Financial Stability

Drivers of CDS usage by EU investment funds

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As part of ongoing efforts to improve the monitoring of derivatives markets, this article investigates the drivers of credit default swaps usage by UCITS investment funds. We present several important findings: only a limited number of funds use CDS; funds that are part of a large group are more likely to use these instruments; fixed-income funds that invest in less liquid markets, and funds that implement hedge-fund strategies, are particularly likely to rely on CDS; and fund size becomes the main driver of net CDS notional exposures when these exposures are particularly large. This article also explores the bond-level drivers of funds' net single-name CDS positions. We find that CDS positions on investment-grade sovereign bonds – most of which are from emerging market issuers – tend to be larger. The analysis finally sheds some light on tail-risk from CDS for funds: directional strategy funds that belong to a large group are the most likely to have sell-only CDS exposures, exposing them to significant contingent risk in case of default of the underlying reference entity. Similarly, a number of funds use CDS to build unhedged credit exposure to US non-bank financial issuers.

Introduction

The use of derivatives by investment funds is of particular interest for several reasons. While the use of derivatives by banks is well documented, evidence relative to investment funds is much more limited at EU level but is key to addressing potential macroprudential concerns. The economic literature is also increasingly looking into the role of non-banking entities in global financial markets, including derivatives markets. Lastly, the EU asset management industry has experienced very strong growth since 2009, with fund assets increasing on average more than 5% per year to reach around €14 trillion in 2017.

Derivative instruments can be categorised according to their underlying asset class, i.e. equity, credit, interest rate, commodity and foreign exchange. In this article 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 main reasons:

- CDS are mainly traded OTC, which is usually synonymous with greater opacity and lower product standardisation;[91]
- CDS played a major role in the global financial crisis by enabling the redistribution and amplification of credit risk without sufficient monitoring by regulatory authorities; and
- CDS are key financial instruments for bond funds, which have taken on extra risk in recent years in a prevailing low-interest-rate environment (Bubeck et al., 2017, and ECB, 2017).

The objective of this article is to investigate the drivers of CDS usage by UCITS funds. First, we aim to identify the main characteristics that make a fund more likely to rely on CDS. Second, we focus on CDS users to explore the fund-level drivers of net CDS notional exposures. Finally, we complement the analysis by exploring some of the bond-level drivers of net single-name CDS positions held by funds.

UCITS funds and CDS markets

The analysis relies on transaction-level regulatory data reported by EU-domiciled counterparties under the European Market

[90] This article was authored by Claudia Guagliano and Julien Mazzacurati.

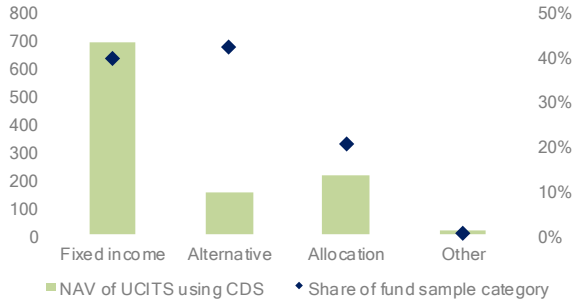
[91] Aldasoro and Ehlers (2018) highlighted that the CDS market has become much more standardised since 2008, reflecting a push by regulatory authorities to reduce counterparty risk by facilitating exposure netting.

Infrastructure Regulation (EMIR).[92] To explore the use of CDS by European investment funds, we match information on credit derivatives reported under EMIR with commercial data on UCITS funds (from Morningstar and Thomson Reuters Lipper) and other publicly available information.[93]

This section summarises some of the main findings from Braunsteffer et al. (2018), based on CDS data from three EU Trade Repositories (TRs) available at ESMA, as of 1 December 2016. To investigate the extent to which EU funds rely on CDS, we built a dataset of more than 18,600 UCITS funds with total net asset value (NAV) of EUR 6.3tn – i.e. more than three-fourths of the UCITS fund industry NAV.[94] The dataset includes Legal Entity Identifiers (LEIs), used to identify UCITS counterparties in EMIR CDS data, and fund-level information from private data vendors.

As at end-2016, 1,337 UCITS funds were identified as a counterparty to at least one CDS transaction, i.e. around 7% of the original fund sample (17% in NAV terms). UCITS accounted for 3.7% of all outstanding CDS contracts in the EU, or 3.2% of total CDS market notional.[95]

V.26
NAV of UCITS funds using CDS and sample category share
CDS users mainly fixed-income, alternative

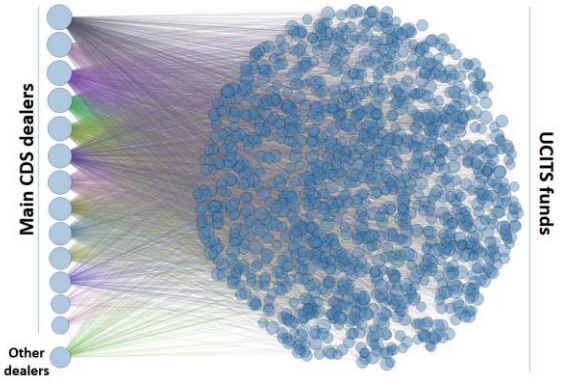


Note: Total net assets of UCITS funds using CDS as of 1 December 2016, by fund category, in EUR bn. Share of fund sample category, right axis, in %.
Sources: Braunsteffer et al. (2018), ESMA.

