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Towards a monitoring framework for securities financing transactions

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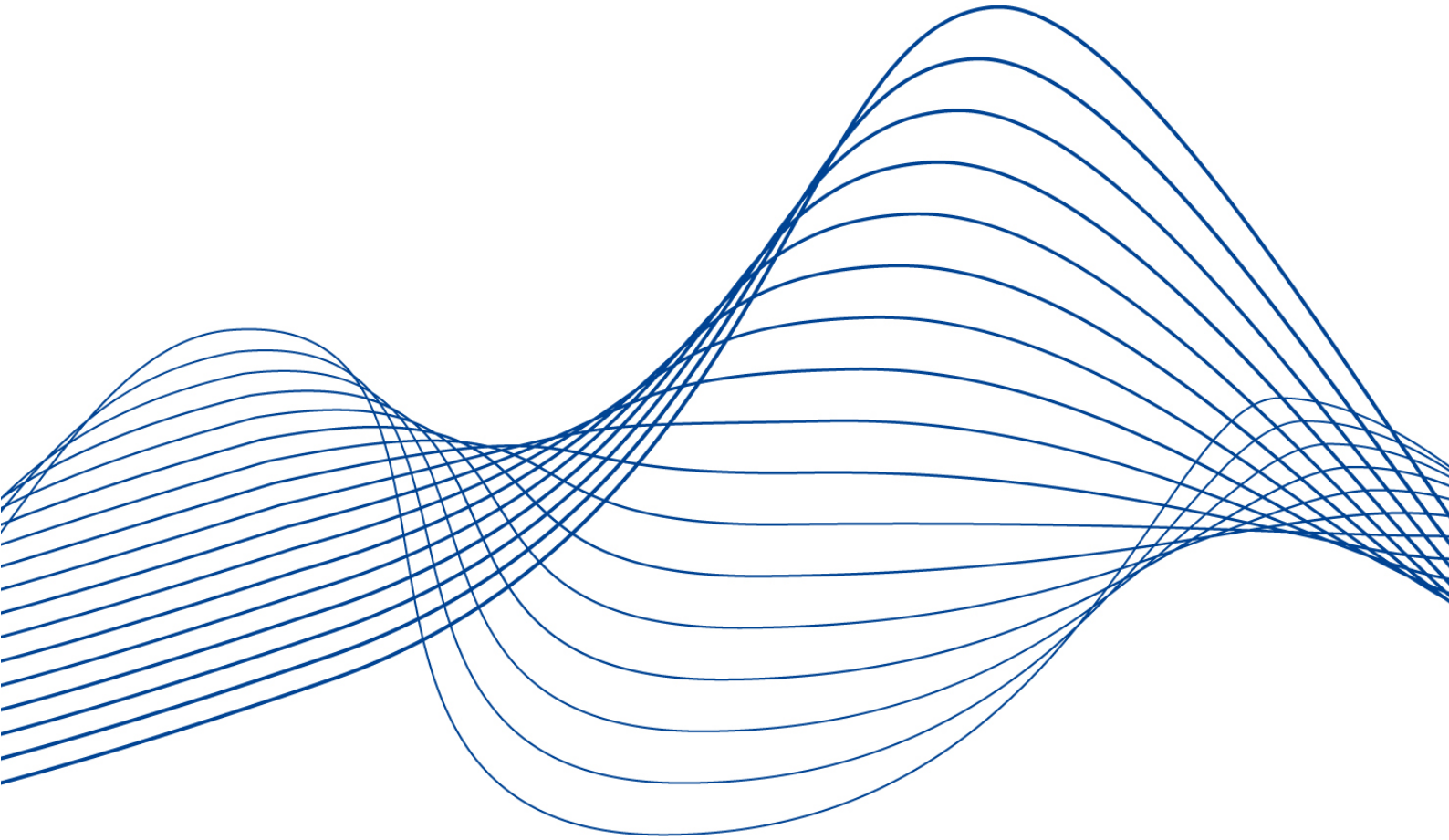

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Executive summary

Supervisory authorities around the world are currently engaged in a policy debate over how to improve the information available on repurchase agreements (repos) and securities lending markets. Repo and securities lending transactions commonly referred to as securities financing transactions (SFTs), play a major role in the financial system. Although these can be relatively low-risk transactions by themselves, their pervasive use may give rise to systemic risk, as was observed during the recent financial crisis.

In order to establish and implement a monitoring framework that allows for an effective assessment of the financial stability risks associated with SFTs, a number of considerable hurdles must be overcome and important decisions must be made.

One contribution of this paper is to identify the potential obstacles and difficulties that may hinder the implementation of a monitoring framework in Europe. The milestones in achieving such a monitoring framework described in this paper are as follows.

1. A need to identify the various financial stability risks that may arise from SFTs assessing their respective levels of significance. This paper concludes that all the risks identified are material and should be monitored.

2. A need to identify a set of indicators to effectively monitor these risks. This work provides a discussion on the level of complexity of these indicators and the additional requirements for establishing effective macro and micro-prudential supervision regimes in Europe.

3. The importance of taking stock of the data needed and comparing the results with the actual data available. We conclude that considerable data gaps can be observed.

4. The need to review the options available to supervisory authorities which can be used to help implement a monitoring and assessment framework. Simultaneously, the paper addresses the main costs and benefits of each option. These options may include – but are not limited to – market surveys, better supervisory reporting and the establishment of trade repositories.

5. For each option listed above, the paper details the obstacles that must be overcome in order to facilitate their implementation and provides further guidance in order to assist supervisory authorities during the implementation process. The main conclusion is that a trade repository collecting transaction data based either on trade-by-trade data or exposure data is likely to be ideal for a comprehensive assessment of risks, to the extent that it is practicable when taking into account differences in market practices.

Introduction

SFTs are a class of financial transactions that exhibit characteristics similar to shadow banking activities. Consequently, they are currently subject to a regulatory overhaul in the context of the ongoing reform of the shadow banking system.

At the international level, the Financial Stability Board (FSB), upon request from the G20, is leading global efforts to "strengthen oversight and regulation of the shadow banking system".[1] As part of a broader package of reforms, the FSB recently published a consultative document[2] on the SFT markets that contains proposals not only for better monitoring, but also for better regulation of risks.[3]

In this respect, this occasional paper contributes to the efforts directed towards strengthening oversight. In particular, it proposes potential improvements to the monitoring and supervision of SFT markets.

In Section 1, the paper first describes the various financial stability risks that may arise from SFTs assessing their respective levels of significance. Section 2 focuses on data for risk assessment purposes. It starts with the indicators required to assess risks adequately, discusses the data needed to build these indicators, and highlights the minimum scope of selected data fields. Section 3 provides an overview of different alternatives to bridge the data gap. Section 4 provides some suggestions on how to close the data gap.

[1] See FSB (2011).

[2] See FSB (2012b).

[3] In a related matter, the FSB's data gaps initiative also aims to establish a framework to monitor linkages between global systemically important banks and their exposure to and funding dependencies to countries, sectors and financial instruments.

Section 1: Financial stability risks and the need for monitoring

SFTs are widely used financial instruments which enhance the functioning and liquidity of securities markets and money markets, as well as playing a role in minimising settlement risks.[4] They are used by a wide range of market participants, including credit institutions, pension funds, insurance companies, asset managers and investment companies, who have various motives for doing so.[5]

In isolation, SFTs can be quite low-risk instruments. Nevertheless, the pervasive use of SFTs by a wide range of financial market participants helps to explain why these instruments may give rise to risks to financial stability with a potentially systemic dimension. Policy-makers must take into account the risks discussed below and have in place an appropriate monitoring and risk assessment framework in order to mitigate or minimise the risks to financial stability.

1.1. Risks to financial stability from securities financing transactions

The risks that may arise from SFTs are often due to their use as a funding tool and to the fact that they inherently lead to the formation of interconnections among markets and market participants.

Many of these risks are such that, should they materialise, they can have a negative impact on asset quality, counterparty credit risk and the availability of funding. Although repos and securities lending transactions differ in terms of regulation, accounting and tax treatment, as well as the purpose for which they are traded,[6] they exhibit many similarities and can be seen as broadly equivalent in terms of economic substance.[7]

The following key features of SFT markets are important for assessing financial stability risks and should be appropriately monitored by competent authorities.[8]

- **Facilitation of credit growth (inside and outside the banking system).** SFTs allow market participants to obtain cash to fund their securities holdings. This supports credit growth if the securities held are debt instruments. Alternatively, securities can be lent against cash, which can then be reinvested in other instruments. This contributes to credit growth if the cash proceeds are invested in debt instruments. To the extent that not only banks, but different types of non-banks are active in SFT markets, growth in the supply of credit can subsequently take place both inside and outside the banking system.

[4] For instance, the access to liquid repo and securities lending markets helps financial institutions to prevent a chain of settlement delivery failures from developing; post-trade market infrastructures such as international central securities depositories (ICSDs) may also engage in securities lending to increase settlement efficiency (see FSB, 2012a).

[5] See FSB (2012a), which provides a detailed description of SFT markets and their use by market participants.

[6] Securities lending often serves to source specific securities, while repos are typically used to obtain funding.

[7] Both repos and securities lending are legally based on reacquisition agreements of the securities lent or used as collateral. The two main standard agreements that govern the international securities lending and repo industries are the Global Master Securities Lending Agreement (GMSLA) for securities lending and the Global Master Repurchase Agreement (GMRA) for repos.

[8] It should also be noted that legal uncertainty and different legal conditions across EU Member States, as well as inadequate collateral valuation practices, may significantly increase volatility and the risk aversion of counterparties in times of crisis.

- **Procyclicality of system leverage.** High asset valuation and low haircuts lead to funding increasingly becoming available in good times, whereas in bad times a contraction of available funding (as haircuts increase and/or market participants withdraw funds) may create stress for some institutions and amplify systemic risk.

- **Maturity and liquidity transformation (inside and outside the banking system).** Financing assets with longer maturity through (shorter-term) SFTs and raising liquid funds for less liquid assets results in maturity and liquidity transformation. Again, to the extent that these transformation functions involve non-banks, such activities take place outside the banking system.

- **Interconnectedness and contagion channels.** SFTs also contribute to interconnectedness between financial institutions, most notably by creating linkages between banks and the shadow banking system. Whilst interconnectedness can even have positive effects by making more collateral available for secured funding, it may, under certain conditions, give rise to contagion channels through which shocks can be transmitted and lead to financial instability. The practice of re-using collateral and of re-hypothecating client assets for various purposes can also contribute to interconnectedness and pave the way for the formation of contagion channels.

- **Collateral fire-sale and concentration.** A lender may need to sell the collateral following the default of a counterparty in distressed market conditions. As a consequence of selling, a lender may realise losses, depress market prices further and possibly trigger a downward spiral in asset prices. The magnitude of these effects increases with the size of the defaulted counterparty and tends to be higher in concentrated markets.

- **Currency mismatches.** If the denomination of the cash leg and the collateral are in different currencies, a lender is exposed to a currency mismatch.[9] For instance, this may give rise to financial stability risks if the currency of the collateral is riskier (e.g. more volatile) than the currency of the cash leg or positively correlated with the credit quality of the borrower.

- **Market structure.** The structure of the market in which SFTs are concluded (bilaterally, central counterparty cleared or tri-party-intermediated) has an impact on how risks materialise and propagate.

The risks listed above and risk-relevant factors are clearly important from a macro-prudential viewpoint. However, they are also relevant from a micro-prudential perspective. For instance, it is critical for micro-prudential supervisors to assess a firm's reliance on SFTs for funding and maturity transformation, as well as an institution's concentration of exposure to counterparties, collateral and fire-sale risks, especially given that these may trigger a firm's failure.

The economic equivalence between repo and securities lending transactions (in particular, when both involve a security leg and a cash leg) requires that any monitoring covers both market segments in order to ensure that risks are identified and to avoid "disclosure-driven arbitrage".

[9] As partially evidenced by the International Capital Market Association (ICMA) and Risk Management Association (RMA) surveys which show the existence of the currency mismatch.

1.2. Materiality of risks

Evidence from the recent crisis shows that these risks are material and have indeed crystallised, especially in the United States. Available market data provides evidence of the materiality both in terms of funding (facilitation of credit growth, leverage, maturity transformation) and interconnectedness.

