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Use of credit default swaps by UCITS funds: evidence from EU regulatory data

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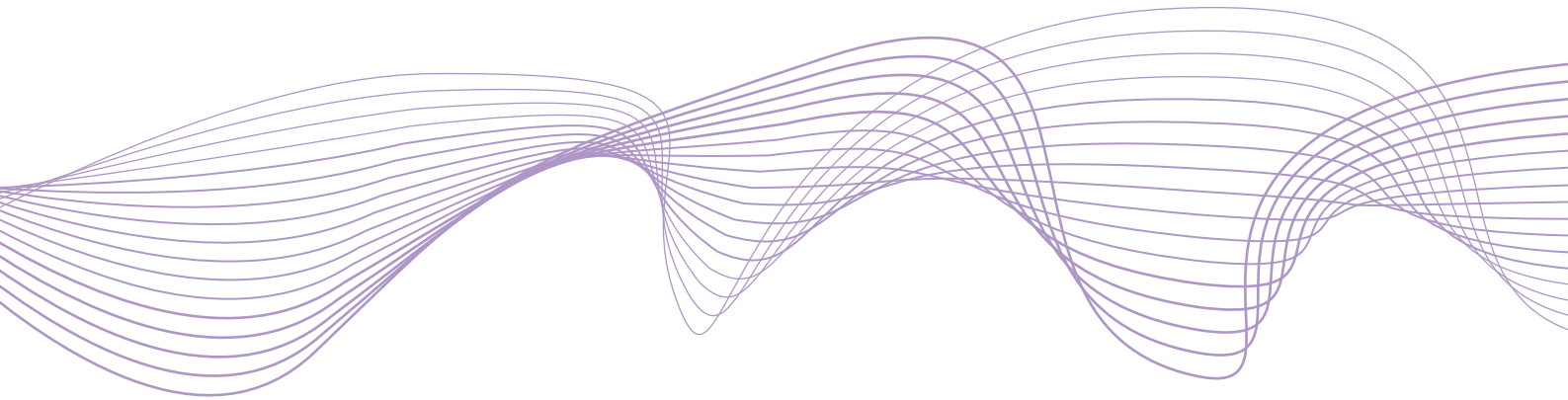

ESRB
European Systemic Risk Board
European System of Financial Supervision

Abstract

Using a sample of more than 18,000 Undertakings for Collective Investment in Transferable Securities, or UCITS, this paper aims to provide a first overview of the use of credit default swaps by EU UCITS funds. We show that UCITS funds only account for a small share of the overall EU credit derivatives market. The CDS market is highly concentrated, with thirteen large dealers acting as counterparty to the vast majority of CDS transactions that involve UCITS funds. The use of CDS by UCITS is mainly concentrated in fixed-income funds and funds that rely on so-called alternative strategies. Funds that use CDS tend to be much larger on average. The analysis also reveals three salient features in the UCITS funds' use of CDS. Firstly, funds with directional strategies, such as fixed-income and allocation funds (or mixed funds), are on aggregate net sellers of CDS. Secondly, a large majority of CDS underlyings are indices, from which funds can gain exposure to multiple entities at once within one sector or region. Lastly, most sovereign single-name CDS are written on emerging market issuers, highlighting the role that these instruments can play in facilitating access to less liquid markets.

JEL classification: F30, G10, G15, G23

Keywords: credit default swaps, investment funds, derivatives, synthetic leverage

Contents

Non-technical summary

Increasing the transparency of derivatives markets remains one of the major global policy goals devised in the aftermath of the global financial crisis. In Europe, the introduction of the European Markets Infrastructure Regulation (EMIR) made it possible for EU and national authorities to increase their oversight of derivatives markets using granular data. While the first wave of research using data reported under EMIR aimed to provide an overview of EU derivatives markets, the focus of the analysis has shifted to the structure of specific asset classes and to particular features of the market. This paper belongs to this second wave, with a view to improving our understanding of the use of derivatives by non-bank financial institutions.

As highlighted in ESRB (2017), the non-bank financial sector in the EU is heterogeneous and includes a vast array of entities and activities. Moreover, data gaps are prevalent for some parts of the sector, which can hinder risk-monitoring exercises. About one third of assets outside banks, insurance corporations and pension funds, are held by the investment fund sector. With harmonised information on alternative investment funds now being reported to authorities, attention turns to the other main type of funds, i.e. Undertakings for Collective Investment in Transferable Securities, or UCITS. Under the UCITS Directive and ensuing Guidelines, funds face a number of obligations that apply in the context of derivatives, including the calculation of counterparty risk, portfolio concentration limits, and disclosure to investors. However, little is currently known of the extent to which European investment funds rely on derivatives and their counterparties to these transactions.

Owing to the role played by credit default swaps (CDS) in the global financial crisis – namely in the build up of off-balance sheet exposures such as AIG's, the spreading of risk across the financial system, and the increased interconnectedness – this asset class of derivatives remains central to policymakers' concerns. In this context, the strong growth of the European asset-management industry in recent years underscores the need for a greater understanding and monitoring of asset management activities, including the use of credit derivatives. Using a sample of more than 18,000 UCITS, this paper thus aims to provide a first overview of the use of CDS by EU UCITS funds.

The main findings of the paper show that UCITS funds only account for a small share of the overall EU credit derivatives market. The market is highly concentrated, with thirteen large dealers acting as the counterparty to the vast majority of CDS transactions. The use of CDS by UCITS funds is mainly concentrated in fixed-income funds and funds that rely on so-called alternative strategies. Funds that use CDS tend to be much larger on average. The gross CDS exposure (i.e. the sum of all buy and sell positions in notional terms) of these funds varies by fund type and size, and can sometimes exceed their net assets. This reflects, in part, the fact that some funds take on both buy and sell CDS positions with the objective to reduce their net CDS exposure.

The analysis also reveals three salient features in the UCITS funds' use of CDS. Firstly, funds with directional strategies, such as fixed-income and allocation funds (or mixed funds), are on aggregate net sellers of CDS. In other words, they are long on the credit risk of the underlying entity, which may be associated with hidden tail-risk. In contrast, funds relying on alternative strategies tend to have more balanced aggregate exposures. Secondly, a large majority of CDS underlyings are indices, from which funds can gain exposure to multiple entities at once within one sector or region. Lastly, most sovereign single-name CDS are written on emerging market issuers, highlighting the role that these instruments can play in facilitating access to less liquid markets.

Section 1
Introduction

Increasing the transparency of derivatives markets remains one of the major global policy goals devised in the aftermath of the global financial crisis. In Europe, the introduction of the European Markets Infrastructure Regulation (EMIR) made it possible for EU and national authorities to increase their oversight of derivatives markets using granular data. While the first wave of research using data reported under EMIR aimed to provide an overview of EU derivatives markets, the focus of the analysis has shifted to the structure of specific asset classes and to particular features of the market. This paper belongs to this second wave, with a view to improving our understanding of the use of derivatives by non-bank financial institutions.

As highlighted in ESRB (2017), the non-bank financial sector in the EU is heterogeneous and includes a vast array of entities and activities. Moreover, data gaps are prevalent for some parts of the sector, which can hinder risk-monitoring exercises. About one third of assets outside banks, insurance corporations and pension funds, are held by the investment fund sector. With harmonised information on alternative investment funds now being reported to authorities, attention turns to the other main type of funds, i.e. Undertakings for Collective Investment in Transferable Securities, or UCITS. Under the UCITS Directive and ensuing Guidelines, funds face a number of obligations that apply in the context of derivatives, including the calculation of counterparty risk, portfolio concentration limits, and disclosure to investors. However, little is currently known of the extent to which European investment funds rely on derivatives.

Anecdotal evidence suggests the use of derivative instruments by non-bank financial institutions (e.g. investment funds, financial vehicle corporations and security and derivative dealers) may be on the rise. Derivatives play a fundamental role for investment funds that implement complex or so-called alternative strategies, such as hedge funds and synthetic index funds. Moreover, they allow entities to net their gross exposures or hedge risks stemming from existing positions. However, derivatives can also be used to gain additional exposure and build off-balance sheet leverage, otherwise known as *synthetic leverage*.

Synthetic leverage differs from conventional (i.e. financial) leverage as it does not involve outright borrowing or debt creation, but is generated from exposures through derivative instruments, such as options, futures and swaps. Derivatives are valued on balance sheet at replacement costs, as opposed to the underlying notional amount of the derivative contract. This allows in principle an entity to build large exposures with a smaller amount of invested capital. A key concern for regulators is that synthetic leverage may give rise to similar risks as financial leverage, i.e. a higher likelihood of market participant default, and a risk of rapid unwinding of leveraged positions. Abrupt deleveraging or a rapid change in the value of the derivative can lead to margin calls and fire-sale feedback loops. These events can propagate liquidity shocks and cause or increase the extent of contagion.

Although a common definition of synthetic leverage has not yet been developed at a global level, some concepts are already captured in the EU regulatory framework. For example in the UCITS and AIFM Directives leverage is calculated using the concept of global exposures[5], which encompasses both on-balance sheet (i.e. collateralised and uncollateralised borrowing, such as repos) and off-balance sheet (i.e. derivatives) exposures. Synthetic or off-balance-sheet leverage is

[5] CESR (2010).

a subset of overall leverage that is neither explicitly identified in EU regulation nor calculated separately from financial leverage.

The use of derivatives by European investment funds is of particular interest for several reasons. Firstly, the EU asset management industry has experienced very strong growth since 2009, with fund assets increasing on average 5% per year to reach around €14 trillion in 2017. Secondly, while the use of derivatives by banks is well documented, information on the use of derivatives by funds at the EU level is much more limited, but key to address potential macroprudential concerns. Thirdly, the economic literature is increasingly looking into the role of non-bank financial institutions in the transmission of monetary policy, with investment funds' portfolio rebalancing identified as an important mechanism.[6] Finally, understanding how funds manage their portfolio risk remains a key objective from an investor protection perspective.

It is well known that some types of funds, such as hedge funds, make extensive use of derivative instruments – a fact that came to public attention with the spectacular collapse of Long-Term Capital Management (LTCM) in 1998. Moreover, in its Hedge Fund Survey (2015), the FCA observed that UK hedge funds obtain most of their overall leverage synthetically through derivatives rather than through financial leverage. Recent evidence from the US also points to the use of derivatives by mutual funds. The SEC (2015) finds that US funds' derivatives exposure – measured as the gross notional amount of derivatives – averaged 20% of their net asset value (NAV). Within the UCITS framework, borrowing is limited to 10 per cent of NAV whereas the restrictions on synthetic leverage are more complex as they depend on how the leverage is measured (see Section 2.1 for more details). While data on alternative investment funds (AIFs) collected at a national level are now being collected at an EU level, there is no such arrangement for EU-wide UCITS data.[7] Although they do not face capital requirements like banks, UCITS have much more stringent requirements than AIFs in terms of portfolio liquidity, concentration, risk management techniques, and leverage. In particular, UCITS are allowed to use derivatives within specific leverage constraints.

Derivative instruments can be broadly categorised according to their underlying asset class, i.e. equity, credit, interest rate, commodity and foreign exchange. In this paper we focus specifically on credit default swaps (CDS), which account for the vast majority of the EU credit derivatives market (El Omari et al., 2017), for three reasons:

i) CDS are mainly traded over-the-counter (OTC), which is usually associated with greater opacity and lower product standarisation;

ii) CDS played a significant role during the global financial crisis, due to the redistribution and amplification of credit risk which they facilitate, without sufficient monitoring by regulatory authorities; and

iii) CDS are a key financial instrument for bond funds, which have taken on extra risk in recent years given the current low interest-rate environment (Bubeck et al., 2017, and ECB, 2017).

As CDS allow entities to transfer their counterparty credit risk, the significant growth of the EU asset management industry makes the mapping of investment funds' CDS exposures an increasingly important element to assess interconnectedness.

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[6] See for example Albertazzi et al. (2016) or Bua et al. (2017).

[7] UCITS – Undertaking for Collective Investment in Transferable Securities – is the EU label for open-ended investment funds that can be sold across borders within the European Single Market to retail investors.

In this paper, we follow Breuer (2002) and define synthetic leverage as the on-balance-sheet asset equivalent of the exposure implied by an off-balance-sheet instrument. We apply this definition to CDS and use a proxy measure of synthetic leverage calculated as the gross notional exposure as a percentage of fund NAV. This calculation is broadly in line with EU fund regulation (UCITS, AIFMD) which converts CDS into its cash-equivalent form for computing leverage. For this purpose, we use granular regulatory transaction-level data reported by EU-domiciled counterparties under the European Market Infrastructure Regulation (EMIR).[8]

A first analysis of the EU derivatives market based on EMIR data shows that non-bank financial institutions engage in derivative transactions (Abad et al., 2016). Building on these initial findings, we provide a more granular mapping on the use of CDS by UCITS funds. To do so, we build a sample of more than 18,600 funds comprising information on funds' domicile, strategy and NAV. An essential aspect of this work is the identification of entities by using their legal entity identifiers (LEIs) in EMIR. LEIs are not mandatory for UCITS funds nor systematically available from commercial data providers yet. The lack of a consistent and comprehensive data source for identifying UCITS through their LEIs hinders monitoring exercises of the sector.

