ESRB
European Systemic Risk Board
European System of Financial Supervision

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Securities financing transactions and the (re)use of collateral in Europe

An analysis of the first data collection conducted by the ESRB from a sample of European banks and agent lenders

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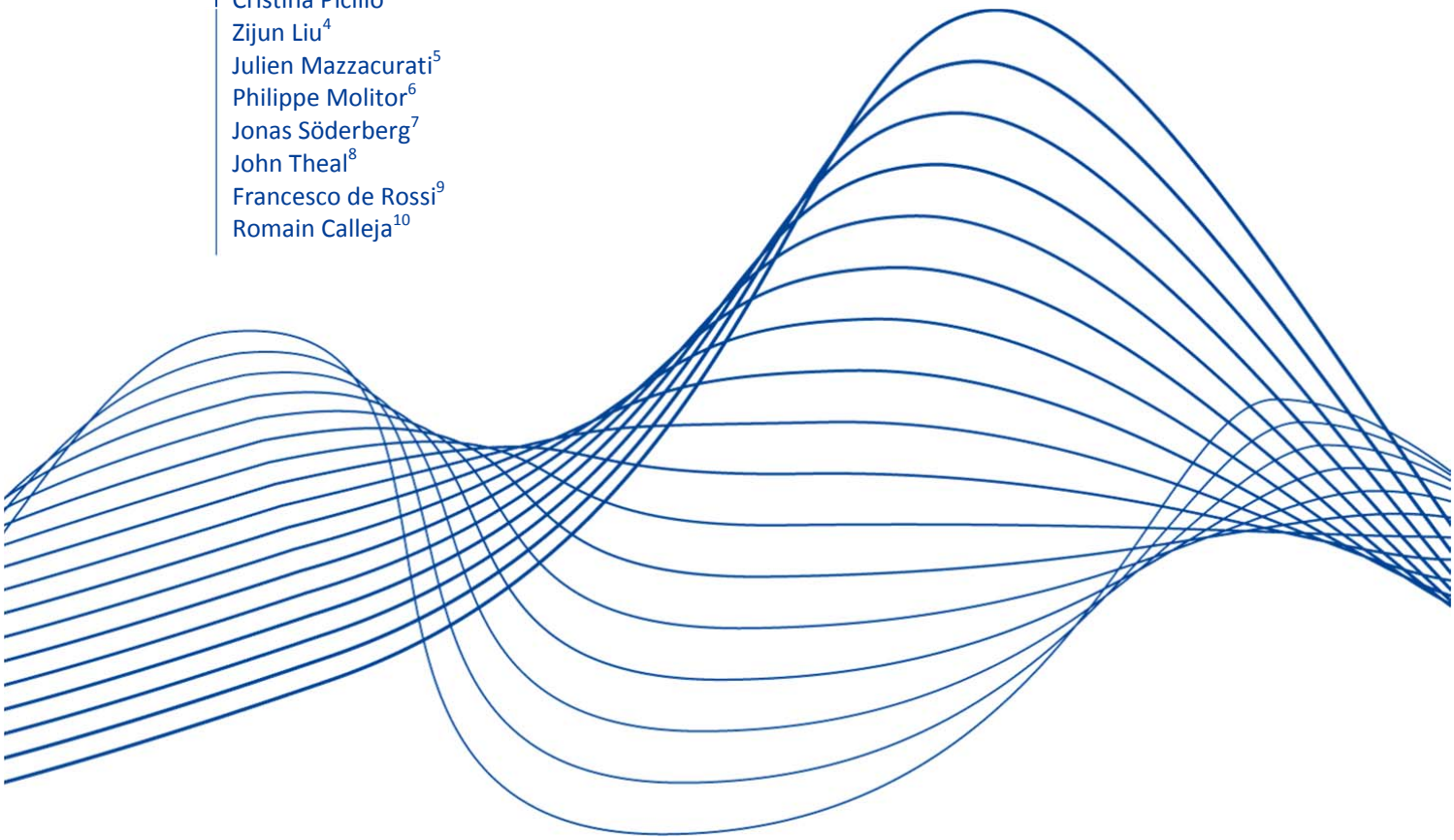

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Executive Summary

Securities financing transaction (SFT) markets and the management and usage of collateral are elements of the financial system which are of systemic relevance. As such, there is a clear need for enhanced transparency and regulatory oversight. The European Systemic Risk board (ESRB) mandated a task force to identify the potential risks related to SFTs in Europe and to develop policy proposals to better monitor any vulnerabilities identified by the analysis. This report presents the results of two data collection exercises that were conducted to gain some initial insights into the structure of the SFT market and the correlated practices adopted by market participants concerning the re-investment or the re-use of the collateral sourced through SFTs or via equivalent transactions. A description of this landscape is, in fact, crucial as a first step in assessing the risks emanating from the cash and securities collateral markets and their potential implications for macro-prudential policy in Europe.

By providing a description of the SFT landscape, the data collection exercises undertaken by the ESRB have a macro-prudential dimension in that they provide data at an aggregated level. The first data collection exercise encompassed a sample of 38 EU banks, representing approximately 60% of the EU banking system's total assets. The institutions covered by this sample are the main players in the management of securities collateral. The second data collection targeted 13 agent lenders that are considered to be the largest re-investors of cash collateral in Europe. The sample period of the data is fixed at the end of February 2013.

The ESRB templates yielded a unique set of data on the sources and use of securities collateral (non-cash collateral) by banks, as well as on the re-investment of cash collateral by agent lenders. The data collections were intended to fit in the broader policy context initiated by the Financial Stability Board (FSB) and the resulting analyses ultimately address a number of the FSB's recommendations. The first element of the analysis in this report is specifically related to the FSB's fourth recommendation (disclosure of collateral management activities) (FSB, 2013) and, to a certain extent, to the first recommendation (authorities to collect granular information on SFTs of large international financial institutions). The second element is similarly related to the first of the FSB's recommendations, but also the sixth, which requests better disclosure of securities lending activities. The analysis contained thereafter is relevant for the European Commission's proposal on the reporting of SFTs to trade repositories (EC, 2014), which will greatly enhance transparency and regulatory oversight of SFT activities in the European Union. Finally, the report is in line with the ESRB's outline of a monitoring framework (ESRB, 2013).

The main findings of the report can be summarised as follows:

i) Data collection on sources and use of securities collateral at EU credit institutions

Widespread reliance on SFTs by banks and non-banks

- **Collateral flows to and from banks amount to some 15% of their total balance sheet**. In terms of instruments, **SFTs account for the largest part of securities collateralised**

transactions, namely 88% of collateral posted (€4.6 trillion). More specifically, collateral from repos accounts for 70% of total collateral flows, while collateral from securities lending amounts to 18%. Looking at the type of securities received as collateral, the banks in the sample exhibit extensive reliance on government debt (61% of total collateral received and posted). Equities (13%) and debt securities issued by financial institutions (8%) are the second and third most used type of securities collateral.

Collateral re-use

- Approximately **94% of securities collateral received by the banks is eligible for re-use**, illustrating the fungible nature of collateral. A calculation method using collateral volumes posted by asset owners and an estimate of the share of own versus collateral received of collateral posted shows that **the banks re-use collateral once** on average, i.e. the collateral re-use factor (multiplier) is 2. The inability of surveyed institutions to report on their re-use of collateral is one significant drawback. This inability seems to suggest that i) the (generally fungible) collateral is pooled and, when re-used, cannot be traced back to the collateral received; ii) institutions' risk management systems may, at the current moment, not enable them to assess their own re-use on a consolidated basis.

Cross-institutional exposures and network structures (interconnectedness)

- In absolute terms, **SFTs are mostly conducted between banks and, to a lesser extent, through central counterparties (CCPs)**. Unsurprisingly, considering net collateral flows, central banks and money market funds (MMFs) stand out as net receivers of collateral (they help fund the banking sector) and hedge funds as net providers of collateral (to banks, through their prime brokerage activities). The network structure of institutions in the sample reveals only **limited interconnectedness between the institutions.** In addition, there are relatively few institutions (i.e. three CCPs and six of the banks in the sample) that are involved in 30% of the total volume of collateral exchanged, which is suggestive of a certain degree of **concentration**. However, these institutions show well-diversified exposures to their counterparties.

Collateral and maturity transformation

- In relation to the **assessment of liquidity and maturity mismatches and collateralisation practice,** evidence of repo use suggests that institutions **build liquid asset buffers**, as they trade in higher amounts of liquid assets than they trade out. **On average, the maturity profile of banks' repo trades seems prudent** (they minimise the maturity of cash lent but maximise that of cash borrowed). **However, if there is no evidence of liquidity risk, on aggregate, in the repo business, at micro level a significant proportion of institutions incur in some liquidity risk**, although with a limited maturity "mismatch" expressed in number of days.

ii) Data collection on re-investment of cash collateral

Based on the data analysis, this report contends that there is some evidence of potential systemic risks and vulnerabilities in the European Union, originating from securities lending transactions and the reinvestment of cash collateral. In reference to the financial stability risks in securities lending and repo markets identified by the FSB, in terms of "pure shadow banking risks" there is the following evidence:

Facilitation of credit growth and build-up of leverage

- **EU securities lending markets contribute to and aid the facilitation of credit growth and the build-up of leverage in the financial system** in two main ways. Firstly, they allow some agent lenders to obtain funding easily against their own assets (the total value of cash collateral received by agent lenders in our sample against securities on loan amounts to €609.6 billion). Secondly, cash collateral obtained from securities lending transactions is typically reinvested in reverse repos (65%), thereby contributing towards an increased reliance on short-term funding, or debt.

Maturity transformation

- **Agent lenders engage in a significant amount of maturity transformation**, which may give rise to both redemption and liquidity risk.

Interconnectedness

- The **significant exposures built across the different types of financial institutions** (e.g. custodians, asset managers, credit institutions and insurances) clearly **contribute to the formation of possible contagion channels** and associated risks. For agent lenders who typically lend securities on behalf of clients and who engage in a securities lending transaction with another institution and reinvest the cash collateral in reverse repos with yet another entity, the resulting risks from a high degree of interconnectedness could become material.

Currency mismatch

- There seems to be a limited overall risk from currency mismatch related to securities lending. The vast majority of securities loaned, cash collateral received and instruments in which the collateral is reinvested is denominated in one of the major currencies (USD, EUR, GBP, JPY, etc.). This suggests limited sensitivity to currency risk or foreign exchange volatility. In addition, the share of each of these currencies in each of the three stages identified above is broadly stable, suggesting that mismatch is limited. At the individual institution level, however, there might be some degree of currency mismatch concentration.

A. Introduction and policy background

In view of the interconnected nature of the global financial system and the difficulty in disentangling shadow banking from traditional banking activities, there is an increased need for enhanced transparency and regulatory oversight of areas which may give rise to systemic risk. One important area relates to securities financing transaction (SFT) markets and, more broadly, the usage of cash and securities collateral.

The European System Risk Board (ESRB) mandated a task force to identify the potential risks related to SFTs in Europe and to develop proposals for monitoring such risks. This report, prepared by the task force, is a very first step towards a monitoring framework and sets out the results of two data collections that were conducted with a view to testing reporting and disclosure templates and gaining some initial insights into cash and securities collateral markets. The two data collections focused on the sources and usage of securities collateral at larger EU credit institutions and on the reinvestment of cash collateral by major EU agent lenders.

The remainder of the introduction (Section A) describes the background and illustrates the broader policy context in which the data collections took place. Part B presents the results of the data collection on the usage of securities collateral, while Part C concentrates on the results of the data collection and on the re-investment of cash collateral. Part D offers a summary of the main conclusions.

A.1. Financial stability risks of SFT markets[1]

A wide range of market participants, including credit institutions, pension funds, insurance companies, asset managers, broker dealers and investment firms, enter into SFTs (i.e. repo and securities lending transactions) to obtain financing, invest cash or borrow specific securities, underscoring the importance of these transactions from a macro-prudential policy perspective. The money-like assets used in SFTs usually enhance liquidity in securities markets and money markets by supporting price discovery and they may also contribute to reducing settlement failures.

Despite their ability to enhance liquidity and their use as funding instruments, SFTs may also give rise to financial stability risks. In assessing the causes of the financial crisis, the Financial Stability Board (FSB) identified SFTs as a potential source of vulnerabilities that can lead to risks to the normal operation and effective functioning of the international financial system. As outlined in ESRB (2013), the financial stability risks that are relevant from a macro-prudential perspective are: (i) the facilitation of credit growth (both inside and outside the banking

[1] For more discussion about SFTs and, in general, the financial stability risks of SFTs, see FSB (2013) and ESRB (2013).

system), (ii) the pro-cyclicality of financial system leverage, (iii) maturity and liquidity transformation (both inside and outside the banking system), (iv) interconnectedness and contagion channels (v) collateral fire-sale and concentration, and (vi) currency mismatches.

From a supervisory perspective, the lack of data on SFTs and the absence of comprehensive prudential oversight compound the concerns about the financial stability risks. Indeed, the source of these risks is related to the less stringent supervision of, and oversight requirements for, those activities that are not captured under the umbrella of prudential regulation, which was established to control for the risks of bank-based credit intermediation. Moreover, the complicated nature of shadow banking activities results in an ill-defined boundary between banking and shadow banking activities, which complicates policy responses and raises methodological questions for disentangling such activities, particularly with respect to large banks that engage in a wide range of activities, including traditional (i.e. deposit-based) and market-based credit intermediation.

Thus, SFT activities remain relatively opaque from a prudential regulation perspective. In this context, policy proposals need to be not only comprehensive but proportional to the level of risk, addressing both the pure shadow banking risks and those related to shadow banking activities conducted by financial institutions.[2]

A.2. Policy background

In August 2013 the FSB published a comprehensive set of thirteen policy recommendations for addressing shadow banking risks in SFTs (FSB, 2013). The very first recommendation of the FSB, which states that "SFT data gaps need to be filled by collecting more granular data on securities lending and repo exposures amongst large and internationally active financial institutions", aims to improve authorities' understanding of risks related to shadow banking through improved transparency and data collection, specifically on SFTs.

Within the European Union, the ESRB has published a report that identifies the data needed to enhance the assessment of financial stability risks arising from SFT markets and presents various options by which authorities can collect such data for a comprehensive assessment of risks, including trade repositories (ESRB, 2013).

[2] The FSB decomposes the risks related to SFTs into two categories: (i) pure shadow banking risks (i.e. maturity and liquidity transformation outside the banking sector, the build-up of excessive leverage outside the reach of prudential regulation and risks from securities lending cash collateral reinvestment) and (ii) risks that span both banking and shadow banking activities (such as the pro-cyclicality of system leverage, collateral fire sales, asset re-hypothecation, interconnectedness from the re-use of collateral and collateral valuation practices).

In January 2014 the European Commission published a regulatory proposal designed to increase the transparency of SFTs[3]. The Commission's proposal builds on the approach adopted for OTC derivatives (EMIR)[4], envisaging the daily reporting of SFTs to a trade repository. The reported data shall be made available to competent EU and national authorities (transparency towards authorities) for monitoring risks originating in SFTs markets. The proposal also includes provisions of transparency towards final investors. It stipulates that all undertakings for the collective investment in transferable securities (UCITS) and alternative investment fund managers should inform investors about the use they make of SFTs in their regular reporting and in pre-investment documents, and the disclosure of risks, as well as the explicit agreement of collateral providers before their assets can be re-hypothecated. Once passed into law, this will constitute a major step forward in achieving enhanced transparency of SFTs in the European Union and in bridging a number of the information gaps identified in this field having relevance to macro-prudential monitoring and policy.[5]

A.3. Scope of ESRB data collection

Against the backdrop of the importance of financial stability risks and the currently significant gaps in SFT market data, this report constitutes a first but important step towards a better understanding of the risks related to SFTs and collateral usage in Europe.

Indeed, the FSB has urgently recommended that authorities should collect more granular data to enhance their monitoring capabilities and their assessment of vulnerabilities and systemic risks related to the shadow banking system, in particular as regards SFTs. However, the effective reporting of SFTs to trade repositories in the European Union would probably not start before 2017. Supervisory authorities may therefore be required to implement transitional measures to collect granular data and to monitor the trends and developments in European SFT markets. Such measures could also help to enhance supervisory authorities' expertise in assessing financial stability risks in SFT markets, thereby contributing to the establishment of the EU monitoring framework based on highly frequent and granular reporting to trade repositories.

Specifically, the ESRB has collected data on the sources and re-use of securities collateral by banks and the re-investment of cash collateral by agent lenders. The first topic is directly related

[3] European Commission proposal for a regulation of the European Parliament and of the Council on reporting and transparency of securities financing transactions, COM(2014) 40 final, 29.1.2014.

[4] Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories.

[5] The EC proposal is in line with FSB recommendations 1, 2, 5 and 7 (highly granular and frequent reporting of SFTs, enhanced disclosures to fund investors and disclosure of re-hypothecation to counterparties under contractual obligation).

to the fourth recommendation of the FSB and gathers information on collateral flows at banks not only associated with SFTs but also with other instruments (such as derivatives). The second topic is related to the sixth of the FSB's recommendations, which calls for better disclosure of securities lending activities. The data collection of the ESRB takes a macro-prudential perspective in that it analyses the data at an aggregated level to provide some initial input to an assessment of systemic risk-relevant factors.

The data collection exercise was conducted between June and September 2013 on a sample of 38 EU banks (equivalent to 60% of the EU banking system's total assets), which are the main players in the management of securities collateral, and 13 agent lenders, which are considered to be the largest EU re-investors of cash collateral.[6]

The institutions were asked to provide data on their collateral flows at two specific points in time (the end of November 2012 and the end of February 2013). The ESRB's objective was to obtain some broad information on trends while avoiding potential problems related to window dressing or extraordinary conditions that could distort the information on one of the two chosen reporting dates. However, the results do not exhibit significant differences between the two points in time, so all data shown in this report are as at the end of February 2013.

[6] The data collections focused only on credit institutions and agent lenders in the respective data collection samples to capture the largest possible share of the market while keeping the administrative burden low. In addition, the focus on agent lenders in the data collection is also warranted due to the specific risk arising from the fact that agent lenders act on behalf of beneficial owners (see FSB, 2012). Future data collections may comprise a wider set of addressees, such as a wider range of investment funds or pension funds and insurance companies.