Evidence of funding-related risks

In its interim report (FSB, 2012a), the Financial Stability Board's (FSB) shadow banking workstream on securities lending and repos presented a review of academic research literature centred on securities lending and repos. The FSB report highlighted the varied evidence surrounding the extent to which haircuts applied in SFTs contributed to increased *pro-cyclicality of leverage* in the financial system between 2007 and 2009.[10] However, low haircuts (and margins) have a significant potential effect on aggregate leverage (both in repo and securities lending markets)[11] and are observed in practice.[12]

Hard data on the extent to which SFTs facilitate *maturity/liquidity transformation* are less abundant. Data collected by the UK Financial Services Authority (FSA)[13] and the Federal Reserve Bank of New York[14] nevertheless show that, *on aggregate*, the largest UK banks and primary dealers in the United States perform maturity transformation on the repo book (i.e. borrow against short-term repo and lend using longer-term reverse repo).

Also, data collected by the Risk Management Association (RMA) show that the weighted average maturity of cash collateral reinvestments denominated in US dollar and euro was elevated just prior to the onset of the crisis.[15] Given that securities on loan can typically be returned at will, this is a striking example of maturity transformation. More recently, there has also been a shift in the composition of the portfolios of cash collateral reinvestment programmes during the post-Lehman period, with allocations moving away from structured credit (which was an example of liquidity transformation) towards instruments perceived as being safer.

[10] For instance, Gorton and Metric (2011) showed that haircuts were highly pro-cyclical in some segments of the bilateral inter-dealer repo market, but Copeland, Martin and Walker (2011) found that haircuts were stable in tri-party repo markets. Similarly, Comotto (2012) showed that haircuts in European repo markets were also mostly stable (but that funding was simply withdrawn instead).

[11] For simplicity, suppose that all counterparties are considered safe, meaning that there are no fire-sale effects to price into the instantaneously realisable value of collateral. With a collateral haircut of 10%, investor (1) can, in the first instance, borrow £90 in cash from investor (2) by posting £100 in collateral. Investor (1) could choose to reinvest all of that cash in £90 of securities and post those to investor (2) to receive £81 cash, and so on. In theory, repeating this process a large number of times means that investor (1) has posted up to (but no more than) £1,000 in collateral – a leveraging of ten times the initial £100 of collateral assets. In a chain with more than two investors, leverage can grow even faster.

[12] See Comotto (2012) for European data; haircut data on the US tri-party market segment are available on the Federal Reserve Bank of New York's website at http://www.newyorkfed.org/banking/tpr_infr_reform.html.

[13] Data from regulatory returns which are not publicly available.

[14] Available on the Federal Reserve Bank of New York's website at http://www.newyorkfed.org/markets/statrel.html

[15] These data are not publicly available. See the RMA's website at http://www.rmahq.org/securities-lending/quarterly-aggregate-composite

Evidence of risk related to interconnectedness

The interim report of the FSB's workstream also highlighted important linkages between the banking and shadow banking sectors via SFT markets.

- In the leveraged investment fund financing and securities borrowing segment, banks lend securities and provide financing to "leveraged investment funds" (most of which are hedge funds) via SFT transactions, facilitated by re-hypothecation. Any sudden withdrawal of re-hypothecated assets by hedge funds can create funding risks for banks. According to the US Securities and Exchange Commission's form 10-Q filings[16], re-hypothecation of securities by the largest US prime brokers declined by 53% (from USD 2.9 trillion to USD 1.3 trillion) between the second and fourth quarters of 2008.

- In the repo financing segment, banks receive funding via repos from non-bank entities. Certain lenders, including money market funds, are likely to withdraw their repo funding completely in times of market stress, leading to "repo runs" on the banks. The total value of the repo and reverse repo business in Europe decreased by 29% between the second and fourth quarters of 2008, from €6.5 trillion to €4.6 trillion, according to ICMA's European repo market survey.[17] In the United States, repo financing by primary dealers dropped by 45%, from USD 4.3 trillion to USD 2.4 trillion over the same period.[18,19]

- Data from Data Explorers (Markit), a securities lending data provider, also show that the value of securities on loan decreased by 43%, from USD 3.2 trillion to USD 1.8 trillion.[20] The value of assets managed by cash collateral reinvestment programmes fell by 20%, from USD 1.6 trillion to USD 1.3 trillion.

These data highlight the magnitude of the risks arising from intra-financial sector *interconnectedness* via SFT markets. A shock in one segment of the financial system may propagate and be amplified as secured funding is withdrawn elsewhere.

Other factors of materiality

As mentioned above, the risks associated with SFTs may appear relatively less material from a firm's perspective but, owing to the pervasive use of SFTs across the financial system, the materialisation of these risks can have systemic consequences. Other risks (such as concentration risks) may be more important at the entity level, but more localised within the financial system.

In both cases, though, the risks to financial stability are material and it is critical that both macro and micro-prudential authorities possess the information they require to perform their duties effectively. It

[16] Available on the US Securities and Exchange Commission's website at http://www.sec.gov/answers/form10q.htm

[17] See ICMA's European repo market survey Number 16 (conducted in December 2008), available on ICMA's website at http://www.icmagroup.org/

[18] According to data from the Federal Reserve Bank of New York, available at http://www.newyorkfed.org/markets/statrel.html.

[19] This might also be considered as evidence of pro-cyclicality.

[20] These figures include both a quantity effect (lesser securities available for loan) and a price effect (as the value of securities typically declined over the period in question).

is all the more important given that the secured funding markets are expected to play an increasingly prominent role in financial markets going forward.

Section 2: Data for risk assessment purposes

In order to assess financial stability risks at both the macro and micro-prudential level, the data available to supervisors must be sufficiently granular and of adequate quality.

2.1. Minimum data needed to assess financial stability risks (macro-prudential perspective)

On the basis of the key financial stability risks and risk factors discussed in the Section 1.1 of this report, one possible starting point to determine which data should be collected could be to ask which indicators of risks authorities should regularly monitor.

Table 1 lists nine indicators that would support a macro-prudential authority in assessing the build-up of risks in SFT markets. For each key risk and risk factor, indicators may be constructed in a more or less complex way (i.e. allowing for more or less refined data breakdowns).[21] The table describes each indicator and the level of complexity that is needed to effectively assess the respective key risk. The last column provides a reference (in the form of a capital letter) for each indicator. These reference letters are used throughout the report. Note that Table A1 in Appendix A provides the rationale underpinning the choices of the indicators retained and depicted in Table 1.

The high-level risks to financial stability listed in Table 1 are not ranked in any particular order of materiality. Indeed, given the previous discussion concerning the materiality of risks in Section 1, all the risks listed are considered to be of equal significance and need to be monitored carefully. In addition, it is worth highlighting that, just because one risk may have been more important than another from a financial stability perspective at some point in the past, it does not follow that this will always be the case.

Back in 2007, for instance, monitoring the facilitation of credit growth through SFT markets might, in hindsight, have been seen as more important than monitoring risks from currency mismatches in SFT markets. Nevertheless, this does not imply that monitoring currency mismatches will be less important going forward. It is therefore more important to devise a framework in which all the key potential risks to financial stability arising from SFTs should be monitored. Once properly assessed, authorities can then attempt to prioritise these risks on the basis of the conjuncture and other factors.

[21] For instance, a simple indicator could be the aggregate size of SFT markets. A more complex indicator could be a breakdown of the size of SFT markets by counterparty type. An additional level of complexity could be to aim at building matrices of gross exposures in SFT markets by borrower and lender type.

Table 1: Indicators of financial stability risks

Financial stability risk/risk factor	Indicators	Reference
Facilitation of credit growth inside/outside the banking system	Aggregate value of repos and cash raised by lending securities against cash collateral by counterparty type (borrower) and lender type.[22]	[A]
Procyclicality of system leverage	Average haircut/margin by asset class, credit quality of collateral, counterparty type, and type of lender.[23]	[B]
Maturity and liquidity transformation	Aggregate split of SFT and reverse SFT by maturity of transaction[24] by counterparty type (borrower) and lender type.	[C]
Intra-financial sector inter connectedness via SFTs	Aggregate value of repos and cash raised by lending securities against cash collateral, by counterparty type (borrower) and lender type (as above).	[A]
	Proportion of collateral received available for re-use,[25] by type of counterparty and type of lender.	[D]
	Proportion of collateral received re-used by type of counterparty and type of lender.	[E]
Collateral fire-sales	Aggregate breakdown of collateral received in SFTs by asset class and credit quality, by type of counterparty, type of lender and credit quality of counterparty.	[F]
	Proportion of collateral received not authorised to hold within investment mandate[26], by type of counterparty.	[G]
Other: Currency mismatch	Aggregate breakdown of currency of denomination of cash leg against currency of denomination of collateral leg, by type of lender.	[H]
Other: market structure	Aggregate value of SFTs bilaterally traded, CCP cleared and tri-party intermediated.	[I]

The second question that naturally arises is which data would enable authorities to construct the proposed list of indicators above. The various data fields ideal to construct the indicators are shown in the accompanying Table 2. Note that in this section we do not address the issue of whether or not

[22] Such an indicator would not help to assess risks from collateral swaps or risks from securities lent against other securities. There may be a strong case for monitoring these risks, too, possibly separately.

[23] Participants may pool several SFTs and receive/post collateral against such a pool of transactions. This may render a granular analysis of haircuts difficult. In addition, haircuts may be influenced by the credit quality of the counterparty. Nevertheless, when this issue was raised during informal conversations at the ECB and Bank of England workshop (held on 3 December 2012), several market participants stated that they would be able to access to such information on a trade-by-trade basis with limited difficulties, albeit at a small cost.

[24] The focus here is on the potential maturity of the transaction; i.e. not taking into account early redemption options. We could potentially consider building two versions of this indicator: one not taking into account redemption options, and one doing so.

[25] Re-use can be defined as re-use of non-cash collateral (including re-hypothecation of client assets) and reinvestment of cash collateral.

[26] Some asset managers may lend cash against collateral which they may not be able to hold given their investment mandate, leading to the immediate liquidation of the collateral, should the counterparty to the trade default. For instance, a money market fund may lend cash against long-term securities.

these transaction data should be reported to a regulatory authority.[27] Consequently, the purpose of Table 2 is simply to illustrate which transactions data would ideally be collected by transacting firms in order to effectively serve as an initial input to the construction of macro-prudential indicators. It is also important to acknowledge that market practices in some SFT market segments could prevent from collecting data on a transaction basis in a meaningful manner. For instance this could be the case when collateral is managed on a pooled basis, *as can occur with some securities lending or some repo transactions*.

Table 2: Transactions data fields required to build the indicators of risks to FS

Data field / Indicator reference	A	B	C	D	E	F	G	H	I
Principal amount (e.g. EUR 10,000,000)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Type of SFT (e.g. repo or securities loan)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Type of lender (e.g. bank or money funds)[28]	✓	✓	✓	✓	✓	✓	✓	✓	-
Credit quality of lender (e.g. AAA)		-		-	-	-	-		
Type of counterparty (e.g. intra-group, bank or insurer)[29]	✓	✓	✓	✓	✓	✓	-	-	-
Credit quality of counterparty (e.g. AAA)		-		-	-	✓	-		
Asset class of collateral (e.g. equity)[30]		✓		-	-	✓			
Asset class of security on loan/borrowed		✓							
Credit rating of collateral (e.g. AAA)		✓		-	-	✓			
Initial haircut (e.g. as a percentage)		✓							
Minimum transfer amount (e.g. in EUR or as a percentage)		✓							
Transaction start date (date format)			-						
Residual maturity of transaction (e.g. days or months)		-	✓						
Early redemption option (yes/no)		-	✓						
First callable date (date format)			✓						
Residual maturity of collateral (e.g. months)		✓	✓			-			
Collateral available for re-use (yes/no)				✓					
Collateral re-used (yes/no)					✓				
Ability to hold collateral (yes/no)		-					✓		
Currency of cash leg (e.g. USD or EUR)		-						✓	-
Currency of collateral leg (e.g. USD or EUR)		-						✓	-
Bilateral transaction (yes/no)		-							✓
Tri-party transaction (yes/no or name of agent)		-							✓
CCP-cleared transaction (yes/no or name of CCP)		-							✓

[27] Specifically, these data fields should not be seen as a blue print for future regulatory reporting guidelines. If authorities will opt to collect such data through regulatory reporting, an evaluation of the feasibility of reporting the different data fields or of aggregates would be required.

[28] Legal entity identifiers (LEIs) could also be considered as an alternative if these are linked to sectors.

[29] Legal entity identifiers could also be considered as an alternative if these are linked to sectors. This would also assist in monitoring intragroup transactions, which may also be of interest, especially in the case of financial conglomerates.

