these global custodians and ICSDs. The bank could then transfer its securities in country A to an omnibus account of the global custodian or ICSD in country A. The counterparty in country B would then acquire a claim on part of that omnibus account.

## 4. Re-use and re-hypothecation

The *re-use* of collateral from e.g. repo transactions and *rehypothecation* of collateral received from derivatives positions may be considered as a special form of collateral optimisation. The idea is that parties receiving collateral assets may redeploy them for their own purposes. This could entail trading collateral assets in order to generate an extra profit, or using them to collateralise their own transactions. The advantages of re-use of collateral or rehypothecation are that it reduces the funding liquidity requirements of financial institutions, and the same collateral may support more than one transaction. This raises market liquidity (see Brunnermeier and Peddersen, 2008), which usually implies a more efficient allocation of financial resources. As rehypothecation offers advantages to the receiving party, the party extending rehypothecation rights usually obtains more favourable conditions such as higher interest rates on assets lent, or more flexible collateral requirements (see Box 3). Of course, there are not only advantages but also risks attached to collateral re-use and rehypothecation. These are discussed in Chapter 6.

All banks in our sample allow for collateral re-use and rehypothecation by their counterparties, and almost all (six out of seven) re-use or rehypothecate collateral themselves. The majority of the banks says they do not depend on the re-use of collateral assets to generate sufficient liquidity for their core business.<sup>14</sup> Dutch banks, however, stress that the re-use of collateral is an important lubricant for the financial system: it enables efficient allocation of assets to those market players who need them most. Received collateral assets are used to: (i) collateralise own transactions, (ii) comply with Basel III liquidity standards, and (iii) generate additional profits in repo or securities lending transactions (Figure 4). None of the interviewed banks had fundamental objections against re-use or rehypothecation of collateral, although one respondent said it is reconsidering its viewpoint because of an incident in which recalling collateral proved difficult.

Asset managers and pension fund asset managers need to respect their customers' wishes regarding the extent to which posted collateral can be re-used. Subject to restrictions laid down in their investment mandate, pension fund asset managers

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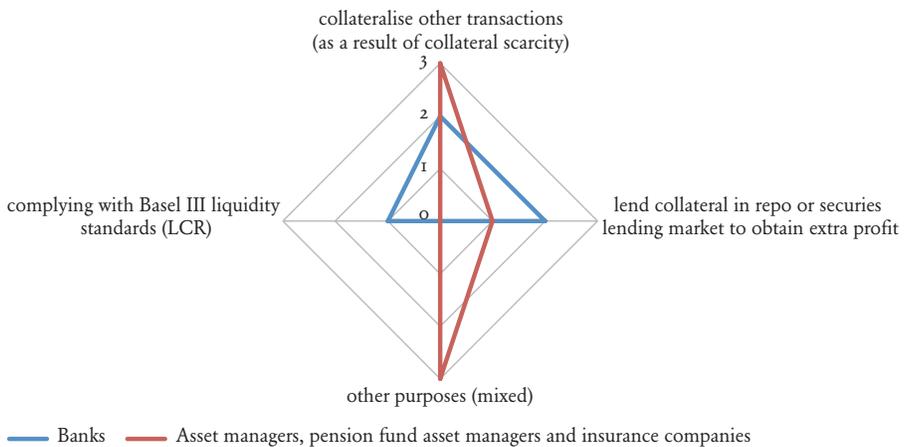
<sup>14</sup> They argue that this makes Dutch financial institutions significantly different from (for example) the US banking sector where rehypothecated collateral assets are a main source of liquidity for investment banks.

allow their counterparties to re-use posted collateral. The majority of the asset managers and pension fund asset managers re-uses received collateral to collateralise other transactions (Figure 4). This is especially attractive for funds with relatively illiquid investment portfolios that would otherwise need to liquidate assets. Moreover, pension fund asset managers say that they often reinvest cash collateral to mimic the asset mix of the funds or reinvest in safe money market funds.<sup>15</sup> Indeed, about half of the asset managers and pension fund asset managers argue that re-use and rehypothecation would re-introduce counterparty and operational risk. but at the same time they find it necessary to generate sufficient liquidity. Some argue that not re-using collateral, and thereby risking collateral scarcity, would pose far greater risks to institutions and the financial system.

Dutch insurance companies have different views on the re-use of collateral. Two insurance companies use received collateral to collateralise their own transactions<sup>16</sup> and one of them would re-use collateral for the purpose of generating additional profits through repo or securities financing transactions. One of them does not re-use or rehypothecate received collateral assets, because collateral should be treated as a buffer against counterparty risk.

**Figure 4 Purpose of re-use of collateral**

The y-axis reflects the number of participants in the survey that gave a particular answer



<sup>15</sup> One asset management company does not co-mingle collateral with other funds because collateral is primarily considered as a buffer against counterparty risk.

<sup>16</sup> One insurance company notes that it only re-uses cash collateral in the light of the recall risks of non-cash collateral.

### Box 3 Collateral re-use and collateral re-hypothecation

Although the terms re-use and rehypothecation are often used interchangeably, there is a technical and legal difference. The term re-use applies if collateral is posted on the basis of title transfer when legal ownership goes from the collateral giver to the collateral taker. The latter can then use the assets as he sees fit. Repo and securities lending transactions are examples of collateralised transactions based on title transfer. The term rehypothecation is used when the collateral is pledged, i.e. the collateral assets remain legally owned by the collateral giver, who must then specify in the contract if collateral is eligible for rehypothecation by the collateral taker. Rehypothecation is common in derivatives transactions, which are usually governed by ISDA Master Agreement and the attached ISDA Credit Support Annex (CSA) stipulating how the receiving party may use the collateral. There are various types of CSAs in use with different characteristics, e.g. rehypothecation allowed or not, with or without the requirement to deliver equivalent collateral, etc. (see Monnet, 2011). In the frequently used New York law governed CSA, the collateral giver does not have the automatic assurance of getting back equivalent collateral, if the collateral taker defaults.

Re-use and rehypothecation create leverage, because they act as a credit multiplier. Suppose, as an example, that bank B receives € 100 in assets from bank A as collateral for a loan worth € 100. If bank B were to redeploy 50% of the received collateral assets, bank B could use € 50 to collateralise a repo transaction with bank C. Bank C, in turn, might use € 25 (assuming again a 50% re-use rate) with bank D to obtain a loan, etc. In the limit this cycle of re-using collateral would add up to € 200. The collateral multiplier is thus  $1/\text{re-use rate}$  (see Bottazzi et al., 2012). In this example, € 100 of initial collateral could support € 200 credit. Thus, the leverage effect of rehypothecation is that the same pool of assets is used to cover an increasing amount of exposure. In case of default, it might be difficult to locate the collateral and hence who will take on the loss. To date, little research has been done into the field of rehypothecation and the implications of defaults (the borrower is unable to return the money) or fails (the cash lender is unable to return the securities).