The proportion of funds using derivatives was highest for fixed-income and alternative funds, with 20% and 15% of these funds respectively using CDS (40% in NAV terms; V.26).

Concentration in this segment of the market is very high, with thirteen banking groups (dealers) taking on 97% of the gross CDS notional exposure to UCITS funds (V.27). Funds do not trade CDS amongst themselves, but rely instead on a bank to provide them access to CDS markets.

V.27
Network of UCITS funds using CDS
High exposure concentration on few dealers



Note: Relationship network of UCITS funds using CDS, as of 1 December 2016, with dealers on the left and funds on the right. The size of each node reflects the number of CDS 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 and the 23 others regrouped together as "Other dealers".
Sources: Braunsteffer et al. (2018), ESMA.

The study introduces an initial measure of gross synthetic leverage from credit derivatives, taking the sum of gross CDS notionals as a percentage of NAV. Since this measure ignores hedging and netting arrangements, as well as mark-to-market values, it is not indicative of individual fund risk exposure. However, it does provide a sense of UCITS funds' activity in CDS markets. As expected, gross CDS notional exposures tend to increase with the size of the fund. Funds with net assets greater than EUR 1bn have a median exposure of EUR 198mn, compared with a median of EUR 32mn for the full sample of CDS users.

Looking into fund categories, the paper shows that alternative funds are particularly active users of CDS amongst UCITS funds, with the median value of gross synthetic leverage from credit derivatives at 44% of NAV. This compares to 12% for the sample of CDS users as a whole (V.28).

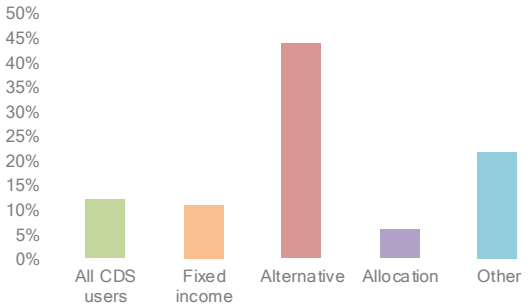
92 Regulation (EU) No 648/2012 on OTC derivatives, central counterparties and trade repositories.

93 Public information includes mainly Legal Entity Identifiers (LEIs), made available on the Global LEI Foundation (GLEIF) website. See Braunsteffer et al. (2018) for further details on the data used.

94 See Braunsteffer et al. (2018) for a full description of the UCITS fund sample and results.

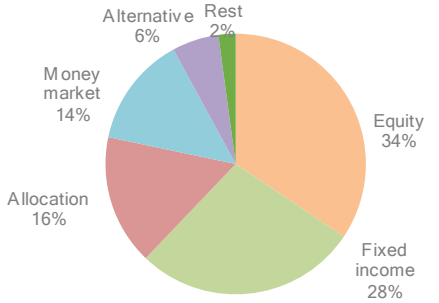
95 The estimate is based on gross notional amounts. This might underestimate the UCITS market share to the extent that banks (the largest actors in CDS markets) frequently enter into interdealer CDS contracts to offset bilateral positions. This would result in a lower net CDS notional amount outstanding. D'Errico and Roukny (2017) find that for the most-traded underlyings bilateral netting can lead to a reduction of up to 50% in notional amounts.

V.28
Gross synthetic leverage of UCITS funds using CDS
Alternative funds rely heavily on CDS



Note: Ratio of gross (buy + sell) CDS notional to net asset value of UCITS funds using CDS, median value by fund category.
Sources: Braunsteffer et al. (2018), ESMA.

V.29
Share of UCITS NAV in fund sample
Sample includes mainly EQ and FI funds



Note: UCITS fund sample, in % of total sample NAV, by fund category.
Sources: ESMA.

Braunsteffer et al. (2018) also provide some evidence that – based on their gross notional exposures and type of CDS underlying (single-name versus index) – fixed-income and alternative funds appear to rely on CDS for different purposes.

