

Grillet-Aubert, Laurent; Haquin, Jean-Baptiste; Jackson, Clive; Killeen, Neill;
Weistroffer, Christian

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Assessing shadow banking – non-bank financial intermediation in Europe

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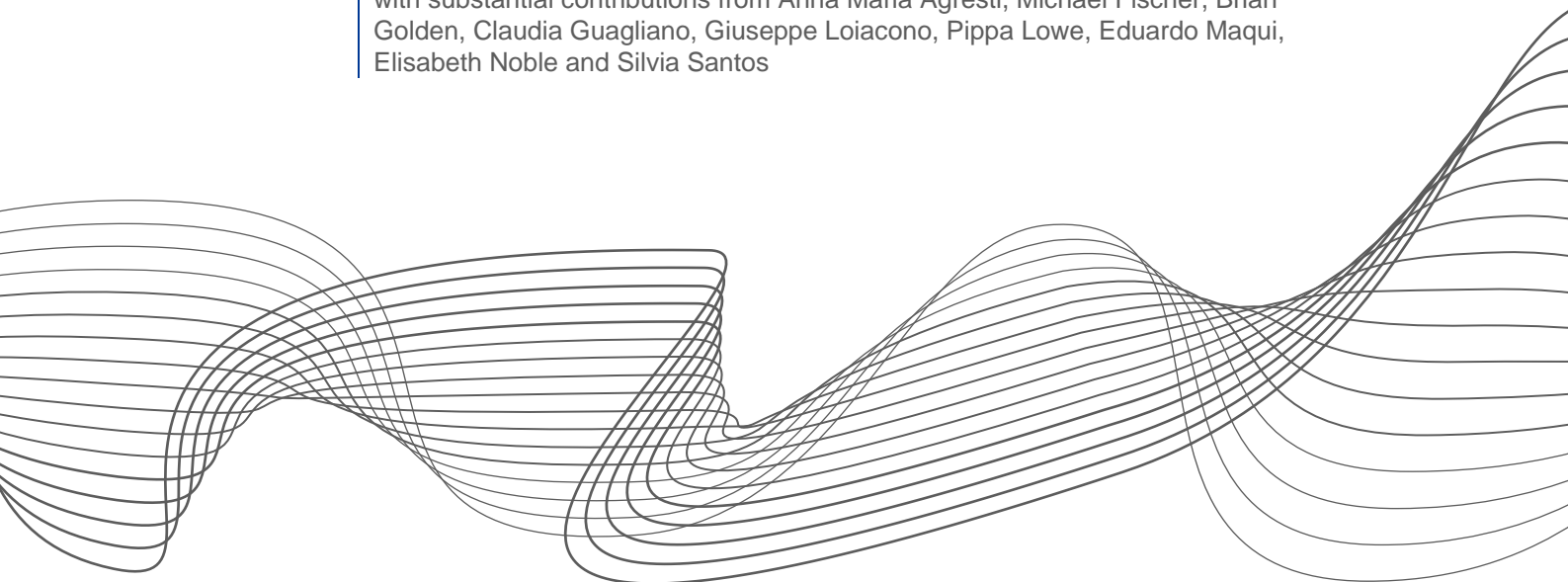
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Assessing shadow banking – non-bank financial intermediation in Europe

No 10/ July 2016

by
Laurent Grillet-Aubert
Jean-Baptiste Haquin
Clive Jackson
Neill Killeen
Christian Weistroffer

with substantial contributions from Anna Maria Agresti, Michael Fischer, Brian Golden, Claudia Guagliano, Giuseppe Loiacono, Pippa Lowe, Eduardo Maqui, Elisabeth Noble and Silvia Santos



ESRB
European Systemic Risk Board
European System of Financial Supervision

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Executive summary

Owing to the disruptive events in the shadow banking system during the global financial crisis, policymakers and regulators have sought to strengthen the monitoring framework and to identify any remaining regulatory gaps. In accordance with its mandate, the European Systemic Risk Board (ESRB) has engaged in developing a monitoring framework to assess systemic risks in the European Union (EU) shadow banking sector. This assessment framework provides the basis for the *EU Shadow Banking Monitor*, which will be published each year by the ESRB. The framework also feeds into the ESRB's Risk Dashboard, internal risk assessment processes and the formulation and implementation of related macro-prudential policies.

The ESRB's Joint Advisory Technical Committee (ATC)-Advisory Scientific Committee (ASC) Expert Group on Shadow Banking (JEGS) has accordingly engaged in:

- conducting a stocktake of relevant available data and related data gaps;
- defining criteria for risk mapping in line with the work of the Financial Stability Board (FSB) in this area;
- deriving indicators using this methodology for the purposes of the ESRB's risk monitoring and assessment.

Shadow banking can be broadly defined as credit intermediation performed outside the traditional banking system. This is consistent with the definition used at the global level by the FSB. Against this background, this paper describes the structure of the shadow banking system in Europe and discusses a range of methodological issues which must be considered when designing a monitoring framework.

The paper applies both an "entity-based" approach and an "activity-based" approach when mapping the broad shadow banking system in the EU. In turn, the analysis focuses primarily on examining liquidity and maturity transformation, leverage, interconnectedness with the regular banking system and credit intermediation when assessing the structural vulnerabilities within the shadow banking system in Europe. This approach appears the most appropriate for the purpose of assessing shadow banking related risks within the EU financial system.

On this basis, the paper complements the *EU Shadow Banking Monitor* by providing further methodological detail on the development of risk metrics. The paper presents the analysis underpinning the construction of risk metrics for the shadow banking system in Europe and highlights a number of areas where more granular data are required in order to monitor risks related to certain market activities and interconnectedness within the broader financial system.



Section 1

Introduction

Owing to the disruptive events in the shadow banking system during the global financial crisis, policymakers and regulators have sought to strengthen the monitoring framework and to identify any remaining regulatory gaps. At the European level, the ESRB has set up the Joint ATC-ASC Expert Group on Shadow Banking (JEGS) whose mandate includes the development of a monitoring framework for the European shadow banking system. This paper describes the structure of the shadow banking system in Europe and discusses a range of methodological issues which must be considered when designing a monitoring framework. In addition, the paper presents the analysis underpinning the construction of risk metrics for the shadow banking system in Europe and highlights a number of areas where more granular data are required in order to monitor risks related to certain market activities and interconnectedness within the broader financial system.

Shadow banking can be broadly defined as credit intermediation performed outside the traditional banking system. This is consistent with the definition used at the global level by the FSB.¹ From a monitoring perspective, this approach appears particularly useful, as it can be implemented consistently at both a global and a regional (e.g. EU) level, using data from financial accounts and related statistics. It also provides a basis for reviewing the appropriate perimeter for monitoring purposes, in particular in the light of financial innovation. Under a broad definition, the overall size of the shadow banking system can be conservatively approximated by the combined total assets of the other financial institutions (OFI) and investment fund sectors (including money market funds, MMFs), as summarised in Table 1.² This measure allows a broad assessment of the scale of the shadow banking sector, and enables policymakers and regulators to focus on more specific types of shadow banking entity insofar as data are also available for these more granular classifications.

This paper applies both an “entity-based” approach and an “activity-based” approach when mapping the broad shadow banking system in Europe. An “entity-based” approach alone would be insufficient owing to the limitations of balance sheet data for risk analysis, such as measuring off-balance-sheet exposures and financial derivatives, and owing to the need to account for specific interactions between entities. Therefore, the analysis also considers an “activity-based” approach in order to provide a broader analysis of linkages between the shadow banking system and the regular banking system.³ In contrast to the entity-based approach, the activity-based approach allows more high frequency data, such as daily transaction data, to be used to construct more timely risk metrics for the EU shadow banking system. However, a full assessment employing an activity-based approach also presents particular challenges owing to data limitations. Nevertheless, as discussed in Section 3, new data sources will soon become available for certain market activities which will permit the enhancement of the monitoring framework by allowing the construction of new risk metrics using the activity-based approach. Thus the activity-based approach outlined in this paper is forward-looking and can be used as a reference point for future monitoring assessments.

¹ The FSB describes shadow banking as a “system of credit intermediation that involves entities and activities outside the

² For the purposes of this paper, OFIs comprise all financial corporations excluding monetary financial institutions (MFIs) (i.e. excluding banks and MMFs), insurance corporations, pension funds, and non-MMF investment funds. Insurance corporations and pension funds are not included in the broad definition of shadow banking presented in this paper.

³ While the activity-based approach is at an early stage, new data on securities financing transactions and derivatives can be incorporated into future monitoring exercises to assess shadow banking risks arising from these activities.



Table 1
Overview of investment funds and OFIs

	Entities: sectors and sub-sectors	Description	
Investment funds	Money market funds (S.123)	Part of the monetary financial institutions (MFI) sector	
	Non-MMF investment funds (S.124)	Bond funds	Allocated to investment policy according to assets in which they primarily invest
		Equity funds	
		Mixed funds	
		Real estate funds	
		Hedge funds	
		Other funds	
		Exchange-traded funds (ETFs)	
Private equity funds			
Other financial institutions (OFIs)	Other financial intermediaries (S.125)	Financial vehicle corporations engaged in securitisation (FVCs)	I.e. special purpose entities (SPEs) engaged in securitisation
		Financial corporations engaged in lending (FCLs)	E.g. financial leasing, factoring, hire purchase
		Security and derivative dealers (SDDs)	I.e. dealers on own account
		Specialised financial corporations	E.g. venture capital, export/import financing, central counterparties (CCPs)
	Financial auxiliaries (S.126)	E.g. insurance or loan brokers, fund managers, head offices of financial groups, financial guarantors	
Captive financial institutions and money lenders (S.127)	E.g. SPEs not engaged in securitisation, "brass plate" companies, holding companies		

Note: While some CCPs are classified as specialised financial corporations under ESA 2010, they are not considered as part of the EU shadow banking system and are therefore excluded from the monitoring assessment presented in this paper.

For the purpose of devising an operational risk metrics framework, it is necessary to focus more specifically on the sources of potential systemic risk in the shadow banking sector. However, this poses several challenges, not least owing to the dynamic and diverse nature of shadow banking and the institutional differences of financial systems across countries. Against this background, this paper focuses primarily on examining liquidity and maturity transformation, leverage, interconnectedness with the regular banking system, and credit intermediation when assessing the structural vulnerabilities within the EU shadow banking system. This approach appears the most appropriate for the purpose of assessing shadow banking related risks within the EU financial system.⁴

1.1 Data gaps and methodological issues for mapping shadow banking

The implementation of a risk assessment framework for the European shadow banking system, which aims to narrow the focus on particular risks for policy purposes, raises three main types of challenges. First, there are shortcomings in granularity for some types of entity and risk factor, including, in particular, liquidity and maturity transformation. In addition, at the European level, there are limitations in the coverage of some types of entity, most notably with respect to entities other than funds and securitisation vehicles. Second, there is a lack of granular information on cross-

⁴ Similarly, in a second step the FSB states: "authorities should narrow the focus for policy purposes to the subset of non-bank credit intermediation where there are (i) developments that increase systemic risk (in particular maturity/liquidity transformation, imperfect credit risk transfer and leverage), and (ii) indications of regulatory arbitrage that is undermining the benefits of financial regulation." (FSB, 2011b)



border linkages between shadow banks and non-EU countries.⁵ While recognising the importance of this issue,⁶ this paper adopts a regional perspective as regards the EU shadow banking system and its dynamics. Third, the financial accounts data which underpin many of the risk metrics are based on on-balance-sheet items which do not fully cover important areas of the credit intermediation chain, such as securities financing transactions (SFTs), derivatives positions and secondary market trading. An assessment of data gaps encountered in this exercise is provided in Annex 1.

It is recognised that there is a need to develop complementary metrics to assess risks from these types of activity, which typically involve off-balance-sheet and synthetic exposures and can run across several entities, including through network externalities. As shadow banking entities can form part of complex financial intermediation chains,⁷ the paper attempts to complement an entity-based approach, based largely on on-balance-sheet data, with an activity-based perspective. This approach is applied to selected shadow banking activities, for which market and/or supervisory data sources are identified. These identified risks and selected data are then used to underpin the development of risk metrics for the EU shadow banking system.

To ensure that shadow banking engagement across the financial system is appropriately monitored and assessed, the monitoring framework presented in this paper does not exclude entities and activities on the basis of prudential consolidation, owing to a lack of granular information on this issue. The specificity of the risks being considered, and their relation to the prudential framework already applicable to banks, is relevant in this respect. The FSB, for example, excludes entities prudentially consolidated within banking groups from the narrow perimeter of the shadow banking sector – an approach that was also followed by the European Banking Authority (EBA) in its work in this area.⁸ There are also ongoing discussions, including in the Basel Committee on Banking Supervision (BCBS), on how to take account of specific risks, such as step-in risk, in the regulatory framework.⁹ However, in terms of operationalising a monitoring approach, there are substantial difficulties arising from a lack of granular information on particular shadow banking entities and activities. Therefore this approach seems the most prudent at present, although the ESRB will closely monitor developments in this area. The aim of future assessments will be to address these data gaps in order to be able to exclude entities and activities on the basis of prudential consolidation, in line with the methodology of other international institutions (such as the FSB).

It is not possible to construct aggregate metrics which make a distinction between entities on the basis of whether they are consolidated in banking groups or not. The ESRB, in conjunction with the ESCB Working Group on Monetary and Financial Statistics (WGMFS), undertook a survey on the prudential consolidation of non-bank financial entities in EU banking groups. The survey highlighted significant data gaps with respect to the share of assets consolidated in banking groups. Data are insufficient to construct a perimeter of the assets consolidated at the EU or euro area level. One possible reason for this lack of data is the difference in the regulatory requirements and regimes

⁵ This is due to the fact the granularity of data vis-à-vis non-residents tends to be limited, and, as national accounts are based on a residential concept, foreign-resident entities are not captured.

⁶ For a discussion, see Errico et al. (2014) and Maes (2014).

⁷ A growing literature has examined the role of shadow banking entities in complex financial intermediation chains. See, for example, Pozsar et al. (2013), Adrian et al. (2013), Adrian (2014) and Cetorelli (2014).

⁸ See in particular the EBA report on the perimeter of credit institutions (EBA, 2014) and the EBA guidelines on limits on exposures to shadow banking entities which carry out banking activities outside a regulated framework (EBA, 2015a).

⁹ See the BCBS consultative document on the identification and measurement of step-in risk (BCBS, 2015), which raises issues of identification of unconsolidated entities to which a bank may provide financial support. The BCBS document proposes potential approaches to reflect step-in risk in prudential measures. See also, for example, Cetorelli (2014) and Claessens and Ratnovski (2014).



applicable to bank and non-bank financial intermediaries. As is found in the survey responses, and as highlighted in EBA (2014), there is large variation with respect to the treatment of certain non-bank financial institutions across EU Member States. The EBA has investigated entities which are not subject to prudential regulation on a solo basis pursuant to specific EU regulation and are not within the scope of prudential consolidation.¹⁰ The EBA notes that “*The survey responses ... indicate that there is some variation between the Member States in terms of the range and types of entities carrying on bank-like activities outside the solo prudential regulatory perimeter (whether under national law or relevant EU measures such as the CRD IV, AIFMD and UCITS) in each jurisdiction*”. In this context, security and derivative dealers (on own account), in particular, are identified in some countries as carrying on bank-like activities outside a prudential framework.

The need to deepen risk assessments to account for emerging or innovation-driven risks within the non-bank financial sector, which has recently been highlighted by some policymakers, is a key motivation of the current exercise.¹¹ A number of EU market directives and regulations, including the Alternative Investment Fund Managers Directive (AIFMD), the European Market Infrastructure Regulation (EMIR) and the Securities Financing Transactions Regulation (SFTR), have structural implications for the EU financial system and are instrumental in increasing data availability for the development of risk metrics for the shadow banking sector. These new data sources will facilitate enhancements to the monitoring framework and metrics as the regulatory environment evolves.

1.2 A framework of risk metrics for shadow banking

Systemic risk may emanate directly from credit intermediation activities in conjunction with maturity and liquidity transformation, leverage or imperfect credit risk transfer, or it may arise indirectly through the interconnectedness of the shadow banking system with the regular banking system.¹² Therefore, in order to assess the engagement of entities in shadow banking activities, a framework of metrics (Table 2) has been developed by the ESRB.¹³ While they are by no means an exhaustive list of the metrics that could be applied in an entity-based approach, these metrics allow a broadly consistent application across a range of entities under review. Insofar as these data are collected directly from reporting agents under ECB statistical regulations, these metrics may also be produced at a national level, and potentially also on an entity-by-entity basis.

¹⁰ See EBA (2014) for more detail.

¹¹ For example, Constâncio (2015) stresses that the “risks stemming from the shadow banking sector are sometimes understated on the ground that potential losses would be suffered by equity holders, who should be aware of the risks they are taking. The systemic risk arising from the shadow banking sector cannot be easily ring-fenced”.

¹² See, for example, FSB (2011b), p. 4.

¹³ These metrics overlap to some extent with those suggested by the FSB in its Workstream 3 on other shadow banking entities, as well as with those mentioned in the FSB’s global shadow banking monitoring reports. In line with this FSB approach, the ESRB also takes into account credit intermediation and the interconnectedness with the banking system. However, whereas the interconnectedness is included in a separate section in the FSB reports, the ESRB decided to classify it as an additional indicator category.



Table 2
Framework of risk metrics for the shadow banking system

Maturity transformation	Short-term assets / Total assets	MAT1
	Long-term assets / Total assets	MAT2
	Short-term liabilities / Short-term assets	MAT3
	Long-term assets / Short-term liabilities	MAT4
Liquidity transformation	Non-liquid assets (i.e. total assets less liquid assets) / Total assets	LIQ1
	Short-term liabilities / Liquid assets	LIQ2
	Short-term assets / Short-term liabilities (current ratio)	LIQ3
	Liquidity mismatch: Liquid liabilities less liquid assets, as share of total assets	LIQ4
Leverage	Leverage = Debt / Total assets	LEV1
	Leverage multiplier = Total assets / Equity	LEV2
Credit intermediation	Loans / Total assets	CRE1
	"Credit assets" (loans and debt securities) / Total assets	CRE2
Interconnectedness with the regular banking system	Assets with credit institution counterparty / Total assets	INT1
	Liabilities with credit institution counterparty / Total assets	INT2

Note: See Annex 2 for further information on available data for the input to these metrics. The ESRB will continue to review possible ways to develop benchmark values for each indicator which can be used in future monitoring frameworks.