B. Sources and uses of securities collateral

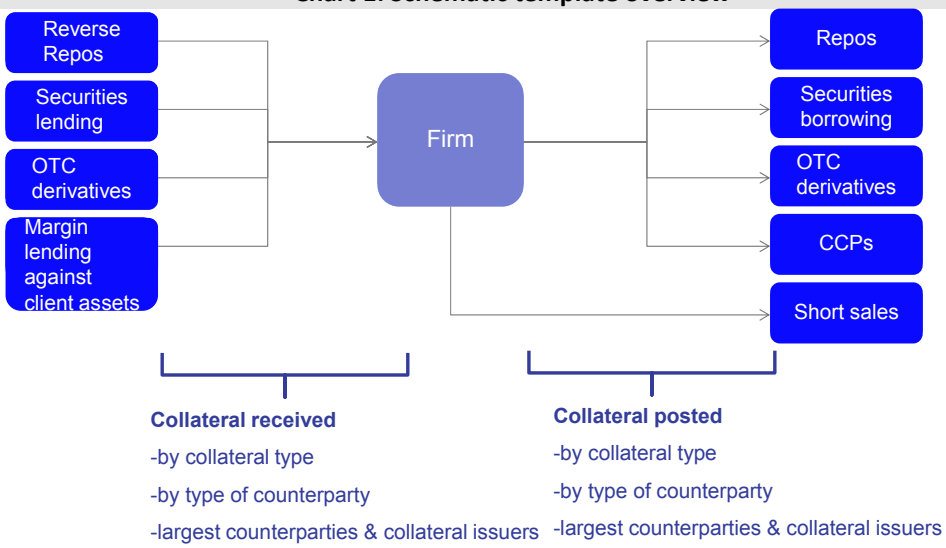
B.1. The data collection set-up

The ESRB collected the data on the sources and use of collateral through the use of a set of templates addressed to a sample of relevant European credit institutions.

B.1.1. The template structure

The set of templates on the re-use of securities collateral covers the topic from a two angles: (i) the collateral that the reporting institution receives and (ii) the collateral that it posts. Chart 1 provides a schematic overview of the template structure.

Chart 1: Schematic template overview



Both collateral inflows and collateral outflows were collected by instrument type. The specific instruments for which the data was requested included repo and securities lending, as well as derivative transactions in which an institution either receives or posts (for central counterparty, CCP, and non-CCP cleared derivatives) collateral. The template also asked about client assets that could be re-used and for collateral posted to cover short sales. Other information requested related to whether collateral received is eligible for re-use and whether collateral posted is effectively being re-used.

The templates also requested information on the type of collateral received and posted, as well as the type of counterparty for transactions involving the reception or posting of collateral. In terms of counterparties, the templates required the reporting institutions to provide the amount of collateral inflows and outflows by counterparty sector and information on collateral flows with their 15 most important counterparties.

B.1.2. The sample

The 38 banking institutions to which the templates were addressed account for €28.2 trillion of total assets and represent more than 60% of the total assets of the EU banking sector. The analysis presented in this report has used both the aggregate sample data and different classifications of the sample banks in an attempt to identify structural differences between them. Given the information collected on the banks in the sample (size, geographic location, business model,[7] global systemically important banks (G-SIB) buckets[8]), multiple permutations of the data can be made. Table 1 shows the number of institutions and total assets for three types of classification. Appendix B shows a further split using combinations of the different dimensions. The report also uses for part of the analysis a further distinction between euro area banks by distinguishing between banks from countries not exposed to sovereign tensions ("Group A banks") and those from countries exposed to sovereign debt strains ("Group B banks", see also Appendix B).

Table 1: Classification of sample banks

Classification dimension	*Characteristic*	*# Banks*	*Total asset volume (€ billions)*
Geographic	Euro area	22	15,9
	Scandinavia	3	1,4
	UK	13	10,9
Business model	Commercial	11	5,3
	Diversified	19	19,0
	Investment	8	3,9
G-SIB	Bucket 3 or 4	6	13,4
	Bucket 1 or 2	14	8,1
	Non G-SIB	18	6,7
Total		38	**28,2**

[7] The allocation by business model is based on both supervisory judgment and a quantitative analysis of indicators of retail (loans to customers and the importance of customer deposits), wholesale (loans to banks) and investment banking activities (derivative and trading activities). Banks with mainly retail activities are classified as commercial banks; banks with retail and wholesale (and investment) banking activities as diversified banks. Investment banks are banks that have low retail and wholesale but mainly investment banking activities.

[8] The allocation of G-SIBs to buckets reflects their required level of additional loss absorbency (http://www.financialstabilityboard.org/publications/r_121031ac.pdf).

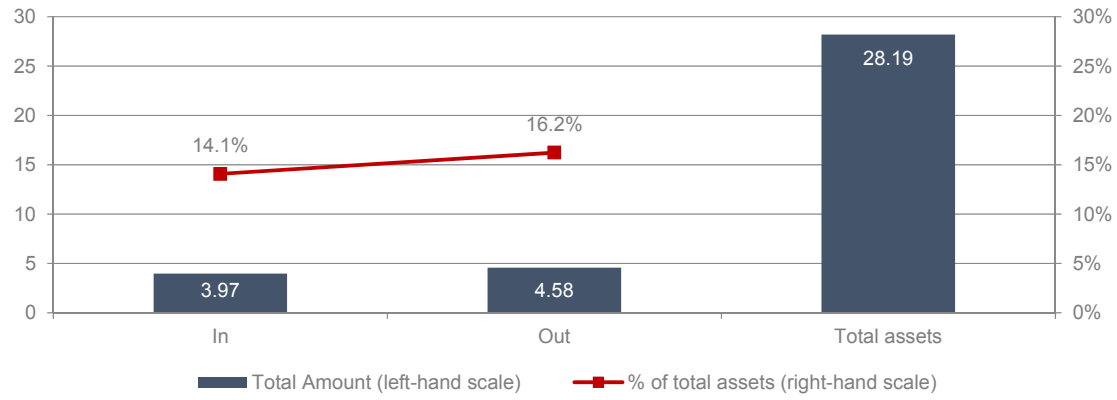
B.2. Overall collateral market view

This section summarises the information at the aggregated sample level. It provides information on collateral flows, broken up by instrument and by type of collateral, and estimates on the degree of re-use and the "velocity" of collateral, and on the maturity "transformation" achieved through SFTs and other collateralised instruments.

B.2.1. Overall levels and segmentation by instruments

Based on the data collected, the sample institutions received a total of roughly €4 trillion of securities collateral and posted roughly €4.6 trillion in securities collateral across all types of instrument. The amounts of collateral received and collateral posted amount to 14.1% and 16.2% of total assets respectively (see Chart 2).

Chart 2: Collateral inflows and outflows, total assets, sample aggregate (€ trillions)



External source of data: Bankscope for total assets.

Table 2 shows the volume of collateral received and posted through the various instruments. SFTs (i.e. repos and securities lending) account for roughly 88% of all collateral received and 83% of all collateral posted, illustrating that the bulk of collateral flows are associated with SFTs. The comparison of the repo volumes calculated from the data templates with those provided by the ICMA repo survey shows that this data collection covers the European repo market to a very large extent.[9]

[9] To estimate the coverage of the repo market, we compared our data on repo transactions with numbers reported in the ICMA Repo Survey. To estimate the size of the repo market in Europe, ICMA regularly asks a sample of 61 financial institutions in Europe for the value of their outstanding repo contracts. ICMA reported outstanding repo transactions (repo and reverse repo transactions) in Europe of €6.08 trillion in June 2013 and €5.5 trillion in December 2012. The data set used for this report comprises outstanding

The data show that banks are net providers of collateral in aggregate (i.e. collateral outflows are higher than inflows). Moreover, banks are net providers for each type of transaction. Obviously, client assets represent only inflows, while short sales give rise only to collateral outflows.

Table 2: Collateral received and posted by instrument (€ billions)

Instrument	Collateral received	Collateral posted
(Reverse) Repo	2,800	3,047
Securities lending/borrowing	707	761
Derivatives	140	200
Total client assets	267	
Short Sales		259
Other instruments	57	310
Total	**3,971**	**4,576**

B.2.2. Segmentation by collateral type

The collateral breakdown shows the type of collateral asset posted and received (Table 3). The majority of collateral is made up of government debt, which is perhaps unsurprising given recent market turbulence. Equities and other financial institutions' debt also represent significant portions of collateral (both for outflows and inflows). There is evidence of the funding of assets that are either more risky or less liquid: outflows of asset-backed securities (ABS) and other private debt instruments are higher than inflows. The opposite is true of government debt.[10]

Table 3: Collateral received and posted by collateral asset type (€ billions)

Collateral	Collateral received	Collateral posted
Government debt	2,602	2,632
Covered bonds	111	180
Debt instruments issued by FIs	305	392
Debt instruments issued by non-FIs	128	120
Asset-backed securities	94	250
Loans	0.8	206
Equities	605	523
Other	126	274
Total	**3,971**	**4,576**

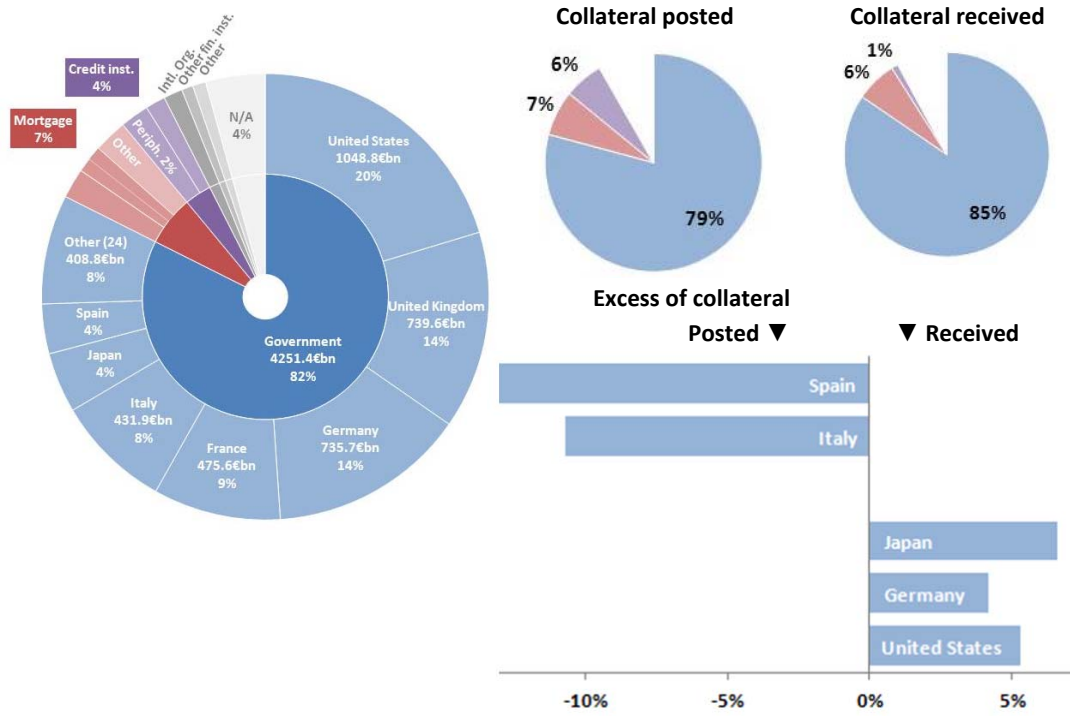
repo and reverse repo contracts of approximately €5.68 trillion (assuming an average haircut of 3%), reported for the 28 February 2013. We can therefore conclude that we capture the vast majority of the EU repo market. The ICMA repo surveys are available at http://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/short-term-markets/Repo-Markets/repo/.

[10] The underlying assumption is that, on average, loans, ABS and debt instruments are lower quality than government bonds and equities.

Analysing the data collected on the most important issuers of collateral allows a more granular look at the collateral composition. A total of 250 unique issuers of collateral were identified. Around 55% of total collateral exchanged was issued by the largest 15 collateral issuers.

Governments (82%) and government sponsored enterprises (GSEs; the "mortgage" category, 7%, consist mainly of loans guaranteed by them) are the main issuers of collateral received and posted by reporting entities (see Chart 3).[11] US government debt accounts for 20% of all government debt, while the UK (14%), Germany (14%) and France (9%) are other important issuers of government debt. Note that these countries also enjoyed relatively low credit default swap (CDS) spreads on their debt at the time of the data collection. Italy (8%), Japan (4%) and Spain (4%) follow in the order of the most important issuers of government debt used as collateral. Credit institutions are the third largest type of issuers of collateral (4%). Half of the collateral issued by credit institutions is issued by those countries most affected by sovereign risk tensions.

Chart 3: Collateral received from and posted to the top 15 counterparties



[11] Note that the top 15 data may not exhibit the same proportion of collateral. For instance, equity is an important collateral overall but does not appear much in the top 15 data. An explanation could be that securities lending transactions, which mainly use equity (see below), are smaller in size or conducted with different counterparties, hence they do not show up in the top 15 data.

Collateral received exceeds collateral posted for securities issued by US, German and Japanese governments. The opposite can be observed for government bonds issued by Italy and Spain. This corroborates the notion of the funding of "risky" assets, as discussed above, for the banks in the sample, while it indicates the opposite for the other credit institutions and the other counterparty types.

Looking more closely at the collateral composition of repos and securities lending transactions, the data show that securities lending transactions involve mainly equities and government debt. The collateral composition of repos matches relatively closely that of the top 15 counterparties, which is not surprising given the large volume of repos.[12]

In line with the observation of SFTs as a funding tool, the evidence on collateral transformation, i.e. the institutions post collateral of lower quality and receive collateral of higher quality, shows up also in these types of transaction.

B.2.3. Re-use of collateral

Collateral can be re-used if provided under "title transfer collateral arrangements" or under "security collateral arrangements" with a right of use (see Annex A). This part of the analysis discusses the information on re-use as provided by the banks and contains an estimate of a re-use factor of collateral.

Re-use eligibility

Table 4 shows the ratio of collateral eligible for re-use to total collateral received. Clearly, the eligibility rate is very high for repos and securities lending transactions, which are typically transfer-of-title agreements and thus give full right of use to the receiver. Client assets under a fixed charge (i.e. security interest) are often less eligible to be re-used, as this is subject to the client's agreement, i.e. the client has to grant the right of use to the prime broker. Since SFTs represent the largest part of collateralised transactions, banks can potentially freely re-use most of their collateral. Thus, there is limited scope for institutions to change or restrict the re-use of collateral.

[12] The fact that equity does not show up in the top counterparty data may be an indication that securities lending transactions are smaller in size and/or are conducted with a wider/less concentrated set of counterparties.

Table 4: Collateral received and posted by instrument (€ billions)

Instrument	Collateral received	Collateral received eligible for re-use	Eligibility (%)
(Reverse) Repo	2,800	2,754	98%
Securities lending/borrowing	709	699	99%
Derivatives	140	115	82%
Total client assets	267	124	46%
Other instruments	57	36	63%
Total	**3,971**	**3,729**	**94%**

Re-use at the institution level

Overall, it appears that the institutions had difficulties in providing information on whether banks posted their own assets as collateral or whether they re-used collateral received from elsewhere.[13] This can be partly explained by the fungibility of collateral (see Appendix A), but a reporting at the aggregate level must be possible, as banks need to make an allocation of their collateral stock (e.g. based on underlying maturity). Note that, under the upcoming European Financial Reporting guidelines on asset encumbrance, the reporting of re-usage will be mandatory.[14] There is thus evidence that banks' risk management systems are currently not yet sufficiently developed to fulfil these guidelines.

A proxy for collateral re-use is obtained by comparing the collateral received that is eligible for re-use with the own unencumbered assets of an institution.[15] If the volume of collateral received eligible for re-use is very high compared with own unencumbered assets, it is very likely that the institution will re-use its collateral (provided that the institution has high net collateral outflows). Chart 4 shows this information for the institutions that have provided the information on own unencumbered assets.[16] There is considerable variation: for example, on average, the amount of collateral received is 145% of unencumbered assets.

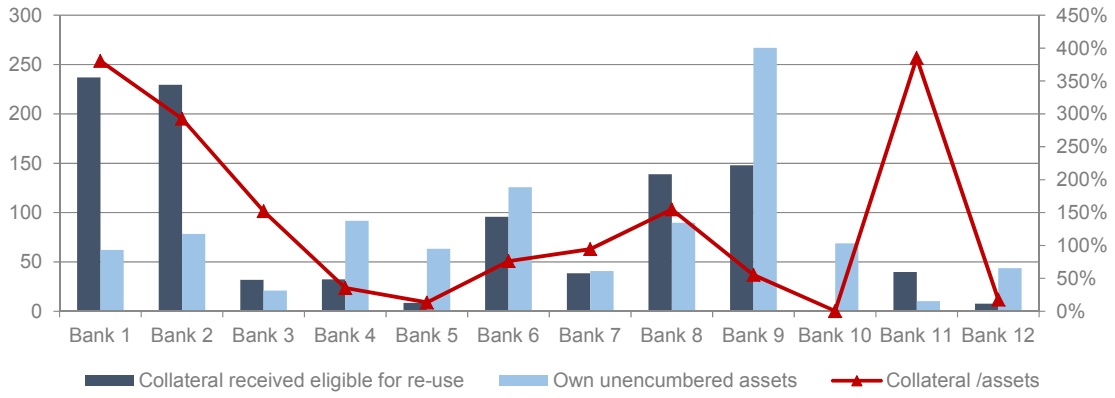
[13] Only one of 38 institutions in the sample reported how much of its collateral posted is actually re-used.

[14] See the European Banking Authority's final draft technical standards on asset encumbrance, available at http://www.eba.europa.eu/regulation-and-policy/supervisory-reporting/draft-implementing-technical-standard-on-supervisory-reporting-asset-encumbrance-

[15] Unencumbered assets are the own assets of an institution that can be freely used as collateral.

[16] Only a subset of the reporting entities has provided their level of unencumbered assets.

Chart 4: Collateral received eligible for re-use vs. own unencumbered assets (€ billions)



Note: Collateral received and own unencumbered assets are shown on the right-hand side, while the ratio collateral/assets is shown on the left-hand side.

Re-use at the aggregate level

Another way to estimate the re-use of collateral is to calculate a re-use factor of collateral using the aggregate flows of collateral in an out of the banking system as described by Singh (2011). As shown in Box 1, based on this methodology, the collateral "velocity" (Singh's terminology) was determined to be 3.5. Such a figure implies that collateral is re-used, on average, 2.5 times. There are, however, various methods to calculate the re-use of collateral at the aggregate level and no robust standard has yet been established. As shown in the Box, the use of a different calculation method yields a re-use factor of 2, implying that collateral is re-used only once.

