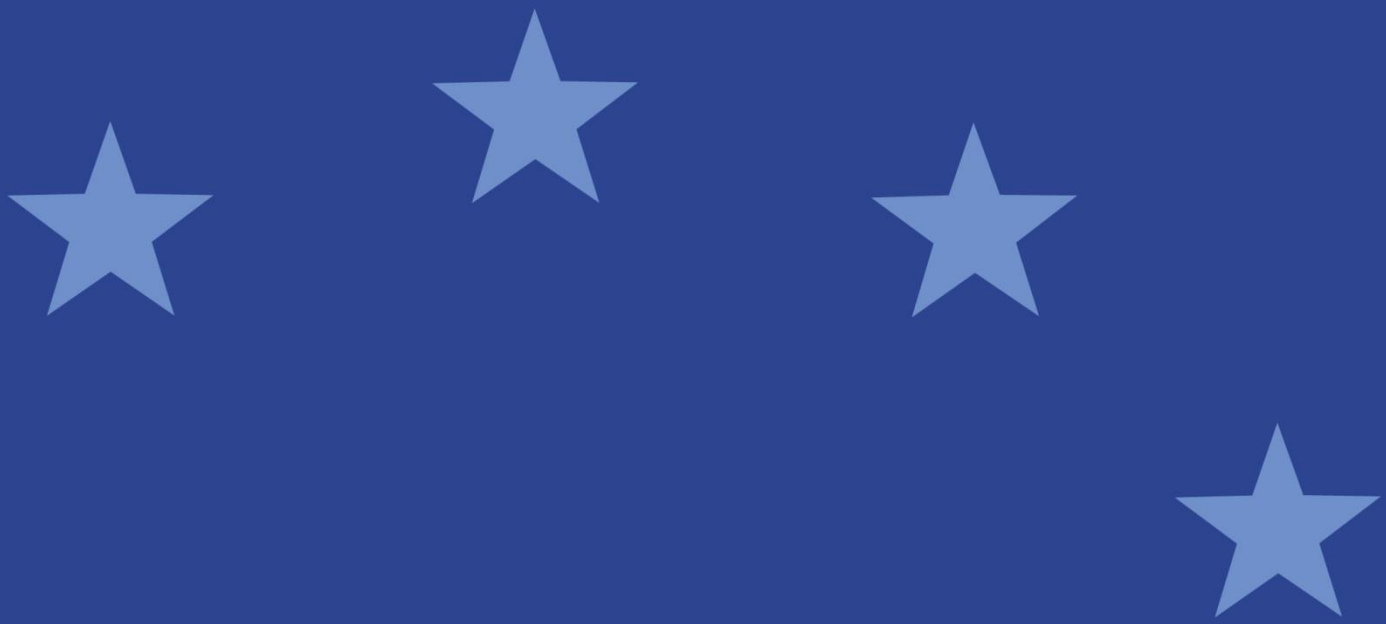
esma European Securities and Markets Authority

TRV

ESMA Report on Trends, Risks and Vulnerabilities

No. 2, 2018



6 September 2018
ESMA 50-165-632

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 The reporting period of this Report is 1 January 2018 to 30 June 2018, unless otherwise indicated. The reporting quarter of the Risk Dashboard in the Risk Section is 2Q18. Legal reference of this Report: Regulation (EU) No 1095/2010 of the European Parliament and of the Council of 24 November 2010 establishing a European Supervisory Authority (European Securities and Markets Authority), amending Decision No 716/2009/EC and repealing Commission Decision 2009/77/EC, Article 32 “Assessment of market developments”, 1. “The Authority shall monitor and assess market developments in the area of its competence and, where necessary, inform the European Supervisory Authority (European Banking Authority), and the European Supervisory Authority (European Insurance and Occupational Pensions Authority), the ESRB and the European Parliament, the Council and the Commission about the relevant micro-prudential trends, potential risks and vulnerabilities. The Authority shall include in its assessments an economic analysis of the markets in which financial market participants operate, and an assessment of the impact of potential market developments on such financial market participants.” The information contained in this publication, including text, charts and data, exclusively serves analytical purposes. It does not provide forecasts or investment advice, nor does it prejudice, preclude or influence in any way past, existing or future regulatory or supervisory obligations by market participants.

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Table of contents

Executive summary

Trends and Risks

ESMA risk assessment

Note: Assessment of main risks by risk segments for markets under ESMA remit since last assessment, and outlook for forthcoming quarter. Assessment of main risks by risk categories and sources for markets under ESMA remit since last assessment, and outlook for forthcoming quarter. Risk assessment based on categorisation of the ESA Joint Committee. Colours indicate current risk intensity. Coding: green=potential risk, yellow=elevated risk, orange=high risk, red=very high risk. Upward arrows indicate an increase in risk intensities, downward arrows a decrease, horizontal arrows no change. Change is measured with respect to the previous quarter; the outlook refers to the forthcoming quarter. ESMA risk assessment based on quantitative indicators and analyst judgement.

Risk summary: Market risk remained at a very high level in 2Q18, accompanied by very high risk in securities markets and elevated risks for investors, infrastructures and services. Equity and bond volatility spikes in February and May reflected growing sensitivities. The level of credit and liquidity risk remained high, with a deterioration in outstanding corporate debt ratings and weakening corporate and sovereign bond liquidity. Operational risk was elevated, with a negative outlook as cyber threats and Brexit-related risks to business operations remain major concerns. Investor risks persist across a range of products, and under the MiFIR product intervention powers ESMA recently restricted the provision of Contracts for Difference and prohibited the provision of Binary Options to retail investors. Going forward, EU financial markets can be expected to become increasingly sensitive to mounting political and economic uncertainty from diverse sources, such as weakening economic fundamentals, transatlantic trade relations, emerging market capital flows, Brexit negotiations, and others. Assessing business exposures and ensuring adequate hedging against these risks will be a key concern for market participants in the coming months.

Securities markets: In 1H18 equity market volatility returned, following a prolonged period of calm. Implied volatility measures jumped to two-year highs, leading some market participants to change their positioning. Global equity prices saw strong temporary corrections in February and May, while credit spreads widened significantly across bond markets. In contrast to 2017, equity and bond issuance declined, reflecting sluggish economic fundamentals and rising bond yields. Securities Financing Transactions continued to grow, with robust demand for high-quality collateral.

Investors: Investment fund returns declined in 1H18 within a context of volatile markets and uncertainty affecting most fund types. Bond funds not only delivered the worst performance over the reporting period, but also recorded significant outflows. Particularly affected were funds focusing on HY assets, pointing to a return of more risk-averse investment behaviour. Overall, in 1H18 EU investment funds had AuM worth EUR 12.6tn. In terms of performance after costs for UCITS funds, net returns were on average significantly lower than in 1H17, at -0.2%. Retail investor portfolio returns were flat, following the turbulence in equity markets during February.

Infrastructures and services: The beginning of 2018 marked the entry into force of the new EU trading regime under MiFID II and MiFIR. The transition was smooth across EU trading venues, with no disruptions reported. In 1H18, bond trading on EU venues increased, although this was mostly due to off-exchange transactions now reported to them. For equities, dark pool trading decreased following introduction of the MiFID II Double Volume Cap measures. On the other hand, OTC trading increased significantly even though the majority of trading continued to take place on lit markets, while the volume traded in periodic auctions surged. Despite increased volumes during the episodes of high equity-

market volatility at the beginning of February and in May, market infrastructures did not suffer major disruptions. With respect to CCPs, the share of centrally cleared products remained high for both IRS and CDS. With regard to financial benchmarks, the number of EURIBOR panel contributors remained stable at 20 banks, and the dispersion of EURIBOR quotes submitted decreased overall.

Products and innovation: FinTech continues to drive innovation in financial services, with potentially far-reaching consequences for both end users and service providers. Virtual Currencies and Initial Coin Offerings have been the focal point of attention recently because of the massive cash inflows that they have attracted. Yet, other applications of Distributed Ledger Technology and RegTech are also witnessing interesting developments. With this edition of the TRV, we start publishing our on-going monitoring of financial innovation and product trends. This new section outlines how these innovations and various others, such as crowdfunding and VIX exchange-traded notes, score on ESMA's innovation scoreboard, and discusses the main recent market and regulatory developments around them.

Vulnerabilities

Enhancing transparency of EU securitisations: The EU Securitisation Regulation includes a number of due diligence and monitoring requirements for investors. ESMA is tasked with developing draft transparency technical standards that will assist investors in fulfilling these obligations, in line with its investor protection mandate. At the same time, securitisation capital requirements are also changing, with important implications for the types of transactions to be observed in the future. This article uses a loan-level and tranche-level dataset of 646 securitisations to simulate the securitisation features that can arise when originators seek to use securitisation as part of their capital management exercises. The draft ESMA disclosure templates can assist investors in fulfilling their due diligence and monitoring tasks to better understand the risks and aspects of these instruments.

Structured retail products – the EU market: Structured products sold to retail investors in the EU are a significant vehicle for household savings. Certain features of the products – notably their complexity and their net performance – warrant a closer examination of the market from the perspective of investor protection. Breaking down the EU market geographically into national retail markets reveals a very high degree of heterogeneity in the types of product sold, though among the vast array of different structured products available to retail investors each market is concentrated around a small number of common types. Changes in typical product characteristics are not uniform across national markets. Analysis both at an EU-wide level and in the French, German and Italian retail markets suggests, however, that the search for yield has been a common driver of several changes in the distribution of product types.

Drivers of CDS usage by EU investment funds: This article investigates the use of credit default swaps by UCITS funds. We find that funds forming part of a large group are more likely to use CDS. Fixed-income funds that invest in less liquid markets, and alternative funds that implement hedge-fund-like strategies, are particularly likely to rely on CDS. Fund size is the main driver of net CDS exposures when these exposures become particularly large. Finally, we investigate the bond-level drivers of funds' net single-name CDS positions and find that CDS positions on investment-grade bonds issued by sovereign issuers – most of which are emerging markets – tend to be larger. The analysis also sheds light on tail-risk for funds from the use of CDS: Directional funds that belong to a large group are the most likely to have sell-only CDS exposures, exposing them to significant contingent risk.

Monitoring volatility in financial markets: Market volatility, and its potential to undermine financial stability as well as to impose unexpected losses on investors, is a subject of concern for securities market regulators. Relatively low or high levels of volatility increase the likelihood of stressed financial markets. Low yields and low volatility characterised the two years between February 2016 and January 2018. In February 2018 equity market volatility spiked as markets were globally affected by a strong correction. The main drivers of the long period of low volatility are related to lower equity returns correlation, search-for-yield strategies, and stable macroeconomic and corporate performances. A prolonged period of low volatility may lead to a more fragile financial system, promoting increased risk-taking by market participants. While the AuM may be considered still rather small, the number of products following volatility targeting strategies is sufficiently broad to become a key factor driving volatility spikes like those that occurred in the first week of February 2018.

Trends

Market environment

The still positive global and EU economic growth helped maintain a generally benign market environment in 1H18. However, political risk related to Brexit and mounting political tensions at international level continue to represent a critical source of potential instability for EU financial markets. Notwithstanding relevant turbulence in equity markets in February 2018 and in EU sovereign bond markets in May, financial conditions remained benign, with continued support from monetary policy. The return of volatility in equity markets affected the performance of several categories of investment vehicles and caused losses for products exposed to volatility. Diversification in the financing of the EU economy continued, with strong growth in equity financing.

In the first half of 2018, the **macroeconomic environment** remained positive. EU GDP growth moderated in 1H18 and it is forecast at 2.1% in 2018 while global economic growth is overall solid but has become more differentiated across regions (3.9% expected in 2018).[1] The EU aggregate deficit continues to decline, with fiscal deficit in most EU countries below 3% of GDP. However, public and private sector debt levels remain high in several Member States.

Political risk related to Brexit remains a key source of concern for EU financial markets, although a preliminary common understanding on a transition period was reached in March 2018. The focus remains on the risk of potential cliff effects, which continues to warrant close vigilance by both market participants and public authorities. Notably, market participants need to prepare for the scenario of no agreement by March 2019.

Moreover, the recently increased trade tensions and the risk of a wider escalation of protectionist measures represent a concern for investors and could impact on the global economy and global financial stability. The appreciation of the dollar (A.4) raised concerns over companies' abilities to repay dollar-denominated debt and, in April 2018, drove the first two weeks of outflows from emerging market bond funds since 2016. In the EU, economic policy uncertainty has increased (T.3) and market confidence is worsening, although it is still above the long-term average (T.4).

Against this background, **financial conditions** remained benign during the first half of 2018, notwithstanding February's turbulence in equity markets. The related price correction cancelled out the gains made since the beginning of the year. Combined with the corrections in May, equity market performance was thus slightly negative over the period. Investment vehicles focusing on equity markets were also affected by the financial turmoil and registered lower returns. Products exposed to volatility, such as inverse VIX ETNs, have likewise been impacted by the strong corrections, suffering severe losses.[2]

Monetary policy stayed supportive. While the US Federal Reserve has raised the policy interest rate and continued to allow a gradual contraction of its bond holdings, the ECB does not expect any change in its monetary policy stance before September 2018.[3]

After a drop in February 2018 during the turbulence that affected markets globally, EU securities registered mainly flat **market performance** during the reporting period, with the exception of some commodity markets which continued to perform strongly (T.1). MiFID II entered into force in January 2018 with no disruptions reported in the market. As part of MiFID II, dark pool trading has been reduced significantly; changes in trading patterns are expected and will be monitored (Box. T.12).

EA investors' risk appetite in 1H18 remained high, confirming the trend observed in 2017, as reflected in **capital flows**. Net monthly purchases of foreign equities by EA residents averaged EUR 15bn in 2017 compared with a ten-year average of EUR 5bn. EA residents' securities investment was channelled mainly into the financial sector (90% of the total). Long-term debt purchases averaged EUR 33bn in 2017, against a ten-year average of EUR 16bn (T.5). EU institutional investment flows grew across sectors (T.7).

Capital market financing continued to grow (9% in 2017). Diversification in the sources of financing for EU economies progressed as debt securities were stable and loans decreased (T.8).

[1] IMF, World Economic Outlook Update, July 2018, and European Commission, Summer 2018 (Interim) Forecast.

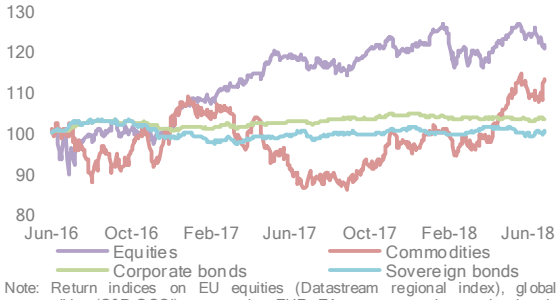
[2] See Products and Innovation, pp.29-30.

[3] https://www.ecb.europa.eu/press/pressconf/2018/html/ecb.is180426.en

T.1

Market performance

Equity prices more volatile



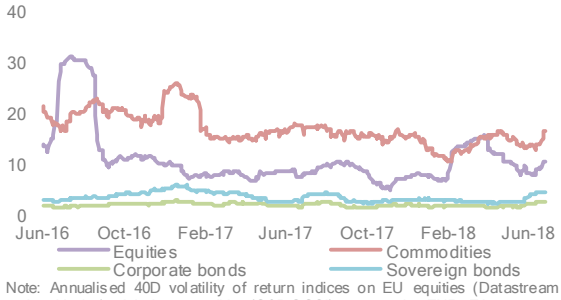
Note: Return indices on EU equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx Euro, all maturities). 01/06/2016=100.

Sources: Thomson Reuters Datastream, ESMA.

T.2

Market volatilities

Volatility increasing in 1H18



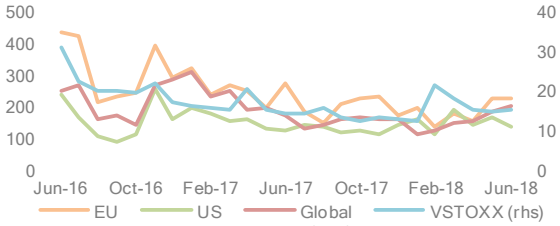
Note: Annualised 40D volatility of return indices on EU equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx Euro, all maturities), in %.

Sources: Thomson Reuters Datastream, ESMA.

T.3

Economic policy uncertainty

Increased economic policy uncertainty in EU



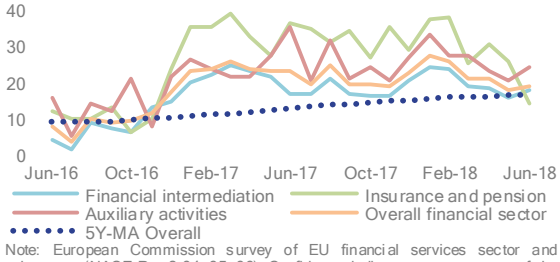
Note: Economic Policy Uncertainty Index (EPU), developed by Baker et al. (www.policyuncertainty.com), based on the frequency of articles in EU newspapers that contain the following triple: "economic" or "economy", "uncertain" or "uncertainty" and one or more policy-relevant terms. Global aggregation based on PPP-adjusted GDP weights. Implied volatility of EuroStoxx 50 (VSTOXX), monthly average, on the right-hand side.

Sources: Baker, Bloom, and Davis 2015; Thomson Reuters Datastream, ESMA.

T.4

Market confidence

Confidence lower but still above average



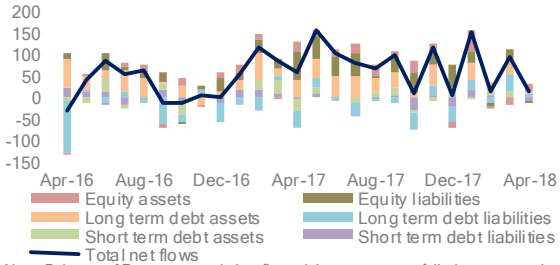
Note: European Commission survey of EU financial services sector and subsectors (NACE Rev.2 64, 65, 66). Confidence indicators are averages of the net balance of responses to questions on development of the business situation over the past three months, evolution of demand over the past three months and expectation of demand over the next three months, in % of answers received.

Sources: European Commission, ESMA.

T.5

Portfolio investment flows

Sustained net outflows from Euro Area



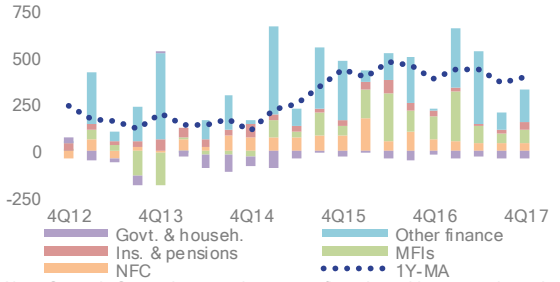
Note: Balance of Payments statistics, financial accounts, portfolio investments by asset class. Assets=net purchases (net sales) of non-EA securities by EA investors. Liabilities=net sales (net purchases) of EA securities by non-EA investors. Total net flows=net outflows (inflows) from (into) the EA. EUR bn.