The above risk indicators have a number of limitations when focusing on more specific sources of risk. The available data on entities' balance sheets lack the granularity which would ideally be required for a comprehensive analysis, in particular on liquidity and maturity of assets and liabilities. Furthermore, data on off-balance-sheet exposures are typically not available. These may be an additional source of risk, or alternatively may mitigate some of the on-balance-sheet risks. The following provides targeted ways to practically address such issues, drawing on currently available data or soon to be available data arising from forthcoming EU data collections. In particular, the analysis underpinning the current risk framework highlights the following issues.

- Liquidity:** The scope for assessing liquidity risk, including maturity and liquidity transformation, on the basis of the entity-based framework is limited. The risk framework is significantly enhanced by considering shadow banking activities primarily involving the liquidity of funding and securities markets.¹⁴ As shadow banking activities can take place across complex financial intermediation chains, which can also include banks, insurance corporations and pension funds, it is important to also consider an activity-based approach to capture risks that cut across entities. The use of additional datasets on off-balance-sheet exposures can also form a useful complement to financial accounts data.¹⁵ However, this approach raises challenges in terms of data availability, typically related to dealers' market-making,¹⁶ or in funding markets, where a preliminary one-off data collection was conducted by the ESRB in 2013, but official EU data will only be available upon implementation of the SFTR¹⁷ in 2018.

¹⁴ Academic concerns about the interactions between funding and market liquidity (see, for example, Brunnermeier and Pedersen, 2009) were emphasised more recently by the Bank of England (see, for example, Box 4 in the Bank of England's December 2014 Financial Stability Report).

¹⁵ Pozsar (2014) calls for "Flow of Collateral, Flow of Risk, Flow of Eurodollar satellite accounts to supplement the Financial Accounts".

¹⁶ In order to assess risks in the investment fund and market-making sectors, the ESRB conducted a **data collection exercise** covering 274 EU asset management firms and 1,668 fixed-income investment funds in 2015.

¹⁷ **Regulation (EU) 2015/2365 of the European Parliament and of the Council of 25 November 2015 on transparency of securities financing transactions and of reuse and amending Regulation (EU) No 648/2012.**



- **Credit intermediation and leverage/synthetic exposures:** The use of derivatives data on the risk exposures of shadow banking entities, in addition to the current balance sheet data, is likely to considerably improve future risk assessments. In this respect, the risk assessment appears to be usefully complemented by an activity-based mapping approach which draws on market and trade repository data sources.
- **Interconnectedness:** More granular data would allow a who-to-whom matrix of financing flows involving shadow banking entities as part of the financial accounts framework. In addition, the integration of new micro-level data on funding, derivatives and securities markets, as well as on specific entities is likely to enhance future risk assessments. Box 2 provides further detail on assessing shadow banking interconnectedness.

The following sections present an entity-based and an activity-based mapping of the broad European shadow banking system. With respect to the entities under review, it is considered that a broad overview of non-bank financial entities (excluding insurance corporations and pension funds) is most appropriate in order to capture potential risks arising from this part of the financial system, including those parts where detailed data are not currently available. Within this, based on the risk metrics framework and underlying analysis, an assessment of entities is made in order to identify those entities most relevant from a shadow banking perspective.

Whereas much of the data underlying the report is also available at a national level, the report focuses on the European system as a whole.¹⁸ While some parts of this system may be particularly concentrated in specific countries within the single market, the primary focus is on the integration and cross-border nature of the activities involved. However, further national-level analysis may be necessary for the purposes of further systemic risk identification and of implementing the applicable micro- and macro-prudential policies.

¹⁸ In some cases the analysis is restricted to the euro area owing to the greater availability of data.



Section 2

Entity-based mapping of shadow banking in Europe

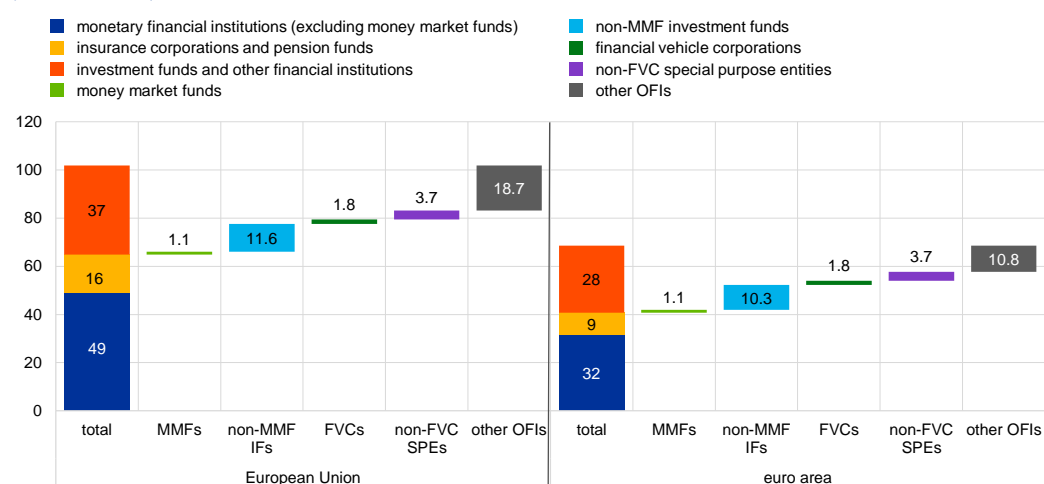
This section of the paper presents an overview of the broad shadow banking system – non-bank financial intermediaries (excluding insurance corporations and pension funds) – using an entity-based mapping approach. In addition, the linkages of non-bank financial intermediaries with financial and non-financial sectors are also assessed. This analysis underpins the construction of risk metrics using granular monetary statistics, complemented by alternative data sources where available, to identify the entities most relevant from a shadow banking perspective.

2.1 A broad measure of shadow banking in Europe

Under a “broad measure” – i.e. based on investment funds and OFIs – the shadow banking system in the EU amounted to €37 trillion, or 36% of the EU financial sector, in the fourth quarter of 2015, while in the euro area it amounted to around €28 trillion (Chart 1). According to this measure, the shadow banking system has almost tripled in size since 2004 in both the EU and euro area, partly due to transactions but also due to asset valuation and other effects (Chart 2).¹⁹ Furthermore, the shadow banking system in the EU grew by 22% between the end of 2012 and the end of 2015. In contrast, total assets of the EU banking system declined by 5% over the same period, so the broad shadow banking system has grown rapidly relative to the regular banking system (Chart 3). Consequently, the shadow banking system now forms an integral part of the EU financial system and a detailed monitoring framework is therefore required in order to assess risks emanating from this part of the financial system.

Chart 1
EU and euro financial sectors and composition of the broad measure

(€ trillions; Q4 2015)



Sources: ECB, De Nederlandsche Bank (DNB) and ECB calculations.

Notes: Non-FVC SPEs are vehicles not engaged in securitisation transactions. Data are currently only available for non-FVC SPEs resident in the Netherlands (based on preliminary data). Data on FVCs are available only for the euro area. “Other OFIs” cover those where no further breakdowns are available.

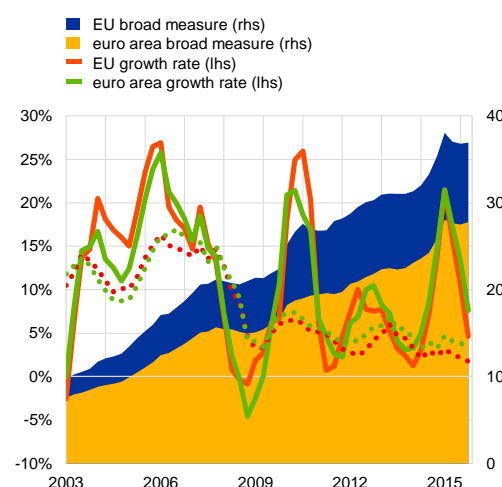
¹⁹ As noted in Chart 2, other effects can include FX or other revaluations and statistical reclassifications.



As shown in Table 1, it is possible to distinguish further categories of entity within the broad measure. A basis for this categorisation is the statistical classification of entities under the framework of the European System of regional and national Accounts (ESA 2010) which provides the legal framework for the compilation of European financial and non-financial statistics. In addition, the statistical requirements on the (euro area) financial sector under ECB regulations and guidelines also provide a basis for harmonised definitions of institutions. Furthermore, data may be available from other sources, such as ad hoc data collections and surveys.

Chart 2
Broad measure of EU and euro area shadow banking

(€ trillions; annual growth rates; last observation: Q4 2015)

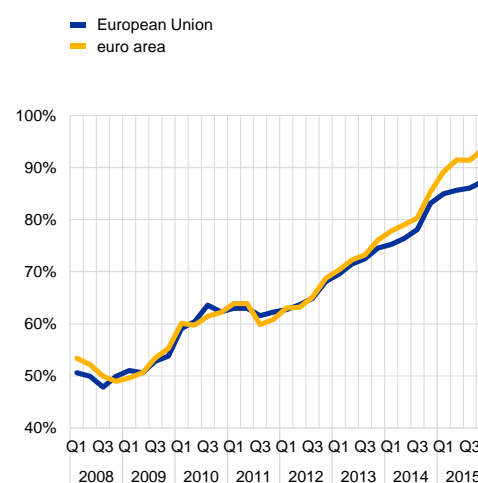


Sources: ECB and ECB calculations.

Notes: Annual growth rates based on changes in outstanding amounts are indicated with the continuous lines. Dotted lines indicate annual growth rates based on transactions – i.e. excluding the impact of FX or other revaluations and statistical reclassifications.

Chart 3
Broad measure as a percentage of credit institutions' total assets

(percentages)



Source: ECB.

For the euro area, the largest component of the broad measure is investment funds, with MMFs and non-MMF investment funds accounting for €1.1 trillion and €10.3 trillion respectively. FVCs account for €1.8 trillion of the broad measure, while available data on non-securitisation SPEs account for a further €3.7 trillion. However, a very large share of the broad measure lies outside of these sub-categories and forms the residual “other OFIs”, which amounts to €10.8 trillion (39% of the broad measure). This includes heterogeneous entities that are not covered by regular statistical collections and for which balance sheet data and information on activities are clearly lacking (see Annex 1). As the statistical data for the euro area are more complete than for the EU as a whole, this residual makes up a larger relative share (around half of the broad measure) for the EU.

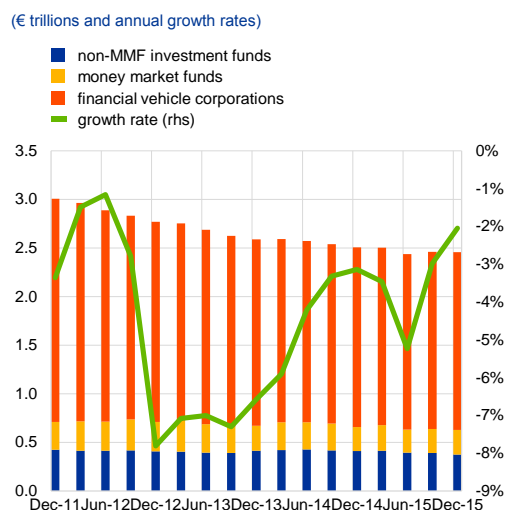
2.2 Narrowing down components of the broad measure

The broad measure of shadow banking, namely the total assets of OFIs and investment funds, is useful as a harmonised basis for international comparisons and for using available statistics to assess the interconnectedness of sectors. However, such a broad measure also includes entities which bear little relevance when assessing shadow banking risks to financial stability, such as holding companies of non-financial corporations (NFCs), entities consolidated into banking groups and subject to prudential regulation and specialised financial institutions (SFIs) which may be set up for the management of intra-group transactions. Nevertheless, within those parts of the broad



measure that are directly linked to financial activities, distinctions can be made concerning the degree of “shadow banking” attributes and risks.

Chart 4
Wholesale funding by euro area non-banks



Sources: ECB and ESMA calculations.
 Notes: Amount of wholesale funding by non-banks. For investment funds and money market funds, the part of debt securities holdings issued by euro area MFIs is shown.

It is evident that there is significant heterogeneity in OFI engagement in shadow banking activities. The mapping of entities to critical shadow banking functions is a means of assessing the level of engagement in shadow banking risks – i.e. along the dimensions of maturity and liquidity transformation, leverage, credit intermediation and interconnectedness with the regular banking system – and the engagement in selected activities. This approach provides an indication of the overall relevance of these entities for shadow banking, whereby those with a greater level of engagement in risks may be considered to be within the narrower concept of shadow banking.²⁰

The shadow banking system has many different functions. The FSB describes it broadly as “credit intermediation involving entities and activities outside the regular banking system”. However, market-based finance also represents

a way to finance assets indirectly, by providing wholesale funding to banks through unsecured commercial paper or secured wholesale funding such as securitisation or repos (Chart 4). The financial crisis exposed the vulnerabilities associated with the wholesale funding that is provided by the shadow banking system. In particular, money market fund investors can divest from financial commercial paper, especially when MMFs offer redemption at par and on demand. Furthermore, in times of stress, the repo market can be unstable, as the use of leverage means that large asset sales can be triggered by small declines in prices.²¹

A lack of data means that it is not possible to construct metrics for investment funds and OFIs as a whole. The following sections deal, in turn, with investment funds and securitisation vehicles, where detailed balance sheet data allow risk metrics to be constructed, before turning to the remaining parts of the OFI sector where data are still lacking, in particular, on non-securitisation SPEs and holding companies, financial corporations engaged in lending and security and derivative dealers.

2.3 Investment funds

Total assets of EU investment funds²² amounted to €12.7 trillion in the fourth quarter of 2015, of which the euro area accounted for €11.4 trillion.²³ Assets managed by these funds have expanded

²⁰ In some cases, the analysis relies on expert judgement and therefore the engagement of non-bank financial institutions in shadow banking activities may not be fully stabilised. For an overview, see Table 1 in ESRB (2016a).

²¹ However, it must be noted that evidence from the academic literature suggests that volumes in the repo market remained relatively resilient in recent periods of stress. See, for example, Boissel et al. (2015) and Perignon et al. (2016).

²² As detailed in Section 2.1, the category “investment funds” includes MMFs and non-MMF investment funds.

²³ ECB investment fund statistics are available for all EU Member States except Bulgaria, Croatia, Denmark, Sweden and the United Kingdom. Data for these countries are sourced from available quarterly financial accounts data.



strongly over the past few years, almost doubling since the end of 2009. Positive net inflows as well as valuation effects have contributed to this strong growth. Geographic concentration is high in the fund sector, with more than 90% of assets under management domiciled in a few countries, including Luxembourg, Germany, Ireland, the United Kingdom, France and the Netherlands. While the risks may be mapped to other countries, the country of domicile is important in determining the geographic locus of potential supervisory measures.

Some types of fund tend to be more prone to shadow banking risk than others owing to their funding structures and the type of asset they invest in. Owing to the large diversity of the sector, views diverge as to what extent investment funds should be considered part of the shadow banking sector. Under the FSB economic functions approach, described in FSB (2015), authorities regard investment funds as part of the shadow banking sector if the funds display “features that make them susceptible to runs”.²⁴

Part of the EU investment fund sector engages in maturity and liquidity transformation and may be subject to run risk, i.e. to the extent that fund shares are callable at short notice. Some funds, especially in the hedge fund sector, are significantly leveraged, while others have moderate leverage created through securities lending or derivatives exposure. In some jurisdictions, investment funds are allowed to originate loans and thus serve as vehicles for direct credit intermediation.²⁵ In addition, as bond funds hold fixed income securities, they may be regarded as facilitating indirect credit intermediation, and they may be subject to liquidity and/or maturity transformation, depending on their asset and liability structure. On this basis, investment funds should be monitored as part of the broad EU shadow banking system.

Any metric based on aggregate statistics masks heterogeneity between various types of fund and risk at the entity level. A breakdown by investment focus, such as bond, equity and mixed funds therefore appears useful (see Charts 5 to 10).²⁶ Other breakdowns, such as liability structures and regulatory constraints, are also considered.

²⁴ See FSB (2015).

²⁵ Further to a Central Bank of Ireland initiative (see Central Bank of Ireland, 2015), the ESRB assessed investment fund loan origination risk in the EU, and its General Board provided the Central Bank of Ireland with recommendations, including the need to monitor risks in this market. More recently, a number of other jurisdictions, including France, have opened consultations on allowing investment funds to originate loans. For an overview of national practices for loan originating funds, see ESMA (2016a).

²⁶ As shown in Table 1, funds can be categorised according to their investment policies. Categorisations include equity funds, bond funds, mixed funds (investing in both equity and bonds with no policy in favour of one or the other), real estate funds, hedge funds and “other” funds. Funds of funds are classified according to the category of funds in which they primarily invest.