Box 1: Estimate of collateral re-use

Singh (2011) defines the velocity of collateral as total collateral received divided by primary sources of collateral. The primary sources of collateral identified in Singh (2011) include hedge funds and collateral received via securities lending from pension funds, insurance companies, asset managers, etc. **Singh (2011) estimated that the collateral re-use factor (multiplier) was around 3 at the end of 2007, and 2.4 at the end of 2010.**

$$Collateral\ multiplier\ (Singh\ 2013) = \frac{Total\ collateral\ received}{Primary\ sources\ of\ collateral}$$

where *primary sources of collateral* include collateral received from hedge funds and via securities lending.

Note that only collateral received that is eligible for re-use is included in the definition above. In the rest of the section, we use **collateral eligible for re-use only** unless otherwise specified.

Based on this methodology, we can calculate a collateral re-use factor as follows. At the end of February 2013, the total amount of collateral received by sample banks was €3.7 trillion. The

total amount of collateral received by sample banks from primary sources (as defined in Singh, 2011) was €1.1 trillion, of which €0.4 trillion was from hedge funds and €0.7 trillion was via securities lending. **The collateral re-use factor is 3.5.**[17]

However, it is worth noting that **the collateral re-use factors calculated in Singh (2011) and using the ESRB data may not be directly comparable**. For example, in Singh (2011), the total amount of collateral received is based on a sample of 10-14 large global banks, but the amount of collateral received from hedge funds and via securities lending is based on industry-wide statistics, which may lead to the underestimation of the collateral re-use factor.

In addition, given the granularity of the ESRB dataset, the collateral re-use factor could be calculated in a number of different ways:

a) Using a **wider definition of primary sources of collateral**. For example, this could include collateral received not only from hedge funds but also other asset managers, insurance companies, pension funds and non-financial corporations.

b) Using **total collateral posted** (including collateral not eligible for re-use but excluding short-sales), rather than received, in the numerator. This is because, conceptually, banks receive collateral from primary sources and post collateral to meet various demands.

c) Taking **own-account assets** into account. Since banks may post collateral using own-account assets, rather than by re-using collateral received, the Singh (2011) definition may overestimate the collateral multiplier. Based on the ESRB data, the average amount of collateral received is 145% of unencumbered assets, suggesting that only 60% of collateral posted is sourced by re-using collateral received on average.

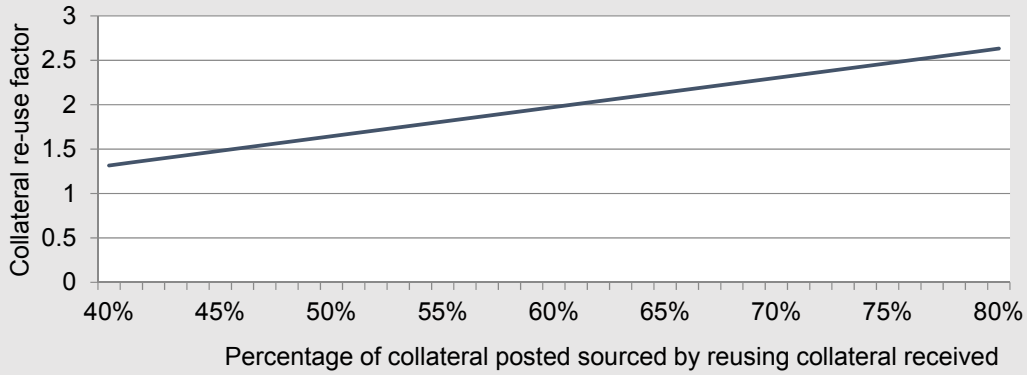
$$Collateral\ re-use\ factor\ (ESRB) = \frac{Total\ collateral\ posted\ by\ reusing\ collateral\ received}{Primary\ sources\ of\ collateral}$$

where *primary sources of collateral* include collateral received from counterparties other than central banks, credit institutions and CCPs, and *total collateral posted by re-using collateral received* is defined as total collateral posted multiplied by the percentage of collateral posted sourced by re-using collateral received.

Based on the changes above, the estimated collateral re-use factor is illustrated in the chart below. We can see that, assuming 60% of collateral posted is sourced by re-using collateral received, **the collateral re-use factor is around 2**.

[17] The collateral multiplier is not exactly equal to the fraction calculated by using the numbers provided in the text due to rounding.

Chart 5: Percentage of collateral posted sourced by re-using collateral received



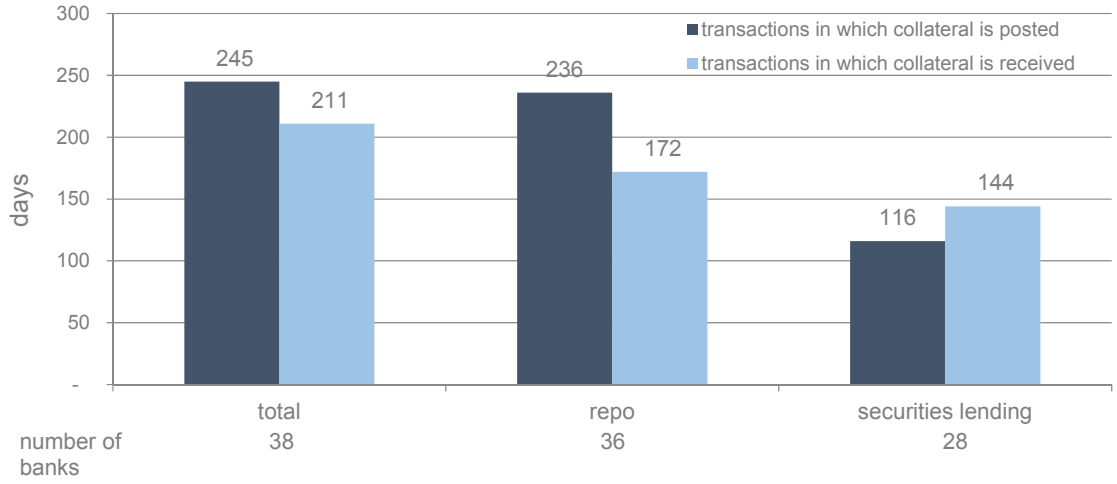
B.2.4. Maturity

On average, the maturity of transactions in which collateral is received is 14% shorter than the maturity of transactions in which collateral is posted (211 days, compared with 245 days, see Chart).[18] This difference is larger for repos, whose maturity of collateral-receiving transactions (reverse repo) is 27% shorter than the maturity of collateral-posting transactions (172 days, compared with 236 days). This behaviour appears to be consistent with prudent liquidity management, minimising maturity of cash lent and maximising maturity of cash borrowed. In contrast, the average maturity of securities lending transactions is 20% shorter than the maturity of securities borrowing transactions (144 days, compared with 116 days).[19]

[18] The percentage is calculated as the difference between the average maturity of collateral posting transactions and collateral receiving transactions, related to the average maturity of collateral posting transactions. Maturity data have been cleaned as follows: (i) reported maturities that refer to amounts equal to zero have been considered as misreporting; (ii) maturities of total aggregates equal to zero have been replaced with the average of maturities reported for single components; (iii) otherwise, maturities equal to zero have been interpreted as unavailable data.

[19] The total maturity values are higher than the figures for repos and securities lending because of a few very long maturities reported for derivatives. In addition, it can be noted that SFTs, like securities-collateralised transactions, can under certain conditions be exempted from certain liquidity requirements set out in prudential regulation.

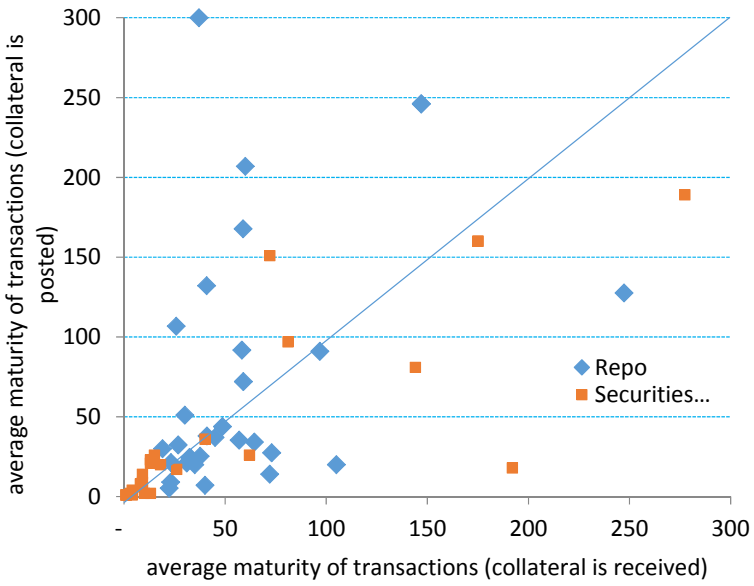
Chart 6: Average maturity (totals, repo and securities lending)



Note: In the analysis, only those reporting entities that have reported maturities both for the lending and for the borrowing side have been taken into account.

The dispersion by individual reporting entity shows that a relevant portion of banks engages in a limited maturity mismatch, which appears consistent with prudent liquidity management practices (see Chart). In the case of repo transactions, 55% of the reporting entities report a longer maturity of collateral receiving transactions (reverse repos and liquidity investment) compared with the maturity of collateral posting transactions (repos and liquidity rising). However, the average maturity mismatch is limited (approximately 25 days).

Chart 7: Dispersion of maturity mismatch across reporting entities (repo and securities lending, in days)



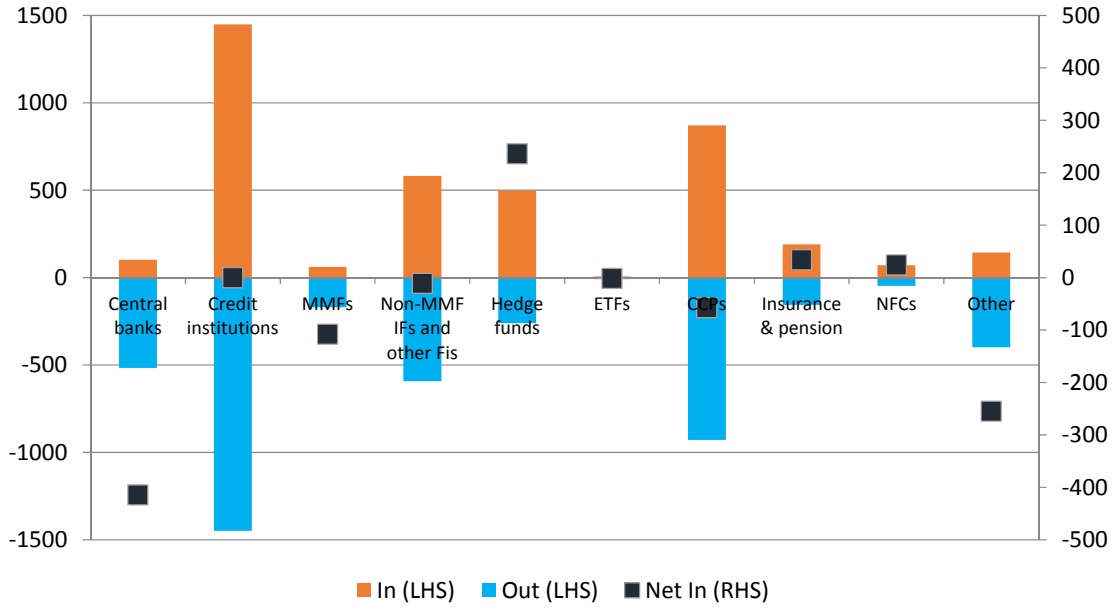
B.3. Interconnectedness and network structure

This section investigates the flow of collateral between the sample institutions and their counterparties. The data provide an overview of counterparties aggregated at sector level (covering the entire sample) and of direct counterparties (the "top 15"), with the result that both cross-sector linkages and direct inter-institution exposure can be analysed.

B.3.1. Cross-sector linkages

Chart shows the collateral flows between the aggregate sample of banks and counterparty sectors. Clearly, a large part of collateralised transactions take place between banks. CCPs also play an important role. In terms of net collateral flows, central banks, money market funds and hedge funds are most important. Central banks and MMFs provide funding to the banking sector and take collateral, while hedge funds are large net providers of collateral to banks.[20]

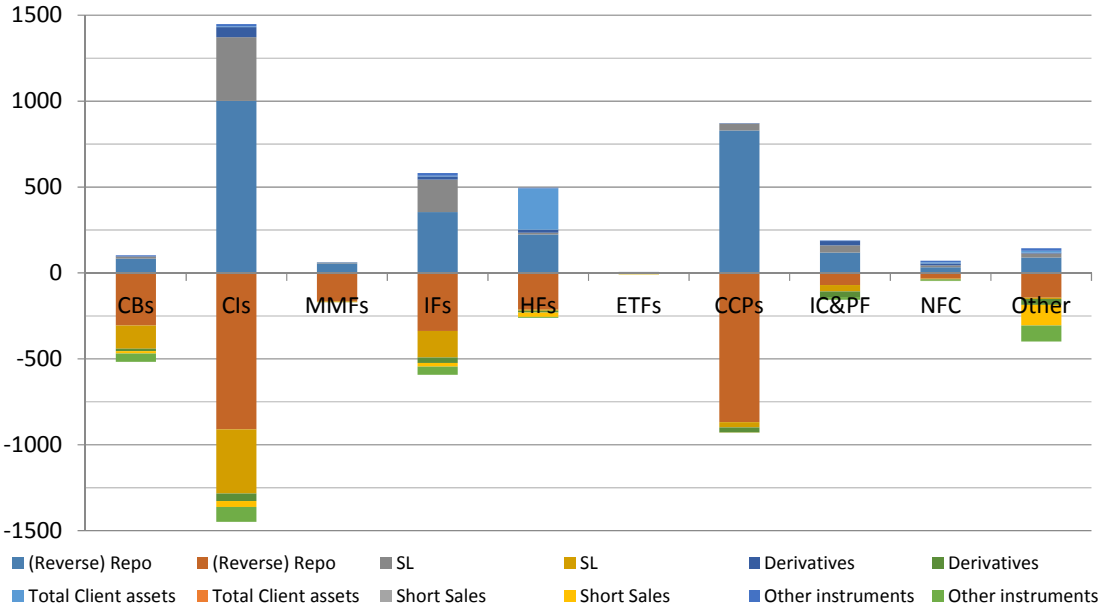
Chart 8: Collateral inflows and outflows of sample institutions by counterparty sector (€ billions)



The picture looks similar if the focus is only on SFTs and client assets, as they account for the largest part of collateral flows. Basically, the results in terms of net providers and takers hold (see Chart).

[20] It should be noted that the level of collateral posted to central banks is likely to be understated; for example, the amount of collateral posted by euro area banks to the ECB amounted to more than €2,180 billion domestically (http://www.ecb.europa.eu/stats/payments/securities/html/coll1.en.html).

Chart 9: Collateral received and posted by counterparty sector (SFTs and client assets, € billions)



Note: Positive flows denote collateral received, negative flows denote collateral posted.

The results confirm the observations made through a number of studies on SFTs. Bilateral repos between banks represent the largest share of the repo market, although CCP-cleared repos also account for a significant share.

Investment funds other than MMFs are quite active in SFT/collateral markets, while exchange-traded funds (ETFs) are surprisingly inactive.[21] Pension funds and insurance companies, as well as non-financial corporations, are relatively small players in SFT markets. The two boxes below shed additional light on the flows between banks and CCPs and between banks and hedge funds, respectively.

Box 2: Securities flows to and from CCPs

One of the difficulties in assessing the securities collateral flows is to understand the nature of the CCP flows in our data sample. From the data received we cannot easily differentiate between those flows that represent pure margin calls to a CCP (either initial or variation

[21] This may be due to a reporting inconsistency. Specifically, addressees may have reported data for the subcategory ETFs in the investment fund category. For reasons of robustness, one may thus consider all non- MMF investment funds together (with the exception of hedge funds data, which seem to be reported in a more reliable way).

margins) and those flows that represent a transaction leg (i.e. the securities leg of a repo transaction). This picture is even less clear when CCPs invest their cash margin in reverse repos, thus receiving securities collateral in return.

At the aggregate level, flows from and to CCPs as counterparties are roughly even – with a very slightly higher securities collateral outflow. From discussions with industry representatives, it is known that initial margin is still partially posted in cash given that CCPs are largely seen as safe havens (variation margin is posted purely in cash and would thus not feature in this data collection). This could explain the relatively slim margin between securities collateral outflows of banks to CCPs (for margin calls, reverse repo transactions with the CCP and cleared repos via the CCP) and securities collateral inflows of banks from CCPs (receiving the securities leg from a cleared repo transaction).

More importantly, it would appear that, in our sample, the pure size of the repo clearing business is such that the reverse repo business conducted with CCPs and the margin calls posted in securities to CCPs pale in comparison. The latter issue is further exemplified by looking at the absolute figures obtained from the data sample that breaks counterparty data down into transaction types. The most interesting data shows the following magnitudes:

Table 5: Collateral flows between banks and CCPs (€ billions)

	Received from CCPs	*Posted to CCPs*
(Reverse) Repo	829.2	867.6
Securities lending/borrowing	40.5	31.9
Derivatives	1.5	27.6
Other instruments (incl. short sales)		1.5

The CCP assumes an effectively flat position in cleared repo transactions, excluding the margin it would charge – the difference in inflows and outflows for cleared repo transactions (from the bank's, i.e. clearing member's, perspective) would thus constitute either the securities margin received on the repo transactions (unless this is accounted for elsewhere) or the securities leg of a repo transaction with the CCP itself (i.e. a reverse repo from the perspective of the CCP).

The differences in volume thus become apparent: the margin on derivative transactions (€27.6 billion) represents a mere 2.9% of total outflows towards a CCP. The difference between inflows and outflows, i.e. the share representing outflows for margin on repo transactions or repo flows with the CCP as a counterparty, which stands at €29.8 billion (net outflows towards a CCP – derivative margin outflows) represents only 3.2% of total outflows. These data clearly show the systemic relevance of the cleared repo business to the financial markets, in that it represents a vast amount of the total collateral flows in the financial system.