[30] One could also consider collecting the ISIN of the collateral leg of the transaction.

In Table 2, column headers correspond to the indicator reference letters presented in the third column of the previous table. A check-mark (✓) indicates that the data field listed in the first column is required in order to construct the selected indicator. A hyphen (-) illustrates that the data field is not strictly necessary *per se*, but collecting such data would nevertheless be desirable and enable a more in-depth risk analysis.

Table 3: Minimum scope and granularity, selected data fields

Data field	Criteria	Minimum scope and granularity
Type of SFT	Types of SFT	All "physical" SFTs,[31] including repurchase agreements; buy-backs and sell-backs; securities lending[32].
	Market segments	Whole SFT market, irrespective of market segment including bilateral, tri-party and CCP-cleared markets.
	Geographical zones	Data should cover at least the main SFT geographical zones,[33] which include, for instance, North America, the European Union and the Asia-Pacific region. A breakdown by country should be sufficient.
Currency of cash leg Currency of collateral leg	Currencies	All currencies. Breakdown by most-traded currency, including USD, EUR, JPY, GBP, AUD, CHF, CAD, HKD, SEK, KRW, NZD, SGD, NOK, MXN and INR.[34]
Type of lender Type of counterparty	Institution type	All banks plus the most important non-banks that are active in SFT markets.[35] Breakdown by type of counterparty and type of lender.
Asset class of collateral Asset class of security on loan/borrowed	Asset classes	All asset types; a breakdown by main asset type (e.g. equities, sovereign bonds, corporate bonds, ABS) should be sufficient.[36]
Credit quality of lender Credit quality of counterparty Credit rating of collateral	Credit quality	All credit qualities; a high-level breakdown by credit rating should be sufficient.

The majority of the data fields listed in Table 2 can be collected easily because they consist of either assembling the relevant empirical data (such as amounts or dates) or checking a box to answer a

[31] We define "physical" SFTs here as transactions which have similar properties to repo or securities lending transactions (i.e. enabling one counterparty to raise cash by posting or lending securities), but do not involve the use of derivatives.

[32] There is a strong case for authorities to monitor the growth of non-physical SFTs. Given that these involve derivatives transactions, the OTC Derivatives Regulators' Forum may advise on how to best proceed with respect to this issue.

[33] This means that if a global solution cannot be implemented, then at least each main geographical zone should attempt to implement its own solution to collect data to monitor risks in SFT markets, preferably in a coordinated manner.

[34] Transactions in currencies of non-euro area EU Member States could be also collected at the respective national level.

[35] Threshold to be defined by relevant authorities. But it is critical to be able to account for market dynamics, whereby some (types of) institutions become more important over time. Transactions with central banks should be excluded in the calculation of the threshold.

[36] Although it may not always be straightforward to allocate some securities to particular asset classes.

simple “yes” or ”no” question. Hence there is limited scope for argument in terms of definitions for these data fields provided that the consensus is that these data are needed for effective risk monitoring.

In contrast, the data fields highlighted in bold warrant further discussion with respect to the adequate level of scope and granularity required for macro-prudential risk assessment. This is because the collection of these data will require the agreement of authorities with respect to the definitions employed and may also require policy-makers to overcome some significant hurdles, which will be discussed in Section 4. However, we argue that not only do all the risks to financial stability need to be monitored with equal attention, but that the data fields listed in Table 2 (to construct the minimum required indicators of risks) should be given equal priority in terms of collection.

We can nevertheless observe that, on the one hand, some data fields – notably information on lender and counterparty – are needed for the construction of almost all indicators (and hence for an assessment of the respective key risk). On the other hand, some data fields are only needed for the construction of a few indicators, such as the data fields on transaction and collateral maturity, early redemption option and first callable date.

Table 3 gives an overview of the scope and granularity we believe to be the minimum required with respect to the data fields shown in bold in Table 2. Table A2 in Appendix A presents a more detailed discussion of the minimum scope for each data field and the rationale underpinning our choices, as well as a list of potential issues to address going forward.

2.2. Additional data to assess financial stability risks (macro-prudential perspective)

In addition to monitoring the indicators discussed previously, macro-prudential authorities should also remain vigilant with respect to the risks arising from the following things.

- **Maturity and liquidity transformation in cash collateral reinvestment programmes:** Cash collateral reinvestment programmes pool the cash proceeds from lending securities on behalf of investors and reinvest this cash in a broad range of assets. Some of these investments include reverse repos, but these do not typically represent the majority of reinvestments. In order to fully capture the risks arising from cash collateral reinvestment programmes, authorities therefore need to collect additional data on the type of asset invested in, its maturity, concentration, credit quality and expected liquidity.[37]

- **Re-use of collateral:** Financial institutions receive *non-cash* collateral when using a variety of financial instruments; this is especially true for securities lending in a European context. They may also re-use the collateral posted for several purposes. The re-use of such collateral may have profound effects on intra-financial sector interconnectedness, contagion and the overall leverage of the financial system. Supervisors need to collect information at the institution-level of the sources and use of collateral by employing an appropriate template (See Section 4.4). Monitoring in detail which security is re-used by which entity would require data to be collected on the exact security used in SFTs, in other words the ISIN. This could prove difficult for transactions backed by general collateral. However, less granular data collection, whereby institutions report the collateral and type of counterparty for both source and re-use purposes could be sufficient for all transactions involving collateral.

[37] For instance, the RMA collects fairly granular data on cash collateral reinvestment programmes at the aggregate level.

- **Re-hypothecation of clients' assets:** Given that re-hypothecation may give rise to similar risks to those associated with the re-use of collateral[38], the re-hypothecation of clients' assets should be monitored at the institution-level in the same manner as the re-use of collateral.

- **Collateral valuation practices:** Inadequate collateral valuation practices may give rise to systemic risk if these lead to excessively low haircuts (relative to the inherent riskiness of the collateral) in SFTs. As a result, it would also seem appropriate for authorities to monitor the valuation methods used and the frequency of marking to market, as well as minimum thresholds, prior to variation margin payments being made.

2.3. Relevance of selected indicators for micro-prudential supervisors

Micro-prudential supervisors and resolution authorities also exhibit a natural interest in terms of the extent to which the firms they oversee are exposed to SFT markets. Table 4 shows that using institution-level data to construct metrics similar to indicators [A] to [I] shown in Table 1 but applied at firm level would also enable authorities to monitor a broad range of risks.[39]

Table 4: Indicators for micro-prudential supervisors

Reference	Equivalent firm-level indicator	Firm-level risk monitored
[A]	Value of repos, cash raised by lending securities against cash collateral and cash raised by re-hypothecating client assets (by counterparty type, i.e. borrower).	Reliance on SFTs for the purpose of funding.
[B]	Average haircut/margin by asset class, credit quality of the collateral and type of counterparty.	Adequacy of collateral valuation practices.
[C]	Aggregate split of SFT and reverse SFT by maturity of transaction.	Maturity transformation via SFTs
[D]	Proportion of collateral received that is available for re-use (by type of counterparty).	Potential for collateral re-use for own funding.
[E]	Proportion of collateral received that is re-used (by type of counterparty).	Extent of collateral re-use for own funding.
[F]	Breakdown of collateral received in SFTs by asset class and credit quality, by type of counterparty, and by the credit quality of the counterparty.	Concentration of exposure by type of collateral and type of counterparty.
[G]	Proportion of collateral received that is not authorised to be held within the investment mandate (by type of counterparty).	Firm's exposure to fire-sale risk.
[H]	Aggregate breakdown of currency of denomination of cash leg against currency of denomination of collateral leg (by type of lender).	Extent of foreign currency funding via SFT markets. Exposure to currency risk.
[I]	Aggregate value of SFTs bilaterally traded, CCP-cleared and tri-party-intermediated.	Extent of reliance on/exposure to any particular SFT market segment.

[38] It may give rise to double-counting issues. For instance, if counterparty A pledges a bond for cash in a repo and counterparty B uses the pledged bond for a securities lending transaction, two SFTs would already be accounted for despite the re-hypothecation.

[39] Of course, micro-prudential supervisors would also be interested in looking at aggregate figures and trends.

The data fields required to build firm-level indicators are broadly similar to those listed previously. From a micro-prudential perspective, however, some of these SFT-focused indicators may not provide the holistic picture of risks and exposures that is necessary. This is particularly relevant for indicators intended to capture firm-level exposure to other counterparties, as well as exposure by type of collateral. For micro-prudential purposes, linking or complementing these data with other related data (e.g. on the funding structure or data comprising other instruments) would be particularly relevant. In addition to the indicators above, data on the interest rate (e.g. repo rate) paid by firms to access secured funding via SFT markets would also help authorities assess risks to individual firms.[40,41]

2.4. Monitoring the frequency and timeliness of data

Most of the key risks to financial stability arising from SFTs tend to build up over time. For instance, excessive credit growth, system leverage and maturity transformation typically follow phases of gradually increasing risk appetite and a subsequent loosening of credit standards.

As a result, from the perspective of a macro-prudential supervisor, it seems that monitoring these risks at the system level (e.g. on the basis of the indicators presented previously) may not require daily data. The adequate frequency of data for macro-prudential monitoring purposes may fall within a range bounded between once a month and once a quarter. For jurisdictions with particularly dynamic SFT markets (such as the United States, the EU and Japan) a monthly monitoring frequency may perhaps be more appropriate, especially given the short-term nature of a significant proportion of SFTs.

Continuous monitoring of SFTs at regular intervals should be based on the most recent data in order to ensure that an up-to-date picture of the distribution of risks in SFT markets is provided. Consequently, the timeliness of data is dependent upon both the dynamics of the SFT markets monitored (in developed SFT markets, for example, data in excess of two weeks old would probably qualify as being stale) and conditions in SFT markets (monitoring in times of market distress potentially requires more up-to-date data).

Broadly speaking, indicators of key systemic risks associated with SFTs in developed SFT markets would probably have to be updated on a monthly or quarterly basis using data collected approximately one to two weeks beforehand and depending on whether markets are considered to be stable or distressed.

From the perspective of micro-prudential supervisors (and potentially resolution authorities), the need for frequent and timely data is most likely greater. One reason for this is that any firm can lose access to SFT markets fairly quickly.[42] Consequently, micro-prudential authorities would need to monitor the risks not only to, but also from, SFT markets (based on the indicators above, for example) to/from individual supervised firms frequently. It seems reasonable that monitoring frequency should be contingent upon the relative importance of the firm to SFT markets and/or the

[40] Financial institutions may also borrow securities to trade the repo rate itself. See Adrian et al (2012).

[41] The repo rate can be indicative of the counterparty risk, although in practice not all lenders adjust the repo rate to account for counterparty risk, but instead make a binary decision on whether to trade with a given counterparty or not (see Comotto, 2012).

[42] As happened to Lehman Brothers in September 2008.

firm's dependence on these markets. From a prudential perspective, a range of weekly to monthly monitoring, based on a daily reporting lag, would seem adequate.

2.5. Available data

We have reviewed publicly available information on repo and securities lending and have also synthesised the information on SFTs in the possession of national authorities. Overall, the information that is currently available to supervisors and the public is not considered to be sufficient for the purpose of monitoring the systemic risks that may arise from SFTs. The data shortcomings can be summarised as follows.

Industry data provider and publicly available sources

Publicly available information on repo markets are only available at an aggregate level, allowing for a general, rather than detailed, overview. The main aggregate information sources comprise ICMA's European repo market survey, the ECB's money market survey and the RMA.

With regard to commercial data, Data Explorers (Markit) allows subscribers to retrieve aggregate and individual information (by financial instrument) on securities lending and claims that its data cover a large proportion of the global stock of loan transactions.

Data Explorers (Markit) does provide some granular information on the type of collateral received (non-cash vs. cash), with a more granular breakdown for cash collateral, as well as on the maturity of the transactions (term vs. open) both on an aggregate (i.e. by asset class) and on an individual basis (per financial instrument).

With regard to the repo market, ICAP provides granular data on transactions executed on its BrokerTec platform, which is an important platform for non-Italian euro area sovereign repo transactions[43]. ICAP claims that it provides good coverage of the market in one-day maturities, but is less dominant for longer-term repos which are mostly voice brokered, even though BrokerTec covers repo transactions of up to 12 months. ICAP also provides bi-daily reports on trade-weighted average prices for each financial instrument traded on its platform.