Chart 5
EU investment funds: Net asset values

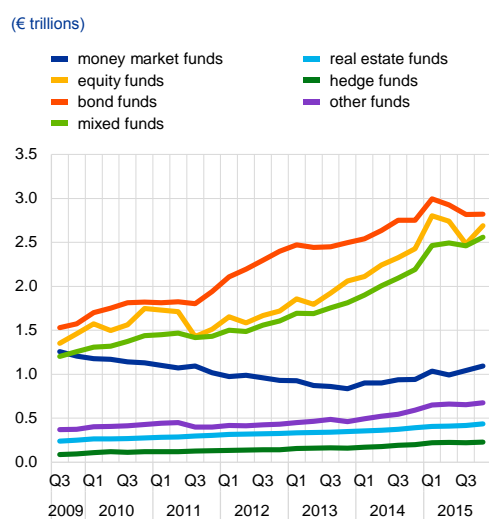
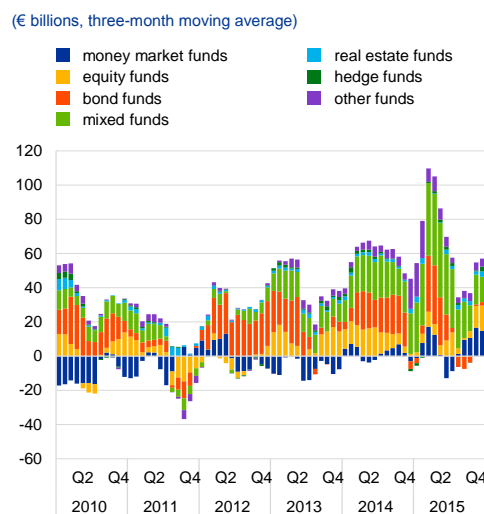


Chart 6
EU investment funds: Net issuance



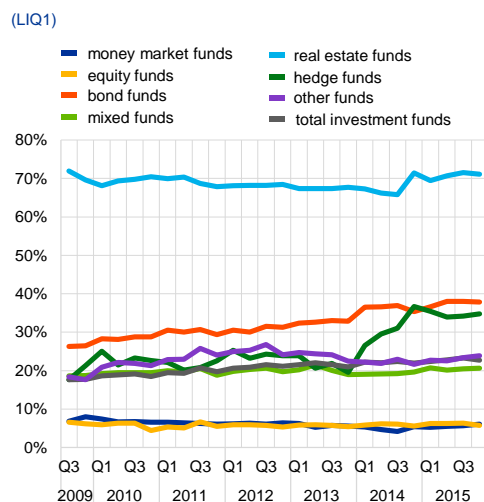
Using ESCB balance sheet statistics, investment funds can be distinguished by their type of openness, i.e. whether they are open-end or closed-end funds. For open-end funds, the number of outstanding shares may vary on a daily basis, whereas closed-end funds have a fixed number of publicly traded shares or units. Closed-end funds are therefore limited in their ability to perform liquidity transformation and should in principle be monitored separately from open-end funds. Closed-end funds account for only 2% of non-MMF investment fund assets and are of minor significance across all fund types except for real estate funds, where 20% are closed-end. Due to the relatively small size of closed-end funds, the metrics presented in this paper cover both closed- and open-end funds, except for liquidity transformation (Chart 7), which refers only to open-end funds. Furthermore, both categories of fund can engage in securities financing transactions (repo and securities lending), which are critical functions associated with shadow banking risk.

In the EU, investment fund leverage and liquidity are regulated by the Undertakings for Collective Investments in Transferable Securities (UCITS) Directive and the AIFMD. Regulations and supervisory practices can vary between the two types of fund. For instance, the UCITS Directive imposes direct restrictions on the use of balance sheet and synthetic leverage, whereas AIFMD does not place any hard limits but requires the asset manager to apply “reasonable” leverage limits to the funds it manages. For the purpose of risk monitoring, it may therefore be useful to distinguish between UCITS and alternative investment funds (AIFs). Where official ECB investment fund statistics do not allow such differentiation, other data sources can be considered.

Risks to the stability of the financial system result from liquidity and maturity transformation, leverage, credit intermediation and remaining opacity of the investment fund sector. The greater the leverage, liquidity and maturity mismatches, and the greater the size of investment funds, the more likely they are to experience distress and impose externalities on other parts of the financial system. Relevant risk metrics for the fund sector therefore include measures of leverage, credit intermediation as well as liquidity and maturity transformation (see Charts 7 to 8).

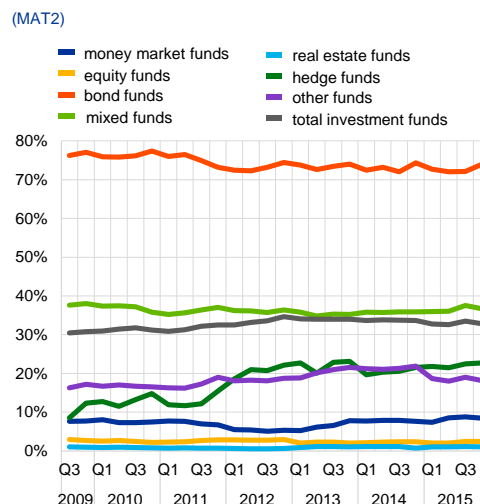


Chart 7
Liquidity transformation by investment funds



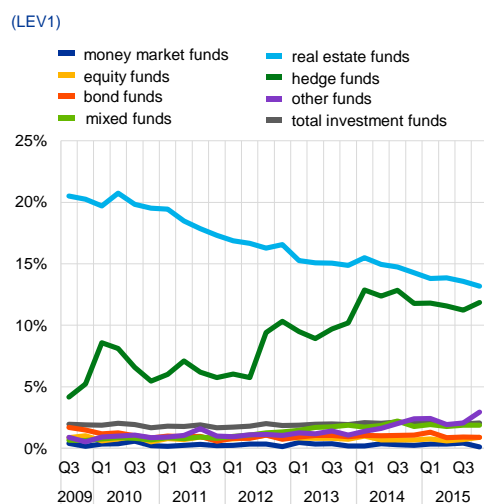
Source: ECB.
 Notes: Based on available data for the EU; Bulgaria, Croatia, Denmark, Sweden and the United Kingdom are not included. Total assets less liquid assets (deposits, sovereign bonds, debt securities issued by MFIs and equity and investment fund shares), as a share of total assets. Closed-end funds are not included. Estimates are made for holdings of non-euro area securities and funds not resident in the euro area.

Chart 8
Maturity transformation by investment funds



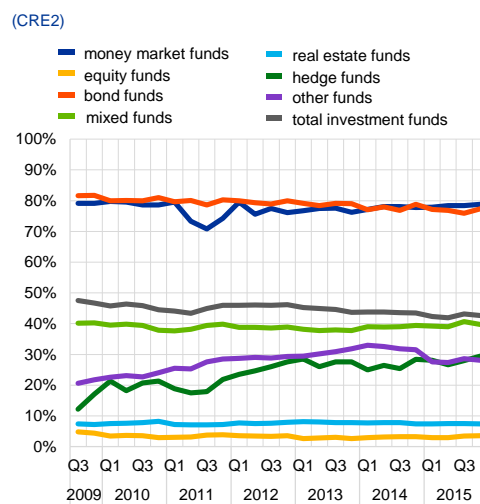
Source: ECB.
 Notes: Based on available data for the EU; Bulgaria, Croatia, Denmark, Sweden and the United Kingdom are not included. Maturity transformation by investment funds expressed as the ratio of long-term assets (with original maturities over one year) to total assets. By this measure, maturity transformation is low for equity funds and real estate funds (which invest in non-financial assets).

Chart 9
Investment funds' financial leverage



Source: ECB.
 Notes: Based on available data for the EU; Bulgaria, Croatia, Denmark, Sweden and the United Kingdom are not included. Leverage is calculated as the ratio of loans received to total liabilities.

Chart 10
Credit intermediation by investment funds



Source: ECB.
 Notes: Based on available data for the EU; Bulgaria, Croatia, Denmark, Sweden and the United Kingdom are not included. The credit intermediation ratio is calculated as holdings of loans and debt securities to total assets.

Most open-end investment funds issue equities that are withdrawable on demand, while investing in possibly less liquid assets. Liquidity transformation in funds arises when investors are offered a greater degree of access to their investments than is consistent with the ease with which the corresponding assets can be sold without a material price impact. There is a risk that the provision of such access could cause investors to believe that their investments are more liquid than is the



case. Unlike depositors' claims on banks, which are in general redeemable at a given value, holders of shares in investment funds are exposed to market valuation effects.

The reliance on demandable equity is a key mechanism in understanding how investment funds may amplify market shocks. One of the main vulnerabilities is the potential of the sector to amplify liquidity shortages in periods of financial stress. If funds were confronted with high redemptions or increased margin requirements, these could result in forced selling in markets with low liquidity. With these liquidity conditions, initial asset price adjustments would be amplified, triggering further redemptions and margin calls, thereby fuelling negative liquidity spirals. Liquidity and maturity transformation is therefore present among different types of funds to varying degrees.

First-mover advantages may create run-like risks, but can be mitigated using adequate redemption and pricing techniques. Where trading costs of redemptions are borne by remaining investors, this might create incentives for investors to redeem earlier than others. Fund practices can reduce or mitigate these incentives.²⁷

It is useful to distinguish between liquidity and maturity of the assets held by investment funds, as both require different metrics for monitoring. Long-term assets – such as highly-rated 10-year government bonds – may be tradable in liquid markets, while some short-dated assets may not be as liquid. Investment funds with high maturity mismatches are sensitive to interest rate risk, whereas funds that have significant liquidity mismatches may be unable to sell assets quickly. Bond funds often manage the risk involved in liquidity and maturity transformation by making a trade-off between the two types of risk (see Box 1). Where funds face the risk of large-scale redemptions, liquidity transformation is a more relevant risk metric than maturity transformation.

AIFs and UCITS obtain leverage through borrowing, derivatives (futures, options, and swaps), securities lending, and repurchase agreements. These transactions can either incur contingent debt obligations under the derivative contract, such as with a swap or future (indebtedness leverage), or provide increased market exposure without incurring future obligations, such as with a purchased option or structured note (economic leverage). Due to the potential future obligation, the former may pose more risks to the two parties.

One of the main reasons why the use of leverage in investment funds may require close monitoring is that liabilities tend to be either on an overnight basis or subject to margin re-setting. Therefore, investment funds can find themselves subject to stress, owing to the capacity of lenders to leveraged investment funds to re-set margins and haircuts on an overnight or short-term basis. The monitoring of such stress lends itself to the use of metrics based on higher frequency data, such as from the EMIR or the SFTR (see Section 3 on activity-based monitoring).

Data availability still limits the ability of authorities to monitor synthetic leverage from a financial stability perspective, i.e. taking into account both on-balance-sheet and off-balance-sheet exposures. The European Securities and Markets Authority (ESMA), which is tasked with harmonising reporting practices, can request access to supervisory data from national authorities. However, supervision of investment funds remains vested de facto in national authorities, and statistical data on exposures and synthetic leverage in the investment fund industry are not collected in a systemic manner at the European level.²⁸

Metrics for leverage, maturity and liquidity derived from available statistical data may lack important dimensions. Metrics that measure liquidity transformation rely on developing tentative classification

²⁷ For example, funds that sell assets of varying liquidity (i.e. a "vertical slice") from across their portfolio to meet large scale redemptions can mitigate first-mover advantage that may arise from selling liquid assets first.

²⁸ In addition, currently there is no single, harmonised measure of leverage within the investment fund sector.



schemes based on asset types. Deposits, sovereign bonds, debt securities issued by MFIs, equities and investment fund shares are all considered liquid assets for the purpose of the proposed risk metrics. For instance, the liquidity transformation indicator presented in Chart 7 measures the share of assets excluding the above liquid assets as a share of total assets. This metric reflects a comparably high level of liquidity transformation for real estate funds and bond funds, but less so for equity funds.²⁹ Another presumption is made regarding redeemability of fund shares, where all shares are deemed to be redeemable at short notice, which may not be the case for some real estate and hedge funds. A similar challenge exists regarding measures of maturity transformation, where the statistical data allows a breakdown by initial maturity but not by remaining maturity. Finally, measures of leverage based on statistical data do not capture a prevalent form of leverage by investment funds which are created synthetically (see discussion below).

Comparing headline leverage in the investment fund sector to banks clearly shows how differently these two sectors intermediate credit and perform liquidity and maturity transformation. Available evidence suggests that for a large part of the EU hedge funds industry, leverage is primarily achieved using derivatives, and any unsecured financial leverage appears minimal in aggregate. Therefore, headline and financial leverage ratios are generally low for most investment funds. This notwithstanding, some hedge fund strategies are known to involve higher leverage, such as relative-value and global macro strategies. Leverage in investment funds tends to be either on an overnight basis or is withdrawable on demand (or subject to margin re-setting).³⁰ This reliance on overnight or short-term leverage, where it occurs, is a key mechanism in understanding how leveraged investment funds can find themselves subject to stress.

Box 1

Trading off liquidity and maturity transformation

Using a simple metric of weighted asset liquidity,³¹ it can be shown that most bond funds in the Lipper IM database (Chart 11) that invest in assets with longer maturity compensate by investing in more liquid assets (Chart 12). Funds investing in sovereign bonds are the ones most engaged in maturity transformation, but they also hold comparatively liquid assets and should be able to trade their securities before maturity, if necessary. By contrast, high-yield bond funds and loan funds (14% of the sample) are characterised by high liquidity transformation and lower than average maturity transformation. This compensation may be more a consequence of the asset characteristics than a deliberate investment strategy (sovereign bonds are usually both the longest-dated and the most liquid debt securities), but it contributes to mitigating the risks. Conversely, the minority of funds combining liquidity and maturity transformation may be regarded as having a riskier profile.

²⁹ One difficulty in interpreting measures of liquidity transformation that rely on the relative size of liquid assets is that funds may sell a "vertical slice" of assets as per footnote 27. The size of funds' holdings of liquid assets may therefore not be a good measure of the ability of funds to meet large scale redemptions, although they can give some idea of overall liquidity of fund assets in some cases.

³⁰ Adrian and Shin (2010) document high and growing leverage ratios of financial institutions, reaching debt-to-equity ratios of 30 or more for dealer banks. Much of this debt is short-term collateralised loans.

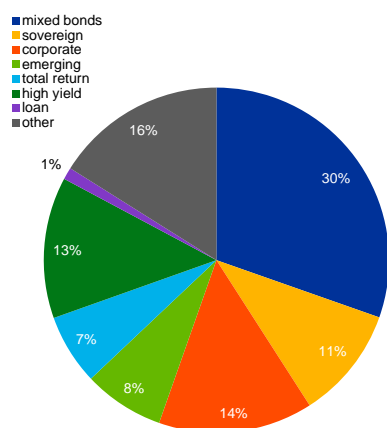
³¹ Each security in the fund portfolio is weighted according to its liquidity, as defined in the banking regulatory framework. A weight of 80% for a security indicates that, under stressed circumstances, the fund should be able to sell the security immediately for more than 80% of its market value. Finally, the ratio is calculated as weighted assets as a percentage of assets under management (AuM). It represents the part of the portfolio that could be sold immediately in a stressed environment.



Chart 11

Different types of bond fund

(percentages; Q4 2015)



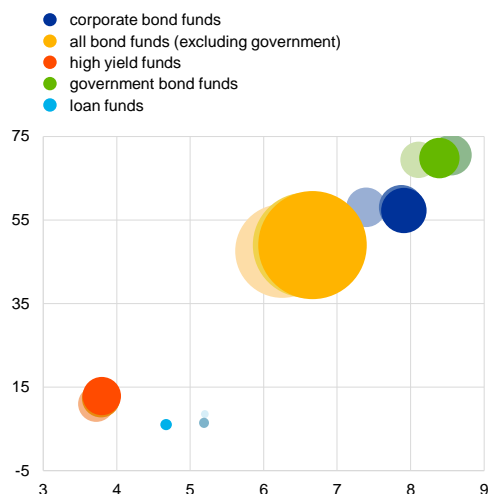
Sources: Thomson Reuters, Lipper, ESMA.

Notes: EU bond funds by assets and strategies at end-2015. The "other" category includes convertible, inflation-protected, hedged, medium-term, long-term, guaranteed, target maturity, short-term.

Chart 12

Bond fund arbitrage between liquidity and maturity transformation

(percentages; Q4 2015)



Sources: Thomson Reuters, Lipper, ESMA.

Notes: Fund type is reported according average liquidity ratio in % (Y-axis), the effective average maturity of their assets in years (X-axis), and their size. Each series is reported for 3 years, i.e. 2013 (light), 2014 (mid tone) and 2015 (dark).

Measures of asset credit quality usefully complement the assessment of liquidity risk, as credit quality usually correlates positively with the ease of selling assets quickly. Combining rating information from Standard & Poors with fund-level data from Lipper IM, it can be seen that the share of holdings rated AAA declined from 28% in the second quarter of 2011 to 15% in the fourth quarter of 2015, while that of holdings rated BBB or less rose from 39% to 55% (Chart 13).

The data also show that average maturities have been rising over the past two and a half years in the low-yield environment. The weighted average maturity (WAM) of bond funds (Chart 14) declined between the first quarter of 2008 and the third quarter of 2013 from 9.5 to 7.8 years. More recently, it has picked up again and reached 8.6 years in the fourth quarter of 2015.³²

Table

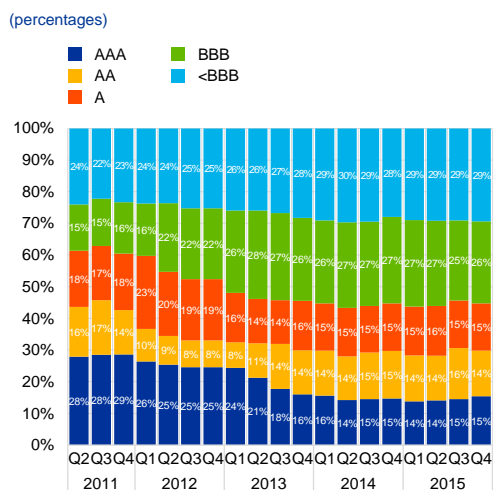
Asset	CQS 1	CQS 2	CQS 3	<CQS 3
Cash	100	100	100	100
Sovereign bonds	100	85	50	0
Corporate bonds	85	50	50	0
Shares	50	50	50	50

Note: CQS refers to credit quality step.

³² A degree of substitutability between liquidity and maturity transformation is, however, highlighted in ESMA (2015).

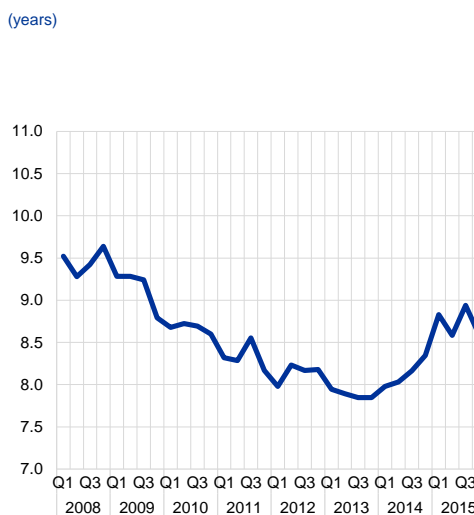


Chart 13
Average rating of EU bond fund holdings



Sources: Lipper, ESMA.

Chart 14
Weighted average maturity of EU bond fund assets



Sources: Lipper, ESMA, Standard & Poors.