The following sections build on these initial findings to provide further insight into the risk exposure of UCITS funds from credit derivatives. We do so by exploring some of the drivers of CDS usage by funds and their net notional exposures, using a spectrum of different netting methodologies.[96]

Drivers of CDS usage by UCITS funds

We start by investigating the main drivers of CDS usage by funds. The analysis in this section and the next relies on an expanded dataset, including data from six TRs as of 27 October 2017. Our database includes 18,850 funds with total NAV of EUR 6,379bn belonging to the following fund categories: allocation (or mixed), alternative, commodity, convertible, equity, fixed-income, miscellaneous, property, and money market. In terms of net assets, 78% of the funds in our sample are equity funds (34%), fixed-income funds (28%), and allocation funds (16%), with an average NAV of EUR 350mn (V.29).

For the first model, we rely on three sets of hypotheses. The first aims to confirm some of the results of Braunsteffer et al. (2018): i) large funds tend to rely on CDS to a greater extent; ii) fixed-income and alternative funds are by far the two main categories of CDS users.

The second and third sets of hypotheses, described in the following subsections, explore the concept of fund families and the fund strategies usually associated with CDS usage.

Investment fund families

The objective of the second set of hypotheses is to understand whether funds that belong to large fund "families", or fund houses, are more likely to use CDS.

There are different explanations as to why funds that belong to a large family may be more likely than others to use CDS. For example, a fund manager that belongs to a large banking group should have easier and cheaper access to CDS markets through the bank's derivatives dealing business. The array of investment vehicles proposed by large banks and insurance companies to their clients (in particular professional investors) is also likely to include funds that carry out complex strategies which often involve the use of derivatives, e.g. for liquidity management purposes.

In the US Jiang and Zhu (2016) find that CDS usage is indeed concentrated in the largest fund families. We rely on a similar methodology to organise our fund sample into families containing

[96] This article relies on net notional exposures, which are useful to highlight UCITS funds' credit exposure to particular countries or sectors from CDS. In contrast, measures of credit *risk* exposures would take into account the CDS mark-to-market value (based on counterparty creditworthiness and the probability of default of the underlying reference entity) and collateralisation, usually resulting in lower net exposures. However, measures of net notional exposures also provide meaningful information: the skewed distribution of credit risk in CDS implies that very significant mark-to-market losses (calculated using CDS notional) can materialise within a short time-frame, as was the case with AIG, which may represent another channel of contagion (ECB, 2009; D'Errico et al., 2016).

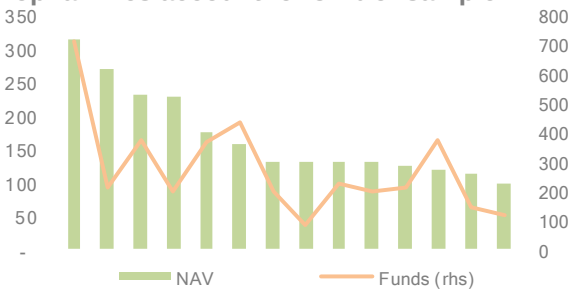
funds owned by the same consolidated group, based on public information.[97] After consolidation, we define two main groups of investment fund families based on the following thresholds:

— Tier-1 families with combined fund net assets in excess of EUR 100bn;

— Tier-2 families with combined fund net assets between EUR 50bn and EUR 100bn.

The Tier-1 group includes 15 fund families, spanning 3,853 UCITS funds, with a combined NAV of EUR 2,377bn (V.30). Almost all of the consolidated entities within the top 15 are large banking or insurance groups. Based on the reasoning presented above, we would expect the probability of using CDS to increase most for funds that belong to a Tier-1 family.

V.30
Net assets and number of funds in the largest fund families
Top families account for 37% of sample NAV



Note: Net asset value in EUR bn, and number of funds (right axis), of fund families with NAV greater than EUR 100bn.
Sources: ESMA.

The Tier-2 group includes the next 21 largest fund families, which are more diversified in nature and include 2,359 funds with a combined NAV of EUR 1,464bn. We also expect funds that belong to a Tier-2 family to be more likely to use CDS than independent funds, albeit less so than Tier-1 family funds.

We use Tier-1 and Tier-2 dummy variables to proxy the size of the asset-consolidated entity that owns funds within our sample and test our hypothesis.

Fund strategies

Our third set of hypotheses posits that, further to the broad fund categories (such as fixed-income), specific fund strategies can lead funds to rely more systematically on CDS.

First, we propose that objectives requiring funds to invest in less liquid securities imply greater reliance on CDS. This builds on the argument by Oehmke and Zawadowski (2016) that CDS markets serve a standardisation role for fragmented and less liquid bonds. The candidates taken to test this hypothesis include funds that invest in emerging markets, and corporate bond funds (especially high-yield funds).

Second, we propose that funds implementing hedge-fund strategies tend to rely on CDS. Hedge-fund strategies used by UCITS chiefly include total return, macro, market-neutral, long/short, and absolute return funds.