Our paper contributes to the growing literature on the monitoring of shadow banking activities by providing a unique insight into the use of CDS by UCITS funds. In this way, it fills an important data gap and sheds new light on asset management activities. Moreover, we also contribute to the ongoing policy discussions on leverage in the non-bank financial sector by providing a first proxy of synthetic leverage from credit derivatives for investment funds.

The rest of the paper is structured as follows: Section 2 presents the literature and main concepts, Section 3 focuses on the data, Section 4 presents the results while Section 5 concludes.

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

Section 2
Concepts and literature

2.1 Measuring synthetic leverage

In the EU regulatory framework, leverage is calculated using the concept of global exposure[9], which encompasses both on-balance sheet (i.e. collateralised and uncollateralised borrowing) and off-balance sheet (i.e. derivatives) exposures. Synthetic leverage is therefore a subset of overall leverage that is neither explicitly identified in EU regulation nor calculated separately from financial leverage.

Three main approaches are identified in the EU framework for the calculation of investment fund exposures:

- The commitment approach under UCITS and AIFMD includes the sum of cash-equivalent positions of derivatives' underlying assets, after netting and hedging arrangements and the market value of the cash collateral is reinvested. For AIFs, all other assets and non-temporary borrowings are also included in the calculation.
- The gross approach requires UCITS and AIFMD to report the absolute value of all their assets (apart from cash and cash equivalents), their non-cash, non-temporary borrowings, their repos and reverse repos, and their securities lending and borrowing transactions, without applying netting and hedging arrangements. UCITS funds using the Value-at-Risk approach (see below) must also report the sum of the absolute value of their derivative notionals (i.e. gross notional) divided by NAV.
- The Value at Risk (VaR) approach is used under the UCITS for funds with complex investment strategies, and in AIFMD when required by national competent authorities. This is not a direct measure of leverage but rather a measure of the maximum potential loss due to market risk. As aforementioned, UCITS funds using this approach are also required to disclose their gross leverage.

Underlying the commitment and gross methods is the widely used concept of cash-equivalent portfolios. This approach assumes that synthetic exposures can be replicated by direct investment in the cash securities markets. The calculation of cash-equivalent portfolios under the commitment approach must take into account relevant netting and hedging sets, which refer to the same underlying assets or similar risks.

The distinction between gross and net leverage is also important. The netting process allows market participants to reduce gross exposures and offset some of the risks, such as counterparty credit risk. While this reduces the default risk of individual entities, gross exposures are also relevant for macro-prudential regulators. The simultaneous unwinding of gross derivative positions by entities under stress may indeed create negative externalities for other market participants, with broader implications for the financial system.

To gain a more complete view of UCITS funds' exposures, we rely on a measure derived from the gross method, i.e. the sum of all buy and sell notional exposures from CDS at individual fund level, even when they are used for netting or hedging purposes:[10]

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[9] CESR (2010).

[10] See Haquin and Mazzacurati (2017) or ECB Financial Stability Review, May 2015 for a discussion on the different measures.

$$Gross\ SL = \frac{\sum CDS^{BUY} + \sum CDS^{SELL}}{Net\ Asset\ Value}$$

While gross CDS notional may overstate the level of risk for individual entities, it offers three important advantages from a macroprudential perspective. First, it is easier to compute and allows for the automated production of risk indicators. Second, it does not require any assumption about hedging: various instruments may be used in order to hedge the same risk, but not all instruments may be equally effective. Third, as shown by D'Errico et al. (2017), derivative netting may be done in multiple ways, and computing a net exposure measure requires an ex-ante choice of netting sets (e.g. bilateral counterparty netting, multilateral netting based on the ISIN of the underlying, on the underlying issuer, or on the country and/or sector of the underlying issuer, etc.). Fourth, a fund can have zero net exposure through CDS positions but still significant amounts of gross exposures, which increases the interconnectedness within the financial system and should thus be relevant from a macroprudential perspective. The gross measure captures this more accurately than other measures that allow for a netting of positions. Understanding whether derivatives are used for netting and hedging purposes, or to create additional exposures, is a crucial step that will need to be tackled in future research. However, data gaps remain regarding counterparties' netting and hedging arrangements.

2.2 Synthetic leverage in EU investment funds

A comprehensive assessment of the systemic risk from synthetic leverage requires analysing specific types of derivative instruments. Derivatives are cross-sectoral instruments widely used by banks and other non-bank financial institutions. Beyond the general risk from leverage (i.e. higher likelihood of default, procyclicality of margining practices and fire-sales risk and negative externalities for other market participants), synthetic leverage contributes to interconnectedness by creating contagion channels between market participants that may have different reasons for dealing in derivatives markets.

Further, derivatives usage by investment funds can pose additional risks to financial stability. First, the EU investment fund sector has expanded rapidly since the 2007-09 global financial crisis and with some recent evidence of increased risk-taking (ESRB, 2017). Since 2008 total net assets of European investment funds more than doubled from around €6 trillion to €14 trillion as at the end of 2016.[11] Meanwhile, bond funds have also shifted their portfolio holdings toward lower quality assets, and reduced their liquidity buffers (ECB, 2017).

Second, there are important interactions in some investment funds' business models between leverage and liquidity mismatches that can amplify systemic shocks. The redeemable nature of shares in open-ended investment funds such as UCITS makes them structurally vulnerable to sudden redemptions, which can affect the liquidity position of funds and trigger fire sales. Leverage can amplify the need for liquidity and thus increase the size of fire sales. For example, leveraged investment funds experiencing higher margin calls can adjust rapidly if they hold assets that can be liquidated within a short timeframe, e.g. one day. If, on the other hand, a leveraged fund holds illiquid assets and is subject to large short-term redemptions, it may have to sell assets at a deep discount in order to honor its obligations. Further asset price declines might trigger more redemptions, starting the liquidity spiral anew. However, in practice, the leverage embedded in

[11] See EFAMA quarterly statistics for more details: http://www.efama.org/statistics/SitePages/European%20Quarterly%20Statistical%20Release.aspx

derivatives is curtailed by margin requirements or credit limits (see Breuer (2002)) and hedge funds in particular are typically subject to maximum levels of leverage by their prime broker (see Ang et al. 2011). In addition, hedge funds do not typically offer daily redemptions, but for those which do there may be liquidity management tools in place (such as suspensions of redemptions) allowing the fund to mitigate this risk.

Third, as most sizeable asset management companies in Europe are owned by banks, which also provide services or products including derivative contracts to their investment funds, or insurance companies, synthetic leverage may play a role in amplifying shocks and transmitting them to the wider financial system. This transmission channel exists within groups where asset management activities are consolidated with other activities, but can also be a consequence of step-in risk (BIS, 2017). The BIS describes step-in risk as "incentives beyond contractual obligation or equity ties to "step in" to support unconsolidated entities in financial distress, rather than allow them to fail and face a loss of reputation".[12]

2.3 Related literature

The link between derivatives, leverage and systemic risk has been explored at length in the financial literature. The importance of accounting for off-balance-sheet exposures when computing leverage measures was first suggested by Breuer (2002), who suggests that leverage measures should be analysed for individual positions but also aggregated by institution and by market. More recently, Papanikolaou and Wolff (2014) postulate that leverage was one of the main factors responsible for the fragility of the financial system during the global financial crisis and conclude that leverage ratios that do not consider off-balance-sheet items encourage firms to expand such exposures or to shift certain activities off their balance sheets. The relation between off-balance-sheet leverage and default risk has been one of the factors leading to the introduction of explicit leverage limits in banking regulations.

The use of derivatives by non-bank financial institutions is not a new phenomenon. Before the global financial crisis, the associated financial stability risks were epitomised by the collapse of LTCM in 1998 (see Edwards, 1999). LTCM was a US-domiciled hedge fund that built substantial off-balance-sheet leverage by acquiring very large positions in interest rate derivatives. They also had borrowed substantial sums to buy more assets, thus contributing to a financial leverage ratio many times the equity in the fund. The fund eventually posed a systemic risk as it started to unravel its positions following losses from the 1998 Russian financial crisis, forcing the US Federal Reserve to organise its rescue in order to preserve financial stability. While this episode highlighted to public authorities' the importance of monitoring both on- and off-balance sheet leverage, the complexity of derivatives continues to obscure the reliable measurement of the latter.

As opposed to traditional debt, which serves mainly one purpose, derivatives can also be used to hedge or mitigate risks. For example, Koski and Pontiff (1999) found that changes in risk for equity funds are significantly related to past fund performance, but are less so for those using derivatives, suggesting that these instruments can also be used to reduce the impact of performance on risk taking.

Following exponential growth of global derivatives markets in the years preceding the global financial crisis, renewed attention on the use of derivatives by non-bank financial institutions arose mainly due to the role that CDS played in the collapse of US insurer AIG. The FSB (2011)

[12] https://www.bis.org/bcbs/publ/d423.pdf

recommendations – increased monitoring of the off-balance sheet activities of shadow banking entities and of the potential leverage associated with such activities – became a priority for public authorities worldwide in the aftermath of the crisis. The collection of regulatory data on derivatives, which aims to improve data availability and granularity globally, is part of a coordinated effort by international authorities to allow such a monitoring to take place.

The recent literature meanwhile has focused on assessing the use of derivatives by investment funds using readily available data, including from commercial providers. Chen (2011) investigate the link between derivatives use by US hedge funds and risk taking using data from Thomson Reuters TASS database. The author observes that derivatives tend to reduce fund risk and mitigate the impact of severe market conditions on fund operations. Using the TASS database and US Securities and Exchange Commission filings, Aragon and Spencer Martin (2012) find that hedge funds use equity options to engage in directional and hedging strategies. The authors note that these funds also tend to manage larger portfolios and have lower risk than non-option users.

Starting from a macroprudential perspective, Kambhu et al. (2007) analyse the exposures that US hedge funds have to banks and non-banks. The authors find that counterparty credit risk management at individual firms may not be enough to mitigate systemic risk due to agency problems, externalities, moral hazard and competitive pressures. These results are in line with the finding in Nijskens and Wagner (2011) which suggest that credit derivatives can mitigate default risk at individual firms, but their widespread use introduces systemic risk into the financial system. Deli et al. (2015) document the derivatives exposure of US mutual funds by type and strategy and by derivative asset class based on a combination of US regulatory data and Morningstar data. Similarly, Haquin and Mazzacurati (2016) propose a strategy to identify synthetically leveraged funds by relying on a fund *beta* (i.e. the sensitivity of the fund's returns to the overall market) and the share of cash in total assets using Thomson Reuters Lipper data.[13]

Owing to the somewhat recent availability of high-frequency and granular data on derivatives following the implementation of post-crisis reforms, the empirical literature that makes use of derivatives data from trade repositories (TRs) is still relatively scarce, albeit quickly expanding. In the US, Du et al. (2016) examine counterparty risk in US CDS markets using data from DTCC. They find that it has a modest impact on CDS pricing, but that market participants actively manage counterparty risk by choosing counterparties of better credit quality and those that are less subject to wrong-way risk.[14] Along these lines, Arora et al. (2012) also conclude that counterparty credit risk in CDS is priced lower than financial theory suggests, reflecting a risk level that is consistent with fully collateralized exposures despite most CDS being in fact unsecured claims.

In Europe, Abad et al. (2016) provide a first snapshot of derivatives markets in the EU based on open transactions in the EMIR data as of 2 November 2015 that were reported to DTCC, the largest TR registered in the EU. Their analysis is based on the following contracts: the 6-month Euribor plain-vanilla fixed-for-floating IRS; single-name CDS; and EUR/USD foreign exchange (FX) forwards. These contracts represent some of the most liquid instruments that are currently traded in European derivatives markets. The authors find that investment funds are not the main players in these markets, with less than 4% of the market in terms of gross notional. These results are confirmed by our findings in this paper and are in line with Clerc et al. (2014) who use network analysis to show how the potential "super spreaders" of financial contagion, identified as the most interconnected participants, consist mostly of banks. El Omari et al. (2017) offers a comprehensive

[13] Future analysis should include near-cash assets (e.g. money market money securities, high-quality government debt) and potentially lines of credit in the cash figure to give a fuller picture of actual liquidity.

[14] Wrong-way risk arises when reference entities and sellers of CDS contracts become strongly correlated.

overview of EU derivatives markets by asset class, including notional volumes and number of transactions, number of market participants, and market concentration.

D'Errico et al. (2016) investigate more closely the network structure of the EU CDS market, focusing on the flow of risk between the sectors of counterparties trading CDS on the major sovereign and financial reference entities from 2011 to 2014. They find that risks flow from a large number of entities buying protection on these reference entities, such as hedge funds, to a smaller number of entities including other non-bank financial institutions through a concentrated network of derivatives dealers. Further analysing the network structure of OTC markets, D'Errico and Roukny (2017) find that the size of OTC derivative markets can be reduced using portfolio compression, which is a multilateral netting process that replaces many trades with fewer trades to reduce the overall gross notional position while maintaining the same net risk profile.