Sources: ECB, ESMA.

T.6

Investment flows by resident sector

Large increase in non-bank investments



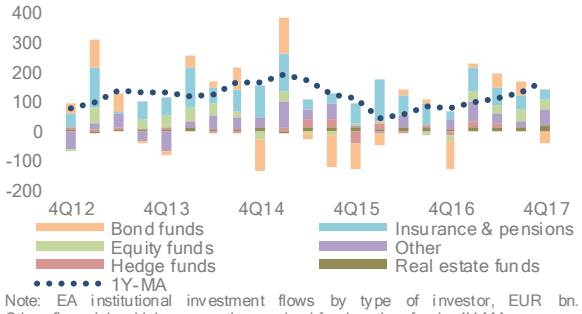
Note: Quarterly Sector Accounts. Investment flows by resident sector in equity (excluding investment fund shares) and debt securities, EUR bn. 1Y-MA=one-year moving average of all investment flows.

Sources: ECB, ESMA.

T.7

Institutional investment flows

Broad-based inflows in 2H17



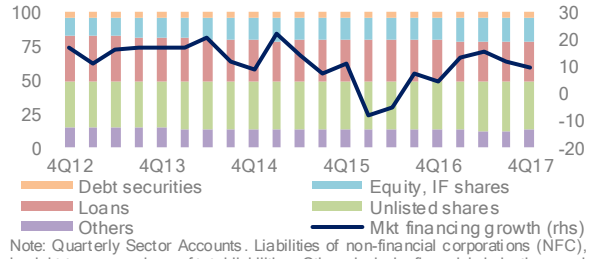
Note: EA institutional investment flows by type of investor, EUR bn. Other=financial vehicle corporations, mixed funds, other funds. 1Y-MA=one-year moving average of all investment flows.

Sources: ECB, ESMA.

T.8

Market financing

Capital market financing growth continues



Note: Quarterly Sector Accounts. Liabilities of non-financial corporations (NFC), by debt type as a share of total liabilities. Others include: financial derivatives and employee stock options; insurance, pensions and standardised guarantee schemes; trade credits and advances of NFC; other accounts receivable/payable. Mkt financing growth (rhs)= annual growth in debt securities and equity and investment fund (IF) shares, right axis, in %.

Sources: ECB, ESMA.

Securities markets

In 1H18 equity market volatility returned, following a prolonged period of calm. Implied volatility measures jumped to two-year highs, leading some market participants to change their positioning. Global equity prices saw strong temporary corrections in February and May, while credit spreads widened significantly across bond markets. In contrast to 2017, equity and bond issuance declined, reflecting sluggish economic fundamentals and rising bond yields. Securities Financing Transactions continued to grow, with robust demand for high-quality collateral.

Equity: volatility returns

Following a prolonged period of calm, **equity price volatility** resurfaced in earnest in global markets during the first half of 2018. The US VIX reached an intraday high of 50% on 6 February, up from 10% in January, with the VSTOXX recording a comparable increase. Implied volatility measures have eased since then, although renewed sell-offs stemming from political uncertainty and trade-war concerns kept volatility indices at relatively high levels through the end of June (T.9).[4]

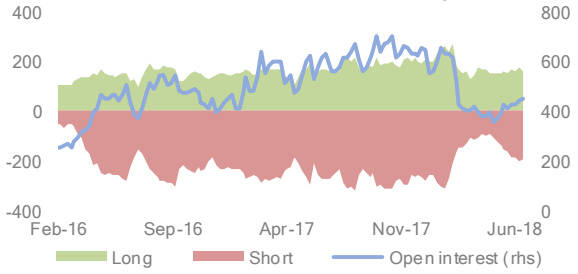
T.9
Implied volatilities
Equity volatility spikes to two-year high

Note: Implied volatility of EuroStoxx50 (VSTOXX) and S&P 500 (VIX), in %.
Sources: Thomson Reuters Datastream, ESMA.

The main trigger of the February spike seems to have been a US employment report showing higher-than-expected wage growth, prompting fears of a pick-up in the pace of monetary policy tightening. However, this episode also played out against the backdrop of rising equity valuations and a protracted period of low volatility that may have fuelled investor complacency, as highlighted in the previous ESMA TRV.[5]

The early-February turmoil is believed to have brought significant losses for investors, with e.g. the assets of short-volatility exchange-traded products dropping from USD 3.7bn to USD 0.5bn in just one week.[6] The number of short positions on VIX futures held by asset managers and leveraged funds, i.e. bets that future volatility would be lower, declined by 70% between January and April, before increasing significantly between April and June (T.10).

T.10
Number of positions on VIX futures
Fewer bets on lower future volatility



Note: Weekly number of long and short positions on VIX futures held by asset managers and leveraged funds, thousands, and total open interest on VIX futures, thousands (right axis).
Sources: CFTC Commitment of Traders Reports, ESMA.

EU equity markets were unsettled again at the beginning of May, with political developments in Europe driving investors to sell off risk assets. This mainly reflected concerns over fiscal sustainability, with Italy's government debt-to-GDP ratio at 131.8% of GDP. However, investors expected the volatility peak to be short-lived, as reflected in the relatively stable price of the one-year VSTOXX option, leading to a flattened volatility term structure (T.11).

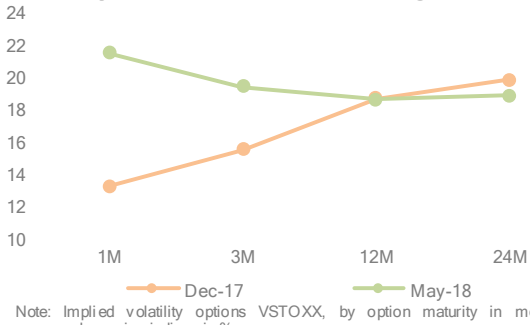
As a result, Italian equities underperformed other markets in May, declining more than 10% (A.16). Nonetheless, the FTSE MIB index was down just 1% in 1H18, as this followed a relatively strong performance at the beginning of 2018. Broader EU **equity prices** slid 1.5% on average over the same period, including a 5% decline for the German Dax (A.15).

[4] See the article "Monitoring volatility in financial markets" in the Vulnerabilities section of this report (pp. 76-83).

[5] See ESMA Report on Trends, Risks and Vulnerabilities, No.1, 2018.

[6] See https://www.bloomberg.com/news/articles/2018-02-06/volatility-inc-inside-wall-street-s-8-billion-vix-time-bomb and p.30 for further details on VIX ETNs.

T.11
Implied volatilities derived from VSTOXX option prices
Volatility term structure flattening out



Note: Implied volatility options VSTOXX, by option maturity in months, measured as price indices in %.
Sources: Thomson Reuters Datastream, ESMA.

Other developed markets fared better, with e.g. US equities up 2% over the same period. As was to be expected in volatile market conditions, European bank shares underperformed other sectors, losing more than 9% since the beginning of the year, compared with a 2% gain for non-financial corporate shares. In comparison, US bank shares were down 4%.

In 1H18 the volume of EU **equity issuance** decreased, reflecting a sharp 32% decline in follow-on issuances and despite a 34% increase in IPOs (A.13). This was mainly driven by a 51% decline in issuance by EU financial corporates, possibly in reaction to lower equity prices and the volatile market environment (A.14).

Equity market liquidity remained broadly stable, despite an increase in our illiquidity indicator in 2Q18 (A.23), with bid-ask spreads slipping almost 2bps from the beginning of the year to an average of 5bps in June 2018 (A.24). On 3 January 2018, MiFID II/MiFIR entered into force without creating any significant disruption in market liquidity (T.12).

T.12
MiFID II/MiFIR: DVC mechanism
Dark pool trading dropped for banned ISINs

In 2007 MiFID introduced the concept of pre-trade transparency waivers, meaning that – where waivers apply – bid and offer prices did not need to be reported by the trading venue before an order was executed.

The waivers introduced by MiFID allowed for the creation of dark pools. MiFID permitted competent authorities to grant four types of waivers:

- Reference Price Waiver (RPW): Systems matching orders based on the midpoint within the current bid and offer process of the trading venue where that financial instrument was first admitted to trading or the most relevant market in terms of liquidity.
- Negotiated Trade Waiver (NTW): Systems that formalise negotiated transactions.
- Large in Scale (LIS): Orders that are large in scale compared with normal market size.
- Order Management Facility (OMF): Orders held in an order management facility of the trading venue pending disclosure.

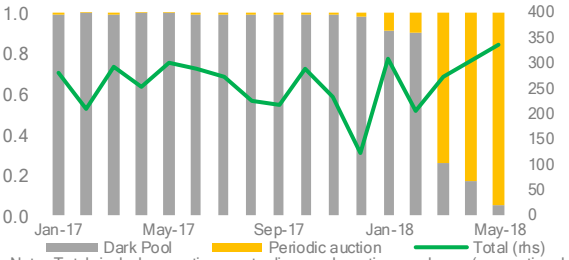
Concerns have mounted over time that the waivers have not been implemented consistently across markets and venues, with a consequent lack of price discovery. To address this issue, MiFID II introduced the double volume cap (DVC) to limit the amount of dark trading in equities allowed under the reference price waiver and the negotiated trade waiver.[7] In particular, dark trading in equity and equity-like instruments is limited in the case of instruments whose percentage of trading on a single trading venue under the waivers is higher than 4% of the total volume of trading in those financial instruments across all EU trading venues over the previous twelve months; and whose percentage of trading across all trading venues under the waivers is higher than 8% of the total volume of trading in that financial instrument across all EU trading venues over the previous twelve months.

The DVC is calculated per instrument (ISIN) based on the rolling average of trading in that instrument over the previous twelve months.[8]

ESMA published the DVC calculations for the first time on 7 March 2018, and again on 10 April, 8 May and 7 June. The total number of ISINs suspended as of 7 June 2018 was 932 (896 at EU Level – 8% limit – and 36 at TV level – 4% limit).

For the ISINs banned by the DVC publications, volumes of continuous trading and auctions (including opening and closing auctions and post-circuit-breaker auctions) represent the large majority of trading, increasing from 91% to 96% of the total between the end of 2017 and the end of May 2018. Dark pool volumes shrank from almost 9% to 0.15% of the total over the same period, while volume traded in periodic auctions – i.e. recurring auctions on individual ISINs, on the basis of distinct order books – increased from 0.2% to 3.4% in the last six months. (T.13).

T.13
Trading volume for banned ISINs
Dark trading dropped for banned ISINs



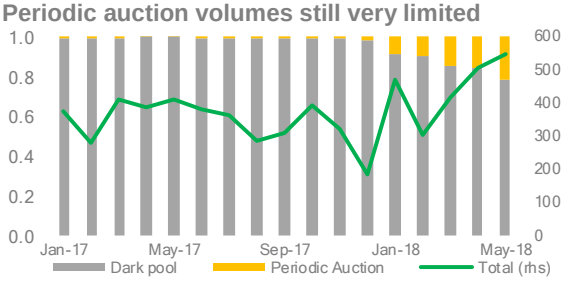
Note: Total includes continuous trading and auctions volume (conventional auctions as part of regular trading, incl. opening and closing auctions and post-circuit-breaker auctions), periodic auctions and dark pool trading volume, in EUR bn. Ratio of the sum of dark pool and periodic auctions, in %.
Sources: ESMA.

For non-banned ISINs, trading volumes remained broadly stable in relative terms. Continuous trading and auctions represent 96% of the total trading volume (up from 95% at the beginning of the year). Volumes traded in periodic auctions increased for non-banned ISINs too, from less than 0.1% to around 0.8% of the total. Dark pool trading also decreased for non-banned ISINs over the analysis period, from 4.3% at the beginning of the year to 2.9% of the total at the end of May 2018 (T.14).

7 The reference price waiver allowed dark pools to match an order at the mid-point of the best bid and offer on the primary exchange; the negotiated transaction waiver allowed orders to be negotiated at the volume-weighted average price.

8 https://www.esma.europa.eu/double-volume-cap-mechanism

T.14
Trading volumes for non-banned ISINs
Periodic auction volumes still very limited



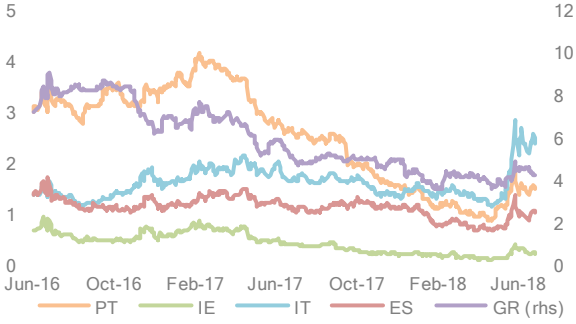
Note: Total includes continuous trading and auctions volume (conventional auctions as part of regular trading, incl. opening and closing auctions and post-circuit-breaker auctions), periodic auctions and dark pool trading volume, in EUR bn. Ratio of the sum of dark pool and periodic auctions, in %.
Sources: ESMA.

Activity in **securities lending markets** for EU equities continued to expand, with an average EUR 223bn in EU equities on loan year-to-date, up 12% from the same period last year (A.72). A surge in M&A activity in 1H18 may have boosted equity borrowing demand, as securities lending markets can be used to profit from arbitrage opportunities.

Bond: spread decompression

In 1H18 EU financial markets experienced a broad-based widening of credit spreads across bond market segments. **Sovereign bonds** exhibited the largest movement, with EA ten-year spreads to German bonds up 10bps from end-2017, led by an 85bps increase for Italian bonds (T.15). The sell-off was particularly pronounced at the short end, with yields on two-year Italian bonds spiking from 0.9% to 2.7% overnight on 29 May. EU sovereign bond market liquidity temporarily deteriorated around the same time, with bid-ask spreads increasing two basis points, and other liquidity indicators also signalling a tighter environment (A.37 and A.38).

T.15
Sovereign bond spreads
Broad-based increase



Note: Selected 10Y EA sovereign bond risk premia (vs. DE Bunds), in %.
Sources: Thomson Reuters Datastream, ESMA.

There were comparable developments in CDS markets, with the five-year Italian **sovereign CDS spread** climbing from 90bps to 263bps, before settling above 200bps in June. In comparison, the spread on the broader European sovereign CDS index rose only 15bps, while the senior financial index gained 40bps.

The turmoil in sovereign bond markets had ripple effects, reinforcing the widening in **corporate bond spreads** that had begun in February (A.48). The difference between BBB-rated and AAA-rated corporate bonds grew from 36bps in December 2017 to 113bps by the end of June. High-yield EUR-denominated bonds traded at a yield of 3.4% in June, up from a low of 2.1% in November.

Sovereign bond issuance experienced yet another sharp decline from a year earlier, with EUR 378bn issued in 1H18, i.e. around 15% less than in 1H17 (A.25). Likewise, the volume of EU government bonds outstanding receded further. The average credit quality of sovereign bonds issued remained stable, slightly below A+, while the rating distribution of outstanding sovereign bonds was unchanged (A.26 and A.27).

Continuing the trend observed in 2H17, **corporate bond issuance** dropped sharply again, from EUR 590bn in 1H17 to EUR 480bn in 1H18 (A.41). The 19% decline was driven mainly by a reduction in investment-grade issuance, although the average credit quality of bonds issued remained stable. Issuance fell across sectors, underscoring the relevance of tighter bond market conditions rather than sector-specific developments (A.42). The issuance of hybrid capital instruments such as contingent convertibles, or CoCos, was also subdued, while the rating distribution of outstanding EU corporate bonds stabilised (A.44 and A.45).

SFTs: high-quality collateral drive

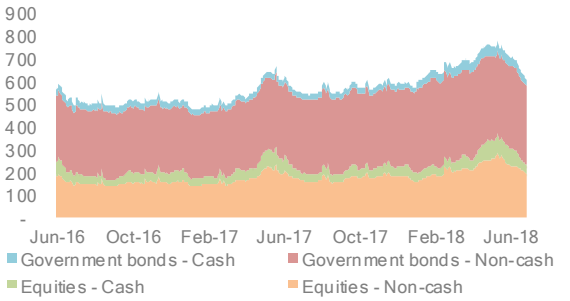
While the amount of high-quality collateral outstanding continues to shrink (A.53), the demand for high-quality liquid assets (HQLA) remained robust, as illustrated by the sustained growth in **securities financing transactions** using EUR government bond collateral. The average daily trading volume in centrally-cleared repo transactions collateralised with EA government bonds reached EUR 217bn in 1H18, up 15% from the same period last year (A.67). The average value of EU government bonds on loan increased by a comparable percentage, to EUR 341bn (A.72).

Continued high demand for HQLA was also reflected in **repo market specialness**, with repo rates on EA government debt securities in very high demand averaging 12bps above the prevailing general collateral rate. This was

broadly in line with last year's average, but still significantly higher than the 2013-16 average of 7bps (A.68). End-quarter repo rate volatility persisted, as HQLA supply remained tight and banks continued to hoard cash around regulatory reporting dates.[9] Low repo market liquidity at quarter-end especially affected institutional investors, as they rely on this market to safely store and quickly retrieve cash.[10]

One of the channels through which market participants can satisfy their demand for HQLA is securities lending. Securities loans collateralised with non-cash, also known as collateral transformation trades, continue to dominate the market (T.16). According to industry estimates, in 2017 a majority of the non-cash collateral posted by tri-party agents (a growing segment of the European market) took the form of government bond collateral, around half of it issued by European governments.[11]

T.16
EU securities on loan
Non-cash collateral still dominates

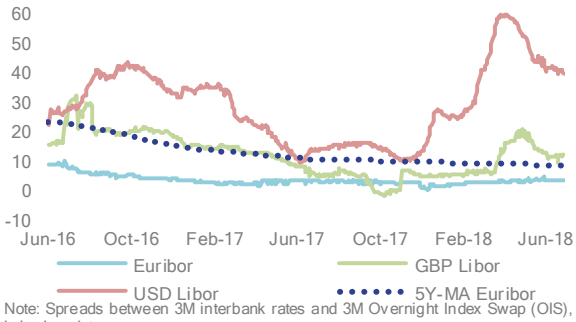


Note: Value of EU equities and government bonds on loan, by collateral type, EUR bn.
Sources: Markit Securities Finance, ESMA.

Money markets: rising borrowing costs

Investors are facing rising borrowing costs in **money markets**, reflecting in part the gradual normalisation of US monetary policy. The USD Libor, in particular, witnessed a significant increase during the first half of the year, making it more expensive for EU firms to borrow in USD (T.17). The USD three-month Libor-OIS spread reached almost 60bps in March, from around 15bps in December. Heavy issuance of US Treasury bills during the first quarter reportedly contributed to a decline in the price of US money market instruments, driving up spreads.

T.17
Money market spreads
USD borrowing costs soar



Note: Spreads between 3M interbank rates and 3M Overnight Index Swap (OIS), in basis points.
Sources: Thomson Reuters Datastream, ESMA.