2.4 Financial vehicle corporations

Financial vehicle corporations (FVCs) are an important part of the financial system owing to their central role in bank funding and credit risk transfer.³³ Since the financial crisis, however, the relevance of securitisation for shadow banking has declined (Chart 15). Securitisation supports credit provision in the system, and this has recently been encouraged by official initiatives³⁴ which have sought to address the impairment of securitisation as a funding tool for the banking system.

FVCs as a whole are highly connected with banks as originators and through the reliance of MFIs on securitisation for funding. Around 60% of the assets of euro area FVCs are linked to euro area MFIs. This mainly arises through loans originated by MFIs which are securitised using euro area FVCs, which stood at €1.2 trillion in the fourth quarter of 2015, most of which concerned loans to euro area households and NFCs (Chart 16). With regard to securitised loans not originated by euro area MFIs, FVCs held €76 billion and €66 billion of loans to euro area households and NFCs respectively in the fourth quarter of 2015. Non-MFI originators have securitised €75 billion in loans to non-euro area residents using euro area FVCs, mainly concentrated in FVCs resident in Ireland, Luxembourg and the Netherlands.

Much of the securitisation activity following the crisis has been in retained deals, i.e. they are not placed in the market but are used for collateral purposes – for example in central bank refinancing operations. As such, retained securitisations – approximately half of outstanding debt securities – do not contribute to interconnectedness, leverage, maturity or liquidity transformation outside the

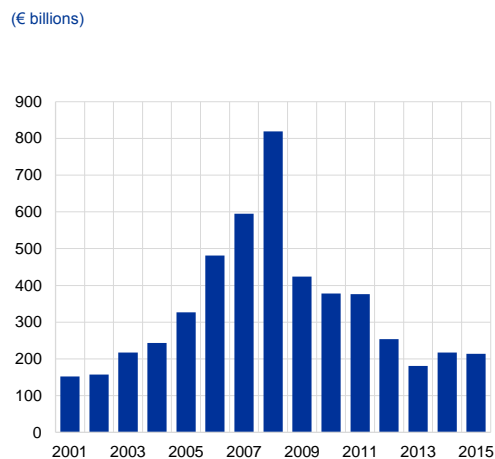
³³ See, for example, Pozsar et al. (2013), which states “The shadow banking system is organized around securitisation and wholesale funding.”

³⁴ See, for example, the joint ECB/Bank of England paper on the EU securitisation market (ECB and Bank of England, 2014) and the proposal on simple, transparent and standardised (STS) securitisation, which is a key component of the Action Plan on Building a Capital Markets Union (European Commission, 2015).



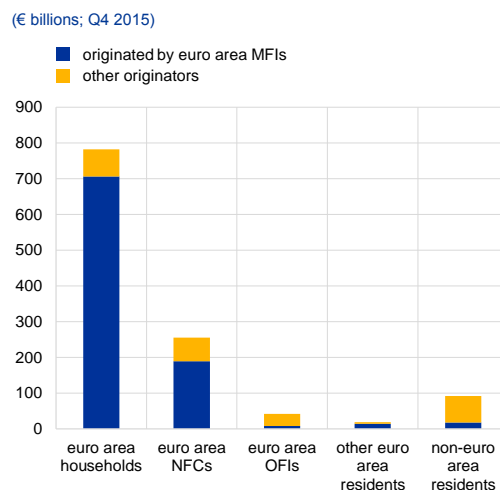
regular banking perimeter and can therefore be largely disregarded from the perspective of shadow banking.³⁵

Chart 15
European securitisation market annual gross issuance



Source: AFME.
Note: AFME data on European issuance includes EEA countries and certain non-EEA countries located on the geographic European continent.

Chart 16
Loans securitised by euro area FVCs by borrowing sector



Source: ECB.

Credit risk transfer is the purpose of most transactions. Loans securitised by euro area FVCs have increased slightly as a share of total assets, but have declined in absolute terms,³⁶ mainly in loans originated by euro area banks, but loans originated by other entities have also been relatively important (Chart 16). Also important for credit risk transfer are synthetic securitisations in which FVCs enter into credit default swaps or loan guarantees. Debt securities issued by FVCs engaged in synthetic transactions totalled €69 billion in the fourth quarter of 2015 – around one-third of the amount at the end of 2009 – but this may underestimate the true extent of credit risk transferred, as synthetic securitisations may not be “fully funded”, i.e. they may guarantee nominal amounts of credit which exceed the capital raised (this is not captured in the ECB data).

Through securitisation, FVCs play an important role in transforming illiquid assets (usually loans) into marketable securities. As such, they can play a role in allowing banks to better manage liquidity and maturity mismatches between their assets and liabilities. Funding liquidity risk for FVCs is generally low, except during the warehousing phase, or unless longer-term assets are being financed, as FVCs do not generally need to meet liabilities by liquidating assets in the market. By design, the leverage of FVCs is very high – the vast majority of their liabilities are debt securities, while they typically have only the minimum statutory shareholders’ equity required in the respective jurisdiction.

³⁵ However, in case retained securitisations should be placed with investors in the future, they should again be taken into account.

³⁶ Note that for statistical purposes, securitised loans are reported on the balance sheet of FVCs regardless of the accounting treatment (i.e. derecognition or non-derecognition from the originator’s balance sheet). Loans securitised by euro area MFIs and not derecognised amounted to €444 billion at the end of 2015, of which €427 billion was securitised using FVCs resident in the euro area.



2.5 Other entities

The residual of OFIs not covered by detailed data collections accounts for over half of the broad measure of shadow banking in the EU and euro area. Despite these data limitations, this section describes the main components of the residual on the basis of national data collection exercises and ad hoc data collections and surveys. Drawing on these sources, the section discusses why these entities should also be considered when designing a monitoring framework for the broad shadow banking system in the EU.

2.5.1 Non-securitisation special purpose entities and holding companies

Non-securitisation SPEs and holding companies represent a substantial share of the residual part of the OFI sector.³⁷ These entities may, for example, engage in transactions on behalf of their parent corporations and multinational groups in order to raise finance or to facilitate intra-group transactions. While a lack of granular data currently impedes an assessment of their engagement in shadow banking activities, these entities can form part of financial intermediation chains, add to the complexity of the financial system and be interconnected with the regular banking system. These entities are currently known to be active mainly in a small number of countries in the euro area (Ireland, the Netherlands and Luxembourg), and there is some degree of heterogeneity across entity types and countries.

Data coverage for non-securitisation SPEs and holding companies is generally less granular than for FVCs and varies across jurisdictions, but significant progress has been made regarding such data. In the case of Ireland, for example, a new non-securitisation SPE data collection process was introduced in the third quarter of 2015. This data collection is based on the application of the FVC granular reporting form to SPEs which are not principally engaged in securitisation, and is currently being analysed within the Central Bank of Ireland.³⁸ Similarly, in the Netherlands, De Nederlandsche Bank now collects monthly survey data on SFIs which include information on individual sub-sector components, such as holding companies.

These entities often have little or no operational linkages with the countries in which they are established. The main rationale for their location is the presence of financial services providers and fiscal planning. Typical examples include entities established to carry out specific objectives other than securitisation (as is the case for Irish non-securitisation SPEs), or entities that hold assets on behalf of another entity (as in Dutch holding companies). There are several reasons why Ireland, the Netherlands and Luxembourg are attractive places for business, such as their networks of tax treaties, holding regimes and intra-group financing regimes. In general, many of these entities are set up strategically by corporations for the purpose of benefiting from a favourable tax treatment and reduced tax rates. Consequently, setting up an international corporate structure around countries such as the Netherlands, for example, is very common practice and the majority of foreign multinationals have at least one entity there.³⁹

Non-securitisation SPEs and holding companies might be excluded from a narrow view of shadow banking if they are not part of a credit intermediation chain (i.e. related to non-financial groups) or are consolidated into a financial group for the purposes of prudential regulation. A common model

³⁷ Preliminary data for end-2015 from the DNB show €3.7 trillion in total assets, which represents around 13% of the euro area broad measure (Chart 1). Entities linked to non-financial groups (e.g. oil companies, the telecom sector or the pharmaceutical industry) account for 92% of the assets, while the remaining 8% are linked to financial groups.

³⁸ See Godfrey et al. (2015).

³⁹ See Broos et al. 2012 and van der Veer et al. (2015).



defines an entity which is part of a financial intermediation chain, with borrowings on both sides of the balance sheet, whose primary role is to circulate financing among the different group entities. Instead of financing the activities of a subsidiary through its local market, a multinational may choose to issue all the company's debt in a single country and subsequently pass on these funds to other entities. As long as these financing flows stay within the group, they do not represent credit intermediation consistent with the functioning of a bank. Specifically, finance companies have loans on the asset side of their balance sheet which are matched almost identically by bond financing on the liability side (having the same interest rates), so no maturity mismatch or credit intermediation occurs. The beginning and end of the financial chain are the same as if the debt were issued by the local entity, but the chain itself is longer. The risks from (additional) maturity or liquidity transformation are negligible. However, these structures could represent considerable risks in terms of complexity and resolution, particularly when they involve multinational financial groups.

Consolidation within a financial group is particularly relevant for non-securitisation SPEs and holding companies. Those that are consolidated as part of a financial group, such as an internationally active bank or insurer, may have a substantive role in the international credit intermediation chain, but are likely to be captured by consolidated supervision abroad. The availability of consolidated information, together with unconsolidated data, would assist in progress towards more effective crisis resolution.

More granular data for such entities throughout the euro area would also be of considerable benefit, not least in determining the relevance for shadow banking. Although non-securitisation SPEs and holding companies appear to have a limited engagement in shadow banking activities, they do add to the complexity of the financial system. Therefore, a closer examination by supervisors of these entities' activities at a granular level may be warranted, with a more complete picture of the sector allowing for a full structural and risk policy assessment.

2.5.2 Security and derivative dealers

Security and derivative dealers (SDDs) are investment firms which are authorised to provide investment services to third parties by investing in securities on their own account.⁴⁰ SDDs may be considered part of the EU shadow banking system as they undertake liquidity and maturity transformation. SDDs utilise the potential from both sides of the balance sheet and optimises the use of all available sources while taking into account the risks associated with each type of liquidity source. On the liability side, securities firms can obtain funding in a variety of forms, both secured and unsecured, from a variety of lenders and for a variety of maturities. On the asset side, high-quality liquid securities can be easily and quickly converted into cash, used to obtain liquidity through the use of repurchase agreements (repos and securities lending) or posted as collateral to support various trading strategies. Each liquidity source, be it on the asset or liability side of the balance sheet, has its own characteristics in terms of cost, availability, maturity and, importantly, liquidity risk.

⁴⁰ The principal activities of SDDs include, in accordance with the ECB statistical definition: (i) trading on their own account and/or at their own risk in new or outstanding financial instruments through the acquisition and sale of those financial instruments for the exclusive purpose of benefiting from the margin between the acquisition and sale price (this also includes market-making activities); (ii) underwriting of financial instruments and/or placing of financial instruments on a firm commitment basis; and (iii) assisting firms in issuing new financial instruments through the placement of the financial instruments with either a firm underwriting commitment or a standby commitment to the issuers. Note: SDDs (in ESA sub-sector S.125) are identified separately from brokerage firms, which do not intervene on their own account (e.g. in principal capacity), but instead transmit their clients' orders to the markets, and are classified as financial auxiliaries (ESA sub-sector S.126).



Due to the very limited disclosure around the transactions they perform, it is not possible to perform a full assessment of shadow banking risks. However, a large part of the total assets of these entities appear to be consolidated in large banking groups and, consequently, they may be subject to regulatory requirements on liquidity and capital and, thus, might be excluded from a narrow view of shadow banking.

The ECB recently conducted a survey⁴¹ on SDDs and their statistics which found that the available data need to be taken with a degree of caution owing to the low coverage and lack of harmonisation of the data. While bank funding does not appear to be a major source of funding for SDDs, the extent of consolidation in banking groups varies between countries, although consolidation seems to occur in those euro area countries where SDDs are concentrated.

2.5.3 Financial corporations engaged in lending

Financial corporations engaged in lending (FCLs) are financial corporations principally specialised in asset financing for households and NFCs. This also includes financial leasing, factoring, mortgage lending and consumer lending companies. These entities may be regarded as part of the shadow banking system if they engage in credit intermediation outside the regulatory perimeter and in the light of their interconnectedness with the regular banking system.

A large part of the total assets of these entities appears to be consolidated in banking groups, although this varies between countries.⁴² However, according to a survey conducted by the ECB, funding from banks does not appear to be the main source of financing for FCLs. The EBA found that the regulatory treatment of FCLs is heterogeneous within the EU (EBA, 2014).

Box 2

Interconnectedness and cross-sectoral exposures of shadow banks in Europe

Shadow banking entities are highly interconnected with the rest of the EU financial system. Based on available statistics, it is possible to compile (at least partially) a matrix of cross-sectoral data that gives an overview of the exposures and funding between different sectors. This matrix corresponds to an estimation of who-to-whom positions in the instruments: loans (and deposit liabilities of credit institutions⁴³), debt securities, and equity and investment fund shares based on available ECB balance sheet statistics (on MFIs and non-MMF investment funds) and financial sector accounts. There are limitations to such an analysis arising from data gaps, in particular with respect to non-listed equity. Potential discrepancies may also arise owing to the use of different data sources and different valuation methods. These data are restricted to the euro area countries and are based on unconsolidated balance sheet information for the relevant entities.

⁴¹ In the context of the overall OFI monitoring exercise, the WGMFS conducted a questionnaire survey with the objective of clarifying for quality analysis purposes the entities and activities of the SDD and FCL sub-sectors. Responses were received from 23 national central banks (NCBs).

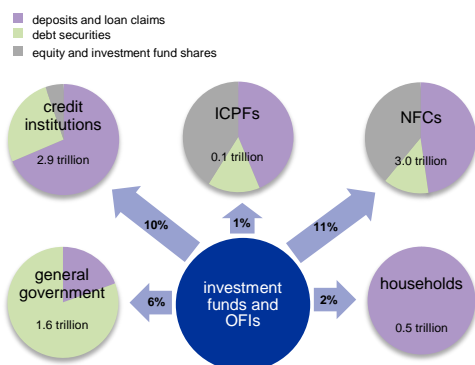
⁴² In two countries (Greece and Estonia), FCLs are fully consolidated in the banking sector. In Italy, only around 60% of the total assets of FCLs are consolidated within domestic banking groups.

⁴³ Credit institutions are part of the monetary financial institution (MFI) sector (along with central banks and MMFs) and are defined in Article 4(1) of the Capital Requirements Regulation (Regulation (EU) No 575/2013) as “an undertaking the business of which is to take deposits or other repayable funds from the public and to grant credits for its own account”. Note that specialised (non-deposit taking) lenders are instead generally classified in the OFI sector as financial corporations engaged in lending (FCLs). ECB data on credit institution balance sheets are derived by deducting quarterly data on MMF balance sheets from the aggregated balance sheets of MFIs (excluding the Eurosystem).



Chart 17
Exposure of euro area investment funds and OFIs to other euro area sectors

(Q4 2015)

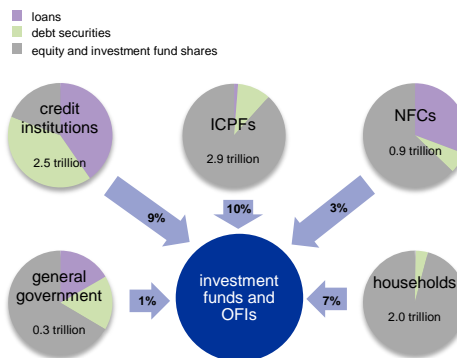


Source: ECB.

Notes: Figures in the arrows refer to the share of the respective euro area sector in the total holdings of investment funds and OFIs of the instruments under review (i.e. deposits and loan claims, debt securities, and equity and investment fund shares).

Chart 18
Funding from euro area investment funds and OFIs to other euro area sectors

(Q4 2015)



Source: ECB.

Notes: Figures in the arrows refer to the share of the respective euro area sector in the total liabilities of investment funds and OFIs of the instruments under review (i.e. loans received, debt securities issued, and equity and investment fund shares issued).

On the whole, exposures of investment funds and OFIs to euro area sectors are dominated by credit institutions, which account for 10% (or around €2.9 trillion) of exposures of the instruments under review, mainly in the form of deposits (Chart 17). Loans to euro area NFCs are also significant, at €1.4 trillion, while loans to households are around €0.5 trillion, which largely relate to securitised loans on FVC balance sheets. Thus, shadow banking entities have an important role in the provision of funding to the real economy. In addition to the exposures to other euro area sectors, there are also significant exposures of investment funds and OFIs to non-euro area residents.

Shadow banking entities are mainly funded by ICPFs and credit institutions, representing 10% and 9% of the total funding respectively (Chart 18). It is possible to conclude that credit institutions invest in other financial institutions by acquiring debt and providing loans, while ICPFs provide funding mainly through holdings of MMF and non-MMF investment fund shares. These relationships are driven in part by the fact that some entities (investment funds and OFIs, credit institutions and insurance corporations) belong to the same financial group.

From a systemic risk perspective, the interconnectedness between the shadow banking system and the regular banking system is particularly important both with respect to the funding of the banking system, and potentially as a channel of contagion. Exposures of euro area credit institutions to investment funds and OFIs are relatively significant, amounting to approximately 9% of credit institutions' total assets (Chart 19), around one-third of which is due to holdings of FVC securities (i.e. mainly resulting from retained securitisations). While retained securitisations support the liquidity of credit institutions, by transforming illiquid assets into marketable instruments that can be used as collateral, in particular in central bank refinancing operations, these activities do not represent bank-like activity outside the regular banking system.

