

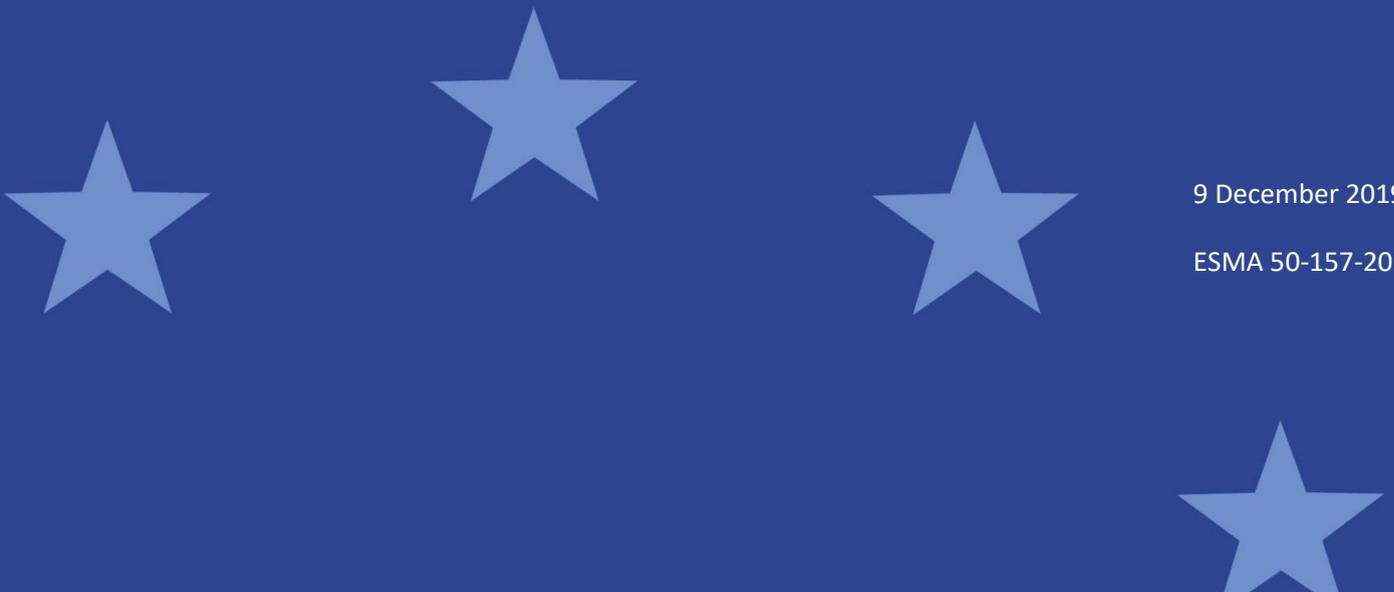


European Securities and
Markets Authority

ESMA Annual Statistical Report

EU Derivatives Markets

2019



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ESMA Annual Statistical Report on EU Derivatives Markets 2019

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Executive summary

Market monitoring

Market structure: The EU derivatives market at the end of 2018 had EUR 735tn in total notional amount outstanding in 66mn open trades. Over 85% of the notional amount was held by investment firms, credit institutions and central counterparties (CCPs). About 10% of total notional amount was between counterparties in the same group (EUR 78tn). The market continued to be dominated by interest rate derivatives (IRDs) at 76% of notional amount. About 15% of the notional amount was in currency, with another 6% in equity, credit and commodities. Over-the-counter (OTC) contracts accounted for 90% of outstanding notional amount in 4Q18 with the remainder in exchange traded derivatives (ETDs). However, 7% of the total notional amount was in OTC contracts executed on trading venues with characteristics comparable to ETD. For IRDs 63% of the outstanding notional amount was centrally cleared, with 25% cleared for credit derivatives (CDs). The UK remained at the centre of derivative trading in Europe and with third countries.

Market trends: Key trends in European derivatives markets in 2018 included: growth in the total notional amount from EUR 665tn in 1Q18 to EUR 735tn by 4Q18. Central clearing rates grew for IRDs outstanding from 61% to 63% and ended 2018 broadly unchanged for CDs at 25%. Rates of clearing for recently executed contracts were higher (at around 80% for IRDs and 50% for CDs). The proportion of ETD contracts over all assets was stable at around 10% through the year. However, OTC contracts executed on trading venues grew strongly for currencies, IRDs and CDs, and over all asset classes grew from 3% to 7% of notional amount. Interconnectedness tended to decrease slightly but remained high in all asset classes. Finally, the proportion of short maturities (less than one year) over all asset classes fell in 4Q18 because of fewer short maturities in credit, commodities and currencies. The distribution of maturities remained stable for other asset classes.

Statistical methods

Data quality improvements: EMIR data are vast and contain detailed information about European derivatives markets. The data are based on reports from EEA counterparties that are provided to trade repositories (TRs), which in turn report to ESMA. An important change for this year's report was the implementation of new RTS and ITS in November 2017 which significantly increased data usability and quality. To assess the post-RTS/ITS data, we performed several analyses of data quality. This revealed that reporting in 2018 was not always consistent. We identified very substantial over-reporting to one TR by some counterparties during 1H18 and several other cases of inconsistent reporting. For the purpose of this statistical report, data cleaning and correction methods were developed and applied to correct this. The descriptive statistics of the data after cleaning and correction suggest that the data used for this report are of a comparable level of quality to those of last year's report.

Intragroup transactions: Intragroup transactions under EU regulation are those between two entities in the same group, subject to certain conditions. They help firms to minimise costs and manage risks (e.g. liquidity, currency risks) within the group and in many cases between jurisdictions. Intragroup usage is higher in equity markets (27% of the total notional amount in equities), in commodities (24%) and in currency markets (19%). Usage is lower in credit (10%) and in interest rate derivatives (7%). Instruments particularly used in intragroup transactions are equity options, which make up 86% of the total intragroup notional amount in equities, currency CFDs, which make up 41% of the currency total, and commodity swaps which make up 56% of the total notional amount for intragroup commodity derivatives. Investment firms, non-financials and credit institutions are the main users of intragroup trades. As expected, CCPs are absent given the exemption from mandatory clearing for these trades. Finally, the analysis of intragroup transactions in products subject to mandatory clearing reveals that a substantial part of intragroup trading occurs between UK and third-country legal entities in the same group, with the UK serving as an entry point to EU markets.

Essential statistics

	Derivatives asset class					
	All	Commodities	Credit	Currency	Equity	Interest rate
Size						
Total notional amount (EUR tn)	735	11	13	110	44	557
Proportion (% of total notional)	100	1	2	15	6	76
Change 1Q18 to 4Q18 (%)	5	-28	-11	-24	21	16
Contracts (number in mn)	66	9	1	32	17	8
Change 1Q18 to 4Q18 (%)	-33	-41	4	12	-60	-14
Proportion (% of total number)	100	13	1	49	25	12
Underlying instruments						
Instrument with largest notional	Swap	Futures	Swap	Forward	Option	Swap
Proportion (% of total notional)	56	33	84	59	55	70
Instrument with most transactions	CFD	CFD	Swap	CFD	CFD	Swap
Proportion (% of transactions)	49	43	92	69	39	69
Counterparty exposures						
By type (% of notional amount)						
CCPs	32	15	12	1	1	41
Investment firms	34	36	50	51	59	28
Credit institutions	21	6	16	23	18	22
Non-financial firms	7	41	9	16	17	4
By domicile (% of notional amount)						
Intra-EEA	43	45	34	27	59	45
Intra-EEA excluding UK	7	7	5	8	14	6
UK to rest of EEA	19	14	18	10	29	20
Intra-UK	18	24	11	9	17	20
EEA with a third country	47	49	54	45	29	49
Intragroup exposures						
Intragroup total notional amount	78	3	1	21	12	42
Proportion (% of notional amount)	11	26	10	19	27	7
Intragroup transactions (number, mn)	13	2	0	9	2	1
Proportion (% of all transactions)	20	18	9	27	12	7
Execution venue and clearing						
ETD proportion (% of notional)	10	54	4	0.5	56	8
OTC proportion (% of notional)	90	46	96	99	44	92
On-trading venue	7	0.003	4	8	0.02	7
Off-trading venue	83	46	93	91	44	84
Clearing rate (% of OTC notional)	n/a	8	25	1	1	63
Concentration						
Top five (% of total notional amount)						
Excluding CCPs	n/a	41	47	44	40	24
Including CCPs	n/a	52	52	44	40	61

Note: All values as of 4Q18 (14 December 2018). Derivatives that do not fall into the asset classes above are excluded as these are a very small proportion of total. OTC contracts on-trading venue are those executed on multilateral or organised trading facilities, other OTC derivatives are considered off trading venue. Top five measure is the total notional amount of the exposures of the largest five counterparties.

Source: TRs, ISO, GLEIF, ESMA.

Market monitoring

Market structure

The EU derivatives market at the end of 2018 had EUR 735tn in total notional amount outstanding in 66mn open trades. Over 85% of the notional amount was held by investment firms, credit institutions and central counterparties (CCPs). About 10% of total notional amount was between counterparties in the same group (EUR 78tn). The market continued to be dominated by interest rate derivatives (IRDs) at 76% of notional amount. About 15% of the notional amount was in currency, with another 6% in equity, credit and commodities. Over-the-counter (OTC) contracts accounted for 90% of outstanding notional amount in 4Q18 with the remainder in exchange traded derivatives (ETDs). However, 7% of the total notional amount was in OTC contracts executed on trading venues with characteristics comparable to ETD. For IRDs 63% of the outstanding notional amount was centrally cleared, with 25% cleared for credit derivatives (CDs). The UK remained at the centre of derivative trading in Europe and with third countries.

The EU derivatives market in 2018¹

In 4Q18 there were 66mn open derivative transactions (covering trades and positions). Overall, these accounted for a **total notional amount outstanding** of around EUR 735tn, including both OTC and ETDs, and presented an 11% increase from the EUR 660tn we reported for 4Q17.²

In this year's report we also identify **intragroup** transactions,³ those between counterparties in the same group. These account for just under EUR 80tn in aggregate notional amount and about 13m of the transactions outstanding. Therefore, excluding those reported as intragroup, the total number of transactions in 4Q18 is about 53mn and the total notional amount outstanding is about EUR 655tn.

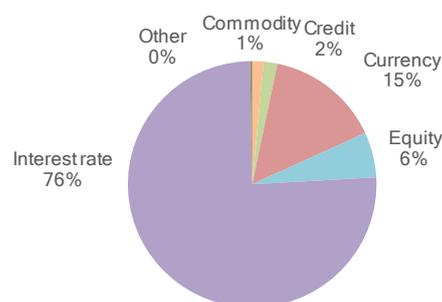
Split by the underlying **assets**, interest rate derivatives (IRDs) account for 76% of the EUR 735tn total notional amount outstanding. Currency derivatives are the next largest by notional amount, but much smaller at 15% (ASRD.1). The remaining categories are smaller

still in terms of notional amount, ranging from 2% for commodities and credit, to 6% for equities in 4Q18.

ASRD.1

Total notional amount outstanding by asset class

IRDs account for three quarters of notional amount



Note: Percentages of total notional amount outstanding by asset class.
Sources: TRs, ESMA.

In terms of average notional amount per transaction by asset class (ASRD.2), IRDs have by far the largest size (at over EUR 70mn) followed by CDs (EUR 15mn), currency

¹ Statistics presented in this report are based on the reporting requirements specified in Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012, (the European Markets and Infrastructure Regulation, EMIR) and the regulatory technical standards adopted for its implementation.

The data cover derivatives transactions involving at least one counterparty domiciled in the EEA, as received from the trade repositories (TRs) registered by ESMA. These data cover all derivative instruments, underlyings, maturities, currencies, counterparties, and trading venues.

All statistics presented here are based on trade-state data, i.e. all outstanding transactions at the end of the reference day, based on the state of each transaction along the derivatives life cycle.

Statistics are presented as the number of contracts outstanding, or the notional amount value of contracts outstanding, with notional amount outstanding defined as the nominal or notional value of all transactions reported

and not yet settled at the reporting date. The total notional amount is the sum of the reported outstanding notional amounts.

The reporting period for this report is the 2018 calendar year. The statistics presented are based on reports from four reference dates spaced at approximately quarterly intervals. The four reference dates are: 23 March 2018, 15 June 2018, 21 September 2018 and 14 December 2018. These were selected to be spaced at quarterly intervals subject to the availability of data from TRs, while avoiding days near to the end of quarters to avoid distortions from end-of-quarter activity (e.g. from contract expiry or rollover).

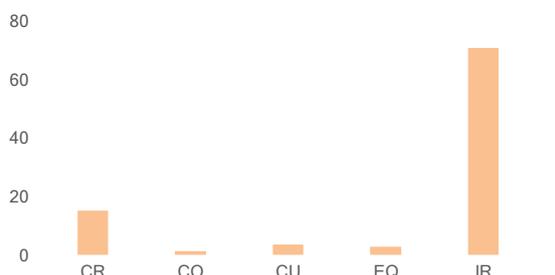
² See *Annual Statistical Report EU Derivatives Markets*, https://www.esma.europa.eu/sites/default/files/library/esma50-165-639_esma-rae_asr-derivatives_2018.pdf

³ See the article on intragroup exposures for more detail.

(EUR 3.4mn), equities (EUR 3mn) and commodities (EUR 1.2mn).⁴

ASRD.2

Notional amount per transaction by asset class
IRDs have the largest notional amount per transaction



Note: Notional amount per outstanding transaction in EUR millions. CR - credit, CO - commodity, CU - currency, EQ - equity, and IR - interest rate.
 Sources: TRs, ESMA.

The relative proportions of notional amount outstanding are similar to a year earlier, except that 8% of notional amount categorised in 4Q17 as 'other' or 'unclassified' has moved to explicit categories in 2018, in particular to the IRD and currency categories. This improved reporting is likely to be due in part to the Regulatory Technical Standards (RTS) implemented in November 2017.

ASRD.3

New Regulatory Technical Standards came into effect
Improved reporting standards

On 1 November 2017 a new EMIR RTS came into effect.⁵ Along with the implementing technical standards (ITS), these introduced major reporting changes. These included:

- improved reporting on derivative product types (e.g. adding swaptions, spreadbets, consistent instrument categories for ETD and OTC);
- more comprehensive and detailed reporting on collateral (e.g. initial margin, variation margin, excess collateral reporting);
- new reporting for credit default swaps (e.g. on seniority, reference entities, attachment and detachment points);
- position- and transaction-level reporting;
- refinements to identify buyer and seller counterparties;
- improved validation to enhance reporting quality, for example on counterparties.

The changes resulting from the RTS mean that we are receiving large amounts of new data and information. This annual report begins the task of presenting statistics based on this new information. However, given the scale of the data, this

⁴ Note that as transactions can include positions which combine multiple trades and net notional amount, the metric of average size here is more informative as to the relative size of trades between asset classes, rather than on the average amount per trade.

⁵ Commission Delegated Regulation (EU) 2017/104 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0104&from=EU>.

⁶ Some over-reporting of trades was identified in the 2018 data. In particular, a disproportionate number of trades were reported to a particular TR in 1H18. The Statistical

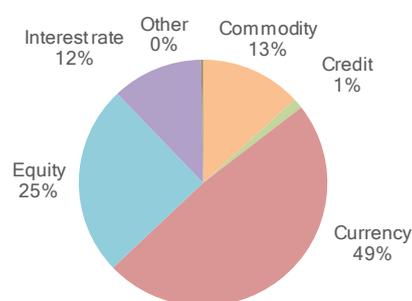
will be an ongoing process. For example, statistics on collateral and trade activity will be developed for future reports.

In addition, the RTS changes, and the challenges TRs and reporting counterparties faced in adjusting to them, will mean there are structural differences in EMIR data before and after 1 November 2017. These may affect comparisons between this report and last year's annual report.

The distribution of derivative instruments looks quite different in terms of the **number of transactions**⁶ compared with notional amounts. Under this size metric, currency derivatives accounted for just under half (49%) of the outstanding trades reported to us in 4Q18, equity derivatives accounted for 25%, commodities accounted for 13%, IRDs accounted for 12%, and credit derivatives accounted for 1% (ASRD.4).

ASRD.4

Number of transactions by asset class
Currencies account for half of transactions



Note: Percentages of outstanding derivative contracts by asset class.
 Sources: TRs, ESMA.

The distribution of total notional amount in terms of the **currency of denomination** was similar to 4Q17, with 43% in USD, 31% in EUR and 11% in GBP (ASRD.5). As expected, given that IRDs account for most of the notional amount, these proportions were driven by the distribution of currencies for IRDs (39% in USD, 32% in EUR and 11% in GBP).

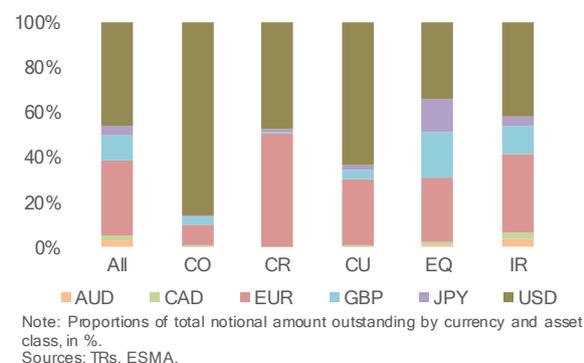
For currency derivatives, the distribution in 4Q18 was 63% in USD, 30% in EUR and 4% in GBP. Commodities were largely denominated in USD, with 86% of the total notional amount associated with contracts in USD, 10% in EUR and 3% in GBP. CDs were almost evenly split between EUR (50%) and USD (48%). Equity derivatives were the most diversified, reflecting the geographical

Methods article in this report provides details on the over-reporting identification and data-cleaning steps taken. In addition, in the 4Q18 statistics there is also a significant drop in the number of trades reported to the same TR in some asset classes. This appears to be a correction to remove data that were over-reported to that TR. Given this, the cleaning needed earlier in 2018 and the structural break resulting from the new RTS, in this report we refrain from comparing the numbers of transactions in 4Q18 and 4Q17, as these may be unrepresentative. Comparisons focus instead on notional amounts.

diversity of the underlying equities. Here the distribution was 32% in USD, 26% in EUR, 19% in GBP and 13% in JPY.

ASRD.5

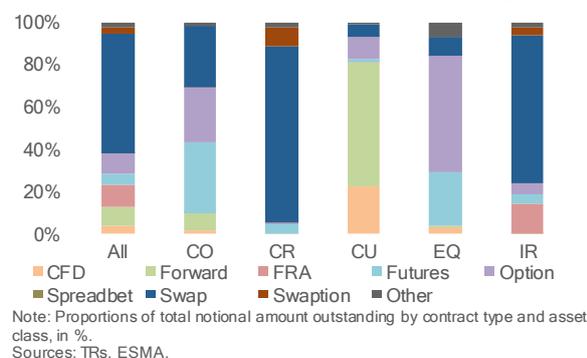
Total notional amount by currency of denomination

US dollar and Euro dominate in each asset class

Following the implementation of the new RTS, entities now report **contract types** with more granularity (ASRD.6). Before the RTS, there were five main types of derivatives contracts: forwards, futures, options, swaps and contracts for difference (CFDs). With the new RTS, two reporting categories were added: swaptions and spreadbets.⁷

ASRD.6

Total notional amount by contract type

Swaps dominate IRDs and credit, forwards dominate currency, options dominate equity

Overall, the distribution of notional amount by contract type and instrument has not changed much since the previous report, except for changes that are due to the improved categorisation from the new RTS.

Swaps accounted for the vast majority of notional amount among both IRDs (70%) and CDs (84%) (ASRD.6). They also accounted for over a quarter (29%) of the notional amount in commodities. As a result of the relatively large proportion of

notional amount in IRDs, more than half of the overall notional amount (56%) was in swaps.

Forward rate agreements (FRAs) accounted for 14% of IRD notional amount at the end of 2018. Forwards dominated currency derivatives at 59% of the total notional amount and accounted for 9% of the notional amount in commodities. Futures accounted for the largest amount of notional amount in commodities at 33%. In equities futures accounted for 25% of the notional amount.

Options were by far the largest instrument by notional amount in equities, accounting for 55% of the total notional amount. They were also the second largest instrument in commodities, accounting for about 26% of the total notional amount there. Swaptions, one of the new RTS categories, accounted for 9% and 4% of the notional amount in credit derivatives and IRDs respectively.

CFDs accounted for 22% of the notional amount in currency derivatives, 3% in equities and 4% of the overall notional amount. In contrast, spreadbets – which are similar to CFDs – only accounted for a very small amount of the overall notional amount. Their notional amount was almost entirely in equities, where they accounted for only 0.07% of the notional amount.

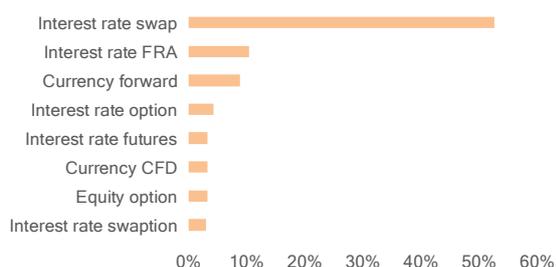
The asset and instrument type together provide an indication of the largest derivative markets by notional amount in 4Q18 (ASRD.7). The four largest markets by notional amount (interest rate swaps, interest rate FRAs, currency forwards and interest rate options) account for over 75% of the total notional amount at the end of 2018.

In terms of the numbers of outstanding transactions, CFDs are the most common (49%), followed by swaps (16%), forwards (11%), futures (11%) and options (8%). Within asset classes, swaps account for most of the transactions in IRDs (69%) and credit (93%). CFDs are the most numerous in currency (69%), commodities (43%) and equity (39%). Forwards are also relatively numerous among currency transactions (21%). Options also account for a significant proportion of equity derivatives (25%).

⁷ A swaption provides the buyer with the option to enter into a swap. Spreadbets are similar to CFDs but have an expiry date and a different tax treatment in some jurisdictions. For further details on spreadbets see, for

example, <https://www.etxcapital.com/en-gb/education/learn-spread-betting/spread-betting-versus-CFDs>.

ASRD.7

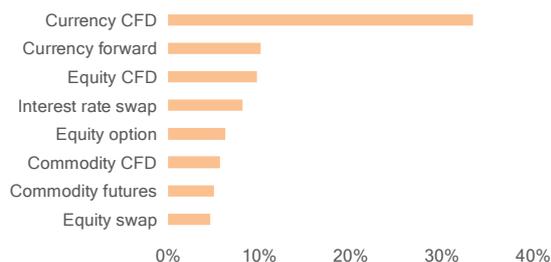
Top 8 notional amount proportion by asset and instrument
Over half of notional amount was in IR swaps

Note: Largest 8 proportions of total notional amount outstanding by asset class and instrument.

Sources: TRs, ESMA.

Looking at these numbers by the combination of underlying asset and instrument currency CFDs and forwards together account for almost half (about 43%) of all outstanding transactions reported to us, while equity CFDs account for another 10% (ASRD.8).

ASRD.8

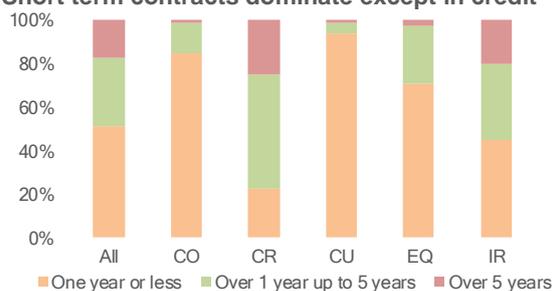
Top 8 proportion of transactions by asset and instrument
Over half of contracts are currency CFDs, currency forwards and equity CFDs

Note: Largest 8 proportions of the number of transactions by asset class and instrument.

Sources: TRs, ESMA.

The distribution of notional amount by the remaining **maturity** of derivatives is similar to that seen a year earlier in 4Q17, although with generally longer maturities (ASRD.9). Shorter maturities dominate, with just over half (52%) of the total notional amount in derivatives with a remaining maturity of a year or less, down from 55% a year earlier. The proportion of the notional amount in contracts with 5 years or more remaining maturity has also increased slightly, from 16% in 4Q17 to 17% in 4Q18.

ASRD.9

Proportion of total notional amount by remaining maturity
Short term contracts dominate except in credit

Note: Proportions of total notional amount outstanding by remaining maturity of the contract and by asset class, in %.

Sources: TRs, ESMA.

Contracts executed on trading venues account for 17% of notional amount

ETDs are standardised derivatives with transparent characteristics and prices. This encourages market participation, increases liquidity and generally acts to improve market efficiency. In contrast, OTC derivatives can be executed bilaterally with features tailored to the two counterparties. They are more difficult for the market to scrutinise. The split between **OTC** and **ETDs** is an important indicator of transparency, standardisation and liquidity in derivatives markets.