The actual re-use rate of collateral depends on many factors, such as (i) risk aversion of financial institutions, (ii) regulations, and (iii) collateral scarcity. Research has shown that rehypothecation (of customer collateral) declined substantially after the default of Lehman Brothers, due to market participants' increased awareness of the associated risks (Singh and Aitkin, 2010). The possibilities for re-use of collateral are likely to be further curbed by the LCR (because only unencumbered

assets are eligible as high-quality liquid assets)<sup>17</sup>, regulatory initiatives to promote central clearing (CCPs are not allowed to re-use collateral) and limitations on the rehypothecation of initial margins in bilaterally cleared transactions. However, collateral scarcity might counterbalance these effects, inducing market participants to search for ways to redeploy collateral assets.

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<sup>17</sup> Assets received in reverse repo and securities lending transactions are included, but only if they have not been rehypothecated.

## 5. Collateral transformation

New regulations have fuelled demand for specific high-quality assets. The mandatory use of CCPs for standard OTC-derivatives transactions will raise the demand for assets accepted as collateral by CCPs (mainly cash and government bonds).<sup>18</sup> The LCR requires banks to hold a sufficient buffer of high-quality liquid assets on their balance sheets and specifies which assets qualify for this purpose. Financial institutions that do not have the right types of collateral assets, can make use of collateral transformation (also called collateral swaps or collateral upgrades).

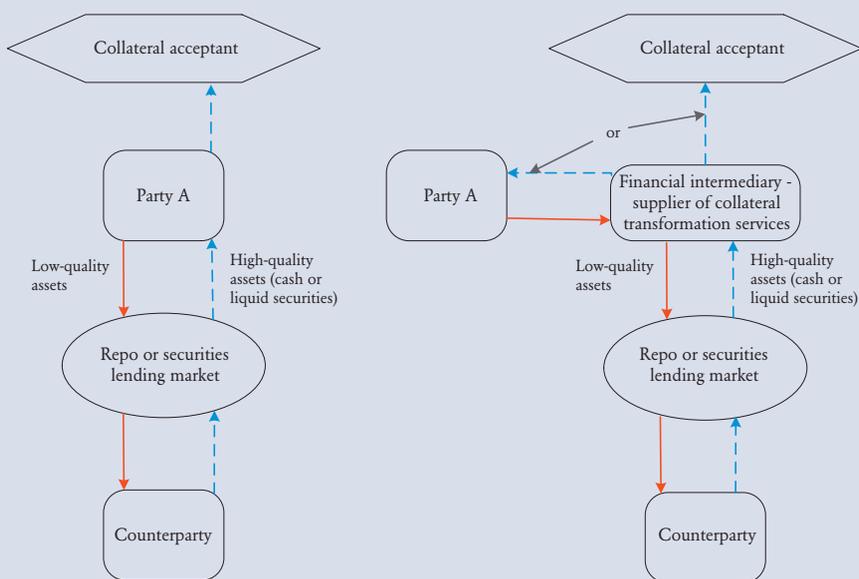
Collateral transformation encompasses all transactions of a financial institution with a third party that are aimed at obtaining the desired type and quality of collateral assets. So collateral transformation differs from collateral optimisation in the sense that the latter tries to put the existing asset portfolio to the best possible use, whereas in case of transformation, the asset portfolio is adjusted to obtain potential collateral of the desired type. A financial institution can either engage in collateral transformation itself (if it is able to trade on the repo or securities lending market) or use an external services provider (see Box 4). Collateral transformation offers significant advantages (see Chapter 6 for a discussion of the risks). Under normal market conditions, it provides for a more efficient allocation of scarce collateral assets and may facilitate economic activity. Collateral transformation allows pension funds or insurance companies to acquire the necessary liquidity when needed. If collateral transformation is not an option, these market participants are forced to hold more cash, which reduces their performance. On the other hand, financial institutions with idle liquidity find it profitable to lend cash or securities to others. Efficient allocation of liquidity ensures that liquidity is put to use where it is most needed.

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<sup>18</sup> Although CCPs vary to some extent and some accept a somewhat broader range as collateral, to date the variation margin is almost always paid in cash, while the initial margin consists mainly of cash and government bonds (see ECB, 2013).

## Box 4 Collateral transformation

Suppose a financial institution ‘party A’ is in need of a collateral upgrade. If this institution is active in the repo and/or securities lending market, it can initiate a collateral upgrade transaction itself – by offering lower quality collateral in return for borrowed cash or higher quality securities. Banks are potential counterparties in repo markets, whereas long-term investors with large securities portfolios (e.g. pension funds or investment managers) are likely counterparties in the securities lending market. Other potential counterparties are financial institutions (custodians, dealers) having securities from clients in custody who, with their clients’ consent, generate more revenue on their portfolios.



In this situation, party A provides for an upgrade of its collateral itself. It borrows cash (repo) or higher quality securities (securities lending) through the repo or the securities lending market with low-quality assets as collateral. The latter is also known as a collateral swap.

In this situation, a financial intermediary provides collateral transformation services. On behalf of party A, the intermediary sources the necessary cash or securities in the repo or securities lending market, or delivers them from its own books. The intermediary then forwards these high-quality assets to Party A itself or directly to a collateral acceptant (e.g. if the intermediary is a clearing member offering transformation services to customers).

If party A has no direct access to repo or securities lending markets, it can effectuate collateral transformation indirectly through an external services provider. Some service providers (especially parties managing large securities portfolios) will have the desired higher-grade assets available on their own books. In other cases, the intermediary will tap the market on behalf of his customer (party A) for the necessary cash or securities. Given their central role in the new derivatives markets infrastructure, general clearing members could become natural candidates to provide collateral transformation services for their clients.

Three Dutch banks indicate that they transform their collateral (Figure 5). This is not spurred by collateral scarcity; making additional profits and the desire to invest cash are the main drivers quoted by the banks. Two banks (including one that is currently not involved in collateral transformation) indicate that they expect to transform more collateral in the future, mainly because of the need to make their liquidity buffers LCR-compliant. Besides operating on the demand side of collateral transformation services, some banks also supply collateral transformation services (Figure 6). The bulk of the banks provides collateral upgrade transactions, mainly short-term collateral upgrades and transformation between high-quality liquid assets, but long-term collateral upgrades are offered too. Four banks expect higher future demand for these services, but only two banks expect to be able to largely accommodate this.<sup>19</sup> The banks that do not expect an increase in collateral transformation, argue that the market cannot provide this because all institutions will try to hold on to their high-quality liquid assets.