In **commodity markets**, rising crude oil prices may also weigh on the profitability of some non-financial corporate sectors. The Brent front-month contract price traded between USD 75 and USD 80 per barrel in May and June, the highest since end-2014, as global demand picked up and OPEC members enforced oil production quotas to restrict crude oil production (A.91). However, the volatility of oil prices has remained limited so far (A.92 and A.94). The oil price increase has supported the profitability of energy companies and their share prices.

[9] See Box on "High-quality collateral scarcity", ESMA Report on Trends, Risks and Vulnerabilities No.2, 2017, p.11.

[10] As suggested by an internal study conducted by the Dutch AFM, these quarter-end effects are partly caused by prudential reporting requirements. Therefore, European regulators are currently analysing whether more frequent reporting, as is the case in the US and UK, is warranted.

[11] See ISLA Securities Lending Market Report, 1 March 2018.

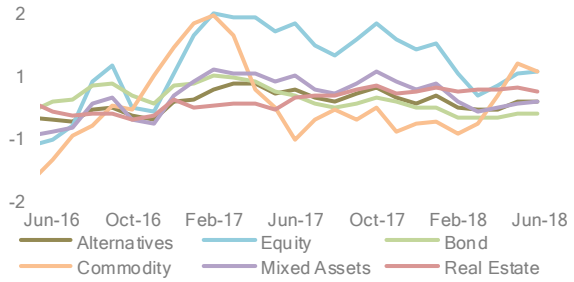
Investors

Investment fund returns declined in 1H18 within a context of volatile markets and uncertainty affecting most fund types. Bond funds not only delivered the worst performance over the reporting period but also recorded significant outflows. Particularly affected were funds focusing on HY assets, pointing to a return of more risk-averse investment behaviour. Overall, in 1H18 EU investment funds had AuM worth EUR 12.6tn. In terms of performance after costs for UCITS funds, net returns were on average significantly lower than in 1H17, at -0.2%. Retail investor portfolio returns were flat in 1H18, following the turbulence in equity markets during February.

Fund performance: bond funds sluggish

Investment **fund performance** was close to zero in 1H18 for most fund categories (T.18). Equity fund returns in particular dropped by 0.4pp, to 0.6%, amid severe market corrections. Real estate fund returns were slightly positive (0.2%). In contrast, commodity fund returns benefited from rising oil prices to increase by 0.8pp, outperforming the rest of the industry. At the other end of the spectrum, bond funds delivered the worst performance of any type of fund (-0.1%). Expectations of rising interest rates and concerns around some EU sovereign bonds notably affected performance for investors in fixed-income assets. The average return on EU money market funds remained slightly negative, which was still moderate given the low interest rate environment. However, dispersion was perceptibly lower than end-2017. The lowest-performing funds in particular posted average monthly returns close to -0.6%, up from -1.0% in 2H17 (A.127).

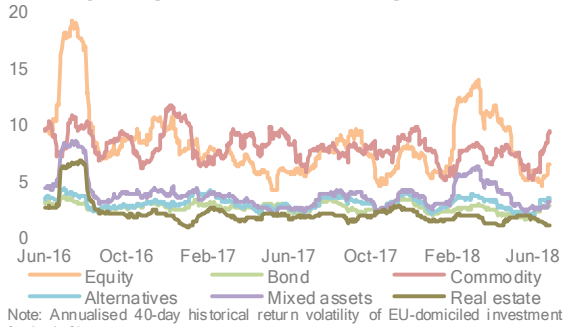
T.18
Fund performance
Low performance for bond funds



Note: EU-domiciled investment funds' annual average monthly returns, asset weighted, in %.
Sources: Thomson Reuters Lipper, ESMA.

Fund volatility surged in 1Q18 for equity (+162%) and mixed funds (+149%) to reach its highest level since 3Q16 before receding at the end of the reporting period, except for commodity funds (T.19).

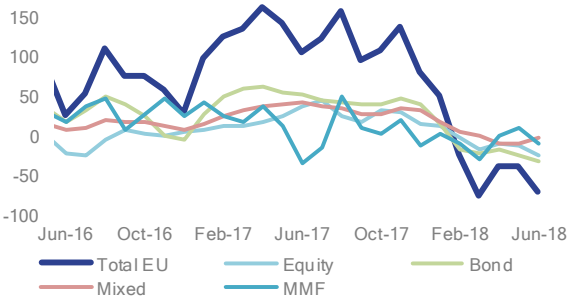
T.19
Fund volatility
Volatility surged before receding



Note: Annualised 40-day historical return volatility of EU-domiciled investment funds, in %.
Sources: Thomson Reuters Lipper, ESMA

Against this backdrop of declining and volatile performance, **fund flows** fell sharply in 1H18 for bond funds (EUR -68.2bn), equity funds (EUR - 39.3bn), MMF (EUR -23.1bn) and mixed funds (EUR -10.3bn). The drop in equity fund flows contrasts especially starkly with ETFs, which recorded solid inflows of EUR 27.8bn, mostly at the beginning of the reporting period. HY bond funds in particular lost investments (EUR -20.5bn), possibly indicating a return to more risk-averse investment behaviour (T.20).

T.20
Fund flows
Large decline across fund types



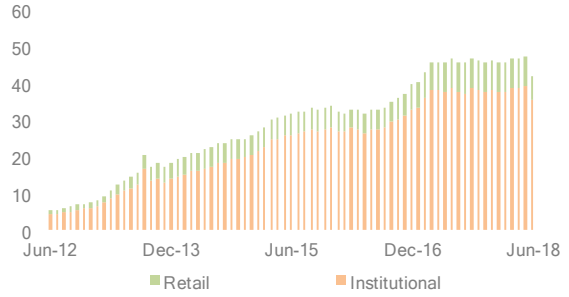
Note: EU-domiciled funds' 2M cumulative net flows, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

Appreciation of the USD (A.4) raised fears over companies' abilities to repay dollar-denominated debt and in April 2018 drove the first two weeks of outflows from emerging market bond funds since 2016. EM bond fund flows nevertheless

remained positive over the reporting period (EUR 14.1bn).

After several years of sustained growth, the NAV of the loan fund sector has stabilised since 1H17, at EUR 48bn (from EUR 5bn in 2012) (T.21).

T.21
Loan funds
Stable since 1H17



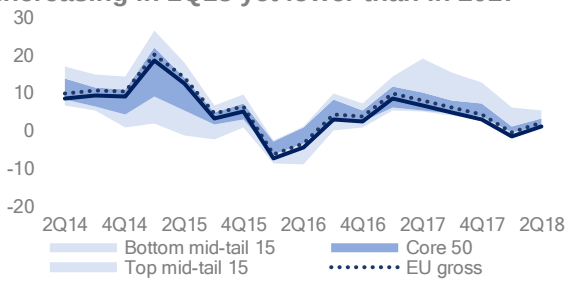
Note: NAV of EU retail and institutional loan participation funds, EUR bn,
Sources: Thomson Reuters Lipper, ESMA.

The **liquidity risk profile** of corporate bond funds deteriorated. ESMA's fund liquidity indicator shows a decrease in asset liquidity and an increase in asset maturity on average in 2017 (A.122). Moreover, the proportion of cash holdings in fund portfolios has been constantly below the four-year average, confirming the downtrend observed (3%) (A.120). Potentially this could affect the funds' ability to meet large redemption demands.

Fund costs: broadly unchanged

In 1Q18 the annual **gross returns** observed dipped to slightly below zero, subsequently recovering in 2Q18 although remaining 5pps lower than in 2Q17. This meant that on average for 1H18 gross returns were significantly lower than for the same period of 2017 (1% in 1H18 versus 9% in 1H17). In turn annual net returns, discounted by ongoing and one-off expenses, also decreased (1.2% in 2Q18 from around 6.7% in 2Q17). At country level net returns vary, due to factors such as cost structures, diversity in investment strategies and investor preferences, which have a significant impact on performance and cost reductions. However, dispersion of net returns for those EU countries with the most significant UCITS markets was relatively contained in 1H18 (T.22).

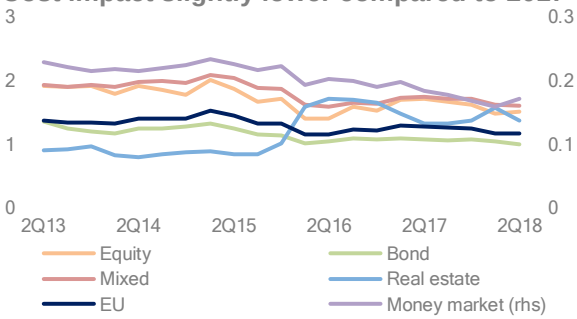
T.22
Net returns of UCITS funds
Increasing in 2Q18 yet lower than in 2017



Note: Net returns of UCITS, adjusted for total expense ratio and load fees, in %. Distribution represents selected EU markets. Top mid-tail 15=distribution between the 75th and 90th percentile. Bottom mid-tail 15=distribution between the 10th and 25th percentile.
Sources: Thomson Reuters Lipper, ESMA.

The absolute impact of ongoing and one-off costs on EU UCITS fund shares lessened slightly, while varying across time and asset classes. The EU average over the first half of 2018 was around 1.2pps compared to 1.3pps for the same period in 2017. Equity (1.5pps) and mixed funds (1.6pps) had higher costs compared to other asset classes, although they did ease on the first half of the previous year (T.23).

T.23
Cost impact on UCITS share returns by asset class
Cost impact slightly lower compared to 2017

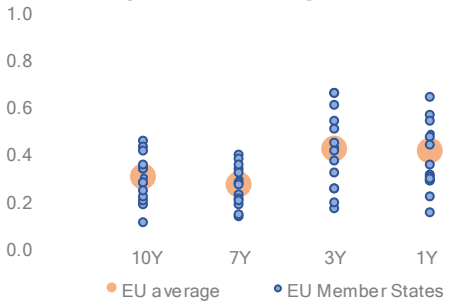


Note: Absolute impact of on-going costs, subscription and redemption fees on gross returns for UCITS fund shares, in percentage points.
Sources: Thomson Reuters Lipper, ESMA.

At the EU level the relative cost impact on a UCITS retail fund share (i.e. the portion of gross return investors lose due to fund costs) varied in 2Q18 across asset classes, being on average much higher for bond and lower for equity (A.126). The higher relative impact of costs at shorter horizons – one and three rather than seven years – is due to lower gross returns over more recent years. The average annual gross return over the last three years in the EU was about 3.4%, versus 6% over the last seven years. This is particularly pronounced in the bond market. While costs hovered around 1%, gross returns for bond funds shrank significantly, averaging around 5% and 2% respectively over seven- and three-year horizons and even turning negative over one year. The relative impact of costs is thus higher over a shorter time period. In

contrast, in the case of equity, gross returns remained high and overall reductions were lower at shorter horizons (T.24).

T.24
Dispersion fund costs relative to gross returns
Lower dispersion at longer horizons

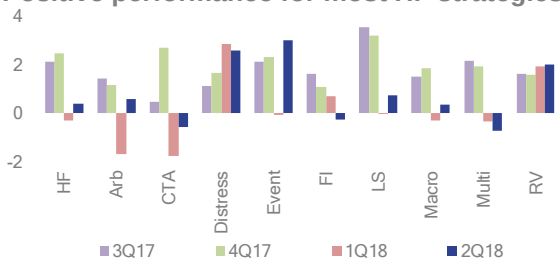


Note: Fund costs (ongoing costs, subscription and redemption fees) as a ratio of gross returns for UCITS fund shares per investment horizon, in %. Focus only on retail investors.
Sources: Thomson Reuters Lipper, ESMA.

Alternative funds: strong performances by most strategies

The global alternative fund industry recorded strong **returns** for most strategies in 1H18 (T.25). Distressed debt (5.5%), relative value (4.0%) and event driven (3.0%) strategies had positive returns, while arbitrage (-1.1%) and CTA (- 2.3%) strategies registered negative returns. The performance of funds specialised in distressed debt was partly enhanced by high profits posted by a fund in the hedge-fund index. In contrast, CTA managers shorting the USD were affected by the appreciation of the USD in 1Q18.

T.25
Hedge funds' performance by strategy
Positive performance for most HF strategies



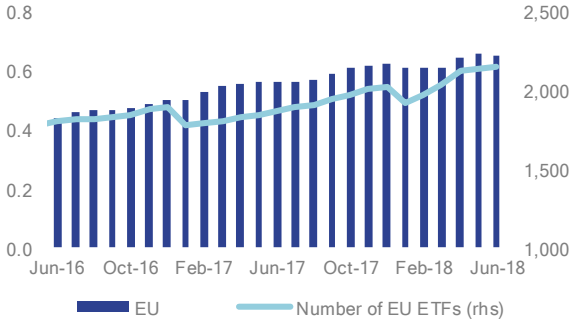
Note: Growth in hedge fund performance indices by strategy: Hedge fund index (Total), arbitrage, Commodity Trading Advisor (CTA), distressed debt, event driven, fixed income, long/short equity, macro, multi-strategy, relative value (RV), in %.
Sources: Eurekahedge, ESMA.

EA hedge fund AuM increased significantly to EUR 494bn from October 2017 to April 2018 (+9.0%). Similarly, their NAV jumped 8.2%, to EUR 392bn. As a result, financial leverage (measured as the ratio of AuM to NAV) was nearly stable at 1.26 (A.137).

ETFs: risky products raised concerns

Similarly to equity funds, **EU ETF performance** declined in 1H18, falling to 0.4%. Despite a drop in 1Q18 due to valuation effects, ETFs' NAV increased by 3.4% to EUR 649bn in 1H18. The industry has experienced remarkable growth of 181% in the last five years (T.26).

T.26
NAV by asset type
Significant long-term ETF growth



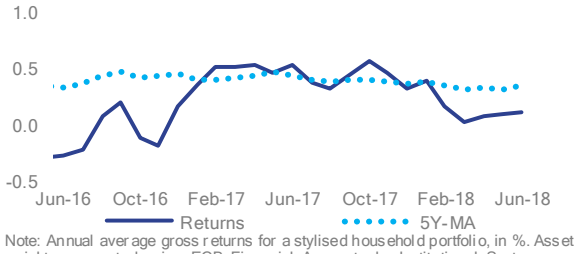
Note: NAV of ETFs, EUR tn, and number of ETFs.
Sources: Thomson Reuters Lipper, ESMA.

Equity ETFs represent the bulk of the ETF industry with 70% of **assets under management**, followed by bond ETFs (25%). ETFs are growing even in less liquid markets such as commodity or high yield. However, concerns were raised in the US in 1Q18 around ETF-like products tracking volatility. During the recent market episode exchange-traded products shorting volatility lost substantially in value; some were forced to suspend trading and close (see pp. 29-30).

Retail investors: muted returns

Retail investor **portfolio returns** fell in 1Q18, driven by falls in equity markets, but recovered somewhat in the second quarter with direct and indirect equity investments registering quarterly returns of 0.7% and 1.5% respectively. Annualised returns for the indicator as a whole were flat at 0.1%, below the five-year average of 0.3% (T.27).

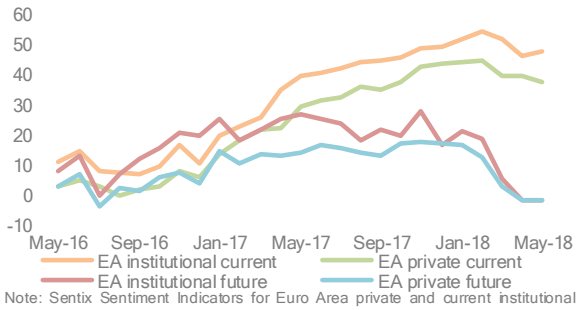
T.27
Retail portfolio returns
Retail investor returns muted in 2018



Note: Annual average gross returns for a stylised household portfolio, in %. Asset weights, computed using ECB Financial Accounts by Institutional Sectors, are 37% for collective investment schemes (of which 12% mutual funds and 25% insurance and pension funds), 31% for deposits, 22% for equity, 7% debt securities and 3% for other assets. Costs, fees and other charges incurred for buying, holding or selling these instruments are not taken into account.
Sources: Thomson Reuters Datastream, Thomson Reuters Lipper, ECB, ESMA.

Investor sentiment among retail investors with regard to current market performance rose throughout 2017, continuing a trend from the first half of the year. It reached a ten-year high in February 2018 and held historically high levels to end-May (T.28). In contrast, future expectations remained largely steady over 2017 before falling to a negative outlook in April and May 2018. The mismatch between current and future expectations may be explained in part by relatively high valuations in asset markets, in turn supported by expansive monetary policy throughout developed markets. Expectations of future interest rate rises in the Euro Area following policy tightening in the US may also play a role.

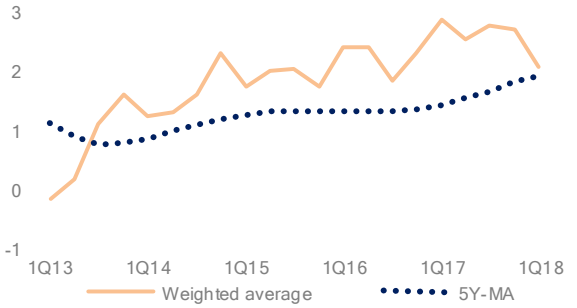
T.28
Investor sentiment
Near-term outstrips long-term sentiment



Note: Sentix Sentiment Indicators for Euro Area private and current institutional investors on a 10Y horizon. The zero benchmark is a risk-neutral position.

Disposable income growth among EA countries stayed solid in 1Q18 at 2.1% on an annualised basis, slightly above the five-year average of 1.9% (T.29). Growth in household disposable incomes may have boosted private investor confidence.

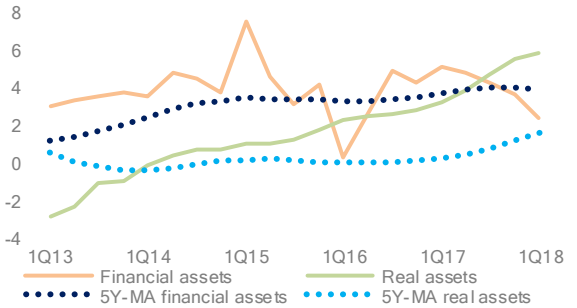
T.29
Disposable income growth
Sustained growth in incomes



Note: Annualised growth rate of weighted-average gross disposable income for 11 countries (AT, BE, DE, ES, FI, FR, IE, IT, NL, PT and SI), in %.
Sources: Eurostat, Thomson Reuters Datastream, ESMA.

Financial and non-financial **assets held by EA households** grew at annualised rates of 2.3% and 5.8% respectively in 1Q18. In the case of real assets, the strong growth was comfortably above its five-year average of 1.5%. In contrast, in the three years to end-2015 financial asset growth had outstripped that of real assets, although the gap had been narrowing for some time against a backdrop of loosening monetary policy and cheaper mortgages to finance real-estate purchases (T.30).