Under EMIR, ETDs are those traded on an EU regulated market⁸ or a third country venue that is considered to be equivalent to an EU regulated market.⁹ Derivatives that are not exchange-traded are considered as over-the-counter (OTC). In this year's report we also count OTC derivatives that are reported with a venue of execution that is not a regulated market or a third country equivalent.¹⁰

The venue of execution data also enables us to see the notional amount executed on trading venues. Trading venues include regulated markets and third-country equivalents (so includes ETDs). In addition, trading venues also include two other types of venues where OTC derivatives can be executed. These are multilateral trading facilities (MTFs) and organised trading facilities (OTFs). They offer similar benefits in terms of transparency, liquidity and efficiency as regulated markets. For this

⁸ Definition, Article 4(1)(21), Markets in Financial Instruments Directive (MiFID) II.

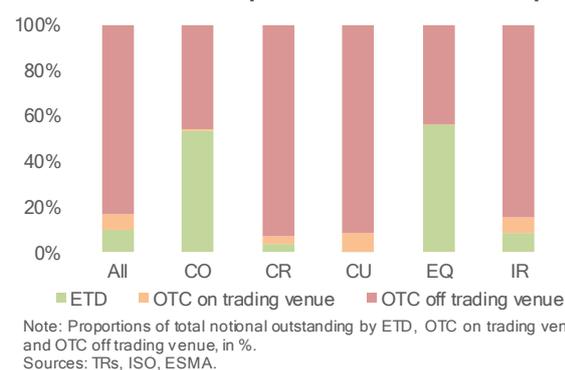
⁹ The list of third-country markets that can be considered equivalent to regulated markets for the purposes of the definition of OTC derivatives: https://www.esma.europa.eu/sites/default/files/library/equivalent_tc-markets_under_emir.pdf

¹⁰ So, derivatives are counted as OTC where the execution venue is reported with XXXX, XOFF or with a market identifier code (MIC) that is not for an EU regulated market or third-country equivalent.

reason, these OTC derivatives – executed on trading venues – are arguably more like ETDs than conventional OTC contracts executed bilaterally.¹¹

In 4Q18, ETDs accounted for 10% of the total notional amount, on-trading-venue OTC derivatives for 7%, and off-trading-venue OTC derivatives for 83% (ASRD.10). The proportion of ETDs is similar to the 11% we reported for 4Q17.

ASRD.10
ETD versus OTC proportion of total notional amount
OTC dominates except in commodities and equities



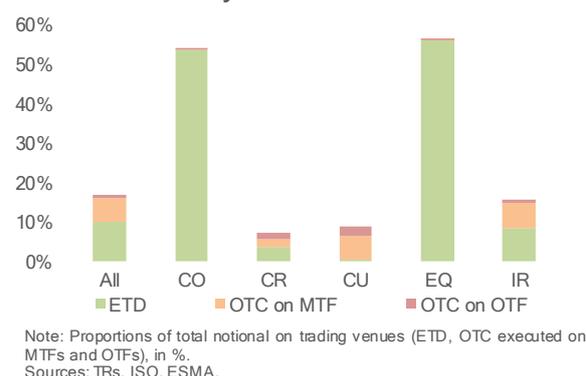
Looking at the split by underlying asset class (ASRD.10), commodities and equities have relatively large proportions of ETDs. This is to be expected given the greater proportion of instruments in these asset classes, such as futures, that are traded on regulated markets. As of 4Q18, the proportion of notional amount in ETDs exceeded that for OTC contracts in both with 56% ETDs for equity, and 54% ETDs for commodities. These compare with corresponding proportions of ETDs in 4Q17 of 47% and 35% for equities and commodities respectively.

In other classes, OTC derivatives still account for most of the notional amount outstanding and show little change from a year earlier, even with OTCs on trading venues included in 2018. Notional amount proportions for OTCs were 92% for IRDs, 99% for currency, 97% for credit derivatives in 4Q18 (ASRD.10). The corresponding OTC proportions in 4Q17, which do not include OTCs on trading venues, were

92% for IRD, and 97% for both currency and credit.

Over all asset classes, 17% of the proportion of outstanding notional amount was executed on trading venues. Contracts executed on MTFs and OTFs are particularly significant for currency derivatives, at 8% of notional amount (ASRD.11). For credit and interest rate derivatives the proportion of notional amount executed on MTFs and OTFs is close to that for ETDs. In credit derivatives, 4% of the notional amount is OTC on trading venue (compared with 4% for ETD), while for interest rate derivatives 7% of notional amount is OTC on trading venue (compared with 8% for ETD). The trading of IRDs and CDs on MTFs and OTFs is likely to be related to the Markets in Financial Instruments Directive (MiFID) II derivative trading obligation.¹² For commodities and equities, the notional amounts for OTCs executed on MTFs and OTFs is extremely small.

ASRD.11
Proportion of total notional amount on trading venues
OTC on trading venue significant for interest rate, credit and currency derivatives.



In summary, proportions of ETDs and OTC derivatives are similar to 4Q17. However, OTC notional amounts on trading venues are significant for currencies, CDs and IRDs.

ASRD.12
Comparing EMIR statistics with those from other sources
EMIR and BIS OTC market size measures

The Bank of International Settlements (BIS) publishes amounts of global OTC derivatives outstanding semi-annually. These BIS estimates are based on dealers in 13 countries reporting gross notional amount at the end of June

¹¹ In what follows, we described OTC derivatives traded on MTFs or OTFs as 'on trading venue'; other OTC contracts are described as 'off trading venue'. This terminology follows the EMIR definition of OTC, which may not be consistent with MiFID II usage. In MiFID II contexts, OTC can exclude contracts traded on trading venues. This is the case, for example, in the *ESMA Questions and Answers on MiFID II and MiFIR investor protection and intermediaries topics* (see p.19, fn.10), available at: https://www.esma.europa.eu/sites/default/files/library/esma35-43-349_mifid_ii_qas_on_investor_protection_topics.pdf

¹² The MiFID II trading obligation sets out the derivatives subject to the EMIR clearing obligation that are to be executed on trading venues. This includes some interest rate and credit derivatives. See Commission Delegated Regulation (EU) 2017/2417, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R2417&from=EN>

and December in a survey sent to the NCBs for the countries in which they are headquartered.¹³ We understand the gross notional amount reported should reflect balance sheet notional amount for the consolidated groups.¹⁴ The national central banks (NCBs) in turn aggregate this to country level which they provide to the BIS for aggregation to global level.¹⁵

Both the BIS and EMIR data on OTC derivatives amounts outstanding aim to increase transparency on derivatives markets, to improve understanding of derivatives markets and to help to better identify risks. The BIS has a global focus, while EMIR data is focused on Europe (EEA). The nature of the data collected is different, the EMIR data is based on mandatory transaction reporting for all counterparties involved in a derivative contract to trade repositories (TRs), while the BIS estimates are based on aggregated consolidated positions as reported by dealers in surveys.

In the BIS statistics, the global notional amount outstanding in OTC derivatives in 2018 totalled USD 595tn at the end of 1H and USD 544tn at year end.¹⁶ As these estimates are of the global OTC market in aggregate notional amount to be reported without netting,¹⁷ they offer a comparator for the total EEA OTC notional amount outstanding that we calculate using EMIR data.

To perform the comparison, we first remove the notional amounts associated with intragroup exposures (because the BIS estimates are based on the derivative exposures of consolidated groups). Removing intragroup exposures and converting to USD, we measure using EMIR data 2018 total notional amount of USD 773tn in Q2 and USD 530tn at year end (28/12/2018). Comparing the two measures of OTC market size, the EMIR data counterintuitively yields similar-sized or larger values for a smaller region (the EEA) than the BIS global measures.

To understand the possible sources of this result, we also analysed the notional amount reported by a small number of European banks in their consolidated global accounts (similar to those reported to NCBs and the BIS), and compared these with the aggregate EU notional amount for these groups, using data reported to us through TRs. This showed:¹⁸

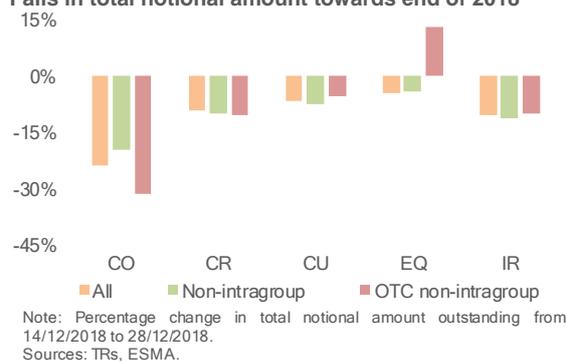
- considerable differences between some of the total notional amounts reported in the accounts and those calculated using EMIR data.
- large discrepancies for some banks and asset classes, with a closer match for others.
- variability over time in the firms' aggregate notional amount calculated using the EMIR data, with noticeable drops just before year-end.

The variability over time is visible in the aggregate notional amount reported to us across all firms. The chart below (ASRD.11) shows the percentage change in outstanding notional amount reported to us between our Q4 reference

date (14 December 2018) and the year-end date (28 December 2018). It shows drops in reported notional amount in all asset classes (with an exception of OTC non-intragroup equity derivatives). Falls in commodity notional amount are particularly striking, perhaps due in part to expiration dates for numerous contracts in the second half of December. Over all asset classes, we see about a 10% average fall in the notional amount reported over the last two weeks of December. We also see falls in the number of trades outstanding, across asset classes, over the same period. Falls in notional amount and number of trades indicate increasing compression and netting of trades towards year end may play a role.

ASRD.13

Changes in outstanding amount in last 2 weeks of 2018
Falls in total notional amount towards end of 2018



Another possible source of difference between the transaction-reporting-based notional amount and balance-sheet notional amount may be from banks treating the aggregation of notional amount on balance sheets in different ways. Unlike fair values, which are subject to netting requirements in hedge accounting standards,¹⁹ there are no explicit requirements for aggregate notional amount.²⁰ These are normally disclosed as risk management disclosures i.e. meeting the objective to provide information on the risks from financial instruments. As a result, we suspect banks may differ in how they aggregate notional amount in balance sheets. Similarly, in EMIR data, notional amounts reported for the positions are net. Netting in some reports can add variability.

We also did a preliminary analysis to estimate another potential source of difference - the proportion of notional amount in EMIR data that is not in between dealers, as the BIS survey captures only the notional amount of trades involving at least one dealer. Early indications were that the

¹³ The BIS also has a Triennial Survey that provides data on amounts outstanding for a larger set of reporting dealers in more countries than the semi-annual survey. Notional amounts are also reported on a consolidated basis. For supplementary information please refer to https://www.bis.org/publ/qtrpdf/r_qt1509e.htm.

¹⁴ BIS OTC statistics should reflect balance sheet information on a consolidated basis/ See p.3-4 of https://www.bis.org/ifc/publ/ifcb43_zf_rh.pdf.

¹⁵ For further details on the approach, see https://www.bis.org/statistics/about_derivatives_stats.htm?m=6%7C32%7C639.

¹⁶ See https://www.bis.org/statistics/d5_1.pdf.

¹⁷ See p.4 of the *Reporting guidelines for semi-annual OTC derivatives statistics at end-December 2017*. <https://www.scb.se/contentassets/33bdc993c23f4e77b643b230332d326f/guidelines-otc-derivatives.pdf>.

¹⁸ As part of the work we also compared the intragroup flag in our data with entity relationship data in the Global Legal

Entity Identifier Foundation (GLEIF) database. This revealed consistency between the GLEIF data and our data in a large majority of transactions.

¹⁹ For fair values IFRS allows for some netting if and only if the entity has a legally enforceable right to set off the amounts and intends to settle on a net basis, or realise the asset and settle the liability simultaneously (see <https://www.ifrs.org/issued-standards/list-of-standards/ias-32-financial-instruments-presentation/>).

²⁰ For example, US generally accepted accounting principles (GAAP) require volumes of derivative activity to be disclosed in financial statements (ASC 815-50-10-1A) but the standard is high-level and allows entities some discretion to disclose 'volumes of such activity that are most relevant and practicable for its individual facts and circumstances' (ASC-815-50-1B). Available at: <https://asc.fasb.org/> (registration required).

proportion of notional amount in trades not involving a counterparty in a dealer's group is relatively small.

More broadly, differences between our measures and those of the BIS may also arise from the different natures of the datasets and their collection. Data quality issues could also lead to discrepancies. For example, the analysis here depends on the quality of the EMIR intragroup flag. Further work would be needed to determine the extent to which divergences are driven by these or other possible causes.

Central clearing of OTC derivatives: almost entirely in interest rate and credit

The EMIR clearing obligation²¹ requires that certain OTC derivatives contracts be cleared through authorised central counterparties (CCPs).²² It is a key part of EMIR, aiming to increase financial stability and to enhance OTC market resilience.

At the end of 2018, the clearing obligation applied to specified classes of interest rate and credit OTC derivatives. The IRD classes subject to the obligation were basis swaps, fixed-to-float interest rate swaps, forward rate agreements, and overnight index swaps. For CDs certain European untranchet index credit default swap (CDS) classes were subject to the obligation.

For derivatives classes currently subject to the clearing obligation, the clearing obligation came into effect at different points in time depending on whether the contract-holders are above or below the clearing thresholds.²³ No new derivative

classes became subject to the clearing obligation during 2018 for all counterparty types.²⁴

As in our report for 2017, the EMIR data for 4Q18 again shows **central clearing** taking place almost entirely in asset classes with products already subject to the clearing obligation.

For IRDs overall, the clearing ratio was 63%, for CDs the clearing ratio was 25%. IRDs show an increase (5 percentage points higher) in clearing from 4Q17, while the clearing rate for CDs shows a slight decrease (2 percentage points lower) (ASRD.14).²⁵

The lower clearing rate for CDs than in 2017 appears to be due to a lower level of notional amount cleared outside of the EEA, which could be due to compression of cleared trades.

Counterparties: investment firms, credit institutions and CCPs are the largest

The exposures that counterparties have to different derivatives products provides useful information on counterparty risks in EU derivative markets. The new RTS implemented in late 2017 enables us to present more information on counterparty exposures for 2018, for example, on non-financial firms.

²¹ Under EMIR, as amended by EMIR Refit text, two types of counterparties are subject to the obligation: Financial counterparties (FC) (such as banks, insurers, and asset managers) which decide not to calculate their aggregate month-end average position in OTC derivatives or the result of which is above any of the clearing thresholds, and non-financial counterparties (NFCs) which include any EU firm whose positions in OTC derivatives contracts (unless for hedging purposes) exceed the EMIR clearing thresholds. Intra-group transactions are exempted from central clearing under certain conditions. The exemption of pension funds from the clearing obligation expired on 17 August 2018, though an additional temporary extension is granted under EMIR Refit (see <https://www.esma.europa.eu/regulation/post-trading/otc-derivatives-and-clearing-obligation>.)

²² As of 31 December 2018, 16 CCPs were authorised to operate in the EU, incl. Nasdaq OMX Clearing AB, European Central Counterparty N.V., KDPW CCP, Eurex Clearing AG, Cassa di Compensazione e Garanzia S.p.A. (CCG), LCH SA, European Commodity Clearing, LCH Ltd, Keler CCP, CCP Austria Abwicklungsstelle für Börsengeschäfte GmbH (CCP.A), LME Clear Ltd, BME Clearing, OMIClear - C.C., S.A., ICE Clear Netherlands B.V., Athens Exchange Clearing House (Athex Clear) and ICE Clear Europe Limited (ICE Clear Europe).

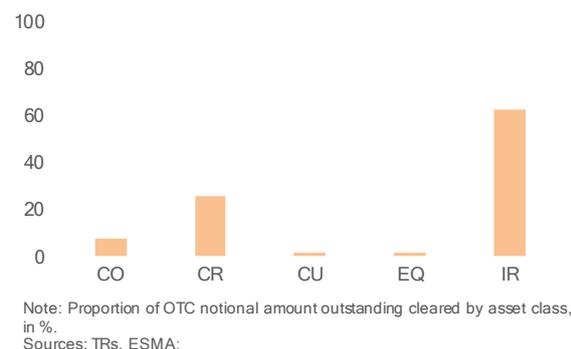
²³ See Commission Delegated Regulation (EU) 2015/2205 for IRDs in G4 currencies (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2015.314.01.0013.01.ENG), Commission Delegated Regulation (EU)

2016/1178 for IRDs in NOK, PLN and SEK (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R1178&from=EN>) and Commission Delegated Regulation (EU) 2016/592 for European Index CDSs (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2016.103.01.0005.01.ENG).

²⁴ The derogation for counterparties in Category 4 (broadly speaking non-financial counterparties above the clearing threshold, NFCs+) expired on 21 December 2018, for the IRDs denominated in the G4 currencies subject to the clearing obligation. This would have brought more IRDs in G4 currencies transactions under the clearing obligation. However, given that EMIR Refit will apply the clearing obligation only to NFCs+ in the asset class(es) where their level of activity is above the clearing threshold, ESMA recommended that national competent authorities (NCAs) not prioritise the supervision of the 21 December 2018 deadline. (see https://www.esma.europa.eu/sites/default/files/library/esma70-151-1773_public_statement_on_co_and_to_for_intragroup_as_well_as_cat_4.pdf)

²⁵ Clearing ratios are calculated here over all interest rate and credit derivatives, some of which are not subject to the clearing obligation, so we would not expect clearing rates here to be 100%.

ASRD.14
Proportion of OTC notional amount cleared
Clearing concentrated in IRD and credit



As in 2017, our data again shows that investment firms and credit institutions were key counterparties in derivative markets in 2018. Together they account for about 55% of the notional amount in the market (ASRD.15), with proportions of 34% and 21% respectively.

Investment firms hold particularly significant exposures across all derivative classes, ranging from 28% of IRDs to 59% of equity derivatives. They also account for about half of the notional amount in both currency and credit derivatives and for over a third of the notional amount in commodities (36%).²⁶

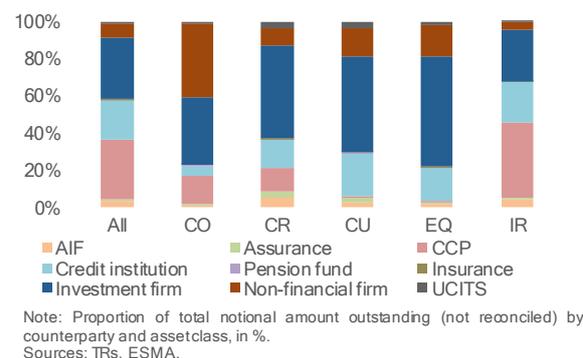
For **credit institutions** the main exposures are in IRDs (22% of notional), currency (23% of notional), equities (18% of notional) and credit (16% of notional).

However, the exposure measures for investment firms and credit institutions will overstate these firms' exposures to some extent because these firms can conduct trading on behalf of end clients that are not captured in EMIR data.

CCPs had sizeable exposures. They accounted for 32% of the total notional amount outstanding. As might be expected, given their role in central clearing, their exposures were mainly in derivative classes with OTC products subject to the clearing obligation. CCP exposures account for 41% of the total notional amount in IRDs, and 12% in credit derivatives.²⁷ With the exception of commodities (where their exposures account for 15% of total notional) CCPs account for very small notional amount proportions in other categories.

²⁶ Note that these proportions are reduced from the 2017 figures because of CCPs, Non-financial firms and assurance firms now also figure as counterparties in our calculations.

ASRD.15
Notional amount by sector of counterparty
CCPs have major exposures in IRDs and credit, non-financials in commodities



Non-financial firms account for 7% of the overall notional amount. As might be expected, their exposures account for a large amount of the commodity derivatives, at 41% of the notional amount in commodities. They also account for significant proportions in equity derivatives (17%) and in currency derivatives (16%).

Similar to 2017, **alternative investment funds** have significant exposures in CDs (5% of the notional) IRDs (4% of the notional) and currency derivatives (3%). **Undertakings for collective investment in transferable securities (UCITS)** remain minor players in the market, with their most significant presence in credit and currency derivatives (4% of notional amount in each). **Assurance firms, insurance firms and pension funds** have relatively small presences. Assurance firms account for 3% of the notional amount in credit derivatives and 2% in currency derivatives. Pension funds register their largest proportion in currency derivatives with just 1% of the notional amount. Insurance firms account for the smallest notional amount, with their exposures accounting for only 0.1% of the total notional amount overall. However, these exposures are likely to materially understate exposures of these firms, since these types of firms are likely to be the end clients of some of the exposures captured under other counterparty types in EMIR.

Importantly, the concentration of market activities become even more visible by matching **exposures between counterparties**. The table below (ASRD.16) presents exposures between counterparties for interest rate derivatives. Here the largest exposures are between CCPs and

²⁷ These percentages are not based on reconciled transactions and do not exclude intragroup transactions, so are not comparable to the clearing ratios presented above.

investment firms (28%) and between CCPs and credit institutions (25%).

ASRD.16

Whom-to-whom matrix of cross sectoral exposures - IRDs

CCPs to credit institutions and to investment firms accounts for over half of the total

	CI	IF	AIF	PF	UCITS	CCP	NF
IC	0.3	1.7					0.1
CI	3.8	6.5	3.9	0.1	0.2	25.4	2.4
IF		7.6	1.5	0.2	0.4	27.9	7.1
AIF						0.1	0.3
CCP							10

Note: Cross sectoral notional amounts between EU counterparties, as a percentage of the total. Empty cases are either zeros or lower than 0.1% of the total. Columns or rows with only empty cells are omitted. Counterparty sectors as self-reported by counterparties. CI=Credit Institution; IF=Investment Firm; IC=Insurance Company; AIF=Alternative Investment Fund; PF=Pension Fund; CCP=Central Counterparty; NF=Non-Financial.
Sources: TRs, GLEIF, ESMA.

Other substantive exposures are those in between investment firms (8%) and those between investment firms and credit institutions (7%). Non-financials are exposed to derivatives markets through CCPs (10%), investment firms (7%) and credit institutions (2%). Exposures in between credit institutions and between alternative investment funds and credit institutions each account for about 4%. Exposures among other counterparties are relatively small.

For credit derivatives, CCPs are also important, although to a lesser extent than IRDs. Here their exposures to investment firms, credit institutions and non-financials respectively amount to 12%, 9% and 5% of the total notional amount. Investment firms' exposures to credit institutions, non-financials and other investment firms make up most of the remaining exposures at 20%, 17% 11% of the total, respectively.

For commodity derivatives, non-financials' exposures to investment firms make up 40% of the total, while CCPs' exposures to investment firms amount to 19%, which reflects the wide usage of these derivatives by non-financials to hedge physical operations, mostly on regulated markets or through brokers.

Nearly a third (30%) of the equity derivative notional amount is held between investment firms. Exposures of these investment firms to

credit institutions (18%) and non-financials (17%) are also substantial.

Finally, for currency derivatives credit institutions' exposures to investment firms are the largest, followed by exposures between credit institutions and non-financials. This signals a two-tiered market in which non-financials trade with investment firms and credit institutions, while the latter two trade with each other.

Concentration and connectedness: some counterparties strongly linked

To assess the extent to which derivatives' exposures are held by relatively few counterparties, we use three measures to assess **concentration**. The first is the proportion of notional amount outstanding held by the top five largest counterparties. The second is the Herfindahl-Hirschman Index (HHI). It is based on the sum of the squares of notional amount proportions for all counterparties.²⁸ It also captures the concentration for counterparties outside the top five. Lastly, we use the number of counterparties in each asset class, measured by the number of unique reporting counterparties.²⁹

The **top five** measure (ASRD.17), excluding CCPs, shows credit and currency markets are the most concentrated with the top five holding 47% and 44% of the outstanding notional amount respectively in each. For currency, equity and interest rate derivatives the figures are 41%, 40% and 24% respectively. Including CCPs increases the proportion of exposures held by the top five for commodities, credit and interest rates. For interest rates the effect is particularly dramatic (from 24% to 61%) because CCPs are among the largest counterparties in that market.

For the **HHI** the concentration picture is similar to that for the top five (ASRD.17). Including CCPs, IRDs again have the most concentrated exposures among asset classes. The lower HHI if one leaves out CCPs for IRDs shows – like the top five measure – that concentration in IRDs is predominantly in CCPs. This is intuitive given the significant volumes cleared by a few large CCPs in this asset class.