Given the nature of their business, pension funds rely more on collateral transformation than banks. The majority of asset managers and pension fund asset managers indeed transforms collateral for their pension fund clients. All expect a higher demand for these services in the next couple of years, in particular for cash-transformation, which they would like to facilitate provided that they are in line with current regulations. Currently, the interviewed pension fund asset managers are not active as suppliers of collateral upgrade transactions to other market participants. While expecting higher future demand, they will not, or only to a small extent, accommodate this. A few pension funds asset managers have been contacted by banks requesting collateral swaps to acquire securities that qualify for the LCR. These requests are said to have peaked some years ago, when the Basel III liquidity standards were first introduced.

All interviewed insurance companies use some form of collateral transformation, although they do not categorise all types as such. Some insurers transform cash into securities or securities into cash, others have committed repo facilities to attract liquidity in emergency situations. While all expect to transform more collateral in the future, the insurers do not expect to become dependent on collateral swaps. Having the option to attract liquidity in case of emergency or to capitalise on profit opportunities are their main drivers for demanding collateral transformation. Insurance companies also provide collateral transformation services, but two of them on a limited basis only (a committed line to a specific counterparty or transformation within the own holding company) since they do not see this as the core business of insurance companies. Only one insurer is considering providing

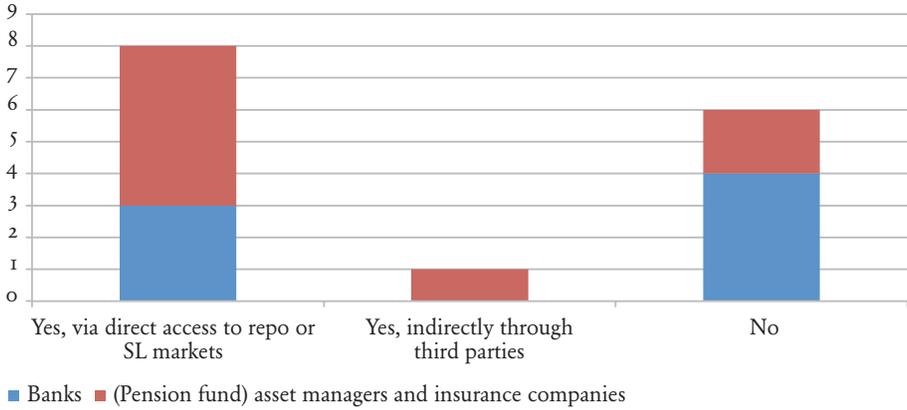
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<sup>19</sup> Some consider their own liquidity or risk management profiles to be a constraint, others intend only to provide collateral transformation services to a select group of counterparties with a high credit quality, or if the return on such transactions more than compensates for the risks incurred.

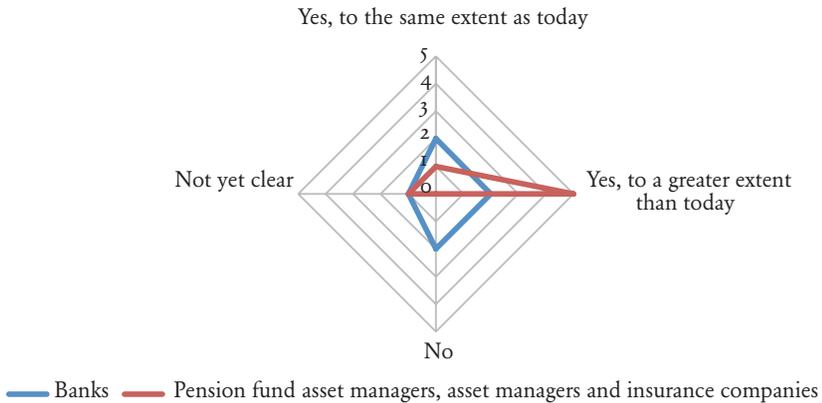
**Figure 5 Demand for collateral transformation**

The y-axis indicates the number of respondents that gave a particular answer.

*Do you currently make use of collateral transformation?*



*Do you expect to use collateral transformation in the future?*

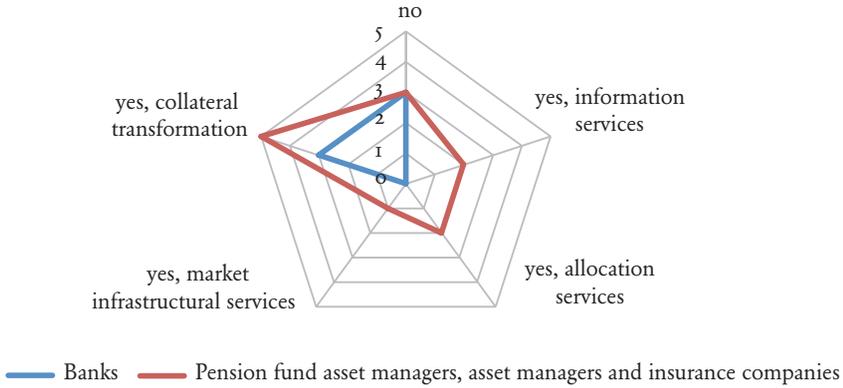


short-term collateral upgrades, but only under the condition that collateral is exchanged on a daily basis and that transactions can be reversed within one business day.

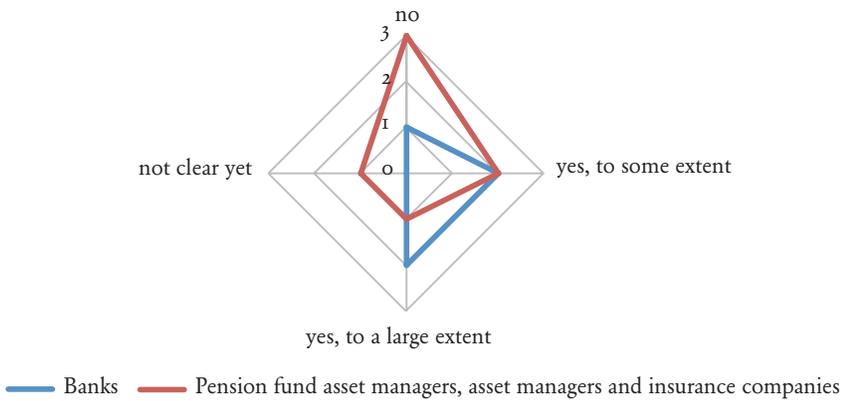
## Figure 6 Supply of collateral services

The y-axis indicates the number of respondents that gave a particular answer.