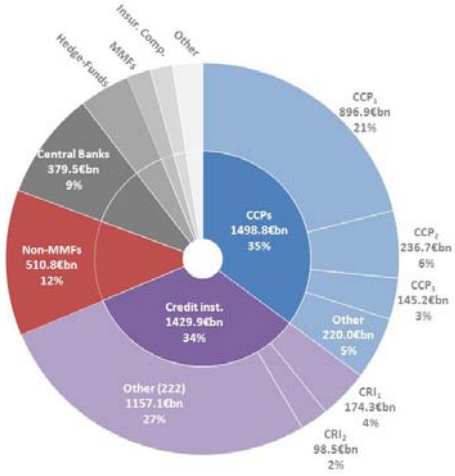
The data on the top 15 counterparties engaged in both providing and receiving collateral give some additional insights into the character of the cross-sector linkages in terms of institution-level concentration. In total, around 450 unique counterparties have been identified among the

top 15 counterparties of each reporting bank, suggesting a vast network. Transactions with the top 15 counterparties of each reporting bank account for about 50% of the total exchange of collateral captured by the exercise.

The breakdown of all counterparties reported in the top 15 list by sample institutions shows that CCPs (35%) and credit institutions (34%) are the main counterparties. While exposure to CCPs is concentrated on three entities, exposure to credit institutions is much less concentrated (224 entities). Non-MMFs (12%) and central banks (9%) are respectively the third and fourth largest counterparties.

On an aggregate level, the 15 most important counterparties across the sample account for more than 30% of total collateral volume exchanged. Consequently, those top 15 entities are good candidates for being the hubs of the collateral network.

Chart 10: Counterparty breakdown of top 15 counterparties



Box 3: Network analysis

This box analyses the structure of the network based on total net exposures. To facilitate the analysis, the datasets on collateral posted and collateral received have been merged. All exposures have been netted bilaterally and therefore do not differentiate between different types of collateral.

We analyse both the aggregate network, i.e. total exposures, as well as the network of the most important firms. First, we plot the network for the aggregated network (see Chart a). We then apply Duffie's (2011) proposal to measure systemic risk exposures in a 10by10by10 approach. In short the first "ten" refers to the ten biggest market participants, the second "ten" to their biggest exposures and the third "ten" to a set of key risk factors, which could also capture behavioural responses such as fire sales. For methodological reasons we focus on the first two tens, i.e. core firms and their counterparties.

The methodology is as follows. The nodes represent the participants in the market for securities lending, while the edges represent their netted exposures. The size of the nodes is proportional to the square root of the sum of all netted bilateral exposures (net collateral received + net collateral posted) within the network depicted. The width of the link represents the size of the bilateral net exposure.

Chart 11: Network analysis

Chart a) Full network of net exposures

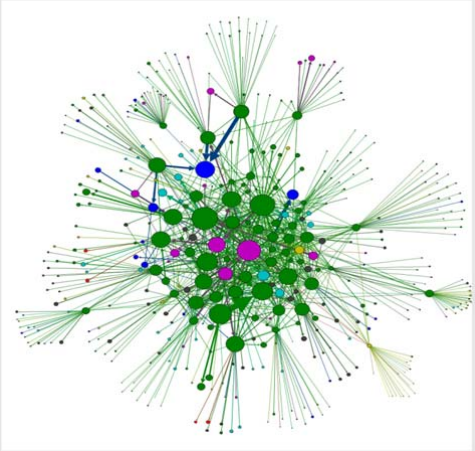
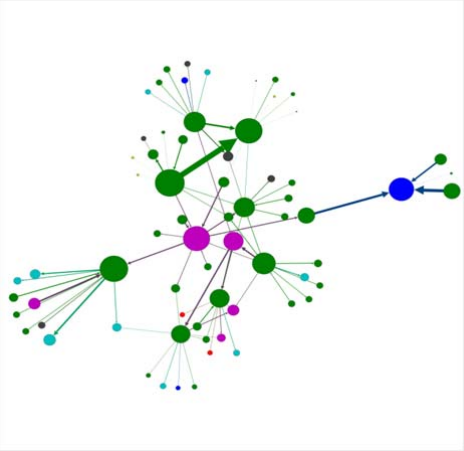


Chart b) 10 by 10 analysis



Key: The colouring of the nodes differentiates according to the type of entities: blue for central banks, green for banks, red for money market funds, pink for CCPs, light blue for non-money market investment funds, yellow for insurance companies and pension funds and grey for non-financial corporations and all other types.

Overall, the (preliminary) analysis indicates a comparatively low degree of interconnectedness in the network. First, in comparison with what is observed for OTC derivatives,[22] the credit institutions in the network have a smaller number of bilateral links. Second, several of the counterparties that exchange the larger amount of collateral, as either recipients or providers, seem not to have links with one another (see Chart b). This is in stark contrast to the CDS market, where the "G14" dealers are very closely connected. Third, the network is also clearly populated with non-bank entities (e.g. CCPs and central banks) that appear among the ten more active counterparties.

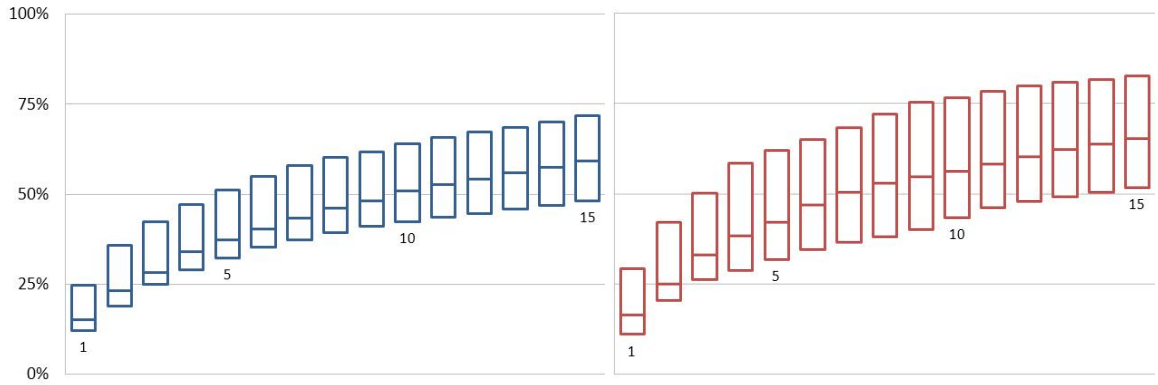
[22] See Peltonen et al. (2013) for evidence on CDS exposures.

B.3.2. Counterparty concentration

There is typically a limited exposure to a single counterparty. Median top exposure to a single counterparty reaches approximately 15% for both collateral received and collateral posted. Exposure gradually decreases for the following top 14 counterparties, while interquartile ranges remain centred on the median (see Appendix C for a detailed breakdown by institution).

Chart 12: Individual cumulative share of top 15 counterparties in total collateral

Interquartile range and median



Notes: Each bar represents the median and interquartile range of the individual cumulative share of top 15 counterparties in total collateral. The median top exposure to a single counterparty reaches approximately 15% for both collateral received and collateral posted. Exposure increases to 25% with the top two counterparties. The median cumulative exposure reaches 60% with the top 15 counterparties.

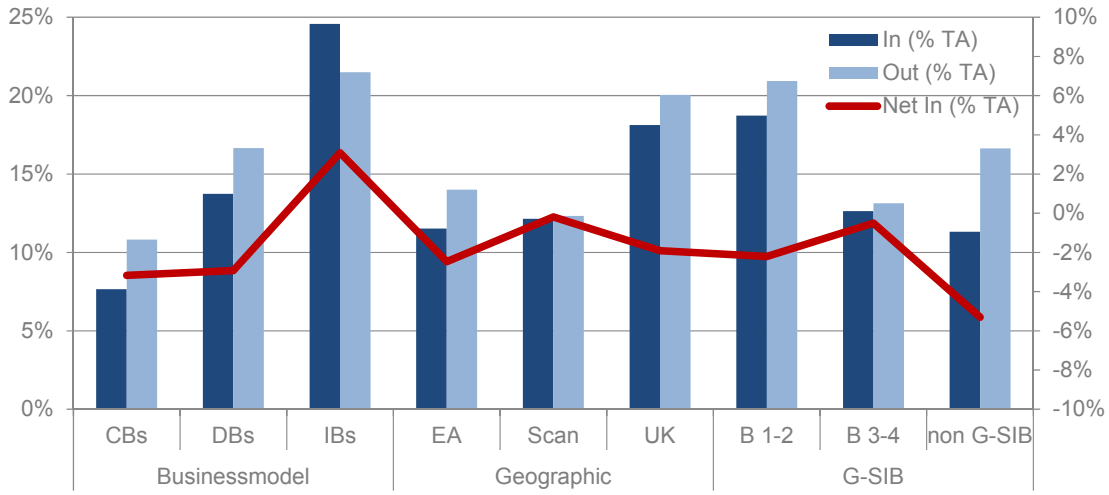
B.4. Structural differences across banks

This section discusses structural differences across the sample institutions by using alternative classifications of the sample banks (see Section B and Appendix B for a description of these classifications). The objective of the analysis, presented below, is to shed light on the structural determinants of the use of collateralised instruments by replicating the charts and tables of the previous sections using the different classifications of the banks. To improve the comparability of the charts, collateral flows have been divided by the amount of total assets of banks in their respective categories (i.e. by business model, geographic location and G-SIB status). Organising the data in such a manner allows a comparison across the different categories.

B.4.1. Structural inflows and outflows

The analysis focuses first on structural inflows and outflows, i.e. the level of collateral inflows and outflows, as well as net inflows as a percentage of total assets for different classifications of the banks (see Chart 13).

Chart 13: Collateral received and posted by bank classifications (percentage of total assets)



Note: Alternative classifications by business model (commercial banks – CBs, diversified banks – DBs, and investment banks – IBs), by geography (euro area –EA, Norway, Denmark and Sweden –Scan, and the UK), and by G-SIB buckets.

The first grouping (the left group of bar charts, by business model) shows that the investment banks (all from the UK) are net collateral takers and hence providers of funding, while commercial and diversified banks are net collateral providers. This is consistent with the observation that euro area banks rely on secured funding from non-euro area investment banks. In addition, the investment banks have the greatest use of collateral relative to the size of their balance sheet.

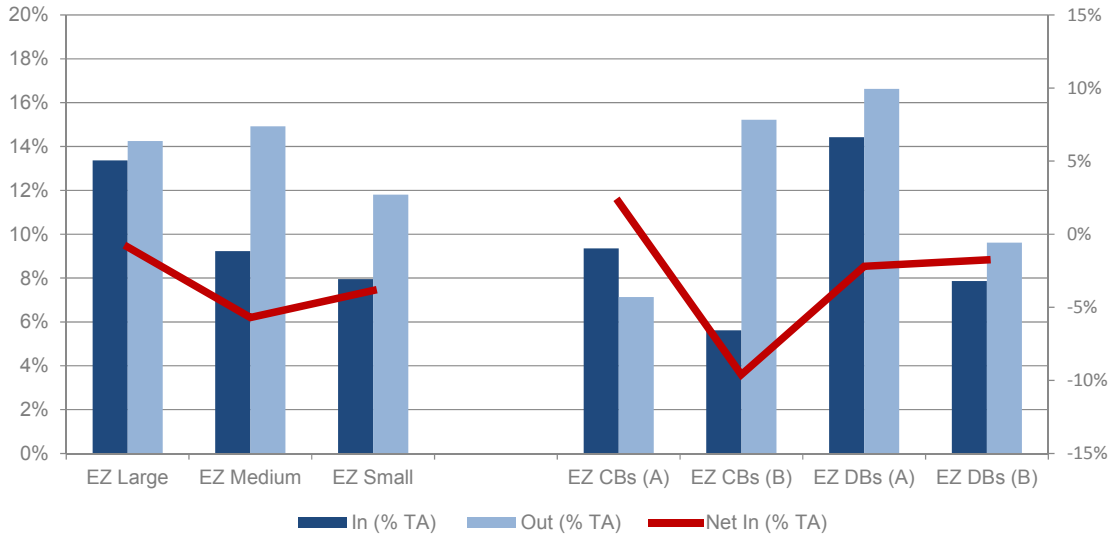
The second grouping (by geographic area) shows a somewhat attenuated pattern, which can be explained by the UK being the home of both investment and diversified banks and the euro area hosting both diversified and commercial banks. Scandinavian (diversified) banks turn out to have neutral funding.

The third grouping (by globally systemic importance of banks) also proves to be relevant. Banks of the category bucket 1 or 2, which contains most investment banks, have a higher share of collateralised transactions to total assets. Non-GSIBs have larger net collateral outflows than G-SIBs, which is consistent with the observation made in the first grouping, as all investment banks are in the G-SIB category.

Chart 44 shows a further distinction of banks within the euro area. The set of bars on the left of the chart regroups euro area banks by size. Large banks nearly balanced collateral flows, while medium-sized and smaller banks have significantly higher outflows than inflows.

The set of bars on the right regroups euro area banks by business model and their location in euro area countries not exposed to sovereign risk tensions (A) and higher sovereign debt strains (B). Group B commercial banks have large net outflows, while group A commercial banks are net collateral takers. Diversified banks in area A and area B exhibit similar patterns.

Chart 4: Collateral received and posted by euro area bank classification (percentage of total assets)



The data analysis reveals remarkable differences in the structural use of collateralised funding between investment banks and the other banks in the sample, both in terms of the level of flows relative to total assets and in terms of net flows. Differences between the non-investment banks are less systematic, although there seems to be a higher degree of reliance on collateralised funding by euro area banks that are smaller or established in EU Member States that experienced sovereign debt tensions.

B.4.2. Instruments

Next, we consider the usage of securities collateral broken down by instruments and collateral using the same classifications.

Chart 15 shows the first set of classifications. Clearly, the use of instruments differs across business models: investment and diversified banks have a higher share of total client assets than commercial banks; derivatives use is also more pronounced at investment banks and they clearly act as intermediaries, with derivatives accounting for both large inflows and outflows. The use of short sales is higher at investment and diversified banks than at commercial banks, which is consistent with what could be expected.

Again, the geographic classification shows a mixed picture due to the fact that the UK comprises both diversified and investment banks while the euro area comprises both commercial and diversified banks. Scandinavian banks have a larger proportion of securities collateral through "other instruments". Similarly, the classification by G-SIB status shows the concentration of smaller, commercial and diversified banks in the non-G-SIB bucket that rely on net funding through collateralised transactions by using mainly SFTs and "other instruments".

Chart 15: Collateral received and posted by instruments and bank classification (percentage of total assets)

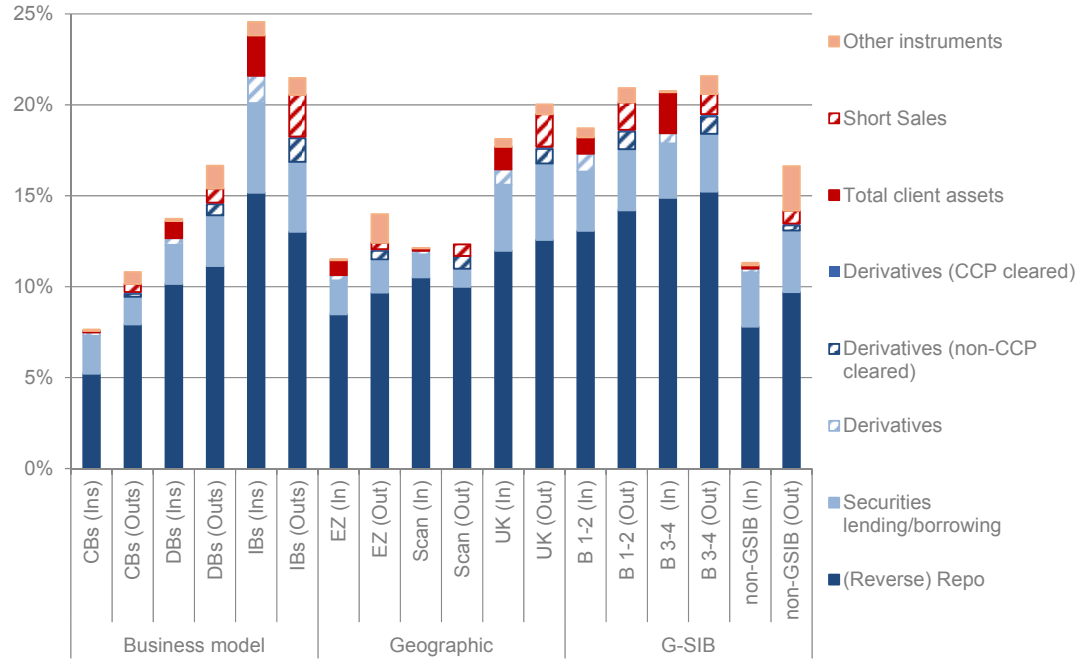
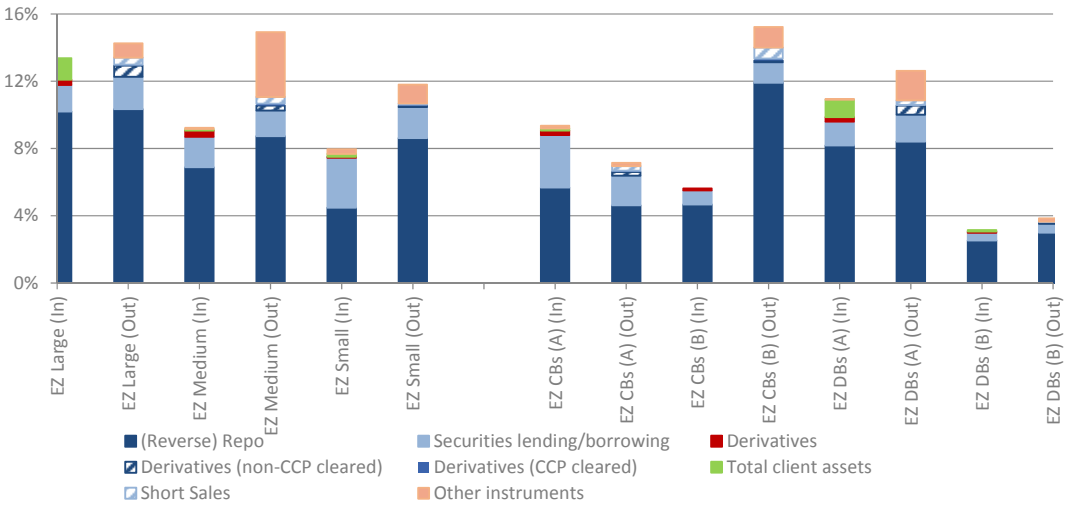


Chart 16 shows the use of instrument by different classification of euro area banks as a percentage of total assets of the respective categorisation. Collateral inflows from securities lending are particularly large for smaller euro area banks, while larger banks have larger inflows from client assets and derivatives. It appears that euro area commercial banks are responsible for the relatively large share of securities borrowing. In the euro area, only diversified banks from area A (see above) receive client assets.