National authorities in Europe have also started to make use of EMIR data for both regulatory[15] and analytical purposes. Kenny et al. (2016) analyse the CDS market in Ireland and find that non-bank financial institutions, specifically funds and special purpose vehicles (SPVs), account for a majority of the net credit exposure. Cielinska et al. (2017) investigate the impact of the Swiss franc de-pegging from the Euro on FX over-the-counter derivatives markets in early 2015. The authors document the intraday impact of the event on liquidity and prices as well as the longer-term impact on network structure, liquidity and collateral.

[15] For example, ESMA has made extensive use of EMIR TR data for its Regulatory Technical Standards on mandatory clearing thresholds by derivatives asset class. See https://www.esma.europa.eu/regulation/post-trading/otc-derivatives-and-clearing-obligation for more details.

Section 3
Data description

3.1 EU credit derivative markets

The global financial crisis highlighted the opacity of the OTC derivative market. Acknowledging the key role these bilateral contracts play in propagating contagion, world leaders at the 2009 G20 Pittsburgh Summit agreed that all OTC derivatives should be reported to TRs to improve market transparency. They further decided that standardised OTC derivatives should be cleared through a central counterparty (CCP) to reduce risk in the market. The EU implemented these measures in 2012 through the EMIR.

Since 12 February 2014, all EU-domiciled undertakings must report transaction-level details of any derivative contract they have entered into and any modification or termination of that contract to a registered TR under EMIR.[16] They must also apply a number of risk mitigation methods for non-centrally cleared OTC derivatives.[17] Entities deemed more systemically important within derivative markets also have further requirements.[18]

EMIR distinguishes between five main derivative classes (interest rate, equity, credit, foreign exchange and commodity)[19] and between over-the-counter and exchange-traded derivatives. All TRs provide the relevant authorities with details on new and modified trades that were reported on the previous day. While this information is contained in "trade activity" reports, "trade state" reports contain a snapshot of transaction-level data on the stock of outstanding contracts at the end of a given day. This information is important for monitoring financial stability risks and forms the basis of our analysis in this paper.

The overview presented in this sub-section is based on the analysis by El Omari et al. (2017) of trade state reports as of 24 February 2017 from the six trade repositories authorised in the EU at this point in time (DDRL, KDPW, REGIS, UnaVista, CME TR and ICE TVEL).

Compared to other derivative asset classes, the number of participants in the credit derivative segment is small, with only 9,829 unique counterparty identifiers reported. In total, six CCPs are active in the market – two of which are authorised in the EU, while the other four are established in third countries. In addition, 76 clearing members are active in this market segment. It is the smallest derivative market in terms of the number of counterparties.

The vast majority of trades were OTC (97% or 1.2mn transactions) whereas only 3%, i.e. 30,000 transactions, were exchange-traded derivatives (ETDs). In terms of notional value outstanding, the credit derivative markets totalled €13.8 trillion. The BIS reports $9.9tn of CDS contracts outstanding

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16 There are eight trade repositories currently registered with ESMA in accordance with EMIR: DTCC Derivatives Repository Ltd., Krajowy Depozyt Papierów Wartosciowych S.A, Regis-TR S.A., UnaVista Limited, CME Trade Repository Ltd., ICE Trade Vault Europe Ltd., Bloomberg Trade Repository Limited, and NEX Abide Trade Repository AB.

17 These methods include timely confirmation, portfolio reconciliation, dispute resolution procedures, and – for those entities with 500 or more derivatives with one counterparty – portfolio compression.

18 This group includes all financial counterparties (FCs)[18] and a subset of non-financial counterparties (NFCs) trading in derivatives above a certain threshold known as NFC+'s. The additional requirements include: marking outstanding trades to market or model daily, exchanging variation and initial margin bilaterally for non-standardised derivatives, and clearing certain standardised products. These additional requirements increase the cost of trading for these entities. Annex 1 contains further details on the NFC+ threshold.

19 All reporting requirement described in this paper were applicable until 1 November 2017.

globally between dealers as at end-2016, and ISDA reports $10.5tn as at February 2017. With regard to the €13.8 trillion notional value outstanding, €13.3 trillion was attributable to the OTC segment, where CDS are traded primarily. On the OTC side, more than 60% of transactions occur between an EEA and a non-EEA counterparty (in terms of both the number of transactions and notionals) (Table 1).

Table 1
Overview of the EU credit derivatives market

Credit derivatives

Mostly OTC transactions

	Number of transactions	% of total	Notional value	% of total
ETD	0.03	3	0.5	4
Trade with EEA	0.003	0	0.3	2
Trade with non-EEA	0.03	2	0.2	1
OTC	1.18	97	13.3	96
Trade with EEA	0.41	34	4.5	32
Trade with non-EEA	0.77	63	8.8	64
Total	1.21	100	13.8	100

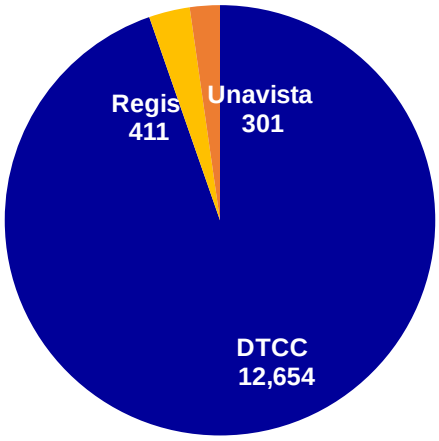
Note: Number of transactions in millions of records. Notional value in EUR tn. Transactions for which the trading venues were not reported and transactions for which the “trade with non-EEA” field was not reported are only included in total numbers.

Source: ESMA.

3.2 CDS data

Chart 1
Gross notional amounts in OTC credit default swaps

(€ billions)



Source: Authors' own computations based on EMIR data.
Note: Only including correctly reported transactions.

In this paper, we rely on CDS data from three different TRs.[20] DTCC is the largest TR in terms of CDS market share. Chart 1 shows that 95% of gross CDS notional in the sample is reported to DTCC.[21] Based on the non-processed trade state reports, gross notional amounts in OTC credit derivatives stood at €13.4 trillion at the beginning of December 2016 with €12.7 trillion, €0.4 trillion and €0.3 trillion reported to DTCC, Regis-TR and UnaVista, respectively. Almost all CDS are traded OTC with much less activity for exchange-traded credit derivatives.[22]

After cleaning the data according to the procedure detailed below, the gross CDS notional amounts to €11.9 trillion, or around 90% of the estimate of the EU CDS market estimate by El Omari et al. (2017) based on data from all TRs.

The reporting under EMIR broadly distinguishes between counterparty and transaction information. For most of the observations, counterparties report their LEIs and that of the other counterparty. Entities also report whether the other counterparty is domiciled outside the EEA. In order to pair data for the same transaction reported by two EU-domiciled counterparties to different TRs, EMIR requires the reporting of a unique trade identifier (UTI) in addition to the product identification and price information.

Since the advent of the EMIR reporting obligation, data quality has significantly improved. However, some data processing needs to take place in order to transform the raw dataset so that it is suitable for economically meaningful statistics and assessments. The procedure allows us to identify and eliminate inconsistent or erroneous observations. The following cleaning process is based on Abad et al. (2016) with slight adjustments.

The stock of all outstanding transactions in the raw trade state reports dated 1 December 2016 of DTCC, Regis-TR and UnaVista is 1,303,771. Using the prevailing official ECB euro foreign exchange rates,[23] we convert all notional positions to EUR before starting the cleaning process. The procedure first eliminates transactions with extreme notionals, i.e. notionals greater than €10 billion and lower than €1,000 (including zero). Second, it eliminates observations with no or

[20] Data used come from DTCC, Unavista and Regis-TR. This mainly reflects data availability issues.

[21] Credit Default Swaps represent around 98% of all outstanding credit derivatives, and 92% of the outstanding notional amounts in current EU credit derivative markets.

[22] The main results were checked with CDS data from a different date (24 February 2017) to ensure that the results were not driven by any major seasonal effect.

[23] We use ECB Euro foreign exchange reference rates. The reference rates are usually updated around 16:00 CET on every working day, except on TARGET closing days. They are based on a regular daily concertation procedure between central banks across Europe, which normally takes place at 14:15 CET. https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/index.en.html

erroneous underlying.[24] Third, we remove triplicates as well as inconsistent observations, and all the remaining duplicates according to their UTI, since reporting under EMIR is dual-sided for all trades between two EU counterparties. Finally, we only keep those observations for which the LEI is reported as counterparty identifier, or transactions for which we could identify the counterparty unambiguously.

Following this cleaning procedure, we are left with a gross notional amount of outstanding CDS contracts of €11.9 trillion. Consequently, around one fifth of the total volume observed in the raw data has been removed to generate a cleaner dataset. Transactions without mark-to-market values make up 18% of the clean dataset, highlighting one aspect for further enhancements in the reporting.

The outlined cleaning procedure does not distinguish transactions by the sector of reporting entities. The next step is therefore to match this clean CDS sample with the sample of UCITS fund LEIs, which is described in the following sub-section.

3.3 Other data sources

Other data sources are necessary to complement the EMIR CDS data with information on the trading counterparties. While information on the corporate sector of the reporting counterparty is available – distinguishing between e.g. credit institutions, investment firms, AIFs or UCITS – no such details exist for the other counterparty. Moreover, one of the objectives of the analysis is to understand to what extent investment funds tend to rely on CDS, which requires building a broader sample not just limited to entities that are present in EMIR data. In order to do so, we use a combination of publicly available data and data from commercial providers.

Moreover, EMIR does not contain any information on the underlying instrument of the CDS, other than the instrument identifier. The current regulatory technical standards mandated by ESMA require the underlying of a derivative to be identified via an International Securities Identification Number (ISIN).[25] The underlying instrument of a single-name CDS is usually a bond. However, multi-name CDS (indices or baskets) are simply marked in the data with an "I" or a "B".[26] For the results presented in Section 4, the underlying instruments of single-name CDS are augmented with the country and economic sector of the issuer, using Bloomberg data.

3.4 UCITS LEI issues

The identification of UCITS funds that use CDS based on EMIR data requires investment fund LEIs. However, this information is not readily available with only limited coverage in the main European funds commercial data providers.

While LEIs are compulsory under a number of EU regulations, including EMIR and MiFID II/MiFIR, there is currently no requirement for UCITS to apply for an LEI. LEIs are mandatory to the extent

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[24] For example, if the reported field for the reference entity is blank or contains the letters "dummy" or "NA".

[25] COMMISSION DELEGATED REGULATION (EU) No 148/2013 of 19 December 2012 supplementing Regulation (EU) No 648/2012 of the European Parliament and of the Council on OTC derivatives, central counterparties and trade repositories with regard to regulatory technical standards on the minimum details of the data to be reported to trade repositories:

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:052:0001:0010:EN:PDF

[26] As of December 2016, no further information was available on the composition of underlyings of CDS indices or baskets. However, following the EMIR Review additional details on CDS indices and baskets are reported since November 2017.

that UCITS are using derivatives (under EMIR) or clients of an investment firm (under MiFIR).[27] Although the share of UCITS that have a registered LEI is growing, the LEI coverage is not yet comprehensive and remains somewhat inconsistent.

UCITS investment funds are typically structured in the following way: a fund management company registered in the EU can either directly manage funds or set up umbrella funds, which can in turn include one or more sub-funds. Each fund has its own set of characteristics including strategy, portfolio, risk profile, NAV, etc. Umbrella funds are generally not essential for analytical purposes as they are only a legal structure and each sub-fund can engage in widely different strategies. On the other hand, consolidation at management-company level (or even at group level) would be interesting, but is currently not possible on a systematic basis given the complexity associated with collecting and reconciling public information on fund ownership structures for the industry as a whole.

One of the main issues encountered while building the sample is that in the Global LEI Foundation (GLEIF) database, LEIs can be assigned to funds or sub-funds.[28] As a result, funds with different portfolios, strategies and NAV can sometimes be associated with a single LEI, which can make it impossible to analyse the use of CDS by individual funds and draw conclusive features as to the profile of funds using CDS.

A second important issue is the reporting of LEIs for co-managed investment funds. In Luxembourg and a few other jurisdictions the assets of several funds (usually within a single management company) can be pooled together, which reduces trading costs and allows for increased position netting. For funds set up with such a structure, derivatives are generally executed, settled and reported at the pool level.[29] Although the number and size of funds using this technique seems to be relatively limited, [30] the sample of UCITS funds used in this paper (and described in the next sub-sections) does not capture derivative transactions reported with the LEI of a pool, umbrella fund or management company. These transactions are not included because fund data from commercial data providers are reported at a fund level, and it is unclear how derivatives contracted at the pooled level should be allocated across the different funds.

In addition to these reporting issues, it is currently impossibile to systematically link sub-funds with umbrella funds and their management companies, which would be highly relevant for the identification of the ultimate risk owner, and more generally the monitoring of systemic risk.[31] In a similar vein, the ownership of several asset managers by one or several other entities implies that it is currently very challenging to understand in full the concentration of risks from a bottom-up perspective (i.e. based on transaction-level data) within one single entity such as a large bank.