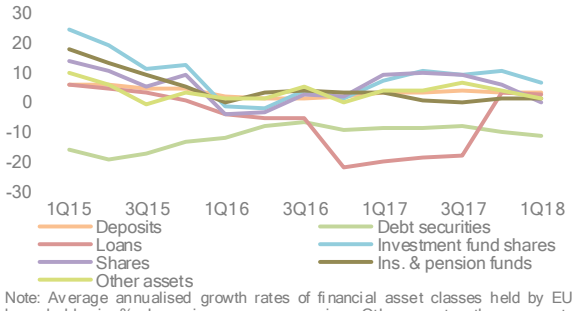
T.30
Asset growth
Increasing real asset growth



Note: Annualised growth rate of EA-19 households' real and financial assets, in %. 5Y-MA=five-year moving average of the growth rate.
Sources: ECB, ESMA.

Substantial growth rates across most asset classes of EA **household financial assets** were seen throughout 2017 (T.31), especially for investment fund shares (6%). An exception was the growth rate in debt securities, which was distinctly negative over the five years to end-March 2018 and stood at -12% for 1Q18. This decline may reflect investors' search for yield.

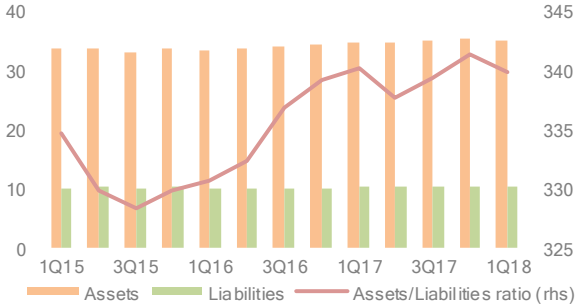
T.31
Growth rates among financial assets by class
Sustained growth in most asset classes



Note: Average annualised growth rates of financial asset classes held by EU households, in %. Ins.= insurance companies, Other assets=other accounts receivable/payable.
Sources: ECB, ESMA.

EU households held around EUR 35tn of financial assets in 1Q18, versus EUR 10tn of financial liabilities (T.32). Underpinned by asset growth, the **household asset-to-liability ratio** reached a five-year high during the second half of 2017, having previously peaked in 1Q15 following several quarters of roughly constant deleveraging in the sector. The rate of growth in household financial assets remained broadly flat, however, in the face of low yields.

T.32
Household assets-to-liabilities ratio
Net wealth dips from five-year high

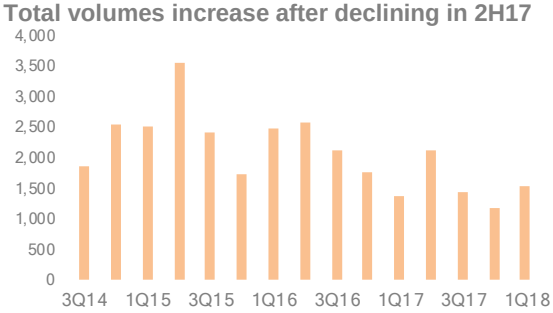


Note: EU households' financial assets and liabilities, EUR tn. Assets/Liabilities ratio in %.
Sources: ECB, ESMA.

Retail investor complaints: up in 1Q18

The incidence of detrimental outcomes as measured by the overall volume of **consumer complaints** made directly to NCAs fell in 2H17 compared with the previous six months, marking a three-year low, before increasing again in the first months of 2018 (T.33). 1H16 had seen a spike in aggregate complaints, attributable to underlying issues in relation to Contracts for Difference (CFDs) in 2015 – complaints being a lagging indicator – and issues around bank resolutions. While complaints relating to CFDs remained at elevated levels throughout the year for a niche retail product, complaints relating to debt securities fell considerably, a broadly based trend across different national markets.

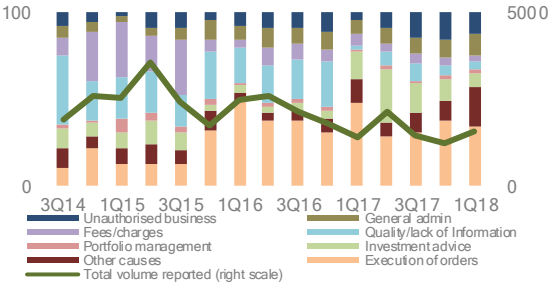
T.33
Consumer complaints filed directly with NCAs
Total volumes increase after declining in 2H17



Note: Total complaints collected via firms. Data collected by NCAs.
Source: ESMA complaints database.

The two primary **causes for complaint** filed with NCAs in 2H17 were the execution of orders (32%) and investment advice (18%) (T.34). The former has been a prominent cause for complaint since 1H16 and reflects varying definitions used by different countries in their data collection and categorisation systems. Likewise, investment advice may be broadly defined in some countries, and in a significant number of cases complaints appear to have been made conspicuously after receipt of advice, e.g. in the context of debt securities following credit events.

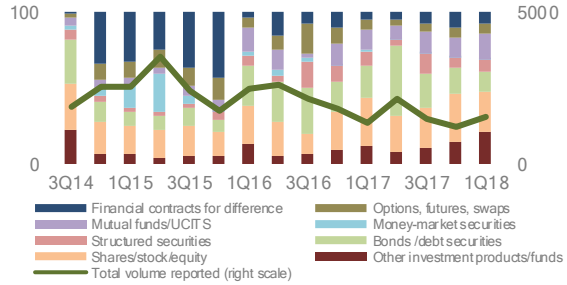
T.34
Complaints filed directly with NCAs, by cause
Execution of orders the main cause for complaint



Note: Complaints reported directly to 18 NCAs: AT, BG, CY, CZ, DE, DK, EE, ES, FI, HR, HU, IT, LT, LU, MT, PT, RO, SI. Line shows total volume of these complaints. Bars show % of total volume by cause. Data collected by NCAs.
Sources: ESMA complaints database

Regarding the **type of financial instrument** cited in complaints filed in 2H17, the proportion of complaints referring to debt securities fell substantially to 17%, down from 30% in the first half of the year (T.35). This trend was driven by firm credit events and, in particular, bank resolutions in more than one country that had led to complaints in late 2016 and early 2017.

T.35
Complaints filed directly with NCAs, by instrument
Increase in complaints related to debt securities



Note: Complaints reported directly to 18 NCAs: AT, BG, CY, CZ, DE, DK, EE, ES FI, HR, HU, IT, LT, LU, MT, PT, RO, SI. Line shows total number of thes complaints. Bars show % of total volume by type of financial instrument.
Source: ESMA complaints database

Infrastructures and services

The beginning of 2018 marked the entry into force of the new EU trading regime under MiFID II and MiFIR. The transition was smooth across EU trading venues, with no disruptions reported. In 1H18, bond trading on EU venues increased, although this was mostly due to off-exchange transactions now reported to them. For equities, dark pool trading decreased following introduction of the MiFID II Double Volume Cap measures. On the other hand, OTC trading increased significantly even though the majority of trading continued to take place on lit markets, while the volume traded in periodic auctions surged. Despite increased volumes during the episodes of high equity-market volatility at the beginning of February and in May, market infrastructures did not suffer major disruptions. The share of centrally cleared products remained high for both IRS and CDS. The number of EURIBOR panel contributors remained stable at 20 banks, and the dispersion of EURIBOR quotes submitted decreased overall.

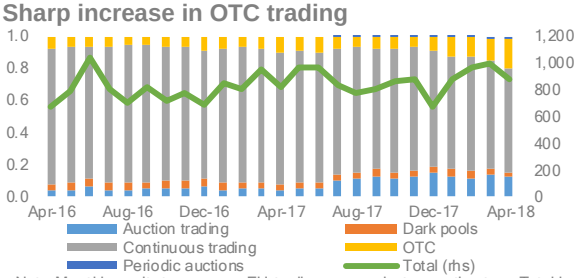
Trading venues: More transparency

MiFID II/MiFIR took effect on 3 January 2018 with the aim of ensuring fairer, safer and more efficient markets and facilitating transparency for all participants. The new reporting requirements should make more information available and reduce the use of dark pools and OTC trading.

Overall in 1H18, trading occurred mainly on lit or auction markets (68% and 13%, respectively) while OTC and dark pool trading amounted to only 15% and 4% respectively.[12] Nevertheless, while volumes on dark pools decreased in March, linked partly to the publication of Double Volume Cap (DVC) data launched in March, OTC volumes surged, with monthly volumes in May 2018 three times higher than in December 2017 (EUR 188bn against EUR 57bn; T.36). In parallel, the volume traded in periodic auctions increased by a factor of forty between December and May, although it still amounted to less than 2% of total on-exchange trading.[13]

The purpose of the DVC mechanism is to limit the amount of trading under certain equity waivers to ensure the use of such waivers does not harm price formation for equity instruments. More specifically, the DVC limits the amount of dark trading under the reference price waiver and the negotiated transaction waiver (see “MiFID II/MiFIR: DVC mechanism” Box T.12, p.10).

T.36
Equity turnover by transaction type
Sharp increase in OTC trading



Note: Monthly equity turnover on EU trading venues by transaction type.Total in EUR bn. “Auction”=Conventional auctions as part of regular trading, incl. opening and closing auctions and post-circuit-breaker auctions; “Periodic Auction”=Recurring auctions on individual ISINs, on the basis of distinct order books, offered as a services separate from regular trading.
Sources: Morningstar Realtime data, ESMA.

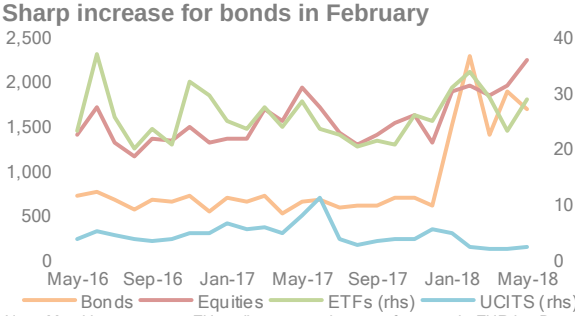
Meanwhile, the proportion of trading on multilateral trading facilities (MTF) remained at its end-2H17 level of 4% as most of the trading continued to take place on regulated markets (A.175).

Trading **turnover** in bonds jumped in February on European exchanges, reaching a monthly turnover similar to equities, as they now included reporting of off-exchange transactions. Over the semester, volumes were dominated by equity trading (51%) and bonds (48%) while ETFs and UCITS only made up less than 1% of the turnover (T.37).

[12] This analysis is based on Morningstar Realtime data. OTC trading is proxied by “Off-order book trading” including trades matched neither on an electronic order book nor on a dark pool. http://www.fese.eu/images/FESE_Statistics_Methodology_March_2018.pdf

[13] The share of periodic auctions trading increased to 3.4% for ISINs banned under the DVC, and 0.8% for non-banned ISINs; see box T.12, p. 10.

T.37
Turnover by type of asset
Sharp increase for bonds in February



Note: Monthly turnover on EU trading venues by type of assets, in EUR bn. Data for Aquis Exchange, BATS Chi-x Europe, Equiduct, London Stock Exchange, TOM MTF and Turquoise are not reported for bonds, ETFs and UCITS.
Sources: FESE, ESMA.

The number of **circuit-breaker** occurrences, which had averaged 104 per week in January, jumped to 400 during the equity sell-off in the week of 5 February. Overall, the weekly number of circuit-breaker occurrences in 1H18 averaged 134, around long-term averages (A.179).[14] Circuit breakers are trading-venue-based mechanisms designed to manage periods of high volatility by halting trading whenever the price of a security falls out of a predetermined price range; trading resumes after the securities affected are put into auction.

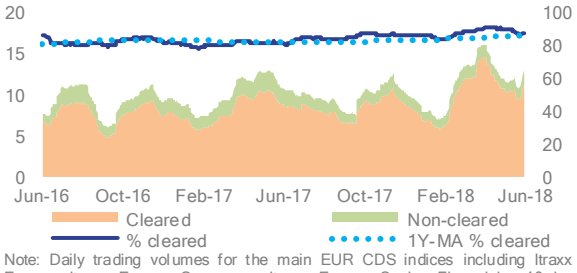
CCPs: increased CDS clearing

Some of the asset classes already subject to a clearing obligation in the EU are now subject to a trading obligation under MiFIR.[15] As of 3 January 2018, clearing members in the classes subject to the clearing obligation, as well as financial counterparties and AIFs above the EUR 8bn threshold, must trade several classes of interest rate derivatives denominated in EUR, GBP and USD, as well as several classes of credit derivatives denominated in EUR, on regulated markets (RMs), multilateral trading facilities (MTFs), organised trading facilities (OTFs) or third-country venues (in the case of EU equivalence decisions).

Central clearing held its long-term upward trend in 1H18. In the case of interest rate derivatives, clearing rates increased for all categories but FRAs, where rates remained around 95%. Clearing rates for basis swaps, regular swaps and OIS stood at 81%, 84% and 94%, respectively, up from 78%, 83% and 93% end-2H17 (A.185).

After the second phase of the clearing obligation for certain CDS indices had entered into force, CDS central clearing rates consistently increased. Based on daily trading volumes, the share of centrally cleared CDS indices now stands at 88%, up from 86% at the end of 2017 and far above the 80% mark for the first half of 2017. This is well above the five-year moving average (T.38).

T.38
EU CDS indices CCP clearing
Close to 90% cleared



Note: Daily trading volumes for the main EUR CDS indices including Itraxx Europe, Itraxx Europe Crossover, Itraxx Europe Senior Financials. 40-day moving average notional, USD bn. ISDA SwapsInfo data are based on publicly available data from DTCC Trade Repository LLC and Bloomberg Swap Data Repository.
Sources: ISDA SwapsInfo, ESMA.

CSDs: volatile rates of settlement fails

Continuing its regulatory effort, in 1H18 ESMA published three sets of guidelines[16] under **Central Securities Depositories Regulation** (CSDR) in all EU languages. The first establishes processes to determine the most relevant currency in which settlement takes place, while the second refers to criteria for assessing the substantial importance of a CSD for a Member State. The third establishes procedures ensuring cooperation between authorities. ESMA has also published guidelines[17] on how to report internalised settlement. Following completion of the final migration wave to T2S, EU CSDs have applied for authorisation under CSDR. Two CSDs have already been authorised and the process is ongoing for most of the others.

Settlement fails increased for all categories around the end of January (T.39) and during the equity market sell-off in February. Settlement fails subsequently returned to lower levels.

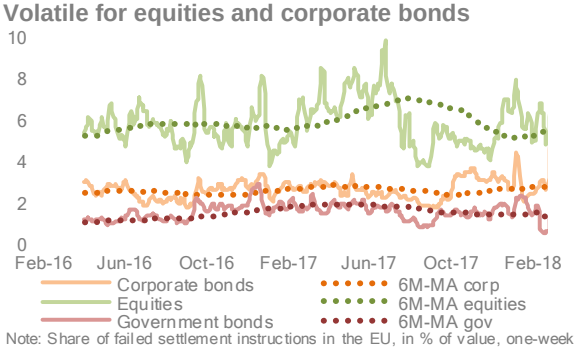
[14] The figures on CB occurrences on EU trading venues do not cover XETRA, Euronext or the Irish Stock Exchange.

[15] Commission Delegated Regulation (EU) 2017/2417 of 17 November 2017 supplementing Regulation (EU) No 600/2014 of the European Parliament and of the Council on markets in financial instruments with regard to regulatory technical standards on the trading obligation for certain derivatives (OJ L 343, 22.12.2017, p. 48).

[16] https://www.esma.europa.eu/press-news/esma-news/esma-publishes-official-translations-three-sets-guidelines-under-csdr

[17] https://www.esma.europa.eu/sites/default/files/library/esma70-151-1258_final_report__csdr_guidelines_on_internalised_settlement_reporting.pdf

T.39
Settlement fails
Volatile for equities and corporate bonds

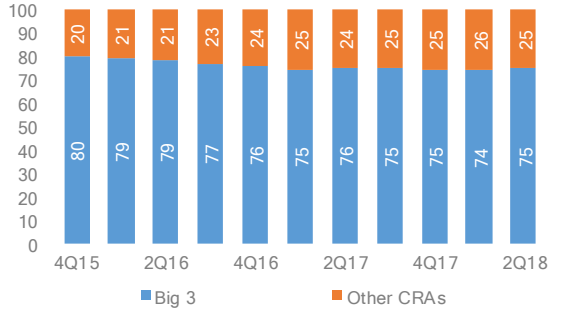


Note: Share of failed settlement instructions in the EU, in % of value, one-week moving averages.
Sources: National Competent Authorities, ESMA.

CRAs: credit quality of securitised products improves

The **CRA industry** in the EU remains concentrated around three large players (S&P's, Moody's and Fitch Ratings) that issue around 80% of all outstanding ratings (T.40). The concentration is 93% in terms of market share, defined as annual turnover generated from credit rating activities and ancillary services at group level.[18] On the other hand, smaller CRAs are expanding their business.

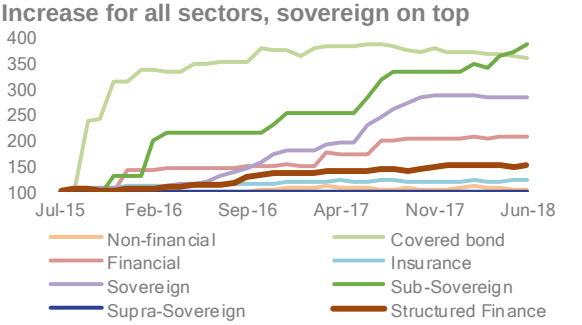
T.40
Ratio of outstanding ratings
Decreasing for the 3 bigger CRAs



Note: Share of outstanding ratings from S&P, Moody's and Fitch, and ratings from all other CRAs, in %.
Sources: RADAR, ESMA.

Indeed, the number of outstanding ratings issued by smaller CRAs is steadily growing: It has increased by 25% since 4Q15, while the ratings issued by the three largest CRAs have decreased by 7% (T.41). This trend is particularly pronounced in the sovereign and sub-sovereign sectors.

T.41
Evolution of outstanding ratings excluding the big 3 CRAs
Increase for all sectors, sovereign on top



Note: Evolution of outstanding ratings by asset type. All CRAs excluding S&P, Moody's and Fitch (01/07/2015=100).
Sources: RADAR, ESMA.

The market concentration is acknowledged by the legislator, which has sought to address this issue with a number of requirements, including the fee provisions that are the focus of a Thematic Report published by ESMA in January 2018.[19] According to the CRA Regulation (CRAR), CRAs are required to ensure that fees for credit rating and ancillary services are not discriminatory and are based on actual costs. ESMA's assessment identified three key areas of concern in this regard: limitation in the level of CRAs' transparency towards the market and clients; limitations in CRAs' cost monitoring practices; and significantly different market power across different CRAs in the credit rating industry.