Chart 16: Collateral received and posted by instrument and euro area bank classification (percentage of total assets)



Concentrating on SFTs, the data again shows their role as a funding tool for banks. The same funding pattern as observed for all collateralised transactions also applies to the use of SFTs: credit institutions posted more collateral than they received. This is particularly true in the case of small and medium-sized banks. The distinction between area A and B banks also reveals that commercial banks in the latter area exhibit larger net outflows of collateral, pointing to the use of repo as a funding tool.

B.4.3. Collateral

The next step is to show the type of collateral used based on the different classifications (see Chart 57). The data shows that commercial and diversified banks post a higher share of "risky" assets, such as covered bonds, loans and ABS, than investment banks. These banks, in turn, post high amounts of equity collateral.

The geographic categorisation shows a concentration of covered bond collateral at Scandinavian banks (which can be explained by the high volume of covered bond issuance in some of these countries), while euro area banks post much more loans than banks in the other regions. The difference between euro area institutions and their UK counterparts is less pronounced, however a slightly greater use of loan outflows and covered bonds inflows is observed in the case of the euro area.

The categorisation of institutions by their systemic importance shows that non-G-SIB entities mainly post loans. Moreover, a noticeable difference is that Scandinavian diversified banks tend to receive and post greater amounts of "other" instruments while receiving and posting fewer equities as collateral.

Chart 57: Collateral received and posted by collateral type and bank classification (percentage of total assets)

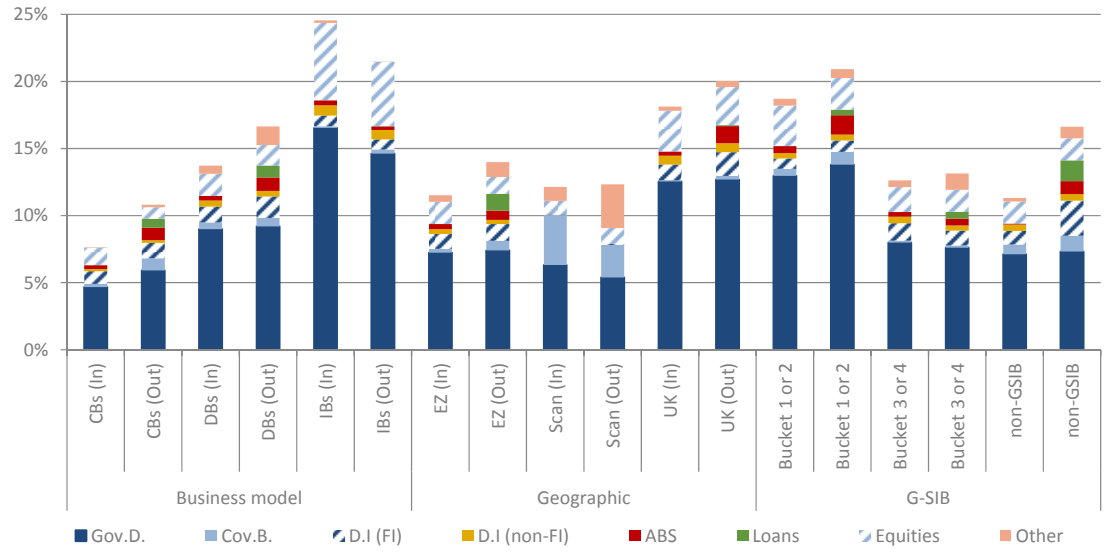
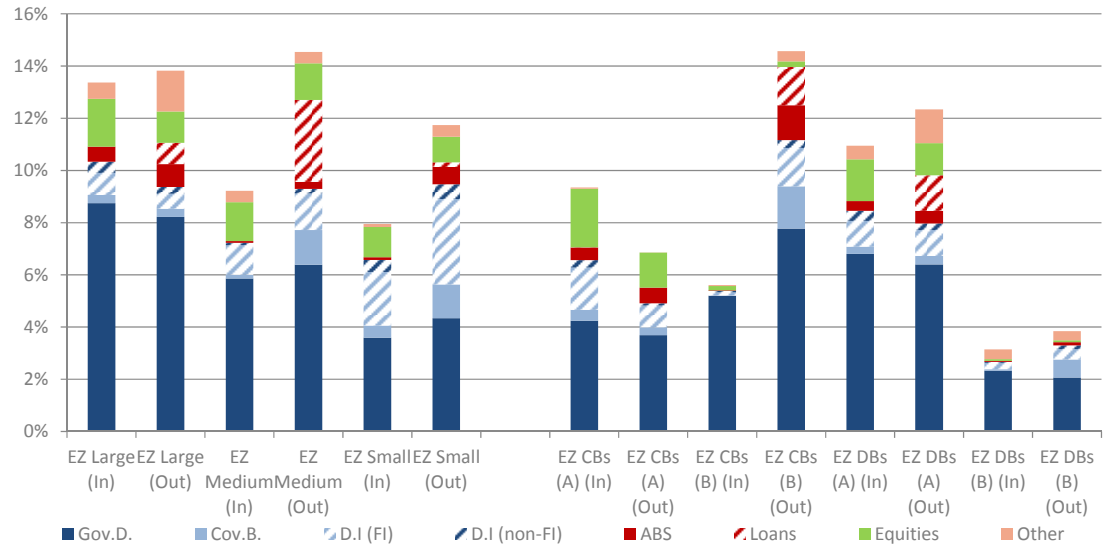


Chart 18, which shows alternative euro area bank categories, illustrates that the use of loans is not confined to banks of a specific business model or from a specific part of the region – both diversified and commercial banks, as well as banks from region A and region B, post loans. The overview of the various euro area bank categories also allows the identification of funding patterns of private debt: The net posting of private debt collateral (ABS, covered bonds and other debt instruments) is more pronounced at medium-sized and smaller banks, as well as at commercial banks from area B.

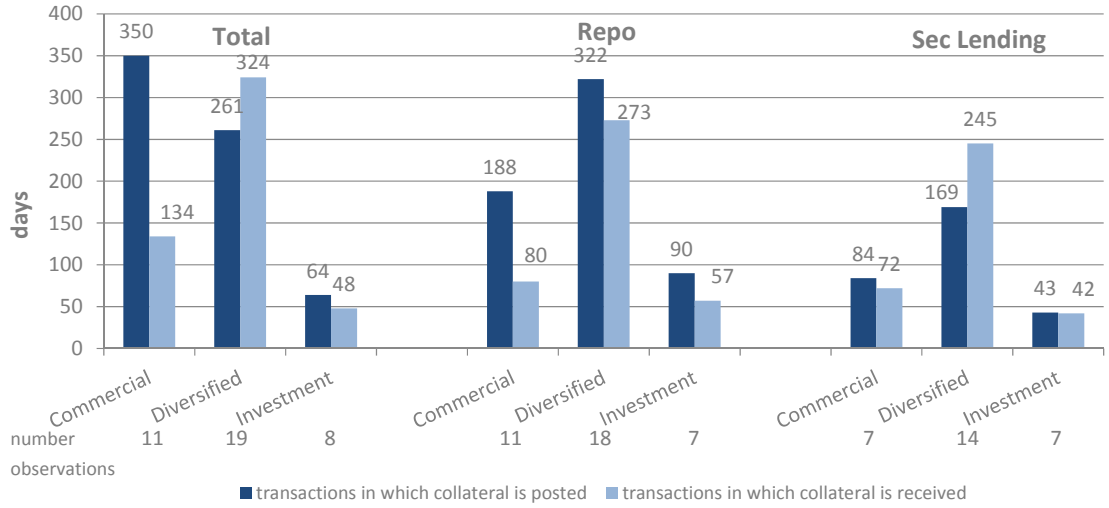
Chart 18: Collateral received and posted by collateral type and euro area bank classification (percentage of total assets)



B.4.4. Maturity

Chart 19 shows that, on average, maturities of collateral posting and receiving transactions (liquidity raising and financing) in repo markets are longer than the average maturity in the securities lending market for all business models.

Chart 19: Average maturity – totals and major transaction types by business model



Note: In the analysis, only reporting entities that have reported maturities both for the lending and for the borrowing sides have been included.

In both types of market, investment banks exhibit the shortest maturities. In the repo market, investment banks have the shortest funding (90 days). The maturity of their securities loans is even shorter (43 days).

With respect to the overall matching of funding and financing, in all business models banks exhibit characteristics that seem to be consistent with a prudent liquidity management profile in their repo transactions, with the most prudent ones being commercial banks (the maturity of cash lent is 188 days and the maturity of cash borrowed is 80 days). For securities lending transactions, investment banks have almost a matched maturity profile, while diversified banks on average show a shorter maturity for collateral-posting transactions (169 days) than for collateral-receiving transactions (245 days).

Nevertheless, it is difficult to infer liquidity risk based on this observed maturity mismatch given the existence of securities collateralised securities lending transactions (non-cash collateralised securities lending).

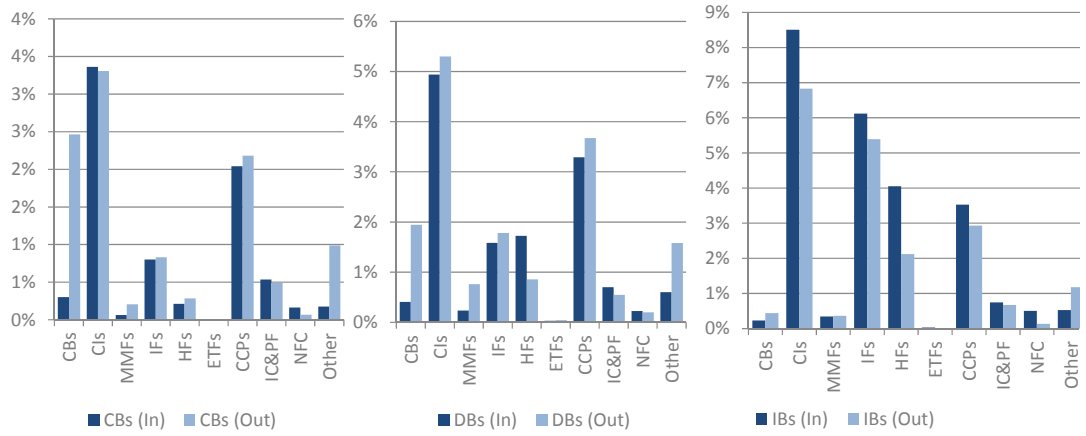
B.4.5. Cross-sector linkages

This section analyses differences across banks with respect to their cross-sector linkages. The linkages, in analogy to Chart 8, are shown by business model, G-SIB status and for a distinct classification of euro area banks.[23]

Chart 20 shows the cross-sector linkages by business model. Commercial banks tend to borrow more from central banks and less from other financial institutions. Diversified banks are roughly in line with the overall sample pattern (see Chart 8). For investment banks, the business with investment funds other than MMFs is much more important than for the other business models. Investment banks also do relatively more business with credit institutions than with CCPs. As expected, investment banks' reliance on central bank financing is low.

Again, the data clearly shows the funding role that investment banks play across counterparties: they provide funding to credit institutions, through CCPs, and to investment funds. The distribution of funding across such a broad range of counterparties is suggestive of a considerable degree of interconnectedness.

Chart 20: Cross-sector flow by business model

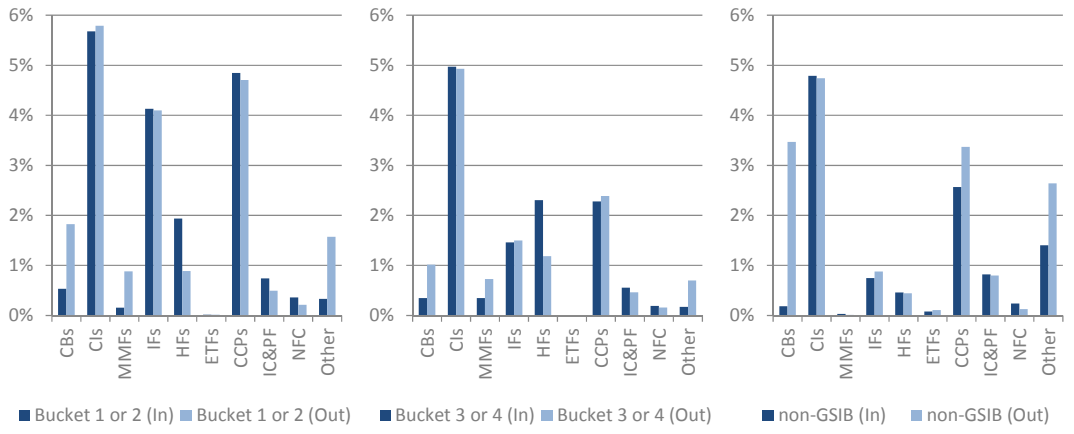


The breakdown by G-SIB classification shows that banks of high systemic importance (bucket 1-4) rely less on central bank refinancing than non-systemically important banks.

Banks in bucket 3 or 4 conduct proportionately more business with other banks, CCPs and investment funds than banks in the other buckets, which can be explained by the larger presence of investment banks in the category "bucket 1 or 2".

[23] The collateral flows are shown here as a percentage of total assets of the respective category to allow a better comparison in terms of relative importance of the different counterparties.

Chart 61: Cross-sector flow by G-SIB status



The differentiation of euro area banks by size provides some additional insights (see Chart 22). Large euro area banks post and receive large amounts of collateral to/from other banks. Small and medium-sized banks, in contrast, post high volumes of collateral to the central bank.

Chart 22: Cross-sector flow by size (euro area)

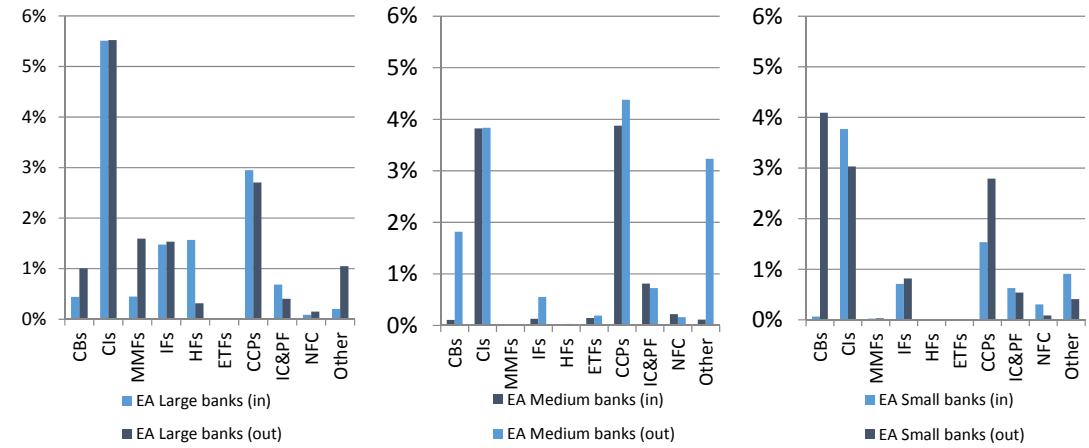
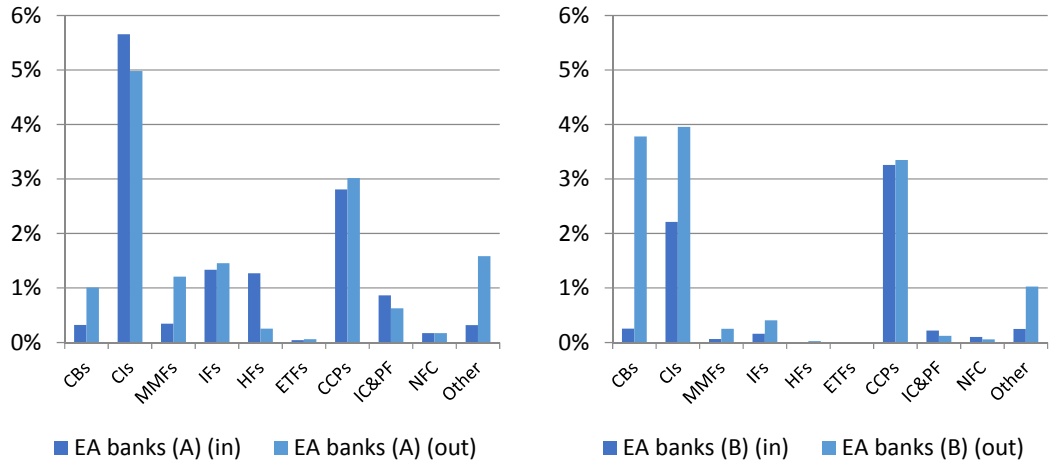


Chart 23 illustrates the differentiation of euro area banks by area A and B. Area A banks are seen to exchange collateral with other banks at substantial volumes, although they make less use of central bank financing. In contrast, banks from area B, make higher use of central bank financing and also receive funding from other banks (they post collateral on a net basis to other banks).

Chart 23: Cross-sector flow by bank area (euro area)

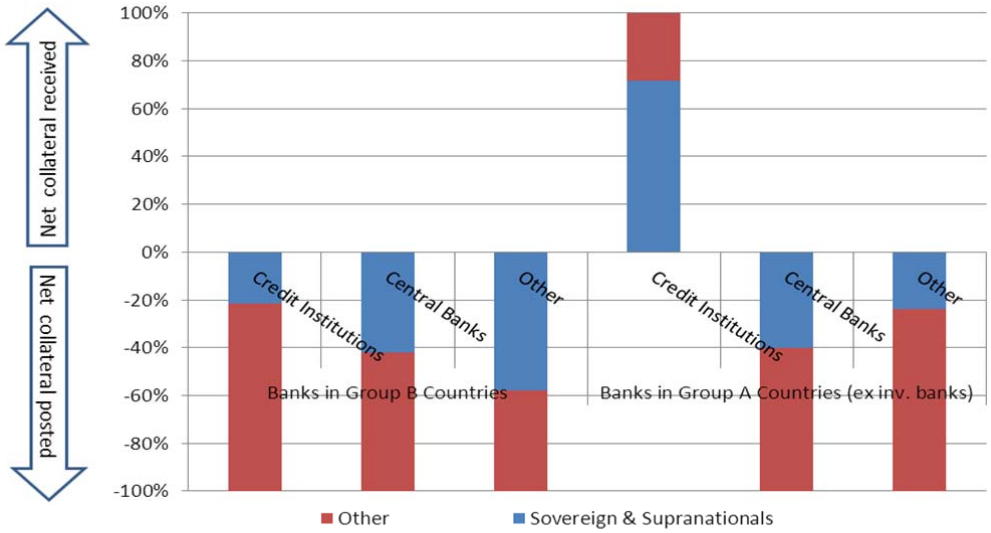


The data on the top 15 counterparties provides more granular information along the geographic and business model dimension. Specifically, central banks are the main counterparties of banks from group B. These banks are mostly commercial and diversified banks. For those banks, the largest share of collateral posted is issued by the reporting institution itself,[24] while collateral exchanged with central banks and banks in other countries is predominantly in the form of sovereign bonds.