Aggregate data are also available on the reinvestment of cash collateral through the RMA's quarterly reports on securities lending and through Data Explorers (Markit). The RMA data cover the primary sources of securities lending, while Data Explorers also covers secondary market activity. The RMA conducts regular surveys on large agent lenders, while Data Explorers collects data from lenders, agent lenders and broker-dealers.

Information on the re-use of non-cash collateral is scant; some institutions provide data in their financial statements on an aggregate level.

Supervisory information

Notwithstanding differences in availability across countries, aggregate data on repo transactions is gathered for credit institutions through national supervisory reporting requirements based on the

[43] Repos on Italian sovereign bonds are mainly executed on MTS.

Financial Reporting (FINREP) framework.[44] By contrast, there is generally less information available for other financial institutions. Information on the repo activities/transactions of institutions such as investment funds/asset managers (including MMFs), pension funds and insurance companies is only available in certain countries. However, even for banks, reporting requirements are not considered to be detailed enough for the purposes of monitoring SFTs. In addition to volumes and high-level maturity breakdowns, some aggregate information by groups of counterparties, on the type of collateral and on the currency of transactions is also available.

Information on haircut levels or the remaining maturity of collateral, for example, is not typically available. The reporting requirements for non-banks, insofar as they exist, are even less granular.

As far as securities lending is concerned, a review of data availability revealed that supervisory authorities possess limited information concerning lending activities. In many countries, no information is available at all or, if there is, supervisors only have access to very rough estimates.[45]

With regard to transaction-level data, only a few supervisory authorities have access to information for some institutions, although even this is limited. However, some European countries have data on repo activities undertaken by banks, insurance companies, pension funds or mortgage firms. The authorities in these countries potentially have some data they can exploit in order to assess the risks associated with exposures and interconnectedness for selected institutions.

2.6. Data gaps

Although it may appear that a wide range of data is indeed available for monitoring purposes, these data are in fact of very limited use from a market surveillance perspective. For instance, it is extremely difficult to re-aggregate with confidence and to subsequently make use of the information at hand in a prudential context. The inevitable conclusion is that the data available are inadequate for the purpose of monitoring the risks arising from SFTs both from both a macro and micro-prudential perspective. The following table summarises the lack of information required to construct a minimum set of indicators.

[44] This source of information will be harmonised across EU Member States under the Capital Requirements Regulation and Directive (CRR/CRD IV), via the Implementing Technical Standard on Supervisory Reporting (applicable to credit institutions and investment firms), developed by the European Banking Authority (EBA).

[45] Nevertheless, some exceptions do exist whereby countries have access to securities lending activities through custodians. This is the case in Bulgaria and Hungary.

Table 5: Shortcomings in existing information for minimum indicators

Indicators	Insufficiency of available data
Aggregate value of repos, cash raised by lending securities against cash collateral and cash raised by re-hypothecating client assets, (by type of counterparty, i.e. borrower, and type of "lender").	Aggregate information partly available, but no granular counterparty breakdown; some lenders not subject to reporting requirements.
Average haircut/margin by asset class, credit quality of collateral and type of counterparty by type of "lender".	Information on haircuts not available on a regular basis even at the aggregate level; no information at the institution level.
Aggregate split of SFT and reverse SFT by maturity of transaction.	Often available (maturity buckets) if institution subject to reporting requirement (banks), lesser availability for non-banks.
Proportion of collateral received that is available for re-use (by type of counterparty and type of "lender").	Information scant.
Proportion of collateral received that is re-used by type of counterparty and type of "lender".	Information scant.
Aggregate breakdown of collateral received in SFTs by asset class and credit quality, by type of counterparty, type of "lender" and credit quality of the counterparty.	No granular breakdown of collateral. No breakdown by type/credit quality of counterparty.
Proportion of collateral received that is not authorised to be held within the investment mandate (by type of counterparty).	Information typically not available.
Aggregate breakdown of the currency of denomination of the cash leg against the currency of denomination of the collateral leg by type of lender.	Typically not available.
Aggregate value of SFTs bilaterally traded, CCP-cleared and tri-party-intermediated.	Aggregate market information available, information by lender/counterparty not available

Section 3: Potential solutions to bridge the information gap

Supervisory authorities can collect the required monitoring data in different ways. This section highlights the various options that authorities have at hand that can improve data availability. An assessment of the main costs and benefits of these options is also provided.

3.1. Available options

It is possible to distinguish between the types of data collected on the basis of the following classification scheme:

i. *portfolio-level* data;
ii. *transaction-level* data on a *stock basis* (i.e. log of open transactions);
iii. *transaction-level* data on a *flow basis* (i.e. trade by trade).

The data required to monitor SFT markets could be collected either on a *voluntary basis* through market surveys or on a *mandatory basis* through regulatory reporting. Note that regulatory reporting can take two main forms, which can be distinguished between on the basis of *trade repositories* (whereby reporting firms provide transaction-level data) and *portfolio reporting* (whereby firms report portfolio position data to authorities).

With regard to regulatory reporting, it is also possible to classify the data on the basis of jurisdictional criteria. Two categories can be defined on the basis of "direct" and "indirect" data collection. With respect to the "direct" nomenclature, reporting is centralised within a single geographical zone (e.g. the EU). In this case, the data is collected *directly* from reporting firms and managed by one central body. Alternatively, the data could be collected from firms by national authorities and then subsequently be passed on to a central body in charge of re-aggregating the data in order to construct the indicators of risks previously discussed. In this context, the central body is considered to have collected the data *indirectly*.

For the sake of brevity, this study only considers the most *relevant subset of the possible combinations* of the three dimensions discussed above (i.e. type of data collected, on a mandatory or voluntary basis, directly or indirectly by the body in charge of constructing indicators). More specifically, our considerations are limited to the following five situations.

i. **Direct portfolio-level market surveys:** In this scenario, a trade body or authority collects portfolio-level data from firms directly, but on a voluntary basis.[46]
ii. **Indirect portfolio-level regulatory reporting.** Here, the relevant national authorities collect portfolio-level data from reporting firms on a mandatory basis and share them (or a subset of them) with a central body in charge of constructing the indicators of risks.
iii. **Direct portfolio-level regulatory reporting.** A central body in charge of constructing the indicators of risks collects portfolio-level data from reporting firms directly and on a mandatory basis.

[46] Of course, one could think of *indirect* market surveys conducted on a national basis, for instance, with a trade body re-aggregating the data. However, we do not consider this scenario at the present time, as it would, in effect, be a step back from what already exists. For instance, the ICMA ERC repo market survey already surveys firms operating in the European market. Furthermore, it is unlikely that firms would provide transaction-level data (whether on a stock or flow basis) to a third party on a voluntary basis.

iv. **Direct transaction-level regulatory reporting on a stock basis:** A trade repository collects a log of open transactions from reporting firms directly on a mandatory basis.[47]

v. **Direct transaction-level regulatory reporting on a flow basis:** A trade repository collects trade-by-trade data from reporting firms directly on a mandatory basis.

Table 6 summarises the options considered in this report.

Table 6: Summary of options

Voluntary or mandatory reporting of data	Direct or indirect collection of data	Type of data collected	Description of data collection method	Also referenced in the text using the following terminology
Voluntary	Direct	Portfolio-level data	Direct portfolio-level market surveys	Market surveys (a)
Mandatory	Indirect	Portfolio-level data	Indirect portfolio-level regulatory reporting	Regulatory reporting at the national level (b)
	Direct	Portfolio-level data	Direct portfolio-level regulatory reporting	Regulatory reporting at the supranational level (c)
		Transaction-level data (stock basis)	Direct transaction-level regulatory reporting on a stock basis	Trade repository (positions or stock basis) (d)
		Transaction-level data (flow basis)	Direct transaction-level regulatory reporting on a flow basis	Trade repository (trade-by-trade or flow basis) (e)

In the remaining part of this section, we consider the costs and benefits of market surveys (a), regulatory reporting (covering b and c) and trade repositories (including d and e). We also discuss some of the trade-offs between these available options.[48]

Market surveys

Overview

Market surveys are regular assessments conducted by authorities or industry associations, typically on a semi-annual or quarterly basis. They are addressed to a sample of market participants on a voluntary basis and the survey results are sometimes available to the public. However, the underlying data may not be available to the public or authorities (in the case of industry-led surveys). Furthermore, owing to the voluntary nature of the surveys, the sample of firms surveyed often includes either the most important institutions in a given market (e.g. in terms of market share) and/or a specific type of market participant (e.g. banks), which could result in a biased sample.

[47] We do not consider the cases of multiple trade repositories within one geographic area such as the EU. This would clearly be a sub-optimal outcome. We therefore do not consider the cases of indirect transaction-level regulatory reporting.

[48] The lettering used corresponds to the one presented in Table 6.

Cost and benefits of market surveys

Market surveys tend to be relatively low-cost exercises that can be quickly adapted and modified as necessary over time.[49] Nevertheless, such changes may involve some costs, which may render a time-series analysis less meaningful, for instance because of changes in sample sizes (which can be frequent given that surveys are voluntary). These surveys can be addressed to all market participants, although in practice it may be difficult to achieve representative coverage across jurisdictions and types of institutions.

Participation in market surveys is, by definition, not mandatory, so for instance firms accepting lower quality assets as collateral in their reverse-repo operations may choose not to report. Such an omission of data introduces a sample selection bias.

In addition, changes in the samples surveyed may render data difficult to compare over time. Given that surveys are typically conducted over quarterly or semi-annual time periods, they cannot be used for frequent and timely monitoring.

Examples of existing market surveys

Examples of surveys conducted within SFT markets include ICMA's semi-annual European Repo Council (ERC) survey on euro interbank money market activity and the ECB's annual euro money market survey.[50]

The Committee on the Global Financial System and the ESCB are also launching a survey on credit terms and conditions in euro-denominated securities financing and over-the-counter (OTC) derivatives markets, which will survey large banks and dealers active in euro-denominated markets and focus on qualitative assessments of changes in wholesale credit terms. The US Federal Reserve System conducts a senior credit officer opinion survey on dealer financing terms on a quarterly basis. This collects qualitative information on changes in credit terms and conditions in SFT and OTC derivatives markets.[51]

Regulatory reporting

Overview

Regulatory reporting is a key supervisory tool used to identify risks in activities undertaken by a given reporting institution. It enables regulatory or supervisory authorities to monitor a firm's activities and to assess the level of risk associated with such activities. It also helps authorities to ensure that reporting entities follow sound risk management practices and that they hold an appropriate level of high-quality capital to help mitigate these risks. Regulatory reporting typically encompasses a wide range of activities and instruments of any given institution.

[49] This flexibility is an advantage, but note that supervisors may only have a limited influence over the design of industry-led surveys.

[50] See Table A3 in Appendix A for a comparison.

[51] See http://www.federalreserve.gov/econresdata/releases/scoos.htm

For the purpose of assessing the risk to financial stability arising from SFT markets, it is useful to distinguish between regular reporting at the national level (which is typical) and at the supranational (e.g. European) level (which may, in the future, play a larger role in the context of macro-prudential supervision and the single supervisory mechanism in Europe).

- **Regulatory reporting at the national level.** This has several implications for the assessment of risks to financial stability. First of all, standardisation and harmonisation of reporting standards is needed in order to improve the comparability of financial information reported to different supervisors within the EU (or any other SFT geographical zone).[52] Second, the issue of data sharing and confidentiality arises, since national supervisors may not be permitted to, or only be willing to, share data under certain conditions. Third, the construction of some indicators to assess financial stability data would require the aggregation of data on firms' positions collected by national supervisors, which may be difficult (see Appendix B). Despite the existence of reporting requirements for some of the participants in SFT markets,[53] these requirements currently lack granularity and are therefore less than adequate indicators of the risks inherent to SFT markets (see Section 2.6). However, more granular reporting requirements, combined with an extension of those requirements to institutions currently not under the reporting perimeter, could help to close some of the data gaps identified.

- **Regulatory reporting at the supranational (e.g. European) level**. A supranational authority having access to all the data could then be in charge of aggregating the reporting firms' portfolios and constructing all the relevant indicators of risks to financial stability suggested in Section 1:. National authorities could have limited access to such a central regulatory reporting database, i.e. besides access to aggregated data, they would only able to see firm-level data on the firms they supervise. This would help to address the data sharing and confidentiality issues among national regulators.

Cost and benefits of enhancing regulatory reporting

Adequate reporting would facilitate the assessment of a wide range of vulnerabilities at the institutional level. In the context of SFTs, regulatory reporting carries the additional benefit of facilitating the assessment of risks that arise from exposure across several instruments (e.g. large exposures to a given counterparty due to reverse repos and unsecured credit).