Model and results

To test these three hypotheses we use the following logit model:

$$\Pr(Use\ of\ CDS_i = 1) = \alpha + \beta(fund) + \gamma(family) + \mu(strategy) + \varepsilon_i$$

where the dependent variable is equal to 1 if the fund is a CDS user[98], otherwise 0. Within the explanatory variables, *fund* includes:

— Size: measured by fund NAV. We rely on log values, in line with the standard practice in financial economics;

— Fixed-income: dummy variable equal to 1 if the fund category is fixed-income and 0 otherwise;

— Alternative: dummy variable equal to 1 if the fund category is alternative and 0 otherwise;

family includes:

— Tier-1 (Tier-2) group: dummy variable equal to 1 if the fund belongs to a Tier-1 (Tier-2) family;

strategy includes:

— FI*emerging: dummy variable interaction between Fixed-Income (FI) and a dummy variable equal to 1 if the fund invests in emerging markets;[99]

— FI*corporate (FI*HY, FI*totalreturn): dummy variable interaction between FI and dummy

[97] Given the absence of comprehensive information on fund management company ownership, this consolidation exercise was carried out manually. Considering frequent changes in fund ownership, we used February 2017 (i.e. our CDS market snapshot date) as the cut-off date, ignoring all operations that have taken place subsequently. The data may include inaccuracies or omissions.

[98] We define a CDS user as a fund that was engaged in at least one CDS transaction based on three different EMIR data snapshots, as of 1/12/2016, 24/02/2017 and 27/10/2017. Overall, there are 1,559 CDS users and 16,890 funds not using CDS.

[99] Out of the 1,745 funds investing in emerging markets, more than 1,000 are equity funds. Braunsteffer et al.

variables equal to 1 if the fund name includes "corporate" ("high yield", "total return");[100]

— Alt*macro (Alt*absolute): dummy variable interaction between Alternative (Alt) and a dummy variable equal to 1 if the fund name includes "macro" ("absolute").

Our hypotheses are confirmed if we find a statistically significant and positive coefficient for the variables, indicating a higher probability that a fund uses CDS. The results of the regression are presented in Table V.31 below, across three different specifications:[101]

V.31
Logit results
Drivers of CDS usage by UCITS funds

	(1)	(2)	(3)
Fund size and category			
Size	0.412***	0.335***	0.330***
Fixed-income	2.358***	2.420***	2.253***
Alternative	2.246***	2.436***	2.319***
Fund families			
Tier-1 family	-	1.222***	1.242***
Tier-2 family	-	1.058***	1.055***
Fund objectives and strategies			
FI*emerging	-	-	0.438***
FI*corporate	-	-	0.466***
FI*HY	-	-	0.517***
FI*totalreturn	-	-	1.396***
Alt*macro	-	-	1.421***
Alt*absolute	-	-	0.583***
Constant	-11.34***	-10.50***	-10.40***
Observations	18,449	18,449	18,449

Note: Estimated coefficients from a logit regression, where the dependent variable is equal to 1 if a UCITS fund is a CDS user (based on regulatory derivatives data as of 1 December 2016, 24 February 2017, and 27 October 2017), 0 otherwise. All coefficients are statistically significant at the 1% level (***). A positive coefficient indicates that the variable increases the probability that a fund uses CDS. FI=fixed-income; Alt=alternative; HY=high yield.
Sources: ESMA.

The results confirm our three sets of hypotheses.

— Larger funds have a higher propensity to use CDS, as indicated by the positive and statistically significant coefficient of *Size*. Fixed-income and alternative funds are also much more likely to use CDS compared to the other UCITS fund categories, as reflected by the very large coefficients.

— UCITS funds that form part of a Tier-1 family have the highest probability of using CDS, as expected. The effect is also present in Tier-2 families, but somewhat weaker. The "family" effect also eliminates some of the *size* effect, reflecting the larger average size of funds belonging to a large fund house.

— CDS are especially relevant for fixed-income funds investing in less liquid securities – in particular high-yield bond funds – and for funds implementing hedge-fund strategies – with the effect strongest for total return and macro funds.

Fund drivers of net CDS exposures

We then turn specifically to CDS users in order to investigate funds' net CDS notional exposures. The net notional value represents the maximum amount that could theoretically be transferred from the CDS seller to the buyer, assuming a zero recovery rate following a default by the reference entity (ECB, 2009). Our sample now includes 1,359 UCITS funds that were counterparty to at least one CDS transaction as of 27 October 2017, with 95% of the sample composed of fixed-income (64%), allocation (16%), and alternative funds (15%).

Like other CDS market participants, funds may be either on the buy side or on the sell side of a trade. On the buy side, the fund is liable for the regular payment of a premium, against which it will receive a sum equal to the CDS notional in case of a credit event (usually a default of the underlying reference entity). On the sell side, the fund receives the CDS premium but compensates the buyer if a credit event occurs.