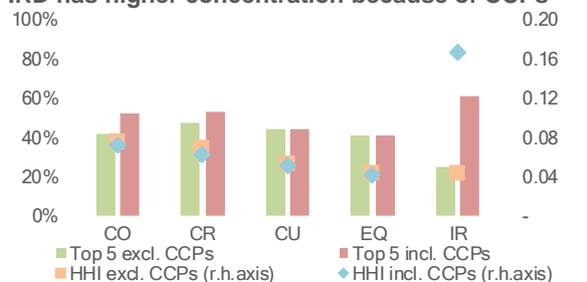
²⁸ Conventionally, HHI is a measure of concentration based on the sum of the squares of market shares (which gives greater weight to larger shares). According to the EC guidelines (in the context of competition law) an HHI value of below 0.1 indicates low concentration and an HHI value of between 0.1 and 0.2 indicates medium concentration. See Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between

undertakings and "Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings" [https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52004XC0205\(02\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52004XC0205(02)&from=EN).

²⁹ This will under-report counterparties because only firms domiciled in the EU or EEA report trades under EMIR.

Also relevant is the **number of counterparties** in each market. In 4Q18, there were about 4,000 in credit, 8,000 in commodities, 25,000 in equities, 60,000 in currency and 85,000 in interest rate derivatives (see ASRD-S.30, ASRD-S.42, ASRD-S.54, ASRD-S.66 and ASRD-S.78).

ASRD.17
Concentration measures: the HHI and top-five counterparties
IRD has higher concentration because of CCPs



Note: HHI and notional amount share in % of top-five counterparties calculated on aggregated notional positions of counterparties. HHI normalised between 0 and 1.
Sources: TRs, ESMA.

The top five levels are not too different from 2017 except for a sizeable fall in concentration for commodities compared with a year earlier, which appears to be due to a fall in concentration in 4Q18 (see ASRD-S.77).

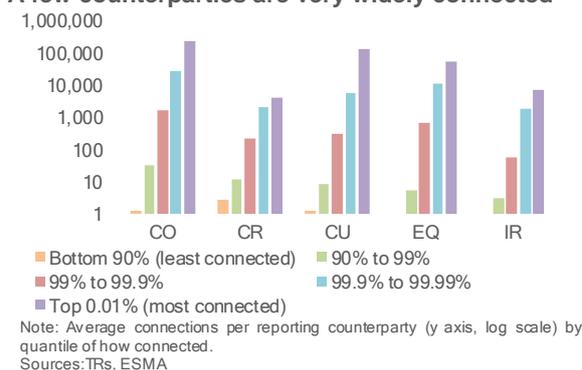
Overall, while there are large numbers of counterparties in each asset class, the top five counterparties still hold between 40% and 60% of total notional amounts. The relative concentration between asset classes is similar using the top five measure and the HHI. Under both concentration measures, IRDs are the most concentrated once CCPs are included.

To supplement these concentration measures, we also look at the **interconnectedness** of markets using statistics on the connections between counterparties.³⁰

Looking at the average number of connections of counterparties, ranked by how connected they are, we see that the top 0.01% most connected reporting counterparties in each asset class have very large numbers of connections (ASRD.18). For example, in commodities there is only one counterparty in the top 0.01% and it is connected to over 200,000 other counterparties.³¹ Credit also has only one reporting counterparty in the top 0.01% and it is connected to about 4,000 counterparties. In interest rate derivatives, there are nine reporting counterparties in the top most connected 0.01%. On average, these are each connected to over 7,000 counterparties.

³⁰ A connection is counted when a reporting counterparty reports one or more outstanding positions with another counterparty.

ASRD.18
Average connections by quantile of how connected:
A few counterparties are very widely connected

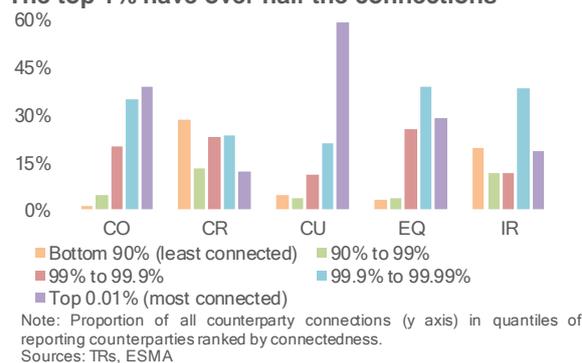


Note: Average connections per reporting counterparty (y axis, log scale) by quantile of how connected.
Sources: TRs, ESMA

At the other extreme, each asset class also has a large proportion of counterparties with very few connections. In particular, in every asset class except credit, between 70% and 80% of the reporting counterparties have one counterparty. This shows how connections are concentrated in a very small proportion of counterparties.

The next chart (ASRD.19) shows the distribution of counterparty connections. It shows, for example, that the top 0.01% most connected counterparties' connections account for almost 20% of all the connections into reporting counterparties. Moreover, the top 1% of most connected reported counterparties in each of the asset classes account for over half of the connections. Proportions for the top 1% range from 58% in credit to 94% in commodities.

ASRD.19
Distribution of connections by quantile of how connected
The top 1% have over half the connections



Note: Proportion of all counterparty connections (y axis) in quantiles of reporting counterparties ranked by connectedness.
Sources: TRs, ESMA

Together the two charts show that in each asset class a few counterparties are connected to many others, while a large majority of counterparties are connected to very few, very often to just one other counterparty. They also show variation in the extent of concentration across asset classes,

³¹ Figures here include non-reporting counterparties so can be exceeded those presented earlier, which only included reporting counterparties.

with connections in credit and interest rate derivatives less extremely concentrated than in commodities, equities and currencies. This is likely to be linked with specific instruments, for example CFDs, that are more prevalent in these asset classes, where a few large counterparties transact with a large number of counterparties with only one derivative position.

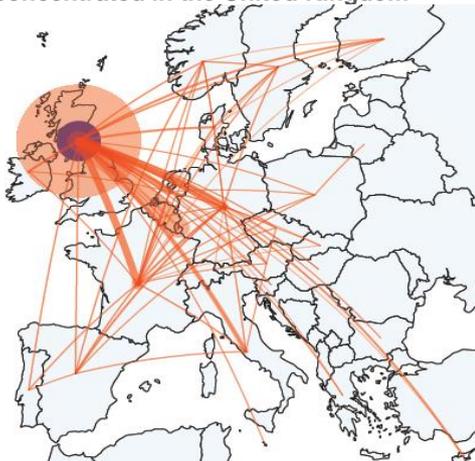
European and global distribution: United Kingdom exposures dominate

Here we look at the cross-border dimension of derivatives exposures. We map the derivatives exposures using the reporting counterparty's domicile information.³² For **intra-EEA exposures**, most of the market is located in the United Kingdom. The patterns for commodities (ASRD.20) are also illustrative of the general patterns for most other asset classes (see ASRD-S.11 to ASRD-S.15).

ASRD.20

Commodities derivatives: intra EEA network

Largely concentrated in the United Kingdom



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the aggregate notional amount outstanding for counterparties domiciled in the Member State. The thickness of the lines is proportional to the total notional amount outstanding between counterparties from the two Member States.

Source: TRs, ESMA, GLEIF.

For commodities the large orange area over the United Kingdom also shows how most of the intra-EU transactions are intra-UK. Exposures between the United Kingdom and other EEA

states are small in comparison and tend to be more significant to countries with larger economies and/or larger financial industries (as illustrated here with France, Germany, and Luxembourg).

Equity is the one asset class where there are exposures in another EU country comparable in size to those in the UK (ASRD.21). Here, a sizeable proportion of the notional amount involves counterparties domiciled in France, with exposures between the United Kingdom and France particularly significant.

ASRD.21

Equity derivatives: intra EEA network

Mainly in and between United Kingdom and France



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the aggregate notional amount outstanding for counterparties domiciled in the Member State. The thickness of the lines is proportional to the total notional amount outstanding between counterparties from the two Member States.

Source: TRs, ESMA, GLEIF.

Overall, the patterns of exposures between EEA states in 4Q18 remain broadly similar to those presented for 4Q17, in our previous report.

Derivatives markets are global, and the EU markets' links with third countries are an important part of the **global market structure**. Charts of the exposures between counterparties in EU and EEA member states and those domiciled in third countries³³ show that the majority of exposures are between the United Kingdom and the United States.

³² In the geographical charts the size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the country (i.e., the sum of all the individual exposures). The thickness of the lines is proportional to the total notional amount outstanding between counterparties from the two countries.

These charts and those in the Annex are based on the domicile of the reporting counterparty, which may not be the ultimate risk holder (e.g. an investment firm trading on behalf of a client). EMIR data do not allow the identification of end clients. As a result, the charts may

overstate the role of large dealers in the market, which tend to be domiciled in a few EU countries.

To identify the domicile of reporting counterparties, we use the counterparty's reported Legal Entity Identifier (LEI) from database of the Global Legal Entity Identifier Foundation (GLEIF). See <https://www.gleif.org/en/about/this-is-gleif>

³³ As EMIR data includes only data reported by EEA counterparties, the global charts presented do not show exposures between third countries.

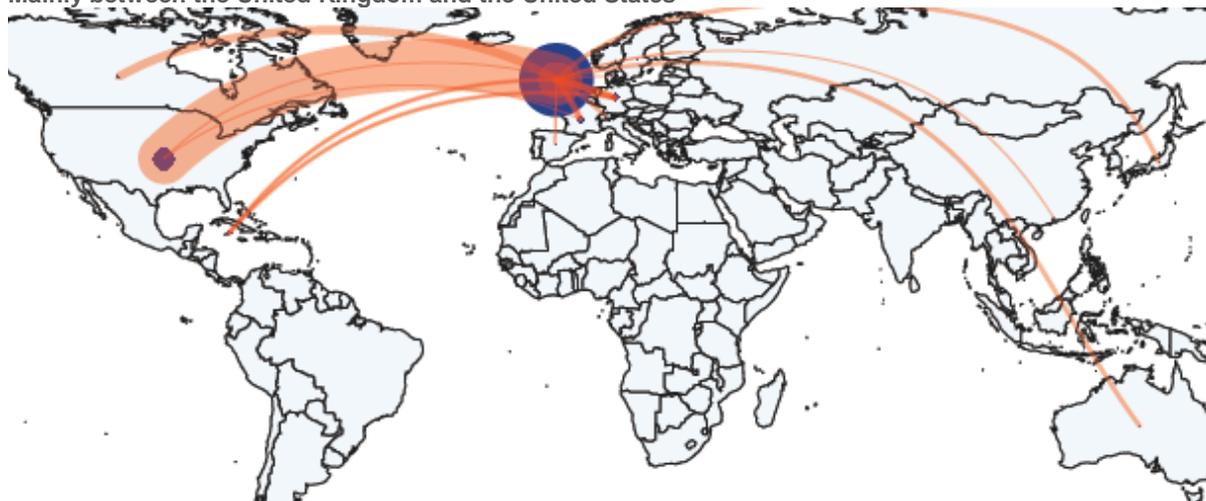
The chart below (ASRD.2), for example, shows the global exposures reported under EMIR for interest rate derivatives. The bulk of exposures are between the United Kingdom and the United States, with smaller connections between the UK and other third countries. This pattern is largely replicated in other asset classes, particularly in credit and commodities (see ASRD-S.17 and ASRD-S.20).

Exposures for currency and equity are somewhat more dispersed, though the US-UK exposure is also the largest here (See ASRD-S.18 and ASRD-S.19).

Finally, the table below shows the extent of links to the United Kingdom. Over half of the notional amount of the exposures in each asset class, with the exception of equities, does not involve a counterparty domiciled in the EEA-30.³⁴

ASRD.22

Interest rate derivatives: global network of positions involving an EU or EEA counterparty
Mainly between the United Kingdom and the United States



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the aggregate notional amount outstanding for counterparties domiciled in the Member State. The thickness of the lines is proportional to the total notional amount outstanding between counterparties from the two Member States.
 Source: TRs, GLEIF, ESMA.

ASRD.23

Cross-border exposures notional amount as a percentage of total outstanding notional amount at 4Q18

United Kingdom – third country exposures dominate

	All	Commodities	Credit	Currency	Equity	Interest rate
Proportion of total notional amount (%)	100	1	2	15	6	76
Proportion by counterparty domicile (%)						
Intra-EEA	43	45	34	27	59	45
Intra-EEA excluding UK	7	7	5	8	14	6
UK - rest of EEA	19	14	18	10	29	20
Intra-UK	18	24	11	9	17	20
With a third country	47	49	54	45	29	49
Unclear if intra-EEA or with third-country	10	6	13	28	12	6

Note: Derivatives that do not fall into the asset classes above are excluded as these are a very small proportion of the total.

Source: TRs, GLEIF, ESMA

³⁴ By EEA-30 we mean members of the EEA (as of 4Q18) excluding the UK.

Market trends

Key trends in European derivatives markets in 2018 included: growth in the total notional amount from EUR 665tn in 1Q18 to EUR 735tn by 4Q18. Central clearing rates grew for IRDs outstanding from 61% to 63% and ended 2018 broadly unchanged for CDs at 25%. Rates of clearing for recently executed contracts were higher (at around 80% for IRDs and 50% for CDs). The proportion of ETD contracts over all assets was stable at around 10% through the year. However, OTC contracts executed on trading venues grew strongly for currencies, IRDs and CDs, and over all asset classes grew from 3% to 7% of notional amount. Interconnectedness tended to decrease slightly but remained high in all asset classes. Finally, the proportion of short maturities (less than one year) over all asset classes fell in 4Q18 because of fewer short maturities in credit, commodities and currencies. The distribution of maturities remained stable for other asset classes.

EU derivatives: second quarter jump in currency derivatives

In terms of size, the data indicate continued growth during 2018 in the **overall notional amount outstanding** (ASRD.24). The total notional amount was about EUR 660tn in 1Q18 and finished at EUR 735tn by 4Q18 (11% growth). There is a peak in notional amount in the second quarter of 2018 of EUR 900tn. This peak is largely accounted for by an increase in the notional amounts reported for currency forwards in that quarter (which almost doubles from 1Q before decreasing in 3Q) and a sizeable increase in IRD notional amount.

ASRD.24
Total notional amounts outstanding by asset class
During 2018 IRD notional amounts grow, currency falls



Note: Total notional amount outstanding by asset class in EUR trillions.
Sources: TRs, ESMA.

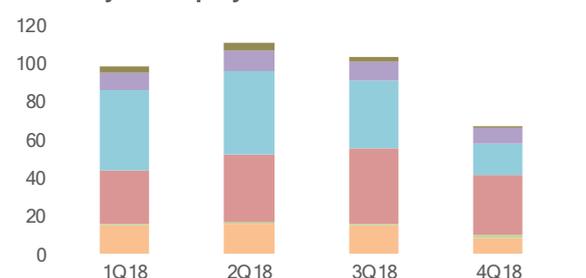
Over the year, IRD notional amount increased from EUR 448tn in 1Q18 to EUR 557tn in 4Q18 (a 24% increase). In contrast, currency derivative notional amount fell from EUR 142tn to EUR 110tn (a 23% decrease), peaking at EUR 235tn in 2Q18, associated largely with a jump in currency forwards in 2Q18.³⁵

For the remaining asset classes, which account for a much smaller proportion of the overall notional amount, trends were more mixed. CD

notional amounts finished 2018 at a similar level as in 1Q18 at about EUR 13tn, with higher levels observed in the intervening quarters. Commodity derivative notional amounts fell from EUR 150tn in 1Q18 to about EUR 110tn by year end (a 27% fall). Equity derivatives grew from EUR 360tn in the first quarter to about EUR 440tn in the final quarter (a 21% increase).

The proportions of the number of **transactions by asset class** were quite stable over 2018, although with a large fall in equity and currency trades in 4Q18 (ASRD.25). This fall appears to be due to a significant reduction in the number of CFDs reported in 4Q18 (ASRD-S.40, ASRD-S.52). However, as this reduction in the number of reported CFDs is associated with the trade repository (TR) that was subject to over-reporting (see Statistical methods article), this may be due to some residual trades, not captured in our cleaning method, no longer being reported.

ASRD.25
Total number of trades outstanding
Currency and equity derivatives most numerous



Note: Total number of outstanding transactions by asset class in millions.
Sources: TRs, ESMA.

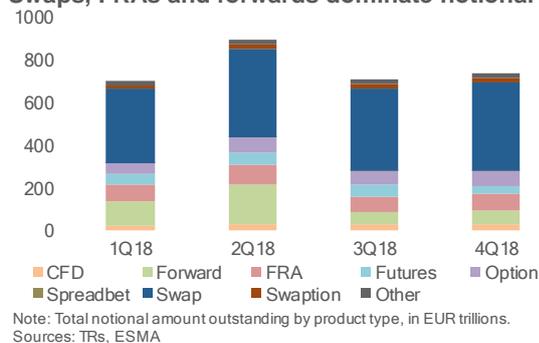
As regards **contract types**, swaps and forwards (including FRAs) account for most of the notional amount throughout 2018. This reflects the dominance of swaps and FRAs in IRDs and of forwards in currency derivatives. In line with the

³⁵ Underlying this are significant jumps in USD-TWD and USD-CLP currency forward notional amount in 2Q in the data reported to multiple TRs. As the pattern is consistent

across TRs, we treat the currency notional amount increases here as representative of market activity.

peak in currency derivative notional amounts in 2Q18, we see a clear peak in forwards in the same quarter. Underlying this peak in both ASRD.24 and ASRD.26 is a particularly marked jump in currency forwards, observed in data reported to several TRs. Currency forwards increased by 70% in 2Q before falling back in 3Q.

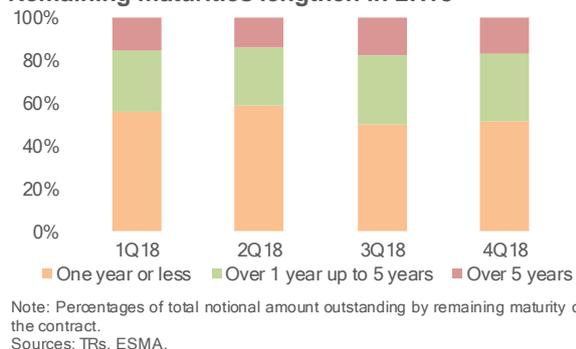
ASRD.26
Total notional amounts outstanding by contract type
Swaps, FRAs and forwards dominate notional



Maturity: longer maturities by year end

The **remaining maturity** of contracts increased in the second half of 2018 (ASRD.27). Over 55% of the notional amount was in contracts with a remaining maturity of one year or less in 1H18. This then fell to below 52% in 2H18. The proportions of the 1-to-5 year and over 5-year categories grew to 31% and 17% respectively by 4Q18. Overall, the distribution shows slightly longer-term residual maturities than in 2017.

ASRD.27
Total notional amount by maturity
Remaining maturities lengthen in 2H18



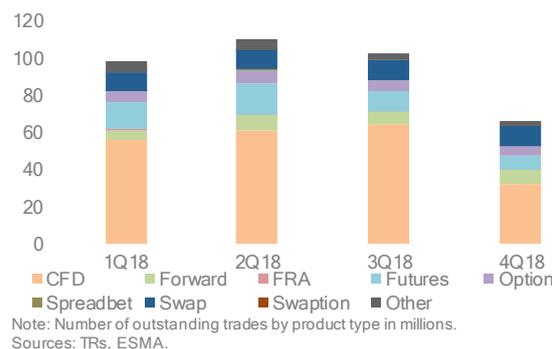
This lengthening of maturities overall is largely due to an increase in maturities in 2H18 in currency derivatives (ASRD-S.60). This in turn arises from a marked fall in notional amounts for contracts with remaining maturity of 1 year or less between 2Q and 3Q, likely to be driven by a sharp fall in currency forward notional amounts at that

time (ASRD-S.57). In contrast, the distribution of remaining maturities for interest rate derivatives was very stable (ASRD-S.24). For credit and commodities, we see marked lengthening of maturity in 4Q (ASRD-S.36 and ASRD-S.72), which coincide with sharp falls in futures notional amounts in both asset classes in 4Q. The distribution of equity maturities remained broadly stable through 2018 (ASRD-S.48).

Contracts for difference: most common instrument throughout 2018

CFDs remain by far the largest group of contract types by number, though the sharp increase observed at the end of 2017 has abated. The numbers of **CFD contracts** increased from 55mn (1Q) to 64mn (3Q) before dropping significantly to 32mn in 4Q (ASRD.28). During 2018 CFDs accounted for between 49% and 62% of the number of outstanding contracts reported to TRs.

ASRD.28
Number of trades by product type
CFDs dominate



Like CFDs, spreadbet numbers also fell sharply from 3Q to 4Q. Futures numbers fell, but more gradually from 2Q to 4Q. The numbers of other products were more stable in 2018.

In contrast, CFD notional amounts increased from EUR 22tn in 1Q to EUR 26tn in 4Q. The fall in the number of CFDs combined with an increase in notional amounts, could indicate a fall in the number of CFDs of small notional amounts and an increase in CFDs with larger notional amounts. If so, this might in part be associated with the introduction of ESMA product intervention measures in August 2018, that aimed to restrict the sale of CFDs to retail

investors.³⁶ These measures might also explain the sharp fall in the number of spreadbets, which are also in scope. Other products, which are not in scope, did not show sharp falls from 3Q to 4Q.

The drop in CFDs in 4Q18 may also partly reflect a reporting correction by a TR. This is because the change in number of contracts is associated with the same TR for which over-reporting was identified and cleaned in 1Q and 2Q (see Statistical methods article).

Over-the-counter central clearing: stable in 2018

In this section we analyse **central clearing trends** during 2018. We focus on IRDs and CDs, as these are the two asset classes that have products subject to the clearing obligation.

The proportion of the notional amount of outstanding OTC transactions that was cleared grew slightly for IRDs, from 61% in 1Q to 63% in 4Q. For CDs the clearing rate was around 25% at the beginning and at the end of 2018.

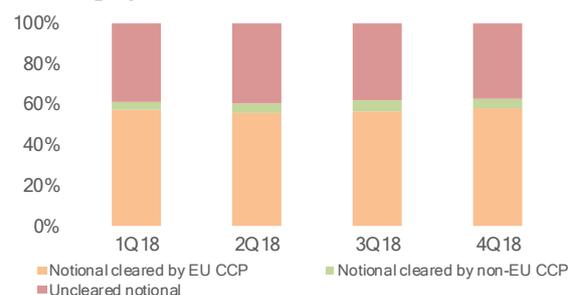
ASRD.29
Central clearing rates – credit and interest rate derivatives
Slight growth during 2018 for IRDs



Note: Percentage of total OTC notional amount centrally cleared by asset class.
Sources: TRs, ESMA.

For **interest rate derivatives** central clearing was carried out mostly by CCPs in the EU (between 57% and 58% of the total outstanding notional amount throughout 2018), while on average 4% of the total notional amount outstanding was cleared by CCPs located in a third country (ASRD.30).

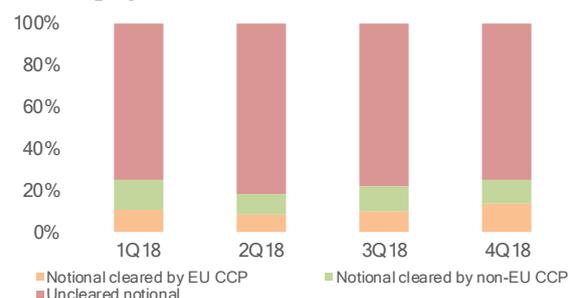
ASRD.30
Interest rate derivatives clearing by CCP location
Clearing by EU CCP



Note: Percentages of cleared and uncleared total outstanding notional by location of CCP for interest rates derivatives.
Sources: TRs, ESMA

For **credit derivatives** the proportion of notional amount cleared by EU CCPs increased during 2018, from 11% of total outstanding in 1Q18 to 13% in 4Q18 (ASRD.31). The proportion of notional amount cleared in a third country CCP was on average 12% of the total in 2018.

ASRD.31
Credit derivatives clearing by CCP location
Clearing by EU CCP



Note: Percentages of cleared and uncleared total outstanding notional by location of CCP for credit derivatives.
Sources: TRs, ESMA

As in 2017, there was very little central clearing in OTC markets for other asset classes in 2018. For commodities, the clearing rates range from 2% to 8%, for equities they range from 0.4% to 1%, and for currencies they range between 1% and 3% (see ASRD-S.68, ASRD-S.44 and ASRD-S.56).