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[27] **https://www.esma.europa.eu/sites/default/files/library/esma70-145-238_lei_briefing_note.pdf**

[28] The ESMA Q&A on EMIR implementation specifies that LEI reporting should take place either at fund or sub-fund level, depending on which of the two is counterparty to the trade. See: https://www.esma.europa.eu/sites/default/files/library/esma70-1861941480-52_qa_on_emir_implementation.pdf

[29] For more details on pooling techniques in UCITS investment funds, see: http://www.alfi.lu/sites/alfi.lu/files/files/Publications_Statements/Statements/ALFI-Position-Paper-ESMA-Technical-Standards-for-the-Regulation-on-OTC-CCPS-TR-25.06.pdf

[30] In Luxembourg, around 420 sub-funds with assets of €130 billion as of June 2012 according to ALFI. Based on trend growth in assets of 5% per year between 2012 and 2016, this would correspond to around 5% of our sample of UCITS based in Luxembourg.

[31] To improve how investment fund families are recorded in the Global LEI System, the LEI Regulatory Oversight Committee is currently considering an update to the fund relationship information: https://www.leiroc.org/publications/gls/roc_20170926-1.copy-1.pdf

Other smaller issues also hamper the ability of authorities to monitor the use of derivatives by UCITS funds. For example, a number of funds have two or more LEIs associated with their names, although one will usually have a "Duplicate" tag assigned to it by GLEIF. Furthermore, naming conventions are sometimes inconsistently applied, with several funds registered in GLEIF without including the umbrella-fund or management-company name (e.g. "Corporate bond fund" only). The language used can sometimes be inconsistent, with a fund name registered in one language while the available investor information (e.g. fund prospectus) only available in another language. These issues make it quite challenging to find the true LEI of many funds, which is essential to identify UCITS funds in EMIR data and associate the correct fund information.

Considering these numerous challenges, the sample of UCITS used in this paper was built over several months on a best effort basis, excluding those for which the LEI could not be found or was uncertain. This sample is likely to be revised in the future as LEI coverage and consistency continues to improve.

3.5 Procedure used to build the UCITS fund sample

We started by downloading share-class level data for 93,993 share classes from the Morningstar database. Investment funds may set up share classes within each sub-fund that have specific characteristics (e.g. ISIN, currency, mitigation of certain risks), although they share a common investment objective.[32] There are usually several share classes associated with a single LEI. Large funds will typically have a greater number of share classes available to investors, in some cases more than fifty.

We ran an automated matching process to return the GLEIF fund name closest to the Morningstar share class name. Although share-class level information (such as ISIN, currency or country where the share is available for sale) is not used for the analysis, relying on different share class names is useful to increase the match rate between the two data sources, since the names in the two databases rarely match perfectly.

Automated matching was then complemented with extensive manual work to check the accuracy of the programme output and to identify LEIs for the remaining Morningstar sample. The issues highlighted in the previous sub-section also underscore the importance of manual checks for the interpretation of the data. While most checks were completed on a name basis using GLEIF data, they sometimes involved looking at the fund prospectus or publicly available data sources containing fund information. In the end, we were able to identify around 18,600 UCITS fund LEIs across more than 80,000 share classes.

3.6 Descriptive analysis of the UCITS funds sample

The UCITS Directive is a detailed, harmonised framework for investment funds that can be sold to institutional and retail investors throughout the EU. UCITS permits funds authorised in one Member State to be distributed in another Member State using a "passport". According to ESMA, there are more than 29,000 UCITS funds in the EU with over €8 trillion in assets under management.[33]

Using the procedure described above, we obtained a fund sample of 18,611 unique UCITS investment fund LEIs, i.e. almost two thirds of the UCITS universe. For around 400 of these funds,

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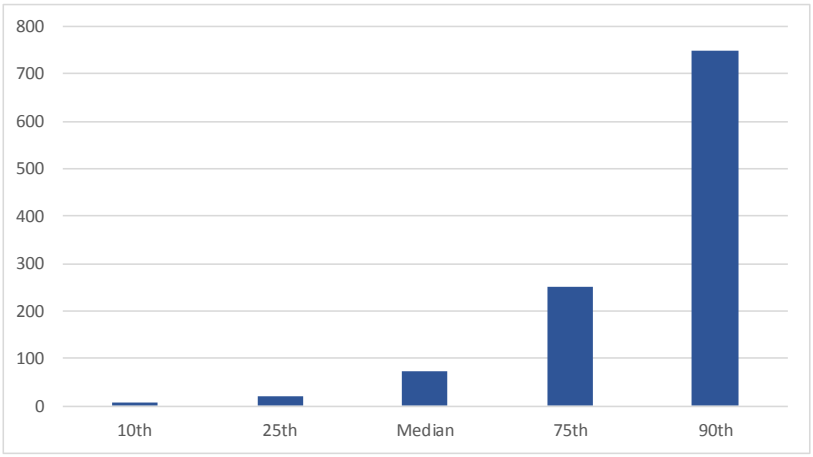
[32] https://www.esma.europa.eu/sites/default/files/library/opinion_on_ucits_share_classes.pdf

[33] https://www.esma.europa.eu/regulation/fund-management

Morningstar does not have the NAV (or the NAV is implausible, e.g. below €1,000). Nevertheless, the sample includes most of the largest funds, since the remaining 18,203 funds cumulate a total NAV of €6.3 trillion, i.e. more than three quarters of the total UCITS fund NAV. As a result, the NAV distribution of our sample is highly skewed, as illustrated in Chart 2, with an average fund NAV of €348 million, compared with a median of €73 million. The 4,550 funds in the top quartile account for 86% of total sample NAV.

Chart 2
Distribution of NAV in UCITS fund sample

(€ millions)



Source: Morningstar and Global LEI Foundation.

Funds rely on many different investment strategies, which are usually grouped into different broad categories, such as equity or bond funds. We rely on Morningstar definitions for the broad classifications used in the sample.[34] The sample includes mainly equity funds (6,401 LEIs), fixed income funds (4,340 LEIs) and allocation funds (also known as mixed funds) investing in both equity and fixed income instruments (5,081 LEIs) (Table 2). Out of these three main categories, fixed-income funds tend to be on average larger than other fund categories, with NAV of €408 million per fund, twice as much as allocation funds. The average NAV of money market funds is by far the largest, at €2.5 billion.

[34] For the detailed list of fund strategies regrouped into the broad categories used in this paper, see Annex 2.

Table 2
Descriptive statistics of the UCITS funds sample

	Number of UCITS fund LEIs	Net Asset Value	
		Total NAV (ú billion)	Mean NAV (ú million)
All funds	18,610	6,329.4	348
Equity	6,401	2,176.5	344
Allocation	5,081	1,028.1	207
Fixed income	4,340	1,747.8	408
Alternative	1,391	362.1	276
Miscellaneous	707	62.7	92
Money market	350	878.1	2,545
Convertible	191	57.9	308
Commodity	82	11.1	142
Property	14	3.6	279
N/A	53	1.6	89

Source: Morningstar and Global LEI Foundation.
Notes: Funds for which no Net Asset Value is available are excluded from the mean NAV.

Almost half of the funds are located in Luxembourg (8,810 LEIs), followed by France (1,894), UK (1,530), Ireland (1,289) and Germany (1,154). In NAV terms, these ~~four~~ five countries account together for 84% of the sample, which is in line with the full UCITS market (85%) based on industry statistics.

The following section presents the results of the matching between this sample of UCITS funds and EMIR CDS data.

Section 4
Results

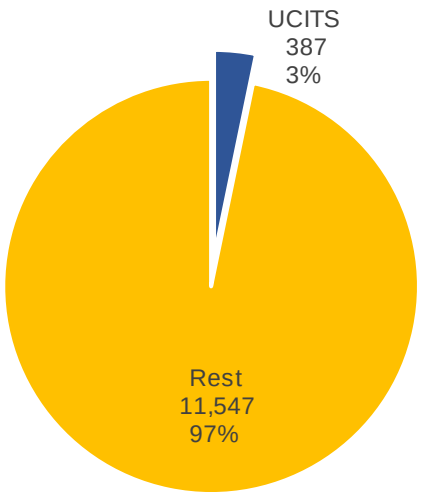
4.1 UCITS in EU CDS markets

We merge the UCITS fund LEI sample to the clean CDS dataset from EMIR (see previous section). Following deduplication as part of the cleaning procedure, which was explained earlier, UCITS may be identified in EMIR data either as the reporting counterparty or as the other counterparty. In order to capture all transactions, the UCITS LEI sample is matched with both reporting fields before consolidation. We then remove all transactions that do not involve a UCITS fund.

Out of the roughly one million observations in the clean CDS data with a gross notional amount of €11.9 trillion, we obtain 41,862 CDS transactions involving UCITS with a gross notional of €430 billion. After examining the outliers in the resulting sample, we find some funds are misreporting the CDS notional currency. All the transactions reported by these funds are excluded from the sample. In the end, we are left with 41,668 observations (3.7% of the overall market) and a gross notional amount of €387 billion (3.2% of total CDS market notional) (Chart 3).

Chart 3
Share of UCITS in gross CDS notional amount outstanding in the EU

(€ billion; percent)



Source: Authors' own computations based on EMIR data.

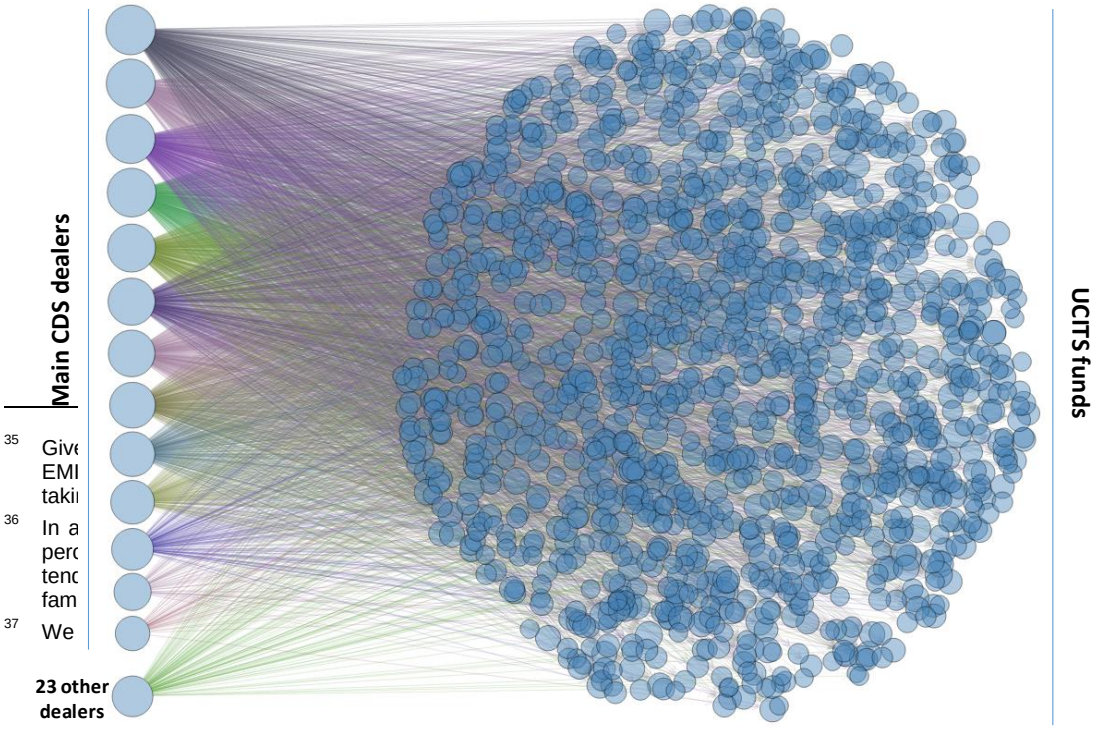
While UCITS make up a relatively small portion of the overall EU CDS market, we note that the estimate is based on gross amounts. A gross measure might underestimate the market share of UCITS compared to a net measure, to the extent that banks (by far the largest actors in CDS markets) frequently enter into interdealer CDS contracts to offset existing bilateral positions. This would result in a much lower net CDS notional amount outstanding. Indeed, D'Errico et al. (2017) find that, for the most traded underlyings, bilateral netting in EMIR CDS data can lead to a reduction of up to 50% in notional amounts.

In our UCITS CDS sample, the least conservative approach to bilateral netting, which involves netting all buy and sell CDS positions between two counterparties, regardless of the other characteristics of the transaction (underlying, effective date, maturity, etc.), yields a reduction in gross notional amount of less than 50%. A more conservative (and realistic) approach would result in lower netting efficiency.[35] Lower netting relative to the market as a whole could reflect the bow-tie structure of CDS markets highlighted in D'Errico et al. (2016) where asset managers tend to be ultimate credit risk buyers (i.e. sellers of CDS), whereas banks often play an intermediation role as derivatives dealers.[36]

Related to this, we observe that funds only trade CDS with a limited set of banking counterparties. After cleaning the data and consolidating subsidiaries and branches, we find that there are only 36 different banking groups acting as counterparties to the 1,337 UCITS funds that use CDS. The vast majority of the trades fall within thirteen groups, which are part of the "G16 dealers" identified in Abad et al. (2016), reflecting a very high degree of concentration. The gross CDS exposure of UCITS to these thirteen groups amounts to €376 billion (i.e. 97% of the total), from 40,607 different transactions. The remaining 23 banking entities, which include two other "G16 dealers", account only for a combined €12 billion in gross CDS notional.