*Do you expect an increase in demand for your collateral services or potential collateral services?*



*If yes, will you accommodate this demand?*



## 6. Risks

### 6.1 Collateral optimisation

Collateral optimisation not only brings advantages, but also carries risks. The most significant risk factors are:

- *Lower overall collateral pools/liquidity buffers.* By reducing collateral fragmentation, more collateral becomes available for use. Financial institutions may then be incentivised to hold less collateral, counting on the ability to use assets held by other entities or in other jurisdictions if the need arises. This could lead to settlement fails and collateral shortages in periods of market stress.
- *Increased interdependence.* When financial institutions centralise collateral assets for several business lines and legal entities and allocate collateral from a central hub, the interdependence of these legal entities increases (see Box 2). This could either impede or ease orderly resolution if the institution runs into financial problems. With increased internal dependence, operational risk is more of an issue, as outages in one unit/system may have company-wide ramifications. If financial institutions engage collateral service providers, they will also become dependent on the operational links with their service providers, on the links of the latter with other relevant financial market structures or counterparties, and on any transactions conducted by the service providers (external interdependence). It is essential that these links are robust and that transactions envisaged by financial institutions and conducted by service providers can be settled as planned: operational or settlement failures may imply that the institution is unable to use or receive the collateral as it expects to do, exposing it to possible liquidity or credit risk. Since collateral services are a new development, there may be legal risks and issues too, especially if the services are built on links between entities in different jurisdictions and possibly different time zones. Finally, these services are offered by a small group of large custodians or (I)CSDs, so that any failure at these services providers may have system-wide effects.
- *Greater complexity.* Increased (internal and external) interdependence and the use of collateral optimisation models both add to complexity. The optimal collateral allocation needs to be calculated on the basis of available collateral, current and future collateral needs and counterparty requirements, using IT applications with optimisation algorithms. Especially in times of market stress,

it is important that models can be adjusted quickly to changing asset prices (volatility) and collateral requirements (i.e. haircuts, limits, eligibility of assets). Operational failure such as malfunctioning of IT systems or model errors may distort the optimisation process, cause collateral shortfalls and could expose the financial institutions to operational and liquidity risks. Greater complexity also makes markets less transparent and makes it more difficult for the participants to assess risks adequately.

In the interviews some Dutch market participants noted that interoperability arrangements between service providers and market infrastructures would increase interconnectedness in the financial system, which could be a channel of contagion. Operational and legal risks, and the losing track of and control over collateral assets were other concerns of financial institutions that are considering using, or are already using, custodians and ICSDs for collateral optimisation.

## 6.2 Collateral re-use and rehypothecation

Besides advantages, the re-use or rehypothecation of collateral carries the following risks:

- *Increased counterparty risk and uncertainty in case of bankruptcy.* A provider of collateral re-use or rehypothecation will not automatically get back the collateral that he originally delivered. In repo and securities lending transactions the attached risk is limited as the counterparty is obliged to remit equivalent collateral when the contract ends. In OTC-derivatives transactions this is more complex, as there are different CSAs in use that have different agreements in place on the use of collateral (see Box 3).
- *Risk of procyclicality.* During periods of stress, the perception of institutions' creditworthiness can change very quickly. When in doubt about the financial health of an institution, other parties suddenly become reluctant to grant this institution rehypothecation rights. This means that an institution that has fallen out of favour may run into funding problems, causing its position to deteriorate further. 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. This risk should not be underestimated. After the bankruptcy of Lehman Brothers, far fewer parties were prepared to allow rehypothecation. 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).
- *Increased interdependence and higher leverage.* Collateral re-use and rehypothecation creates interdependence between market participants since the same collateral assets are used to secure transactions by different participants. This entails risks if collateral is recalled or transactions need to be unwound, since the

actual quantity of collateral can be substantially lower than the contractually committed quantity (see Box 3).

Perceptions of Dutch financial institutions of the risks of collateral re-use and rehypothecation differ widely. Some argue that re-use and rehypothecation would re-introduce counterparty and operational risk. Others take the opposite view and claim that restrictions on re-use would be a major risk in the light of increasing collateral scarcity. Some asset managers find the rehypothecation of variation margins less risky than the rehypothecation of initial margins, as the former is a reflection of a current market value. Should the counterparty not be able to return the rehypothecated collateral to its original owner, that party can refrain from paying the counterparty the amount due on the derivatives contract.<sup>20</sup> The initial margin, however, acts as a buffer against potential future exposure and is as such not directly linked to a current market value. Failure to return the collateral associated with the initial margin component can therefore not be offset by withholding payment of the opposite leg of the transaction. Moreover, some market participants argue that re-using cash collateral is less risky because cash is fungible, whereas non-cash collateral entails the risk that specific collateral assets are not returned or that returned 'equivalent' collateral is not really equivalent (i.e. is of lower quality or has other properties).

### 6.3 Collateral transformation

Besides advantages, there also risks attached to collateral transformation. Some of these risks pertain to the buyer or supplier of collateral transformation, others pertain to both (see Financial Stability Board 2012, and Financial Services Authority 2012).

#### *Risks for the buyer*

- *Procyclicality, roll-over risk and high asset encumbrance:* if the maturity of the derivatives contracts exceeds that of the collateral transformation transaction (which is likely at pension funds and life insurers) there is a risk that the transformation transactions cannot be rolled over. This may happen due to distortions in the repo or securities lending market or because the collateral transformation provider may decide to stop its services in case of market stress. This could pose serious risks to pension funds and insurers, because – unlike banks – they do not have access to central bank liquidity and thus depend on other channels to obtain liquid assets. A possible solution would be to sell other assets in order to procure the appropriate collateral assets, but in case of system-wide stress, assets may only be sold at rock bottom prices, leading to fire-sales.

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<sup>20</sup> The party that posts collateral has a negative market value on its derivatives contract, which implies an amount due to the counterparty.

Even if collateral transformation contracts can be rolled over during market stress, procyclicality may pose problems, because margin calls and haircuts on collateral e.g. by CCPs and clearing members may suddenly increase in times of market stress. Buyers of collateral transformation services would then urgently need to lend more of their less liquid assets to obtain a collateral upgrade, encumbering a larger proportion of the balance sheet. Asset encumbrance is a problem for banks in particular (since their unsecured creditors or the deposit guarantee scheme would be left with lower residual claims in case of resolution) and less so for pension funds and insurance companies (as these are financed by means of premiums), but it leads to a less flexible allocation of assets for all institutions.

In the interviews Dutch pension funds expressed the feeling that their higher need for collateral transformation would expose them to increased liquidity, roll-over, and operational risks.