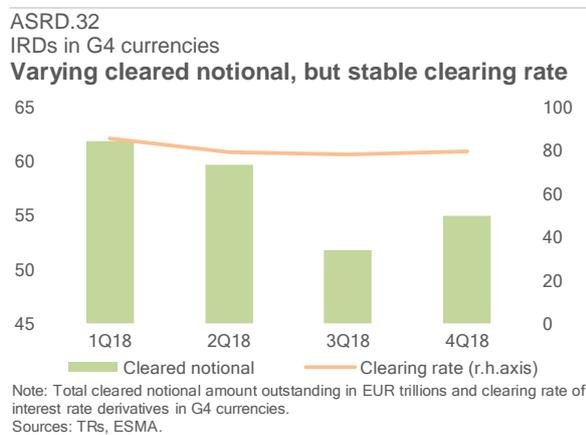
Below we present notional amounts cleared and clearing rates by quarter for specific products subject to the clearing obligation.³⁷ Estimates here are based on the execution timestamp for

³⁶ Since 1 August 2018 a restriction on the marketing, distribution or sale of CFDs to retail investors is in effect. This consists of (i) leverage limits on the opening of a position between 30:1 and 2:1, which vary according to the volatility of the underlying asset; (ii) a margin close-out rule on a per account basis; (iii) a negative balance protection on a per account basis; (iv) a prohibition on benefits to incentivising trading; and (v) a standardised risk warning. For further details, see <https://www.esma.europa.eu/policy-activities/mifid-ii-and-investor-protection/product-intervention>.

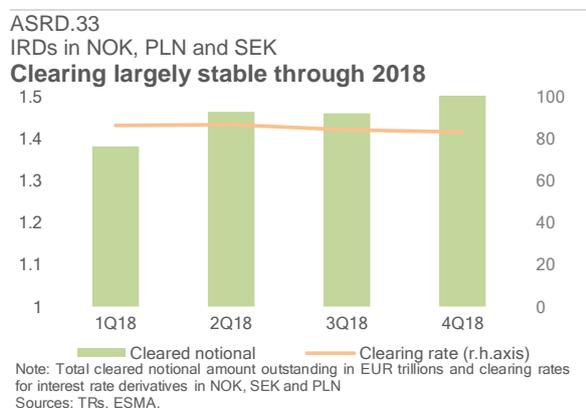
³⁷ Note that because of data limitations, we identify the instrument but not the counterparties here. This means in some cases the transaction would not be subject to the clearing obligation (e.g. for an NFC below the threshold). For an overview of the clearing obligation and risk-mitigation techniques under EMIR see: <https://www.esma.europa.eu/regulation/post-trading/otcderivatives-and-clearing-obligation>.

trades reported on our four quarterly reference dates.³⁸

For **OTC interest rate derivatives** classes denominated in the G4 currencies (USD, EUR, GBP and JPY) the quarterly clearing rate for new contracts was stable at around 81% throughout 2018 (ASRD.32).

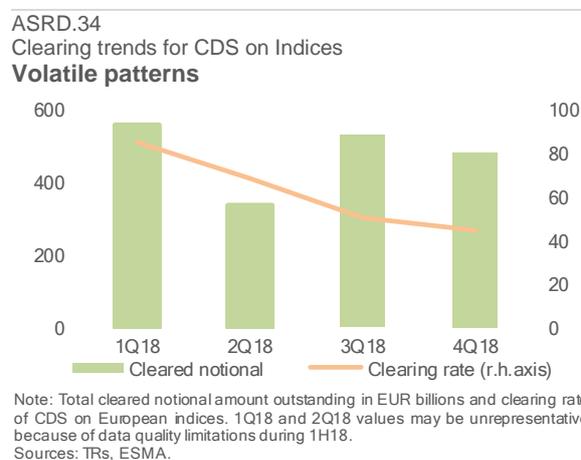


Looking at OTC interest rate derivatives classes denominated in NOK, PLN and SEK clearing rates have similar trends and levels as those for IRD in the G4 currencies. Clearing rates for contracts in 2018 were stable at around 85% (ASRD.33).



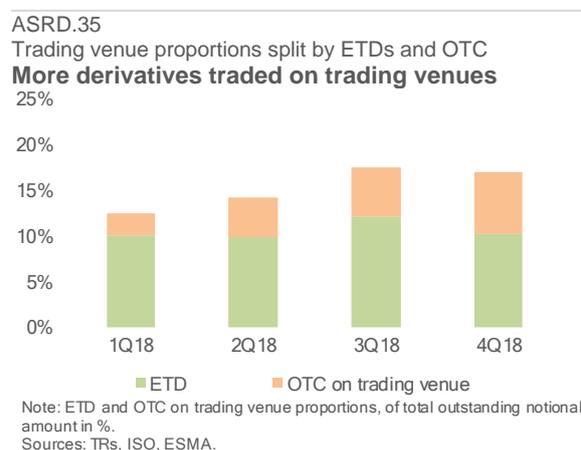
As in last year's report, the credit derivative clearing rates and cleared notional amounts for **CDSs on European indices** are volatile (ASRD.34).³⁹ Quarterly clearing rates calculated from data reports started at 85% in 1Q18 and finished at 44% in 4Q18. However, a fall in clearing should not be read from this because the data quality of a sizeable proportion of credit

derivatives reports did not permit identification of the underlying instrument for the first half of 2018, and so we were unable to check if they were subject to the clearing obligation. This prevents us from reliably analysing clearing statistics for these products in 1H18 and analysing trends through the year.



Execution: exchange-traded derivatives stable, trading venue proportion grew

As in 2017, the proportion of overall notional amount in ETDs remained relatively stable in 2018. The outstanding ETD notional amount was 10% in both 1Q18 and 4Q18, peaking at 12% in 3Q18 (ASRD.35).



At asset level, the proportion of notional amounts in ETDs grew in equities (from 45% in 1Q18 to 56% in 4Q18), was broadly flat in commodities

³⁸ For our 1Q reference date (23 March 2018), we consider only contracts outstanding at that date that were executed after 1 January 2018 (to construct a starting point). For dates after 23 March 2018, we consider only contracts executed after the previous reference date to avoid double counting trades. There is also some survival bias because contracts that matured before a reference date are not reported in our data for that date. This bias will

decrease for trades executed closer to the reference date, because a smaller proportion of these will have matured or been closed and so been omitted from the data.

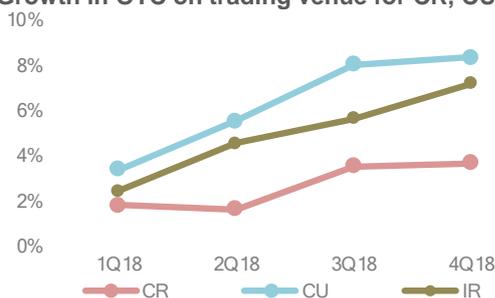
³⁹ These are index CDS that have as reference index the iTraxx Europe Main or the iTraxx Europe Crossover. (See <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0592&from=EN>)

(55% in 1Q18, 54% in 4Q18), fell in IRDs (from 10% in 1Q18 to 8% in 4Q18) and fell in credit (from 6% in 1Q18 to 4% in 4Q18). The proportion of notional amounts in ETDs in currency remained low at under 1% throughout.

However, if one considers the notional amount exchanged on trading venues by also including MTF and OTF, then the proportion of **the notional amount executed on trading venues grew** over 2018. Contracts executed on trading venues includes ETDs and OTC contracts executed on venues that have similar features to exchanges (i.e. on MTFs and OTFs). The proportion of notional amount executed on trading venues grew from 13% in 1Q18 to 17% in 4Q18 (ASRD.35). This was driven by strong growth in three asset classes in the proportion of OTC contracts traded on MTFs and OTFs (ASRD.36). Over the same period there was a fall in the overall proportion of notional amount OTC executed off trading venues, which was 87% in 1Q18 and 83% in 4Q18.

ASRD.36

Proportion of notional amount that is OTC on trading venue
Growth in OTC on trading venue for CR, CU and IR



Note: Proportions of total notional amount that is OTC on trading venue (MTF or OTF) by asset class, EQ and CO omitted as shares are negligible. Sources: TRs, ISO, ESMA.

This growing trading venue proportion alongside the fall in other OTC notional amount is promising because it indicates a move of OTC contracts away from more opaque contexts (e.g. bilaterally traded off venue) to venues with greater transparency (regulated markets, MTFs and OTFs).

This trend may partly be due to the MiFID II trading obligation, implemented in January 2018, which requires that products subject to the clearing obligation which meet certain conditions⁴⁰ be traded on trading venues from January 2018. That said, some of the growth seen above may also be from improvements in reporting, with trading venues now more explicitly reported with the implementation of MiFID II.

Looking at **concentration**, we see growth in counterparty numbers over the reporting period in each of the asset classes. Looking at the percentage increases from 1Q18 to 4Q18, growth in the number of counterparties ranges from 9% for interest rate derivatives to 29% for commodities, with growth of 16% for credit derivatives, 21% for equities and 22% for currency derivatives (see ASRD-S.22, ASRD-S.34, ASRD-S.46, ASRD-S.58, ASRD-S.70). In 4Q18 counterparty numbers ranged from 4,000 for credit derivatives to over 85,000 for IRDs.

Looking at the HHI and top five metrics, we see a steep **fall in concentration for commodities** in 4Q18 (ASRD-S.77), both in terms of the notional shares of the top five largest counterparties, and the HHI. The proportion of exposures held by the top five counterparties falls from 66% in 1Q18 to 41% in 4Q18, while over the same period the HHI drops from 0.13 to 0.07. This level is in line with other asset classes, and if it persists, will represent a significant fall in concentration.

For other asset classes, the concentration metrics of the HHI and top five were more stable, showing little major change over 2018.

As discussed in the market structure section, the most concentrated market, appears to be interest-rate derivatives (HHI 0.17 in 4Q18). This is probably because of large proportions of central clearing, which results in large exposures being held by a small number of CCPs. This can be seen in our data, with the HHI falling to 0.04 if it is calculated over counterparties that are not CCPs.

Interconnectedness: falls in average connections per counterparty over 2018

In this section we briefly look at **interconnectedness trends**. First, we look at the trends in the average number of connected counterparties that reporting counterparties have. The chart below (ASRD.37) indexed at 100% at 1Q18 shows falls for each of the asset classes except for credit, which is essentially unchanged.

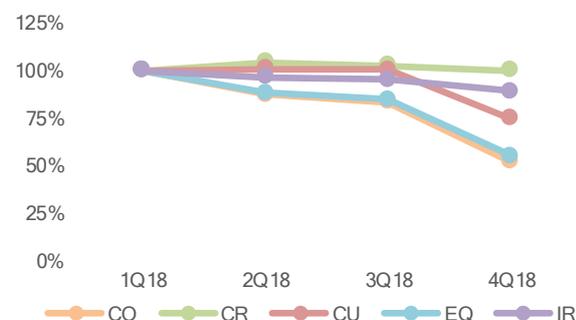
For interest rates the average number of connections per counterparty fell by 11%. For equities, currencies and commodities the fall is much more significant, although we suspect the fall in 4Q18 is driven largely by the removal of over-reported trades in 4Q by the affected TR. Nonetheless, equities and commodities still show

⁴⁰ This includes some interest rate and credit derivatives. See Commission Delegated Regulation (EU) 2017/241,

falls to 3Q of about 15% each. In contrast, for currencies the average number of counterparties remains stable up to and including 3Q. Overall, this suggests, with the exception of credit and currency, that markets became slightly less connected over 2018.

ASRD.37

Average connections per counterparty

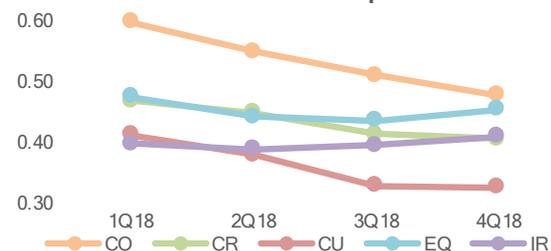
Falls for most assets in 2018

Note: Average connections per reporting counterparty as a percentage of 1Q18 value.
Sources: TRs, ESMA.

Next, we look trends using another measure (ASRD.38). Eigenvector interconnectedness measures the extent to which the connections in a market tend to be centralised in a few very highly connected counterparties. In doing so, it also takes into account the connections of these counterparties to other highly connected counterparties in the network. It ranges from 0 (lowest interconnectedness) to 1 (highest). With this measure, concentration of connections fell for all assets in 2018, except for IRDs for which it increased slightly.

ASRD.38

Eigenvector interconnectedness by asset

Falls for all assets in 2018 except for IR

Note: Eigenvector interconnectedness indicator by asset. This measures a participant's influence based on the number of links it has to other participants within the network and takes into account the connections of these participants through the network. It ranges from 0 (lowest) to 1 (highest interconnectedness).
Sources: TRs, ESMA.

Despite the falls in the average number of connections per counterparty and in the eigenvector interconnectedness for most assets, connections remain very highly concentrated among a very small proportion of counterparties in each of these markets (see ASRD.18 and ASRD.19).

Summary

Key trends from 1Q18 to 4Q18 were as follows.

- **Interest-rate derivatives:** IRDs increased in size in terms of the outstanding notional amounts (up by 24%) while the number of transactions fell (by 12%). Clearing rates grew from 61% in 1Q18 to 63% in 4Q18. Over the same period, the notional amount of contracts executed on trading venues grew from 12% to 16% of all the outstanding notional amount.
- **Credit derivatives:** CDs were rather stable in size with clearing rates also ranging from 18% to 25% throughout 2018. The ETD notional amount grew before falling in 4Q along with a sharp fall in futures outstanding. This was also associated with a decrease in the proportion of contracts with short-term maturities. OTC contracts executed on trading venues grew from 2% to 4% of the notional amount.
- **Equity derivatives:** For equity derivatives, notional amounts increased while the number of transactions fell over the year. The number of CFDs, by far the largest category in terms of number of transactions, fell in the second half of the year (probably in part because of a correction to remove over-reported trades). Trading venue notional amount, almost entirely ETDs, grew over the year from 45% to 56% of the outstanding notional amount.
- **Currency derivatives:** Currency derivatives experienced a jump in notional amount in 2Q18, associated with a spike in currency forwards, before falling back down and ending the year 23% lower than in 1Q18. The trading venue notional amount, largely OTC, grew from 4% to 9% of the total amount.
- **Commodity derivatives:** Commodities were stable in size until 4Q18 when there was a marked fall in notional amounts and number of trades. This was associated with a sharp fall in futures outstanding in 4Q18. Overall, the notional amount outstanding fell by 27% from 1Q18 to 4Q18. The ETD notional amount stood at 55% in 1Q18 and grew up to 3Q18 before falling back to 54% 4Q18. This is probably associated with the sharp drop in futures transactions in 4Q18. Concentration also fell sharply in 4Q18 on all measures.

Statistical methods

Data quality improvements

EMIR data are vast and contain detailed information about European derivatives markets. The data are based on reports from EEA counterparties that are provided to trade repositories (TRs), which in turn report to ESMA. An important change for this year's report was the implementation of new RTS and ITS in November 2017 which significantly increased data usability and quality. To assess the post-RTS/ITS data, we performed several analyses of data quality. This revealed that reporting in 2018 was not always consistent. We identified very substantial over-reporting to one TR by some counterparties during 1H18 and several other cases of inconsistent reporting. For the purpose of this statistical report, data cleaning and correction methods were developed and applied to correct this. The descriptive statistics of the data after cleaning and correction suggest that the data used for this report are of a comparable level of quality to those of last year's report.

Introduction

In the previous year's report, we provided an extensive overview of the main steps that we undertook to prepare the data for the report.⁴¹ In the same spirit, this year's methodological section gives a short overview and update on EMIR data. First, it summarises the new RTS and ITS that came into force in November 2017 and how it facilitated the production of this report. The second part is devoted to the major data quality analysis performed by ESMA and highlights key challenges that we encountered with the 2018 data. In addition, we describe a slight change in the outlier method that allows more robust identification of abnormal values. Finally, we provide descriptive statistics on the data resulting from the cleaning/correction steps we performed and show how these affected the presented aggregates.

European Markets Infrastructure Regulation data overview

The cornerstone of this report is the underlying data reported under Article 9 of EMIR. Article 9 requires all counterparties concluding derivatives transactions located in the EEA⁴² to report their trade, (double-reporting regime). The information is reported by both counterparties separately but with the same identifier (i.e. trade ID) to a TR. The TRs then disseminate these reports, filtered according to access rights, to the relevant authorities. These authorities can include the

European supervisory authorities, national competent authorities (NCAs) or central banks. Like last year, we used data coming from all TRs that were registered in 2018.⁴³ For this year, data were accessed solely through the TRACE system.⁴⁴

Essentially, TRs provide three types of reports to the authorities: trade-activity, trade-state and position data. The first, trade-activity data are very granular, showing each lifecycle event of a transaction (e.g. creation, valuation, modification, termination). The next type provided is trade-state data (also referred to as stock data). In this aggregation the trade-activity messages are applied to each outstanding transaction. Hence, these data show a snapshot with the latest information on each individual derivative. The third type of report, position data, provides the information on outstanding derivatives between two counterparties at an instrument level.⁴⁵

As in last year's report, we use trade state data because we aim to quantify the whole European market at a given point in time. We capture all open transactions within the EEA and between the EEA and a third country. For each of the quarterly datapoints we select a Friday in the middle of the month to avoid potential effects caused by the expiry dates of ETDs and the regular compression exercises that happen on the last Friday of the month. As we use quarterly data, our four datapoints are based on the following four months: March, June, September and December (2018). The number of records in these four quarterly dates (after the rigorous

⁴¹ Please find the previous edition of the report here: <https://www.esma.europa.eu/press-news/esma-news/esma-data-analysis-values-eu-derivatives-market-%E2%82%AC660-trillion-central-clearing>.

⁴² Also the AIF that are managed by AIFM authorised or registered under Directive 2011/61/EU

⁴³ For an updated list of registered TRs see <https://www.esma.europa.eu/supervision/trade-repositories/list-registered-trade-repositories>.

⁴⁴ TRACE is the Access to Trade Repositories System. ESMA's TRACE provides a single point of access to trade repository data for authorities.

⁴⁵ For more information please see the guidelines here: https://www.esma.europa.eu/sites/default/files/library/esma70-151-1272_guidelines_on_position_calculation_by_trade_repositories_under_emir_final_report.pdf

cleaning exercise explained below) ranges from 84mn to 145mn.

Data quality improves after the new regulatory technical standards in 2017

Since the introduction of the new RTS⁴⁶ and ITS,⁴⁷ which came into force on 1 November 2017, we observe an **improvement in data quality** as a result of new reporting fields and the efforts to streamline existing ones. In the following we focus on the changes that have an impact on this year's annual statistical report. The most important change that significantly improved data quality was the introduction of the mandatory fields, 'asset class' and 'contract type'. As outlined in the previous report, the definition of these characteristics was quite challenging for ETDs because the information was not explicitly reported for these. Hence, we relied on a proprietary algorithm to classify these contracts. Under the new RTS this additional data-processing step became redundant as now every new transaction needed to be allocated to a specific asset class (e.g. equity, currency) and a contract type (e.g. option, future). This improved the breadth and accuracy of these fields.

An additional change is the new distinction introduced between trade level and position level reporting, which allow for a clear identification of the reports made at position level. The counterparties can report post-trade events at position level when certain conditions are met, i.e. where the trade reports relate to products that are fungible with each other and where the original trade reports were correctly reported and terminated (it is not allowed to report only positions).⁴⁸ The possibility to report in this way alleviates regulatory burdens while still enabling the same level of risk assessment for the authorities. In this report we do not systematically distinguish between the two.

Data quality assessments and corrections

In preparing this report we extended our data quality analysis and procedures extensively to ensure the reliability of our calculations. In the next two sections we present an analysis on

reporting consistency for EEA entities and its key results. The subsequent section presents a problem of over-reporting to one TR that needed to be addressed to provide reliable results.

EEA reporting consistency

We conducted a major assessment of data quality for this report by investigating the consistency of the reporting of notional amounts within the EEA. This was possible due to the double-sided reporting regime mandated within EMIR, whereby counterparties residing in the EEA must each report their transaction to a TR. Our assessment compared the two reported notional amounts for trades for which both counterparties were in the EEA to check if notional amounts matched. A limitation of the approach was that it excluded trades with a third-country counterparty, as these have only one reporting counterparty.

The assessment was based on the cleaned data (removal of outliers and cleaning procedures as described below). First, the aggregated notional amount outstanding was calculated separately for each of the two reporting counterparties and compared with each other. Differences in this amount indicated a reporting inconsistency which could indicate misreporting. Alternatively, it could also indicate a disagreement between the two counterparties over the notional amount, a key metric in derivatives trading, which could pose an **operational risk** for the two counterparties.

This analysis also allows the identification of entities that systematically over-report, under-report or do not report at all. One major example of systematic over-reporting, which was identified and corrected using this method, is presented in the following section.

Example of an entity that misreported

Based on the analysis outlined above we identified one entity that reported a **suspiciously high notional amount** in a particular asset class. This unusual notional amount was identified from the inter-country exposure map where the country of this entity stood out.

⁴⁶ Please see here for the legal text of the RTS: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2017.017.01.0001.01.ENG&toc=OJ:L:2017:017:TOC

⁴⁷ Please see here for the legal text of the ITS: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2017.017.01.0017.01.ENG&toc=OJ:L:2017:017:TOC

⁴⁸ All conditions necessary for reporting at position level are specified in the TR question 17 in the EMIR Q&A under <https://www.esma.europa.eu/questions-and-answers>

Further analysis revealed that at its peak, in 3Q18, almost 80% of the outstanding notional amount in one inter-country relationship was associated with this entity. Comparing the notional amount positions of this entity with those reported by its corresponding foreign counterparties, showed a significant mismatch. The corresponding counterparties reported less than 0.1% of the entity's reported notional amount and less than 1% of its reported derivative positions. It was also observed that the same derivative positions appeared to be reported multiple times, but each with a new trade ID issued and assigned. Under the reporting logic within EMIR this meant that each of these trades was treated as a new derivative even though contractually speaking it was not.

From this it became clear that the counterparty was systematically over-reporting. Hence, we decided to consider only derivatives reported by the other counterparties against this entity as valid and to **correct the double reporting** as follows. First, all reports by the affected entity were removed. Second, the other counterparty's notional amounts were assigned to the entity, but with the buy-sell side identifier reversed.

This method cannot be used for trades involving a non-EEA entity (such as US-based entities). These are neglected because they do not fall under the double-reporting regime. Therefore, this cleaning procedure is not applicable to all reports. Nonetheless, it provides a useful method (assuming the accuracy of the other counterparty) when faced with systematic data mismatches between reporting counterparties. In future reports, we intend to extend this type of data cleaning more broadly to further reduce data quality problems from this kind of over-reporting.

Removing trades over-reported to a trade repository

In 1Q18 and 2Q18 a disproportionate number of trades was reported to a particular TR. This **over-reporting of trades** grew during 1H18. At its peak in mid-2018, the TR was reporting about 200mn outstanding trades. This was well in excess of the total number of trades reported to all other TRs.

Investigating this, we found that many trades in 1H18 were absent from later reports in 2018 and had inconsistent execution and reporting times. Therefore, in order to clean the data, trades with inconsistent execution data and those later absent in 2018 were removed.

The number of trades for the affected TR (and overall) decreased significantly in both 1Q18 and 2Q18 when this cleaning procedure was applied. Trades removed were across all contract types, but with CFDs particularly represented.

Finally, in the 4Q18 statistics there was also a significant drop in the number of trades reported to the same TR in certain asset classes, which appeared to be a correction made to remove data that were over-reported to that TR. Given this, the significant cleaning needed for 1H18, and the structural break from the introduction of the RTS, we refrain in the report from comparisons of the number of transactions in 4Q18 with the 4Q17 figures from the previous year's report as these may be unrepresentative. Comparisons instead focus on notional amounts.

Results and statistics from the cleaning and correcting process

For the threshold calculation, we introduce this year an additional correction because some derivatives are too rarely traded to yield a sample size that is large enough to allow a sensible statistical threshold calculation. Whenever we encounter such a small population of derivatives they are matched against close neighbours with valid thresholds (defined by the similarity in the outlier defining fields). If we encounter two or more neighbours that have a similar distance, we select the lower threshold. The **outlier removal** exercise reduces the notional amount to EUR 4,297tn while keeping 99.745% of the records (ASRD.39). The total notional amount is slightly higher than in 2017, where we observed EUR 4,041tn after outlier removal.

ASRD.39

Cleaning and reconciliation results

EMIR data need complex cleaning steps

	Raw	Outliers removed	Double reporting removed	Expired trades removed
Commodity	12,872	86	58	58
Credit	7,253	73	57	57
Currency	4,723,712	752	586	586
Equity	472,920	245	160	160
Interest rate	4,836,108	3,082	2,113	2,113
Other	573,586	60	35	35
Total	10,626,452	4,297	3,009	3,009

Note: Total notional amounts in EUR trillions. 'Raw' indicates the total notional amount before any outlier identification and treatment. 'Outliers removed' indicates the total notional amount after the removal of the outliers. 'Double reporting removed' indicates the total notional amount after the removal of double reporting. 'Expired trades removed' indicates the total notional amount after expired trades removed.

Sources: TRs, ESMA.