Chart 4 illustrates the high degree of interconnectedness in the market. The thirteen main CDS dealers (left-hand side) have on average 340 business links each with UCITS funds (right-hand side), ranging from 43 to 605 links.[37] Moreover, the sum of their top five exposures to funds amounts to €177 billion, or almost half of the total CDS exposure of these thirteen dealers to UCITS funds. In contrast, UCITS funds have typically less than five business links with CDS dealers, although the number of links increases with the size of the fund: from 2.9 links for the 25% smallest funds using CDS to 4.8 links for the top 25%. There is no clear relationship between the gross CDS exposure of a fund and its number of links.

Chart 4
Network of UCITS funds using CDS



35 Give
EMI
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36 In a
perc
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fam
37 We

Source: Authors' own computations based on EMIR data.

Note: Relationship network of UCITS funds using CDS, with dealers on the left and funds on the right. The size of each node reflects the number of existing relationships that an entity has with other counterparties, regardless of the number or size of transactions. The thirteen main CDS dealers in the dataset are displayed individually. The rest of the counterparties dealing CDS are regrouped together ("23 other dealers").

The vast majority of these banking counterparties are based in Europe; only 17% of CDS transactions and 12% of gross CDS notional are traded with a non-EEA counterparty. The prevalence of EEA-based counterparties reflects the fact that most G16 dealers have European subsidiaries or are headquartered in Europe.

Therefore, UCITS do not trade CDS amongst themselves or with other types of non-bank financial counterparties, but rely instead on a bank to provide them access to CDS markets, as part of the range of services offered. As such, these results confirm that UCITS do not play an intermediation role in the CDS markets but rather tend to be net buyers or sellers of protection. The gross CDS exposure of UCITS is thus one possible measure of derivative-based interlinkages between banks and investment funds.

4.2 Main profile of UCITS using CDS

After matching the UCITS sample with the EMIR CDS data, we find that 1,337 UCITS funds were engaged in CDS transactions as of 1 December 2016. These funds represent about 7% of the original sample, and 17% in NAV terms. Some specific features allow us to outline the broad profile of a UCITS fund using CDS. This is close to the SEC (2015) findings for the US investment fund market, according to which 4% of US mutual funds use CDS (based on a 10% random sample of 1,188 funds).

The share of UCITS funds trading derivatives is highest for fixed income and alternative funds, with respectively 20% and 15% of funds in the sample identified as a counterparty to at least one CDS contract (Table 3). Alternative funds are defined as funds relying on alternative investments (as opposed to securities) such as derivatives, and include for example currency, long/short equity, market neutral, absolute return, arbitrage and multi-alternative funds (see Annex 2).

Table 3
Overview of UCITS funds using CDS

	Full UCITS fund sample		UCITS funds using CDS			
	Number of funds (% Total)	NAV (% of Total)	Number of funds	Match rate per fund category (%)	NAV	NAV of UCITS using CDS as a proportion of total NAV per fund category (%)
All funds	**18,610**	**6,329.4**	**1,337**	**7.2%**	**1,078.3**	**17.0%**
Equity	6,401 (34.4)	2,176.5 (34.4)	16	0.2%	6.0	0.3%
Allocation	5,081 (27.3)	1,028.1 (16.2)	189	3.7%	212.2	20.6%
Fixed income	4,340 (23.3)	1,747.8 (27.6)	872	20.1%	693.0	39.7%
Alternative	1,391 (7.5)	362.1 (5.7)	205	14.7%	153.4	42.4%

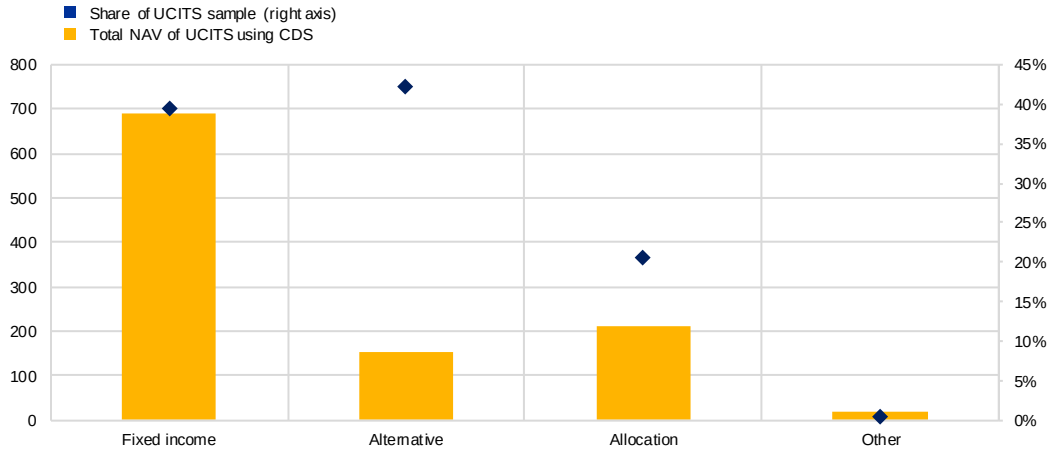
Miscellaneous	707 (3.8)	62.7 (1.0)	39	5.5%	3.5	5.6%
Other	690 (3.7)	952.3 (15.0)	16	2.3%	10.1	1.1%

Source: Authors' own computations based on Morningstar and EMIR data.
Notes: NAV in EURbn. Other includes convertibles, money market, commodities, property funds, and funds without category.

In NAV terms, CDS users account for 17% of the full sample, but fixed income and alternative UCITS funds using CDS amount to 40% of the original sample NAV for each fund category, suggesting that the average NAV of these funds is higher than the rest of the sample (Chart 5). This finding is also in line with SEC (2015), which found that alternative funds have a much greater propensity to use derivatives than other types of mutual funds.

Chart 5
NAV of UCITS funds using CDS and share of sample per fund category

(€ million; percent)

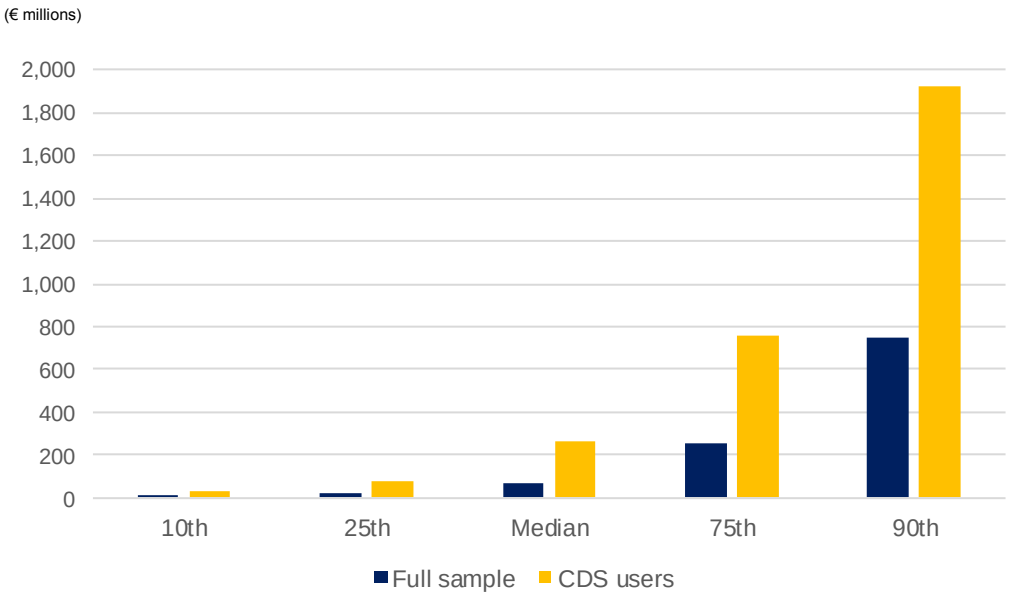


Source: Authors' own computations based on EMIR data.
Notes: Net asset value of UCITS funds using CDS (left axis) and corresponding share of UCITS funds using CDS in % of the full sample NAV. Other includes miscellaneous, convertibles, money market, commodities, property funds, and funds without category.

Overall, the average NAV of funds using CDS is €815 million compared with €348 million for the full sample. This reflects, to some extent, the preponderance of fixed income funds, which were on average larger in the original sample (€408 million) than other categories of UCITS funds. The higher NAV of CDS users appears most pronounced at the lower end of the distribution, suggesting that small UCITS funds do not typically rely on CDS (Chart 6).[38] This is in line with the findings of Jiang and Zhu (2016) for US mutual funds, according to which the largest CDS exposures tend to be associated with the largest funds.

[38] This result may partly result from the cleaning procedure removing misreported transactions, to the extent that smaller funds spend less money on back-office functions such as reporting.

Chart 6
Distribution of UCITS fund NAV for the full sample and for funds using CDS



Source: Authors' own computations based on EMIR data.
Notes: Distribution of the Net asset value of UCITS funds using CDS and UCITS funds in the full sample.

Table 4
UCITS fund size and gross CDS notional

Net Asset Value	Number of funds	Mean gross CDS notional (ú mln)	Median gross CDS notional (ú mln)
1mln - 50mln	224	55.0	7.9
50mln - 200mln	350	149.1	14.5
200mln - 500mln	290	120.7	32.0
500mln ï 1,000mln	207	257.2	51.5
>1,000mln	244	916.7	198.0

Source Authors' own computations based on EMIR data.
Note: Distribution of the Net asset value of UCITS funds using CDS and UCITS funds in the full sample. Data excluding funds with NAV below €1 million or for which NAV is not available.

The average gross CDS notional is €288 million, and the median is €32 million. As expected, CDS exposure tends to increase with the size of the fund. This is mainly true for the upper part of the distribution: funds with NAV greater than €1 billion have an average notional exposure of €917 million (Table 4).

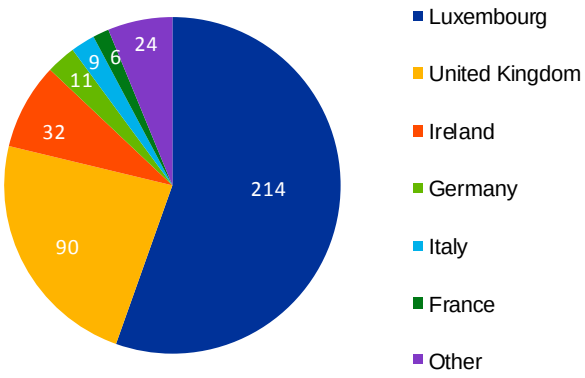
In terms of gross CDS exposure, fixed income and alternative UCITS funds account for more than 90% of the €387 billion in gross CDS notional amount outstanding, with €162 billion and €187 billion respectively, followed by allocation funds (€34 billion). Unsurprisingly, other major fund categories such as equity, commodity and money market funds barely make use of credit derivatives, with a combined gross CDS notional exposure of less than €2 billion.

Regarding links with CDS dealers, alternative funds have on average more links (4.3) than fixed-income (3.7) or allocation (2.3) funds. This could reflect different business models whereby funds choose to enter into a contractual agreement with one or several CDS dealers, or the intention to limit counterparty concentration risk.

Luxembourg is the main country of domicile of UCITS funds using CDS, with €214 billion in gross CDS notional used by funds based in this country (55% of the total), followed by the UK (€90 billion, 23%) and Ireland (€32 billion, 8%) (Chart 7).

Chart 7
Gross CDS notional by UCITS fund domicile

(€ billions)



Source: Authors' own computations based on EMIR data.
Note: Data in billion euros.

4.3 Synthetic leverage from credit derivatives

We propose a first measure of gross synthetic leverage in UCITS funds from credit derivatives, derived from the gross approach defined in EU regulation (UCITS and AIFMD) to calculate global exposures. The measure takes the sum of gross CDS notionals as a percentage of NAV. From a risk perspective, fund NAV is a measure equivalent to bank equity. This proxy measure of leverage is free of any assumptions compared with, for example, a measure based on net notional and offers the advantage of being relatively easy to compute using transaction data such as EMIR. However, the measure does not take into account offsetting positions or hedging, thus potentially overestimating leverage.