Unhedged sell-side positions should be a particular source of concern for authorities. As highlighted in Jiang and Zhu (2016), the incremental returns from selling CDS come at the cost of a "hidden tail risk" similar to selling disaster insurance. Following a credit event, the large one-off payments required to compensate CDS buyers could force funds to fire-sell assets in order to free up cash and meet their

(2018) show that equity funds typically do not use CDS, therefore we interact the *emerging* variable with the *Fixed-income* variable to focus on the 566 funds that are most relevant to the analysis.

[100] While the interactions of *corporate* and *HY* with *Fixed-income* (and of *macro* and *absolute* with *Alternative*) are largely redundant, they help to focus on the specific effect of the strategies within these two fund categories where most CDS users are found. This also ensures that any miscategorised fund is excluded from the sub-sample.

[101] For presentation purposes, the table includes only strategies that yielded statistically significant results. Other strategies investigated include: alpha, hedge, conservative, short duration, long duration, market neutral, long/short.

obligations. Moreover, such contingent liabilities are only partially captured on funds' balance sheets and in conventional measures of financial leverage, leaving investors somewhat in the dark as to the potential vulnerability of the funds they have invested in.

Funds may choose to take on buy positions only, sell positions only, or both buy and sell positions. A first, simple approach to computing the net CDS position of fund *i* is to take the difference between the sums of its buy and sell positions:[102]

$$Net\ CDS\ position_i = \sum_i Buy\ CDS_i - \sum_i Sell\ CDS_i$$

Similarly to the gross exposure approach, this measure is not indicative of a fund's credit exposure to a particular issuer, country or sector. However, it is broadly reflective of UCITS fund activities in the CDS market and allows us to investigate one-sided strategies. Again, we rely on a logit model to determine if the probabilities of having buy-only exposures, sell-only exposures or both buy and sell exposures relate to the size of a fund, its category,[103] and whether the fund is part of a large family, respectively. Table V.32 shows the results of the three regressions.

V.32
Logit results
Drivers of UCITS net CDS positions

	(Buy only)	(Sell only)	(Buy & Sell)
Size	-0.074*	-0.140***	0.165***
Fixed-income	-0.054	-0.935***	0.891***
Alternative	-0.600***	-1.765***	1.770***
Fund family size			
Tier-1 group	-0.669***	0.522***	0.187
Tier-2 group	-0.870***	0.737***	0.126
Constant	0.851	1.997***	-4.111***
Observations	1,344	1,344	1,344

Note: Estimated coefficients from three logit regressions, where the dependent variables are equal to 1 if a UCITS fund has buy-only, sell-only, or buy and sell CDS positions, respectively (based on regulatory derivatives data as of 27 October 2017), 0 otherwise. The levels of statistical significance are indicated by: ***p<0.01, **p<0.05, *p<0.1. A statistically significant and positive (negative) coefficient indicates that the variable increases (decreases) the probability that a fund has buy-only, sell-only, or both buy and sell CDS positions.
Sources: ESMA.

Large funds appear more likely to hold both buy and sell CDS positions, confirming that fund size is a reliable signal of CDS market activity. Alternative funds are also the category most likely to have both buy and sell positions, while the probability that a fund has sell-only positions decreases if the fund category is fixed-income or alternative. In contrast, there is a higher probability that a large-family fund will have sell-only positions, rather than buy-and-sell or buy-only CDS positions.

In summary, these results show that

- large funds tend to be more active in CDS markets; and
- funds that belong to a large family are more likely to take on sell-only CDS exposures.

As highlighted above, significant hidden tail-risk may be attached to such sell-only CDS positions, which allow funds to obtain unhedged credit exposures. One possible interpretation could be that funds benefitting from the explicit or implicit guarantee of a large group have a stronger incentive to take more risk, i.e. a reduced incentive to hedge their exposures. While regulatory authorities have looked into potential "step-in" risk for banks (BCBS, 2017), the possible implications for non-banking entities that benefit from such a safety net remain unexplored so far.

We then turn our focus to the drivers of funds' net CDS notional exposure size. The high dispersion of net exposures in our sample suggests that the impact of the determinants may not be constant across the distribution, but may instead vary. Therefore, we run two quantile regressions of net CDS notional exposures on a similar set of explanatory variables. Results for net positive and net negative exposures are reported separately in Tables V.33 and V.34, across five quantiles (10th, 25th, 50th, 75th and 90th).

The estimates from the quantile regressions show that

- for both net buy and net sell exposures, fund size is particularly relevant for the largest exposures (Q75 and Q90, i.e. funds with net exposure within the top 25th and 10th

[102] There are different methodologies to calculate net positions. We start with the simplest approach to investigate whether key fund-level characteristics play a role in funds' aggregate CDS exposures. While other netting methodologies (e.g. bilateral netting by ISIN, see next section) can be deemed more accurate, they also require the use of more granular information, which implies working on a smaller segment of the market.