The information on the main types of collateral exchanged by the reporting banks with their major counterparties (see Chart 24) provides additional insights, although an important caveat needs to be made on the heterogeneity of the data used for this analysis. Banks in group A appeared to provide funding to other credit institutions in exchange for collateral comprised mainly of securities issued by sovereign or supranational entities (such as the European Financial Stability Facility and the European Stability Mechanism), which is typically highly rated. In contrast, group B banks appeared to have posted mainly other assets to other credit institutions. This relationship is reversed for other counterparties encompassing MMFs, CCPs, other investment funds, insurance companies and pension funds. To those other counterparties, in fact, group A banks (excluding again investment banks) seemed to have provided collateral of various types; while credit institutions in group B may have posted mainly sovereign (and supranational) bonds. Finally, the data seem to confirm a pattern where banks in both groups have pledged various types of assets to central banks in addition to sovereign bonds.

[24] The type of instrument involved here cannot be clearly identified by the one-off data collection.

Chart 24: Main type of collateral exchanged with major counterparties

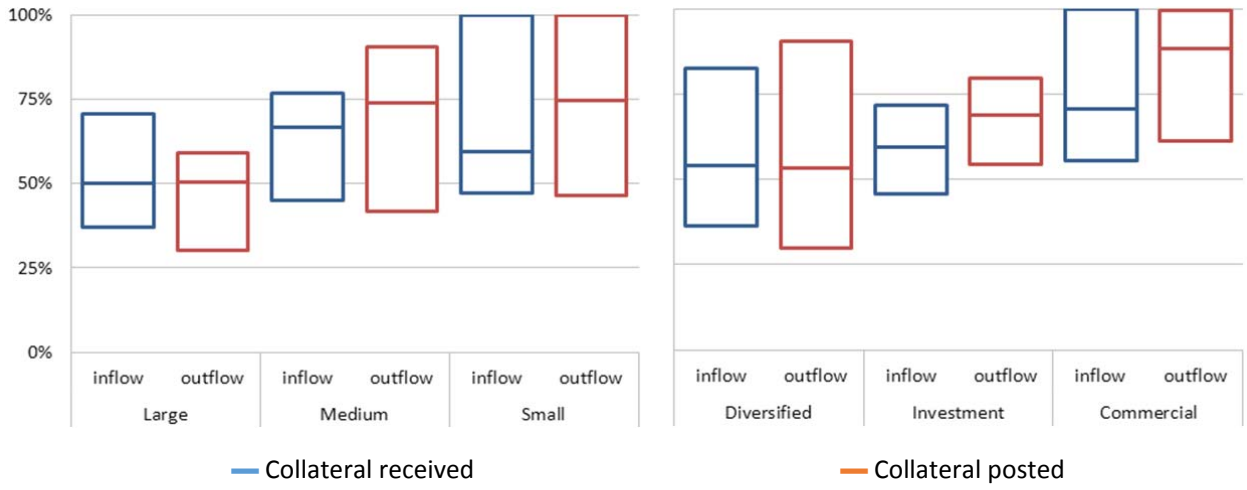


B.4.6. Counterparty concentration

In terms of concentration, the transactions with main counterparties (top 15 for each reporting entity) account for about 50% of the total exchange of collateral. However, some relevant differences can be noted depending on the size and business model of the reporting institution (Chart 75). In particular, small and commercial banks have fewer counterparties, as suggested by the large share (a median around the 75% mark) of total collateral exchanged with the major 15 counterparties. Overall, the reporting banks seem to have posted collateral towards a smaller number of counterparties than those from which those have received collateral.

Chart 75: *Share of top 15 counterparties in total collateral*

A: Interquartile range and median by size *B: Interquartile range and median by business model*

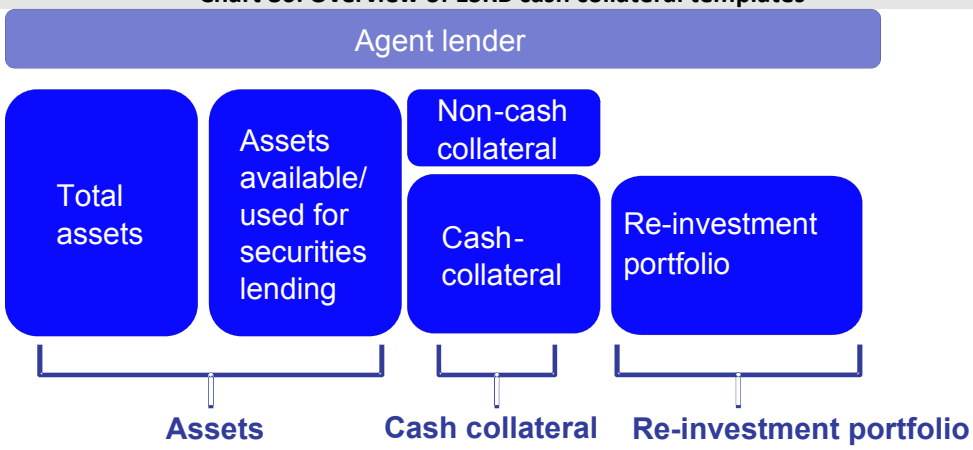


C. The re-investment of cash collateral

C.1. The set-up of the data collection

The second ESRB data collection targeted the re-investment of cash collateral by agent lenders. The agent lenders were required to provide information (see Chart 86) on the amount of their total assets (own and clients' assets), as well as on the proportion of those assets available for securities lending.

Chart 86: Overview of ESRB cash collateral templates



More precisely, the data collected on securities lending, cash collateral and cash collateral reinvestment permitted an analysis of:[25]

- the assets and collateral posted to institutions, broken down by client type. The templates also included the portion of the securities lending portfolio that is guaranteed by the reporting institution, the type of collateral received from securities lending and the cash collateral split between segregated and commingled accounts;
- the maturity breakdown of the cash collateral received, including information on earliest possible termination of the contract;
- the cash collateral re-investment portfolio, with a breakdown by type of product or investment, e.g. cash and bank deposits, reverse repos, securities or loans and a further breakdown of the securities received through reverse repos. For the products and transactions the expected liquidation period was also reported, allowing an initial

[25] For a description of agent lenders' practice of re-investing cash collateral,l see also FSB (2012) and Keane (2013).

assessment of liquidity and maturity transformation, as well as of the ability of reporting institutions to quickly raise cash in "normal" times;

- the potential currency mismatches between the securities loans, the cash collateral received and product or investment in which it is re-invested.

C.2. Market overview: assets and securities lending

The data collection gathered information from 13 financial institutions acting as agent lenders (henceforth referred to as agent lenders) reporting €4.8 trillion in total assets managed as at 28 February 2013 (see Table 6).[26] The volume of securities on loan (€817.3 billion) illustrates the significant size of EU securities lending markets and the relevance of this data collection exercise. A large share of securities lending transactions also included guarantees, usually in the form of indemnifications to be provided to clients in case of losses (e.g. counterparty default). The greater volume of collateral received (€938.4 billion, including €328.8 billion in securities and €609.6 billion in cash) reflects the over-collateralisation of securities lending transactions.

Table 6: Summary statistics for the data collection (€ billions)

Assets	Total	Available for SL	Used for SL	Utilisation rate (%)	o/w guaranteed by AL
Own assets	1,605.0	277.2	126.1	45.5	--
EU clients' assets	1,140.9	1,305.7	161.0	12.3	114.4
Non-EU clients' assets	2,081.2	4,831.4	530.2	11.0	489.4
Total	4,827.0	6,414.2	817.3	12.7	603.9

Notes: Three respondents did not provide "total assets" data. The last column denotes the asset volumes that are guaranteed by the agent lender through indemnifications.

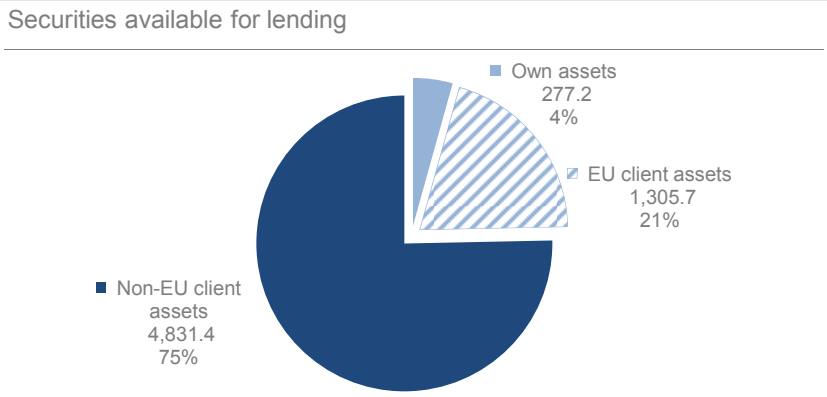
Collateral received from securities lending against	Securities collateral	Percentage of total	Cash collateral	Percentage of total
Own assets	27.7	12.4	195.4	87.6
EU clients' assets	102.0	60.6	66.4	39.4
Non-EU clients' assets	199.1	36.4	347.8	63.6
Total	328.8	35.0	609.6	65.0

[26] However, the actual coverage is likely to be greater than this, as three respondents did not indicate total assets for their clients. However, these respondents reported a combined €3.2 trillion in securities available for securities lending, implying that the templates likely cover a total asset universe of €8 trillion (4.8 + 3.2) or greater.

Cash collateral received against	In segregated accounts	Percentage of cash collateral	In commingled accounts	Percentage of cash collateral	Managed by beneficial owner or third party
Own assets	--	--	195.4	100.0	--
EU clients' assets	18.6	28.7	46.1	71.3	1.7
Non-EU clients' assets	223.5	68.9	101.0	31.1	23.3
Total	242.1	41.4	342.6	58.6	25.0

Looking into the breakdown of securities available for lending (€6.4 trillion)[27], the first key observation is the high degree of interconnectedness between the EU financial institutions surveyed and non-EU clients, with €4.8 trillion (75% of all securities available for lending) in non-EU client assets managed by EU agent lenders. This shows that there are significant cross-border linkages between EU and non-EU jurisdictions. Conversations with agent lenders revealed that EU securities lending markets seem indeed to serve as a hub for clients based in the Middle East and North Africa, as well as the Asia-Pacific region. This non-EU client base is fairly static and is essentially composed of sovereigns (central banks or sovereign wealth funds), institutional investors (insurance corporations and pension funds) and asset managers, i.e. long-term investors.

Chart 97: Securities available for lending



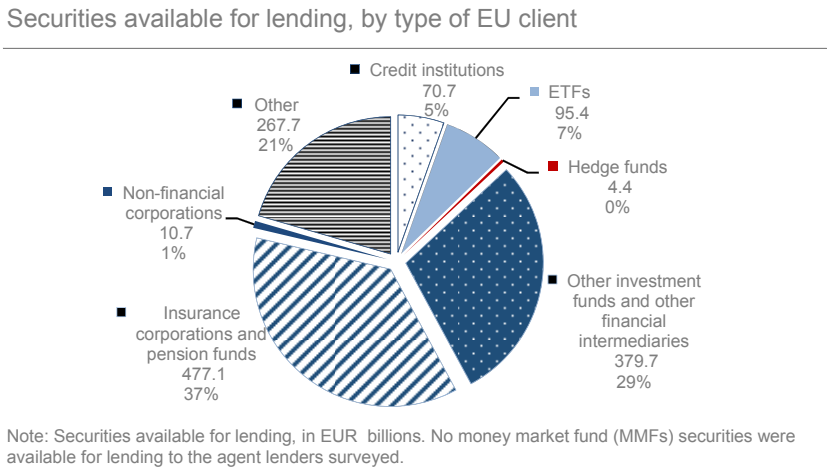
Note: Securities available for lending, split between own securities and securities lent on behalf of EU and non-EU beneficial owners.

As regards EU clients' assets available for lending (€1.31 trillion of securities), only a small share is owned by credit institutions (5%). The majority comes from insurance corporations and

[27] Excluding the institutions that did not report total assets (i.e. out of the agent lenders reporting €4.8 trillion in total assets), this number drops to €3.2 trillion. The percentage of total assets available for securities lending seems very high and should be interpreted with caution, as it is possible the reporting agent lenders may not have full information regarding those client assets that are not part of the securities lending programme.

pension funds (37%), followed by other investment funds and other financial intermediaries (29%), and then by "Other"[28]. Thus, non-banks are rather predominant in EU securities lending markets (see Chart 28).[29]

Chart 28: Securities available for lending by EU client



Note: Securities available for lending, in EUR billions. No money market fund (MMFs) securities were available for lending to the agent lenders surveyed.

From the ESRB data collection, out of the total €6.4 trillion securities available for lending, only €817.3 billion (12.7%) appeared to be used in actual securities lending transactions (see Table 6). In particular, around 45.5% of agent lenders' own securities were on loan, while for EU and non-EU clients the share of securities lent out ranged between 6% and 14%. An exception in this regard may be constituted by hedge funds, the data for which seemed to indicate a much higher proportion (about 85%) of securities actually put on loan.

C.3. Market overview: collateral received and cash reinvestment

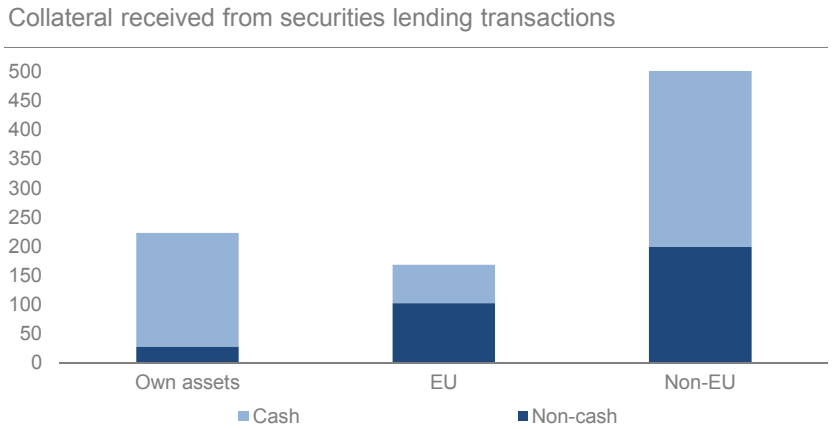
The collateral received from securities lending transactions amounted to €938.4 billion, including €328.8 billion in securities and €609.6 billion (or 65% of the collateral received) in cash

[28] The "Other" category includes, for example, non-ETF UCITS.

[29] Comparing the results with commercial data providers, it appears, however, that investment funds may play a greater role in the global securities lending markets than what can be observed through the ESRB data collection, as investment funds own about a half of the total securities available for lending.

(see Chart 99).[30] Cash collateral dominated, especially in the case of agent lenders' own securities on loan (87.6%) and, to a lesser extent, for non-EU clients (63.6%).

Chart 29: Type of collateral received by asset ownership



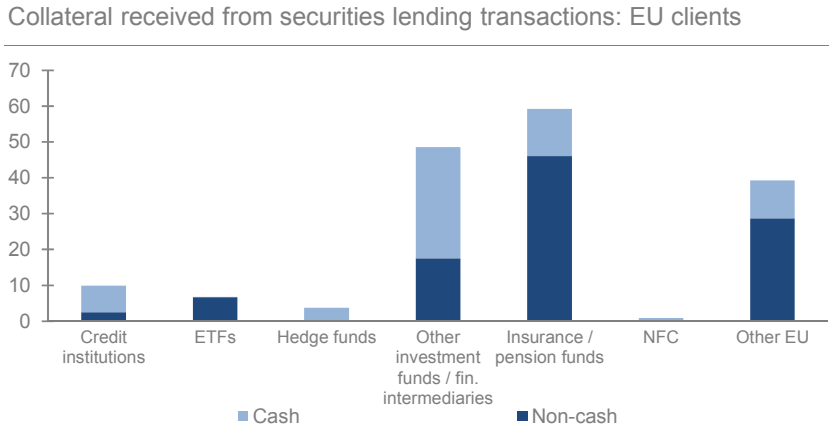
Note: Cash and non-cash collateral received for securities lending transactions, in EUR bn.

The relatively greater importance of cash collateral that emerged from the ESRB data collection seems to differ from data provided by industry sources. This may suggest that non-EU securities captured in the data collection sample (whether belonging to the agent lender or beneficially owned by EU or non-EU clients) were largely collateralised with cash.

For EU client assets, the data collected show that agent lenders received on average 39.4% of collateral in cash. Cash dominates in the case of assets owned by credit institutions, other investment funds, hedge funds and non-financial corporations. In contrast, assets from insurance corporations and pension funds, ETFs and other institutions tend to be collateralised with securities (see Chart 30).

[30] Some respondents indicated that they do not accept cash as collateral for securities lending transactions.

Chart 30: Type of collateral received against EU clients' assets



Note: Cash and non-cash collateral received for securities lending transactions, in EUR bn.

A sizeable portion of the cash collateral received was placed into segregated accounts (€242.1 billion, or 41.4% of the total cash collateral received). This share was particularly large for non-EU client assets (68.9% of the cash collateral received). This allocation of collateral potentially reduces contagion risk, as agent lenders cannot use these segregated funds to back investments or face losses outside of the account. Such segregated accounts, which allow for greater investment control, are typically reserved for larger clients. Smaller clients tend to use commingled accounts (including UCITS), as a lower volume of assets can prove challenging in terms of liquidity management or relatively costly, making it difficult to achieve attractive yield targets. Different investment profiles (e.g. conservative/aggressive) exist in both types of account from which clients are typically free to choose based on their risk appetite. UCITS in which cash collateral may be reinvested are subject to strict investment guidelines, which would contribute to the mitigation of maturity and liquidity risk.