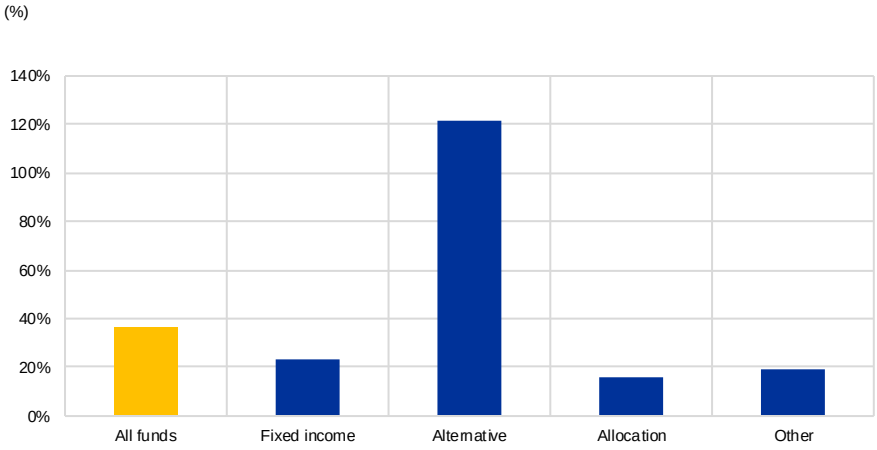
Taking the 1,337 UCITS funds using CDS as an aggregate, this measure reveals that synthetic leverage from credit derivatives is 36%. Funds relying on alternative strategies are by far the most leveraged type of UCITS on a gross basis, with gross CDS notional equivalent to around 120% of their aggregate NAV (Chart 8). This is expected, given that alternative funds mainly rely on non-traditional assets such as derivatives to carry out complex trading strategies within one or across several asset classes (e.g. equities and bonds). As such, these funds appear more likely to rely on

an advanced risk measurement methodology such as the VaR approach to calculate their global exposure.[39]

These aggregate results are driven to some extent by a few funds. At an individual fund level (i.e. based on the sum of each fund's buy and sell notional exposures over the fund's NAV), the median synthetic leverage measure is 12% for all UCITS funds using CDS, and 44% for alternative funds specifically. Most other fund categories have synthetic leverage within the 10-20% range in aggregate, except for fixed income funds (23% in aggregate, with a median measure of 11% at individual fund level).[40] As highlighted earlier, these numbers are not indicative of individual fund risk exposure, but reflect instead gross exposure of CDS contracts undertaken with the banking sector (ignoring hedging and netting arrangements) and interconnectedness.

Chart 8

Gross synthetic leverage of UCITS funds using credit derivatives



Source: Authors' own computations based on EMIR data.
Notes: Ratio of gross (buy + sell) CDS notional to net asset value of UCITS funds using CDS, by fund category. Other includes miscellaneous, convertibles, money market, commodities, property funds, and funds without category.

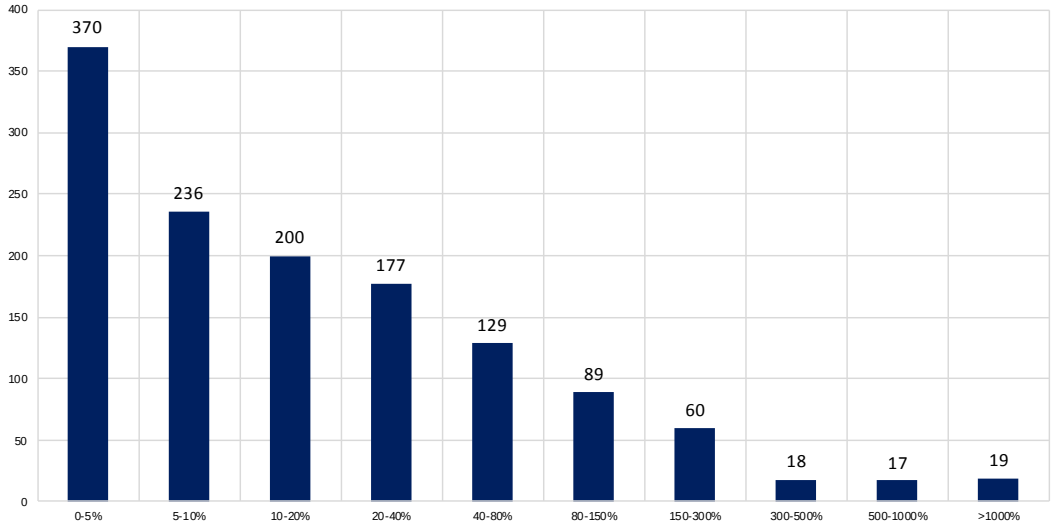
The majority of UCITS funds using CDS have limited exposure relative to their size: 60% of funds using CDS have a gross CDS exposure below 20% of their NAV. However, for more than one hundred funds, the sum of gross exposures from credit derivatives is in excess of their NAV (i.e. >100% in Chart 9). Further, for a non-trivial number of funds, this measure of gross synthetic leverage exceeds 500%. Absent any misreporting of fund NAV or derivative transactions, the data would thus suggest that a small number of funds appear to be significantly leveraged in credit derivatives markets on a gross basis.

[39] According to the CESR (2010) Guidelines on Risk Measurement and the Calculation of Global Exposure and Counterparty Risk for UCITS, "UCITS engaged in complex investment strategies which represent more than a negligible part of the UCITS' investment policy […] must use an advanced risk measurement methodology such as the Value-at-Risk (VaR) approach to calculate global exposures."

[40] Commodity funds also display a high synthetic leverage ratio from credit derivatives, however the sample size is much smaller, with only five funds using CDS and 36 CDS transactions.

Chart 9
Distribution of UCITS fundsôgross synthetic leverage from credit derivatives

(number of funds)



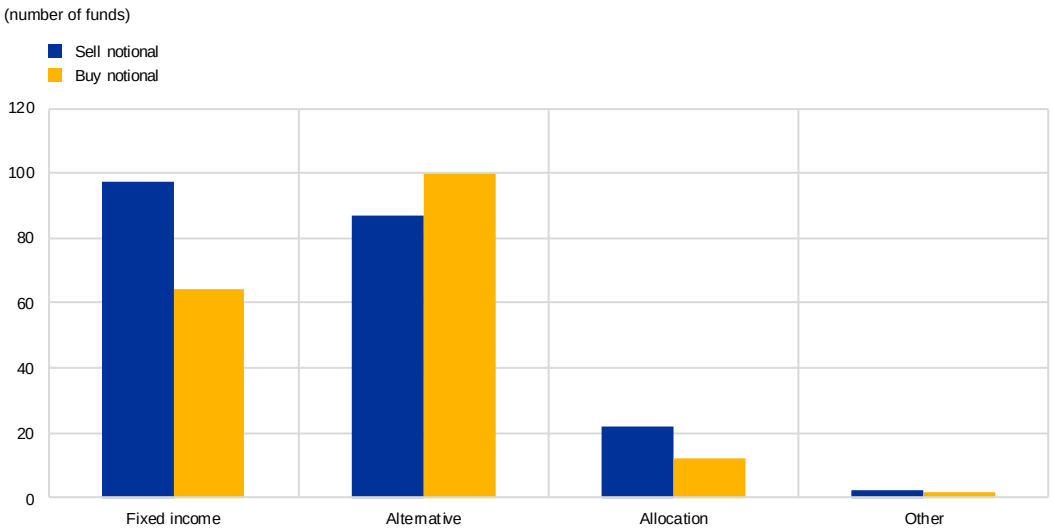
Source: Authors' own computations based on EMIR data.
Notes: Number of UCITS funds by gross synthetic leverage bucket size, calculated as the ratio of gross (buy + sell) CDS notional to net asset value.

Funds may rely on CDS to offset other synthetic positions (from e.g. other CDS exposures or different types of derivative instruments) or physical positions (e.g. bonds and other assets). For this reason, splitting gross CDS notional between buyers and sellers is useful to understand the aggregate position of UCITS funds in credit derivative markets.

The total notional amount of CDS positions on the buy side for UCITS funds is €177.6 billion, compared to €208.7 billion on the sell side. Overall, this suggests that UCITS funds tend to be on aggregate sellers of CDS in the market. This is similar to US mutual funds, which according to Jiang and Zhu (2016) are net sellers of CDS as a whole. However, it is important to keep in mind that a large number of funds take on both buy and sell positions and that the underlying instrument or issuer of these positions may vary (i.e. whether funds are in aggregate net sellers or net buyers of CDS may conceal different country or sector dynamics).

Next, we split the data further according to fund category. Fixed income funds appear to be sellers of CDS on aggregate, as reflected by the much larger gross CDS exposure on the sell side (€97.5 billion) compared to the buy side (€64.2 billion). The same is true of allocation funds, albeit for a smaller aggregate exposure. In contrast, alternative UCITS funds tend to have somewhat larger exposures on the buy side, indicating that they are using CDS differently (Chart 10).

Chart 10
Gross CDS sell and buy notional, by fund category



Source: Authors' own computations based on EMIR data.
Note: Buy and sell CDS notional of UCITS funds by fund category in EURbn. Other includes miscellaneous, convertibles, money market, commodities, property funds, and funds without category.

The precise purpose of CDS exposures is not straightforward to interpret, as a full understanding would require fund-by-fund portfolio analysis and market intelligence. Nevertheless, these figures already point to some broad trends that may be useful for future research.

The split between buy and sell CDS positions suggests that UCITS funds using directional strategies, such as fixed income and allocation funds, rely on CDS to go long on the credit risk of the underlying entity or to generate premium income. CDS could fit into investment fund strategies given the liquidity advantage of CDS over the underlying bonds and resulting yield spreads (Oehmke and Zawadowski, 2015).

Investors can take naked CDS positions (i.e. CDS positions without owning the underlying asset) on any type of bond, except EU sovereign bonds.[41] According to Jiang and Zhu (2016), selling CDS and buying bonds can be viewed as substitutes in obtaining credit exposures. Investment funds with more volatile fund flows and more frequent portfolio changes are more likely to use short positions in the relatively liquid CDS market instead of long positions in the underlying bonds.

Alternatively, investment funds may use CDS to enhance yields on their fixed income portfolio. Indeed, shorting a CDS can generate high implicit leverage at low cost, potentially allowing investors to multiply their gains. However, the incremental returns from selling CDS also come at the cost of increased "hidden tail risk" or contingent liabilities.

In comparison, the comparably larger ratio of buy to sell positions for alternative UCITS funds suggests a different use of CDS. Alternative funds may rely on CDS to a greater extent than other fund types in order to offset an existing position or hedge their portfolio credit risk, if they own the underlying bond. Alternatively, they may seek to exploit the existence of a negative basis (i.e. a CDS spread smaller than the underlying bond spread) by buying a bond and buying protection on

[41] All credit default swap positions related to a sovereign issuer must have an underlying exposure to the risk of default of that issuer or of a decline in the value of the sovereign debt of that issuer. For more details, see: **https://www.esma.europa.eu/regulation/trading/short-selling**

the same reference name. If the fund does not hold the underlying bond, buying a CDS simply amounts to taking a bet on the potential default of the reference entity.

4.4 Analysis of UCITS CDS underlyings

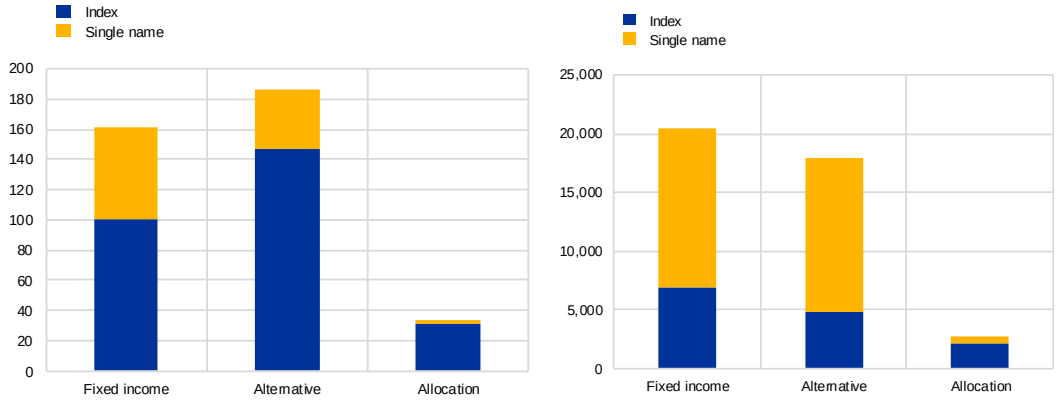
There are three main types of CDS underlying in EMIR data: single-name, index and basket. While entities started reporting granular information on the indices and baskets without a unique identifier from November 2017, the data used in this paper (which are from 1 December 2016) almost exclusively include identifiers for single-name CDS. Nonetheless, analysis of the type of CDS underlyings provides relevant information to understand the use of CDS by UCITS funds.

In the CDS market as a whole, multi-name CDS (index and basket) account for around 55% of all transactions in terms of CDS notional. For the UCITS sample, the share of multi-name CDS contracts increases to 73% of gross notional, with the vast majority of CDS written on indices. The average size of CDS transactions written on indices (€20 million) is five times larger than single-name CDS, with indices making up only 19% of the total number of transactions, but 34% of transactions involving UCITS.

The use of index CDS is particularly high for alternative UCITS funds: around 80% of their gross CDS exposure (€147.4 billion) corresponding to 27% of the transactions (Charts 11 and 12). Moreover, the average size of CDS index trades for alternative funds is €30 million – twice as high as other fund categories. The share of index CDS is relatively smaller for fixed income funds, at 62%. However, most of the difference between buy and sell notional comes from the use of indices by fixed income funds, with €62.3 billion on the sell side and €39.2 billion on the buy side.