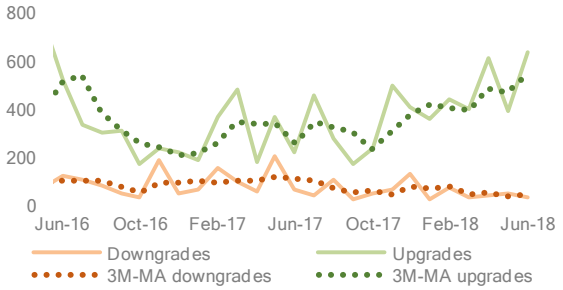
In terms of **geographical coverage**, of all the EU-registered CRAs only the three largest have full EU-wide coverage, issuing ratings for entities located or instruments traded in all 28 Member States. As of July 2018 there were seven CRAs that operated within national borders only.

In 1H18, rating actions on securitised products were characterised by more upgrades than downgrades (T.42). Moreover, while the average size of downgrades had increased in the first months of 2018, this was followed by a drop in May and June (A.55). This is partly related to the improved economic environment, which has led to a reduction in the leverage embedded in securitised instruments as senior tranches are repaid over time.

[18] See ESMA Report on CRA Market Share Calculation, 20 December 2017.

[19] See ESMA Thematic Report on fees charged by Credit Rating Agencies and Trade Repositories, 11 January 2018.

T.42
Number of rating changes on securitised assets
Upgrades outpace downgrades



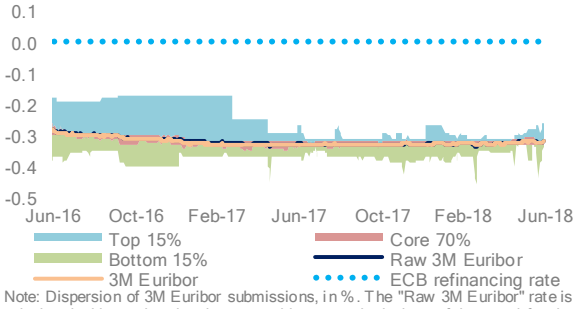
Note: Number of rating changes on securitised assets.
Sources: RADAR, ESMA.

Benchmarks: first publication of ESMA register of administrators

As from 3 January 2018, ESMA began publishing its register of benchmark administrators and third country benchmarks, in accordance with the **Benchmarks Regulation** (BMR).[20] As of 18 July 2018, the register lists 15 administrators[21] located in the Union which have been authorised or registered pursuant to Article 34, Article 30(1) and Article 32, Article 33 of the BMR. The register has been set up by ESMA on the basis of information provided by Member States. Currently the coverage is still limited.

In terms of panel composition, the Euribor panel composition remained stable in 1H18 at 20 banks, while 28 banks continued to constitute the EONIA panel (A.195). Our risk indicators do not identify any significant irregularity in Euribor submission and calculation during the reporting period.[22] The dispersion of Euribor submission quotes remained stable at the beginning of 1H18 (T.43).

T.43
Dispersion of submission levels
Increase in the bottom 15% in 1H18



Note: Dispersion of 3M Euribor submissions, in %. The "Raw 3M Euribor" rate is calculated without trimming the top and bottom submissions of the panel for the 3M Euribor.
Sources: European Money Markets Institute, ESMA.

The low level of dispersion is also reflected in the sharp drop in the maximum difference between the quotes submitted and the actual Euribor in early 1H18, as the submission by one panel bank converged to the other quotes in the six-month tenor rate. Alongside this, the **gap** between the actual Euribor[23] and the non-trimmed average for the three-month tenor narrowed in 1H18 (T.44).

T.44
Difference between maximum contribution and Euribor
Low following end-2017 volatility spike

Note: Normalised difference in percentage points between the highest contribution submitted by panel banks and the corresponding Euribor rate. The chart shows the maximum difference across the 8 Euribor tenors.
Sources: European Money Markets Institute, ESMA.

The **three-month Euribor rate** remained flat at negative levels during the first half of the year, with 94% of the banks keeping their quotes unchanged on average (A.198). Finally, in 2018 the three-month Euribor remained below the ECB interest rate for the main refinancing operations.

On 26 February 2018 the inaugural meeting of the working group on euro risk-free rates took place. The working group was launched at the end of last year by ESMA, the ECB, the EC and the Belgian Financial Services and Markets

[20] Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016.

[21] https://www.esma.europa.eu/benchmarks-register

[22] ESMA's risk indicators are based on the data publicly available on the EMMI website.

[23] The current Euribor calculation builds on a quote-based methodology, where the highest and lowest 15% of submitted quotes are eliminated in order to prevent any individual contributors from influencing the rate. The remaining quotes are then averaged.

Authority (FSMA).[24] Among other things, the working group is tasked with identifying and recommending alternative risk-free rates and studying potential issues in relation to transition to these rates in line with its terms of reference. Such rates could serve as an alternative to the current interest rate benchmarks used in a variety of financial instruments and contracts in the Euro Area. The working group comprises a number of European credit institutions as voting members, plus industry associations as observers.[25]

In parallel, other Working Groups continue their work to implement the Financial Stability Board's recommendation to develop alternative risk-free rates (RFRs) for use as an alternative to IBOR-style reference rates. In particular, the Working Group on Sterling Risk Free Reference Rates, following the April 2017 decision to use SONIA benchmarks as preferred RFR, has focused on how to transition from GBP LIBOR using SONIA. On 23 April 2018, the BoE reformed the SONIA benchmark. The main changes were:

- The BoE took over the production of SONIA, including the calculation and publication from the Wholesale Market Brokers Association.
- Inputs to SONIA were broadened to include overnight unsecured transactions negotiated bilaterally as well as those arranged through brokers. These data are collected using the BoE Sterling Money Market data collection.
- The averaging methodology for calculating SONIA changed to a volume-weighted trimmed mean.
- The SONIA rate for a given London business day is now being published at 9am on the following London business day to allow time to process the larger volume of transactions it will capture. Previously it was 6pm on the same day.

Over the most recent six months, the indicative data show that the reformed SONIA would have been 1.5bps below the SONIA published using the previous methodology. Average daily volumes for reformed SONIA over that period were around GBP 50bn, or over three times larger than those underlying published SONIA.[26]

Work continues on the reform of EURIBOR to implement a new, hybrid methodology. The test phase of the hybrid methodology for EURIBOR developed by the European Money Markets Institute (EMMI), the administrator of EURIBOR, began on 2 May and ran for three months. EMMI also provides EONIA, but has decided not to pursue a review of the EONIA methodology[27] in line with the BMR. In its current form, EONIA would not become compliant with the BMR, and its use in new contracts would therefore not be permitted after 1 January 2020.

In parallel, on 28 June 2018 the ECB's Governing Council decided on the final methodology to calculate a euro short-term rate (ESTER) based entirely on money market statistical reporting (MMSR), which it will begin publishing in 2H19. Pre-ESTER data, based on the main methodological features of the forthcoming ESTER, have been released to allow market participants to assess the suitability of the new rate. ESTER will reflect the wholesale euro unsecured overnight borrowing costs of Euro Area banks and will complement existing benchmark rates produced by the private sector, serving as a backstop reference rate. Like the EONIA, it relies on transactions from the euro-denominated overnight unsecured money market segment. However, the two reference rates differ in several ways. First, EONIA is administrated by the private sector via EMMI, while ESTER will be administrated by the ECB. EONIA relies on voluntary data input by 28 panel banks (with one contribution per bank), while the ECB's new rate will be built on the daily data submissions of the banks reporting in accordance with the MMSR Regulation. Moreover, EONIA is a weighted average rate of the submitted contributions; ESTER relies on individual transactions rather than on a single contribution per bank. Furthermore, ESTER is based on unsecured overnight borrowing deposit transactions, while EONIA is calculated using unsecured overnight lending transactions.

At the global level, in a recent statement on **benchmark reform**[28] IOSCO set out matters for consideration by users of financial benchmarks, in particular urging users to prepare for scenarios in which a benchmark is no longer available.

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[24] See ESMA's concluding remarks on the first meeting of the Euro Risk Free Rate Working Group – Frankfurt, 26 Feb. 2018

[25] http://www.ecb.europa.eu/paym/initiatives/interest_rate_benchmarks/WG_euro_risk-free_rates/html/index.en.html

[26] https://www.bankofengland.co.uk/markets/sonia-benchmark

[27] https://www.emmi-benchmarks.eu/assets/files/D0030D-2018-Eonia%20review%20state%20of%20play.pdf

[28] See IOSCO Statement on Matters to Consider in the Use of Financial Benchmarks, 5 January 2018.

Products and innovation

FinTech continues to drive innovation in financial services, with potentially far-reaching consequences for both end users and service providers. Virtual Currencies (VCs) and Initial Coin Offerings (ICOs) have been the focal point of attention recently because of the massive cash inflows that they have attracted. Yet other applications of the Distributed Ledger Technology (DLT) and RegTech are also witnessing interesting developments. With this TRV, we start publishing our on-going monitoring of financial innovation and product trends. This new section outlines how these innovations, and various others such as crowdfunding and VIX Exchange-Traded Notes (ETNs), score on ESMA's innovation scoreboard, and discusses the main recent market and regulatory developments around them.

Key innovative areas

FinTech – technology-enabled innovation in financial services – is transforming the way financial markets and financial market participants operate, with a number of potential benefits for end-users. Yet this does not come without challenges, as these innovations may introduce new risks.

VCs, ICOs, DLT, RegTech and crowdfunding are the most prominent examples of this FinTech revolution. Retail investors attracted by the potential to make rapid gains have recently piled into VCs and ICOs, raising serious concerns among regulators across the globe. There have been a number of interesting developments on the DLT front over the last few months, although most remain in a test environment in the financial securities space. While RegTech may have far-reaching consequences for financial markets and their participants, it appears more benign from a regulator's standpoint because of its potential to enhance compliance with the rules. Meanwhile crowdfunding, for all the benefits that it could bring as an alternative source of funding for start-ups and small businesses provided appropriate safeguards are in place, remains a nascent industry in the EU.

Financial innovation scoreboard

ESMA takes a balanced approach to innovation, working to understand the economic functions that innovations may serve and the potential benefits and risks that they may bring. ESMA staff then look at how these innovations interact with the existing regulatory framework to assess whether there may be gaps or impediments in the current rules that would need to be addressed. ESMA has put in place a framework for monitoring financial innovation. This includes a financial innovation scoreboard, a methodology that enables ESMA to prioritise and analyse financial innovations relative to ESMA's objectives of investor protection, financial stability and market integrity.[29] The following part of this section outlines how the most prominent recent innovations perform on ESMA's scoreboard. While the scoreboard has helped capture the risks and benefits that these innovations may introduce, outcomes cannot be easily predicted. Also, there may be a need to adjust the scoring,

T.45
Financial innovation scoreboard

Innovation	IP	FS	MI
VCs	●	●	●
IP: mostly outside of the regulated space and extreme price volatility. FS: comparatively small in size, but requires monitoring. MI: most VC exchanges are unregulated and hence prone to market manipulation and operational flaws.			
ICOs	●	●	●
IP, FS, MI: similar to VCs above, except that some coins or tokens issued through ICOs have rights attached, e.g. profit rights, meaning that they could be less speculative over time. Also, ICOs could provide a useful alternative source of funding.			
DLT	●	●	●
IP: no major risks, has the potential to improve outcomes for consumers. FS: applications are still limited in scope, but scalability, interoperability and cyber resilience challenges will require monitoring as DLT develops. MI: anonymity, and potential significant governance and privacy issues.			
Crowdfunding	●	●	●
IP: the projects funded have an inherently high rate of failure. FS: no particular risk at this point. Also crowdfunding improves access to funding for start-ups and other small businesses. MI: the relative anonymity of investing through a crowdfunding platform may increase the potential for fraud.			

[29] For further details on ESMA's approach to the monitoring of financial innovation and its scoreboard, please refer to ESMA, 2016, "Report on Trends, Risks and Vulnerabilities, No.1, 2016" and "Report on Trends, Risks and Vulnerabilities, No.2, 2016" available at https://www.esma.europa.eu/sites/default/files/library/2016-348_report_on_trends_risks_and_vulnerabilities_1-2016.pdf and https://www.esma.europa.eu/sites/default/files/library/2016-1234_-_trv_no._2_2016.pdf.

RegTech

IP, FS, MI: widespread adoption of RegTech may in fact reduce certain risks. For example, the use of machine learning tools to monitor for potential market abuse has the potential to promote market integrity.

VIX ETNs

IP: complicated valuation, which depends on layers of synthetic exposure, may make it difficult for investors to understand the risks. Also, long VIX ETNs typically decline in value while short VIX ETNs risk dramatic falls in value. MI: Recent research suggests potential scope for manipulation of reference prices. FS: not of systemic importance at present but may be associated with contagion effects.

Note: Assessment of the risk financial innovation poses to Investor Protection (IP), Financial Stability (FS) and Market Integrity (MI). Green=low risk, yellow=medium risk, orange= high, red=very high.

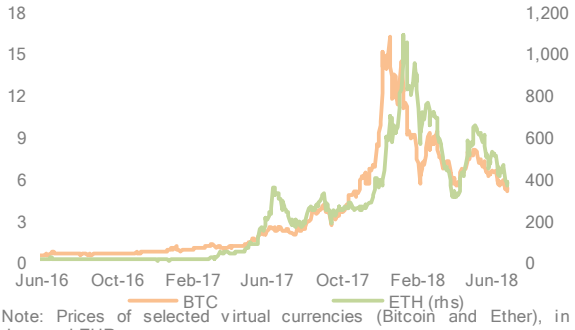
and hence ESMA's regulatory and supervisory response.

Market and regulatory developments

Virtual Currencies

After explosive growth in 2017, the market capitalisation of Virtual Currencies (VCs) plummeted to EUR 250bn as of end-June 2018, i.e., around a third of what it was at its peak of about EUR 700bn in early January 2018. (T.46)

T.46
Virtual currency price
VC prices down 70%, no recovery



Note: Prices of selected virtual currencies (Bitcoin and Ether), in thousand EUR.
Sources: Coinmarketcap.com, ESMA.

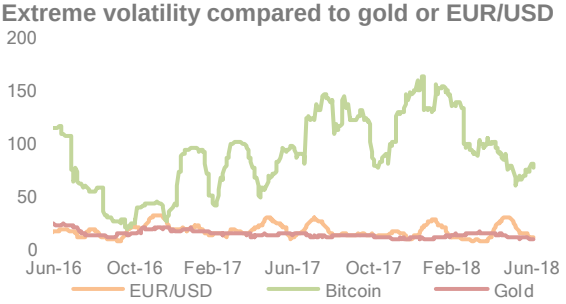
This sharp decline can be attributed to a combination of factors, including actions by regulators globally, aimed at warning investors about the high risks of VCs and curbing illicit VC activities. Well-publicised operational disruptions and hacks at VC exchanges have also helped investors realise that VCs are indeed extremely risky and that they have no protection when dealing with unregulated investments such as VCs.

Bitcoin, and to a lesser extent Ether, continue to dominate the market. But the development of additional coins since the advance of the ICO phenomenon in early 2017 has led to a slight drop in their combined market share. It currently fluctuates between 55% and 75%.

Both Bitcoin and Ether have undergone sharp price corrections since their peak in December 2017 and January 2018 respectively. Bitcoin saw two-thirds shaved off its peak quotation, while Ether suffered a 70% drop in value.

The volatility of VCs remains considerably higher than that of commodities or currencies (T.47). Since January 2018, the Bitcoin average 30-day rolling volatility has oscillated between 90 and 165%. Looking at the last ten years, the 30-day rolling volatility of gold reached a maximum of 60% in October 2008 during the financial crisis and, aside from occasional modest spikes, has remained quite stable around 10%. The volatility of the USD/EUR spot rate remained very stable at around 5% during the same period, except in January 2009 when it reached 30%.

T.47
Virtual currency price volatility
Extreme volatility compared to gold or EUR/USD



Note: Annualised 30-day historical volatility of USD-denominated returns for Bitcoin and gold, and 30-day historical volatility of EUR/USD spot rate returns, in %.
Sources: Thomson Reuters EIKON, ESMA.

In February 2018, ESMA, together with the other ESAs, issued a warning to consumers on the risks of buying VCs.[30] The warning alerts consumers to the fact that the price of VCs is extremely volatile and that there is a high risk of their losing a large part, or even all, of the money invested. What is more, because VCs largely operate outside of the regulated space, consumers will not benefit from the protection that goes with regulated investments.

It seems difficult to anticipate how the market might evolve in the coming months, partly because of the uncertainties attached to the regulatory status of VCs. Yet the phenomenon,

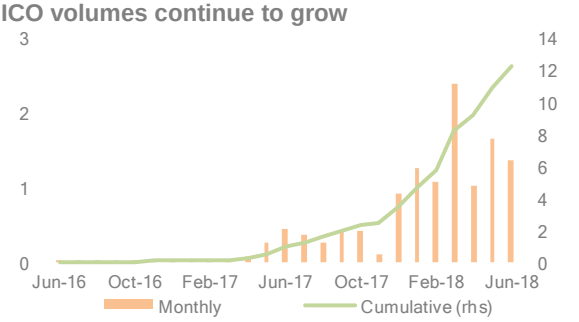
[30] European Supervisory Authorities, 2018: "ESA warning on virtual currencies", 12 Feb. Available at https://www.esma.europa.eu/press-news/esma-news/esas-warn-consumers-risks-in-buying-virtual-currencies

regardless of the exact form that VCs may take in the future, seems here to stay.

Initial Coin Offerings

The equivalent of EUR 8.8bn was raised through ICOs in the first six months of 2018, compared with EUR 3.3bn for the full year 2017.[31] Even discounting the record token sale of Telegram, which raised a total of EUR 1.4bn in 2018, annualised volumes are up fourfold in 2018 relative to 2017. Since Mastercoin, the first ICO launched in 2013, around EUR 12.3bn had been raised through ICOs as of mid-2018. As many smaller ICOs go unaccounted for, the actual volumes raised may be understated.[32] While initial ICOs typically involved innovative businesses at an early stage of development, now well-established companies such as Hyundai or Kodak have launched ICOs or are considering doing so. The investor base has expanded as well, moving from the "blockchain community" to a broader group of investors, including institutional (T.48).

T.48
ICO issuances in EUR
ICO volumes continue to grow



Note: Volumes raised in ICOs expressed in EUR bn, monthly and cumulative.
Sources: Coinschedule.com, ESMA.

This is despite the fact that a large proportion of businesses that launch ICOs fail. About half of the businesses that held ICOs in 2017 have already been unsuccessful: some are understood to be outright frauds while others simply fail to deliver the promised product or service.[33] Only 44% of start-ups survive the first 120 days from the end of their ICO. [34] Another important source of risk for investors relates to cyber security. On average 10% of ICO proceeds are lost due to hacks and cyber-attacks.[35] Coincheck.com, one of the most prominent crypto currency exchanges in Japan, suffered a major hack earlier this year, with around USD 500mn worth of tokens stolen.