[103] Empirical evidence presented in the previous section suggests that fixed-income and alternative UCITS funds are the most active in CDS markets. To account for this, we add a dummy variable for each of the two fund types to allow for potential differences in aggregate net CDS positions driven by these categories.

percentiles), as shown by the increasing value of the statistically significant coefficients;

— the *Alternative* variable is a key driver of net exposure on the buy side, but not on the sell side, while the *Fixed-income* variable does not seem to drive consistently net exposures; and

— funds with both buy and sell CDS positions tend to have larger net exposures.

V.33

Quantile regression results

Drivers of UCITS net buy CDS notional exposures

	Q10	Q25	Q50	Q75	Q90
Size	1.03***	5.15**	15.0***	34.2***	51.7***
Fixed-income	-1.24	0.36	-0.37**	25.6**	26.4
Alternative	0.60	8.47**	27.8***	107.4***	207.3*
Buy and sell	0.03	0.01	7.9***	17.3***	130.3**
Obs.	688				

Note: Quantile regressions of the net CDS notional exposures of UCITS funds with a net buy exposure, regardless of the CDS underlying. Net exposures split across five quantiles, with Q10 the 10% smallest exposures, Q25 exposures between 10th and 25th percentile, etc. The levels of statistical significance are indicated by: ***p<0.01, **p<0.05, *p<0.1 (with robust standard errors). A statistically significant and positive coefficient indicates that the variable increases funds' net CDS notional exposures.
Sources: ESMA.

V.34

Quantile regression results

Drivers of UCITS net sell CDS notional exposures

	Q10	Q25	Q50	Q75	Q90
Size	0.9***	2.9***	9.0***	26.7***	65.5***
Fixed-income	-0.4	-1.1	-2.3	1.8	37.7
Alternative	0.8	3.1	7.5**	17.2	21.1
Buy & Sell	0.03	3.5***	14.1***	61.9*	381.8***
Obs.	620				

Note: Quantile regressions of the net CDS notional exposures of UCITS funds (in absolute value) with a net sell exposure, regardless of the CDS underlying type. Net exposures split across five quantiles, with Q10 the 10% smallest exposures, Q25 exposures between 10th and 25th percentile, etc. The levels of statistical significance are indicated by: ***p<0.01, **p<0.05, *p<0.1 (with robust standard errors). A statistically significant and positive coefficient indicates that the variable increases funds' net CDS notional exposures.
Sources: ESMA.

Analysis of fund CDS underlying

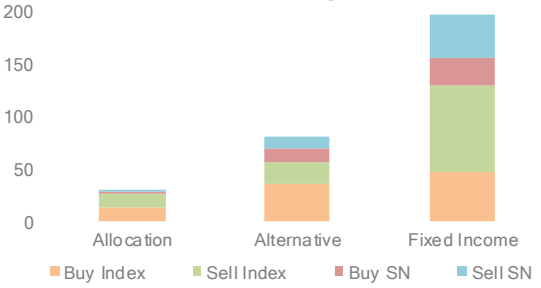
In this final section, we exploit the information reported on CDS underlying under EMIR. More specifically, we rely on the ISIN of the securities used as underlying in single-name CDS (SN-CDS) to investigate the bond-level drivers of the net CDS positions held by UCITS funds.[104]

EMIR defines three main types of CDS underlying: single-name, index, and basket. In October 2017 for the CDS users in our sample, multi-name CDS (almost exclusively index) accounted for 70% of gross CDS notional. The use of index CDS was particularly high for allocation funds, making up 90% of their gross CDS notional exposure (EUR 27bn). The share of index CDS was relatively smaller for fixed-income funds, at 66% (EUR 130bn), with a significant share on the sell side. The use of single name CDS by UCITS funds amounted to a gross CDS notional amount of EUR 96bn, with 60% on the sell side – i.e. exposure to underlying default risk. The amount of sell-side single-name CDS notional exposure was particularly high for fixed-income funds, at EUR 42bn (V.35).

V.35

Gross CDS notional by underlying type and fund category

Fixed-income funds mainly on the sell side



Note: Buy (Sell) Index is the sum of Buy (Sell) Index CDS positions. Buy (Sell) SN is the sum of Buy (Sell) Single Name CDS positions. Data in EUR bn.
Sources: ESMA.