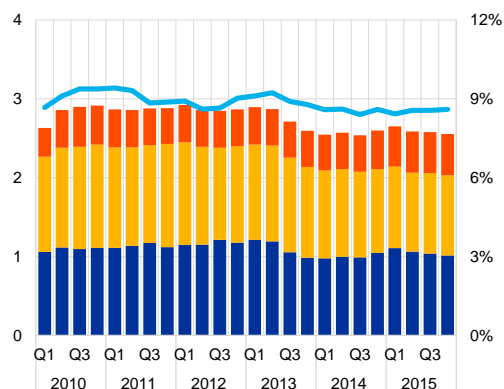


Chart 19

Euro area credit institutions' assets vis-à-vis euro area investment funds and OFIs

(outstanding amounts in € trillions and percentage share of credit institutions' total assets)

- loans (lhs)
- debt securities (lhs)
- equity and investment fund shares (lhs)
- share of total bank assets (rhs)



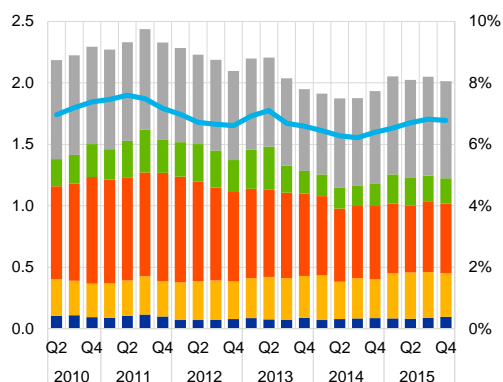
Source: ECB.

Chart 20

Euro area credit institutions' deposits from euro area investment funds and OFIs

(outstanding amounts in € trillions and percentage share of credit institutions' total assets)

- money market funds (lhs)
- non-MMF investment funds (lhs)
- financial vehicle corporations (lhs)
- central counterparties (lhs)
- other OFIs (lhs)
- share of bank liabilities (rhs)



Source: ECB.

Focusing on deposits placed with credit institutions (Chart 20), around 7% of deposits relate to the broad measure of investment funds and OFIs. However, this includes deposits of FVCs, some of which are engaged in retained securitisations, and interbank borrowing (repos) intermediated by CCPs which are not relevant from a shadow banking perspective. Hence, the broad measure needs to be narrowed down to more granular components where bank-like functions are performed by non-bank financial entities and to arrive at aggregates that are more useful for assessing risk. Overall, from a systemic risk perspective, these data highlight the large cross-sectoral exposures of shadow banking entities and their strong links to the regular banking system within the EU financial system.

In addition to the cross-sectoral exposures presented above, shadow banking entities can form part of complex financial intermediation chains which may also include banks and insurance corporations and are therefore potentially highly interconnected nodes within the financial system. Owing to their heterogeneous activities, shadow banking entities can be direct counterparties to banks in a number of markets, including derivative and SFT markets. New regulatory data such as required under AIFMD, EMIR and SFTR will allow a detailed assessment of the linkages between shadow banking entities and banks in a range of markets.

While data limitations currently impede a full assessment of interconnectedness, the EBA has found that EU banks are exposed to a number of different types of shadow banking counterparty, with around 65% of their exposure being to securitisations (26%), investment funds other than MMFs (24%) and finance companies (16%).⁴⁴ 184 institutions (169 credit institutions and 15 investment firms) from 22 Member States participated in the EBA's data collection exercise. This exercise informed the EBA's definition of "shadow banking entity" in its guidelines on the qualitative approach institutions should adopt for the purposes of monitoring and setting appropriate internal

⁴⁴ See EBA (2015b).



individual and aggregate limits on exposures to shadow banking entities.⁴⁵ The EBA's data collection exercise also showed that banks possess limited information regarding the supervisory treatment of their shadow banking counterparties.⁴⁶

Interconnectedness may also take the form of implicit guarantees and backstops of shadow banking entities⁴⁷ that may be associated with step-in risks for the banking system. The BCBS defines step-in risk as "the risk that a bank may provide financial support to an entity beyond or in the absence of any contractual obligations, should the entity experience financial distress".⁴⁸ Such backstops may have negative externalities for the banking system and can act as an additional transmission channel through which risks emanating in the shadow banking system can spread to other parts of the financial system.

Interconnection between the shadow banking system and the banking system can take place via a range of different channels. From a macro-prudential perspective, interconnectedness can exist at both the entity and activity level and therefore needs to be closely monitored in order to assess potential contagion and feedback loops between sectors. While data limitations currently impede a full assessment of interconnectedness, in particular when employing an activity-based mapping approach, new regulatory data will allow a more detailed assessment of interconnectedness in the future which could enhance the analysis presented in this paper.

⁴⁵ See EBA (2015a).

⁴⁶ For example, almost 90% of shadow banking counterparties were classified as "other" in the EBA data collection exercise carried out in 2015, reflecting the fact that these entities were either not supervised or were not further identified by the reporting bank (see EBA, 2015b).

⁴⁷ See Claessens and Ratnovksi (2014).

⁴⁸ See BCBS (2015).



Section 3

Activity-based mapping of shadow banking in Europe

An activity-based approach is required to complement the previous focus on shadow banking entities. It is necessary to capture risks that cut across different types of entity in financial markets. This involves market dynamics generally measured with granular and/or off-balance-sheet data, such as contagion and pro-cyclicality in funding and derivatives markets. An approach focused on activities has been adopted by the FSB and is aligned both with the focus of its shadow banking monitoring on economic functions and its analytical and policy work on SFTs.

The activity-based approach focuses on risks to financial markets and seeks to build on the financial stability mandates given to EU authorities,⁴⁹ drawing on related market data collections (e.g. AIFMD and EMIR). An activity-based approach can better account for the specificity of financial stability risks, typically related to financial market intermediation and involving market externalities related to liquidity and leverage. Such risks may, for example, take the form of fire sales involving pro-cyclical features due to indirect informational effects across different categories of market participant.⁵⁰

In addition, such an approach can complement an analysis of interconnectedness (e.g. cross-sectional views of network and contagion channels) with assessments of vulnerabilities in the chains of financial market intermediation, typically focusing on potential asymmetries of information underlying credit risk transfer and/or liquidity and maturity transformation.

An activity-based approach can also consider data that may specifically contribute to assessing risks from market activities, such as off-balance-sheet exposures from derivatives or funding, or granular (e.g. intraday liquidity risk) exposures which may not be fully accounted for under the entity-based approach.

Although the types of risk embedded in shadow banking activities can be ascribed to the same risk factors as those for entities, the methodologies used in this section differ. For example, SFT markets contribute to maturity and liquidity transformation within the financial system. It is also noted that multi-layered network exposures may arise in derivatives or SFT markets as well as in underlying collateral markets, giving rise to interconnectedness and potential contagion risks. Therefore, the development of aggregate risk metrics presents particular challenges.

Against this background, the activity-based approach presented in this section remains largely a programmatic and forward-looking exercise. With due consideration for evolving data availability and policy measures addressing the risks, it is aimed to review and discuss data sources in order to develop relevant risk metrics in future monitoring assessments. The risk metrics based on the activity-based mapping should also be developed, with the aim of mapping them back to the underlying entities. Table 3 reviews different market activities and highlights potential indicators that could be further examined, based on new regulatory and market data sources. It also summarises data availability for the different market activities. As the EMIR and SFTR apply primarily at the level of secured transactions, assessing liquidity conditions across underlying collateral asset markets is deemed useful for a complete assessment. Market liquidity activities typically include: i) the provision of liquidity services by security and derivative dealers, and ii) liquidity services –

⁴⁹ EU market directives and regulations adopted since the advent of the crisis, including EMIR, AIFMD, the Markets in Financial Instruments Directive (MiFID II), and SFTR, entail a range of risk management tools and reporting requirements specifically aimed at mitigating financial stability risks in EU financial markets. The ESRB is explicitly mandated to supervise related risks in AIFMD, EMIR and SFTR.

⁵⁰ See Clerc et al. (2016).



expressing a structural demand for liquidity – performed by asset managers on behalf of investment fund shareholders. In addition, the assessment considers possible market-wide metrics. Box 3 deepens the discussion of the assessment of market liquidity.

Table 3
Market activity metrics

Activities	Markets	Indicators	Aggregation	Data availability
SFTs	<ul style="list-style-type: none"> - Repo, reverse repo, - Sell/buy backs - Securities lending - Margin lending 	<ul style="list-style-type: none"> - Outstanding positions (stock) - Trade flows - Trade intermediation (principal/agent) - Central counterparty clearing - Repo rate and trade price metrics (e.g. collateral margins/haircuts) - (Cash/non-cash) collateral characteristics, including currency, maturity, quality, trade type, re-use 	<ul style="list-style-type: none"> - Aggregate indicators - By jurisdiction, currency, maturity, trade type, entity and counterparty sector - Firm-level data (e.g. for stress testing) 	<ul style="list-style-type: none"> - Limited market data availability - Upon SFTR implementation in 2018
Derivatives	<ul style="list-style-type: none"> - Forwards - Swaps (IRs, CDSs) - Option contracts 	<ul style="list-style-type: none"> - Gross notional amounts - Market value (gross and net of short/long positions) - Gross credit exposure - (Cash/non-cash) collateral characteristics, including currency, maturity, quality, trade type, re-use 	<ul style="list-style-type: none"> - Aggregate indicators - By jurisdiction, currency, maturity, product type, entity/counterparty sector 	<ul style="list-style-type: none"> - EMIR: initial data available, still subject to quality review - AIFMD: data pending - UCITS: no data
Collateral (across secured markets)	<ul style="list-style-type: none"> - Cash collateral - General collateral - Special collateral 	<ul style="list-style-type: none"> - Outstanding eligible collateral assets - Outstanding collateral posted - Collateral re-use and rehypothecation - Collateral market liquidity (see section below) 	<ul style="list-style-type: none"> - Aggregate market indicators 	<ul style="list-style-type: none"> - Should build on EMIR and SFTR data and possibly other supervisory data sources (e.g. on banks)
Market liquidity (liquidity provision/demand activities)	<ul style="list-style-type: none"> - Bond markets (including corporate, sovereign, securitisation) - Collateral markets - Financial instrument derivatives 	<ul style="list-style-type: none"> - Liquid markets:* trading volume, quoted, effective spreads/depth, resilience (e.g. Amihud)/price impact, etc. - Illiquid markets: proxies for the above - Liquidity risk premia - Short-term cross-asset return correlations 	<ul style="list-style-type: none"> - Aggregate indicators by market segment 	<ul style="list-style-type: none"> - Limited and circumstantial
	<ul style="list-style-type: none"> - Entity specific indicators (including on investment funds, broker-dealers) 	<ul style="list-style-type: none"> - Liability constraint and liquidity/maturity transformation metrics (see Section 2.3) - Liquid asset holdings (see Section 2.3) - Dealer/market maker inventories (gross and net, and accounting for hedges) 	<ul style="list-style-type: none"> - Firm-level data 	<ul style="list-style-type: none"> - Partial (e.g. based on national accounts)

* Several regulatory definitions can be relied upon, including those of high quality liquid assets (HQLA) and extremely HQLA in EBA (2013) and MiFID II asset classifications.

3.1 Securities financing transactions

Securities financing transactions (SFTs) are forms of secured borrowing. SFTs are “secured” in the sense that the borrower of cash or securities provides collateral to the lender. The collateral may take the form of cash or securities. If the borrower (collateral giver) in the SFT defaults, the lender (collateral taker) keeps the collateral. If the collateral has been provided in the form of securities, the collateral taker could sell those securities in order to recover the amount lent.

SFTs include a variety of financial contracts, such as repurchase agreements (repos), securities lending and margin lending transactions. A repurchase agreement is an arrangement that combines the sale of securities in the first leg of a transaction (usually with a spot settlement date)



with the simultaneous commitment to buy back equivalent securities in the second leg of the transaction (with a future settlement date).⁵¹ Securities lending refers to transactions where one counterparty (the lender) lends securities against collateral, subject to a commitment from the borrower to return the same securities on an agreed future date or when requested to do so by the lender. This contractual agreement entails the payment of a fee, usually charged to the borrower.

Understanding the extent to which SFT markets contribute to shadow banking risks (e.g. by analysing the maturity structure of securities on loan for maturity transformation, or the type of assets in which cash collateral is reinvested for liquidity transformation) should usefully complement the entity-based approach, as a significant amount of these activities are carried out off-balance-sheet. In particular, entities that are not covered under the entity-based approach, such as ICPFs, may engage in shadow banking activities by acquiring SFT or credit guarantee exposures.

The recent Securities Financing Transactions Regulation (SFTR) addresses many of the transparency challenges posed by SFTs. The SFTR requires all SFTs to be reported to trade repositories, and all UCITS and alternative investment fund managers (AIFMs) to inform investors on their use of SFTs in their regular reporting, and in pre-investment documents. This Regulation is in line with several of the FSB recommendations (highly granular and frequent reporting of SFTs to trade repositories, enhanced disclosures to fund investors and disclosure of re-hypothecation to clients and counterparties)⁵² and would allow supervisors to access granular and comprehensive data to monitor risks originating in SFT markets.

3.1.1 Repo markets

As part of SFTs, repo transactions are an important part of the shadow banking system as they can lead to the build-up of leverage. The size of the EU repo market is significant and was estimated at €5.6 trillion in December 2015 (Chart 21).⁵³ Repos may contribute to an overreliance on short-term funding – an unstable source of funding that tends to dry up when market conditions deteriorate. However, evidence from the academic literature suggests that volumes in the repo market remained relatively resilient in recent periods of stress.⁵⁴ That said, conditions may vary by market.

Data on repos are incomplete and are based on information from surveys. Repo market data should ideally cover all EU repo and tri-party repo markets, regardless of the origin or type of collateral used in repo transactions. The main source of repo market data is the International Capital Market Association (ICMA), which conducts a semi-annual European repo market survey. Markets covered include EU Member States and other countries within the European Economic Area (EEA). Results are survey-based and therefore may not be fully representative of developments in repo markets. In addition, the survey includes a non-constant sample of around 60 large financial institutions, which may miss some actors in the market and/or create a sample bias from one survey to another. ECB data on MFI balance sheets includes data on reverse repos of MFIs with euro area CCPs and repos of MFIs with euro area CCPs as well as with other euro area non-MFI sub-sectors (Chart 22). However, there are several limitations which make it difficult to cross-check the data with other estimates of repo market size. First, these data only include repos

⁵¹ Repurchase agreements (repos) include “classic” repos, as well as sell-buyback transactions. In “classic” repos, in which income payments are transferred back to the original owner of the securities on the same day, the difference between the two prices defines the repo rate. In sell-buyback transactions, income payments are retained by the buyer of the securities, hence the repurchase price is adjusted accordingly to take this into account.

⁵² Recommendations 1, 2, 5 and 7 (FSB, 2013).

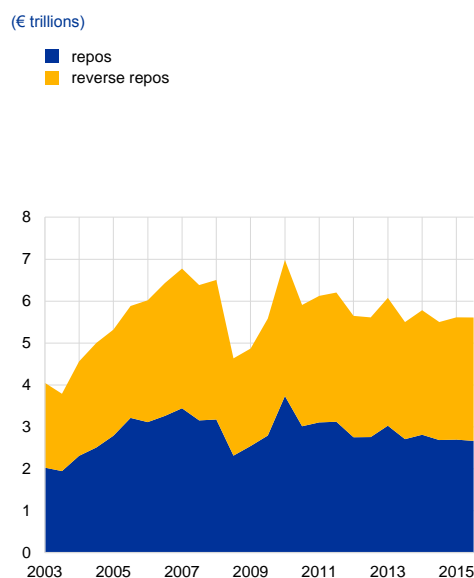
⁵³ See the December 2015 ICMA European Repo Markets Survey.

⁵⁴ See, for example, Boissel et al. (2015) and Perignon et al. (2016).



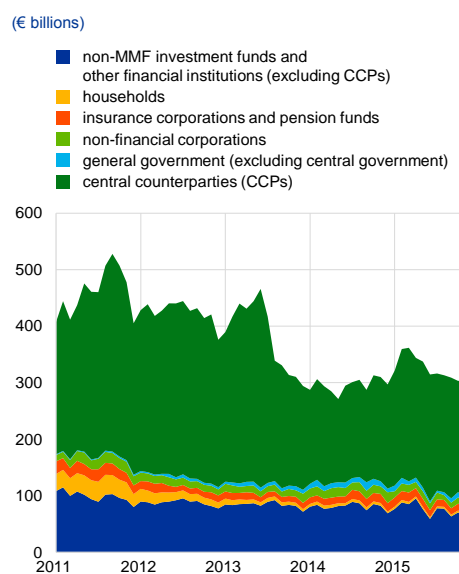
and reverse repos using cash as collateral. Second, these data only include “repo-type” transactions against cash collateral, i.e. securities lending transactions collateralised with cash. Finally, some CCPs which are on the ESMA list of CCPs are also classified as MFIs, and hence these positions are reported in the MFI statistics as inter-MFI positions.

Chart 21
Size of EU repo market



Sources: ICMA, ESMA.
Note: Gross nominal value of European repo contracts outstanding.

Chart 22
Euro area MFI repos with non-MFIs, by sector



Source: ECB.
Note: Based on MFI balance sheet data on repos and securities lending with euro area counterparties which are cash collateralised.

3.1.2 Securities lending

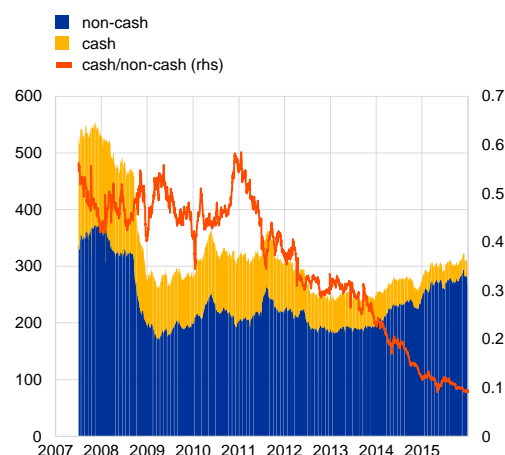
Securities lending is a market practice in which securities are temporarily transferred by one party (the beneficial owner) to another party (the borrower). Securities lending transactions are a key element of the shadow banking system, especially when cash is used as collateral, as they contribute to credit provision in the system, while the cash received is typically reinvested. Securities lending data should ideally cover all transactions, whether carried out by EU agent lenders (e.g. EU banks, ETFs, etc.) or by non-EU agent lenders on behalf of beneficial owners based in the EU (e.g. custodian banks). The types of collateral (cash or non-cash) received in securities lending transactions also carry risks of a slightly different nature (cash collateral reinvestment or non-cash collateral reuse).