A very significant portion of the cash collateral was reinvested (€573.0 billion), equivalent to around 95% of the cash collateral received.[31]

C.4. Redemption and liquidity risks

We have identified two potential risks related to maturity transformation when reinvesting cash collateral, namely redemption and liquidity risk. These risks arise from two different features: the term structure of the transactions (redemption risk) and their actual maturity (liquidity risk).

[31] Here, we subtracted the amount of cash collateral managed by beneficial owners or third parties (€25 billion) from the total overall amount of cash collateral received (€584.6 billion).

Chart 101: Maturity transformation risks

Redemption risk

Agent Lender	
Assets	Liabilities
Cash collateral reinvested: **term maturity**	Cash collateral received: **open maturity**

Liquidity risk

Agent Lender	
Assets	Liabilities
Cash collateral reinvested: **long liquidation time**	Cash collateral received: **short maturity**

Subject to redemption, an agent lender might not be able to return the collateral received from an open maturity transaction when the borrower of a security terminates the transaction, as the cash is reinvested at fixed term maturity.[32]

Subject to liquidity risk, if the cash reinvestment is not at a fixed but an open maturity, the expected liquidation period of the cash collateral reinvestment may also prevent the agent lender from being able to return the collateral. In this case, the risk stems from the prevailing market conditions (liquidity, price movements, etc.) that might impair the possibility to liquidate assets in order to satisfy the outflow of short-term cash collateral.[33]

It is difficult to draw precise conclusions as to the level of risk originating from maturity transformation given that respondents seem to have interpreted differently the "expected liquidation period" question regarding their reinvestments. For example, in the case of *hold-to-maturity* reinvestment strategies, the expected liquidation period is equal to the remaining maturity of the security purchased. However, this does *not* reflect the agent lender's ability to liquidate its investments under a stress scenario. Similarly, some agent lenders included open maturity reinvestments in the one-day liquidation category (i.e. fixed term).

Nevertheless, a degree of risk does seem to exist, as reflected by answers on the earliest termination period of reinvestments that were provided by agent lenders. Although the specific interpretation also seems to slightly differ across respondents (e.g. earliest possible termination due to post-trade settlement cycles, ability to get cash back on the agent lender's asset side, or ability to return collateral on agent lender's liabilities side), overall this earliest possible

[32] In a transaction with open maturity, the collateral can be recalled at any point in time by one of the counterparties after the order.

[33] It is unclear what the amount at risk could be exactly, as this would require monitoring access to details on individual transactions/investments to identify the exact share of open maturity collateral that is reinvested at term-long maturity. However, based on the data collected, this amount seems to be within a €250 billion to €300 billion range (term maturity reinvestments minus term maturity collateral received).

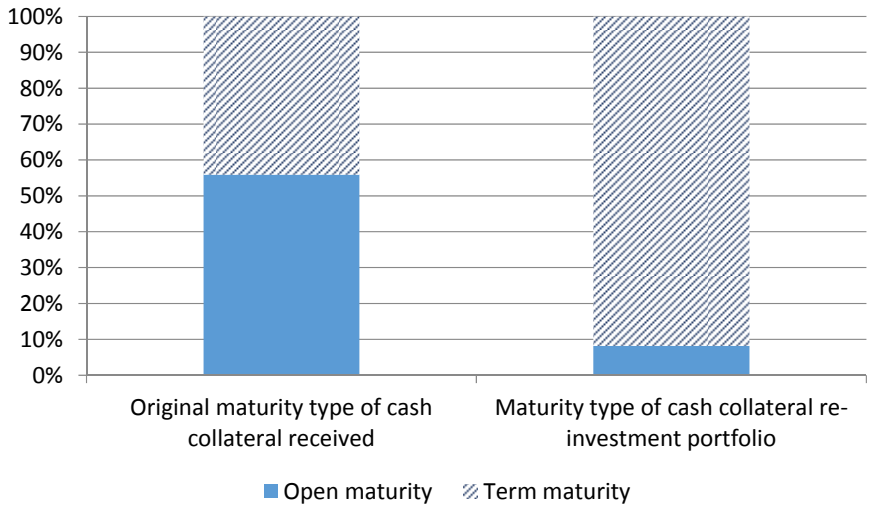
termination does reflect limitations to agent lenders' ability to quickly close out securities lending transactions.

Redemption risk*:*

The majority of cash collateral received was at open maturity (€331.4 billion). This implies that securities lending may not be a stable source of funding for financial institutions, as evidenced by the problems AIG experienced during the financial crisis (see Keane, 2013).

On the other hand, in our sample the cash collateral was largely reinvested at term maturity (€525.7 billion, Chart 112), i.e. into assets from which a disinvestment *might not* be done at any point in time after the order but for which a liquidation period equal to or greater than one day would be necessary (see Chart 34 and Chart 125 for breakdowns of expected liquidation periods of reinvestments). Disinvestment at an earlier point in time may possibly result in sales at a discount price. Redemption risk would likely become problematic in a situation of market stress with collateral fire sales weighing on asset prices.

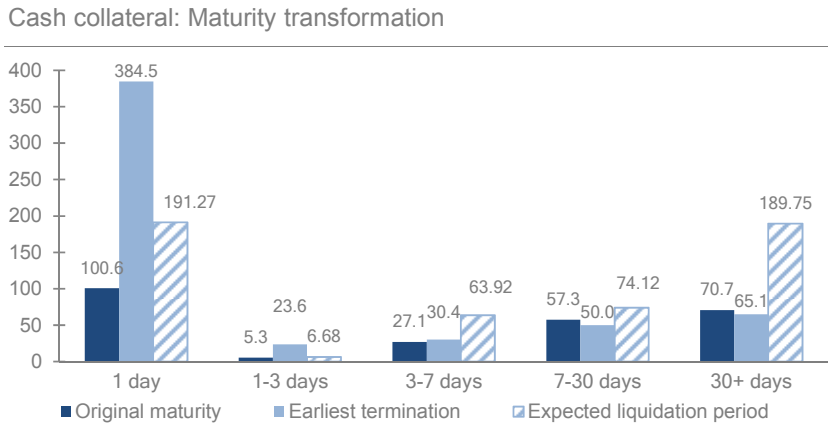
Chart 112: Type of maturity of cash collateral and re-investment portfolio



Liquidity risk:

The second major risk, which differs slightly from redemption risk, stems from the length of the expected liquidation period of cash collateral reinvestments. A certain amount of the cash collateral reinvested (€189.8 billion) has a liquidation period greater than one month, i.e. potentially significantly longer than the original maturity of the term securities lending transaction (and the cash collateral received) or than the earliest possible termination (see Chart 33). It is worth highlighting that a sizeable share of the cash collateral (20-30%) is typically reinvested at open maturity or at very short-term maturity (one day), in order to allow for flexible liquidity management by agent lenders.

Chart 33: Original maturity and earliest termination provision of securities lending transactions, and expected liquidation period of reinvestments



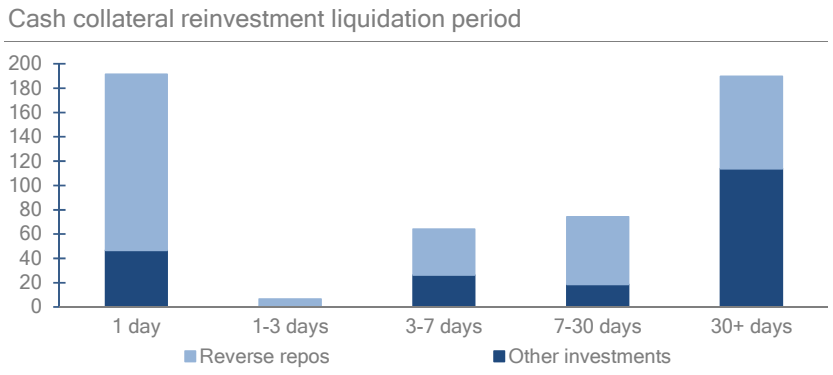
Note: In EUR bn.

While the majority of investments go into reverse repos (see *Facilitation of credit growth* below), it appears that potential liquidity risk is especially concentrated in non-repo instruments.

For reverse repos, €47.3 billion (12.9% of the total) is invested at open maturity. For term maturity reverse repos, the largest portion has an expected liquidation period of one day (€144.7 billion or 39%), followed by a liquidation period extending from two to 30 days (€99.3 billion), while reinvestments with a liquidation period longer than 30 days account for €75.9 billion.

In comparison, the majority of non-repo instruments have an expected liquidation of 30 days or more (€133.8 billion, or 55.3% of the total term maturity reinvestments excluding reverse repos), and only half of that amount has a one-day maturity (€46.6 billion or 22.6%; see Chart 34).

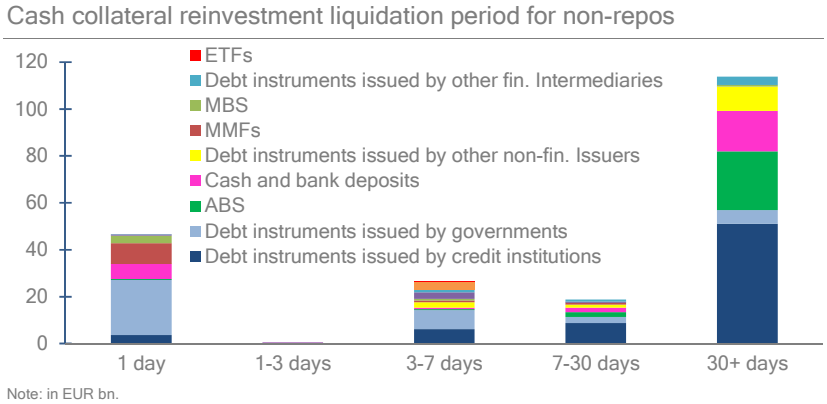
Chart 34: Liquidation period of cash collateral reinvestments



Note: in EUR bn.

Specifically, the majority of cash collateral reinvested in debt issued by credit institutions, debt issued by non-financial corporations, ABS and cash or deposits[34] has an expected liquidation period longer than 30 days (see Chart 12).

Chart 12: Liquidation period of cash collateral reinvestments in non-repo instruments

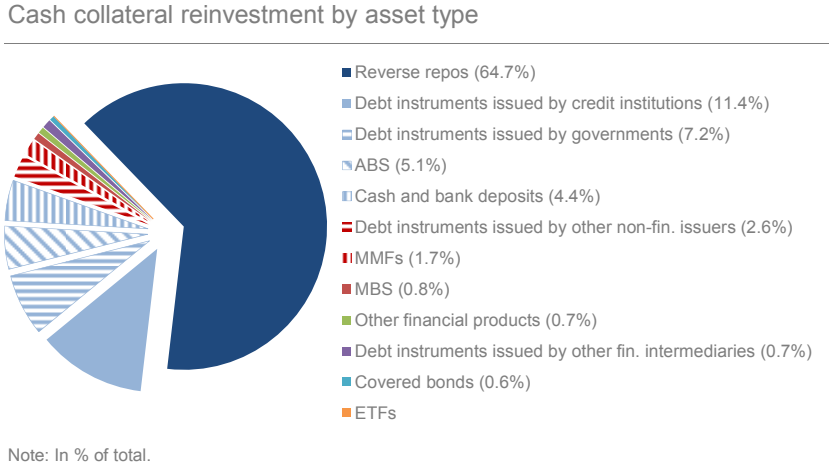


Facilitation of credit growth and exposure to (credit) risks

Of the €573 billion reinvested, a large majority goes into reverse repos (64%), followed by debt (credit institutions 11.4%, governments 7.2% and non-financial issuers 2.6%), ABS (5.1%) and cash and bank deposits (4.4%). This suggests that the reinvestment of cash increases interconnectedness between financial institutions through increased exposure to other market participants (see Chart 12). In addition, the amount of reverse repos undertaken implies that a sizeable part of the financial system relies on very short-term funding, which is likely to reinforce run risks. Nevertheless, in this case redemptions risks may be overcome as there is not a maturity mismatch between funding and cash reinvestment.

[34] This likely refers to term deposits.

Chart 13: Cash collateral reinvestments by instrument



Note: In % of total.

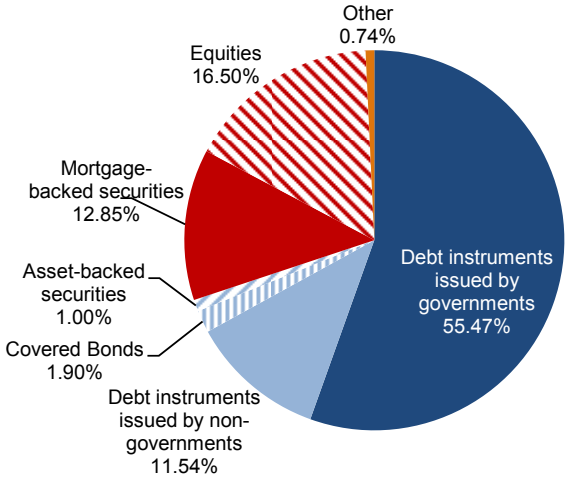
These findings show much higher reinvestment in reverse repos than indicated in the Risk Management Association's (RMA) quarterly surveys, which shows that reverse repos amount to 40% of the US dollar cash and 50% of the euro cash collateral received as at the end of the first quarter of 2013. However, data available in the RMA survey are not as detailed in terms of granularity (e.g. asset classes) and coverage (EU agent lenders) as would be required for monitoring purposes.[35]

- **Reverse repos**

It is important to analyse which assets are used as collateral in reverse repos, as around 65% of the securities lending cash collateral received is reinvested in these types of transaction, which also serve to facilitate credit growth and increase overall leverage. Around half of the collateral received in reverse repos is investment grade government bonds and treasuries (see Chart 14). The rest comprises mainly equities (17%), non-government bonds (12%) and mortgage backed securities (13%).

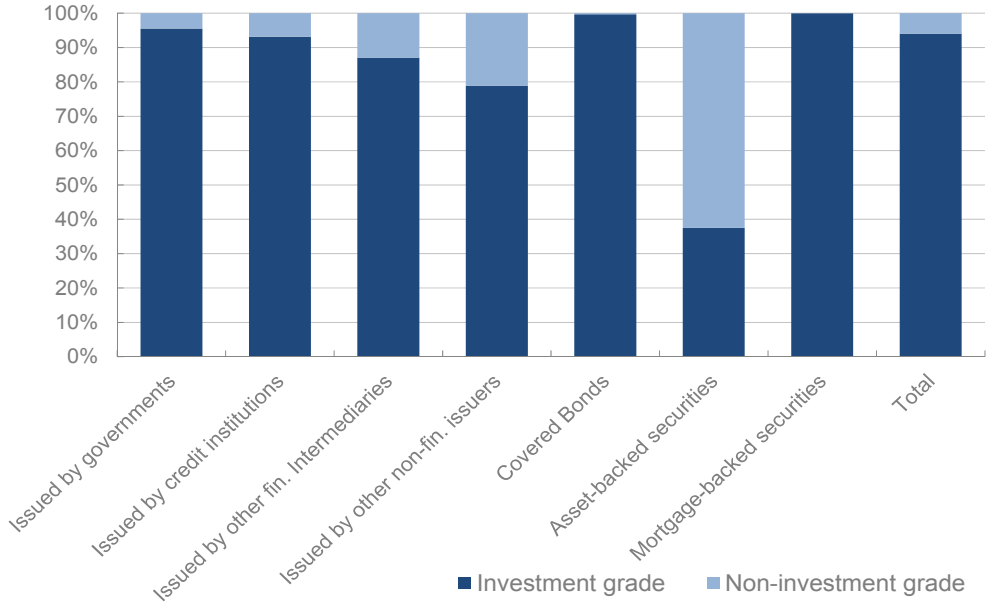
[35] The RMA survey focuses on the 15 largest US investment banks only.

Chart 14: Reverse repos by type of asset



The average credit quality is high, with nearly 95% of instruments rated investment grade or higher (see Chart 15). However, over 60% of ABS are non-investment grade, although ABS constitutes just a small fraction (around 1%) of reverse repos. Owing to a lack of information on counterparties' creditworthiness, it is somewhat difficult to draw in-depth conclusions from the overall credit risk in the reverse repos.

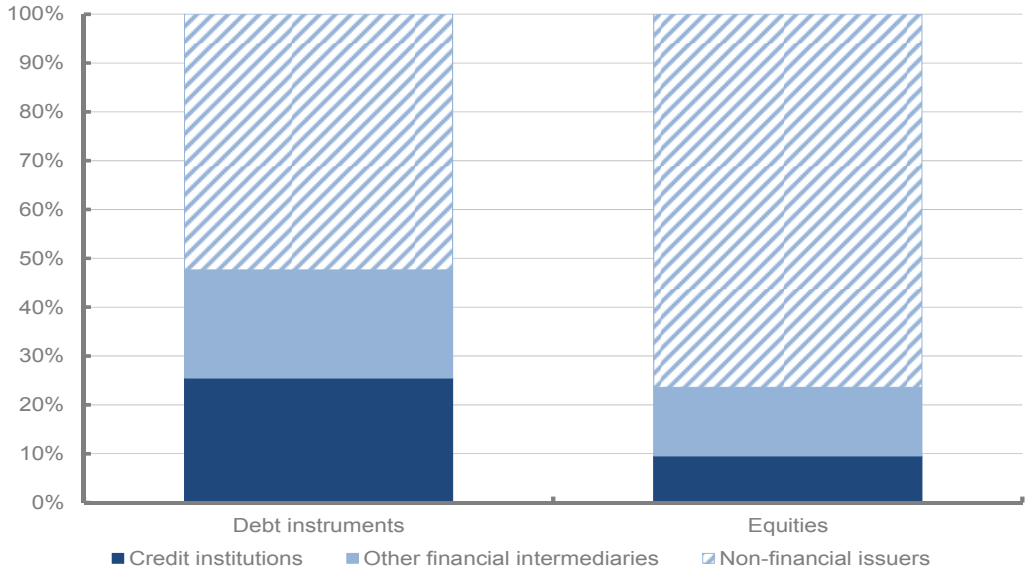
Chart 15: Reverse repos by credit quality for different types of debt instruments



Given the sheer size of the interbank repo and tri-party repo markets, the counterparties in these reverse repos are likely to be financial institutions, which would contribute to increased interconnectedness. However, as reverse repos mainly went into government bonds and

treasuries and the equities and non-government debt instruments issued by non-financial issuers, this risk is somewhat limited (see Chart 39).