#### *Risks for the supplier*

- *Liquidity and counterparty risk.* The supplier of collateral transformation services will typically deliver high-quality collateral (cash, high-quality securities) and will receive a fee for accepting illiquid or lower quality assets as collateral in return. It is important that collateral transformation providers have good models to value the received collateral assets. They also need to ascertain that they do not need the assets delivered for their own liquid buffers (i.e. that they do not incur liquidity risks) and that the assets received offer adequate protection in case of counterparty failure. Given the stringent collateral requirements of CCPs, general clearing members (GCMs) may offer collateral transformation trades as part of their clearing business. This may expose the GCM to counterparty risk, as it is obliged to meet margin calls made by the CCP instantaneously and may not succeed in immediately passing this on to its customers. Market participants expect that GCMs will mitigate this risk by requiring customers to maintain additional collateral buffers in order to meet sudden margin calls.

Only one Dutch financial institution interviewed expressed fundamental objections against providing collateral transformation because of the risks involved. Market liquidity risks and operational risks are the main concerns of banks that provide collateral transformation. Several banks take a careful approach towards providing collateral transformation, using their own risk management and counterparty creditworthiness as decision criteria. But banks do not (fully) internalise the systemic risks of collateral transformation. This is not surprising, because it is almost impossible for a financial institution to deduce how its counterparty uses cash or securities obtained via securities lending or repo transactions.

### *Risks for buyers and suppliers*

- *Increased interdependence and possible concentration risks.* Collateral transformation leads to more repo and securities lending transactions, causing increased interdependence between market participants and an increased risk of operational failures with concomitant liquidity and credit risks. These risks have been described above under 'collateral optimisation'. Banks in need of collateral transformation are most likely to use their central bank to achieve this, as many central banks, including the Eurosystem central banks, have less strict collateral requirements than other collateral takers. This enables banks to use their somewhat lower-quality collateral to obtain credit from the central bank, yielding them cash that may be used as collateral on the market, or to help them become LCR-compliant. Pension funds and insurance companies typically have large portfolios of high-quality assets, but little cash or liquid assets. If the need for cash collateral emerges, they would probably approach their bank. Given their central role in the new derivatives markets infrastructure, general clearing members could develop into large-scale collateral transformation providers for their customers and thereby become a 'single point-of-failure' that many end-users are dependent on, creating concentration risks. This may also potentially expose CCPs to increased risk as an extra link in the chain of market participants and transactions is necessary in order to meet margin requirements.

## **6.4 Evaluation of the risks**

Although there are differences in the details, there are important high-level similarities in the risks attached to collateral optimisation, collateral re-use (or rehypothecation) and collateral transformation. The risks attached to the different market responses to scarcer collateral fall into four broad risk categories: (1) too low or unstable collateral buffers (liquidity risk), (2) greater interdependence and complexity, (3) increased counterparty risk and related risks and (4) procyclicality (see also Table 1 in Chapter 8).

The risks identified here are not new. The financial institutions and market infrastructures involved in collateral management (custodians, CSDs, ICSDs) and the collateral services provided by these entities have been around for quite some time. Moreover, collateral management transactions are performed on 'old' markets (repo market, securities lending market) and settled in existing systems (securities settlement systems, payment systems, internal systems of custodians etc.). What is new is the unprecedented interest in collateral optimisation, re-use and transformation, also from financial institutions (such as pension funds and insurance companies) that have never had to worry about possible collateral shortages. This implies that the risks identified here are likely to increase too.

It is difficult to predict whether or not these risks will become material. There is no way of forecasting how many institutions will be experiencing collateral shortages and what the size of possible shortages would be. One factor is that collateral requirements tend to be heavily influenced by the overall level of trust in the economy and tightened during market stress, so that collateral requirements and market perceptions on the quality of different collateral assets tend to vary over time. Another factor is that not all details of the relevant regulations have been worked out yet and that CCPs and general clearing members have not yet finalised their collateral requirements. It would be helpful for financial institutions to hear these details as soon as possible, as this would enable them to make a more reliable assessment of their collateral adequacy. Finally, reliable information on collateral transformation is lacking due to the fact that transformation trades are performed as ‘normal’ securities lending and repo transactions (see Box 4), as only the driver behind them differs. Current work by the FSB to improve transparency on securities lending and repo markets could shed further light on collateral transformation activities.

## 7. Policy options

Given the potentially high risks attached to collateral optimisation, collateral re-use (rehypothecation) and collateral transformation, it is necessary to develop a view on how risks could be mitigated if they become material. Six areas for possible action can be identified. First, central banks are significant collateral takers, so that their collateral requirements have a major impact on the degree of collateral scarcity in the market and on the market's need to respond to any emerging shortages. Second, it is important to get a better understanding of the pros and cons of collateral re-use and rehypothecation given the relation to collateral velocity and collateral scarcity. Finally, measures could be considered to mitigate the four main risks identified (see Section 6.4).

### 7.1 The role of central banks' frameworks

Central banks play an important role in influencing collateral scarcity and in determining the extent to which financial institutions need to optimise or transform their collateral. The current practice is that many central banks relax their collateral requirements in times of stress in order to prevent liquidity squeezes in the financial system. However, this practice also allows banks to reserve their higher quality collateral for market participants with stricter collateral requirements and it lowers the banks' need to cut back on the liquidity they supply to other financial institutions, thereby alleviating collateral scarcity within the financial system. Accordingly, during market stress many central banks act as 'collateral transformers' (cash for lower quality collateral), enabling banks (and other financial institutions) to cope with any temporary shortages of high-quality collateral. While this is beneficial from a financial stability perspective, the possible influx of lower quality collateral could pose risk management challenges to the central bank.

However, central banks are often less successful in tightening their collateral frameworks during periods of boom. Easy collateral and lending conditions may then lead to excessive system leverage and rising vulnerabilities, which will manifest themselves during times of stress. Moreover, financial institutions may get a false sense of collateral abundance if the central bank is always there to upgrade their lower quality collateral. All in all, it is better for central banks to pursue a countercyclical collateral policy: relax collateral requirements during a crisis (to safeguard financial

stability) and tighten them in good times. Effectively, the central bank's collateral framework is then used as a macroprudential instrument.

## **7.2 Balancing the risks and benefits of collateral re-use and rehypothecation**

There are both risks and benefits attached to collateral re-use and rehypothecation, as they imply that various counterparties use the same assets to securitise different transactions (see Box 3). The main benefit is that this gives collateral 'velocity', lowers overall collateral needs (as a pool of assets of a certain value can secure a higher value of exposures) and thereby lowers pressure on the existing stock of collateral. Restrictions on collateral re-use and rehypothecation would make collateral scarcer, cause global financial lubrication to decline, and thereby affect monetary policy (see Singh, 2011). However, the benefits of greater collateral velocity and the risks of higher system leverage and interdependence are two sides of the same coin.