The analysis presented in this paper focuses on risk metrics that could be developed from existing data sources. A key data source is Markit Securities Finance, which provides daily data on securities available for lending, securities on loan, the type of collateral received, the average length of securities lending transactions, the maturity type (open or term), the share of fees received from securities lending transactions and the industry sector of the securities' beneficial owners. These sources do not provide aggregates by agent, lender or country while the information available on market-wide maturity measures is limited.



Chart 23
EU government bond lending

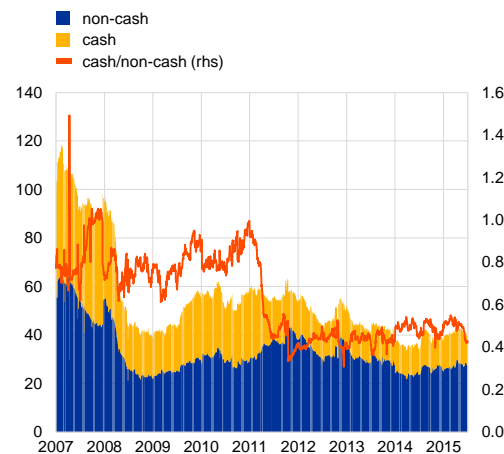
(€ billions and cash/non-cash collateral ratio)



Sources: Markit, ESMA.
Note: Outstanding value of European government bonds on loan against cash/non-cash collateral.

Chart 24
EU corporate bond lending

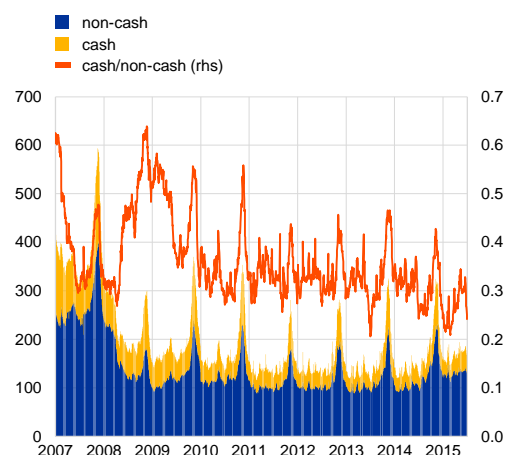
(€ billions and cash/non-cash collateral ratio)



Sources: Markit, ESMA.
Note: Outstanding value of European corporate bonds on loan against cash/non-cash collateral.

Chart 25
EU equities lending

(€ billions and cash/non-cash collateral ratio)



Sources: Markit, ESMA.
Note: Outstanding value of European equities on loan against cash/non-cash collateral.

As at the end of December 2015, the total outstanding value of EU securities on loan was composed of government bonds (€304 billion, Chart 23), corporate bonds (€39 billion, Chart 24) and equities (€158 billion, Chart 25). For all three types of securities lent, the main type of collateral used was non-cash collateral. European equities lending trades are subject to seasonality changes, with corporate action trading (i.e. lending for cross-country tax arbitrage on dividends) boosting volumes during the second quarter of each year.

Securities lending activity peaked in 2007 for all asset classes. As the market deteriorated in 2008, there was a significant drop in the demand for securities owing to deleveraging by funds and brokers/dealers, driven primarily by the need to raise cash to meet investor redemptions and to decrease their balance sheet size. On the supply side, crisis-induced

risk aversion by the beneficial owners reduced supply and lenders restricted the range of counterparties to which they were willing to lend securities. In addition, regulatory bans on short selling reduced incentives to lend securities. As a result, in 2008, the European market for government bond lending, corporate bond lending and equities lending fell respectively by €200 billion, €50 billion and €180 billion.

Securities lending with open maturity accounts for the vast majority of transactions across the three market segments. Open maturity transactions present a higher degree of risk than term maturity transactions. In periods of financial stress, lenders may recall the securities lent in open maturity transactions and lenders may not be able to return them. Liquidity transformation risk arises when cash collateral is received at open maturity and reinvested at term maturity.



Securities lending transactions by agent lenders based in the EU is significant (around €500 billion, of which €304 billion are on government bonds lending), although no comprehensive regulatory or official sector data are currently available. Cash collateral reinvestment and non-cash collateral reuse imply that overall credit provision to the financial system might be much greater than the headline estimates available through commercial databases.

The degree of interconnectedness is likely to be very high, given that investment fund and ICPF assets are often held in custody in financial institutions (custodian banks) that lend securities on behalf of their clients. The securities lending process involves swapping assets with other financial entities or obtaining cash collateral to reinvest in other assets, including in assets issued by other financial institutions. The lack of data in this area prevents us from assessing the degree of interconnectedness. However, agent lender data indicate that three-quarters of the securities available for lending were managed by the reporting entities on behalf of non-EU clients, suggesting significant cross-border linkages between EU and non-EU jurisdictions.⁵⁵

Most securities lending transactions are performed on an open maturity basis, which implies a potentially significant run risk. This risk may potentially be exacerbated by the fact that most of the cash received against EU client assets is managed in comingled accounts rather than separate accounts. Assets managed in comingled accounts create greater incentives for “runs” by clients. Based on the limited data available, liquidity risks seem somewhat contained, as cash collateral reinvestment goes mostly into high-quality assets.

3.2 Derivatives

Derivatives may be used to insure or acquire (and possibly leverage) exposures to a variety of markets. Given quite significant growth in the reliance of financial market participants, including a number of shadow banking entities, on derivatives over recent decades, and given methodological issues and data gaps (e.g. on derivative dealers) faced by risk assessments in this area, there is reason to focus on the impact of the use of derivatives on shadow banking risk exposures. In the current framework (see Table 3), several risk dimensions warrant attention, in particular leverage, credit risk transfer, and interconnectedness.

3.2.1 Leverage

Risks from excessive leverage can materialise primarily through two main channels. Excessive leverage can generate risk to the financial system and produce negative externalities through pro-cyclicality and contagion. Leverage has the potential to amplify price fluctuations in asset markets in a pro-cyclical way, particularly when it is combined with liquidity transformation and involves negative feedback loops between liquidity and asset prices (e.g. fire-sale dynamics) and indirect contagion (signalling) effects.⁵⁶ Contagion of asset price shocks can feed through multiple networks of counterparties, including collateral markets, and can thereby generate and propagate losses and defaults.

Leverage is typically measured as the ratio of total (including borrowed) assets to own funds, and can be obtained by direct borrowing from credit institutions or through funding or derivative

⁵⁵ See Keller et al. (2014).

⁵⁶ For example, Bouveret et al. (2014) indicates that “a repositioning by hedge funds” (i.e. a simultaneous unwind of protection selling trades in US Treasuries markets) “possibly created the market conditions that allowed the flash event” (i.e. the Treasury “flash rally” of 15 October 2014).



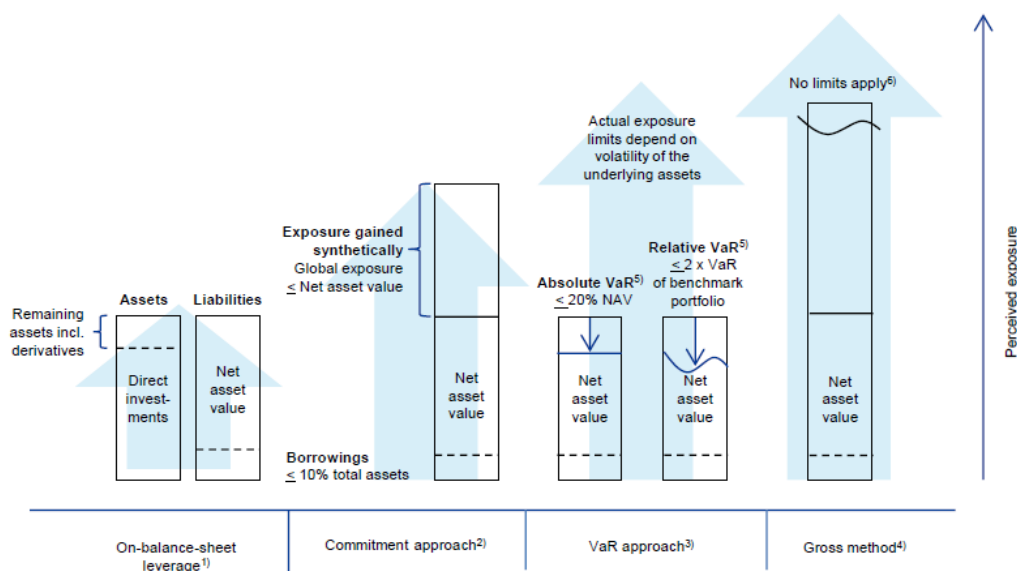
transactions (see Chart 26). Indeed, financial institutions may not only leverage their positions by contracting bank credit, engaging in short-term (secured or unsecured) funding operations (see Section 3.1 on reverse-repo and securities lending) or issuing financial debt, but also by acquiring liability exposures through derivatives. Such synthetic leverage plays an important role in the asset management sector, where it is an integral part of business models,⁵⁷ and represents a particular risk factor for some investment fund strategies relying on synthetic structures, such as hedge funds or some synthetic ETFs (see Chart 27).⁵⁸ Thus, standard balance sheet measures, typically based on a contract's market value, may significantly underestimate financial institutions' leverage exposures when leverage is embedded in derivatives contracts.⁵⁹ Hence, several indicators are discussed in order to correct for such potential underestimations.

Chart 26
Investment fund leverage metrics reported under current regulatory rules

Leverage can be higher than what headline ratios suggest

Reporting options, exposure limits and synthetic leverage in investment funds

(arrows reflect perceived risk exposures for a given portfolio under different reporting options)



Notes:

- 1) Under the UCITS Directive, a fund may not borrow more than 10% of its assets on a temporary basis.
- 2) Under the UCITS Directive, global exposure after netting may not be higher than the fund's net asset value (NAV).
- 3) Maximum potential loss for a confidence interval, assuming a certain probability distribution for historical observations.
- 4) Sum of gross exposures, i.e. portfolio equivalents for derivatives, excluding cash; metric to be reported under the UCITS Directive and the AIFMD.
- 5) Maximum potential loss over a 20-day period at a 99% confidence interval; restrictions apply to UCITS.
- 6) Other limits may be binding, including counterparty exposure for UCITS.

Source: Box 7 in ECB Financial Stability Review May 2015, including additional detail on the underlying regulatory framework.

Methodologies have been developed to account for related exposures. Metrics used for this purpose, which form the basis for regulatory reporting requirements, generally rely on

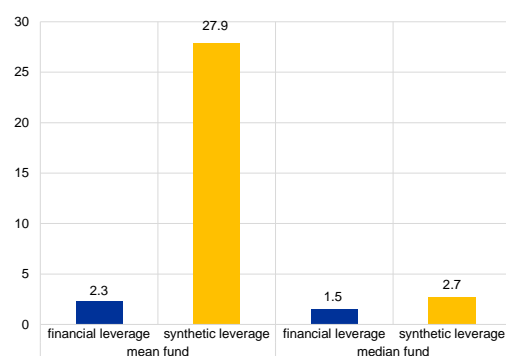
⁵⁷ Under UCITS, regulatory restrictions on investment funds' direct borrowing and derivatives exposures are applicable.
⁵⁸ See Grillet-Aubert and Sow (2009) on the pro-cyclicality of the interplay between ETF liquidity and synthetic leverage.
⁵⁹ Proposed Basel III rules require banks to hold risk-weighted regulatory capital against their asset portfolio and impose a cap on leverage. Adequate leverage measures (e.g. appropriately assessing the assets to equity ratio) for financial institutions using derivatives would thus need to rely on equivalent portfolio techniques to unbundle derivatives.



“cash-equivalent” indicators as developed by the International Monetary Fund (IMF) (Breuer, 2000). They measure the implicit leverage from open derivative positions by essentially disentangling the equity and debt components of “cash equivalent” portfolios and comparing cash flows on this basis. Accordingly, an open position, for example on a forward, swap or option contract, can be computed by considering a contract’s notional exposure, which may in some cases far exceed the contract’s market value. The conditionality embedded in derivatives contracts plays an important role and requires the adjustment of synthetic leverage measures over time.

Chart 27
UK hedge funds:
financial vs. synthetic leverage

(multiples of NAV; September 2014)



Source: FCA hedge fund survey.

Multiple synthetic leverage metrics should be considered. The foremost synthetic leverage measure considers the exposure at risk from a derivative’s underlying asset (gross notional exposure, GNE). It can be aggregated across contracts and entities, and represents an upper bound to the measurement of risk. A more detailed risk assessment complements gross indicators with net indicators, typically compensating for an entity’s long and short positions in a given contract. Further netting may be considered across exposures deemed equivalent, typically to consider exposures to specific risk factors, thus typically trading off the accuracy of the description of the specific underlying risks against the simplicity and inherent model risk. A useful approach may also focus on extreme events, since the value of

derivative contracts may be subject to strong non-linearities. Therefore, indicators based on the value-at-risk (VaR) method⁶⁰ or derived from stress test scenario analysis may complement a risk monitoring framework.

Synthetic leverage exposures can also be acquired by entities other than investment funds and an assessment across entity types remains challenging. In practice, a number of rules, such as those applicable to UCITS or AIFs, limit leverage exposures or mitigate them through risk management requirements (e.g. by securing trades), and other types of shadow banking entities may also generally engage in providing and/or obtaining leverage through derivatives. Whereas the macro-prudential reach of the current regulatory framework applicable to investment funds remains, in part, to be assessed,⁶¹ exposures at risk should also be considered for types of entity other than investment funds. For example, through exposures to “SFT-equivalent” total return swaps, SDDs may create risk by providing leverage, or incur exposures of their own. In view of current data gaps and remaining challenges in aggregating supervisory information,⁶² econometric methods may also be useful in approximating aggregate leverage.⁶³

⁶⁰ In some cases, risk assessments based on VaR can partly substitute for leverage measures under UCITS rules.

⁶¹ The ESRB has initiated work in this field as part of the “macro-prudential policy beyond banking” mapping project.

⁶² An important issue is that current definitions across investment funds prevent simple aggregation. See, on hedge funds, Ang et al. (2011).

⁶³ For example, McGuire and Tsatsaronis (2008) consider that “By relating portfolio returns to pre-specified market risk factors, style analysis is an important tool in analysis the investment strategies of hedge funds. It also serves as the basis for a simple time-varying indicator of leverage, based on the degree to which the returns on risk factors are amplified in the returns on capital held by hedge funds.”

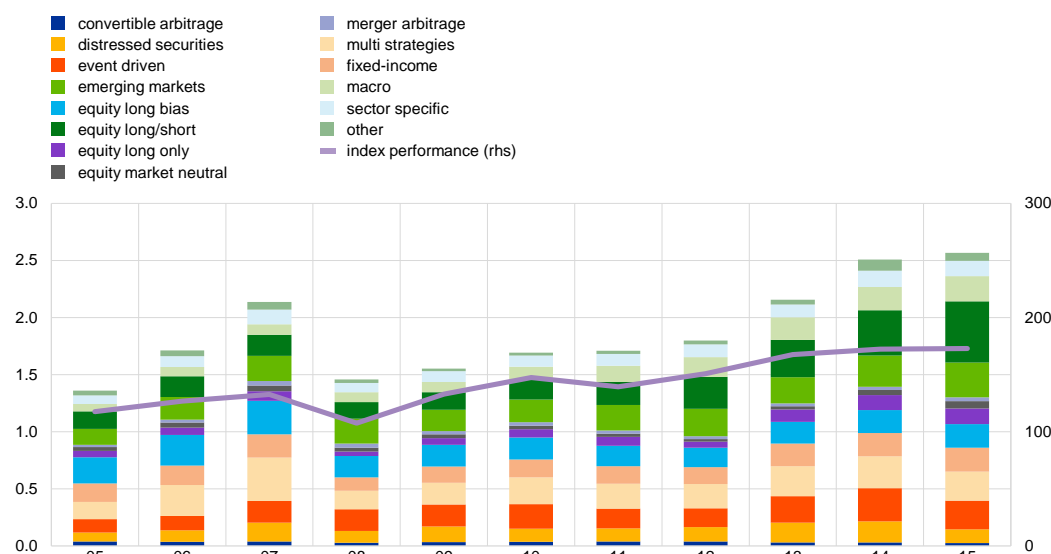


Measurement issues may arise when assessing synthetic leverage risk. These issues are both of a methodological nature – typically due to the challenges of aggregating and comparing leverage measures across various instruments and entities, in particular across sectors – and related to the data – namely to their availability, completeness, quality, consistency and accounting treatment. The AIFMD (and EMIR) represent steps towards filling related data gaps.⁶⁴ Progress in this area will also undoubtedly need to account for global initiatives (e.g. including the adoption of the legal entity identifiers (LEIs) by asset managers, and other improvements in supervisory data collections).

The environment of low interest rates that has prevailed in recent years appears generally conducive to search-for-yield behaviour and, thus, leverage. However, evidence remains scarce at this stage and is largely limited to hedge funds. GNE ratios show a very high concentration of hedge fund leverage in a few large funds (typically applying relative value and global macro strategies, see Chart 28).⁶⁵

Chart 28
Global hedge fund strategies

(net asset value in USD trillion; index, 2004=100)



Source: BarclayHedge and ESRB.

3.2.2 Credit enhancement

In general, bank deposits are secured explicitly and implicitly by various means, such as regulatory requirements, access to central bank liquidity and deposit insurance schemes, although the extent

⁶⁴ Based on a broad definition of AIF leverage in the AIFMD as “any method by which the AIFM increases the exposure of an AIF it manages whether through borrowing of cash or securities, or leverage embedded in derivative positions or by any other means”, the Commission’s impact assessment stresses that “to allow investors to compare such information [on the use of leverage] across AIF and across borders in the Union when taking investment decisions, and to provide supervisors with information that is comparable and can be aggregated for the purpose of macro-prudential and systemic risk oversight, a harmonised approach to the calculation of leverage is crucial” (European Commission, 2012). Delegated acts specify the metrics to be reported in the supplementing Regulation (EU) No 231/2013 (see Chart 26).

⁶⁵ See Financial Conduct Authority (2015).



to which they are secured depends on the rules of the respective jurisdiction. In the shadow banking system, these backstops are generally absent or less explicit, but an increasing reliance in developed economies on shadow banking financing channels has prompted some macro-prudential authorities to reconsider their policy stance in this respect.⁶⁶

Various types of financial intermediary⁶⁷ provide external credit enhancement as a service in financial markets. External credit enhancement fundamentally consists of providing credit risk insurance to a third party, and generally comes in the form of either explicit insurance (e.g. letters of credit and other guarantees) or derivatives covering liquidity risks or providing credit guarantees (typically credit default swaps – CDS).