Bond drivers of single-name CDS positions

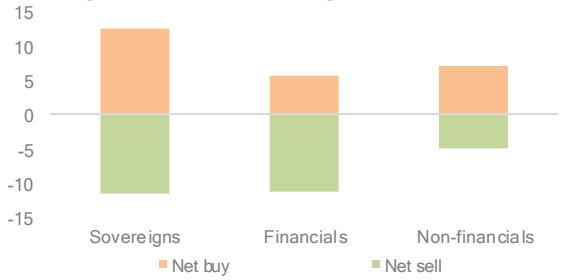
To investigate the bond-level drivers of CDS usage, we restrict the analysis to single-name CDS (SN-CDS), for which identification of the underlying bond is possible, and enrich the dataset with information on the CDS reference entities (i.e. the issuer of the security) from Thomson Reuters Eikon. In October 2017, there were 1,670 bonds used as underlyings in 18,491 SN-CDS transactions. The use of SN-CDS data also allows for greater flexibility in the netting methodology. First, we rely on multilateral netting, obtained by differencing the sum of buy and sell CDS exposures of fund *i* on reference entities within country or sector *j*, and summing the resulting net notional exposures across all funds:

$$Net\ SN\_CDS\ notional_j^{Multi} = \sum_i \sum_{k \in j} Buy\ SN\_CDS_{i,k} - \sum_i \sum_{k \in j} Sell\ SN\_CDS_{i,k}$$

[104] For single-name CDS, the underlying bond ISIN is reported under EMIR together with other characteristics of the transaction. For CDS indices, the ISIN is available only for transactions reported from November 2017.

This formula delivers an estimate of the net credit exposures of UCITS funds to specific countries or sectors.[105] In October 2017 there were 462 UCITS funds with SN-CDS positions on 197 bonds from 60 sovereign issuers. These positions amounted to EUR 24.2bn in net CDS notional, including EUR 11.5bn on the sell side (V.36).

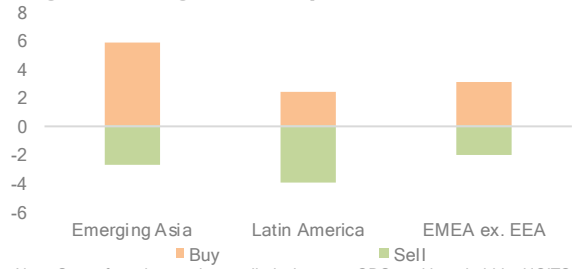
V.36
Funds' net SN-CDS exposure by reference entity sector
Sell exposures in sovereigns and financials



Note: Sum of net buy and net sell single-name CDS positions held by UCITS funds as of 27 October 2017, by sector of the underlying bond issuer. Notional amounts in EUR bn.
Sources: ESMA.

Almost 90% of funds' sovereign CDS exposure on the buy side was to emerging market issuers and more than 75% on the sell side, confirming the relevance of CDS for funds investing in these markets, as previously highlighted. The aggregate net CDS exposure of EU funds to sovereigns varies greatly by region, with most of the buy-side exposure to Asia and most of the sell-side exposure to Latin America (V.37).

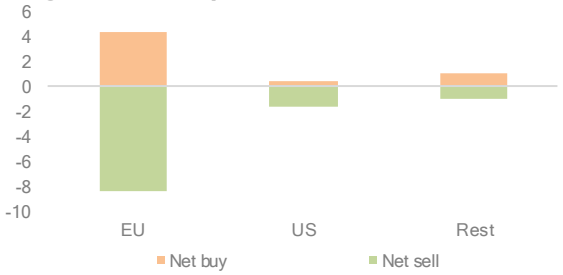
V.37
Funds' net SN-CDS exposure to EM sovereign issuers
Large sovereign CDS exposure to EM Asia



Note: Sum of net buy and net sell single-name CDS positions held by UCITS funds on emerging market sovereign issuers, as of 27 October 2017. Notional amounts in EUR bn. EMEA ex. EEA=Europe, Middle East and Africa, excluding countries from the European Economic Area.
Sources: ESMA.

There were 612 funds using SN-CDS on 1,473 corporate bonds for a combined net CDS notional of EUR 29.2bn, including EUR 16.1bn on the sell side. In stark contrast to sovereign SN-CDS, only 5% of funds' corporate CDS exposure was to issuers domiciled in emerging markets. Around 70% of the net sell-side exposure was to financial issuers – based for the most part in the EU (V.38).

V.38
Funds' net SN-CDS exposure to financial issuers
Large net sell exposure to EU financials



Note: Sum of net buy and net sell single-name CDS positions held by UCITS funds in underlying financial corporate bond issuers, as of 27 October 2017. Notional amounts in EUR bn.
Sources: ESMA.

To explore the bond-level drivers of net SN-CDS exposures, for each fund we calculate the difference between its buy and sell positions on a single ISIN across the fund's counterparties. Compared with the previous methodologies, the resulting net position offers a more accurate representation of funds' long or short exposures to specific bonds.[106]

$$Net\ SN\_CDS\ notional_{ij}^{Bilateral} = \sum_{k \in j} Buy\ SN\_CDS_{i,k} - \sum_{k \in j} Sell\ SN\_CDS_{i,k}$$

This methodology yields 8,586 net CDS positions. The aggregate net notional exposure on the buy side was EUR 36.8bn, and EUR 48.5bn on the sell side. We use these net positions in three different OLS regressions: the first uses the absolute net notional as the dependent variable, while the second and third rely on net buy and net sell positions, respectively.