In response to the phenomenon many regulators have issued warnings to alert investors to the high risks of ICOs. Some, including China and South Korea, have banned VCs/ICOs. In the US, the SEC has recently issued scores of subpoenas and information requests to technology companies and advisers involved in ICOs and VC-related activities. Some regulators, e.g. Gibraltar, Malta and France, are considering bespoke regimes. Gibraltar for instance is proposing the concept of 'authorised sponsors'.

In November 2017, ESMA issued two Statements on ICOs, the first to alert investors to the high risks entailed and the second to remind firms involved in ICO activities of their obligations under existing EU financial rules. Following these publications, ESMA set up a Task Force with Member States to look into ICOs/VCs and identify potential gaps and issues in the current EU rules that would require a regulatory response.[36] A key consideration for ESMA is the legal qualification of the coins or tokens issued under MiFID II and the broader implications that this may have on our regulatory and supervisory activities.

There are some industry-led initiatives, such as the Crypto Valley Association or Consensys, aimed at promoting sound practices, e.g. through codes of conduct or common standards. But it remains unclear whether they will gain sufficient traction to have a meaningful impact on the industry.

The distributed nature of the technology creates specific challenges in terms of regulation/supervision, as does the cross-border nature of the phenomenon, which calls for a coordinated international-level response. In March 2018, the G20 issued a communique highlighting the potential benefits but also the

[31] Source CoinSchedule.com, see https://www.coinschedule.com/stats.html

[32] Zetzsche et al., 2017, "Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation", European Banking Institute Working Paper Series 2017 - No. 11. Available from SSRN at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3018534##. The authors estimate overall funds raised in ICOs to be around USD 10bn by late 2017.

[33] Sedgwick, K., 2018, "46% of Last Year's ICOs Have Failed Already", Bitcoin.com News, Feb 23. Available at https://news.bitcoin.com/46-last-years-icos-failed-already/

[34] Benedetti and Kostovetsky, 2018, "Digital tulips? Returns to investors in Initial Coin Offerings", 5 June. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3182169

[35] Ernst & Young, 2017, "Cybersecurity regained: Preparing to face cyber attacks", 21 Nov. Available at https://consulting.ey.com/cybersecurity-regained/

[36] ESMA, 2017: "Report: the Distributed Ledger Technology Applied to Securities Markets", 7 Feb. Available at https://www.esma.europa.eu/press-news/esma-news/esma-assesses-dlt%E2%80%99s-potential-and-interactions-eu-rules

risks of crypto-assets and has requested the FSB and other standard-setting bodies, including CPMI and IOSCO, to report in July 2018 on their work on crypto-assets, underscoring a certain sense of urgency. The number of new ICOs launched continues to grow.

Distributed Ledger Technology (DLT)

The recent volatility in the VC and ICO markets has served to overshadow several interesting developments in the DLT sector. In December 2017 the Australian securities exchange, ASX, announced that it had selected DLT, developed by its technology partner Digital Assets, to replace CHESS, the system it uses to record shareholdings and manage the clearing and settlement of equity transactions in Australia. The decision follows on from the completion of extensive suitability testing over the past two years.[37] ASX subsequently launched a consultation paper to collect feedback from users and other stakeholders to assist in planning for delivery of the new system, which is expected to be rolled out by 2020-2021.[38] Vanguard has completed a pilot to provide a range of its index funds with up-to-date market data using a blockchain platform developed by Symbiont. According to Vanguard, the platform should allow the instantaneous distribution and processing of index data and remove the need for manual updates, thereby enhancing benchmark tracking and reducing costs.[39] In January, SWIFT and seven central securities depositories (CSDs) signed a Memorandum of Understanding to work together to demonstrate how DLT could be implemented in post-trade scenarios, such as corporate actions processing, including voting and proxy-voting. The group will investigate the types of new products that can be built using it, and how existing standards such as ISO 20022 can support it.[40] IZNES, the pan-European record-keeping platform for funds powered by SETL's blockchain technology, has started to process live transactions.[41] Chartered Opus and Marex Solution have launched a Structured Product to be transacted and custodied using blockchain. The product, a GBP principal protected note linked to the FTSE 100 index, is registered, cleared and settled on the Ethereum blockchain.[42] Finally, a number of banks are experimenting with the way blockchain could help cut costs and enhance transaction processing within capital markets, e.g. for debt issuance, corporate loans or foreign exchange transactions.[43]

In February 2017, ESMA published a report looking more closely into the possible applications of DLT to securities markets, the potential benefits and risks, and the gaps and impediments in the existing regulatory framework. The report concluded that any regulatory action would be premature at this juncture, pending future market developments. At the national level, following two public consultations in May and September 2017 the French Ministry of Finance published on 9 December 2017 a DLT Order on the use of a shared electronic recording device for the representation and transmission of financial securities.[44] The Order effectively legalises blockchain for the representation, transmission and pledge of 'non-CSDR' securities, e.g. funds, commercial paper and private securities. The DLT Order will enter into force upon publication

37 ASX media release, 2017, "ASX selects distributed ledger technology to replace CHESS", 7 Dec. Available at https://www.asx.com.au/documents/asx-news/ASX-Selects-DLT-to-Replace-CHESS-Media-Release-7December2017.pdf

38 ASX consultation paper, 2018, "CHESS replacement: new scope and implementation plan", April 2018. Available at https://www.asx.com.au/documents/public-consultations/chess-replacement-new-scope-and-implementation-plan.pdf

39 Ricketts, D., 2017: "Vanguard successfully tests blockchain for market data", Financial News, 17 Dec. Available at https://www.fnlondon.com/articles/vanguard-successfully-tests-blockchain-for-market-data-20171212

40 SWIFT media release, 2018, "SWIFT and CSD community advance blockchain for post-trade", 16 Jan. Available at https://www.swift.com/news-events/press-releases/swift-and-csd-community-advance-blockchain-for-post-trade. Abu Dhabi Securities Exchange, Caja de Valores, Depósito Central de Valores, Nasdaq Market Technology AB, National Settlement Depository, SIX Securities Services and Strate Ltd are among the CSDs participating in the DLT project with SWIFT. Additional CSDs are expected to join in the coming weeks.

41 MondoVisione media release, 2018, "SETL and OFI AM Blockchain Transactions on IZNES Fund Record-Breaking Platform", 11 Jan. Available at http://www.mondovisione.com/media-and-resources/news/setl-and-ofi-am-process-blockchain-transactions-on-iznes-fund-record-keeping-pla/

42 Marex Spectron media release, 2018, "World's first blockchain-based structured product", March 2018. Available at http://www.marexspectron.com/about-us/news/2018/03/worlds-first-blockchain-based-structured-product

43 See for example, WSJ blog, 2018, "JPMorgan tests blockchain's capital markets potential", May 2018. Available at https://blogs.wsj.com/cio/2018/05/16/jp-morgan-tests-blockchains-capital-markets-potential/

44 Ordonnance n° 2017-1674 du 8 décembre 2017 relative à l'utilisation d'un dispositif d'enregistrement électronique partagé pour la représentation et la transmission de titres financiers. Available (in French) at https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000036171908&categorieLien=id

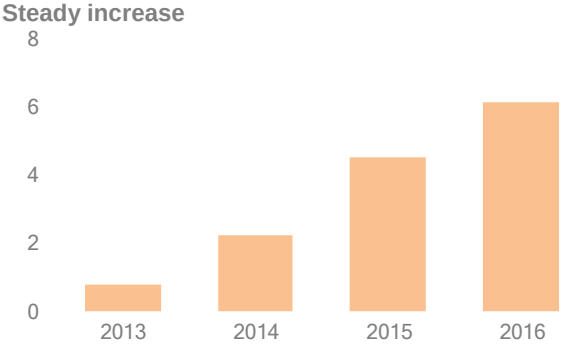
of a pending decree, which will specify its technical conditions.

ESMA expects to see a number of interesting further developments around DLT applied to financial markets in the coming months.

Crowdfunding

Crowdfunding is still a nascent industry in Europe, and data on the state of the market are patchy. The volumes raised through crowdfunding have been growing fast, although from a tiny base (T.49). The size of the market almost doubled every year between 2013 and 2016 to reach EUR 6.1bn in 2016. [45]

T.49
Volume raised in crowdfunding
Steady increase



Note: Crowdfunding volume raised, in EUR bn.
Sources: Cambridge Centre for Alternative Finance, ESMA.

The UK dominates the market, with 76% of the total volume raised by UK-based companies in 2016, totalling EUR 4.6bn against EUR 1.5bn in the rest of the EU. The volumes raised in France and Germany in 2016 stood at EUR 350mn and EUR 260mn respectively.

Loan-based crowdfunding has been growing more quickly and is now six times larger than investment-based crowdfunding, at EUR 5.2bn in comparison to EUR 0.8bn in 2016.

The size of the deals depends very much on the type of funding model. As an example, in 2016 the average deal size for investment-based crowdfunding was around EUR 325k, in comparison to EUR 110k for P2P business loans. Equity-based crowdfunding is mostly used by "technology" companies, "real estate & housing companies" and "Internet & e-commerce companies", in that order. Technology companies alone represented 20% of the entire equity-based funds raised in Europe.

In March 2018, as part of its FinTech Action Plan, the European Commission issued a proposal for an EU regulation on investment-based and lending-based crowdfunding, with a view to fostering the growth of a pan-European crowdfunding industry, which is still underdeveloped.[46] This proposal establishes a European label for crowdfunding service providers which would be authorised and supervised at EU level under an EU regime. It seeks to address risks in a proportionate manner, by empowering investors with the necessary information. Also, it requires crowdfunding service providers to have the necessary safeguards in place to minimise the likelihood of risks materialising.

RegTech and SupTech

Firms across the financial sector are increasingly using "RegTech", i.e. technological tools designed to facilitate compliance. Established market participants are in some cases developing RegTech themselves, though many third-party providers offer tools such as automated reporting software or model risk management. At the same time, national authorities are turning to new technology to support financial supervision ("SupTech").

Different drivers have spurred the recent global development of RegTech and SupTech. A major driver on the demand side is the increase in reporting requirements in many jurisdictions following the financial crisis. Supply-side drivers include increased computing power and data storage capacity, a long-standing trend boosted in recent years by cloud computing.

One form of technology underpinning many RegTech and SupTech innovations is machine learning, whereby problem-solving software improves its performance automatically through repeated trials based on training data. Machine learning algorithms typically need very large data sets to optimise their performance effectively. Recent years have seen huge growth in the amount of relevant data available from diverse sources. Promising applications include new software to help detect market integrity issues and increased automation of stress tests. For

[45] Cambridge Centre for Alternative Finance, 2018, "3rd European Alternative Finance Industry Benchmarking Report". Available at https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/expanding-horizons/#.WwRFRI0UlaU

[46] European Commission, 2018, "FinTech action plan: For a more competitive and innovative European financial sector", 8 March. Available at https://ec.europa.eu/info/publications/180308-action-plan-fintech_en

example, the Autorité des Marchés Financiers du Québec recently implemented automated alerts, based on a machine learning algorithm applied to OTC derivatives data, to detect potentially non-compliant transactions.

Another example of RegTech is the use of Application Programming Interfaces (APIs) to facilitate reporting and communication within and by firms. Recent cases have included seven of the largest Austrian banking groups using a common reporting platform developed with a RegTech provider as a central interface between the banks and the central bank of Austria. This has enabled greater automation of aspects of the reporting process. As with machine learning tools, RegTech is just one among many applications of APIs across the wider economy.

The benefits and risks arising from different RegTech and SupTech innovations can be expected to evolve over time in step with developing technologies and business models. A direct benefit to firms from RegTech is cost reduction. Another benefit to firms and the financial system as a whole is that greater automation can reduce human error. Additionally, RegTech and SupTech tools based on machine learning may enhance monitoring capabilities, detecting subtle patterns in vast data sets that indicate potential market abuse or threats to financial stability.

However, such tools will be effective only if used appropriately. Low-quality input data may lead to poor performance. Another source of risk to firms and authorities when monitoring markets is potential over-reliance on automated warnings at the expense of qualitative expertise. Finally, increased automation and the use of cloud-based tools may increase concentration risk.

Emerging issues

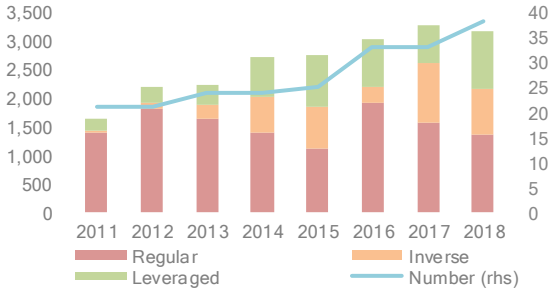
VIX ETNs: market risks materialise

The VIX index measures the implied volatility of options on the S&P 500 index. It was launched in 1993 by the Chicago Board Options Exchange. Futures and options on the VIX were introduced in 2004 and 2006 respectively, enabling investors to trade this measurement of investor sentiment with regard to future volatility. Realising the generally negative correlation between volatility and stock market performance, many investors have looked to use volatility instruments to hedge their portfolios.[47]

A VIX Exchange-Traded Note (ETN) is a tradable unsubordinated debt security that tracks an index of VIX futures. For example, a VIX ETN might track the VIX Short Term Futures Index, which itself replicates a constant one-month rolling long position in first- and second-month VIX futures contracts. Importantly, VIX ETNs do not track the VIX itself.

In contrast to VIX ETNs, inverse VIX ETNs aim to profit from falling volatility by shorting VIX futures of different maturities, i.e. they are a bet on a falling VIX, selling longer-dated volatility index futures. The number of ETFs and ETNs on the VIX and their total value outstanding has risen in recent years, with increases in exposure via leveraged and inverse products in particular (T.50). In the three months to end-March 2018, ETFs and ETNs with exposure to the VIX were worth around USD 3.2bn. Similar (though fewer) instruments exist for the European market in the form of VSTOXX ETNs. The VSTOXX is a volatility measure based on options on the Eurostoxx 50 index with a 30-day rolling maturity.

T.50
ETFs and ETNs with VIX exposure
Inverse and leveraged exposures increase



Note: Number and total volume outstanding of ETFs and ETNs with exposure to the VIX, USD mn, by category of exposure. "Inverse"=inverse exposure to the VIX. "Leverage"=leveraged long exposure. "Regular"=long exposure. 2018 data to end-March.
Sources: ETFGI, ESMA.

This growth in total exposure is despite the fact that long VIX ETNs almost constantly lead to losses for investors, and that inverse VIX ETNs involve significant risks. The VIX futures market is usually in contango as contracts tend to decrease in value as they near expiry.[48] The

[47] Analysis of the strong negative correlation between VIX futures and S&P futures can be found in AMF, 2018, "Heightened volatility in early February 2018: the impact of VIX products", 18 April, p.28. http://www.amf-france.org/en_US/Publications/Lettres-et-cahiers/Risques-et-tendances/Archives?docId=workspace%3A%2F%2FSpacesStore%2F1b3ca6c2-149c-4ab9-8043-826e060c19e8&xtor=RSS-7

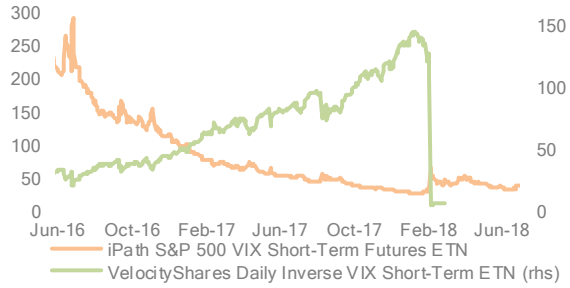
[48] Given that VIX futures are strongly negatively correlated with S&P futures, demand for long VIX positions is to some extent likely to be attributable to the hedging of long positions in equities. Hedging behaviour will push

exception to this tends to be when the VIX is at a relatively high level, in which case market expectations tend to be that stock market volatility will decrease. As VIX ETNs are based on VIX futures, they typically decay in value as the relevant futures themselves decay in value, converging on the VIX itself.

There is a risk that retail investors may misunderstand the exposure they take on in buying a VIX ETN if they assume they have direct exposure to the VIX itself, rather than to futures on the VIX.[49]

While inverse VIX ETNs saw large returns from the low volatility of recent years, events on 5 February 2018 showed what devastating effects a sharp increase in volatility can have for investors in such instruments. After the VIX experienced its largest daily increase on record, rising 20 points from 17 to 37, inverse VIX ETNs suffered severe losses. A prominent example of such loss was the Credit Suisse "VelocityShares Daily Inverse VIX Short-Term ETN". The ETN's value was down 93% at the end of the trading session, after a halt in trading that had lasted for most of the morning. This led to the bank redeeming the ETN early, as is generally a possibility under the terms of short volatility products, given the potential for unlimited losses for the issuer (T.51).

T.51
Contrasting returns from long and short VIX ETNs
Short positions plunged in February 2018



Note: Prices of the iPath S&P 500 VIX Short-Term Futures ETN and the VelocityShares Daily Inverse VIX Short-Term ETN (rhs), USD. VelocityShares Daily Inverse VIX Short-Term ETN was redeemed early after 5 February 2018.
Sources: ThomsonReuters, ESMA.

Sharp volatility increases such as were seen on 5 February 2018 are perceived to be very improbable events, and market participants may thus underestimate their associated risks. Moreover, herding and contagion effects can worsen the impact of such events, as investors shorting volatility seek to offset their positions by shorting equities or buying volatility protection, in turn worsening the turmoil.

The substantial risks inherent in VIX investments make the market outlook for VIX ETNs especially uncertain. One topic that may prompt close monitoring by authorities in future is the apparent potential for market manipulation in relation to volatility indices. For example, recent academic research suggests that market manipulation may explain volume spikes in the options used to calculate the VIX.[50] This research is limited to the VIX rather than the VSTOXX, as the value of the latter is derived in a different way and is based not on quotes but solely on trade prices.[51]

Product intervention

CFDs and Binary Options

In March 2018, ESMA announced that its Board of Supervisors had agreed measures under ESMA's recently-established Product Intervention powers restricting the provision of Contracts for Difference (CFDs) to retail investors and prohibiting the provision of Binary Options to retail investors. On 1 June 2018, the measures adopted were published in the Official Journal of the European Union. They came into effect on 2 July 2018 for Binary Options and 1 August 2018 for CFDs.

ESMA, along with NCAs, had identified a significant investor protection concern in relation to CFDs and Binary Options offered to retail investors. The measures, which apply to firms across the EEA, have been taken to protect retail investors.

The intervention measures relate to CFDs, which are cash-settled derivative contracts designed to give the holder (long or short) exposure to an underlying. These CFDs include, inter alia, rolling spot forex products and financial spread bets. Unlike some other products such as options, CFDs are cash-settled and do not have a predetermined expiry. They are typically offered with leverage which amplifies returns. However, a source of detriment to investors is the high leverage, as financing costs and transaction costs (such as bid-ask spreads) are typically

up the price of a future on the VIX compared to its current value, since such investors pay a premium to hedge their positions.