In the next step we account for the double reporting of EMIR. As a large proportion of derivative transactions are conducted between EEA counterparties, we see a significant decline in the notional amount down to EUR 3,009tn.

Interestingly, the relatively large notional amount removed at this step also indicates how much is traded among EEA counterparties relative to the other categories. We can observe that currency and credit derivatives for which less of the notional amount is removed at this step, are traded the most with counterparties in third countries (e.g. U.S. or Japan). On the other side, equity, commodity and "other" derivatives, for which more of the notional amount is removed, are traded more with the EEA and less with third countries.

In the final step trades that are expired were removed. Hardly any records (0.01% of the sample) and a non-substantial notional amount (EUR 0.089tn) are affected in this final step.

Conclusion and outlook

In this section we provided a brief overview of the EMIR data set and the challenges we faced using it. Regarding the streamlined reporting under the

new RTS/ITS we observed an increase of data quality which helped us to prepare this report, using four dates of Trade State data. Nevertheless, the data preparation was challenging as we faced a substantial over-reporting issues. To further increase the reliability of our calculations we conducted additional data quality checks using only data subject to double reporting. This analysis unveiled other cases of inaccurate reporting which we addressed. In addition, we introduced some small adjustments in the outlier methodology for rarely-traded instruments.

ESMA continues to improve the data quality with several initiatives in cooperation with the NCAs. In 2019 ESMA and several NCAs performed the peer review into supervisory actions aiming at enhancing the quality of data reported under EMIR. The exercise found room for improvement at NCAs and sets out good practices to enhance data quality supervision.⁴⁹ Another initiative is the in 2014 established 'Data Quality Action Plan' (DQAP) which is a joint effort by NCAs to improve data quality in several highly important areas. ESMA expects further improvement of data quality thanks to its supervision and the diligent work of the NCAs.

⁴⁹ Please see here for the final report:
<https://www.esma.europa.eu/press-news/esma-news/es>

[ma-sees-significant-room-improvement-national-regulators%E2%80%99-supervision](https://www.esma.europa.eu/press-news/esma-news/esma-sees-significant-room-improvement-national-regulators%E2%80%99-supervision)

Intragroup transactions

Intragroup transactions under EU regulation are those between two entities in the same group, subject to certain conditions.⁵⁰ They help firms to minimise costs and manage risks (e.g. liquidity, currency risks) within the group and in many cases between jurisdictions. Intragroup usage is higher in equity markets (27% of the total notional amount in equities), in commodities (24%) and in currency markets (19%). Usage is lower in credit (10%) and in interest rate derivatives (7%). Instruments particularly used in intragroup transactions are equity options, which make up 86% of the total intragroup notional amount in equities, currency CFDs, which make up 41% of the currency total, and commodity swaps which make up 56% of the total notional amount for intragroup commodity derivatives. Investment firms, non-financials and credit institutions are the main users of intragroup trades. As expected, CCPs are absent given the exemption from mandatory clearing for these trades. Finally, the analysis of intragroup transactions in products subject to mandatory clearing reveals that a substantial part of intragroup trading occurs between UK and third-country legal entities in the same group, with the UK serving as an entry point to EU markets.

Introduction

Intragroup transactions are those between two entities in the same group that comply with certain conditions (e.g. both counterparties are included in the same consolidation on a full basis or they are subject to a centralised risk evaluation). They help firms to exploit opportunities, minimise costs and manage risks (e.g. liquidity or currency risks) within the group and in many cases across jurisdictions. Accordingly, they evolve in response to market, regulatory and legal differences.

Under a temporary regime, these transactions can benefit from an exemption from the clearing obligation in the EU. This includes intragroup transactions with counterparties established in a third country regardless of whether the third country has been considered equivalent to EU markets by the European Commission.

It is important to distinguish intragroup transactions from other transactions. They have different implications for risk, for example, two exposures within the same group that offset each other can reduce risk, but intragroup transactions can increase risk, for example, when they act to exploit regulatory differences across jurisdictions.

As of 14 December 2018, there were 13mn open intragroup transactions, which together accounted for an outstanding notional amount of EUR 78.5tn. These intragroup trades accounted for about 19% of all trades by number and for about 11% of the total notional amount outstanding.

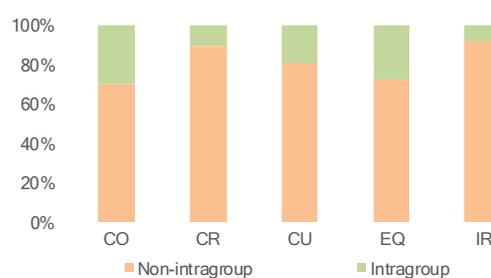
Overall intragroup usage: largest proportion in equity, commodities and currency

Looking at intragroup usage by **asset class**, in ASRD.40, we see intragroup transactions are widely used in equity markets (27% of the total notional amount), in commodities (28%) and in currency markets (19%). They are less prevalent in credit (10%) and in interest rate derivatives (7%).

ASRD.40

Intragroup usage by derivative asset class

Largely used in equities, commodities and currencies



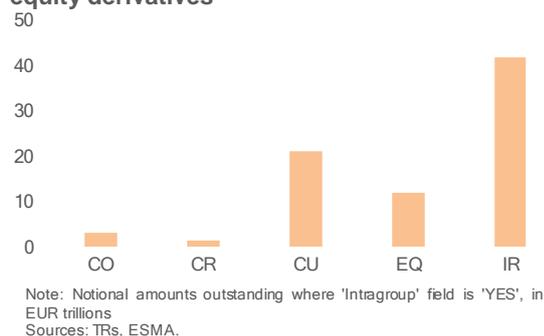
Note: Percentage of intragroup notional amount outstanding by asset class.
Sources: TRs, ESMA.

In addition, as shown in ASRD.41, the relatively small proportion of IRD intragroup transactions is associated with a significant notional amount (EUR 42tn), which is to be expected given the large overall size of IRD markets in notional amount terms. Notional amounts are also significant in currency (EUR 21tn) and equity (EUR 12tn), whereas notional amounts are smaller for credit (EUR 134bn) and commodities (EUR 278bn).

⁵⁰ Article 3 of EMIR refers to Intragroup transactions.

ASRD.41

Notional amount outstanding by asset class derivatives
Large amounts for interest rate, currency and equity derivatives



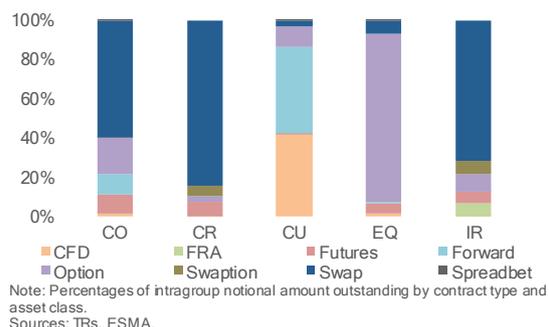
Instruments: equity options, currency CFDs and commodity swaps widely used

Three instruments stand out in terms of intragroup usage by **instrument type** (ASRD.42): equity options make up 86% of the total intragroup notional amount in equities (against 15% for non-intragroup); currency CFDs make up 41% of the currency total (against 18% normally); and commodity swaps are a bigger proportion of intragroup (56%) than non-intragroup (15%).

For equity options, intragroup transactions are mostly made up of ETDs, here paralleling the importance of ETD for equities. As with transactions more generally, currency CFDs are the most commonly used product among intragroup transactions. Their use is even more prevalent in intragroup transactions, with 41% of the notional amount of currency intragroup transactions in CFD contracts versus 18% for non-intragroup currency derivatives. Finally, commodity swaps are very often used by non-financials for hedging purposes and this is reflected in the intragroup trades, where non-financials play a significant role.

ASRD.42

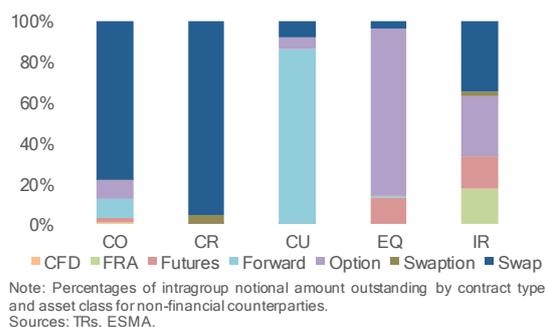
Total notional amount by instrument
Equity options, currency CFDs and commodity swaps more prevalent in intragroups



Looking only at non-financials, they mostly use derivatives for hedging and this is reflected in their intragroup trades (ASRD.43).

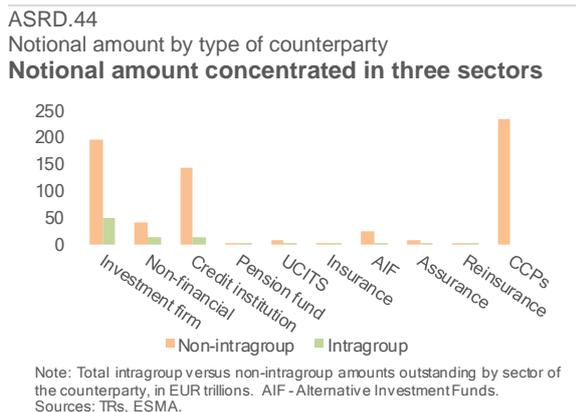
ASRD.43

Total notional amount by instrument for non-financials
Commodity swaps and currency forwards more prevalent in non-financials



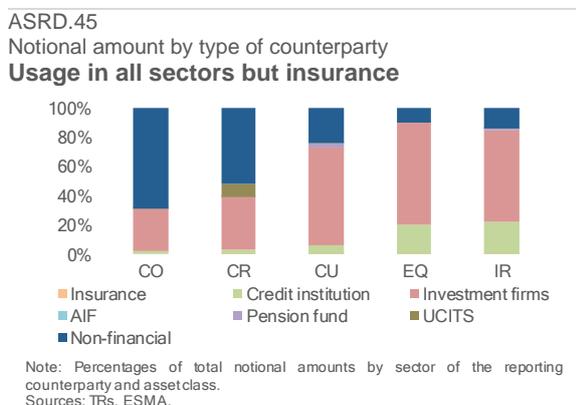
Counterparty type: usage depends on asset class

Looking at the intragroup **exposures by counterparty sector** (ASRD.44), we see that intragroup transactions are used mainly within investment firms, non-financials and credit institutions, whereas there appear to be much lower intragroup transactions in the insurance and pension fund sectors.



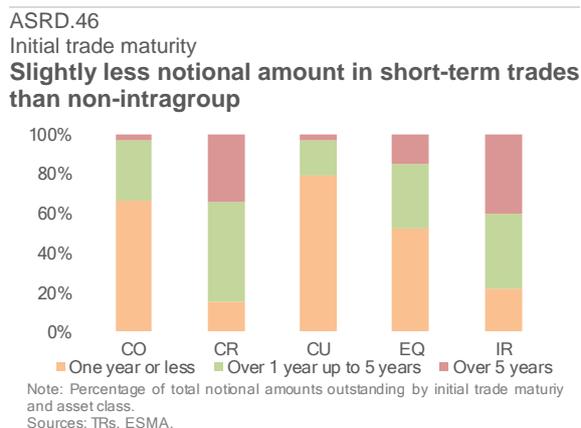
Usage in asset classes varies widely by counterparty type (ASRD.45), reflecting different business needs. Notional amounts of commodity intragroup transactions are mainly associated with non-financials (69% of total notional amount) and investment firms (29%), with credit institutions at 3%. For currency, 67% of intragroup notional amount is in investment firms, 24% in non-financials, 6% in credit institutions and 3% in pension funds. Exceptionally, among asset classes, pension funds are represented in intragroup currency transactions.

For credit, the distribution is similar to commodities, with investment firms at 35% and non-financials at 51%, but with a difference: UCITS here make up 9% of the intragroup notional amount for this market, which is in line with a previous analysis.⁵¹ For equity and IRDs, most trading occurs within the investment firm sector, but credit institutions are also more present than for other asset classes (with 21% and 22% of the total notional amounts respectively). Insurance intragroup exposure culminates at EUR 41bn for IRDs, less than 0.01% of the total notional amount.

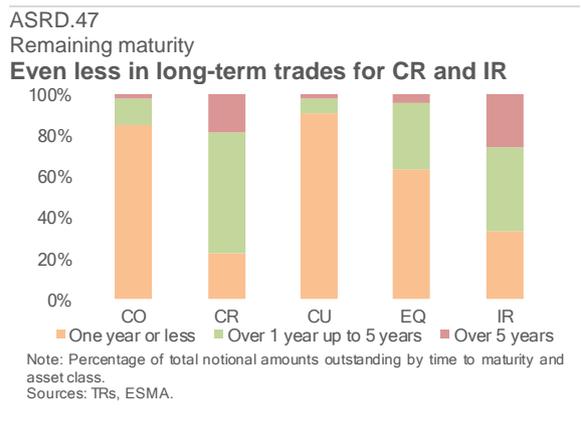


Maturities: slightly less notional amount proportion in short-term maturities than non-intragroup

The proportion of notional amount where the **initial maturity of the contract** is less than 1-year is slightly smaller for intragroup transactions than for non-intragroup ones, across all asset classes (ASRD.46). For currency derivatives the proportion of notional amount of products with maturity of one year or less stands at 79% (versus 86% for non-intragroup transactions, for commodities it is 67% (versus 79%), for equities it is 52% (versus 65%), and for IRDs it is 22% (versus 32%).



The picture also looks similar for average time remaining to maturity, as of 4Q18 (ASRD.47), although with shorter maturities given that time has passed since origination.



Average trade-size: lower for intragroup, except for currency derivatives

Average trade-sizes are slightly lower for intragroup trades than non-intragroup

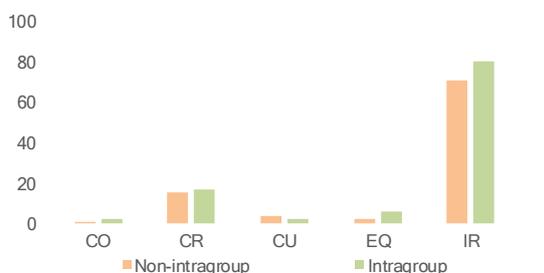
⁵¹ Use of derivatives by UCITS equity funds, ESMA, TRV 2 2019.

transactions (ASRD.48) for equity (EUR 2.2mn as against EUR 6.1mn for non-intragroup transactions), commodities (EUR 1.1mn as against EUR 2mn), interest rates (EUR 71mn as against EUR 80mn) and credit (EUR 15mn as against EUR 17mn).⁵²

ASRD.48

Average trade notional amount by asset class

Smaller intragroup trade size for all but CUs



Note: Average trade size of intragroup versus non-intragroup trades, in EUR millions.
Sources: TRs, ESMA.

The exception is currency derivatives, where the average intragroup transaction size is a larger (EUR 3.9mn versus EUR 2.4mn for non-intragroup transactions). This could be explained by the fact that currency derivatives are mostly OTC non-cleared derivatives where the post-trade bundling of different trades into positions is much less common than for other asset classes.

Type of trading: as for the overall market dominance of OTC except for equity

In terms of split by type of **execution venue** (ASRD.49), 53% of the equity intragroup notional amount is ETD (against 60% for non-intragroup transactions). This is in clear contrast to other asset classes, which are predominantly or almost entirely OTC by notional amount. Proportions in ETDs are 17%, 10% and 9% for commodities, credit and interest rate derivatives respectively (against 69%, 2% and 9%, respectively for non-intragroup transactions). Only 0.4% of currency derivatives are ETDs. Except for credit derivatives, the proportion of ETDs is thus smaller or similar for intragroup transactions than for non-intragroup transactions.

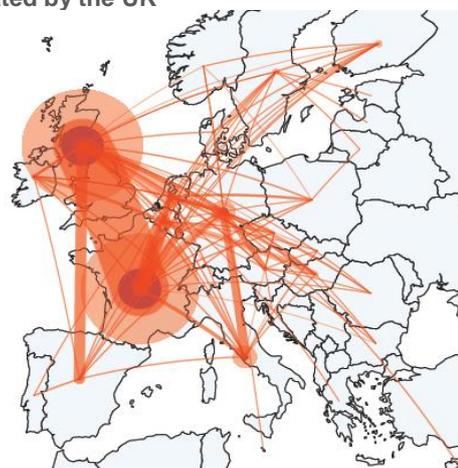
ETD numbers for intragroup transactions may, however, be an underestimate given that counterparties to an ETD transaction are not expected to report whether or not it is an intragroup transaction.

Geographical exposures: mainly between the United Kingdom and the United States

Cross-border exposures of groups are important indicators of firms' structuring their derivative businesses to adjust to and exploit market, regulatory and legal differences between states. In addition, given the important role of the United Kingdom in derivatives markets, it also sheds light on the extent to the United Kingdom is used to channel business between the EEA and third countries and within the EEA, as for non-intragroup transactions.

ASRD.49

EEA intragroup transactions: geographical network
Dominated by the UK



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States. The orange bubbles represent intra-country transactions.
Sources: TRs, GLEIF, ESMA.

Focusing on intra-EEA transactions, it is immediately clear that a significant proportion of the intragroup transactions involves United Kingdom counterparties. Most firms that have cross-EEA exposures within their groups have an entity in the United Kingdom as a counterparty. The United Kingdom also has the largest intragroup exposures by notional amount (ASRD.50).

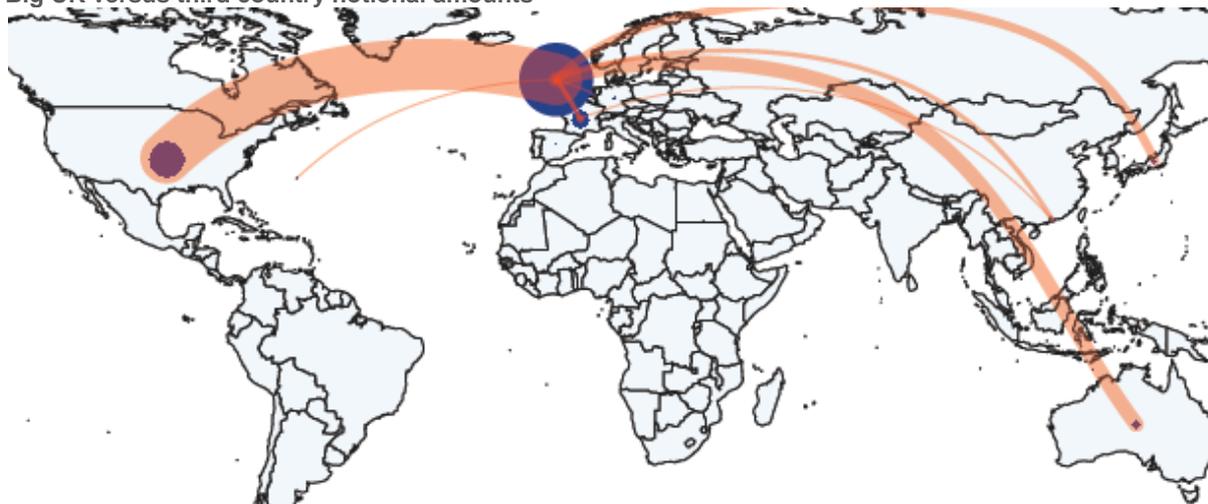
Zooming out to include intragroup exposures with counterparties outside the EEA (ASRD.51), we can see that intragroup transactions between UK and third-country counterparties are substantial. A pattern emerges of big third-country groups, with headquarters located for example in the United States, trading with their United Kingdom subsidiaries in order to access the EU market.

⁵² Note that as transactions can include positions which combine multiple trades, the metric of average size here is more informative about the relative size of trades

between asset classes, than about the average amount per trade.

ASRD.50

Overall intragroup transactions: geographical network
Big UK versus third country notional amounts



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.

Sources: TRs, GLEIF, ESMA.

Intragroup transactions and the clearing obligation

Intragroup transactions between EU counterparties are exempt from mandatory clearing. Intragroup transactions with a counterparty established in a third country are only temporarily exempted from the clearing obligation until 21 December 2020, if no equivalence decision has been adopted in the meantime with the third country of establishment.

In this context, it is important to monitor various characteristics of these intragroup trades that are subject to an exemption from the clearing obligation. Trade sizes, and the extent to which they are between EU and third country counterparties as well as between EU-27 and UK counterparties, are of particular importance to assess the impact of the exemption regime.

Three categories of derivative products are subject to OTC mandatory clearing in the EU:

- 1) basis, fixed-to-float and overnight indexed interest rate swaps as well as FRAs denominated in the G4 currencies (EUR, GBP, USD or JPY), all of which were the first classes of instrument to be subject to mandatory clearing, and which came into effect in 2016;
- 2) index credit default swaps, which followed in 2017;
- 3) FRA and fixed-to-float swaps in NOK, PLN and SEK, which also came into effect in 2017.

A first interesting finding is that, whereas for the credit derivatives virtually no central clearing occurs, around 8% of the intragroup notional amount for the two interest rate subclasses are cleared, despite the intragroup exemption.

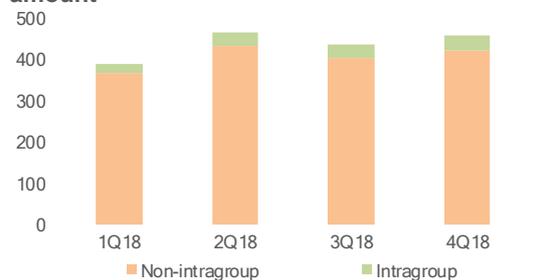
IRDs denominated in G4 currencies: intragroup transactions increase in 2018

For interest rate derivatives denominated in one of the G4 currencies (EUR, USD, GBP, JPY), intragroup notional amount volumes increased from EUR 20tn (6% of total notional amount) in 1Q18 to EUR 34tn (9%) in 4Q18 (ASRD.52).

ASRD.51

IRD G4 total notional amounts outstanding

Large relative increase in intragroup notional amount



Note: Total notional amounts outstanding in IRDs denominated in NOK, PLN or SEK, in EUR trillions.

Sources: TRs, ESMA.

In terms of number of trades outstanding, there were about 290,000 intragroup transactions for these products in 1Q18, which had increased to 330,000 by 4Q18.

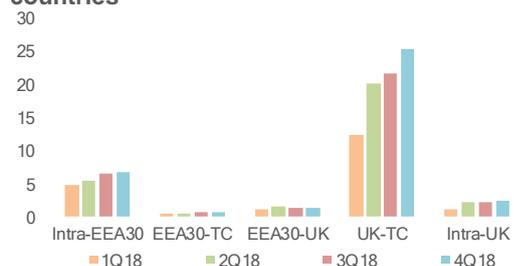
As discussed above for derivatives in general, the average size of an intragroup transactions is

smaller for IRDs, unlike other assets (ASRD.48). This holds also for the average size of an intragroup trade in IRDs subject to the clearing obligation — here intragroup trades are also smaller than the non-intragroup ones. One possible explanation is that non-intragroup transactions in IRDs subject to the clearing obligation are bundled and reported as part of bigger positions, unlike intragroup trades that are not subject to the clearing obligation. The same pattern is also present for the other two classes of instruments subject to clearing obligation.

Looking now at the geographical distribution of intragroup transactions for **interest rate derivatives denominated in G4 currencies**, we see that most of the notional amount is in exposures between UK and non-EEA counterparties. The notional amount (ASRD.53) also increased over the year, almost doubling between 1Q18 and 4Q18.

ASRD.52
Intragroup IRD G4: total notional amount by counterparty location

Mainly between United Kingdom and third-countries

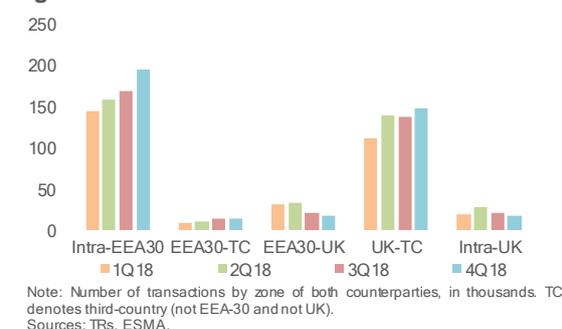


Note: Notional amounts outstanding by zone of both counterparties, in EUR trillions. TC denotes third-country (not EEA-30 and not UK). Sources: TRs, ESMA.

Nevertheless, looking at the number of transactions (ASRD.54), intra-EEA-30⁵³ trades

are relatively more important than in terms of notional amounts making intra EEA trades bigger on average than the others. The increasing trend seen in the notional amounts is also absent as the number of outstanding transactions is decreasing over the year.