Charts 11 and 12
Gross CDS notional and number of CDS transactions, by underlying type and fund category

(left: billion euros; right number of trades)



Source: Authors' own computations based on EMIR data.
Note: Gross (buy + sell) CDS notional (left chart) and number of CDS transactions (right chart) of UCITS funds, by fund category and underlying type. Basket CDS and other fund types excluded for clarity.

There are many reasons that explain why a fund manager may opt for CDS indices rather than single names, including for example the generally greater liquidity of CDS indices, the higher

degree of standardisation, or their greater level of price transparency.[42] More importantly for our analysis, multi-name CDS are very useful to gain exposure to multiple issuers of fixed-income instruments within one sector, region, or asset class (or any combination thereof), but also to hedge an existing credit risk exposure while diversifying the fund portfolio. On the other hand, due to lower correlation, indices may have lower hedging efficiency than single-name contracts.

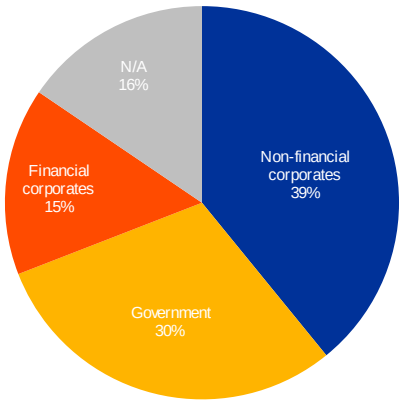
The evidence from EMIR data presented above suggests that, given their greater use of CDS indices and aggregate buy position, alternative UCITS funds may rely on CDS either to obtain a short credit risk exposure to multiple issuers at once (or, more broadly, to a sector or region), or to hedge a specific exposure while diversifying their portfolio. Fixed income funds, on the other hand, seem to use CDS to gain a long exposure to specific entities by being aggregate sellers of a large number of single-name contracts. Given the variety of strategies and portfolios that exist within each fund category, these broad features may obviously conceal significant heterogeneity across funds.

The use of single-name CDS by UCITS funds amounts to a gross CDS notional amount of €105.9 billion. Chart 13 regroups the underlying instrument issuer into different sectors, illustrating the gross aggregate exposure of UCITS funds to various parts of the economy. The largest gross CDS exposure is to debt from non-financial corporates (€41.4 billion, or 39%), which includes mainly consumer cyclicals and non-cyclicals (16%) followed by communications, industrials, materials, energy and utilities.

Chart 13

Share of investment fundsôsingle-name CDS notional, by sector of the underlying

(percent of UCITS single-name CDS notional)



Source: Bloomberg, Authors' own computations based on EMIR data.

The second largest gross CDS exposure is to sovereign and quasi-sovereign issuers (30%) from more than 50 countries. The aggregate exposure of UCITS funds to sovereigns is €16.8 billion on the buy side and €14.9 billion on the sell side. The prevalence of buy- or sell-side positions varies by country.

[42] See for example "Markit credit indices: A primer" (November 2008): https://www.markit.com/news/Credit%20Indices%20Primer.pdf

The largest sovereign exposures are to China (€4.4 billion in gross CDS notional for 856 transactions) and Italy (€3.6 billion for 264 transactions), which represent a combined 25% of the gross single-name CDS exposure to the sovereign sector. Emerging markets represent nine of the top ten single-name CDS exposures, both in notional terms and number of transactions. One possible explanation for the large share of emerging market in sovereign CDS is the prohibition of naked CDS exposures to EU sovereign debt under the EU Short Selling Regulation. As no such prohibition exists on non-EU sovereigns, the CDS exposure of UCITS to emerging markets is not constrained by the corresponding value of government debt in their portfolio, but only by restrictions on portfolio concentration and leverage applying to all UCITS. Another potential reason for the large share of emerging market sovereign CDS could be UCITS engaging in proxy hedging, i.e. aiming to hedge the risk of other assets (e.g. equities) that are correlated with the sovereign's creditworthiness.[43]

Following a similar methodology for the analysis, Box 1 describes some findings on other types of non-bank financial institutions, and contrasts these with the results obtained from the UCITS sample

Box 1

Use of credit default swaps by financial vehicle corporations (FVCs) and non-securitisation special purpose vehicles (SPVs)

This box examines the use of CDS by two types of non-bank financial institutions, namely financial vehicle corporations (FVCs) engaged in securitisation and non-securitisation special purpose vehicles (SPVs).[44] As the financial crisis revealed, these types of vehicles are important to consider for systemic risk monitoring given their strong interconnectedness with the banking system and their involvement in credit intermediation chains. Understanding the use of CDS by these vehicles can therefore provide new insights on the nature of these linkages.

The business models of FVCs and non-securitisation SPVs differ. To qualify as an FVC, the entity's principal activity must be that of carrying out securitisation transactions.[45] The most typical form of securitisation[46] is based on the purchase of loans from a credit institution or another financial intermediary. FVCs can also engage in synthetic securitisation through derivatives. For example, some FVCs can be structured as synthetic collateralised debt obligations (CDOs) which sell credit default swaps to generate income for noteholders. Quarterly balance sheet data on FVCs domiciled in the euro area have been collected by the ECB since end 2009. In contrast, non-securitisation

43 See "A new look at the role of sovereign credit default swaps", International Monetary Fund, Global Financial Stability Report, April 2013, Chapter 2.

44 Collectively referred to as vehicles.

45 The FVC structure (i) is intended to isolate the payment obligations of the undertaking from those of the originator, or the insurance or reinsurance undertaking (in the case of insurance-linked securitisations); (ii) it issues debt securities, other debt instruments, securitisation fund units, and/or financial derivatives and/or legally or economically owns assets underlying the issue of these financing instruments that are offered for sale to the public or sold on the basis of private placements.

46 Securitisation is defined as a transaction(s) where the credit risk of an asset is transferred to the balance sheet of an entity, either through the economic transfer (purchase) of the asset or through the use of derivatives. See Godfrey B. Killeen N. and Moloney K. (2015) "Data Gaps and Shadow Banking: Profiling Special Purpose Vehicles' Activities in Ireland" Central Bank of Ireland. Quarterly Bulletin. July, pp. 48-60. https://www.centralbank.ie/docs/default-source/publications/quarterly-bulletins/quarterly-bulletin-signed-articles/data-gaps-and-shadow-banking.pdf?sfvrsn=6

SPVs engage in a diverse range of activities other than securitisation. EU level data are not readily available for non-securitisation SPVs. They may engage in a host of different activities including, for example, acting as funding vehicles for their parent companies or facilitating intra-group financing for multinational groups.[47]

In order to examine the derivative activities of these vehicles, we first combine data from a variety of sources, manually collect LEI codes at the entity level (where available) and then match these with the EMIR data.[48] Information on euro area domiciled FVCs are taken from the ECB website and are complemented with UK securitisation SPVs published by the Bank of England on a quarterly basis. This list contains details on UK securitisation SPVs owned by monetary financial institution (MFIs) such as the name of the parent MFI, residency of the SPV, type of loans held and a list of the ISIN codes for issued securities together with issuance dates. As EU-wide data on non-securitisation SPVs are not readily available, we employ country-level data on Irish domicilied non-securitisation SPVs, where a data collection process for these types of vehicles has recently been initiated. In total, we collect LEI data on 2,015 vehicles, approximately 1,800 of which are FVCs while the remaining are non-securitisation SPVs.[49]

As of 1 December 2016, FVCs and SPVs had around 4,800 open CDS contracts with a gross notional amount of almost €24 billion. Of this amount, approximately 65% was written on single-name reference entities (which represents a much higher share than for UCITS funds) while 35% relate to baskets and indices. However, less than 50 vehicles (mainly FVCs) were engaging in CDS transactions out of a total sample of over 8,000 unique counterparties on this date. In terms of gross notional amounts, CDS trades involving FVCs and SPVs represented 0.2% of the total gross notional CDS transactions on 1 December 2016. However, as with UCITS, it is important to note that the gross notional amounts may understate the market share of these vehicles compared to a net notional measure.

Regarding the underlying reference entity of the CDS, there is evidence of some sector concentration, as the largest gross notional exposures of these vehicles is to non-financials, financials, and asset-backed securities. The prevalence of the ABS sector corresponds with the nature of FVCs' business models. Around half of the ABS exposures are to mortgage-backed securities whereas the other half are to other ABS.

Data challenges hamper the mapping exercise of CDS activities using EMIR data. For example, it has not been possible to collect LEI information on all of the vehicles in order to retrieve their EMIR data. Moreover, a lack of EU-wide entity information does not allow for the mapping of non-securitisation SPVs' derivative activities.[50] Despite these data limitations, the results of this box based on an initial mapping of vehicles suggests that some vehicles are engaged in derivative transactions albeit in lower numbers than UCITS funds.

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47 For further details of the Irish sample activities, see Barrett D, Godfrey B, and Golden B. (2016) "New data collection on special purpose vehicles in Ireland: initial findings and measuring shadow banking", Central Bank of Ireland Quarterly Bulletin. 4, October, pp. 71-84. Available at https://www.centralbank.ie/docs/default-source/publications/quarterly-bulletins/QB4-16/gns-5-1-15-new-data-collection-on-special-purpose-vehicles.pdf?sfvrsn=2

48 In line with the data and cleaning procedure presented above for UCITS funds, there were approximately 1.3 million trades with a gross notional of over €14 trillion in the initial sample for 1 December 2016.

49 In Q4 2016, there were 3,700 euro area domiciled FVCs reporting to the ECB with only 153 engaged in synthetic securitisations. Some of these entities may not be captured within our sample if we are unable to match the LEI code for the FVC or if the FVC had no open positions on 1 December 2016. The number of UK securitisation SPVs engaged in synthetic securitisations are not reported in the list published by the Bank of England.

50 Moreover, these vehicles are categorised as NFCs and benefit from the hedging and group transfer exemptions. Therefore, there is a possibility that they avoid the risk mitigation requirements imposed on financial counterparties (margin requirements etc.). This may reduce the efficacy of the regulation from a financial stability perspective. As part of the EMIR review, ESMA proposed to categorise FVCs and SPVs as financial counterparties. See Annex 1 for further details.

Section 5
Conclusion

Building on the first analyses of EU regulatory data on derivatives, this paper explores for the first time the use of CDS by UCITS investment funds. Recent literature reveals that the non-bank financial sector plays a significant role in EU derivatives markets. This paper focuses specifically on UCITS funds, a sector that has more than €8 trillion in net assets and has experienced significant growth in recent years. The analysis presented in this paper use a novel dataset by combining investment fund data with transaction-level derivatives data reported under the EMIR.

The analysis of EU credit derivatives markets as of the end of 2016 reveals that 7% of UCITS funds, out of a sample of more than 18,500 entities, use CDS. These funds use a combined €387 billion in gross CDS notional, i.e. less than 5% of the EU CDS market. Fixed income funds and alternative funds are the main types of UCITS funds that participate in this market, with around 20% of the funds in these two categories (40% in terms of net asset value) using CDS, for a gross notional amount of €162 billion and €187 billion, respectively. The market is highly concentrated, with thirteen banking entities taking on 97% of the gross CDS exposure to UCITS funds.

We propose a first measure of synthetic leverage from credit derivatives derived from EU regulation, proxied by the gross CDS notional as a percentage of fund net assets. The advantage of this measure is that it is free of assumptions regarding hedging efficiency and netting, and it is relatively easy to compute. Although the majority of funds using CDS seem to have limited exposure relative to their balance sheet (below 20% of their NAV), we find that for more than 100 funds the gross exposure from credit derivatives exceeds their NAV. Moreover, a non-trivial number of funds have gross exposure in excess of 500%. While these numbers are not indicative of funds' risk exposure, they do reflect interlinkages between investment funds and banks, with whom UCITS trade CDS exclusively.

Around two thirds of UCITS gross CDS notional is based on CDS indices, and a third on single-name CDS. Alternative funds tend to make relatively greater use of indices, which allow them to gain exposure to multiple issuers and diversify their portfolio. Regarding single-name CDS, UCITS funds use them for non-financial sector debt (39%) and sovereign debt (30%). A very large share of single-name sovereign CDS is written on emerging market issuers, illustrating the role of these instruments in providing credit exposure or facilitating heding strategies to less liquid securities or markets.

The evidence presented in this paper suggests that UCITS funds rely on CDS for multiple purposes. In line with the literature, fixed income funds tend to be aggregate sellers of protection in CDS markets, which allows them to assume credit risk equivalent to buying bonds but with better liquidity (Jiang and Zhu, 2016). In contrast to these yield enhancement strategies, alternative funds tend to be aggregate buyers of protection, mainly through CDS indices, which allows them to gain exposure to a large number of entities, diversify their portfolio, or develop trading strategies based on the negative basis between CDS spreads and underlying bond yields. However, these strategies can come at the cost of increased "hidden tail risk" or contingent liabilities.

To gain a better understanding of how UCITS funds use CDS, further research is needed. A deeper understanding of CDS markets will require a more granular classification of fund investment strategies, and an investigation of portfolio holdings. To enhance coverage and refine the analysis, greater efforts will be required on the completeness and consistency of LEIs for non-bank financial institutions. This is fundamental to the identification of these entities in EMIR data, as well as other regulatory databases. Finally, one key conceptual difficulty that remains in the context of derivatives

is the netting methodology, which can yield very different fund risk profiles depending on the netting sets used and hedging assumptions made.