Amending and/or introducing reporting requirements would almost certainly require a change in the existing regulations (at EU and national level), especially if reporting obligations are extended to institutions that are not currently subject to reporting requirements. Nevertheless, careful consideration of the data to be collected would also be required in order to allow for risks to be assessed. The design of reporting requirements could also be hard to modify over time (because of the potential costs involved for market participants), so there is a risk that any redesigned requirements would only reflect issues that were already known (e.g. because risks did materialise) and would not enable authorities to identify new types of risks or issues as they emerged.

[52] Harmonised reporting would also contribute to increasing the cost-effectiveness of supervision across the EU, reducing the reporting burden on cross-border credit institutions and removing a potential obstacle to financial market integration.

[53] See, for instance, the reporting requirements on repos and securities lending foreseen in the latest draft version available of the Capital Requirements Regulation (paragraph 3 of the latest report of the Council): http://register.consilium.europa.eu/pdf/en/12/st16/st16677.en12.pdf.

Regulatory reporting might help to address the additional information needs of micro-prudential supervisors. As mentioned previously, some of the drawbacks of obtaining more data for macro-prudential supervisors through regulatory reporting at the national level include a broad range of hurdles that would have to be overcome (e.g. in terms of data sharing, data compatibility and constructing aggregate indicators). Note that the cost (for market participants) and benefits (for authorities) of regulatory reporting will also depend on the frequency of this reporting.

In the context of regulatory reporting at the supranational level, one of the significant benefits of a central body collecting data on firms' portfolios is that it would allow issues related to data sharing among national supervisors to be circumvented. However, similar problems to those that arise when attempting to aggregate portfolio-level data apply here as well.

Existing reporting requirements

A summary of information on SFTs available via current regulatory reporting of repos and securities lending in Europe was discussed in section 3. It concluded that reporting requirements were granular enough for an adequate assessment of risks.

The Federal Reserve Bank of New York's FR 2004A/B/C weekly report of dealer positions, transactions and financing reports, which collects information on market activity from primary dealers in US government securities, is an example of granular regulatory reporting.

As a European example of the aggregation of national reporting data, the European Banking Authority (EBA) already collects data on SFTs from the major banks via the FINREP framework. Thus, there might be scope to build on this in the future to cover SFT related information.

Trade repositories[54]

Overview

Trade repositories can capture either transaction data (i.e. flows reported to the trade repository within a pre-agreed time lag on a trade-by-trade basis) or trade exposure data (i.e. stocks).[55] The latter are captured by regularly collecting a log of open transactions from market participants. This is discussed further in Box 1. Trade repositories typically gather information on a frequent (e.g. daily) basis and the data fields collected are predetermined.

From the point of view of financial stability, the monitoring of individual transactions is not critical.

Thus, regardless of whether the data are initially collected on a flow or stock basis, the transactions would have to be aggregated using an adequately designed analytical overlay for risk assessment purposes. It is therefore important to clearly specify **up front** the data needs and the types of analysis that should be performed. This could be done by using some of the indicators of risks suggested in this report as a starting point for further analysis. Note that, for a number of SFTs, some terms of the transaction (e.g. collateral) are not determined at the point of trade and are subject to

[54] A preliminary assessment of the main benefits and challenges of establishing a trade repository for repo transactions in the EU can be found in ECB (2013).

[55] ECB (2013), footnote 20 provides the following definition of a TR: "*A trade repository is an entity that maintains a centralised electronic record (database) of transaction data. In particular, it centralises the collection, storage and dissemination of data*".

change after the trade. Owing to this, collecting data on open positions (stocks) may be technically easier and less costly than doing so on a trade-by-trade (i.e. flow) basis.

The transaction-based nature of the data also gives rise to confidentiality issues, so access to data must be governed in an adequate manner. Coordination between relevant authorities across jurisdictions is necessary, taking into account the degree of confidentiality of the information available.

A trade repository may, in principle, be run by a private provider or a public authority. In both cases, authorities may need to mandate firms to report the relevant data. Note that cases in which a public authority mandates the reporting and runs the trade repository are akin to regulatory reporting to a supranational authority, the only difference being that, rather than portfolio data, stock or flow data on transactions are collected.[56]

In principle, the trade repository data may not only be used for regulatory purposes, but can also, in part, be made public (e.g. in an aggregated form), which would increase market transparency, while respecting the confidentiality needs of market participants.

Cost and benefits

The fact that the nature of the data contained in a trade repository is potentially highly granular allows for a more exhaustive assessment of risks to financial stability, as well as a deeper understanding of market functioning and timelier insights into the build-up of risk. Nevertheless, additional institution-level data could be needed in order to monitor more specific risks (see section 2.3). The highly granular nature of the data also allows the analytical overlay to be modified in order to provide answers to unforeseen questions, should these arise. In addition, a trade repository collecting SFT data may also serve other regulatory purposes, such as facilitating the recovery and resolution processes.

Overall, implementing a trade repository could involve high costs. For competition reasons and owing to the views of national authorities, several trade repositories could be established globally. In order to ensure that the data reported are consistent, the implementation of a trade repository may require a legal basis that calls for reporting requirements to be placed on all market participants. If not, market participants may not report the data regularly, leading to potential bias in the analysis. Component authorities (such as the European Securities and Markets Authority (ESMA) for European trade repositories) must thus be appointed to authorise the registration of trade repositories (or to run one themselves).

In the case of transaction data, handling could be very complex, owing to the high volume of transactions (e.g. counted in millions for repos in Europe only) that need to be captured. In the case of a trade repository collecting a log of open positions, the main benefits are likely to include: i) collecting and storing less data at a lesser frequency than a trade-by-trade trade repository, which could translate into a lower running cost; ii) enabling the construction of adaptable analytical overlays similar to a trade-by-trade trade repository; iii) enabling the issue of having to re-aggregate data collected by national supervisors to be addressed; iv) constructing financial stability indicators using

[56] A trade repository is also feasible at the national level (hence the cases akin to a national authority collecting data). However, we do not consider this, as trade repositories only make sense if they cover broader geographical areas.

the log of a transaction as an input which would address the issues that arise when constructing these indicators using firms' portfolio data (see Appendix C).

Examples of existing trade repositories

There exist currently no trade repositories for SFTs. However, privately owned trade repositories for OTC derivatives are being established (see the box below). In principle, a trade repository could also be owned and run by a public authority, which would allow for a quick re-design in the case of new types of risk arising.

Box: Trade repositories – lessons learnt

In the OTC markets, the establishment of trade repositories for derivative transactions is already under way. Even before the Dodd-Frank Act and the European Market Infrastructure Regulation (EMIR) were finalised and a requirement to register transactions in a trade repository was put into law, industry and regulatory authorities were in the process of setting up repositories for key asset classes such as credit default swaps (CDS), interest rate derivatives and equity derivatives. The process provided a number of key points to learn from and refer to when making decisions that will be of interest when considering the establishment of trade repositories for SFTs.

- *Trade vs. transaction repositories:* A trade repository can either capture transaction-level data with all the relevant details, including time stamp and matching confirmation, or it can simply capture trade exposure data. The latter will not enable any assessment of possible market abuse patterns. However, it can give a useful overview of cross-industry exposures and also capture open derivative transactions. The design is crucial, as data would be sourced from different internal systems by financial institutions. Transaction data would have to come from the confirmation desk in the back office, while trade exposure data could be sourced from risk management systems.

- *Key characteristics for the asset class:* Asset classes that are mainly traded by major broker-dealers with highly automated systems can more easily provide a range of characteristics to a trade repository in electronic format, whereas widely traded financial products with significant buy-side participation will struggle to manually transmit a vast range of transaction parameters to a data warehouse in a (potentially) different jurisdiction. In the latter case, regulatory authorities will have to carefully consider the trade-off between getting detailed information (rather than restricting the choice to a few key characteristics) and getting complete data (i.e. capturing the whole market).

- *Time to set up:* Trade repositories are relatively straightforward to set up from an operational perspective. The difficulty is introducing firm data from a range of financial institutions' systems with different levels of sophistication and formatting. The more characteristics that have to be reported, the more time-consuming the set-up will become. On the other hand, having a definite list of characteristics will help in designing the end state of the repository. Although repositories were developed gradually in the OTC markets, this led to problems when new data could not be sourced in the same way as previously, necessitating a re-design of the repository itself.

- Further information about minimum data reporting requirements, as well as the methodology and mechanism for data aggregation on a global basis, is available in the Committee on Payment and Settlement Systems/International Organisation of Securities Commissions report on OTC derivatives data reporting and aggregation requirements.[57]

[57] Available at http://www.bis.org/publ/cpss100.htm

3.2. Summary: comparison of the three main options in terms of costs and benefits

Trade-offs between available options

Recent work at Financial Stability Board level[58] has analysed the trade-offs associated with each of these approaches. The main differences between the three mainstream options – surveys, regulatory reports and trade repositories – can be captured by two key trade-offs.

- **Flexibility vs. Consistency**: Surveys are more flexible than either regulatory reports or trade repositories, as they can more easily be adapted over time. However, changes in the information collection process make the data less consistent and therefore harder to compare over time.

- **Comprehensiveness/timeliness vs. Cost**: Trade repositories gather data more frequently and with more granularity than regulatory reports, which in turn gather more data than surveys. Generally, the cost of collecting, maintaining and analysing data increases with the amount and frequency of data gathered, both for regulators and market participants. However, the additional data facilitate a deeper understanding of market functioning and may provide more timely insights into the build-up of risks. The resulting information can be useful if unforeseen circumstances arise. Regulatory reports, in particular, allow for the collection of aggregate positions, which can be helpful in identifying systemic risks. Such positions can also be aggregated from trade-level information, albeit at a potentially significant cost.

Different factors determine the relative costs and benefits of the three approaches. A jurisdiction's institutional or regulatory set-up, for example, is one key factor. For instance, in countries or jurisdictions where SFT market participants are diverse and end up being regulated differently, better supervisory reporting may involve higher costs.

In terms of geographical scope and international coordination, it is also important that any reporting obligation (to a trade repository or through regulatory reporting) is balanced in terms of costs and does not provide incentives for institutions to move business to jurisdictions with lower reporting costs. Global coordination is considered to be essential, especially when establishing one or several trade repositories.

[58] See FSB (2012b).

Comparison of costs and benefits

The table below provides an overview of the three main options in terms of costs and benefits.

Table 7: Summary of the three main options in terms of costs and benefits

	Trade repository	Regulatory reporting	Market survey
Usefulness for identifying emerging risks	A flexible analytical overlay (e.g. ability to run queries cut along different data fields) would help spot vulnerabilities at a firm level and (sub) system level.	Would help spot vulnerabilities, especially at the level of regulated entities. Some macro-prudential analysis possible, but partitioned coverage by jurisdiction is a potential issue.	Some macro-prudential analysis of risks possible, but limited in depth and scope of participants. Usefulness depends on whether participants are representative across types and jurisdiction.
Cost	High upfront costs; pooled running costs; low reporting costs.	Some upfront costs borne by investors when setting up systems; ongoing reporting costs. Increase in costs depends on existing reporting requirements.	Low cost if market participants respond on a "best endeavours" basis (e.g. no requirement to invest in IT systems).
Flexibility	Rigid data template and costly to amend data fields *ex post.*	Fairly rigid once investors have adapted their IT systems.	Flexible in theory, but often less so in practice (e.g. ICMA survey).
Legal basis	Mandatory.	Mandatory.	Voluntary.
Access to underlying data	Authorities likely to have access to data as required because of their regulatory mandate.	Authorities have access to data as required because of their regulatory mandate.	No automatic access to underlying data when surveys are conducted by trade bodies. When conducted by authorities, full or partial access (e.g. if cross-jurisdiction).
Timeliness of access by authorities	Virtually instantaneous.	Complex reporting might only be realistic on a weekly or less frequent basis (e.g. UK FSA liquidity reports).	Typically conducted on a semi-annual or quarterly basis, so timeliness is poor.
Data consistency	Data are consistent across time, market segments and jurisdictions.	Data are consistent across time and market segments within jurisdictions, but risk of inconsistency between jurisdictions.	Data typically consistent across jurisdictions, but not necessarily across time, as questions and/or respondents may change. Consistency also depends on the quality of the data reported, which may differ across institutions.
Usefulness for increasing transparency	Meaningful aggregation and publication of data respecting confidentiality issues feasible to increase market transparency.	Meaningful aggregation and publication of data respecting confidentiality issues feasible to increase market transparency. Benefit limited by granularity. Need for coordination among supervisors in the case of national reporting.	Typically public; information gathered through a non-public survey could be published while respecting confidentiality issues. Benefit limited by information content of survey.
Coverage of jurisdictions	Dependent on design, but may be possible to cover multiple jurisdictions.	Reporting for each jurisdiction; reporting to supranational authority may increase coverage.	Reporting typically across jurisdictions.
Coverage of investors	All investors are included if data collection is transaction-driven.	Sectoral coverage, limited by regulatory reach.	Limited coverage – typically includes largest firms within one or more sectors.