An adequate policy response could be to allow collateral re-use and rehypothecation in low-risk cases and to put restrictions on the high-risk cases. Rehypothecation tends to lead to more uncertainties than re-use, as the latter entails title transfer. Moreover, as cash is fully fungible, cash re-use and rehypothecation seems to be less risky than securities re-use and rehypothecation, especially if these securities are 'special'. Finally, for the variation margin, re-use and rehypothecation seems more appropriate than for the initial margin, since the former is basically a 'payment' of the contract's current market value, while the latter is meant to act as a buffer for potential future counterparty exposure. Authorities could examine these different forms of re-use and rehypothecation to assess where risks tend to be low and where they tend to be higher. This may lead to an approach where the main benefits of re-use and rehypothecation are preserved, while the main risks are capped.

Several policy initiatives are already being taken to curb the risks of rehypothecation and leverage. A policy recommendation issued by the Financial Stability Board (FSB) puts restrictions on the rehypothecation of customer assets and the FSB's proposed minimum standards for haircuts on securities financing transactions and numerical floors would reduce the amount of system leverage (FSB 2013). Work by the BCBS and IOSCO on margin requirements for non-centrally cleared derivatives has established that initial margins can only be rehypothecated once and only under restricted circumstances (see BCBS/IOSCO 2013).

## **7.3 Mitigating the risk of too low or unstable collateral buffers**

To limit the risk of too low overall collateral pools, financial institutions and their supervisors should monitor and stress test the adequacy of institutions' collateral portfolio's to ensure that they have enough high-quality collateral on a structural basis. Supervisors should encourage regular liquidity stress-tests, which include

contingent liabilities from e.g. derivatives positions and consider possibly stricter counterparty (e.g. CCP) collateral requirements. Banks are already performing stress tests for the purpose of the liquidity coverage ratio (LCR), which stipulates that banks should have sufficient unencumbered high-quality liquid assets (HQLA) at their disposal to be able to cope with a 30-day stress scenario. Pension funds and insurance companies should also perform regular stress tests.

Moreover, it is important for institutions not to depend on rehypothecation as this is not a stable liquidity source during market stress when rehypothecation rights may be withdrawn. Banks, pension funds and insurance companies need to make sure that they have alternative, more stable liquidity sources in case they are no longer able to rehypothecate collateral received. Similarly, financial institutions (and their supervisors) need to make sure that they do not depend on transformation for their collateral adequacy. Especially if firms depend on collateral upgrades, they should be aware that their contracts may not be rolled over, or only under unfavourable conditions during periods of market stress. While the LCR ensures that banks hold minimum buffers of high-quality liquid assets, the LCR may not guarantee sufficient liquidity if a bank is highly dependent on collateral transformation. The reason being that the HQLA obtained through repo or securities lending are all eligible for the LCR, but if these assets are obtained through collateral upgrades they may no longer be available when needed. Both financial institutions and supervisors have a responsibility to assess the quality and stability of liquidity buffers. Given the nature of their business, pension funds and insurance companies may find it more difficult or costly to maintain permanent liquidity buffers. Supervisors should ensure that the right balance is struck between the benefits and costs of maintaining a certain amount of liquidity.

#### **7.4 Mitigating the risks of greater interdependencies and complexity**

Financial institutions need to be mindful of the risk of increased internal interdependence in their business continuity planning as well as in their recovery and resolution plans, which should be assessed by their supervisors. Where external dependencies on financial institutions are created (e.g. a firm or FMI becoming dependent on collateral information provided, or collateral transactions performed by a custodian), there should be clear service level agreements (SLAs) in place to avoid misunderstandings. Such SLAs would need to specify the details of the services provided, such as the frequency at which collateral information is refreshed (to limit the risk of the firm making its collateral decisions based on outdated information) and the responsibility for allocating or re-allocating collateral in different situations (the firm or its service provider). It is also important to have a good understanding of the procedures in case of operational failures at the service provider, such as the expected recovery time and the communication channels to be used. As a higher degree of collateral optimisation is likely to come at the

expense of higher operational risks, financial institutions need to make conscious and careful choices in balancing costs and benefits. To limit the risks of greater complexity, financial institutions should understand the complexities generated by the interdependencies described above. They should also familiarise themselves with the exact functioning of collateral optimisation models, in particular if these models issue collateral transactions automatically.

Authorities also have a role in mitigating the risks of greater interdependencies and greater complexity. One possibility could be to prescribe or organise stress tests capturing the different entities involved in a collateral chain (FMIs, financial institutions) in order to shed light on the market's behavioural response to market stress. In addition, supervisors as well as authorities responsible for financial stability should be aware of the concentration risks that could emerge if in the future financial institutions become dependent on a few systemically relevant 'collateral transformers' (e.g. a few general clearing members offering these services), and that failure of a systemically relevant collateral transformer could have system-wide ramifications. Supervisors should ensure that financial institutions master the collateral optimisation models that they use.

If collateral optimisation leads to more interdependence between FMIs in the form of heavier use of the existing links between them and the possible creation of new ones, overseers should monitor this and make sure that FMIs comply with Principle 20 of the Principles for financial market infrastructures (PFMIs). This states that 'an FMI that establishes a link with one or more FMIs should identify, monitor, and manage link-related risks' and it gives guidance on how this can be achieved (see CPSS/IOSCO 2012). Overseers also possibly need to give more thought to the safety of CCPs (and other FMIs) if the indirect users first need to transform their collateral with the direct user to fulfil the CCP's (or other FMI's) collateral requirements. If 'downstream' collateral transformation is considered risky, further guidance on Principle 5 of the Principles for Financial Market Infrastructures may be called for (see CPSS/IOSCO, 2012).<sup>21</sup>

## 7.5 Mitigating increased counterparty and related risks

To reduce counterparty risk and uncertainty, financial institutions and their supervisors should understand that in some CSAs it may be difficult to reclaim rehypothecated collateral. Hence, financial institutions should know the details of the CSA they are using and be careful in granting rehypothecation rights on assets that are special to them (as 'equivalent collateral' returned by a counterparty may

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<sup>21</sup> Principle 5 states 'An FMI that requires collateral to manage its or its participants' credit exposure should accept collateral with low credit, liquidity, and market risks. An FMI should also set and enforce appropriately conservative haircuts and concentration limits'.

then not really be ‘equivalent’ in their own perception). In relation to collateral transformation, the supplier of high-quality collateral (and the supervisor of this institution), must take into account that it may be difficult to recall securities lent to another party and that there are, possibly serious, counterparty and liquidity risks attached to accepting lower quality collateral while providing another financial institution with higher-quality collateral.