References

Abad, J., I. Aldarsoro, C. Aymanns, M. D'Errico, L. Fache Rousova, P. Hoffman, S. Langfield, M. Neychev, and T. Roukny (2016), "Shedding light on dark markets: First insights from the new EU-wide derivatives dataset", ESRB Occasional Paper No 11, September.

Albertazzi, U., B. Becker and M. Boucinha (2016), "Portfolio rebalancing and the transmission of large-scale asset programs: Evidence from the Euro Area".

Ang, A., G. Sergiy, and G. Inwegen (2011), "Hedge Fund Leverage", NBER Working Paper No. 16801, February.

Arora, N., P. Gandhi, and F. Longstaff (2012), "Counterparty credit risk and the credit default swap market." *Journal of Financial Economics*, Vol. 103(2), pp. 280-293.

Bank for International Settlements (2017), "Identification and management of step-in risk", BCBS Guidelines, 25 October 2017.

Breuer, P. (2002), "Measuring off-balance-sheet leverage", *Journal of Banking and Finance*, Vol. 26, pp. 223-242.

Bua G. and P. Dunne (2017), "The portfolio rebalancing effects of the ECB's asset purchase programme", Central Bank of Ireland Research Technical Paper 07/RT/17.

Bubeck, J., M. Habib, S. Manganelli (2017) "The portfolio of euro area fund investors and ECB monetary policy announcement", ECB working paper No. 2116.

Chen, Y. (2011), "Derivatives use and risk taking: evidence from the hedge fund industry", *Journal of financial and quantitative analysis*, Vol. 46, No. 4, August 2011, pp. 1073-1106.

Cielinska, O., A. Joseph, U. Shreyas, J. Tanner and M. Vasios (2017), "Gauging market dynamics using trade repository data: the case of the Swiss franc de-pegging", Bank of England Financial Stability Paper No.41, January 2017.

Clerc, L., S. Gabrieli, S. Kern and Y. El Omari (2014) "Monitoring the European CDS market through networks: Implications for contagion risks", European Securities and Markets Authority, Working Paper No. 1, 2014.

D'Errico, M., S. Battiston, T. Peltonen and M. Scheicher (2016), "How does risk flow in the credit default swap market", ESRB Working Paper No. 33, December 2016.

D'Errico, M. and T. Roukny (2017), "Compressing over-the-counter markets", ESRB Working Paper No. 44.

Dek M., T. De Renzis, and L. Ionita (2017), "Exchange-traded derivatives in the EU – an overview", European Securities and Markets Authority, Report on Trends, Risks and Vulnerabilities, No. 2, 2017.

Deli, D., P. Hanouna, C. Stahel, Y. Tang and W. Yost (2015), "Use of derivatives by registered investment companies", Securities and Exchange Commission White Paper, December 2015.

Du, W., S. Gadgil, M. B. Gordy and C. Vega (2016), "Counterparty risk and counterparty choice in the credit default swap market", *Finance and Economics Discussion Series 2016-087*, Federal Reserve Board.

Edwards, F. (1999), "Hedge funds and the collapse of Long-Term Capital Management", *Journal of Economic Perspectives,* Vol. 13, No. 2, pp. 189-210.

El Omari, Y., M. Haferkorn and C. Nommels (2017), “EU derivatives markets – a first-time overview”, European Securities and Markets Authority, Report on Trends, Risks and Vulnerabilities, No. 2, 2017.

European Central Bank (2017), “Financial Stability Review”, November 2017.

European Systemic Risk Board (2017), “EU Shadow Banking Monitor”, No. 2, May 2017.

FSB (2011), “Transforming shadow banking into resilient market-based finance – Recommendations to strengthen oversight and regulation of shadow banking”.

Godfrey B., N. Killeen and K. Moloney (2015), “Data Gaps and Shadow Banking: Profiling Special Purpose Vehicles’ Activities in Ireland” Central Bank of Ireland. Quarterly Bulletin. July, pp. 48-60.

Haquin, J.B. and J. Mazzacurati (2016), “Synthetic leverage in the asset management industry”, European Securities and Markets Authority, Report on Trends, Risks and Vulnerabilities, No. 2, 2016.

Jiang, W. and Z. Zhu (2016) “Mutual fund holdings of credit default swaps: liquidity, yield, and risk taking”, Columbia Business School Research Paper No. 15-9.

Kambhu, J., T. Schuermann, and K. J. Stiroh (2007), “Hedge Funds, Financial Intermediation, and Systemic Risk”, *Federal Reserve Bank of New York Staff Reports,* No. 291.

Kenny, O., N. Killeen and K. Moloney (2016). “Network analysis using EMIR credit default swap data: micro-level evidence from Irish domiciled special purpose vehicles (SPVs)”, *IFC Bulletins*.

Koski, J. and J. Pontiff (1999), “How are derivatives used? Evidence from the mutual fund industry”, *The Journal of Finance,* Vol. LIV, No. 2, April 1999, pp. 791-816.

Nijskens, R., and W. Wagner (2011), “Credit risk transfer activities and systemic risk: How banks became less risky individually but posed greater risks to the financial system at the same time”, *Journal of Banking and Finance* 35, pp. 1391–1398.

Papanikolaou, N. I., and C. P. Wolff, (2014), The role of on- and off-balance-sheet leverage of banks in the late 2000s crisis, *Journal of Financial Stability* 14, pp. 03–22.

Annex 1
Background information on EMIR reporting

The NFC+ threshold is based on having a rolling average gross notional position in one asset class exceeding a specified amount for thirty consecutive working days. Calculated at the group level for OTC derivatives only, this value is €1 billion for credit and equity derivatives and €3 billion for interest rate, foreign exchange, commodity, and other derivatives. When calculating their gross notional positions, NFCs can net contracts in opposing directions with the same counterparty if they have the same characteristics. For example, if NFC A buys a 5-year credit default swap (CDS) on ABC Corp. for €1 billion in notional from Bank A and NFC A also sells a 5-year CDS on ABC Corp. for €1 billion in notional to Bank A, its gross notional exposure after netting would be 0 and thus it would not be an NFC+. An NFC breaching the threshold must inform ESMA and the relevant national regulator immediately.

Two important exemptions in EMIR are made for hedging and intragroup trades. The Regulation defines hedging for NFCs and groups as the objectively measurable reduction of risks directly relating to commercial and treasury activities (see Article 10(3) EMIR). In particular, these hedges should be economically appropriate for reducing interest rate, foreign exchange, inflation, commodity, and credit risks relating to the conduct and management of an NFC. NFCs' self-classified hedging trades do not count towards the NFC+ threshold and thus they do not have to clear or collateralise these trades. For example, if an NFC had a €1 trillion gross notional position in CDS and reported these trades as hedging, it would remain an NFC. The analysis and evaluation of hedging techniques used by NFCs may be worthwhile in light of the exemptions. Special purpose vehicles' (SPVs) hedging techniques warrant further analysis due to their links to credit intermediation (Godfrey et al. 2015, Kenny et al. 2016, Barrett et al. 2016).

According to Article 3(1) EMIR, intragroup transactions are trades between two fully consolidated undertakings with centralised risk evaluation, measurement, and control procedures. Whereas derivatives used for hedging can be excluded from the calculation of the NFC+ threshold, the intragroup exemption applies only to the clearing and collateralisation obligations for OTC derivatives. Intragroup trades are still included in the NFC+ threshold calculation. ESMA's Q&A on EMIR states that if two NFC group entities enter into a non-hedging, intragroup transaction with each other, both sides' exposures (i.e. twice the notional) should be counted towards the clearing threshold.[51] For non-hedging intragroup transactions between an NFC and an FC, only the NFC side of the transaction needs to be included in the calculation. Entities have to apply to their national regulator for permission to use the intragroup exemption, with the acceptance criterion being that the trades do not increase systemic risk.[52] For intragroup trades with counterparties domiciled in a third country, the European Commission (EC) must have adopted an implementing act under Article 13(2) EMIR in respect of the country to qualify for the exemption.[53] The clearing

[51] ESMA's most recent Q&A on EMIR can be found at **https://www.esma.europa.eu/sites/default/files/library/2016-1176_qa_xix_emir.pdf.**

[52] Determining what characterises a systemically risky transaction is still unclear and would benefit from further analysis. Size and interconnectedness are likely to be important determinants.

[53] In practice, the EC has not done so for third countries and currently only the EU counterparty must submit a derogation request to their national regulator.

exemption is currently in force for mid-size institutions (i.e. those operating above the threshold of €8 billion) while the collateralisation exemption is under debate at the EU level.

For clarity, we provide two examples of NFCs using differing combinations of the hedging and intragroup exemptions. Imagine a bank sets up three separate, unconsolidated legal entities – Entity 1, Entity 2, and Entity 3 – with €1 billion in notional of interest rate swaps (IRSs) in each. They report themselves as NFCs and classify their trades as non-intragroup, thus they are considered NFCs. If they all considered each other to be in the same group and then reclassified their transactions to intragroup, the group becomes an NFC+ a month later and would be required to provide daily valuation updates immediately and clear the swaps after four months. This reclassification will bring extra costs of trading to the group. The group could apply for exemptions from clearing and collateralisation, but would still be required to provide daily valuation updates. If, however, the entities declared the intragroup trades as hedges, then the group would become an NFC again.

Further, envisage two other NFCs – Entity 4 and Entity 5. Entity 4 sells a CDS on the iTraxx Europe Main Index worth €1 trillion in notional to Entity 5, and they both report this trade as non-intragroup and hedging. Entities 4 and 5 remain NFCs despite taking a sizeable derivative position. Lastly, imagine Entity 4 reports this sale as non-intragroup and non-hedging. It would soon after become an NFC+ and would be required to clear the index CDS.

The additional requirements on FCs and NFC+'s are in place to increase transparency and reduce risk in relation to systemically important entities and their derivative transactions. These requirements bring with them additional costs. As there are exemptions to these rules (for example hedging and intra group trades for NFCs), regulators should monitor the activities of these entities, particularly those who are connected to credit intermediation (e.g. certain SPVs). For FCs regulators should again monitor the activities of these entities with respect to their potential to impact financial stability.

Annex 2
Morningstar broad categories

The broad categories used in this paper follow Morningstar's definitions. A non-exhaustive list of the detailed fund categories that are included in the four main broad categories is included below.

To facilitate reading, repetitive fund categories (e.g. countries and regions for equity funds or currencies for fixed income funds) were excluded. Some of the detailed fund categories may be specific to a region outside Europe.

Overview of Morningstar categories by broad category group

Allocation	Alternative	Equity	Fixed income
Allocation Funds	Hedge Funds	Equity	Bond
Target Date	Bear Market	Anchored Equity	Bond and Cash
Balanced	Neutral Portfolio	Anchored Small/Mid Cap Equity	Bonds - Diversified
Balanced - Conservative Allocation	Capital Protected	Equity (Pure)	Bank Loan
Balanced - Moderate Allocation	Convertible Arbitrage	Equity Tilt Portfolio	Core Fixed Income
Aggressive Balanced	Convertible Arbitrage Hedge	High Income Equity	Fixed Income Tilt portfolio
Cautious Balanced	Corporate Event Driven	Small/Mid-Cap Equity	Inflation-Protected Fixed Income
Conservative Allocation	Corporate Event Driven Hedge	Small-Cap Equity	Mortgage
Moderate Balanced	Distressed Companies	Diversified	Short Duration Fixed Income
Moderate Allocation	Distressed Companies Hedge	Large Blend	Global Bond
Multisector - Aggressive	Equity Net Long Exposure	Large Geared	Short Bonds
Multisector - Balanced	Equity Net Long Hedge	Large Growth	Diversified Bond
Multisector - Conservative	Equity Net Neutral Exposure	Large Value	Government Bond
Multisector - Growth	Equity Net Neutral Hedge	Mid/Small Blend	High Yield Bond
Multisector - Moderate	Equity Net Short Exposure	Mid/Small Growth	Global Bond - Hedged
	Equity Net Short Hedge	Mid/Small Value	Long Bond
	Equity Variable Exposure	Foreign Large Blend	Fixed Income
	Equity Variable Hedge	Large-Cap Equity	Ultrashort Bond
	Absolute Return	Mid-Cap Blend	Short-term Bond
	Fixed Income Arbitrage Hedge	Mid-Cap Growth	Multisector Bond
	Fixed Income Arbitrage	Mid-Cap Value	Foreign Bond
	Fund of Funds		Muni
	Fund of Funds Hedge		Hybrid Income
	Global Macro		Intermediate Government
	Global Macro Hedge		Intermediate-Term Bond
	Guaranteed Funds		Other Bond Fund
	Managed Futures		Reserve Backed
	Managed Futures Hedge		
	Merger Arbitrage		
	Merger Arbitrage Hedge		
	Multi Strategy		

Multi Strategy Hedge
Relative Value Arbitrage
Relative Value Arbitrage Hedge
Retail Venture Capital
Stable Value

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