Chart 39: Issuers of non-government debt instruments and equities in reverse repos



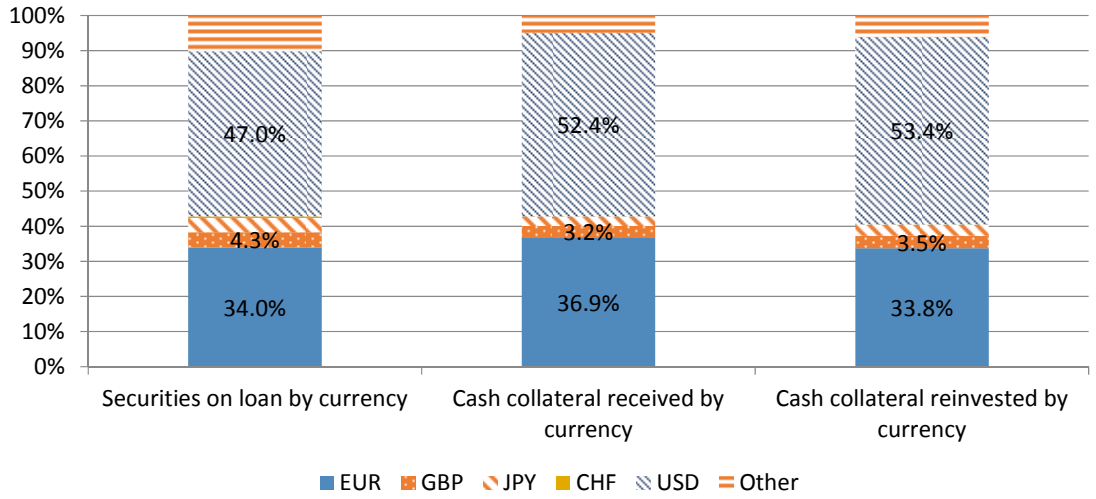
C.5. Currency mismatch

A potential source of vulnerabilities for SFTs is currency mismatch, which occurs when the two legs of a transaction are denominated in different currencies. In the context of the re-investment of cash collateral, there are thus two potential sources of currency mismatch. First, a mismatch between the currency of the asset lent and the cash collateral received and, second, between the cash collateral received and the asset in which the cash collateral is re-invested.

The magnitude of the risk arising from a mismatch therefore depends on the volatility of the relevant currencies, which is reflected in the exchange rate between them. Consider for instance, an agent lender who re-invests euro denominated cash collateral in assets in a foreign currency. If that currency falls sharply and the lender has to return the cash collateral to the borrower of the underlying security, the agent lender can liquidate the asset only by incurring a loss on the cash re-investment.

Chart 16 shows the currency breakdown of the different legs of a securities lending/cash reinvestment chain. The allocation of securities on loan by currency denomination shows that the vast majority of the securities/assets and cash are denominated in either US dollars or euro, which are considered to be relatively stable currencies. They account for more than 80% of the total securities on loan (approximately 90% of the cash collateral received) and 87% of the asset in which cash collateral is re-invested.

Chart 16: Currency distribution



Given the relative low volatility between the US dollar and the euro, one may conclude that, at an aggregate level, the risk arising from currency mismatch is quite low.[36] Nevertheless, vigilance is warranted for three reasons. First, the data collection revealed that two agent lenders exhibited quite significant changes in their degree of currency mismatch across the two reporting dates (November 2012 and February 2013). Second, the data collection did not specify "other currency", which may imply that some localised concentration of currency mismatch went undetected. Third, owing to the nature of the data collected, it is not possible to perform a direct mapping from the securities on loan to the cash collateral received. Some risk could thus be concentrated at a specific institution, especially if it has a large amount of internationally less important currencies.

[36] Irrespective of the stability of the currency, the high degree of investment in US dollars may result in a heightened sensitivity to developments in the United States. In addition, sensitivity may be exacerbated if a given institution has strongly invested in US dollars and if that reinvestment is concentrated in a single or small group of institutions.

D. Conclusion

The data collection exercise conducted by the ESRB constitutes a first step towards enhancing transparency in SFT and collateral markets in the European Union. It allows some initial insights into the structure of European SFT markets and some first steps in assessing risk-relevant factors in these markets. In addition to providing a description of the SFT landscape in Europe, the data collection should also contribute to the policy efforts to build a comprehensive macro-prudential monitoring framework that, eventually, will allow the ESRB to conduct exhaustive assessments of systemic risks arising from SFT markets. Looking ahead, this may imply establishing a properly targeted regular form of data collection, reflecting improvements based on the results of this first exercise.

This report summarises the results obtained from the data collection exercise by highlighting some of the key characteristics of cash and securities collateral usage by EU agent lenders and credit institutions. It therefore provides some first elements of transparency into such hitherto opaque markets. The main findings from the ESRB data collection can be summarised as follows:

Widespread reliance on SFTs by banks and non-banks

- The data have shown that collateral flows to and from banks amount to some 15% of their total balance sheet (commercial banks are in the 8%-11% range; investment banks in the 22%-25% range). As for the collateral uses, SFTs account for the largest part of securities collateralised transactions, namely 88% of collateral posted (€4.6 trillion). In more granular terms, repos account for 70%, and securities lending for 18%, of this collateral. As for the type of collateral, banks rely extensively on government debt as collateral (61 % of the total collateral received and posted). Equities (13%) and debt securities issued by financial institutions (8%) are the second and third most used type of collateral.

Re-use factor suggests that collateral is re-used once; opacity on exact level of reuse at micro level

- 94% of securities collateral received by the banks is eligible for re-use, illustrating the fungible nature of collateral. Collateral re-use metrics take an aggregate view of collateral re-use. They focus on the re-use by financial intermediaries (banks and broker-dealers) of securities pledged by "structural asset owners".[37] Such a re-use factor (multiplier) comes at 2.0, suggesting that collateral is re-used once on average.

  Thus, the **inability** of surveyed institutions **to provide data on their exact level of re-use** of collateral represents a still existing area of opacity and limits the level of detail to which the analysis in this report can be conducted. In addition, this inability of surveyed institutions to provide the data seems to suggest that (i) the (generally fungible) collateral is pooled and,

[37] Typically institutional investors such as pension funds, insurers, collective investment funds, etc.

when re-used, not traced back to the collateral received; and (ii) more importantly, institutions' risk management systems do not seem to permit them to assess their own degree of re-use on a consolidated basis.

Cross-institutional exposures and network structures reveal limited interconnectedness

- In absolute terms, **SFTs occur mostly between banks and, to a lesser extent, through CCPs**. Unsurprisingly, considering net collateral flows, central banks and MMFs stand out as net receivers of collateral (they fund the banking sector) and hedge funds as net providers of collateral (to banks). Here, the data collected would be usefully completed by "who-to-whom" information, e.g. explicit data on which type of collateral is held by which type of institution.
- The network structure seems, on the whole, to reveal **limited interconnectedness**. There are a relatively low number of institutions (i.e. three CCPs and six of the banks in the sample) that are involved in more than 30% of the total volume of collateral exchanged, which is a sign of **a certain degree of concentration**. However, they show well-diversified exposures to their counterparties according to the data collected for the purposes of the present report. The loose network structure is also reflected in several additional findings. First, institutions have a smaller number of bilateral links. Second, among the core firms, many have only few links with the other core institutions. Third, in the analysis focusing on the ten key firms, we can clearly distinguish the different types of institutions, i.e. central banks, CCP and credit institutions, indicating that also non-bank institutions (CCPs) are of systemic importance in this network.

Evidence of liquid asset buffers and limited maturity mismatch in repos, at aggregate and idiosyncratic level

- With reference to asset liquidity, evidence of repo use suggests that institutions **build liquid asset buffers**, as they trade in higher amounts of liquid assets than they trade out. If liquidity funding transactions are relatively short-term, institutions may not be able to maintain the buffer if counterparties do not renew their funding. With reference to maturity mismatch, **on average the maturity profile of banks' repo trades appears to be prudent** (they minimise the maturity of cash lent but maximise that of borrowed cash). **However, if there is no evidence of liquidity risk on aggregate in the repo business, at the micro level a significant proportion of institutions incur some liquidity risk**. Nevertheless, they exhibit a limited maturity "mismatch" expressed in number of days.

Shadow banking risks from securities lending and the reinvestment of cash collateral:

Facilitation of securities lending appears to facilitate credit growth and a build-up of leverage in the financial system

- EU securities lending markets contribute to facilitating credit growth and a build-up of leverage in the financial system: SFTs allow some agent lenders to obtain funding against their own assets with ease (the total value of cash collateral received against securities on

loan amounts to €609.6 billion and the cash collateral obtained from securities lending is typically reinvested into reverse repos (65%). Such a funding chain involving short-term debt may add to systemic vulnerability and contribute to increasing the overall degree of pro-cyclicality in the financial system.

Maturity transformation

- Agent lenders engage in a significant amount of maturity transformation, which gives rise to both redemption risks and liquidity risks. A large amount of cash collateral received from securities loans with an open maturity is reinvested at fixed maturity, which creates potential redemption risks in case of a run under stressed market conditions. In addition, some cash collateral received either at open or short maturity is reinvested in instruments at long maturity (i.e. with an expected long liquidation period).

Liquidity transformation

- The degree of liquidity transformation done through securities lending transactions appears to be limited, as a high proportion of assets in which cash collateral is reinvested are of high quality, mainly investment-grade debt securities.

Collateral fire sales and procyclicality

- Data on SFT margins and haircuts were not collected in this first data collection exercise. Any future repetition of this exercise will therefore have to include such refinements. Fire sales are less of a direct risk for securities transactions collateralised with cash. However, reverse repo financing owing to the reinvestment of cash collateral implies that counterparties of agent lenders might bear the risk of losses.

Interconnectedness via securities lending

- The build-up of significant exposures across financial institutions of different types (custodians, asset managers, credit institutions and insurance companies) can contribute to the risk of contagion if an institution in the network becomes distressed. The data collection exercise seemed to confirm that the reinvestment of cash collateral in conjunction with securities lending can become a source of systemic risk and contagion in the light of the complex nexus of transactions conducted by agent lenders on behalf of other client institutions.

Currency mismatch

- There seems to be a limited overall risk from currency mismatch related to securities lending. The securities loaned, cash collateral received and instruments in which the collateral is reinvested are largely denominated in one of the major currencies (USD, EUR, GBP, JPY, etc.). This suggests limited sensitivity to currency risk or foreign exchange volatility. In addition, the share of each of these currencies in each of the three stages

identified above is broadly stable, suggesting that mismatch is limited. At the individual institution level, however, there might be some degree of currency mismatch concentration.

Appendix A: Legal and accounting background on SFTs

Legal structure

Collateral received in financial transactions may not be eligible for re-use depending on the legal structure of the specific transaction. Securities transferred in securities lending and repo transactions are typically eligible for re-use, while a material percentage of securities collateral received in derivative transactions is not eligible for re-use. In addition, many hedge funds have restrictions on the ability of their prime brokers to re-hypothecate their assets.

In a typical repo transaction, the legal ownership of the collateral is transferred from the cash borrower to the cash lender and the economic benefits associated with ownership, such as dividends and coupons, are paid back to the original owner of the collateral. This means that the cash lender, who is the legal owner of the collateral securities during the life of the repo transaction, is entitled to sell the securities or post them as collateral in another transaction, as if he owned the securities outright. The borrower's proprietary interest in the assets posted as collateral is replaced with a contractual claim to redelivery of equivalent securities. If the lender becomes insolvent before the securities are returned, the borrower must claim in the lender's insolvency as an unsecured creditor for the difference between the cash received and the value of the assets posted as collateral. Similarly, in a typical securities lending transaction, the legal ownership of the securities lent and the collateral is transferred between the beneficial owner and the securities borrower. This means that collateral received in the vast majority of securities lending and repo transactions can be re-used (except in the rare situation where collateral is received in the form of a pledge/security interest rather than title transfer).

Similarly, in derivatives transactions, collateral can be received in the form of title transfer or security interest. All collateral received under title transfer is eligible for re-use, because the ownership of the asset has been transferred. Collateral received under security interest may be eligible for re-use subject to the consent of the delivering party; ISDA CSAs generally include this right of re-use unless the parties specifically remove it. According to ISDA Margin Survey 2013, only 57.8% of securities collateral received by large firms in over-the-counter derivatives can be re-used (92.7% for cash collateral).

Re-hypothecation is often defined as the practice where a prime broker re-uses collateral posted by their clients. When borrowing from a prime broker, the client almost always needs to post margin or collateral to protect the prime broker from counterparty risk. The assets held on behalf of the client may be re-used by the prime broker for its own purposes, if allowed in the prime brokerage agreement. Typically, prime brokers are required by regulations to hold client assets on segregated accounts. However, the rules would not apply when the full ownership of the asset is transferred to the prime broker for the purposes of securing the client’s obligations, according to the Markets in Financial Instruments Directive. Therefore, once the prime broker exercises its right to re-hypothecate these assets, the title to the asset transfers to the prime broker and the rules no longer apply.

Upon re-hypothecation, the client's assets are removed from the prime broker's client account and the client's proprietary interest in the assets is replaced with a contractual claim to redelivery of equivalent securities. If the prime broker becomes insolvent before the securities are returned, the client must enter a claim as an unsecured creditor for an amount equal to the value of the re-hypothecated securities. When Lehman Brothers collapsed, clients of Lehman's prime brokerage business, which had allowed Lehman to re-hypothecate securities positions to obtain funding, were deemed unsecured creditors and found themselves without access to their positions after Lehman declared bankruptcy. After the crisis, many hedge funds have placed contractual limits, , usually 140% of their net borrowing, on the extent to which prime brokers can re-hypothecate their assets.

Accounting treatment

Under the International Financial Reporting Standards, accounting rules for securities collateral received in financial transactions reflect the underlying arrangements that the party delivering the collateral retains the risks and rewards associated with owning the securities posted as collateral, which would remain on the balance sheet of the collateral poster irrespective of whether or not the collateral is eligible for re-use. However, when the transaction involves a cash leg (whether as cash lent in a repo transaction or cash collateral in a securities lending or derivative transaction), it will be reported as a liability on the balance sheet of the party receiving the cash, together with a corresponding asset depending on how the cash collateral is reinvested. If a transaction lacks a cash leg, it will not appear on the balance sheet at all.

Collateral fungibility

In most securities financing and derivative transactions where collateral is delivered via title transfer, the collateral receiver is only obliged to return "equivalent securities" when the transaction expires. "Equivalent securities" are typically defined as securities issued by the same entity in the same issue.[38] This, and the fact that the legal ownership of the securities is transferred to the collateral receiver, means that collateral is fungible, e.g. securities received as collateral are no different to equivalent securities held outright on the balance sheet. The fungible nature of collateral means that many firms struggle to identify how much collateral they have re-used. This is because securities received as collateral are managed together with securities held outright on the balance sheet in a large pool of assets and they cannot be distinguished from one another. Nonetheless, it remains possible to broadly estimate the reliance of firms on collateral re-use by comparing the amount of unencumbered assets held on balance sheet to the collateral received and eligible for re-use.

[38] In the tri-party repo market, the definition of "equivalent securities" can be much broader and include a basket of different securities.

Appendix B: List of sample institutions and possible classifications

The following tables show the classification of all banks by geography, business model and G-SIB status. A further breakdown of euro area banks is also provided according to countries that experienced relatively higher and lower CDS spread levels.

Table 7: Classification by geography and business model

Geographic	Business model	# banks	Total assets
UK	**Investment**	**8**	**3,888**
	Diversified	**5**	**6,981**
	Commercial	**0**	**0**
Euro area banks	**Investment**	**0**	**0**
	Diversified	**11**	**10,628**
	Commercial	**11**	**5,266**
Scandinavian	**Investment**	**0**	**0**
	Diversified	**3**	**1,408**
	Commercial	**0**	**0**
Total		**38**	**28,192**

Table 8: Classification by G-SIB status and business model

G-SIB bucket	Business model	# banks	Total asset volume
3 or 4	**Investment**	**2**	**307**
	Diversified	**4**	**7,742**
	Commercial	**1***	**194**
1 or 2	**Investment**	**5**	**3,384**
	Diversified	**6**	**6,915**
	Commercial	**3**	**3,076**
non G-SIB	**Investment**	**1**	**315**
	Diversified	**7**	**4,381**
	Commercial	**9**	**1,996**
Total		**38**	**28,192**

*Notes: * A G-SIB bank in bucket 3 or 4 has provided information on a subsidiary classified as commercial bank. It has been assigned the same bucket as the mother bank.*

Table 9: Classification of euro area banks by area and size[39]

		# Euro area banks	Total asset volume
Countries not exposed to sovereign debt tensions	**Diversified**	**9**	**9,028**
	Commercial	**6**	**2,869**
Countries exposed to sovereign debt strains (B)	**Diversified**	**2**	**1,600**
	Commercial	**5**	**2,397**
Large		**6**	**9,617**
Medium		**5**	**3,626**
Small		**11**	**2,651**

[39] The classification as group A and group B banks has been based on CDS spreads. Area B comprises banks from Italy, Spain and Ireland. All other euro area banks are in area A.

Appendix C: List of SFT Team Members

The authors of this report are all part of a team that works on topics related to shadow banking and that is formed by members of the Joint ATC-ASC Expert Group on Shadow Banking (JEGS) of the ESRB and experts from ESRB member institutions and the ESRB Secretariat. This report has benefitted from the input of the entire team, which is listed below.

Joachim Keller (Chair)	Banque Nationale de Belgique
Antoine Bouveret	European Securities and Markets Authority/International Monetary Fund
Romain Calleja	European Systemic Risk Board
Francesco de Rossi	European Systemic Risk Board
Leonor Dormido (former member)	European Systemic Risk Board
Cristina Picillo	Banca d'Italia
Michael Grill (former member)	Deutsche Bundesbank
Zijun Liu	UK Prudential Regulation Authority
Julien Mazzacurati	European Securities and Markets Authority
Martin Mitov	European Commission
Philippe Molitor	European Central Bank
Steffen Meusel	Bundesanstalt für Finanzdienstleistungsaufsicht
Ben Pott	European Banking Authority (until May 2014)
Victor Corneliu Savin	European Commission
Claudia Schwarz (former member)	Deutsche Bundesbank
Jonas Söderberg	Sveriges Riksbank
John Theal	Banque Centrale du Luxembourg
Marco Fattore (former member)	Banca d'Italia

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