## **7.6 Mitigating the risk of procyclicality**

Where possible, policy makers should aim to mitigate procyclicality within the financial system, as this could give market participants the false impression of collateral abundance in good times and aggravate problems in times of stress. If collateral requirements fluctuate less during the economic cycle, financial institutions’ collateral needs are more stable so that collateral can be managed more efficiently. The FSB’s current proposals for minimum standard and numerical haircut floors on securities financing transactions put a price tag on collateral transformation trades and mitigates some of the procyclicality risks. Further initiatives by authorities would be welcome. Overseers could ascertain that CCPs set conservative, through-the-cycle haircuts and collateral policies and validate their collateral and risk models in line with Principle 5 of the PFMI.<sup>22</sup> The same holds true for general clearing members: given their central role, supervisors should take both microprudential and macroprudential considerations into account when assessing their risk and collateral policies, balancing the stability of the general clearing member with the implications of its risk management for the financial system. Finally, it is important that financial institutions have strong and stable liquidity buffers to dampen procyclicality. For banks the LCR standard is helpful in this respect by requiring banks (during stable periods) to hold a sufficiently large liquidity buffer to cover their stressed net outflows while at the same time allows banks to deplete their stock of HQLA and fall below the minimum requirement in times of stress.

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<sup>22</sup> One of the key considerations published with Principles 5 is that FMIs “establish stable and conservative haircuts and margin requirements that are specifically designed to limit the need for destabilising pro-cyclical adjustments, to the extent practicable and prudent” (see CPSS/IOSCO 2012). Similar provisions to limit procyclical behaviour by CCPs can be found in Article 41 of EMIR and Article 28 of the relevant Commission Delegated Regulation.

## 8. Executive summary

More prudent counterparty risk management as well as new regulations governing OTC derivatives and liquidity have boosted the demand for high-quality collateral. Although an absolute shortage of high-quality liquid assets seems unlikely (the total supply of collateral remains much higher than the total demand), the growth of the total demand for high-quality collateral outpaces the growth of its supply. This causes pressure on the prices of high-quality collateral assets. Moreover, individual financial institutions may experience collateral scarcity. These developments will incentivise financial institutions to use their available collateral as efficiently as possible (collateral optimisation) or to make better use of received collateral (collateral re-use or rehypothecation). Institutions may also engage in more repo or securities lending transactions to obtain assets of the desired type (collateral transformation), using their other (lower quality) assets as collateral. Collateral optimisation, re-use and transformation enable institutions to adapt to a world where high-quality collateral is in greater demand.

Chapters 2 to 5 of this study described how the Dutch financial sector reacts to increasing collateral needs, based on in-depth interviews with experts from a select and representative sample of banks, (pension fund) asset managers and insurance companies. Results show that most financial institutions in the Netherlands expect that their collateral portfolio will be adequate (57%), although a large proportion (43%) is not yet sure (Figure 1). Within the last group, there is a minority fearing possible quantitative collateral shortages (14%), while the institutions' main concern (86%) are potential qualitative collateral mismatches (e.g. a firm may need more cash in the future than currently available, while having abundant other high-quality collateral assets).

Dutch banks, pension fund asset managers and insurance companies take active steps to improve their collateral management systems and to reduce the fragmentation of information within their organisation (Figure 2), as this is a prerequisite for collateral optimisation. Dutch financial institutions seek to further improve their collateral allocation. Many banks have already taken some steps to achieve this but see room for further improvement, while many pension fund asset managers and insurance companies are now considering first steps (Figure 3). Collateral is re-used actively for different purposes (Figure 4) and many institutions find re-use

or rehypothecation of collateral necessary to generate sufficient liquidity. Due to the nature of their business, pension funds and insurance companies currently rely more on collateral transformation than banks and several expect to need more collateral transformation in the future (Figure 5). Some Dutch financial institutions provide collateral transformation services and expect that the demand for these services will increase (Figure 6).

Unfortunately, there are not just advantages to collateral optimisation, re-use and transformation, but risks too. Chapters 6 of this study focused on the risks of these activities and showed that there are high-level similarities in the risks attached to these different responses to scarcer collateral. In particular, the risks appear to fall into four broad categories: (1) too low or unstable collateral buffers (liquidity risk), (2) greater interdependence and complexity, (3) increased counterparty risk and related risks and (4) procyclicality. Table 1 summarizes the risks identified in collateral optimisation, re-use and transformation.

Chapter 7 discussed policy options to mitigate the risks identified. Some of these were directly targeted to the risks identified in Table 1, but others were of a more general nature. Table 2 summarizes the suggested policy options.

**Table 1 Main risks of collateral optimisation, re-use and transformation**

Main risks	Collateral optimisation	Collateral re-use and rehypothecation	Collateral transformation
1 Too low or unstable collateral buffers (liquidity risk).	Optimisation may incentivize institutions to hold too little collateral.	Rehypothecation rights may be withdrawn during market stress.	Collateral upgrades may be unavailable during market stress.
2 Greater interdependence and complexity.	Central collateral management creates internal interdependence, engaging collateral service providers creates external dependence. More interdependence between FMIs. Optimisation models also create complexity.	External dependence on rehypothecation of another party's collateral. Rehypothecation and re-use lead to long collateral chains and system leverage.	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 (e.g. GCMs).
3 Increased counterparty risk and related risks	n.a.	Grantor of rehypothecation rights may find it difficult to get back equivalent collateral when needed, creating counterparty and market risks.	Supplier of collateral transformation may face counterparty and liquidity risk during market stress.
4 Procyclicality	n.a.	Users of rehypothecation rights may encounter liquidity problems when these rights are withdrawn during market stress. This liquidity shock then spreads throughout the system.	Buyer of collateral transformation may face roll-over risk or unfavourable renewal conditions during stress, possibly leading to asset encumbrance.