As a contingent transfer of credit risk, credit enhancement should be considered for the purposes of assessing shadow banking risks for multiple reasons. Although credit enhancement cannot be strictly regarded as credit intermediation as such, it alters the credit risk-return profile of the balance sheets of both protection-buying and protection-selling entities.⁶⁸ As it insures against tail risks, it may contribute to an increase in credit intermediation, for example through securitisation. More importantly, credit enhancement in the form of CDS constitutes a form of synthetic leverage,⁶⁹ as long as it increases an entity's liability exposures.⁷⁰ Finally, credit enhancement increases the interconnection of market participants guaranteeing each other's risks, with ambiguous effects in terms of contagion and risk absorption.

One form of credit enhancement is CDS. Two main sources exist for CDS data. One is the Bank for International Settlements (BIS) semi-annual survey of over-the-counter (OTC) derivatives markets. The other is data from trade repositories. The EMIR grants access to European trade repositories to the ESRB and ESMA, as well as access to euro area trade repositories to the ECB.⁷¹ ESMA has developed standardised reporting across trade repositories to facilitate data use.⁷² Depending on the asset class, individual trade repositories may already cover the majority of the market. The high global interconnectedness of the CDS market has been a focus of attention recently.⁷³ Clearing requirements currently being adopted under the provisions of the EMIR are aimed in particular at decreasing interconnectedness and at netting and concentrating remaining exposures in CCPs.

⁶⁶ Academic evidence in Gornicka (2016), for example, suggests that bank intermediation and off-balance sheet intermediation through shadow banking entities such as SPEs are now complementary.

⁶⁷ In the case of credit default swaps bought and sold via US regulated institutions, the biggest net sellers at the sectoral level are dealers, banks and insurance companies (in that order), while the biggest net buyers are hedge funds and asset managers.

⁶⁸ This section focuses on external credit enhancement and therefore abstracts from internal enhancements such as over-collateralisation, subordinated debt and close-out netting agreements.

⁶⁹ For a definition of synthetic leverage, see Financial Conduct Authority (2015).

⁷⁰ Note that a protection seller receiving insurance premia and paying out a claim upon the occurrence of a credit event does not, however, incur a rollover risk, as would be the case with other forms of leverage, but instead a risk of contract termination (independently of the underlying credit event).

⁷¹ See Commission Delegated Regulation (EU) No 151/2013.

⁷² See Commission Delegated Regulations (EU) Nos 148/2013 and 150/2013.

⁷³ AIG was unable to pay out claims on CDS and had to rely on a massive liquidity injection from the public sector (see Markose et al., 2012).



Box 3

Assessing market liquidity

Market liquidity is generally defined as the ability to dispose of a financial asset without delay and without incurring a substantial price change. The previous sections discuss the methodology for identifying the financial stability risks posed by shadow banking activities involving liquidity transformation. Some shadow banking entities typically provide, or demand, market liquidity services. For example, SDDs⁷⁴ act as liquidity providers, and investment funds demand liquidity on behalf of their shareholders and may accordingly engage in shadow banking activities.⁷⁵ In markets which are reliant on dealer intermediation, financial instability may result from imbalances between supply and demand, where the liquidity supply depends on the willingness and ability of dealers to temporarily warehouse risk, and the demand for liquidity is expressed by market participants such as investment funds (as a result of redemption decisions by end-investors). A particular concern in recent years in this context has been the growth of open-end investment funds, which offer daily liquidity whilst investing in potentially less liquid assets.

A key financial stability benefit of the provision of finance by non-banks is the increase in diversity and resilience of financing to the real economy. Liquid markets are an important component of such provision via market-based finance – and are therefore important in helping to ensure that the benefits of credit provision by non-banks in financing investment in the real economy are maximised. This box discusses how volatility and illiquidity could affect financial markets, and how market liquidity might be assessed. Bouts of volatility associated with short-term illiquidity in a number of financial markets over the past few years have led to concerns that market liquidity may have become more fragile. Although such episodes in themselves are not necessarily threats to financial stability, it is important to understand the ways in which they could persist, become amplified or spill over to other markets.⁷⁶

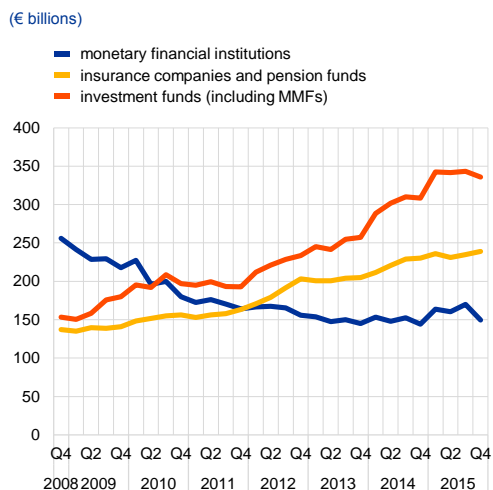
⁷⁴ Note that SDDs display a pronounced engagement in shadow banking activities and risks (see EU Shadow Banking Monitor, ESRB 2016a). They are however commonly subject to prudential consolidation and the related financial stability risks, which are mitigated by EU banking rules. A need for further assessment of this point is recognised (see Section 2.5.2).

⁷⁵ These activities are consistent with the FSB's Economic Function 3, "Intermediation of market activities that is dependent on short-term funding or on secured funding of client assets", which is typically conducted by broker-dealers, and Economic Function 1, "Management of collective investment vehicles with features that make them susceptible to runs", which is typically conducted by fixed income funds, mixed funds, credit hedge funds and real estate funds. In the current framework, these market players are regarded as shadow banking entities in the SDD and investment fund categories of the European System of Accounts (ESA 2010) (see Section 2.4).

⁷⁶ A number of market events have raised financial stability concerns over recent years. See, for example, Bouveret et al. (2014) in relation to the US Treasury bond market.

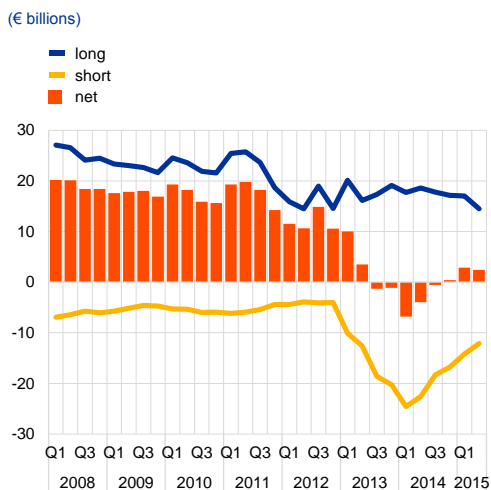


Chart 29
Holdings of non-financial corporate bonds by sector in the euro area



Source: ECB.

Chart 30
Non-financial corporate bonds: net market maker inventories



Source: ESRB.

Note: Investment grade non-financial inventory data collected for 13 EU market-makers.

Broadly, there are three concerns. Volatility and illiquidity could lead to broader contagion by, for example, changing the value of securities pledged as collateral in securities financing and derivatives markets, thereby impairing the ability of financial institutions to finance themselves and manage their risks. In addition, they could affect conditions in primary markets by, for example, increasing new issuance premia or even preventing some companies from being able to raise market-based finance. They could also discourage participation in financial markets. All these risks crystallised to different degrees in different markets during the global financial crisis. Currently, a key concern is that, against the backdrop of a search for yield in response to generally low market interest rates, a reversal in risk-seeking behaviour by investors could test the ability of markets to absorb sales from end-investors. As part of an analysis of shadow banking (“financial intermediaries or activities involved in credit intermediation outside the regular banking system, and therefore lacking a formal safety net”), the IMF specifically questioned the extent to which “shadow banking can play a beneficial role as a complement to traditional banking by supporting market liquidity”.⁷⁷

The interaction between supply and demand of market liquidity may trigger sudden and self-sustaining liquidity imbalances and amplify asset price movements. Over recent years, several changes have impacted on secondary markets. Technological, regulatory, and competitive developments have affected the supply of liquidity – i.e. the ability and willingness to act as counterparty to immediate trading needs as typically performed by contractual or de facto market makers. Such vulnerabilities in liquidity supply have been emphasised lately by the BIS Committee on the Global Financial System (CGFS), with a focus on structural factors affecting fixed income markets.⁷⁸ Several factors affecting the asset management industry may also induce vulnerabilities. Such vulnerabilities were highlighted recently in connection with a rise in the provision of credit by

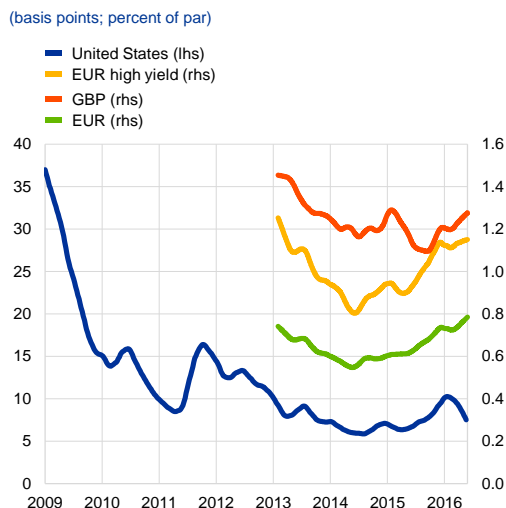
⁷⁷ See Chapters 1 and 2 of the IMF’s October 2014 Global Financial Stability Report (IMF, 2014b).

⁷⁸ See Committee on the Global Financial System’s report on market-making and proprietary trading (CGFS, 2014).



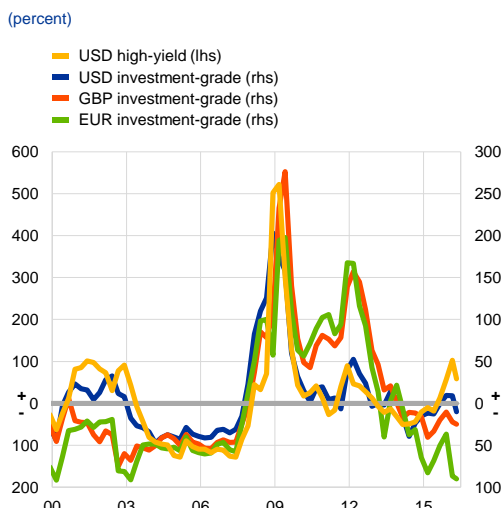
investment funds outside the banking system.⁷⁹ Such credit intermediation appears to be heavily reliant on market liquidity, and a number of structural asset management industry developments may raise liquidity risks further (e.g. liquidity mismatches between redemptions and underlying market liquidity, pro-cyclicality due to a rise in passive strategies, asset management concentration, rising (global) interconnectedness).⁸⁰

Chart 31
Corporate bonds: quoted bid-ask spreads



Source: MarketAxess.
Notes: For the United States, the MarketAxess Bid-Ask Spread Index (BASIX)TM tracks daily bid-offer spreads in high-grade segments using MarketAxess BondTickerTM data. EU BASIX calculations use end-of-day quoted prices from MarketAxess Trax[®]. Trax quoted prices are enriched with traded prices on EU bonds, as a means of validating the data. Trax processes approximately 65% of all EU fixed income transactions through its post-trade services.

Chart 32
Corporate bond liquidity risk premia: deviations from historical averages



Sources: Bloomberg, BofA Merrill Lynch Global Research, Thomson Reuters Datastream, and Bank of England.
Notes: Implied liquidity premia are estimated using a Merton model as in Leland and Toft (1996) to decompose corporate bond spreads. Quarterly averages of deviations of implied liquidity risk premia from sample averages. Sample averages are from 1999 Q4 for € investment-grade bonds, and 1997 Q1 for GBP investment-grade, USD investment-grade and USD high-yield corporate bonds.

A range of market liquidity metrics may be considered for the purpose of assessing financial stability risks (see Table 3). They can be broken down along a number of complementary dimensions:⁸¹ the cost of trading (e.g. bid-ask spreads), volume based measures (e.g. market turnover or market depth), price based measures (e.g. estimated liquidity risk premia, or “noise” measures) and market impact (e.g. Amihud or other price impact measures). Ideally, such metrics would rely on time-stamped data on posted orders and executed trades, but often such data is either not available⁸² or unduly time-consuming to process. Such metrics should be evaluated

⁷⁹ See IMF (2014a).

⁸⁰ See, in particular, IMF (2014a) and FSB (2016). In the EU, the ESRB has assessed financial stability risks from investment fund liquidity mismatches and leverage. For this purpose, it collected data on market making and investment fund liquidity in fixed income markets. The exercise included a macro stress simulation of the investment fund sector and a review of ex post liquidity management tools available and used. It will lead to a forthcoming ESRB publication.

⁸¹ Such metrics are established on a theoretical and empirical basis in extensive academic literature on market “microstructure”. See for example, Schestag et al. (2016). Authorities adopt such metrics for the purpose of financial stability risk monitoring. See OFR (2014).

⁸² MiFID II introduces new pre- and post-trade publication requirements and establishes a framework for a new type of service – data reporting services (DRSs) operated by data reporting services providers (DRSPs). These include approved publication arrangements (APAs), consolidated tapes (CTs) and approved reporting mechanisms (ARMs). See the new Commission Delegated Regulation of 2 June 2016 (C(2016) 3201 final). New data gathered under these provisions might be used for the purposes of the current framework.



against the structural liquidity of various assets. Measures of the reliance on certain trading strategies or intermediaries (e.g. market making arbitrage) and trading techniques (e.g. high-frequency trading and algorithmic trading) or on certain trading venues may also be relevant.

EU corporate bond markets have been a particular area of focus in recent years,⁸³ during which time the bulk of the bond ownership has shifted away from the banking sector towards the investment fund and ICPF sectors (Chart 29). More recently, some market participants have expressed concerns with respect to corporate bond market liquidity.⁸⁴ Whereas EU market making information remains scarce, an ESRB survey provides some initial insight into this market. The survey results show a recent decline in liquidity provision (see Chart 30).

Bid-ask spreads in these markets also point to somewhat rising pressures on market liquidity over recent quarters, but bid-ask spread levels appear to remain far below their peaks during the financial crisis (Chart 31). A full assessment will require additional data (e.g. longer time series) and metrics (e.g. on market depth and impact), and will have to account for structural change (e.g. an increase in electronic trading) in these markets. In a persistently low interest rate environment, the low level of risk premia in corporate bond markets (Chart 32) could be subject to a reassessment by market participants. In such an event, a repricing of assets would have the potential of being amplified by a dearth of market liquidity.

Specific contagion channels may also be considered (from one asset market to another, such as direct linkages from derivatives to underlying cash markets, or indirect linkages through, for example, funding channels). Other metrics which could be considered to assess possible channels of contagion include network structures and exposures to common factors. Risk management and operational risks arising from market liquidity are primarily assessed through qualitative assessments of governance structures, procedures, systems and controls in place.⁸⁵

⁸³ See AMF (2015) regarding the French market, Anderson et al. (2015) and Aquilina and Suntheim (2016) regarding the UK market, and ESMA (2016b) for an EU perspective. Regarding the United States, see Bessembinder et al. (2016).

⁸⁴ See CGFS (2015).

⁸⁵ See the ESMA's guidelines on systems and controls in an automated trading environment, MiFID II and other prudential trading book risk management rules.



Section 4

Conclusion

Recent policy initiatives aimed at increasing non-bank financing to the real economy, such as the Capital Markets Union (CMU), have reinforced the need to develop a monitoring framework for the shadow banking sector in the EU. Given the increasing size of the shadow banking system in the EU, coupled with the disruptive events which took place in this part of the financial system during the global financial crisis, policymakers and regulators have focused on strengthening the monitoring framework with the aim of identifying any remaining regulatory gaps.

Both an entity-based approach and an activity-based approach are necessary in order to cast the net wide when mapping shadow banking in the EU. This dual approach to mapping shadow banking allows a more complete analysis of the structural vulnerabilities of the shadow banking system by considering both on- and off-balance-sheet activities. However, for the purposes of devising an operational risk metrics framework, it is necessary to focus more specifically on the sources of potential systemic risk in the shadow banking system. Therefore, employing the risk metrics constructed using balance sheet data for entities and a forward-looking approach based on other available data for activities, this paper has looked at liquidity and maturity transformation, leverage, interconnectedness with the regular banking system and credit intermediation for components of the EU shadow banking system.

From an entities perspective, it is evident that there is significant heterogeneity in the shadow banking activities of investment funds and OFIs. While data gaps do not allow the construction of risk metrics for investment funds and OFIs as a whole, investment funds, FVCs and the remaining OFI sector have been considered separately in the paper in order to assess their shadow banking activities. However, risk metrics cannot be constructed for a significant component of the shadow banking system in the EU, namely a residual of OFI entities that are not covered by regular reporting. Therefore, in the absence of risk metrics for this component of the shadow banking system, the paper has drawn on national data collection exercises and ad hoc surveys. Overall, our analysis finds that a large part of the other OFI sector appears to have limited engagement in shadow banking activities. However, in order to get a more complete picture of this sector, more granular data would be beneficial.

The activity-based mapping approach complements the entity-based mapping approach by allowing a broader analysis of shadow banking which may not be fully captured by the balance sheet risk metrics. The activity-based approach ensures that risks that cut across entities in financial markets are also captured in our monitoring framework. In order to employ the activity-based approach, however, the paper must adopt a forward-looking methodological approach and rely on a range of market data sources to map SFTs and derivatives activities. New regulatory data such as required under AIFMD, EMIR and SFTR will allow the construction of new risk metrics for these activities in future assessments, and these data can be used to enhance the monitoring framework presented in this paper. Overall, market activities such as SFTs and derivatives need to be considered in a monitoring framework for the shadow banking system, as they can exacerbate vulnerabilities within the financial system. For example, they can lead to the build-up of leverage and can contribute to the pro-cyclicality of the financial system. As the global financial crisis showed, such market dynamics can result in fire sales during periods of stress which can harm market liquidity. Furthermore, SFTs and derivatives activities can result in increased interconnectedness in the financial system, so potential feedback loops also need to be mapped and assessed when designing a monitoring framework for the EU shadow banking system.