Section 4: Closing the information gap

The aim of this section is to discuss how the data required to construct the indicators of risks to financial stability arising from SFTs (see Section 1) can best be collected given the pros and cons of the three main data collection methods discussed in Section 3.

One potential starting point could be to ask how likely it is that a particular data collection method (i.e. trade repository, regulatory reporting or market survey) would help authorities reach the desired minimum level of coverage for the data fields needed to construct risk indicators.

Note that this analysis assumes that, in accordance with Section 2, data should, at the very least, be collected in the following ways.

- On the basis of the main SFT "market clusters" (e.g. the EU, North America and the Asia-Pacific region). This means that, if a global solution cannot be implemented, then at least each main geographical zone should attempt to implement its own solution for collecting data to monitor risks in SFT markets.
- On all "physical" SFTs, including repurchase agreements and securities lending.
- On all SFT market segments, i.e. bilateral, tri-party and CCP-cleared markets.
- On all banks and – at the very least – the most important non-banks active in a given SFT market cluster such as the EU.
- On all currencies.

4.1. Data collection method and impact on achieving the data coverage required

This subsection provides an analysis of the likelihood that the three main data collection methods discussed above will help achieve the data collection objectives detailed previously. In this section, we focus our analysis on the data coverage which will require prior agreements (e.g. with respect to the definitions employed) and may give rise to potential issues.[59]

The analysis in this Occasional Paper suggests the following things.

- With respect to SFT product coverage, regulatory reporting is more likely to provide an aggregate overview across products for reporting institutions once the reporting requirement has been mandated. Nevertheless, trade repositories could provide such a cross-product overview if adequately designed from the outset. But, given the voluntary nature of surveys, there is a risk that some firms may be unwilling to report positions for some specific products.
- Capturing data across market segments (bilateral, tri-party and/or CCP-cleared SFTs) is equally likely across data collection methods. This is because a trade repository's transaction reporting data fields (in the case of both flow and stock data) could require specification of the segment in which the transaction has been conducted; regulatory returns could mandate a breakdown by

[59] The implicit assumption here is that, for the other data fields, all options are equally suited to collecting the data. This is probably a strong assumption (even if everyone agrees about the data to be gathered, the costs of doing so may differ across options), but it could be acceptable for our purposes.

market segment; or surveys could ask for such a breakdown (as is currently the case in the ICMA repo survey[60]).

- Collecting data based on the geographical clusters discussed in Section 2 (e.g. the EU, the United States and Japan) should be politically feasible via a trade repository, as demonstrated by the recent ECB/Bank of England initiative. With regard to surveys, the ICMA repo survey already covers most of the European market, while Data Explorers collects data on global securities lending markets. However, aggregating data collected by national supervisors, especially in Europe, could prove difficult in the absence of data sharing agreements between authorities.

- Achieving the desired level of coverage by counterparty type could be challenging. For trade repositories collecting flow data, this issue is probably circumvented by requiring that reporting occurs on a transaction basis, regardless of the counterparty involved. For trade repositories collecting stock data and for regulatory reporting, addressing this issue may require changes in national or supranational laws to enable authorities or a private trade repository operator to collect data from non-supervised entities. With respect to market surveys, achieving the desired counterparty coverage is quite unlikely if reporting is voluntary.

- Once the definitions of the currency of denomination buckets, counterparty and securities credit rating buckets and the breakdown of asset classes have been agreed upon by authorities, the data collection method should not affect the likelihood of obtaining the desired data. Here, the issue is one of setting common harmonised definitions.[61]

Table 8 summarises our views: *likely* means that no **major** hurdles are foreseeable; *potentially* shows that some hurdles may need to be overcome; and *unlikely* indicates that major hurdles would prevent the required data from being collected.

Table 8: Likelihood that the data collection method will help achieve our objectives

Objective	Trade repository	Reporting	Survey
Collecting data on all "physical SFTs"	Potentially	Likely	Unlikely
Collecting data on all market segments	Likely	Likely	Likely
Collecting all required data within the main geographical zones	Potentially	Potentially	Likely
Collecting data on all counterparties	Potentially	Potentially	Unlikely
Collecting data on all currencies	Likely	Likely	Likely
Collecting data on all credit qualities	Likely	Likely	Likely
Collecting data on all asset classes	Likely	Likely	Likely

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

[61] For instance, the ICMA repo market survey is already able to: i) provide a breakdown of the collateral taken in the tri-party repo market by asset class and credit quality; ii) provide estimates of the currencies used in European repo markets.

In addition to helping achieve the desired data coverage, we can ask whether a data collection method can provide the required data timeliness (see section 3.2) and is adequate for the construction of the analytical overlay required for both micro and macro-prudential risk analysis.

Again, the analysis in this Occasional Paper suggests the following things.

- As currently observed in CDS markets, a trade repository is most likely to provide timely data when the Depository Trust and Clearing Corporation (DTCC) is able to provide regulators with weekly or less frequent data on global aggregate positions, e.g. by type of counterparties or reference entities. Once reporting institutions have adequately updated their IT systems, regulatory reporting could also be very timely (e.g. weekly liquidity returns from UK FSA-regulated banks). But voluntary market surveys are very unlikely to provide authorities with timely data.

- If properly designed, trade repositories should enable authorities to easily construct the required macro-prudential risks indicators at the EU level using an automated analytical overlay. Regulatory reporting could also lead to a satisfactory outcome if the data collected by national authorities can be adequately re-aggregated (or collected by one central body). However, given that market surveys are typically conducted by separate trade bodies or data providers, authorities may experience difficulties when trying to reconcile disparate data sources, which could hinder the construction of a macro-prudential analytical overlay.

- Regulatory reporting by supervised entities is naturally conducive to micro-prudential risk analysis. Such institution-driven analysis could also be achieved through a trade repository if national authorities have access to the right level of data. In contrast, regulatory authorities have no access to the underlying data submitted by individual institutions to market surveys being conducted by trade bodies (such as ICMA and the International Securities Lending Association) or commercial data providers, and this naturally complicates micro-prudential analysis.

Table 9 summarises these views.

Table 9: Likelihood that the data collection method will help achieve the desired data timeliness and build the required analytical overlays

Additional criteria	Trade repository	Reporting	Survey
Timeliness of data	Likely	Potentially	Unlikely
Building macro-prudential analytical overlay	Likely	Potentially	Unlikely
Building micro-prudential analytical overlay	Potentially	Likely	Unlikely

From the analysis above, we conclude that **relying on market surveys to monitor risks in SFT markets is inadequate**.[62] Such a method of data collection is unlikely to provide adequate counterparty coverage or frequent enough and timely data, nor does not allow authorities to create the analytical tools required for continuous monitoring.

[62] We therefore chose to eliminate market surveys from further analysis given their inadequacy in our opinion.

Table 10: Key issues to address in order to construct the required risk indicators

Hurdles	Trade repository (flow data)	Trade repository (stock data)	Regulatory reporting
Product coverage	Agree on product coverage at launch.	Agree on product coverage at launch.	Coordinate scope of reporting among supervisors.
Geographical coverage	Agree upon geographical coverage of trade repository at launch.	Agree upon geographical coverage of trade repository at launch.	Agree upon geographical coverage (progressively).
Counterparty coverage	Mandate transaction-based reporting.	Potential need to amend existing legislation to mandate reporting from firms not currently subject to reporting requirements.	Potential need to amend existing legislation to enable authorities to collect data from firms they potentially do not have jurisdiction over.
Timeliness of data (macro-prudential analysis)	Agree upon reporting frequency.	Agree upon reporting frequency.	Agree upon maximum time frame for data sharing with centralising body.
Timeliness of data (micro-prudential analysis)	Agree upon reporting frequency and which data collected by the trade repository is accessible to which authorities (at launch, if possible).	Agree upon reporting frequency and which data in the trade repository is accessible to which authorities (at launch, if possible).	Agree upon reporting frequency. Agree upon maximum time frame for data sharing with national supervisors.
Building macro-prudential analytical overlay	Analytical overlay needs to be carefully designed from the outset, with access to tools depending on the type of authority.	Analytical overlay needs to be carefully designed from the outset, with access to tools depending on the type of authority.	Define data collection standards to enable aggregation, minimise manipulation errors and minimise double counting; define data sharing procedures and data analysis procedures.
Building micro-prudential analytical overlay	Agree upon which data collected by the trade repository are accessible to which authorities (at launch, if possible).	Data of a given counterparty in the trade repository are accessible to the competent national authority.	At the discretion of national authorities.

Nevertheless, a significant number of hurdles need to be overcome in order to construct the required indicators from the data collected, whether that data be collected through trade repositories or via regulatory reporting. Table 10 summarises the issues to be addressed in order to construct the required risk indicators with appropriate data coverage, timeliness and analytical overlay.

It distinguishes between: i) a trade repository collecting transaction data; ii) a trade repository collecting exposure data; and iii) regulatory reporting (of portfolio-level data) collected by a national authority or by a central body and shared with national supervisors (as introduced in Section 3:).

4.2. Identifying less adequate solutions and selecting from the remaining ones

From Table 10, it is clear that there is no easy way to collect the data needed for macro and micro-prudential surveillance of risks from SFT markets. The three approaches considered all involve some significant challenges. It is therefore difficult to clearly identify the single "best" data collection method.

Likely inadequacy of regulatory reporting of portfolio positions to national authorities

It is important to point out that significant issues could arise when creating macro-prudential surveillance tools if national authorities were to collect data from the institutions they have authority over and then in turn provide these data to a third party.

Although this approach would require less coordination among authorities ahead of data collection (e.g. in terms of geographic coverage), it would generate substantial downside risks in terms of the quality of macro-prudential analyses.

These downside risks apply to the quality of the data, data aggregation, manipulation errors, data sharing procedures and timeliness issues. Given that our primary objective is to develop a robust macro-prudential surveillance framework at the "market cluster" level, **collecting data in a centralised and coordinated fashion offers a better solution than fragmented national reporting**.

Issues with regulatory reporting of portfolio positions to a supranational authority

Some issues may arise when attempting to construct the indicators listed in Table 1 using aggregate portfolio positions reported by institutions. This is partially shown in Appendix B, in which we have attempted to construct a matrix of aggregated bilateral gross exposures in SFT markets with a breakdown by counterparty type using random portfolio positions.

Our analysis shows that, despite operating in a much simpler world than the real one (in our simple model, there are only nine reporting entities, the data are collected centrally and counterparty data are available), our central authority would face difficulties when attempting to construct an accurate picture of SFT markets based on portfolio data if the portfolio-level data collected is not sufficiently granular.[63]

As a result of this preliminary analysis, it seems that constructing the suggested indicators of risks to financial stability with original transaction data as inputs would produce much more trustworthy indicators (providing reporting arrangements adequately address any double-counting issues that may arise if transactions are reported multiple times). Therefore, to the extent that such solution can be implemented given existing market practices, a trade repository collecting trade-by-trade data or trade exposure data appears to be an ideal data collection method for most SFTs.

[63] It may be of interest to validate this analysis by attempting to construct the various indicators of risks using **real** data from reporting firms' portfolios.

Key differences between a trade repository collecting trade-by-trade data and one collecting trade exposure data

As noted in Section 3, there are significant differences between a trade repository capturing transaction-level data (i.e. flows) and one capturing positions data (i.e. stocks at points in time).

Constructing our risk indicators requires stock data. If trade repositories were only to collect trade-by-trade data, only a partial view of outstanding amounts on SFTs would be provided at first. However, this could be only a temporary issue because, given the typically short nature of SFTs, the sum of open flows would very quickly equate to the stock.[64]

Nevertheless, this points towards the issue of costs. As discussed before, weekly stock data from reporting institutions could be less costly to collect, store and filter then collecting transaction data on a daily basis.[65] In addition, owing to the fact that the nature of certain SFTs is such that some terms of the transaction (e.g. collateral) are not determined at the point of trade and are subject to change after the trade, it may be technically difficult to collect transaction data on a flow basis.