ASRD.53
Intragroup IRD G4 – trades by counterparty location
Higher number of trades within the EEA

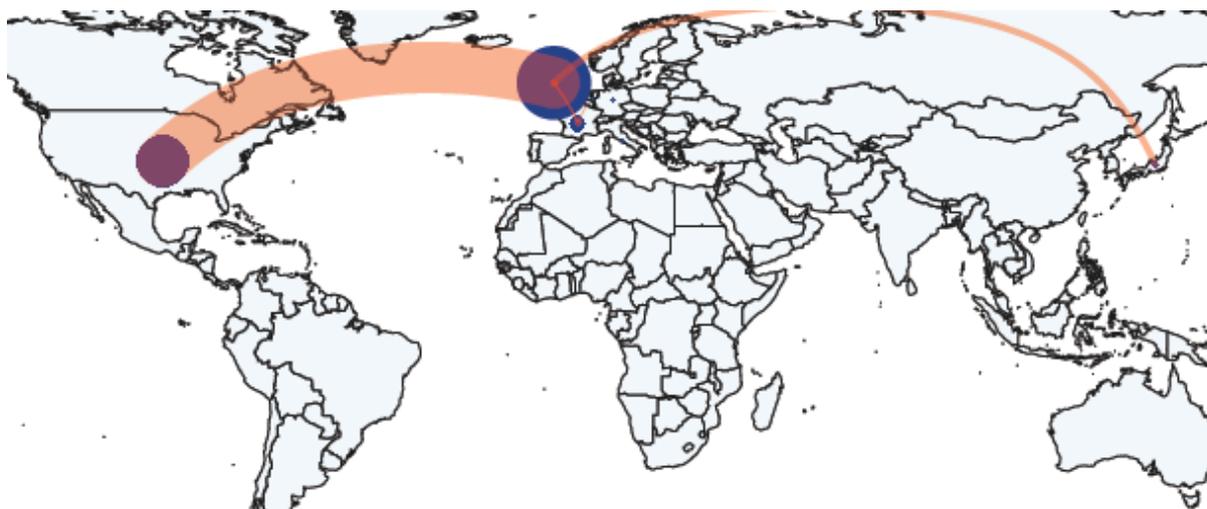


Note: Number of transactions by zone of both counterparties, in thousands. TC denotes third-country (not EEA-30 and not UK). Sources: TRs, ESMA.

The extent of the UK-to-third-country exposures is even clearer in the map below (ASRD.55) which shows cross-country intragroup notional amount aggregates globally. The bulk of the EU market for IRDs in the four big currencies occur between the United Kingdom and third countries, especially Japan and the United States. Big international groups here are accessing the EU market through their United Kingdom subsidiaries.

⁵³ EEA-30 refers to EEA states excluding the United Kingdom as of 4Q18.

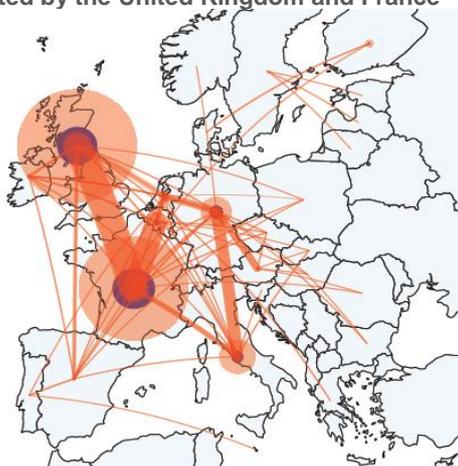
ASRD.54
IRS G4 intragroup notional amount outstanding
Intra-EEA and UK-US exposures dominate



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.
Sources: TRs, ESMA, GLEIF.

Looking more closely at intra-EEA exposures the picture is similar to the full IRD market, with the main exposures between the United Kingdom and a few continental European countries, particularly France (ASRD.56).

ASRD.55
EEA intragroup transactions: geographical network – IRDs in G4
Dominated by the United Kingdom and France



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States. The orange bubbles represent intra-country transactions.
Sources: TRs, GLEIF, ESMA.

CDS indices: intragroup transactions mainly between the UK and the US

In this section we turn to **credit default swap indices** subject to the clearing obligation (ITraxx Europe Main and ITraxx Europe-Crossover). For these, the number of transactions and the proportion of intragroup notional amounts

increase in 2018, and substantially in 4Q. However, these trends are unlikely to reflect the market because in 1H18 for a sizeable proportion of credit derivatives, data quality did not permit identification of the underlying instrument. This hampers categorisation of products as subject to the clearing obligation in this time period.

As the data had improved significantly by 4Q18, we focus on 4Q18 here. Looking at ASRD.57 we see that the vast majority of the intragroup notional amount outstanding is in between UK and third country counterparties. The very large size of UK-to-third-country exposures relative to other exposures is much more pronounced than for IRDs in G4 currencies.

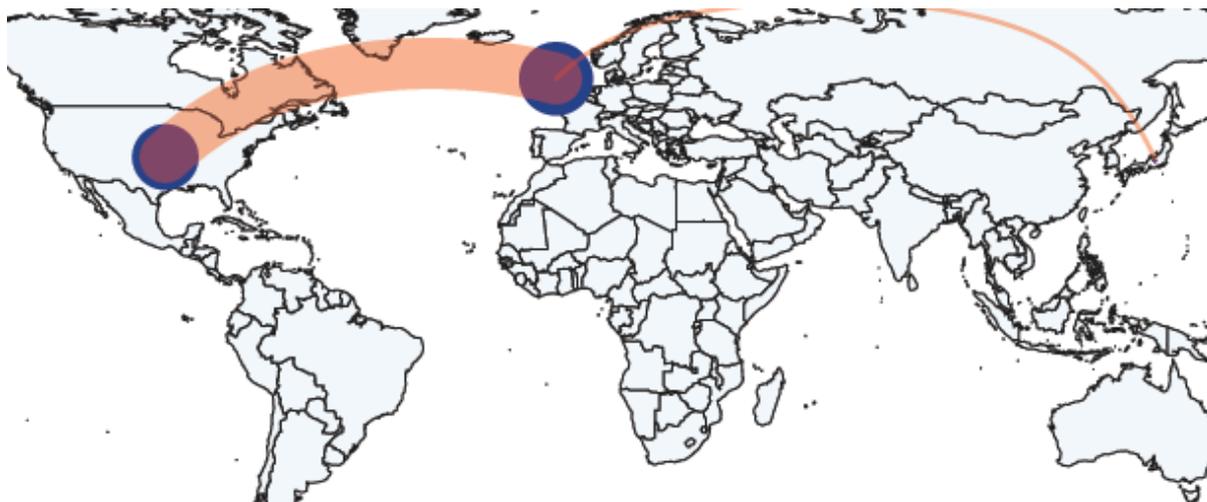
ASRD.56
Intragroup CDS ITraxx – total notional amount by counterparty location
Mainly between the United Kingdom and third-countries in 4Q



Note: Total notional amounts outstanding by zone of both counterparties, in EUR millions. Logarithmic scale. TC refers to third-country (non-EEA-30 and non-UK).
Sources: TRs, ESMA.

In addition, the vast majority of UK to third-country intragroup transactions are between UK and US counterparties, with some between UK and Japanese counterparties (ASRD.58).

ASRD.57
 Intragroup CDS ITraxx total notional amount per zone
Mainly between the United Kingdom and the United States

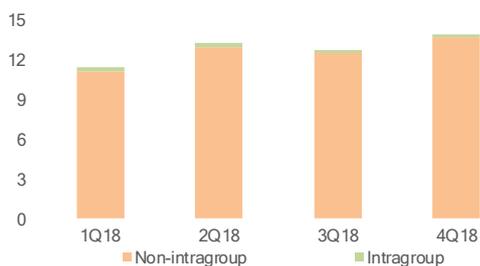


Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.
 Sources: TRs, ESMA, GLEIF.

IRDs denominated in NOK, PLN and SEK: mostly intra-EEA transactions

For the last class of instruments for which mandatory clearing has been implemented – **interest rate derivatives in NOK, PLN and SEK** – volumes of intragroup transactions oscillated between EUR 365bn in 1Q18 and EUR431bn in 4Q18, which equate to between 3% and 4% of the total notional amount for this category (ASRD.59).

ASRD.58
 IRD in NOK, PLN and SEK total notional amount outstanding
Intragroup transactions account for around 3% of total

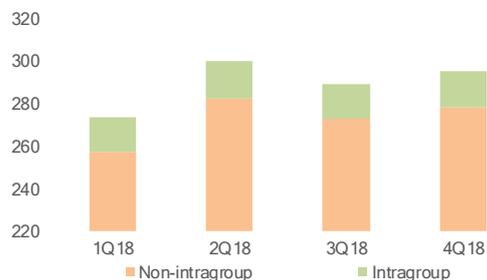


Note: Total notional amounts outstanding in IRDs denominated in NOK, PLN or SEK, in EUR trillions.
 Sources: TRs, ESMA.

Moreover, in terms of number of trades (ASRD.60), intragroup trades in IRDs in these currencies accounted for about 6% of the total number of trades in this category throughout 2018. Therefore, for IRDs denominated in NOK, PLN and SEK, intragroup trades are on average smaller than non-intragroup ones. This is consistent with the observation for G4 IRDs and,

as discussed there, potentially linked to the exemption from the clearing obligation and smaller transaction sizes for non-cleared trades.

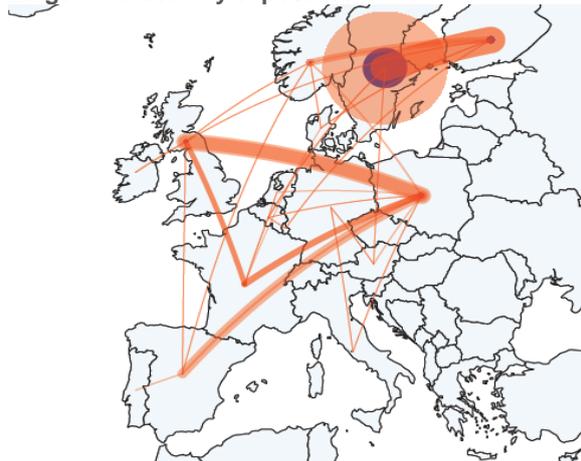
ASRD.59
 IRD in NOK, PLN and SEK number of open transactions
Intragroup transactions account for around 6% of transactions



Note: Transactions in IRDs denominated in NOK, PLN or SEK, in thousands.
 Sources: TRs, ESMA.

Looking at the geographical distribution of these intragroup trades (ASRD.61 and ASRD.62), we see that, in contrast to G4 IRDs and CDS, the majority of exposures are between EEA-30 counterparties. This is as one might expect, given that business in these currencies is more tied to domestic considerations.

ASRD.60
 IRD non-G4 total notional amount per country
Large intra-country exposures

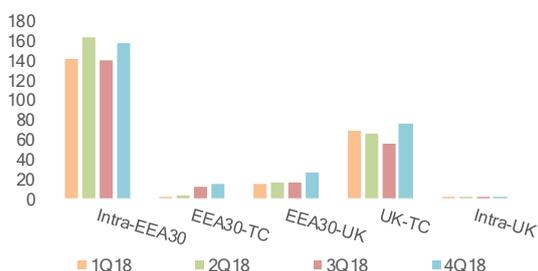


Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.
 Sources: TRs, ESMA, GLEIF.

The relatively low presence of big non-EU groups in this class could be an additional explanation for the smaller average trade size for this category.

ASRD.61
 Interest rate swap NOK, PLN and SEK total notional amount per zone

Majority of intra-EEA exposures



Note: Total notional amounts outstanding by zone of both counterparties, in EUR billions. TC denotes third-country (non-EEA30 and not UK).
 Sources: TRs, ESMA.

It is also worth noting that some of the biggest bilateral exposures are between counterparties in

the same country and perfectly off-set each other, which suggests intra-group hedging activities.

Conclusion

This article gives a picture of intragroup derivative usage by EU counterparties. Overall, the largest proportion of intragroup trading occurs on equity, commodity and currency markets. Some specific instruments also stand out, such as equity options, currency CFDs and commodity swaps. In term of types of counterparties, non-financials are particularly active in this category. This is explained by the fact that non-financial counterparties can access some financial markets for hedging only through financial entities that are part of the same group. Another clear pattern emerges when looking at the geographical distribution of counterparties. Big international groups appear to access the EU market through United Kingdom subsidiaries. Most countries in the EU are exposed firstly to the United Kingdom, with worldwide exposures dominated by exposures between the United Kingdom and third countries such as Japan or the United States. This phenomenon is also visible for asset classes subject to mandatory clearing. The exception are intragroup transactions in IRD non-G4 products (NOK, PLN, SEK), for which we observe mostly intra-country exposures in these Member States.

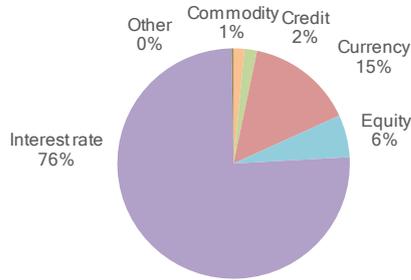
Derivatives statistics

Market structure

EU derivatives market

ASRD-S.1

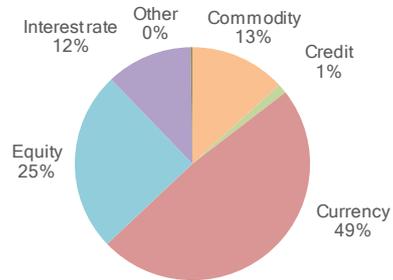
Total notional amount by asset class



Note: Percentages of total notional amount outstanding by asset class. Sources: TRs, ESMA.

ASRD-S.2

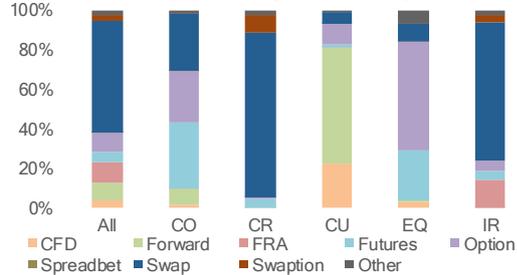
Number of derivative contracts by asset class



Note: Percentages of outstanding derivative contracts by asset class. Sources: TRs, ESMA.

ASRD-S.3

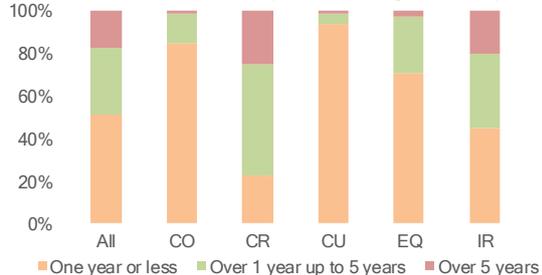
Total notional amount by contract type



Note: Proportions of total notional amount outstanding by contract type and asset class, in %. Sources: TRs, ESMA.

ASRD-S.4

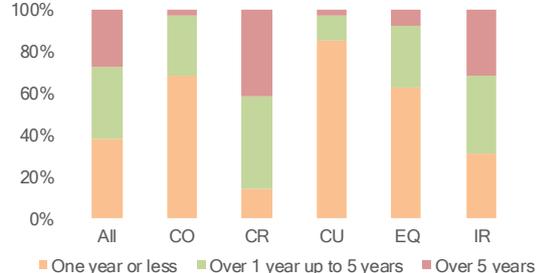
Total notional amount by remaining maturity



Note: Proportions of total notional amount outstanding by remaining maturity of the contract and by asset class, in %. Sources: TRs, ESMA.

ASRD-S.5

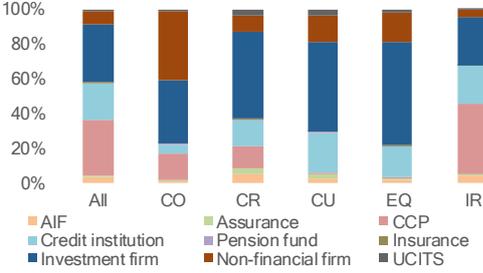
Total notional amount by maturity at execution



Note: Proportions of total notional amount outstanding by maturity at execution of the contract and asset class, in %. Sources: TRs, ESMA.

ASRD-S.6

Total notional amount by sector of counterparty



Note: Proportions of total notional amount outstanding (not reconciled) by counterparty and asset class, in %. Sources: TRs, ESMA.

ASRD-S.7

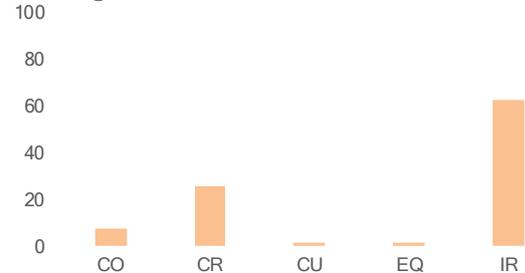
Total notional amount by type of execution



Note: Percentages of total notional amount outstanding by ETD and OTC by asset class. Sources: TRs, ESMA.

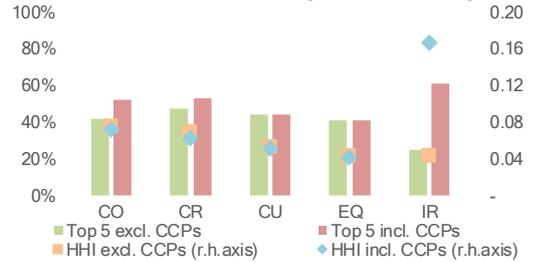
ASRD-S.8

Clearing rates



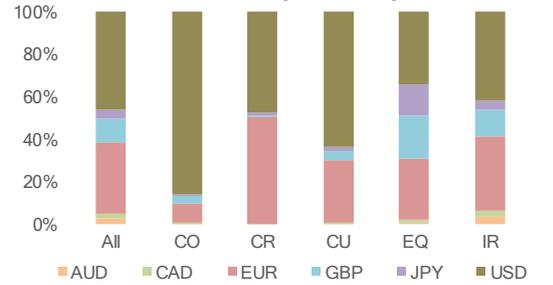
Note: Proportions of OTC notional amount outstanding cleared by asset class, in %. Sources: TRs, ESMA.

ASRD-S.9
Concentration: HHI and top-five counterparties



Note: HHI and notional amount share in % of top-five counterparties calculated on aggregated notional positions of counterparties. HHI normalised between 0 and 1.
 Sources: TRs, ESMA.

ASRD-S.10
Total notional amount by currency



Note: Proportions of total notional amount outstanding by currency and asset class, in %.
 Sources: TRs, ESMA.

ASRD-S.11
Interest rate derivatives: Intra-EEA network



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.
 Sources: TRs, GLEIF, ESMA.

ASRD-S.12
Credit derivatives: Intra-EEA network



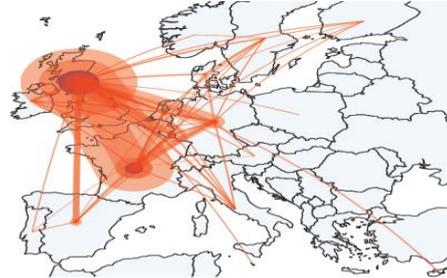
Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.
 Sources: TRs, GLEIF, ESMA.

ASRD-S.13
Currency derivatives: Intra-EEA network



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.
 Sources: TRs, GLEIF, ESMA.

ASRD-S.14
Equity derivatives: Intra-EEA network



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.
 Sources: TRs, GLEIF, ESMA.

ASRD-S.15
Commodity derivatives: Intra-EEA network



Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.
 Sources: TRs, GLEIF, ESMA.

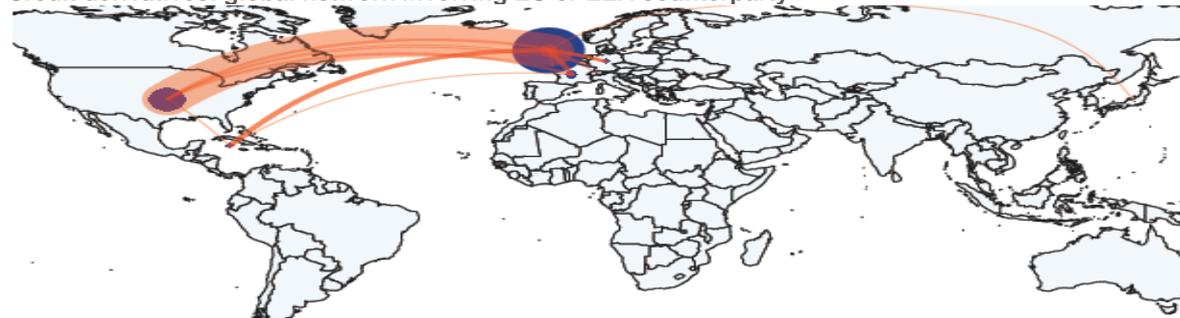
ASRD-S.16

Interest rate derivatives: global network involving EU or EEA counterparty

Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.

Sources: TRs, GLEIF, ESMA.

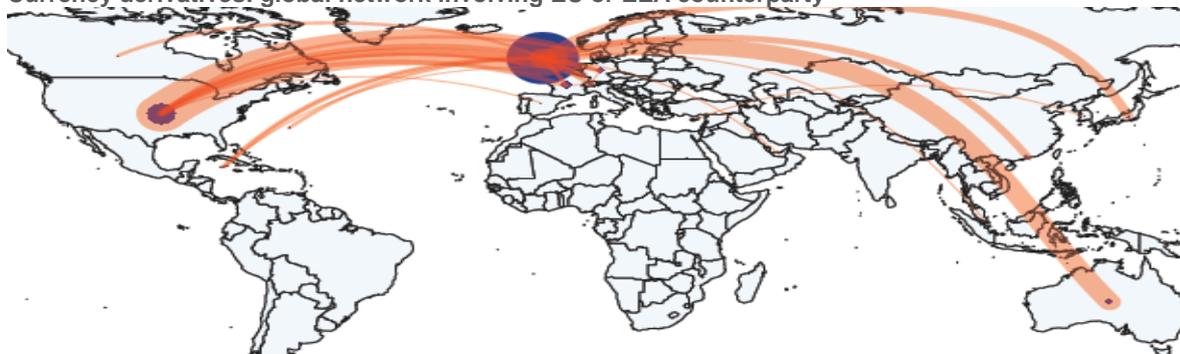
ASRD-S.17

Credit derivatives: global network involving EU or EEA counterparty

Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.

Sources: TRs, GLEIF, ESMA.

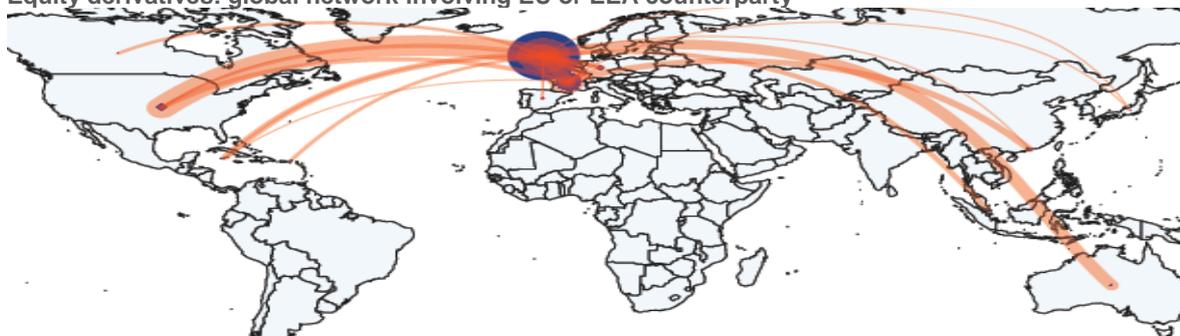
ASRD-S.18

Currency derivatives: global network involving EU or EEA counterparty

Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.

Sources: TRs, GLEIF, ESMA.

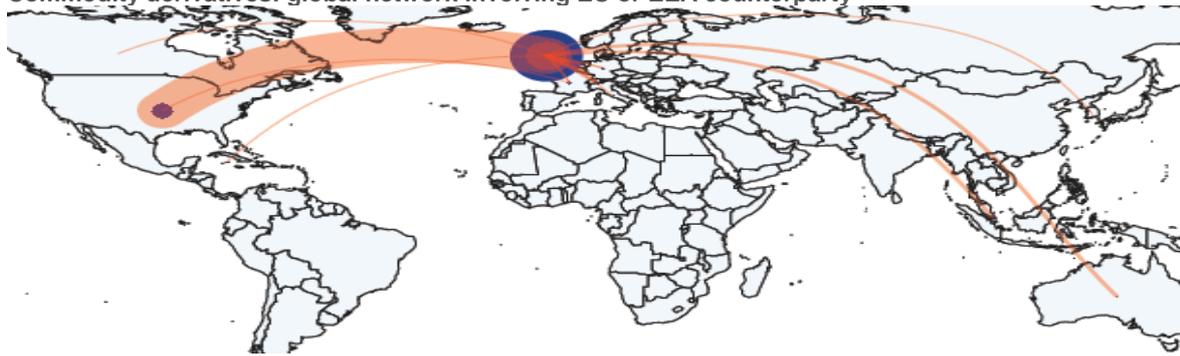
ASRD-S.19

Equity derivatives: global network involving EU or EEA counterparty

Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.