In line with the previous results on the relevance of fund size and category, we keep the main fund-level variables in the specification. In addition, we include the following bond-level variables:[107]

[105] However, these estimates do not consider potential fund portfolio holdings of the underlying bonds or partial hedging from CDS indices. The figures and exhibits exclude large outliers and may therefore underestimate to some extent the net aggregate exposure of UCITS funds to specific countries or sectors.

[106] This is notwithstanding the share of SN-CDS hedged with multi-name CDS such as indices, or the share of buy-side SN-CDS used to hedge long physical positions on bonds.

[107] Due to a lack of available data for around a third of the bonds, illustrating the illiquid nature of many of the bonds used as CDS underlying, bid-ask spreads were not

— Issued amount: Log value of the issued bond amount converted to euro.

— Sovereign: Dummy variable equal to 1 if the issuer is a sovereign, 0 otherwise, interacted with Issued amount.

— Investment-grade sovereign: Dummy variable equal to 1 if a sovereign bond is rated BBB- or higher.

V.39

OLS regression results

Bond drivers of UCITS net single-name CDS positions

	(Absolute)	(Net Buy)	(Net Sell)
Fund characteristics			
Size	3.253***	3.372***	3.474***
Fixed-income	0.848	1.368	1.707
Alternative	1.356	0.065	5.506
Bond characteristics			
Issued amount	-1.038**	-1.768***	1.875
Sovereign	0.359***	0.434***	0.154
Investment-grade sovereign	0.332**	0.412**	0.306
Constant	-37.78***	-25.43***	-102.51**
Observations	6,948	3,408	3,297

Note: OLS regressions of the net single-name CDS positions of UCITS funds. The first regression (Absolute) uses the absolute value of all net CDS positions. The second and third regressions consider net buy and net sell positions, separately. The levels of statistical significance are indicated by: ***p<0.01, **p<0.05, *p<0.1 (with robust standard errors). A statistically significant and positive (negative) coefficient indicates that the variable increases (decreases) the size of funds' net single-name CDS positions.
Sources: ESMA.

Overall, the results from Table V.39 suggest that fund size remains a key driver of the net SN-CDS position. Other fund characteristics do not seem to matter as much. Furthermore:

— the results for net sell SN-CDS positions are generally inconclusive. A plausible explanation is that funds sell SN-CDS to build long credit exposures to the underlying bond issuers, so these exposures do not bear a direct relationship with the instrument itself.

— in contrast, the stronger results for net buy CDS positions suggest that funds may instead buy SN-CDS to hedge their bond holdings. Their CDS exposures are thus more closely related to the specific characteristics of the underlying bond.

— finally, the size of net CDS positions tends to increase when the underlying bond issuer is a sovereign – most of which are emerging markets –, reinforcing the view that CDS can be used to build large positions in less liquid markets. On the other hand, the equally strong relationship with the investment-grade status of these sovereign bonds might reflect an intention to limit credit exposures to the riskiest sovereign issuers.

Conclusion

Regulatory data on derivatives reported under EMIR allow authorities to improve their monitoring of risk in these markets. This article investigates the drivers of CDS usage by UCITS investment funds, building on our previous results (Braunsteffer et al., 2018). We find that the probability of a fund using CDS increases with the fund size (measured by net assets) for fixed-income and alternative funds, and for funds that are owned by large groups such as banks or insurance companies.

The analysis also investigates the effect of specific fund features and underlying bond characteristics on buy and sell CDS positions, as well as on the size of funds' net CDS notional exposures. To do so, we rely on different netting methodologies of use in obtaining a complete picture of funds' exposures and their drivers. The main conclusions are that fund size is a key driver of large CDS positions and that CDS are used to obtain credit exposure to less liquid markets, such as high-yield bonds and emerging markets, or to implement hedge-fund strategies.

Importantly, the article sheds some light on where the potential tail-risk associated with funds' net sell CDS positions is concentrated. Unlike net buy CDS exposures, which may be used to hedge a long position in the underlying bond, net sell exposures are used mainly for speculative purposes and to enable funds to build off-balance-sheet leverage. However, they also expose funds to significant contingent risk in the event that the underlying reference entity defaults. When unhedged credit exposures are particularly large, this may stress the funds' balance sheet and lead to broader financial stability issues. The operational findings presented in this article can thus serve as a basis for supervisory authorities to identify funds that may require closer scrutiny.

We find that funds belonging to a large fund family are the most likely to have sell-only CDS positions. This might indicate a stronger incentive to take risk, reflecting the explicit or implicit guarantee that these funds benefit from. The analysis of CDS underlyings also reveals that a

included as an explanatory variable. Other variables tested but not included in the table (due to substitutability with other variables or redundancy) were: emerging-market issuer, corporate sector of the issuer, and bond currency.

number of funds rely on single-name CDS to obtain unhedged credit exposure to EU financial issuers.

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