Therefore, to justify the potentially significant differences in running costs, a trade-by-trade reporting trade repository should probably be designed to provide more than just surveillance, assuming that the two trade repository configurations provide identical data quality for surveillance purposes. It could, for instance, be fully integrated into the SFT post-trade value chain by supporting trade matching/confirmation or legal certainty if market participants and authorities were to consider that this would add value.

To decide upon which solution is the most desirable, authorities should first **ensure that the data collection method enables them to construct the required indicators** and then rank potential solutions in terms of added value relative to costs. So, to some extent, a more expensive solution that would enable all indicators to be constructed could be better than a much cheaper solution that would not provide a clear view of SFT markets (e.g. if not all counterparties are captured).

The best solution therefore depends on the ability of stakeholders to overcome the hurdles listed previously. Since these hurdles are roughly the same for collecting stock and flow data, the comparison boils down to the costs and benefits of managing (and updating in real time) a vast amount of trade-by-trade data rather than open positions.

In terms of governance, a trade repository may be run by a public authority or a private provider. In principle, the choice of ownership should have no impact on the ability to assess risks. In both cases, it must be ensured that reporting requirements are such that all market participants, or all trades, are covered. If a private provider runs the trade repository, competent authorities must be able to access the data; if a supranational authority (such as ESMA) operates a trade repository, access to data held by national authorities must also be organised.

[64] A process which could be accelerated by mandating open SFTs above a certain remaining maturity (e.g. one year) to be submitted to the trade repository ahead of launch (so called back loading).

[65] According to ICMA estimates, a trade repository would have had to capture 28 million repo transactions in Europe in 2011, including double counting. Assuming 20 data fields per transaction, this would translate into half a billion data points to store per annum. For comparison, according to the DTCC, there are currently “only” 4.5 million interest rate derivative contracts currently open. And, in CDS space, the latest Trade Information Warehouse data show that about 48,000 CDS transactions are captured in a week (so roughly 2.5 million a year, including index CDS and single names). So the point that a repo trade repository (not even including securities lending transactions) would be an ambitious enterprise is a fair one.

4.3. Potential addressees of the reporting requirements

The question of who should report to a trade repository is critical in addressing the potential issue of double counting. It could make sense to settle for a solution along these lines – assuming there are no impediments (such as confidentiality agreements).

- CCPs report CCP-cleared transactions (as potentially only the CCP would know who the counterparties to the trades were).[66]
- Third parties report tri-party repo or intermediated securities lending transactions (again because only the third party would know who the counterparties were).
- Either the lender or the borrower (to be decided) reports a bilaterally agreed trade not executed on an automated trading system (ATS).
- ATS providers report electronically executed non-CCP-cleared bilateral trades.

Such an approach to reporting would ensure each trade is reported only once. Note that, in the case of a trade-by-trade trade repository, the entity reporting would have to report on a trade-by-trade basis. In the case of a trade repository collecting exposure data, reporting entities would have to report **a log of open transactions** at the time of reporting (e.g. on a weekly basis), potentially including the data fields discussed in Table 2 in Section 2, to the extent that this is achievable given market practices and can be implemented in a meaningful way.[67]

4.4. Outstanding gaps and how to address them

Transaction-related data alone is not sufficient for a complete risk assessment. Some relevant information must also cover related instruments; applicable risk management practices also play a role.

- Collateral re-use and re-hypothecation: trade repositories and centralised reporting of SFTs do not allow for a full picture of the sources of collateral and how collateral is re-used at a given institution. Other instruments, such as OTC derivatives and short sales, also give rise to collateral demand and supply for re-use. The re-hypothecation of client assets also provides institutions with collateral that can be pledged to third parties. A special template collecting information on sources of collateral and client assets and on re-use/re-hypothecation for all relevant instruments might therefore be used to complement the risk assessment.
- Cash collateral reinvestment programmes: as with the re-use of non-cash collateral, agent lenders can reinvest the cash obtained as collateral in a variety of financial instruments, deposits and repos, among other things. Here, a dedicated template that collects data on the cash reinvestment chain (comprising information on the underlying securities lending transaction and the reinvestment schedule) might be appropriate.

[66] In the case of trades that are executed on an exchange or electronic platform with an open order book, not for bilateral SFTs that are passed on to the CCP after being executed over the counter.

[67] Reporting a log of open transactions would avoid the issue of double counting. If every firm reported data at portfolio level, it would be not be possible to construct the macro-prudential indicators of risks to financial stability because it would not be possible to remove overlaps between portfolios across institutions. But, if firms report a transaction log, e.g. using LEI, then authorities can use the analytical overlay to construct a database of unique transactions and build reliable risk metrics (see Appendix B)

- Collateral valuation practices: supervisory authorities should also review the collateral valuation practices of institutions, as they potentially have a large impact on how often and accurately haircuts are set, and hence how institutions adjust their SFT activities in times of crisis. Such a review is particularly important when common principles for valuation practices have not yet been established.

Concluding remarks

Supervisory authorities around the world are currently engaged in a policy debate on how to improve the information available on repo and securities lending markets. Transactions in these markets play an important role in the financial system and, although repo and securities lending transactions in isolation could be perceived as being relatively low risk, their pervasive use may give rise to systemic risk, as witnessed during the recent financial crisis. From a macro-prudential perspective, it is therefore of great importance that the competent authorities have at hand the information needed to assess these risks.

This paper contributes to the debate by describing the logical chain leading from the identification of risks, via the description of the indicators and data needed to assess these risks and the description of the various options on how to collect that information to an analysis of which of those options are more suitable. The main conclusion is that, to the extent that it is compatible with market practices, a trade repository for collecting transaction-based data on SFTs would be ideal from a supervisory perspective. It is our view that the question of whether a trade repository should collect trade-by-trade or exposure data is beyond the remit of this occasional paper, which focuses on data for risk assessment purposes. This issue should be discussed further between the relevant authorities and market participants, possibly on the basis of the relative costs and benefits.

There are obstacles to negotiate before such a trade repository can be established and it is important that policy-makers now move forward and assess whether these can be overcome. At the same time, it is important that policy-makers clearly formulate the analytical overlay, i.e. describing how data should be aggregated to construct meaningful indicators that allow for both a macro and micro-prudential risk assessment. This paper aims to contribute to this debate by describing the various risks and the indicators needed to assess those risks.

Much more work remains before a European macro-prudential framework in which risks are consistently assessed across Member States is in place. In conceptual terms, this paper is a contribution to the process of constructing such a framework which ultimately aims not only at improving the monitoring and supervision of SFT markets, but also enabling policy-makers to take appropriate and timely action to mitigate risks stemming from these markets.

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Appendix A – Rationale underpinning the required indicators and the minimum scope and granularity of the required data fields

Table A1: Potential indicators and required indicators

Risks to Financial Stability	Minimum Indicators / By	Lender type	Borrower type	Credit quality	Asset class	Asset quality	Maturity	Currency	LEI	Rational for minimum required level of breakdown by indicator	Reference
Facilitation of credit growth	Aggregate value of SFTs	✓	✓	-			-	-	-	A breakdown by counterparty type is a necessary minimum to monitor the extent to which non-banks engage in SFTs. This includes cash collateral reinvestment programmes. Data on the type of lender (e.g. bank, MMMF…) is also needed to monitor providers of funding. Similar data but at entity level would be useful for microprudential purposes (e.g. to evaluate risks from the proportion of funding arising from SFTs).	A
Procyclicality of system leverage	Average haircut/margin	✓	✓	✓	✓	✓	-	-	-	At the minimum, it is necessary to collect granular data on haircuts (by asset class of collateral received, credit quality of collateral received and counterparty type) because it has been shown that the distribution of haircuts/margin can vary greatly across these criteria (hence rendering less granular data unusable for risk assessment purposes). Similar data at entity level would be useful for microprudential purposes.	B
Maturity and liquidity trans-formation	Aggregate split of SFTs by maturity	✓	✓	-					-	At the minimum, authorities should monitor the split by maturity (of repo, reverse repo, and cash collateral re-investment) as it has been shown that banks perform maturity transformation on the repo book, and non-banks create shadow banking type risks either by financing themselves via short term SFTs (or lending in long term reverse repo). Similar data but at entity level would be useful for microprudential purposes.	C
Intra-financial sector inter connected-ness via SFTs	Aggregate value of SFTs	✓	✓	-				-	-	A breakdown by counterparty type is a necessary minimum to monitor intra-financial sector exposures. Data on the extent of actual and possible re-use would inform on the length of chains. A break-down of the collateral received would be useful to monitor the extent of collateral initially issued by financial firms used in SFTs.	A
	Proportion of collateral received	✓	✓	-							D
	Proportion of collateral received re-	✓	✓	-							E
Collateral fire sales	Aggregate breakdown of collateral received in SFTs	✓	✓	✓	✓	✓				To assess fire sales risks following a counterparty's default, one needs to have at the minimum detailed sight on the concentration of collateral held by lenders and on the extent to which this collateral can be held on balance sheet should the counterparty default (as the latter, if negative, would automatically result in a fire-sale).	F
	Proportion of collateral received not authorised to	✓	✓	✓	-	-					G
Other: Currency	Breakdown of currency of denomination of cash leg and collateral	✓						✓	-	At the minimum authorities should have sight on the extent to which lenders are taking a significant currency mismatch risk. Similar data but at entity level would be useful for microprudential purposes.	H
Other: market structure	Aggregate value of SFTs bilaterally traded, CCP cleared and tri-party	✓	✓	-			-			Authorities should have sight on the broad structure of SFTs given that different segments exhibited different behaviours during the 2007-2009 crises.	I

Table A2: Minimum scope and granularity, selected data fields

Table 3	Minimum scope and granularity	Rationale	Potential issues
Types of SFT	• At the minimum, data should be collected on all "physical" SFTs, including repurchase agreements, sell and buy backs, securities lending and re-hypothecation of clients' assets. • Complementary data on synthetic SFTs should also be collected (albeit potentially via a different data collection mean) to monitor the growth of that funding segment.	• The "physical" SFTs described below can all be used as substitutes to raise funds. Despite operating in somewhat segregated market segments, market participants can typically use any of these markets to access funds. • Synthetic SFTs are still a relatively small market segment, but provide economically equivalent access to funding and could grow substantially.	• The data collected must allow data to be aggregated across SFT product types, both in the cross-section and the time series. • The data must enable risks to be compared like for like across SFT product types.
Geographical zones	• SFT markets are cross-border, so capturing global data would make sense. However, this may be difficult in practice. • At the minimum, data should be collected for the main SFT "market clusters", which include North America, the EU and Japan.	• Authorities need to monitor macro and micro-prudential risks arising in their jurisdictions. • The data collected should therefore adequately reflect the activity of all firms engaging in SFT activity within a defined jurisdiction.	• The data should be standardised enough across regional clusters to allow for comparison across geographical zones.
Counterparty type (lender and borrower)	• At the minimum, data should be collected on the most important types of firms which are active in SFT markets. • These include investment banks, commercial banks, custodian banks and firms looked at by FSB WS3 such as money market funds, hedge funds, pension funds, asset management firms (including ETP providers), cash collateral reinvestment programmes, insurance companies, securitisation vehicles, large corporates and debt management offices. Intra-group data should also be captured. • Reporting firms should be selected on the basis of the location of their headquarters and branches.	• Although banks are important players in SFT markets, their share of global activity in SFT markets is far from dominant. • Other types of firms play a critical role in the SFT nexus, either as providers of cash or "collateral mines". • It would therefore be incomplete if risks arising from SFTs were assessed without capturing the whole range of counterparties involved.	• Need to find a way to collect data even on firms not regulated by macro/micro financial authorities. • Need to address risk of double counting (e.g. by specifying the side of the trade as lender or borrower). • When one counterparty of the SFT is not reporting its leg of the transaction (because it is foreign), the data should at least specify the cluster it belongs to.
Credit quality of counterparty	• A relatively high-level breakdown by credit rating of counterparties in SFT transactions should be sufficient.	• The credit quality of counterparties in SFTs influences haircuts and provides important information to assess the risk of collateral chains collapsing.	• Standardising ratings when different firms are rated by different (or several) rating agencies
Type of assets/collateral	• A relatively high-level breakdown by asset type (e.g. equities, sovereign bonds, corporate bonds, ABS) should be sufficient. • However, complementary information on the type of issuer (sovereign, PNFC, financial) would be useful as well.	• The type of assets on loan or used as collateral has a major influence on haircuts and provides important information to assess the risk of collateral fire sales, as well as intra-financial sector interconnectedness.	• Settling on a static demarcation between asset classes could be difficult. • In the long run, the data should be granular enough to capture new instruments whose market share is growing (ETPs).