Sources: TRs, GLEIF, ESMA.

ASRD-S.20

Commodity derivatives: global network involving EU or EEA counterparty

Note: Undirected network of total notional amount outstanding. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the Member State. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two Member States.

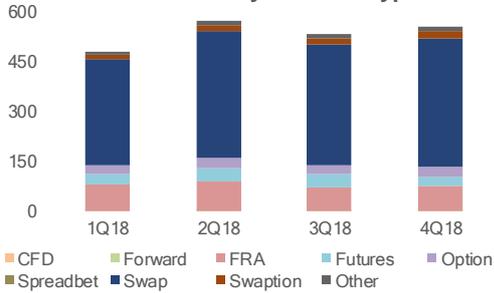
Sources: TRs, GLEIF, ESMA.

Market trends

Interest rate derivatives market

ASRD-S.21

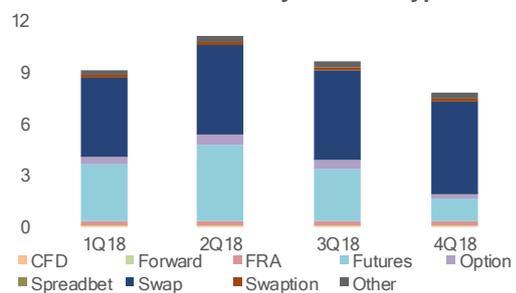
Total notional amount by contract type



Note: Total notional amount outstanding by contract type, in EUR trillions.
Sources: TRs, ESMA.

ASRD-S.22

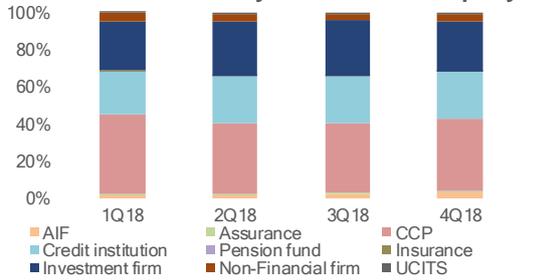
Number of transactions by contract type



Note: Number of transactions by contract type, in millions.
Sources: TRs, ESMA.

ASRD-S.23

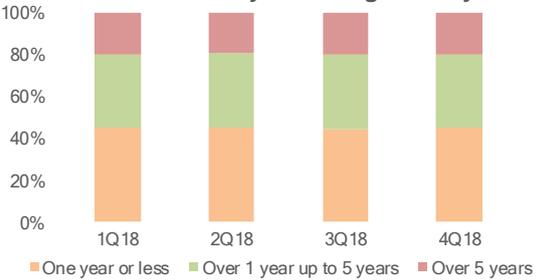
Total notional amount by sector of counterparty



Note: Proportions of total notional amount outstanding (not reconciled) by counterparty, in %.
Sources: TRs, ESMA.

ASRD-S.24

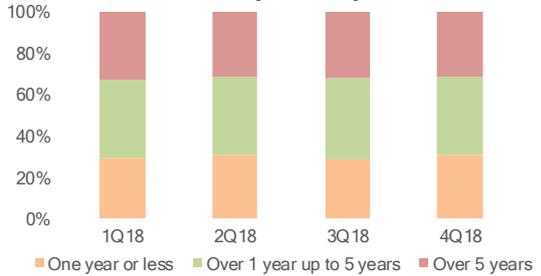
Total notional amount by remaining maturity



Note: Proportions of total notional amount outstanding by remaining maturity of the contract, in %.
Sources: TRs, ESMA.

ASRD-S.25

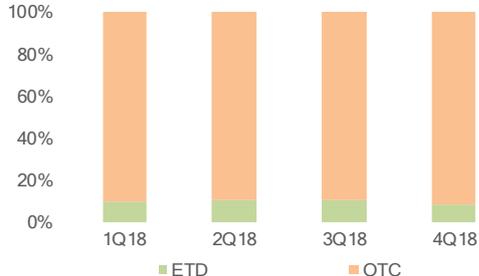
Total notional amount by maturity at execution



Note: Proportions of total notional amount outstanding by maturity at execution of the contract, in %.
Sources: TRs, ESMA.

ASRD-S.26

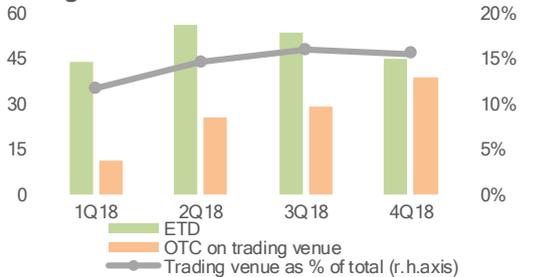
ETD versus OTC



Note: Proportions of total notional amount outstanding, in %.
Sources: TRs, ISO, ESMA.

ASRD-S.27

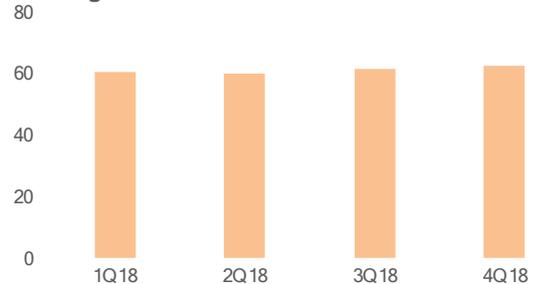
Trading venue notional amounts OTC and ETDs



Note: Notional outstanding ETD and OTC on trading venue in EUR trillions, and trading venue notional amount as a proportion of total outstanding notional amount in % (r.h. axis).
Sources: TRs, ISO, ESMA.

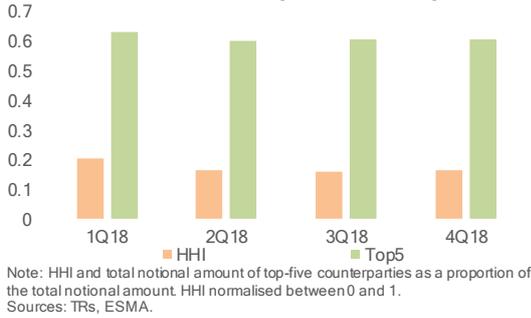
ASRD-S.28

Clearing rates

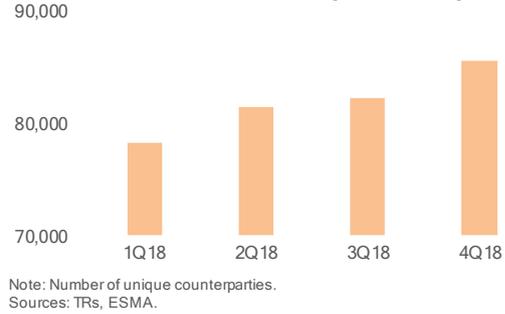


Note: Percentages of OTC notional amount outstanding centrally cleared.
Sources: TRs, ESMA.

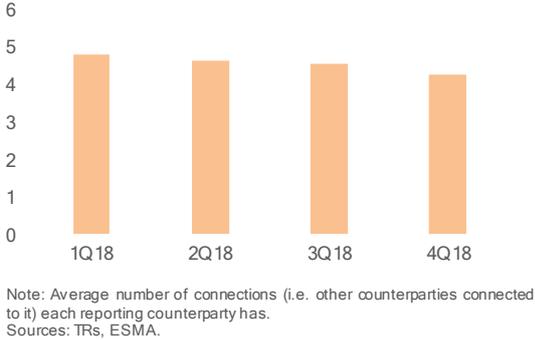
ASRD-S.29
Concentration: HHI and top-five counterparties



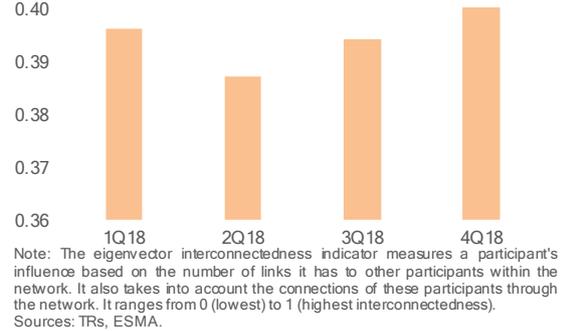
ASRD-S.30
Concentration: Number of unique counterparties



ASRD-S.31
Average connections per counterparty

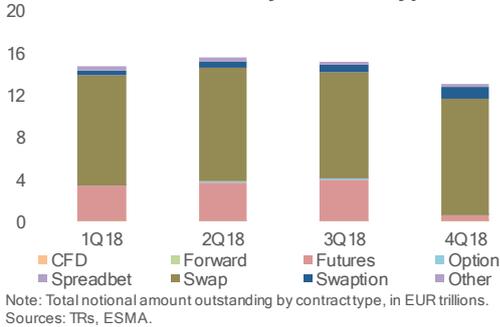


ASRD-S.32
Eigenvector interconnectedness

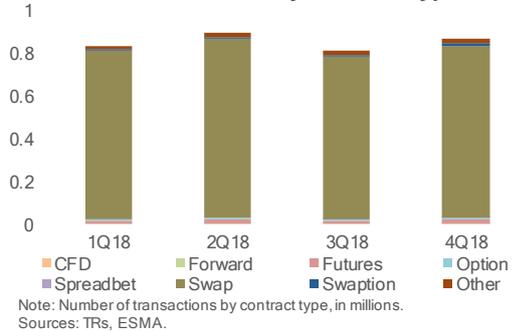


Credit derivatives market

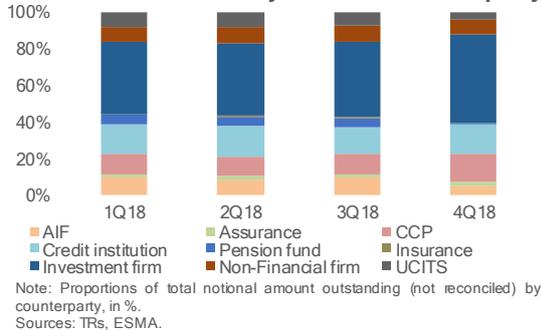
ASRD-S.33
Total notional amount by contract type



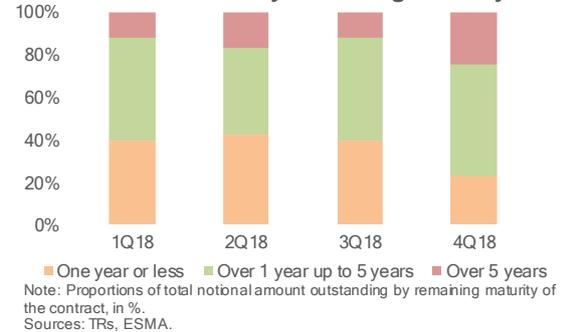
ASRD-S.34
Number of transactions by contract type



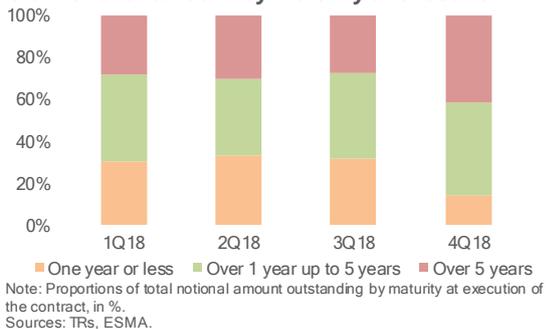
ASRD-S.35
Total notional amount by sector of counterparty



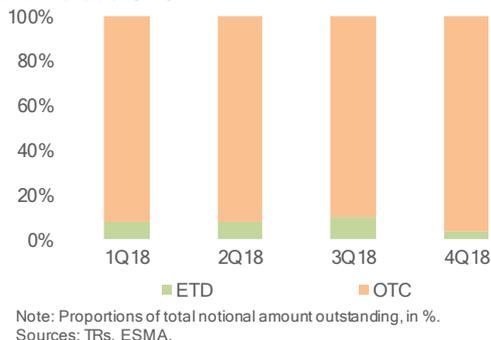
ASRD-S.36
Total notional amount by remaining maturity



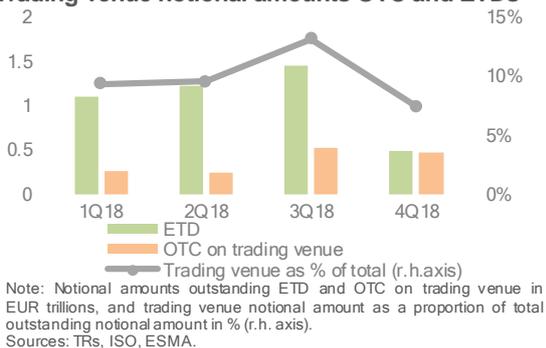
ASRD-S.37
Total notional amount by maturity at execution



ASRD-S.38
ETD versus OTC



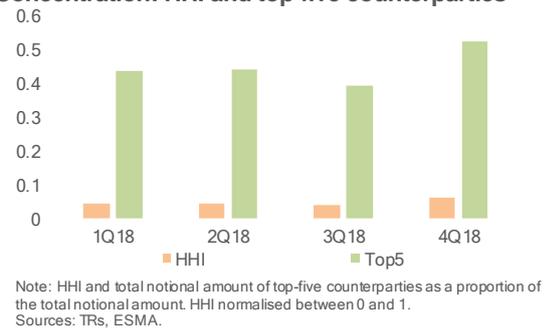
ASRD-S.39
Trading venue notional amounts OTC and ETDs



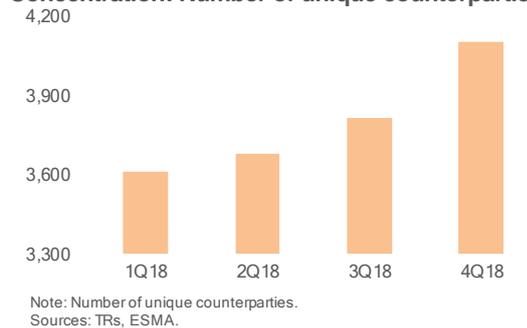
ASRD-S.40
Clearing rates



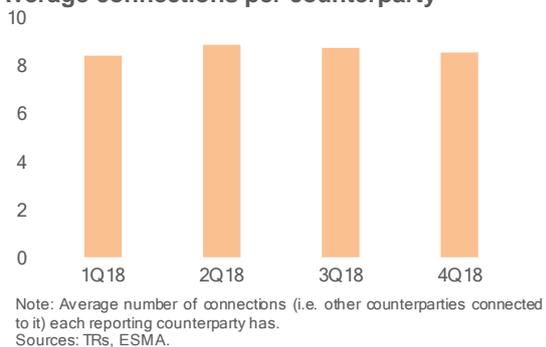
ASRD-S.41
Concentration: HHI and top-five counterparties



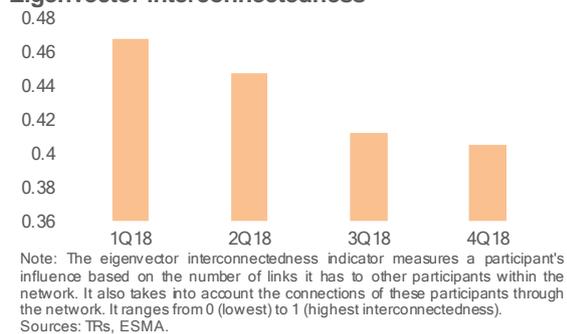
ASRD-S.42
Concentration: Number of unique counterparties



ASRD-S.43
Average connections per counterparty



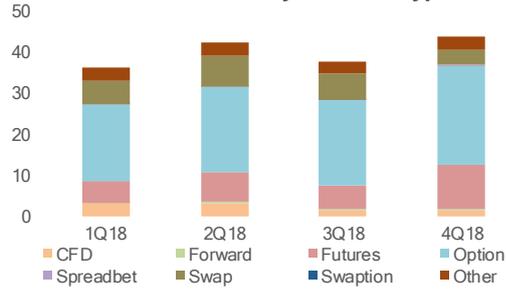
ASRD-S.44
Eigenvector interconnectedness



Equity derivatives market

ASRD-S.45

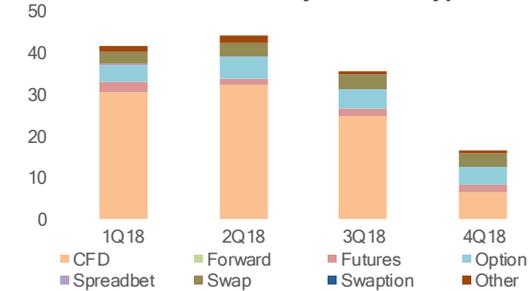
Total notional amount by contract type



Note: Total notional amount outstanding by contract type, in EUR trillions. Sources: TRs, ESMA.

ASRD-S.46

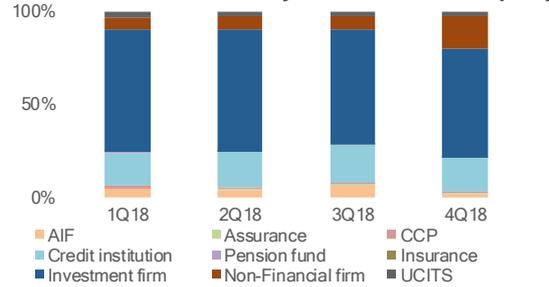
Number of transactions by contract type



Note: Number of transactions by contract type, in millions. Sources: TRs, ESMA.

ASRD-S.47

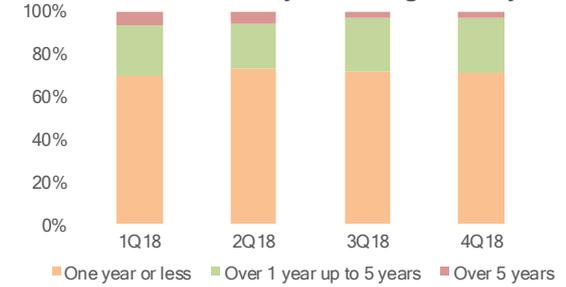
Total notional amount by sector of counterparty



Note: Proportions of total notional amount outstanding (not reconciled) by counterparty, in %. Sources: TRs, ESMA.

ASRD-S.48

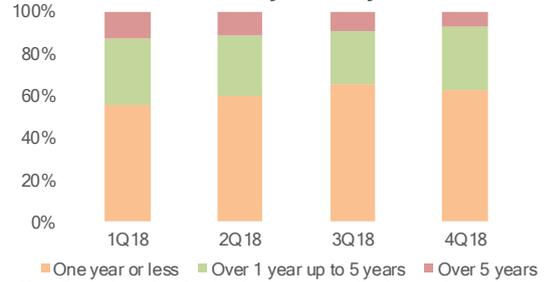
Total notional amount by remaining maturity



Note: Proportions of total notional amount outstanding by remaining maturity of the contract, in %. Sources: TRs, ESMA.

ASRD-S.49

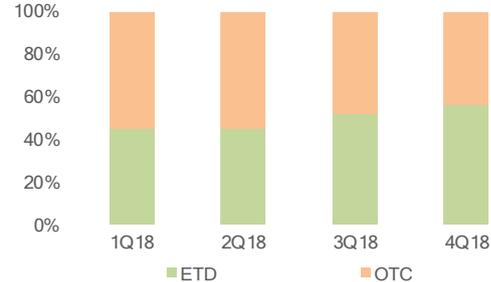
Total notional amount by maturity at execution



Note: Proportions of total notional amount outstanding by maturity at execution of the contract, in %. Sources: TRs, ESMA.

ASRD-S.50

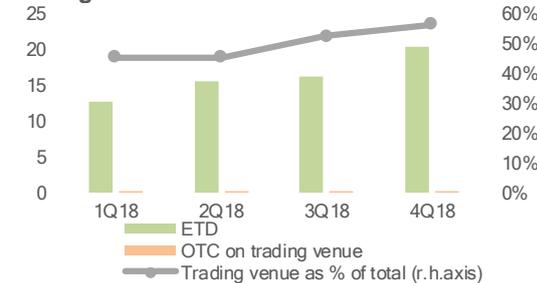
ETD versus OTC



Note: Proportions of total notional amount outstanding, in %. Sources: TRs, ESMA.

ASRD-S.51

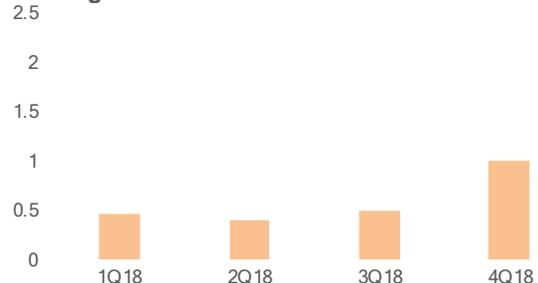
Trading venue notional amounts OTC and ETDs



Note: Notional amounts outstanding ETD and OTC on trading venue in EUR trillions, and trading venue notional as a proportion of total outstanding notional amount in % (r.h. axis). Sources: TRs, ISO, ESMA.

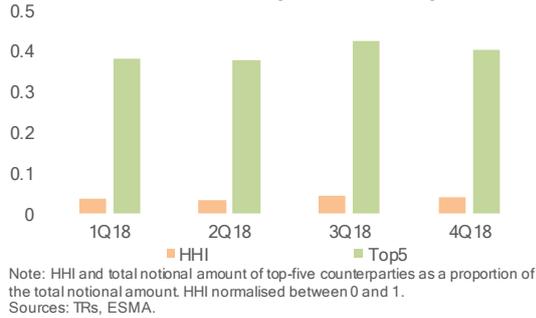
ASRD-S.52

Clearing rates

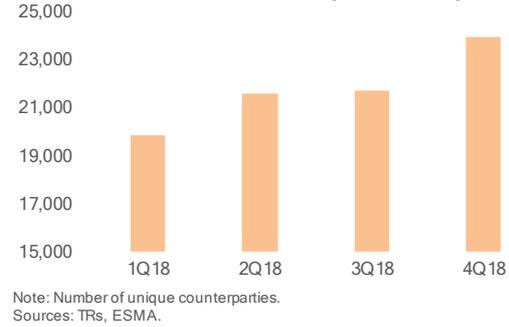


Note: Percentages of OTC notional amount outstanding centrally cleared. Sources: TRs, ESMA.