49 Financial Times, April 18, 2017, "The Fearless Market Ignores Perils Ahead". https://www.ft.com/content/099ebfe2-2061-11e7-a454-ab04428977f9

50 Griffin, J. M. and Shams, A., 2017, "Manipulation in the VIX?" Review of Financial Studies, Volume 31, Issue 4, 1 April, pp 1377–1417. https://doi.org/10.1093/rfs/hhx085

51 See Le Moign, C. and Raillon, F., 2018, "Heightened Volatility in Early February 2018: The Impact of VIX Products", AMF.

based on the investment's total value. An additional source of risk identified was that high leverage exacerbates the risk of sudden price movements depleting much or all of an investor's margin, or even leaving the investor owing money to providers. In the case of the Swiss Franc event of January 2015, for instance, when the Franc rose suddenly against the Euro following a policy announcement by the Swiss National Bank, many retail investors were left owing very large sums of money to firms.

A Binary Option is a cash-settled derivative that expires at a pre-specified time. It generally has two possible outcomes at expiry: either it pays out a fixed monetary amount (the "fixed payoff"), specified in advance, or it is worth zero (i.e. the investor loses the entire investment). The option pays out at expiry if a specified event relating to the price of the underlying has occurred. For example, a Binary Option may pay out if the price of an underlying equity index rises during a specified period for investors in such instruments.

Investor protection concerns relate to the complexity and lack of transparency of the products. In the case of CFDs, excessive leverage is also a concern. In the case of Binary Options, retail investors were exposed to detrimental outcomes arising from, firstly, structural negative expected returns and an embedded conflict of interest between providers and their clients; secondly, the disparity between the expected return and the risk of loss; and thirdly, issues related to the product marketing and distribution.

NCAs' analyses of CFD trading across different EU jurisdictions have shown that 74% to 89% of retail accounts typically lost money on their investments, with average CFD trading losses per client ranging from EUR 1,600 to EUR 29,000 in recent years. NCAs' analyses for Binary Options also found consistent losses on retail clients' accounts.

The agreed measures are as follows:

Binary Options: a prohibition on the marketing, distribution or sale of Binary Options to retail investors; and

CFDs: restrictions on the marketing, distribution or sale of CFDs to retail investors, including:

- leverage limits on opening positions;
- a margin close-out rule on a per account basis; negative balance protection on a per account basis, standardising practices between providers and preventing investors' margins from being eroded close to zero;
- negative balance protection ensuring that investors are not placed in a position of owing money to providers;
- preventing the use of incentives by a CFD provider; and
- a firm-specific risk warning delivered in a standardised way.

MiFIR gives ESMA the power to introduce temporary intervention measures on a three monthly basis. Before the end of the three months, ESMA will review the product intervention measures and consider the need to extend them for a further three months.

Risks

ESMA Risk Dashboard

R.1
Main risks

Risk segments	Level	Outlook	Risk categories	Level	Outlook	Risk sources	Outlook
Overall ESMA remit	orange	→	Liquidity	orange	→	Macroeconomic environment	→
Systemic stress	yellow	→	Market	red	→	Low interest rate environment	↗
Securities markets	red	→	Contagion	orange	→	EU sovereign debt markets	→
Investors	yellow	→	Credit	orange	→	Infrastructure disruptions, incl. cyber risks	↗
Infrastructures and services	yellow	→	Operational	yellow	↗	Political and event risks	↗

Note: Assessment of main risks by risk segments for markets under ESMA remit since last assessment, and outlook for forthcoming quarter. Assessment of main risks by risk categories and sources for markets under ESMA remit since last assessment, and outlook for forthcoming quarter. Risk assessment based on categorisation of the ESA Joint Committee. Colours indicate current risk intensity. Coding: green=potential risk, yellow=elevated risk, orange=high risk, red=very high risk. Upward arrows indicate an increase in risk intensities, downward arrows a decrease, horizontal arrows no change. Change is measured with respect to the previous quarter; the outlook refers to the forthcoming quarter. ESMA risk assessment based on quantitative indicators and analyst judgement.

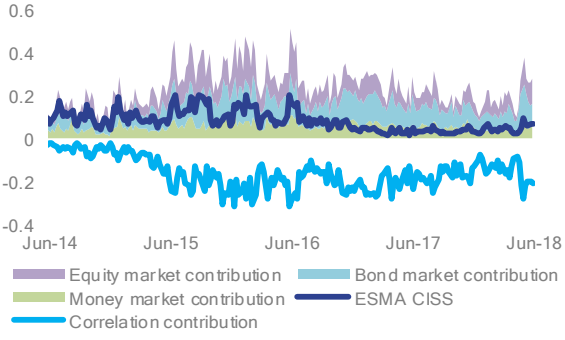
Equity markets in the EU began the quarter with a price recovery from the previous drop but then fell again in May. Sovereign and corporate bond market volatility was also high, as signs of liquidity drying up appeared in May. Market risk is very high, resulting from high asset valuations in equities coupled with market uncertainty as the period of ultra-low interest rates draws to a close. Our outlook for liquidity, contagion and credit risk remains unchanged. Operational risk was elevated, with a negative outlook, as cyber threats and Brexit-related risks to business operations remain major concerns. Going forward, EU financial markets can be expected to become increasingly sensitive to mounting political and economic uncertainty from diverse sources, such as weakening economic fundamentals, transatlantic trade relations, emerging market capital flows, Brexit negotiations, and others. Assessing business exposures and ensuring adequate hedging against these risks will be a key concern for market participants in the coming months.

Risk summary

Market risk remained at a very high level in 2Q18, accompanied by very high risk in securities markets and elevated risks for investors, infrastructures and services. Equity and bond volatility spikes in February and May reflected growing sensitivities. The level of credit and liquidity risk remained high, with a deterioration in outstanding corporate debt ratings and weakening corporate and sovereign bond liquidity. Operational risk was elevated, with a negative outlook as cyber threats and Brexit-related risks to business operations remain major concerns. Investor risks persist across a range of products, and under the MiFIR product intervention powers ESMA recently restricted the provision of Contracts for Difference (CFDs) and prohibited the provision of Binary Options to retail investors. Going forward, EU financial markets can be expected to become increasingly sensitive to mounting political and economic uncertainty from diverse sources, such as weakening economic fundamentals, transatlantic trade relations, emerging market capital flows, Brexit negotiations, and others. Assessing business exposures and ensuring adequate hedging against these risks will be a key concern for market participants in the coming months.

Systemic Risk as measured by the ESMA version of the Composite Systemic Indicator increased in 2Q18, reaching levels unseen since mid-2016 following the UK referendum on membership of the EU. The main sectoral contribution to the indicator's increase stems from bond markets.

R.2
ESMA composite systemic stress indicator
Multi-quarter high, driven by bonds



Note: ESMA version of the ECB-CISS indicator measuring systemic stress in securities markets. It focuses on three financial market segments: equity, bond and money markets, aggregated through standard portfolio theory. It is based on securities market indicators such as volatilities and risk spreads.
Sources: ECB, ESMA.

Risk sources

Macroeconomic environment: The European economy grew at its fastest rate for ten years in 2017. EU GDP growth moderated in 1H18 and it is forecast at 2.1% in 2018 while global economic growth is overall solid but has become more differentiated across regions (3.9% predicted in 2018).[52] In the US, stronger-than-anticipated inflation reignited investors' fears of more aggressive interest-rate increases. The macroeconomic environment and its interaction with market expectations, notably over future monetary policy actions, played an active role in February's market correction and remain a significant risk source going forward. Appreciation of the USD raised fears over companies' ability to repay their dollar-denominated debt and, in April 2018, drove the first two weeks of outflows from emerging market bond funds since 2016.

Low interest-rate environment: In 2018, risks related to the low interest-rate environment switched from risks related to the consequences of this environment - with the associated search-for-yield behaviour by investors and potential mispricing of assets - to risks related to the gradual increase in interest rates and end of low yields. Initial signs of a reversal in risk premia related to an exit from the low interest rate environment first appeared in the US, triggering a global equity sell-off in February. Since then, risk premia on sovereign and corporate bond markets have started to diverge, showing signs of risk reallocation. Ten-year EA sovereign spreads to the DE Bund increased by 23bps on average (R.9), while corporate spreads widened by 15bps on average across ratings (R.15). Covered bond spreads experienced similar movements (R.18). Another sign of the potential curbing of search-for-yield behaviour is the continued net outflows from high-yield bond funds experienced over 2Q18 (R.25). Market reactions to monetary policy actions and the phase-out of the low-interest-rate environment will be interlinked going forward. Hence, our risk outlook for this category remains on a deteriorating trend.

EU sovereign debt markets: In 2Q18, EU sovereign bond yields were characterized by high volatility during short periods of political uncertainty. Ten-year sovereign yields increased in IT, PT or ES (+0.9, +0.4 and +0.2pps respectively) while they decreased by 0.2 % in DE, DK or SE. These movements may have been amplified by lower liquidity in these markets, most notably in May.

Market functioning: Following the entry into force on 3 January 2018 of MiFID II/MiFIR, ESMA published the first Double Volume Cap (DVC) data on 7 March 2018. For the ISINs banned by the DVC publications, volumes on continuous trading and auctions represent the large majority of trading; between the end of 2017 and the end of May 2018 they increased from 91% to 96% of the total. Dark pool volumes decreased from almost 9% to 0.15% of the total over the same period, while volume traded in periodic auctions increased from 0.2% to 3.4%. Hour-long market interruptions due to technical glitches occurred, for example, in the US (25 April) and in the UK (7 June) with only few to no repercussions on the related markets. The number of circuit-breaker occurrences, which averaged 100 per week, peaked at 202 during the last week of May. Overall, this mean weekly number is below long-term averages (R.35). Regarding market infrastructures, central clearing continued to increase amid ongoing implementation of the clearing obligation for derivatives. With respect to securities settlement systems, following completion of the final migration wave to T2S, EU CSDs have applied for authorisation under CSDR. Cyber risk remained a concern for financial institutions, especially with respect to their business continuity and the integrity of proprietary data, as data theft is still the main source of breaches in the financial sector (R.43). Finally, the total volume of retail investor complaints increased in 1Q18, with the majority remaining linked to the execution of orders for bonds and equities (R.32, R.33).

Political and event risk: In the EU, Brexit remains one of the most significant political risks, even though a preliminary common understanding on a transition period was reached in March 2018. Market participants need to prepare for a potential scenario of no agreement and the related risks, including contract continuity and reduced access to financial market infrastructures. Growing uncertainty around trade and global market policies could also pose a threat to the continued improvement of trade and capital market integration in the EU and other jurisdictions.

[52] IMF, World Economic Outlook, July 2018, and European Commission, Summer 2018 (Interim) Forecast.

Risk categories

Market risk – very high, outlook stable: Equity markets began 2Q18 with a recovery from the previous quarter's losses. Nevertheless, EU equity markets were unsettled again at the beginning of May as political developments in Europe, together with geopolitical events and discussions over international trade arguments, drove up volatility. Measured by the VIX for the US or the VSTOXX for the EU, volatilities jumped in May to 17% and 20% respectively. Other markets, such as sovereign and to a lesser extent corporate bonds, were also subject to these event risks. Appreciation of the USD against most of the other main currencies amid a strong US economy and expectations of monetary tightening from the Federal Reserve forced several EM central banks to raise official rates as well. Against the EUR, the USD gained 5% over the course of the quarter. These developments should be closely monitored, as equity and sovereign markets, where liquidity is becoming tighter, appear vulnerable to these short-lived events and EM-focused European funds registered outflows (R.25).

Liquidity risk – high, outlook stable: In May bond markets experienced temporary deteriorating liquidity. On sovereign bond markets in particular, both the bid-ask spreads (R.10) and the composite sovereign bond indicator jumped. Two-year Italian debt rose by 130bps on 29 May, its biggest daily move since 1992. The rise was less pronounced on corporate bond markets, where only the Amihud indicator (R.16) increased significantly. Tight bond liquidity may have exacerbated price movements on these markets. Trading volumes of centrally cleared repos broadly followed the long-term upward trend (R.13). Collateral scarcity premia (i.e. the difference between general collateral and special collateral repo rates) were lower in 2Q18 than during the previous quarter, despite an end-quarter spike. High levels of collateral scarcity premia reflect possible shortages of high-quality collateral (R.14). This may fuel liquidity risk and volatility in funding costs and reduce overall market confidence.

Contagion risk – high, stable outlook: On sovereign bond markets, the median correlation between Germany and other EU countries' bond yields decreased during 2Q18 as only some MS saw significant increases in their yields. Dispersion levels increased for the same reason (R.19). Finally, interconnectedness between hedge funds or MMFs and the banking sector decreased slightly in 2Q18 although remaining at a relatively high level (R.29).

Credit risk – high, outlook stable: In 2Q18, non-financial corporate bond spreads continued to increase for low-ratings (BBB). This development had begun in February as a result of asset reallocation and following market movements for equities and bonds. Spread increases were more pronounced for low-rated bonds, which could be considered a sign of shifting risk perceptions linked to risk premia reversals. Spreads stood within a range of 113bps for BBB-rated securities to 10bps for the AAA class, in comparison to the much narrower range of 66bps to 9bps at end-2017 (R.15). At the same time, the credit quality of outstanding corporate bonds continued to deteriorate (R.17).

Operational risk – elevated, outlook deteriorating: ESMA recently identified several significant investor protection and conduct risk concerns in the EU. ESMA has formally adopted new measures on the provision of Contracts for Difference (CFDs) and Binary Options to retail investors. These measures were published in the Official Journal of the European Union on 1 June. As of 2 July 2018, there has been a ban on the marketing, distribution or sale of Binary Options to retail investors, while from 1 August CFDs have been subject to a restriction on their marketing, distribution or sale to retail investors. Risks related to Brexit, and its uncertain impact on an array of complex legal and regulatory issues, continue to pose a significant operational risk to EU financial markets, both for investors and infrastructures. ESMA issued a public statement to raise all market participants' awareness of the importance of preparing for the possibility of no agreement in the context of Brexit.[53] With regard to cyber risks, concerns are expected to intensify in the medium to long term as financial data breaches are increasingly frequent in comparison to breaches in other sectors (R.43); as a result, the risk outlook for operational risk is deteriorating. Finally, the dispersion of Euribor submission quotes was stable in 2Q18 (R.41).

[53] https://www.esma.europa.eu/press-news/esma-news/esma-reminds-uk-based-regulated-entities-about-timely-submission-authorisation

Securities markets

R.3

Risk summary

Risk level

Risk change from 1Q18

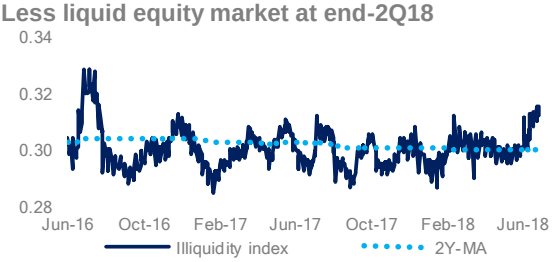
Outlook for 3Q18

Risk drivers

- Risk-premia reversal
- Political risk
- Geopolitical and event risks
- Potential scarcity of collateral

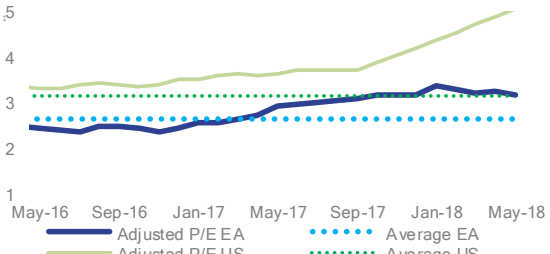
Note: Assessment of main risk categories for markets under ESMA remit since past quarter, and outlook for forthcoming quarter. Systemic risk assessment based on categorisation of the ESA Joint Committee. Colours indicate current risk intensity. Coding: green=potential risk, yellow=elevated risk, orange=high risk, red=very high risk. Upward arrows indicate a risk increase, downward arrows a risk decrease. ESMA risk assessment based on quantitative indicators and analyst judgment.

R.4
ESMA composite equity liquidity index
Less liquid equity market at end-2Q18



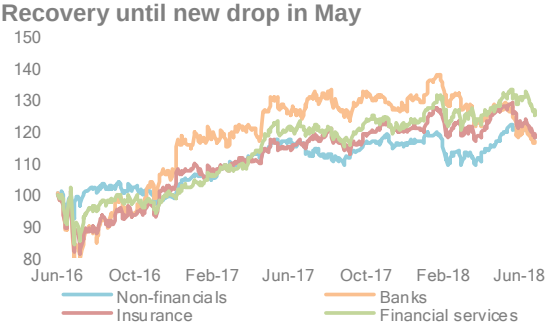
Note: Composite indicator of illiquidity in the equity market for the current Eurostoxx 200 constituents, computed by applying the principal component methodology to six input liquidity measures (Amihud illiquidity coefficient, bid-ask spread, Hui-Heubel ratio, turnover value, inverse turnover ratio, MEC). The indicator range is between 0 (higher liquidity) and 1 (lower liquidity).
Sources: Thomson Reuters Datastream, ESMA.

R.5
Equity valuation
Returning to average in EA



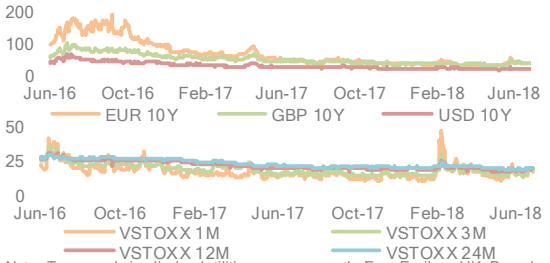
Note: Monthly earnings adjusted for trends and cyclical factors via Kalman filter methodology based on OECD leading indicators; units of standard deviation; averages computed from 8Y. Data available until May 2018.
Sources: Thomson Reuters Datastream, ESMA.

R.6
Equity prices
Recovery until new drop in May



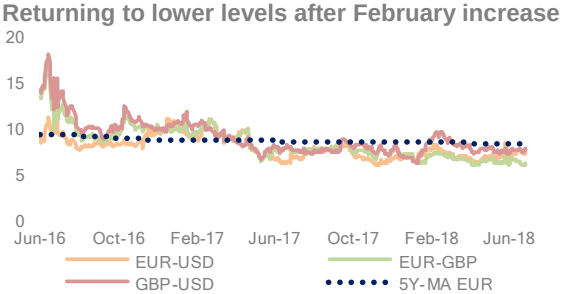
Note: STOXX Europe 600 equity total return indices. 01/03/2016=100.
Sources: Thomson Reuters Datastream, ESMA.