Credit quality of assets/collateral	• A breakdown by credit rating of collateral used in SFT transactions should be sufficient to assess the risks to financial stability.	• The credit quality of collateral in SFTs influences haircuts and provides important information to assess fire-sale risks.	• Standardising ratings when different assets are rated by different (or several) rating agencies
Currency	• If data is collected geographically, it should cover all currencies used in SFTs within the defined geographical cluster. • A breakdown by key currencies may initially be sufficient (e.g. USD, EUR, GBP, JPY, CHF, RMB, AUD, CAD, NZD).	• Firms within a geographical cluster engage in SFTs denominated in a range of currencies, so all currencies need to be captured to obtain a full picture of SFT markets within one geographical area. • A firm located in one cluster transacting in the currency of another cluster would be able to avoid reporting obligations (but could still swap the cash raised for its local currency). • Capturing all currencies enables FX risks to be assessed.	• In the long run, the data should be granular enough to capture currencies whose market share is growing.
Industry structure	• Data should be collected on the whole SFT market, irrespective of the market segment, including bilateral, tri-party and CCP-cleared markets.	• Different firms may typically be involved in different market segments, but boundaries are permeable. So, if reporting requirements only focus on one segment, firms may diverge towards the most opaque.	• The data collected must suit industry practices applied across market segments.

Table A3: A comparison of the ICMA European Repo Council survey with the ECB survey on euro interbank money market activity

	ICMA ERC survey	ECB survey
Measure	Outstanding amount (i.e. stock) on a given day at the end of June/December of a given year.	Turnover (i.e. flow); specifically, daily average turnover for the second quarter of the year.
Periodicity	Semi-annual.	Annual.
Location of respondents	15 European countries, North America, Australia and Japan.	27 EU countries and Switzerland.
Number of respondents	62 institutions in the June 2012 survey.	172 institutions for the total panel. 105 institutions for the constant panel
Type of institution	All financial institutions (e.g. including national debt and other public agencies).	Credit institutions only.
	Transactions with all counterparties except central banks.	Interbank transactions only (i.e. excludes transactions with customers and central banks).
Currencies	The total figure is broken down into: • EUR; • GBP; • USD; • SEK; • DKK; • JPY; • CHF, • other.	EUR only. The FX swap segment is collected for the following pairs vis-à-vis EUR: • USD; • CHF; • JPY; • GBP.
	The total figure is broken down into: • cross-currency; • other (same currency).	
Maturities	Measures remaining term to maturity.	Measures original term to maturity.
	Aggregates one-day transactions.	One-day transactions are broken down into: • overnight; • tomorrow/next; • spot/next.
	Other transactions are broken down into: • two to seven days; • one week to one month; • one month to three months; • three months to six months; • six months to 12 months; • over 12 months; • forward-forwards.	Other transactions are broken down into: • two to seven days; • one week to one month; • one month to three months; • three months to six months; • six months to one year; • more than one year • (no forward-forward category).
		For each maturity bucket, a weighted average maturity is calculated.
Collateral	The total figure is broken down into: • fixed income; • equities.	
	Fixed income is broken down into 15 EU countries and the United States; in the case of collateral issued in other countries, it is analysed by OECD membership or region. Each EU Member State is further broken down into: • government; • other. "Other" German collateral is broken down into: • Pfandbrief; • other.	The total figure is broken down into: • domestic ("national"); • euro area; • other.
Counterparties	The total figure is broken down into: • direct; • via voice broker; • via ATS. Each category is further broken down into: • domestic; • cross-border; • anonymous. ATS is also further broken down into: • anonymous via a CCP.	The total figure is broken down into: • domestic; • euro area; • other.
		The total figure is broken down into: • direct; • via voice broker; • via ATS (electronic broker).

Type of transaction	All types of repo, classic and sell/buy-backs. Securities lending against any type of collateral which is conducted from repo desks is measured separately.	All types of repo and securities lending against cash collateral.
	The total figure is broken down into: • classic repo; • documented sell/buy-backs; • undocumented sell/buy-backs.	
	Each sub-category is broken down into repo and reverse repo.	Each sub-category is broken down into repo and reverse repo, except for analysis of: • location of counterparty; • type of counterparty.
	The total figure is broken down into: • fixed rate; • floating rate; • open.	Each maturity band is further broken down into: • floating rate (indexed); • other (fixed rate and open). There are therefore nine maturity/rate sub-categories.
	The total figure is broken down into: • tri-party repo; • other (delivery and hold-in-custody). Tri-party repo is further broken down into: • fixed term; • open.	The total figure is broken down into: • non-CCP repo transactions; • CCP repo transactions.

Source: ECB

Appendix B: Constructing macro-prudential indicators from the aggregated portfolio positions of reporting firms

This appendix discusses the difficulties arising when attempting to obtain an aggregate view of SFT markets based on portfolio data, using a simple example.

We assume the following.

- Nine entities are domiciled in an SFT market cluster such as the EU (including three banks, one insurance company, one pension fund, one money fund, one hedge fund, one third party (e.g. tri-party agent or agent lender) and one CCP).
- This SFT market cluster is composed of several jurisdictions, but all firms domiciled in the cluster report to **one** central authority,[68] which receives the data in **Figure B2**.
- SFT markets in the cluster are open internationally and the nine reporting entities are able to interact with foreign firms.
- The central body is in charge of aggregating the nine regulatory reports below (from A to I) in order to provide a breakdown of SFT markets in the cluster by counterparty type.

Despite operating in a much simpler world than the real one (i.e. only nine reporting entities, with data being collected centrally and available counterparty data) the authority would still face difficulties when trying to paint an accurate picture of SFT markets based on these reports. Using the data provided in Figure B2, it could at best produce the following two matrices of gross lending/borrowing by counterparty type (**Figure B1**).[69]

FigureB1: Aggregated overview of counterparty exposures from regulatory reports

		Borrowers				
	Lending	Banks	IPFs	MMMFs	Hedge funds	Total
Lenders	Banks	700	0	0	100	800
	IPFs	200	0	0	0	200
	MMMFs	125	0	0	25	150
	Hedge funds	0	0	0	25	25
	Total	1025	0	0	150	1175

		Lenders				
	Borrowing	Banks	IPFs	MMMFs	Hedge funds	Total
Borrowers	Banks	650	175	125	0	950
	IPFs	0	0	0	0	0
	MMMFs	0	0	0	0	0
	Hedge funds	50	0	25	0	75
	Total	700	175	150	0	1025

Source: Authors' calculations.

The table on the left-hand side is constructed by summing across lending exposures shown in the portfolios in Table B2 (the banks in the first row lent 700 to other banks and 100 to hedge funds). The table on the right-hand side is constructed by summing across the borrowing exposures showed in the portfolios (the banks in the first column lent 650 to other banks and 50 to hedge funds). The discrepancies between the tables arise from interactions with non-reporting entities – for reasons of simplicity, only foreign firms are included here although, in reality, non-reporting local firms may exist. To some extent, both tables are "right" (and both are "wrong").

[68] This is a strong assumption given that, in most countries, national authorities typically only have visibility over regulated banks. See Section 2, which discusses available data.

[69] Such a table is useful to understand cross-sector linkages within a geographical area. To depict a network of exposures, one would want to add a CCP row and a CCP column in the tables in figure B1 (because the CCP becomes the counterparty to the trade after novation).

In both tables, the positions reported by the CCP (I) and the third party (H) are reallocated (based on various assumptions).[70] For instance, we had to assume that all trades intermediated by a third party in the case of hedge funds were financed by money funds and not pension funds, or that all CCP-cleared SFTs by insurance companies corresponded to borrowing by banks.[71] These types of assumptions can be made in a small model with nine firms, but are very difficult to get right when hundreds of firms are reporting.

All these issues would mean that the cells coloured in red in Figure B1 could distort the true nature of interbank SFT markets (e.g. if CCP positions cannot be reallocated adequately). Furthermore, all the cells in blue could underestimate exposures across non-bank counterparties because third-party intermediated transactions could not be reallocated precisely. Double counting issues could also arise, in particular when estimating positions between banks and non-banks. The cells in orange would be most affected.

A key point to take away from this preliminary analysis is that fairly granular data are required to construct risks indicators using aggregated portfolio positions data. For instance, clearly distinguishing between 'local' and 'foreign' counterparties would minimise risks from double counting or misallocations of positions. This case study focuses on counterparty exposures, but similar issues would arise when attempting to construct other indicators (e.g. of haircuts) from portfolio data.

[70] Note that reporting entities such as banks and real money firms would most likely not be able to provide a counterparty breakdown of their CCP-cleared transactions (at least not anonymised trades) or their SFTs intermediated by third parties (e.g. securities lent via an agent lender). So the centralising body would have to make assumptions in order to reallocate CCP positions and third party positions across counterparty types.

[71] This may currently be a good proxy, but this will not be the case going forward as client-clearing markets develop.

Figure B2: Portfolios of SFT positions reported (including counterparty breakdowns)

Bank (A) (broker-dealer)	Borrowing	Lending	Net
CCPs	400	250	150
Third-party	50	0	50
Bilateral of which	200	300	-100
Intra-group	50	0	50
Banks	75	200	-125
IPFs	75	0	75
MMMFs	0	0	0
Hedge funds	0	100	-100
Total	650	550	100

Bank (B) (commercial bank)	Borrowing	Lending	Net
CCPs	200	0	200
Third-party	125	0	125
Bilateral of which	25	0	25
Intra-group	0	0	0
Banks	25	0	25
IPFs	0	0	0
MMMFs	0	0	0
Hedge funds	0	0	0
Total	350	0	350

Bank (C) (Cash rich)	Borrowing	Lending	Net
CCPs	0	300	-300
Third-party	0	50	-50
Bilateral of which	25	0	25
Intra-group	0	0	0
Banks	0	0	0
IPFs	0	0	0
MMMFs	25	0	25
Hedge funds	0	0	0
Total	25	350	-325

Insurance company (D)	Borrowing	Lending	Net
CCPs	0	0	0
Third-party	0	25	-25
Bilateral of which	0	100	-100
Intra-group	0	0	0
Banks	0	100	-100
IPFs	0	0	0
MMMFs	0	0	0
Hedge funds	0	0	0
Total	0	125	-125

MMF (E)	Borrowing	Lending	Net
CCPs	0	0	0
Third-party	0	75	-75
Bilateral of which	0	25	-25
Intra-group	0	0	0
Banks	0	25	-25
IPFs	0	0	0
MMMFs	0	0	0
Hedge funds	0	0	0
Total	0	100	-100

Hedge Fund (F)	Borrowing	Lending	Net
CCPs	0	0	0
Third-party	25	0	25
Bilateral of which	50	25	25
Intra-group	0	0	0
Banks	50	0	50
IPFs	0	0	0
MMMFs	0	0	0
Hedge funds	0	25	-25
Total	75	25	50

Pension fund (G)	Borrowing	Lending	Net
CCPs	0	0	0
Third-party	0	50	-50
Bilateral of which	0	0	0
Intra-group	0	0	0
Banks	0	0	0
IPFs	0	0	0
MMMFs	0	0	0
Hedge funds	0	0	0
Total	0	50	-50

Third-party agent (H)	Borrowing	Lending	Net
CCPs	0	0	0
Third-party	0	0	0
Bilateral of which	225	225	0
Intra-group	0	0	0
Banks	175	25	150
IPFs	25	75	-50
MMMFs	0	125	-125
Hedge funds	25	0	25
Total	225	225	0

CCP (I)	Borrowing	Lending	Net
CCPs	0	0	0
Third-party	0	0	0
Bilateral of which	500	500	0
Intra-group	0	0	0
Banks	500	450	50
IPFs	0	50	-50
MMMFs	0	0	0
Hedge funds	0	0	0
Total	500	500	0

Source: Authors' calculations.

Appendix C: List of members

The authors of this report are all part of a team that works on topics related to shadow banking. It is formed of members of the analysis working group of the ESRB, as well as experts from its member institutions and the ESRB Secretariat. The report has benefited from the input of the entire team listed below, with the authors being marked with an asterisk.

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