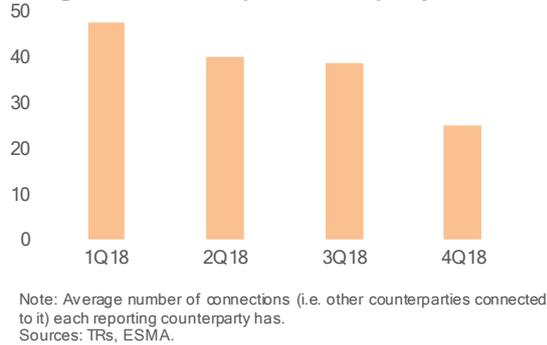
ASRD-S.53
Concentration: HHI and top-five counterparties



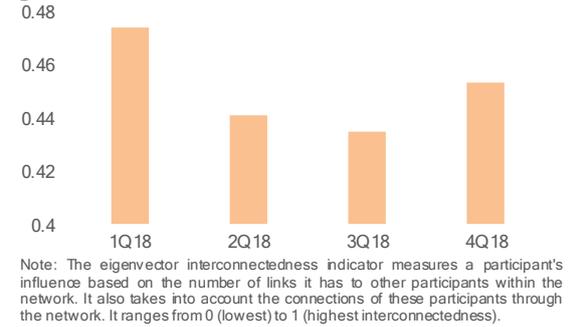
ASRD-S.54
Concentration: Number of unique counterparties



ASRD-S.55
Average connections per counterparty

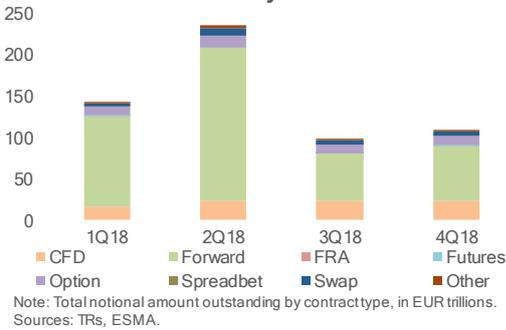


ASRD-S.56
Eigenvector interconnectedness

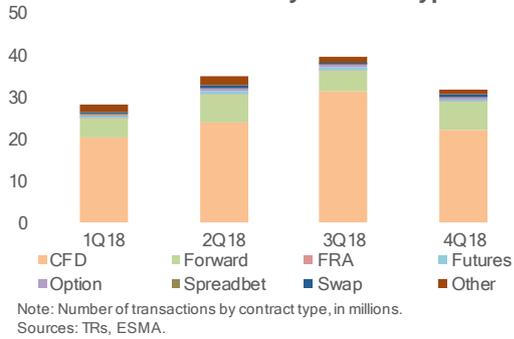


Currency derivatives market

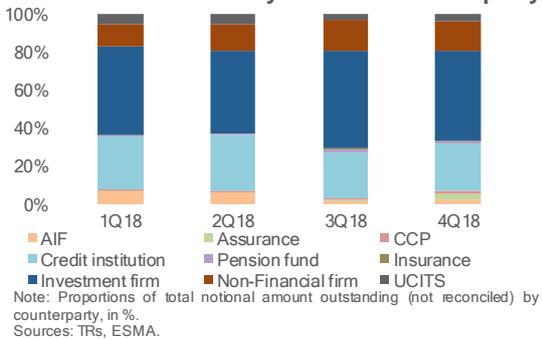
ASRD-S.57
Total notional amount by instrument



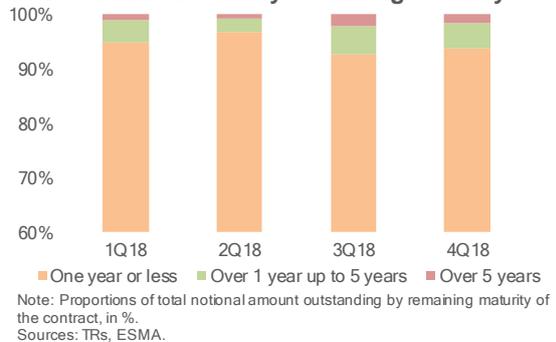
ASRD-S.58
Number of transactions by contract type

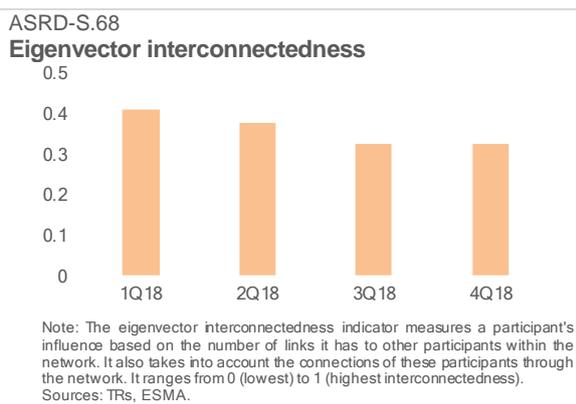
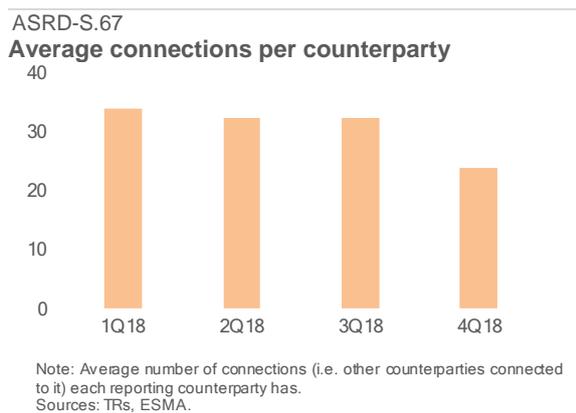
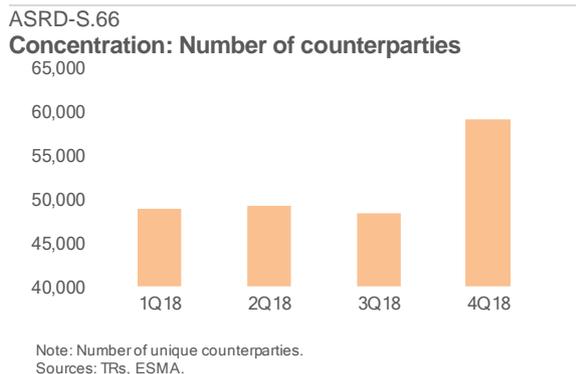
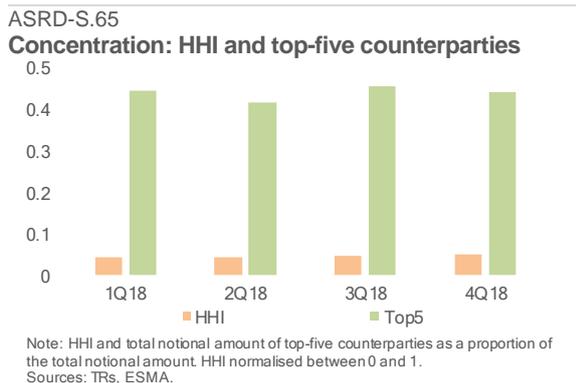
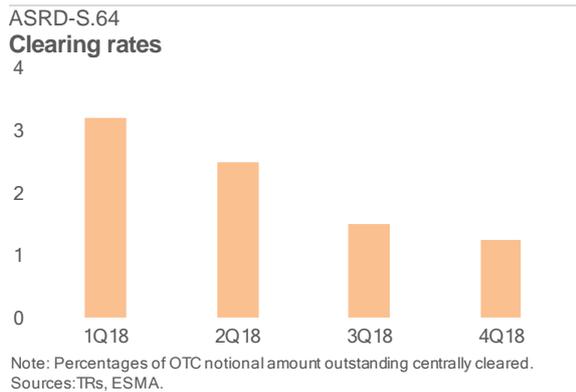
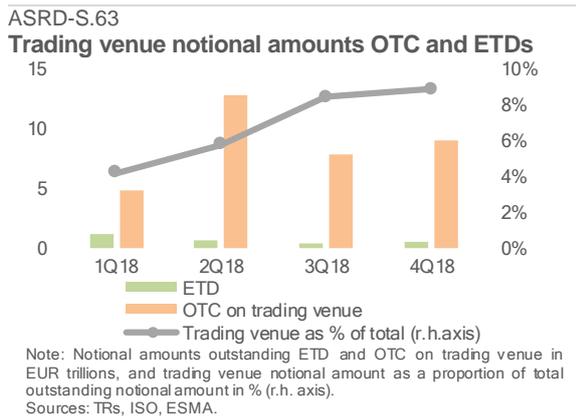
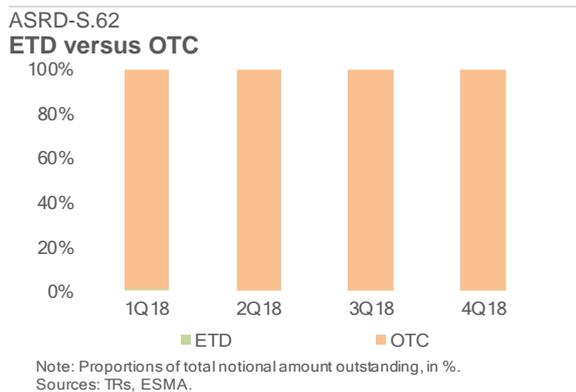
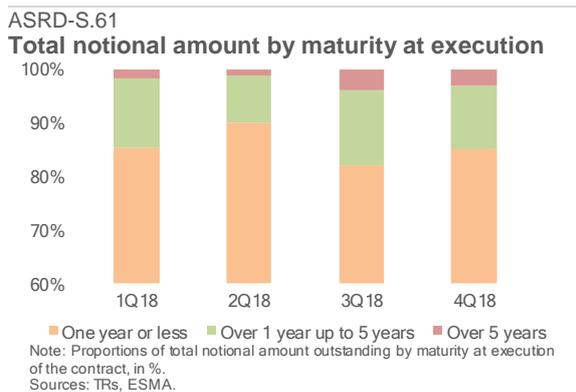


ASRD-S.59
Total notional amount by sector of counterparty



ASRD-S.60
Total notional amount by remaining maturity

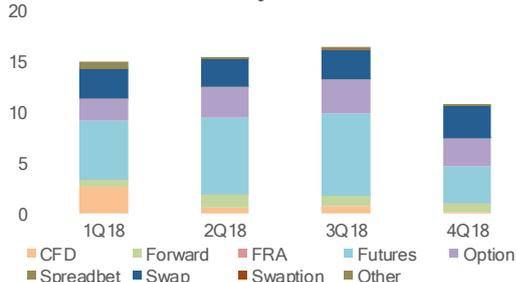




Commodity derivatives market

ASRD-S.69

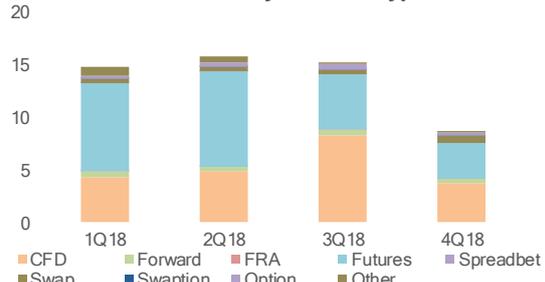
Total notional amount by instrument



Note: Total notional amount outstanding by contract type, in EUR trillions.
Sources: TRs, ESMA.

ASRD-S.70

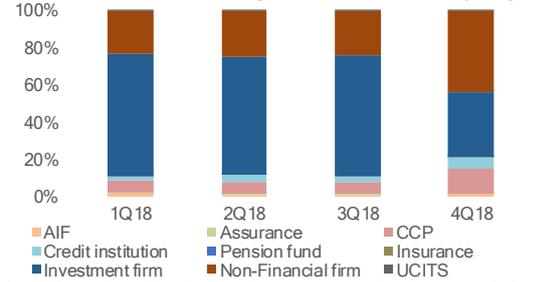
Number of transactions by contract type



Note: Number of transactions by contract type, in millions.
Sources: TRs, ESMA.

ASRD-S.71

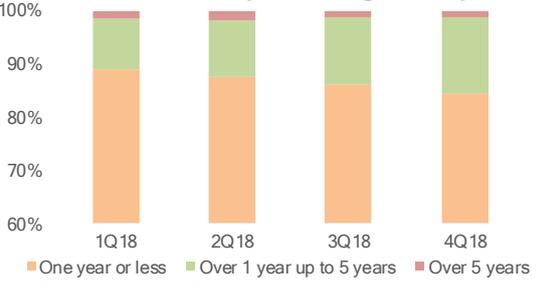
Total notional amount by sector of counterparty



Note: Proportions of total notional amount outstanding (not reconciled) by counterparty, in %.
Sources: TRs, ESMA.

ASRD-S.72

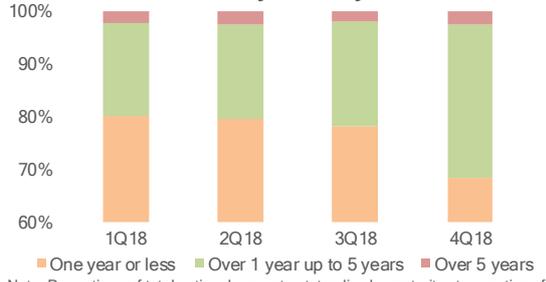
Total notional amount by remaining maturity



Note: Proportions of total notional amount outstanding by remaining maturity of the contract, in %.
Sources: TRs, ESMA.

ASRD-S.73

Total notional amount by maturity at execution



Note: Proportions of total notional amount outstanding by maturity at execution of the contract, in %.
Sources: TRs, ESMA.

ASRD-S.74

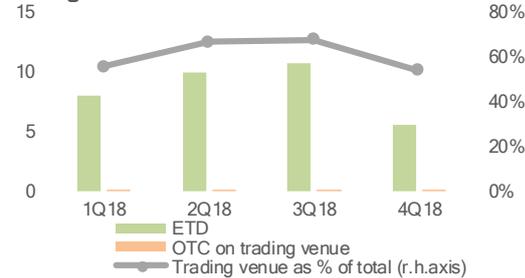
ETD versus OTC



Note: Proportions of total notional amount outstanding, in %.
Sources: TRs, ESMA.

ASRD-S.75

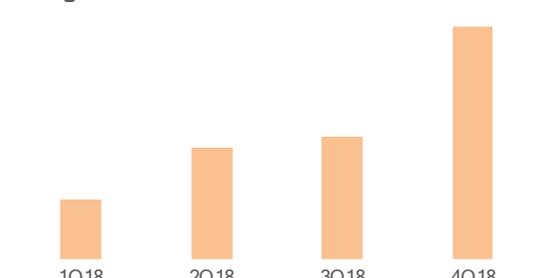
Trading venue notional amounts OTC and ETDs



Note: Notional amounts outstanding ETD and OTC on trading venue in EUR trillions, and trading venue notional amount as a proportion of total outstanding notional amount in % (r.h. axis).
Sources: TRs, ISO, ESMA.

ASRD-S.76

Clearing rates



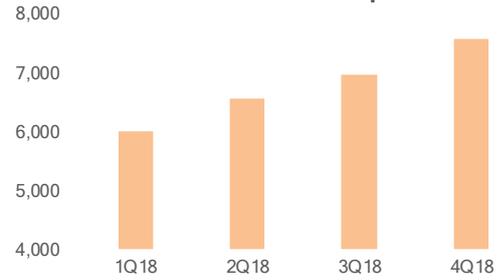
Note: Percentages of OTC notional amount outstanding centrally cleared.
Sources: TRs, ESMA.

ASRD-S.77
Concentration: HHI and top-five counterparties



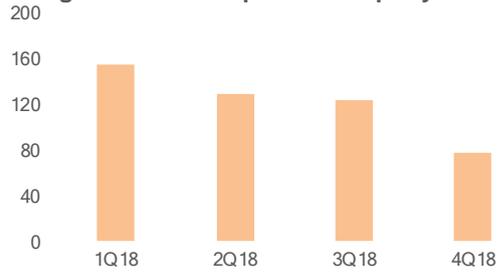
Note: HHI and total notional amount of top-five counterparties as a proportion of the total notional amount. HHI normalised between 0 and 1.
 Sources: TRs, ESMA.

ASRD-S.78
Concentration: Number of counterparties



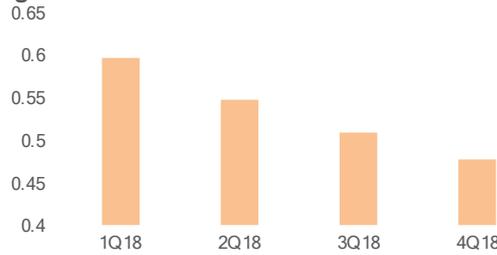
Note: Number of unique counterparties.
 Sources: TRs, ESMA.

ASRD-S.79
Average connections per counterparty



Note: Average number of connections (i.e. other counterparties connected to it) each reporting counterparty has.
 Sources: TRs, ESMA.

ASRD-S.80
Eigenvector interconnectedness



Note: The eigenvector interconnectedness indicator measures a participant's influence based on the number of links it has to other participants within the network. It also takes into account the connections of these participants through the network. It ranges from 0 (lowest) to 1 (highest interconnectedness).
 Sources: TRs, ESMA.

Annex

Statistical annotations

ASRD-S.10 – ASRD-S.20 Geographical network of derivatives: These maps of the geography of risks show the undirected network of total notional amounts outstanding between country domiciles of counterparties. The size of the bubbles is proportional to the total notional amount outstanding for counterparties domiciled in the country. The thickness of the line is proportional to the total notional amount outstanding between counterparties from the two countries.

ASRD-S.29, ASRD-S.41, ASRD-S.53, ASRD-S.65, ASRD-S.77, Concentration - top five exposure: This graph shows the relative notional amount exposure of the top five counterparties (excluding the central counterparties) compared with the overall market.

ASRD-S.29, ASRD-S.41, ASRD-S.53, ASRD-S.65, ASRD-S.77, Concentration - HHI: These graphs show the development of concentration of open contracts by all counterparties (including central counterparties) using the Herfindahl-Hirschman index (HHI) which is a widely used measure to determine the concentration of a market. A higher HHI is associated with higher concentration, i.e., less competition in a market, and a smaller HHI is associated with a more competitive, i.e., less concentrated, market. The calculation is as follows:

$$HHI = \sum_{i=1}^N (\text{MarketProportion}^2)$$

ASRD-S.28, ASRD-S.40, ASRD-S.52, ASRD-S.64, ASRD-S.76 Clearing rates: We define the clearing rate as the cleared outstanding notional amount divided by the total outstanding notional amount, for contracts with at least one counterparty located in the EEA. The formula to compute clearing rates is:

$$\text{Cleared notional (\%)} = \frac{\frac{CN_{EEA}}{2} + CN_{Non-EEA}}{UN + \left(\frac{CN_{EEA}}{2} + CN_{Non-EEA} \right)}$$

where:

- CN_{EEA} is the notional amount of contracts with one EEA CCP as a counterparty;
- $CN_{non-EEA}$ is the notional amount cleared by a non-EEA CCP;
- UN is the notional amount uncleared.

For a detailed explanation of the formula and its application, see the section “Methodology for clearing rate calculation”, pp.25-31 in the EU Derivatives Annual Statistical Report 2018.

ASRD-S.32, ASRD-S.44, ASRD-S.56, ASRD-S.68, ASRD-S.80 Eigenvector interconnectedness: This is a recursive measure which gives the tendency of participants to be exposed to other central participants.

Glossary

Central counterparty: an entity that interposes itself between the two sides of a transaction, becoming the buyer to every seller and the seller to every buyer.

Clearing: the process of establishing positions, including the calculation of net obligations, and ensuring that financial instruments, cash, or both, are available to secure the exposures arising from those positions.

Clearing member: an undertaking that participates in a CCP and that is responsible for discharging the financial obligations arising from that participation.

Client: an undertaking with a contractual relationship with a clearing member of a CCP that enables that undertaking to clear its transactions with that CCP.

Commodity forward: a contract between two parties to purchase or sell a commodity or commodity index at an agreed price on a future date.

Commodity option: a contract that gives the buyer the right (but not the obligation) to purchase or sell a commodity or commodity index at an agreed price at or by a specified date.

Commodity swap: a contract between two parties to exchange sequences of payments during a specified period, whereby at least one sequence of payments is tied to a commodity price or commodity index.

Counterparty: an entity that takes the opposite side of a financial contract, for example, the borrower in a loan contract, or the buyer in a sales transaction.

Credit default swap: a contract whereby the seller commits to repay an obligation (e.g. bond) underlying the contract at par in the event of a default. To produce this guarantee, a regular premium is paid by the buyer during a specified period.

Credit derivative: a derivative whose redemption value is linked to specified credit-related events, such as bankruptcy, credit downgrade, non-payment or default of a borrower. For example, a lender might use a credit derivative to hedge the risk that a borrower might default. Common credit derivatives include credit default swaps (CDS), total return swaps and credit spread options.

Currency option: a contract that gives the buyer the right (but not the obligation) to purchase or sell a currency at an agreed exchange rate at or by a specified date.

Currency swap: a contract between two parties to exchange sequences of payments during a specified period, whereby each sequence is tied to a different currency. At the end of the swap, principal amounts in the different currencies are usually exchanged.

Derivative: a financial instrument whose value depends on some underlying financial asset, commodity or predefined variable. Derivative, or derivative contract, means a financial instrument as set out in points (4) to (10) of Section C of Annex I to Directive 2004/39/EC, as implemented by Article 38 and 39 of Regulation (EC) No 1287/2006.

Equity forward: a contract between two parties to purchase or sell an equity or equity basket at a set price at a future date.

Equity option: a contract that gives the buyer the right (but not the obligation) to purchase or sell an equity security or basket of equities at an agreed price at or by a specified date.

Equity swap: a contract between two parties to exchange sequences of payments during a specified period, where at least one sequence is tied to an equity price or an equity index.

Exchange rate: the price of one country's currency in relation to another.

Exchange Traded Derivative: A derivative that is traded on a regulated market or on a third-country market considered to be equivalent to a regulated market in accordance with Article 28 of MiFIR (Regulation (EU) No 600/2014 of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Regulation (EU) No 648/2012), and as such does not fall within the definition of an OTC derivative as defined in Article 2(7) of Regulation (EU) No 648/2012, according to Article 2 of MiFIR.

Financial counterparty: an investment firm authorised in accordance with Directive 2004/39/EC; a credit institution authorised in accordance with Directive 2006/48/EC; an insurance undertaking authorised in accordance with Directive 73/239/EEC; an assurance undertaking authorised in accordance with Directive 2002/83/EC; a reinsurance undertaking authorised in accordance with

Directive 2005/68/EC; a UCITS and, where relevant, its management company, authorised in accordance with Directive 2009/65/EC; an institution for occupational retirement provision within the meaning of Article 6(a) of Directive 2003/41/EC; and an alternative investment fund managed by AIFMs authorised or registered in accordance with Directive 2011/61/EU.

First counterparty basis: a methodology whereby positions are allocated to the primary party to a contract.

Insurance: for this report, insurance is the aggregation of an insurance undertaking authorised in accordance with Directive 73/239/EEC; an assurance undertaking authorised in accordance with Directive 2002/83/EC; and a reinsurance undertaking authorised in accordance with Directive 2005/68/EC.

Interconnectedness: interconnectedness is a market-level centralisation measure based on the network-centrality scores of each counterparty in the market, while the market is defined as all derivatives outstanding within an asset class. This is done using the R package *igraph*.⁵⁴ The underlying formula is:

$$\text{Interconnectedness}(\text{market}) = \frac{\sum(\max(c(w), w) - c(v), v)}{\text{maximum theoretical score}}$$

where $c(v)$ is the centrality of counterparty v . The market-level centrality score is then normalized by dividing it by the maximum theoretical score for a theoretical market with the same number of counterparties. It ranges between 0 and 1, 0 being the minimum level of interconnectedness and 1 the maximum. For eigenvector interconnectedness the most centralized structure is the graph with a single edge (and potentially many isolates).

Interest rate option: a contract that gives the buyer the right (but not the obligation) to pay or receive an agreed interest rate on a predetermined principal at or by a specified date.

Interest rate swap: a contract to exchange periodic payments related to interest rates on a single currency. It can be fixed for floating, or floating for floating based on different indices. This group includes those swaps whose notional amount principal is amortised according to a fixed schedule independent of interest rates.

Notional amount outstanding: total nominal or notional amount value of all derivatives contracts concluded and not yet settled on the reporting date.

Over the counter: an 'OTC derivative' or 'OTC derivative contract' means a derivative contract the execution of which does not take place on a regulated market as within the meaning of Article 4(1)(14) of Directive 2004/39/EC or on a third-country market considered as equivalent to a regulated market in accordance with Article 19(6) of Directive 2004/39/EC.

Pension funds: for this report, an institution for occupational retirement provision within the meaning of Article 6(a) of Directive 2003/41/EC.

Portfolio compression: portfolio compression is defined in MIFIR as a risk reduction service in which two or more counterparties wholly or partially terminate some or all of the derivatives submitted by those counterparties for inclusion in the portfolio compression and replace the terminated derivatives with another derivative whose combined notional amount value is less than the combined notional amount value of the terminated derivatives.

Remaining maturity: the period from the reference date until the final contractually scheduled payment.

Swap: financial derivative in which two parties agree to exchange payment streams based on a specified notional amount for a specified period.

Trade repository: a legal person that centrally collects and maintains the records of derivatives.

⁵⁴ Csardi G, Nepusz T: The *igraph* software package for complex network research, *InterJournal, Complex Systems* 1695. 2006. <http://igraph.org>

List of abbreviations

AIF	Alternative Investment Fund
BIS	Bank for International Settlements
CCP	Central Counterparty
CDs	Credit Derivatives
CDS	Credit Default Swap
CR	Credit
CFD	Contract for Difference
CM	Clearing Member
CO	Commodity Derivatives
CTPY	Counterparty
CU	Currency Derivatives
EEA	European Economic Area
EMIR	European Markets Infrastructure Regulation
EQ	Equity Derivatives
ETDs	Exchange Traded Derivatives
FC	Financial Counterparty
FRA	Forward Rate Agreement
FSB	Financial Stability Board
HHI	Herfindahl-Hirschman Index
IR	Interest Rate
IRD	Interest Rate Derivatives
IRS	Interest Rate Swaps
ISDA	International Swaps and Derivatives Association
LEI	Legal Entity Identifier
MIC	Market Identifier Code
MiFIR	Markets in financial instruments Regulation
MTF	Multilateral Trading Facility
NCA	National Competent Authority
NFC	Non-Financial Counterparty
OTF	Organised Trading Facility
OTC	Over the Counter
RTS	Regulatory Technical Standard
TR	Trade Repository
UCITS	Undertakings for Collective Investment in Transferable Securities

Countries abbreviated according to ISO standards

Currencies abbreviated according to ISO standards



European Securities and
Markets Authority