**Table 2 Policy options**

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Area	Possible actions to mitigate risks
1 Central bank frameworks	Countercyclical collateral requirements by central banks
2 Collateral re-use and rehypothecation	Further analysis of benefit-risk balance of different forms of re-use and rehypothecation
3 Too low or unstable collateral buffers (liquidity risk)	Perform regular liquidity stress tests and take into account that rehypothecated collateral and collateral upgrades are ‘unstable’ liquidity sources.
4 Greater internal and external interdependence and greater complexity	Make adequate business continuity and recovery/resolution plans to respond to increased internal dependence and complexity. Make senior managers understand (possible risks of) complex optimisation 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 PFMI 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 PFMI).
5 Increased counterparty risk and related risks	Make financial institutions understand the risks of rehypothecation and the implications of different CSAs Ensure that institutions are able to bear the liquidity and counterparty risk (i.e. sufficient buffers) when offering a collateral upgrade
6 Procyclicality	Minimum standards for haircut setting and minimum haircut floors for certain transactions (work underway by FSB) Ensure that CCPs and GCMs set conservative and stable through-the-cycle haircuts Institutions to have strong and stable liquidity buffers

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## Appendix: Collateral supply and demand

In line with the methodology in Levels and Capel (2012), this section provides estimates for the supply of and demand for high quality collateral. Figure 7 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) 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 by market participants (labelled non-HQLA and RMBS).<sup>23</sup> This graph shows that the supply of high-quality collateral (categories 1+ to 2B) increased by approximately EUR 320 billion between Q4 2012 (no data available before 2012) and Q1 2014, amounting to EUR 8.6 trillion.

Figure 8 shows a rough estimate of the demand for high-quality collateral in the euro area between 2007 and 2013.<sup>24</sup> This demand fluctuates around EUR 4 trillion between 2010 and 2013, assuming full and immediate effectiveness of the LCR and EMIR. This is almost 40% above the collateral requirement at the end of 2007 (of EUR 2.9 trillion). The growth of the total demand for high-quality collateral outpaces the growth of its supply, causing pressure on the prices of high-quality collateral assets.

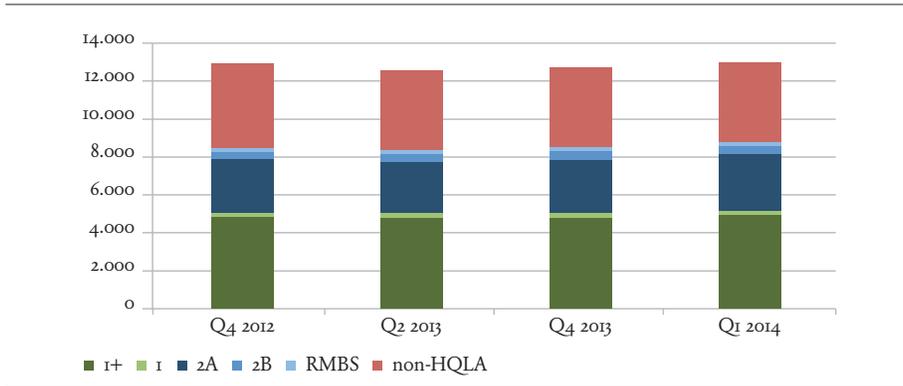
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<sup>23</sup> In the graph Category 1+ includes all marketable assets that are (i) accepted by the Eurosystem as collateral, (ii) included in the Basel III LCR Level 1 asset class (but excluding coins, banknotes and central bank reserves) and (iii) accepted by most market participants, such as CCPs. This category mostly consists of highly rated sovereign bonds. Category 1 consists of the remaining assets accepted by the Eurosystem and included in the Level 1 asset class of Basel III. Similarly, category 2a and 2b correspond to the intersection of ECB eligible collateral and Level 2a and 2b of Basel III, but excluding RMBS. This pool contains slightly less creditworthy (A- to BBB-) sovereigns and government guaranteed bonds (A to A-), as well as some covered (AAA to AA-) and corporate bonds (AAA to BBB-). Highly rated RMBS are listed as a separate category. All other remaining ECB eligible collateral that is not included in the Basel III LCR framework is labelled 'non high-quality collateral'. Data sources: EADB, Bloomberg, Basel III and own calculations

<sup>24</sup> Figures for the repo market are based on ICMA's semi-annual European repo market surveys. Collateral used for Eurosystem credit is retrieved from the ECB's annual reports. The required amount of variation margin for OTC derivatives is calculated by means of Singh's (2010) method and BIS OTC-derivatives statistics. Tabb-Group (2010) estimates were extrapolated to gauge the collateral needs in exchange traded derivatives markets. For further details on the methods used, see Levels and Capel (2012). Initial margin estimates from Sidanius and Zikes (2014) were extrapolated to the total OTC-derivatives market (not only IRS and CDS) and scaled down to represent the euro area's market share. LCR shortfalls were taken from EBA's (2013) quantitative impact study of the LCR and NSRF. In the calculations, immediate and full effectiveness has been assumed for new regulations (EMIR and Basel III's LCR). Finally, rehypothecation has not been accounted for. Data sources: Source: ICMA repo market surveys, ECB annual reports, BIS statistics, Singh (2010), Sidanius and Zikes (2014), TABB-Group (2010), EBA (2013) and own calculations.

**Figure 7 Estimated supply of high-quality collateral in the euro area**

In billion EUR

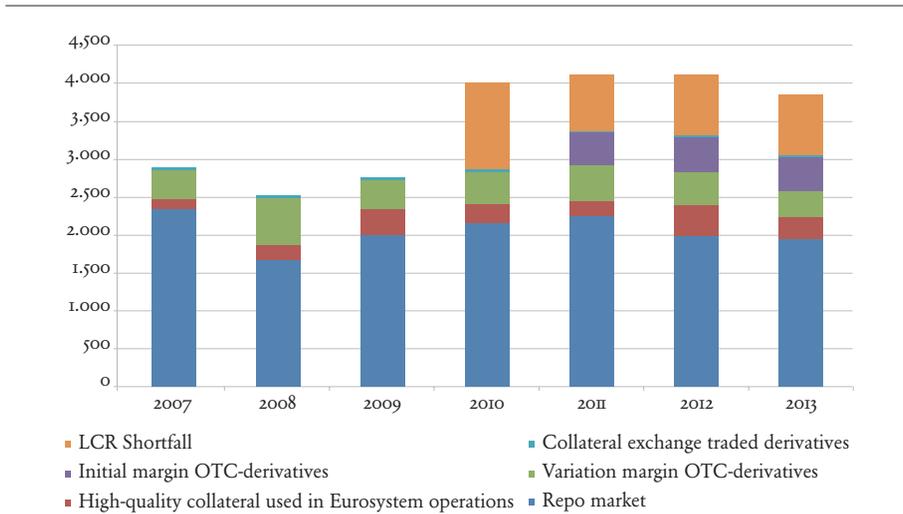


Sources: see footnote 23.

However, the total supply remains more than double the total demand, making an absolute shortage of high-quality collateral unlikely, especially considering that collateral demand has probably been overestimated (new regulations will in fact be gradually phased in) and supply underestimated (since rehypothecation has not been incorporated in this analysis).

**Figure 8 Estimated demand of high-quality collateral in the euro area**

In billion EUR



Sources: see footnote 24.

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