Looking ahead, a number of potential avenues for improving the monitoring framework can be identified. A key enhancement for the analysis of entities is to improve coverage and metadata.



Over half of the broadly defined EU shadow banking system consists of entities for which granular data are currently not available. Therefore, risk metrics cannot be constructed for this part of the shadow banking system. New data reporting currently being implemented in some jurisdictions should therefore be incorporated into future monitoring assessments. In addition, owing to data limitations, the assessment presented in this paper cannot differentiate between shadow banking entities that are consolidated within large banking groups and unconsolidated entities. Future monitoring assessments should therefore seek to focus on entities which are not consolidated in large banking groups and which remain outside the regulatory perimeter.

The activity-based mapping approach will be enhanced through the availability of new regulatory data. For example, data on SFTs and derivatives under the SFTR and EMIR will become available which in due course will allow the development of new risk metrics and a better assessment of shadow banking interconnectedness.

Future monitoring frameworks can be extended to assess the geography of risks within the shadow banking sector. While entities such as investment funds and FVCs are largely domiciled in a small number of European jurisdictions, in many cases they have limited domestic links to these jurisdictions. Therefore, future monitoring assessments should aim to assess the geography of risk, including any potential cross-border regulatory issues.



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Annex 1

Overview of data sources and data gaps

This annex provides an overview of the data sources used to map the EU shadow banking system. An assessment of data gaps is also presented, although some of these will be bridged in the near term through improvements in the availability of statistical and regulatory data.

Main data sources on shadow banking

The methodology employed in this paper required a stock-take of available data relevant for shadow banking. It also looked ahead to new data sources that will become available. The main sources were “official” statistics on the financial sector produced by the European System of Central Banks (ESCB) and data from alternative sources such as commercial data providers and survey results.

The two main official data sources are the financial accounts data and monetary statistics collected from reporting agents in accordance with ECB statistical regulations. National and euro area financial accounts data provide a complete and consistent set of quarterly accounts, in line with international statistical standards⁸⁶ and were the main source of information on the OFI sector as a whole. Monetary statistics collected by the ESCB⁸⁷ for the euro area and, with some limitations, for non-euro area EU Member States, are used heavily in the construction of risk metrics. The data collected from reporting agents provide a harmonised approach to sector and instrument classifications and, where available, are an important input into the compilation of financial accounts, although there are some differences in valuation and methodological criteria. Data collected under ECB regulations include monthly and quarterly balance sheet statistics for MFIs (including MMFs) and non-MMF investment funds (by investment policy), and quarterly data for FVCs. Enhanced data on insurance corporations will be collected from July 2016 under a new statistical requirements integrated with Solvency II. Most (although not all) of the ECB data used in this paper are publicly available, and in many cases the national level data are also available.

A significant part of the euro area financial sector, however, is not covered by detailed balance sheet statistics – specifically OFIs other than FVCs. The “residual” part of the total OFI sector in the euro area – i.e. the part not covered by data collected under the ECB’s statistical regulations – is highly concentrated. Over half is in just two countries, Luxembourg and the Netherlands, and indications are that much of this activity relates to intra-group financing for non-financial groups, and consequently does not relate to shadow banking activities (see the Section 2.5.1 on non-securitisation SPEs and holding companies). Further investigation and future data collections may shed more light on the relevance of these OFIs for shadow banking.

Publicly available data sources are used, where available, to complement official statistics. These data sources – e.g. commercial data providers or data published by trade associations – are useful

⁸⁶ European statistics are compiled under Regulation (EU) No 549/2013 on the European system of national and regional accounts in the European Union (the ESA 2010 Regulation).

⁸⁷ See the [statistics section](#) of the ECB’s website.



in filling gaps with respect to assessing risks in specific parts of the shadow banking system.⁸⁸ Regular and ad hoc surveys are also useful in shedding light on specific areas (especially under the activity-based approach).

A potentially useful data source is supervisory data which may become available at a national level or will be disclosed under EU regulations and directives. As these data sources are not available at this stage, they are not incorporated into the risk metrics framework presented in the paper. However, the appropriateness of this information for the purposes of mapping the shadow banking system will continue to be explored in future monitoring frameworks.

Assessment of data gaps

While a great deal of data is available from statistics on investment funds and OFIs in the EU, some important gaps remain. Although data may be available from other public data providers or surveys, these data are not always comparable. Consequently, metrics for shadow banking risk may not always cover the EU as a whole.⁸⁹ An assessment of currently available data is presented in Table A by geographic coverage for the EU as a whole and for the euro area. However, availability will continue to improve, in particular as more statistics based on micro-level data are developed. Data on risk indicators (maturity transformation, liquidity transformation, leverage, credit intermediation and interconnectedness) are assessed on the basis of the quality and appropriateness of available data for constructing relevant metrics. Four key areas of data gaps can be identified: data on non-euro area EU Member States; entities not covered by ECB statistical regulations; data on liquidity transformation; and data on activities in general.

While financial accounts data are compiled for all EU Member States, the coverage of monetary data for non-euro area EU Member States is not complete. Monetary data on MMFs, non-MMF investment funds and FVCs are collected in the euro area under binding ECB regulations and the coverage is complete. With regard to non-MMF investment funds, several non-euro area countries also provide data.⁹⁰ While much of the EU is therefore currently covered by these monetary data, harmonised data are not available for all countries. Data coverage on hedge funds under mandatory AIFMD reporting will be of benefit in providing information in a harmonised way on concentration of exposures (to counterparties, assets, etc.), liquidity risk profile and leverage.

There are data gaps with respect to entities not covered by ECB statistical regulations, i.e. OFIs other than FVCs. For FCLs and SDDs, data collection is not binding, and data are not provided for all countries, so a significant part of the euro area population is not yet covered (especially with regard to FCLs). Given their relative size, these non-covered OFIs represent a key data gap where further information is necessary in order to determine which parts are relevant from a shadow banking perspective.

⁸⁸ Such sources include, for example, Fitch Ratings and Crane data on prime MMFs, Thomson Reuters Lipper data on bond funds, Deutsche Bank data on ETFs, ICMA and ICAP on repo activities, and Markit Securities Finance on securities lending. Data from the European Private Equity and Venture Capital Association (EVCA) and the Association for Financial Markets in Europe (AFME) provide useful pan-European data on private equity and securitisation, respectively. In addition, commercial hedge fund databases can be used to complement ECB data on alternative funds (e.g. strategies, returns). Currently, the ESMA is working on software which is aimed at combining four different hedge fund databases: BarclayHedge, Eurekahedge, TASS and HFR (no data provider covers the entire industry).

⁸⁹ The metrics that are constructed on the available data may, however, be considered representative of the EU as a whole, subject to the assumption that the characteristics of these entities/activities in the uncovered jurisdictions are comparable to those for which data are available.

⁹⁰ Data on resident non-MMF investment funds are collected in the Czech Republic, Poland, Hungary and Romania.



Table A
Assessment of data availability and data gaps

	Coverage		Risk indicators				
	EU	Euro area	Maturity transformation	Liquidity transformation	(Financial) leverage ⁽⁴⁾	Credit intermediation	Interconnectedness
Entity							
Money market funds	●	●	●	●	●	●	●
Non-MMF investment funds	●	●	●	●	●	●	●
<i>Bond funds</i>	●	●	●	●	●	●	●
<i>Equity funds</i>	●	●	●	●	●	●	●
<i>Real estate funds</i>	●	●	●	●	●	●	●
<i>Hedge funds</i>	●	●	●	●	●	●	●
<i>ETFs(1)</i>	●	●	●	●	●	●	●
<i>Private equity funds(1)</i>	●	●	●	●	●	●	●
OFI sector (total)	●	●	●	●	●	●	●
<i>FVCs</i>	●	●	●	●	●	●	●
<i>FCLs</i>	●	●	●	●	●	●	●
<i>SDDs</i>	●	●	●	●	●	●	●
<i>Other OFIs(2)</i>	●	●	●	●	●	●	●
Activity							
Repo markets	●	●	●	-	●	●	●
Securities lending(3)	●	●	●	-	-	●	●
<i>Non-cash collateral re-use</i>	●	●	●	●	-	●	●
<i>Cash collateral reinvestment</i>	●	●	●	●	-	●	●
Derivatives	●	●	●	●	●	●	●
Market liquidity provision	●	●	●	●	●	●	●
Insurance-related	●	●	-	-	-	●	●

- Data are very good in terms of coverage / are very appropriate for constructing metrics.
- Data are substantially complete in terms of coverage / are appropriate for constructing metrics.
- Some data are available which may be used for constructing metrics (although incomplete/unharmonised).
- Data are substantially incomplete / are not fit for the purpose of constructing metrics.

- (1) In the statistical reporting, ETFs and private equity funds are included within the above types, depending on the strategy of the fund, but full balance sheet data are not available for the construction of metrics.
- (2) I.e. the part of the OFI sector (total) not included in breakdowns of the above sub-categories.
- (3) Note that liquidity transformation is only relevant insofar as the collateral received from SFTs is reinvested/re-used.
- (4) The available balance sheet data are not appropriate for the calculation of synthetic leverage.

The table above presents an assessment of data gaps in two dimensions: (i) the completeness of the coverage of respective entities which are resident in the EU and euro area; and (ii) the appropriateness or usefulness of these data for the purpose of constructing metrics for the respective risk indicators, based on a benchmark of what would be "ideal" for such purposes. Note that the assessment of coverage does not imply that granular entity-level information is available for analysis. Where these are collected under ECB regulations, this may be available to NCBs, but only the aggregate national data are available for this exercise.



While some data are generally available with respect to liquidity transformation, they do not meet all the needs for the purposes of constructing metrics. This is partly due to the lack of detailed maturity breakdowns over the very short term (i.e. less than one year) in these data, which are collected for monetary analysis purposes. In addition, a proper analysis of liquidity transformation would require more granular data on the liquidity of instruments (e.g. equities, debt securities, and the redemption policies of funds). Other sources may be used to provide information on liquidity for specific entities, although a proper assessment of liquidity transformation may require information at a micro level. Regarding the other indicators, metrics on leverage, credit intermediation and interconnectedness with the banking system can be readily constructed from available data. Metrics on maturity transformation can be constructed, although on the basis of original (rather than residual) maturity and with a lack of granularity for shorter maturities.

Regarding the shadow banking activities analysed in the scope of this paper, data coverage is uneven. ESCB statistics provide partial coverage of repo markets in terms of credit provision and interconnectedness, but not for maturity transformation or liquidity transformation. The frequency of these data also limits the ability to monitor repo markets, and they therefore need to be complemented with commercial data, although large gaps persist. For securities lending and cash collateral reinvestment, no official data source currently exists. Commercial data sources allow daily monitoring of credit provision (securities on loan) and, to an extent, interconnectedness (share of beneficial owners by sector, but no information available on counterparties), including some information on the maturity of these transactions. Only very partial data exist on the reinvestment of cash collateral, which is quite a significant gap in the coverage of shadow banking activities.

Several ongoing regulatory and statistical initiatives will improve the availability and, importantly, the granularity of data for future monitoring exercises. This includes the possibility of exploiting security-by-security data on holdings by sector (see ECB, 2015a), which will provide much greater granularity with respect to the assets held by the financial sector, and the scope to include additional data on residual maturities. With regard to SFTs, data will be enhanced through a proposed Commission regulation on SFTs which will require the reporting of SFTs to trade repositories. The ECB's Money Market Statistical Reporting (MMSR) Regulation (ECB/2014/48), under which reporting commenced in April 2016, will contribute data on interconnectedness of credit institutions, in particular with other financial institutions, through the collection of granular statistics on secured, unsecured and some derivative money market transactions.⁹¹ In addition, the "AnaCredit" project to establish a shared central credit database of loan-level data for the euro area to support the ESCB and supervisors in the analysis of credit will improve the quality and granularity of statistical information.⁹² First reporting – covering credit granted by credit institutions to legal entities, including in other parts of the financial sector – will take place at the end of 2018.

⁹¹ See the [related pages](#) on the ECB's website.

⁹² See the recently issued ECB Regulation on the collection of granular credit and credit risk data (ECB/2016/13) and the AnaCredit pages on the [ECB's website](#).



Annex 2

Components of risk metrics for the risk indicators framework

Metric input	Money market funds (MMFs)	Non-MMF investment funds	Financial vehicle corporations (FVCs)	Metrics reference (Table 2)
Data collection	Regulation ECB/2013/33 concerning the balance sheet of the monetary financial institutions sector	Regulation ECB/2013/38 concerning statistics on the assets and liabilities of investment funds	Regulation ECB/2013/40 concerning statistics on the assets and liabilities of financial vehicle corporations engaged in securitisation transactions	
Coverage	Quarterly data from Q1 2006; euro area.	Quarterly data from Q4 2008; euro area, Czech Republic, Poland, Hungary and Romania.	Quarterly data from Q4 2009; euro area.	
Short-term assets	Deposits and debt securities issued by euro area residents <1yr original maturity.	Deposits and debt securities held <1yr original maturity.	Deposits with MFIs, securitised loans <1yr original maturity; "other securitised assets" (mostly accounts receivable) and debt securities held <1yr original maturity.	MAT1, MAT3
Short-term liabilities	Loans, shares/units issued (assumed redeemable at short notice).	Shares/units issued (assumed redeemable at short notice).	Debt securities issued with original maturity <1yr.	MAT3, MAT4
Long-term assets	Debt securities issued by euro area residents >1yr original maturity.	Debt securities held >1yr original maturity.	Securitised loans (excluding short-term loans to NFCs); debt securities holdings with original maturity >1yr.	MAT2, MAT4
Liquid assets	Deposits with MFIs, debt securities, equity and non-MMF investment fund shares/units.	Deposits with MFIs, debt securities issued by euro area MFIs and general government, and equity and investment fund shares.	Deposits with MFIs, debt securities <1yr original maturity and shares and other equity (excluding securitisation fund units issued by other FVCs).	LIQ1, LIQ2, LIQ4
Liquid liabilities	Shares/units issued.	Shares/units issued.	Debt securities issued with original maturity <1yr.	LIQ4
Credit intermediation	Loans and debt securities held. No distinction between loans purchased and loans originated by funds.	Loans and debt securities. No distinction between loans purchased and loans originated by funds.	Loan claims (on euro area non-MFIs and non-FVCs) and securitised loans and debt securities holdings.	CRE1, CRE2
Debt (leverage)	Loan liabilities.	Loan liabilities.	Debt securities issued and loan liabilities.	LEV1
Interconnectedness	Assets: deposits and debt securities issued by euro area and non-euro area banks. Liabilities: MMF shares held by MFIs.	Assets: deposits and debt securities issued by euro area MFIs. Liabilities: non-MMF investment fund shares held by MFIs (available for total only – not by investment policy).	Assets: deposits with euro area MFIs, securitised loans originated by euro area MFIs, and debt securities issued by euro area MFIs. Liabilities: FVC debt securities held by euro area MFIs (mainly retained securitisations).	INT1, INT2

Notes: The above table summarises the input for metrics presented in Table 2 for MMFs, non-MMF investment funds and FVCs based on available data collected under the respective statistical regulations addressed to euro area reporting agents. This input will be improved as data availability and granularity is enhanced. The ESRB will continue to review possible ways to develop benchmark values for each indicator which can be used in future monitoring frameworks.



Abbreviations

Other

AFME	Association for Financial Markets in Europe	FCL	financial corporation engaged in lending
AIF	alternative investment fund	FSB	Financial Stability Board
AIFM	alternative investment fund manager	FVC	financial vehicle corporation engaged in securitisation transactions
AIFMD	Alternative Investment Fund Managers Directive	GNE	gross notional exposure
AMF	Autorité des Marchés Financiers	HQLA	high quality liquid assets
APA	approved publication arrangement	ICMA	International Capital Market Association
ARM	approved reporting mechanism	ICPF	insurance corporations and pension funds
ASC	Advisory Scientific Committee	IMF	International Monetary Fund
ATC	Advisory Technical Committee	IRS	interest rate swap
AuM	assets under management	JEGS	Joint ATC/ASC Expert Group on Shadow Banking
BIS	Bank for International Settlements	LEI	legal entity identifier
CCP	central counterparty	MiFID II	Markets in Financial Instruments Directive II
CDO	collateralised debt obligation	MFI	monetary financial institution
CDS	credit default swap	MMF	money market fund
CGFS	Committee on the Global Financial System	NAV	net asset value
CMU	Capital Markets Union	NCB	national central bank
CQS	credit quality step	NFC	non-financial corporation
CT	consolidated tape	OFI	other financial institution
DRS	data reporting service	OFR	Office of Financial Research
DRSP	data reporting service provider	OTC	over-the-counter
EBA	European Banking Authority	SDD	securities and derivatives dealer
EEA	European Economic Area	SFI	specialised financial institution
EMIR	European Market Infrastructure Regulation	SFT	securities financing transaction
ESA	European System of national and regional Accounts	SFTR	Securities Financing Transactions Regulation
ESCB	European System of Central Banks	SPE	special purpose entity
ESMA	European Securities and Markets Authority	SPV	special purpose vehicle
ETF	exchange-traded fund	STS	simple, transparent and standardised
EVCA	European Private Equity and Venture Capital Association	UCITS	undertaking for collective investment in transferable securities
FASB	Financial Accounting Standards Board	VaR	value at risk
FCA	Financial Conduct Authority	WAM	weighted average maturity
		WGMFS	Working Group on Monetary and Financial Statistics



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Laurent Grillet-Aubert

ESRB Secretariat, Frankfurt am Main, Germany; e-mail: laurent.grillet-aubert@esrb.europa.eu

Jean-Baptiste Haquin

European Securities and Markets Authority (ESMA); e-mail: jean-baptiste.haquin@esma.europa.eu

Clive Jackson

European Central Bank (ECB), Frankfurt am Main, Germany; e-mail: clive.jackson@ecb.europa.eu

Neill Killeen

ESRB Secretariat, Frankfurt am Main, Germany; e-mail: neill.killeen@esrb.europa.eu

Christian Weistroffer

European Central Bank (ECB), Frankfurt am Main, Germany; e-mail: christian.weistroffer@ecb.europa.eu

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Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.esrb.europa.eu

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