R.7
Financial instrument volatilities
February spike, since returned to lower levels



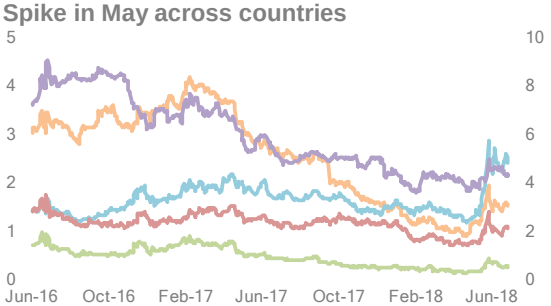
Note: Top panel: implied volatilities on one-month Euro-Euribor, UK Pound Sterling-GBP Libor and US Dollar-USD Libor swaptions measured as price indices, in %; bottom panel: Euro Stoxx 50 implied volatilities, measured as price indices, in %.
Sources: Thomson Reuters EIKON, Thomson Reuters Datastream, ESMA.

R.8
Exchange rate volatilities
Returning to lower levels after February increase



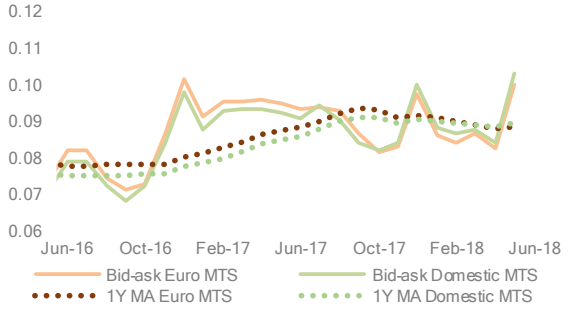
Note: Implied volatilities for 3M options on exchange rates. 5Y-MA EUR is the five-year moving average of the implied volatility for 3M options on EUR-USD exchange rate.
Sources: Thomson Reuters EIKON, ESMA.

R.9
Sovereign risk premia
Spike in May across countries



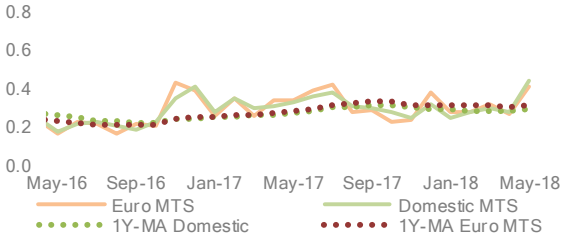
Note: Selected 10Y EA sovereign bond risk premia (vs. DE Bunds), in %.
Sources: Thomson Reuters Datastream, ESMA.

R.10
Sovereign bond bid-ask spreads
Less liquidity as from May



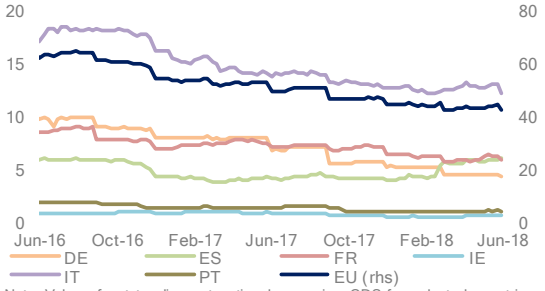
Note: Bid-ask spread as average bid-ask spread throughout a month across ten EU markets, Domestic and Euro MTS, in %.
Sources: MTS, ESMA.

R.11
ESMA composite sovereign bond illiquidity index
Relatively low liquidity levels remain



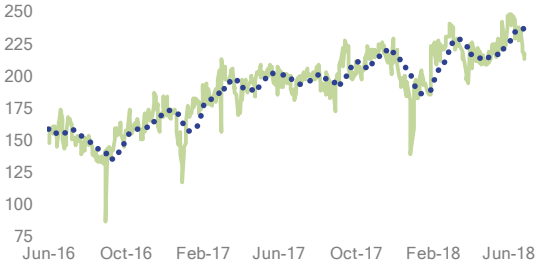
Note: Composite indicator of market liquidity in the sovereign bond market for the domestic and Euro MTS platforms, computed by applying the principal component methodology to four input liquidity measures (Amihud illiquidity coefficient, Bid-ask spread, Roll illiquidity measure and Turnover). The indicator range is between 0 (higher liquidity) and 1 (lower liquidity).
Sources: MTS, ESMA.

R.12
Sovereign CDS volumes
Stable with seasonal decrease at end-2Q18



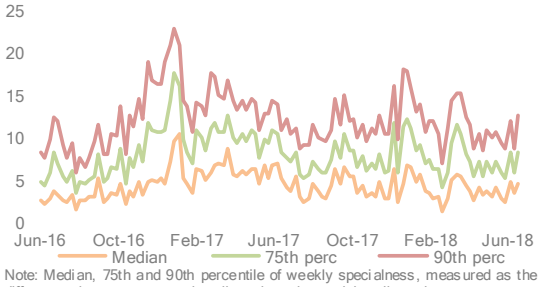
Note: Value of outstanding net notional sovereign CDS for selected countries; USD bn.
Sources: DTCC, ESMA.

R.13
Sovereign repo volumes
Oscillating around ascending long-term trend



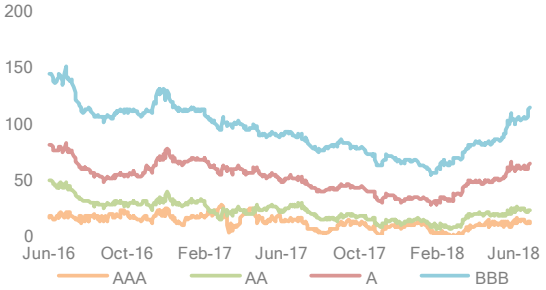
Note: Repo transaction volumes executed through CCPs in seven sovereign EUR repo markets (AT, BE, DE, FI, FR, IT and NL), EUR bn.
Sources: RepoFunds Rate, ESMA.

R.14
Repo market specialness
Still subject to spikes



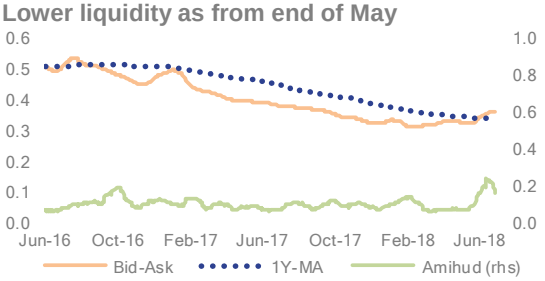
Note: Median, 75th and 90th percentile of weekly specialness, measured as the difference between general collateral and special collateral repo rates on government bonds in selected countries.
Sources: RepoFunds Rate, ESMA.

R.15
Corporate bond spreads
Increase starting in February



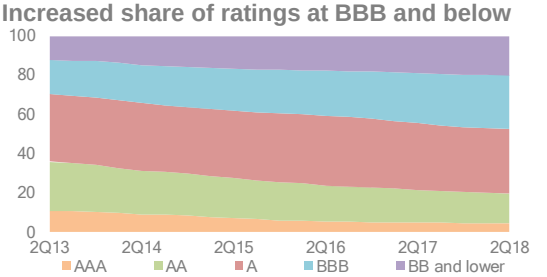
Note: EA corporate bond spreads by rating between iBoxx corporate yields and ICAP Euro Euribor swap rates for maturities from 5 to 7 years, in bps.
Sources: Thomson Reuters Datastream, ESMA.

R.16
Corporate bond bid-ask spreads and Amihud indicator
Lower liquidity as from end of May



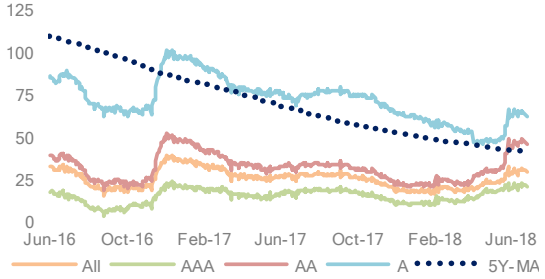
Note: Markit iBoxx EUR Corporate bond index bid-ask spread, in %, computed as a one-month moving average of the iBoxx components in the current composition. 1Y-MA=one-year moving average of the bid-ask spread. Amihud liquidity coefficient index between 0 and 1. Highest value indicates less liquidity.
Sources: IHS Markit, ESMA.

R.17
Long term corporate debt outstanding
Increased share of ratings at BBB and below



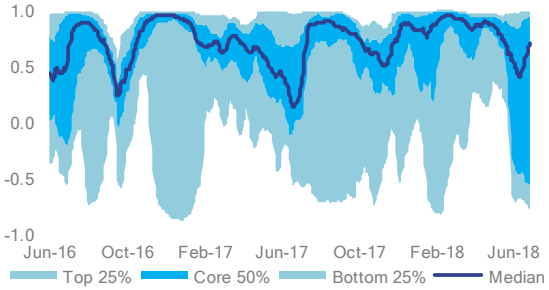
Note: Outstanding amount of corporate bonds in the EU as of issuance date by rating category, in% of the total.
Sources: Thomson Reuters EIKON, ESMA.

R.18
Covered bond spreads
Increase in May



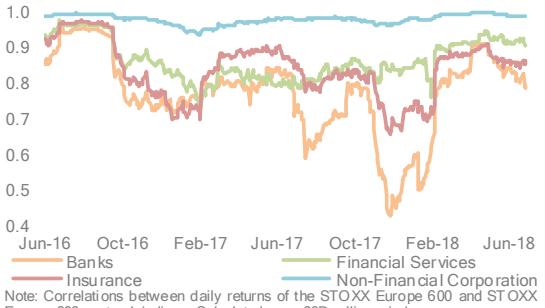
Note: Asset swap spreads based on iBoxx covered bond indices, in bps. 5Y-MA=five-year moving average of all bonds.
Sources: Thomson Reuters Datastream, ESMA.

R.19
Dispersion in sovereign yield correlation
Lower correlation



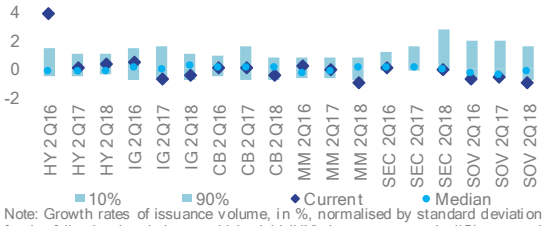
Note: Dispersion of correlations between 10Y DE Bunds and other EU countries' sovereign bond redemption yields over 60D rolling windows.
Sources: Thomson Reuters Datastream, ESMA.

R.20
Sectoral equity indices correlation
Lower for banks and insurances



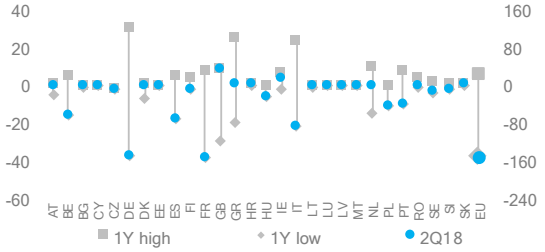
Note: Correlations between daily returns of the STOXX Europe 600 and STOXX Europe 600 sectoral indices. Calculated over 60D rolling windows.
Sources: Thomson Reuters Datastream, ESMA.

R.21
Debt issuance growth
Decline in issuance across bond classes



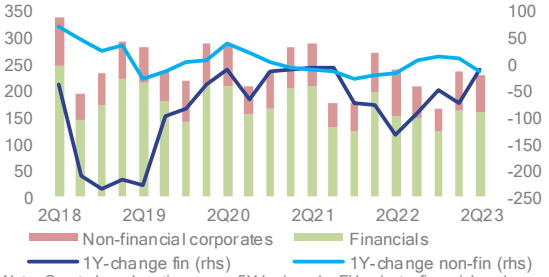
Note: Growth rates of issuance volume, in %, normalised by standard deviation for the following bond classes: high yield (HY); investment grade (IG); covered bonds (CB); money market (MM); securitised (SEC); sovereign (SOV). Percentiles computed from 12Q rolling window. All data include securities with a maturity higher than 18M, except for MM (maturity less than 12M). Bars denote the range of values between the 10th and 90th percentiles. Missing diamond indicates no issuance for previous quarter.
Sources: Thomson Reuters EIKON, ESMA.

R.22
Net sovereign debt issuance
Negative net issuance in the EU



Note: Quarterly net issuance of EU sovereign debt by country, EUR bn. Net issuance calculated as the difference between new issuance over the quarter and outstanding debt maturing over the quarter. Highest and lowest quarterly net issuance in the past year are reported. EU total on right-hand scale.
Sources: Thomson Reuters EIKON, ESMA.

R.23
Debt redemption profile
Lower short-term financing needs for financials



Note: Quarterly redemptions over 5Y-horizon by EU private financial and non-financials corporates, EUR bn. 1Y-change=difference between the sum of this year's (four last quarters) and last year's (8th to 5th last quarters) redemptions.
Sources: Thomson Reuters EIKON, ESMA.

Investors

R.24

Risk summary

Risk level

Risk change from 1Q18

Outlook for 3Q18

Risk drivers

– Asset re-valuation and risk re-assessment

– Correlation in asset prices

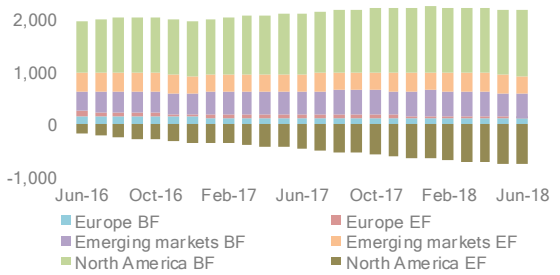
– Risky market practices: VCs, ICOs

Note: Assessment of main risk categories for markets under ESMA remit since past quarter, and outlook for forthcoming quarter. Systemic risk assessment based on categorisation of the ESA Joint Committee. Colours indicate current risk intensity. Coding: green=potential risk, yellow=elevated risk, orange=high risk, red=very high risk. Upward arrows indicate a risk increase, downward arrows a risk decrease. ESMA risk assessment based on quantitative indicators and analyst judgment.

R.25

Cumulative global investment fund

Outflows from most fund categories in 2Q18

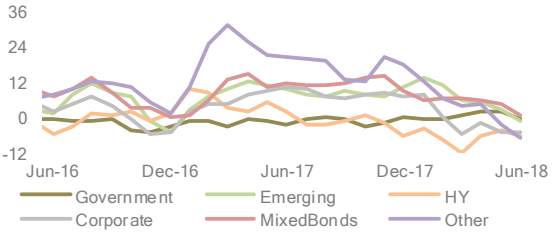


Note: Cumulative net flows into bond and equity funds (BF and EF) over time since 2004 by regional investment focus, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

R.26

EU bond fund net flows

Net outflows for HY and corporate bond funds

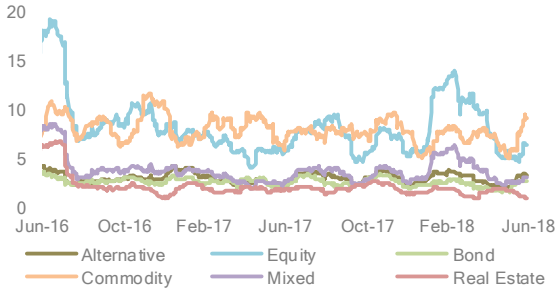


Note: Two-month cumulative net flows for bond funds, EUR bn. Funds investing in corporate and government bonds that qualify for another category are only reported once, e.g. funds investing in emerging government bonds reported as Emerging; funds investing in HY corporate bonds reported as HY).
Sources: Thomson Reuters Lipper, ESMA.

R.27

RoR volatilities by fund type

Spike in volatility for commodities

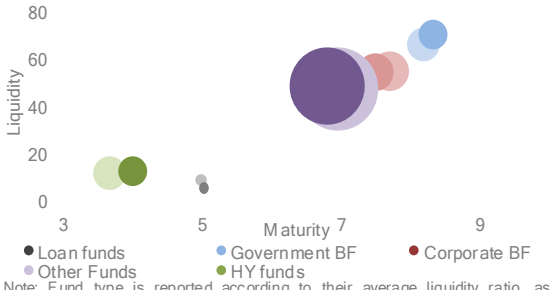


Note: Annualised 40D historical return volatility of EU-domiciled mutual funds, in %.
Sources: Thomson Reuters Lipper, ESMA.

R.28

Liquidity risk profile of EU bond funds

Stable liquidity and mixed maturity changes

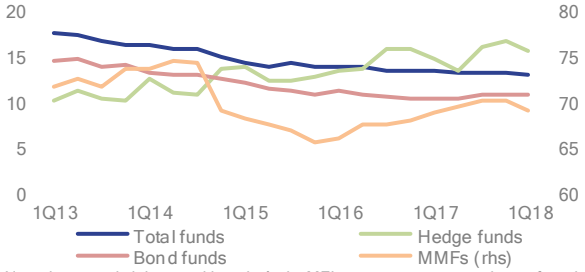


Note: Fund type is reported according to their average liquidity ratio, as a percentage (Y-axis), the effective average maturity of their assets (X-axis) and their size. Each series is reported for 2 years, i.e. 2017 (bright colours) and 2018 (dark colours).
Sources: Thomson Reuters Lipper, ESMA.

R.29

Financial market interconnectedness

High for HFs

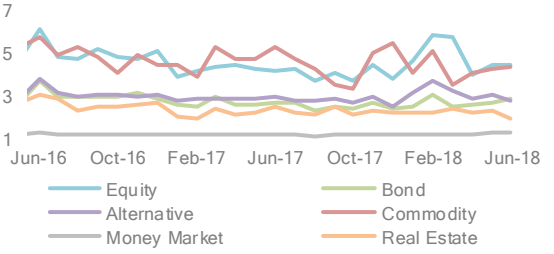


Note: Loan and debt securities vis-à-vis MFI counterparts, as a share of total assets. EA investment funds and MMFs, in %. Total funds includes: bond funds, equity funds, mixed funds, real estate funds, hedge funds, MMFs and other non-MMF investment funds.
Sources: ECB, ESMA.

R.30

Retail fund synthetic risk and reward indicator

Higher for equity funds



Note:The calculated Synthetic Risk and Reward Indicator is based on ESMA SRRI guidelines. It is computed via a simple 5-year annualised volatility measure, which is then translated into categories 1-7 (with 7 representing higher levels of volatility).
Sources:Thomson Reuters Lipper, ESMA.

Infrastructures and services

R.31

Risk summary

Risk level

Risk change from 1Q18

Outlook for 3Q18

Risk drivers

– Operational risks, incl. cyber and Brexit-related risks

– Conduct risk, incl. intentional or accidental behaviour by individuals, market abuse

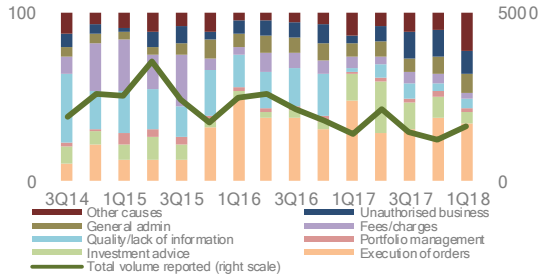
– Systemic relevance, interconnectedness between infrastructures or financial activities, system substitutability

Note: Assessment of main risk categories for markets under ESMA remit since past quarter, and outlook for forthcoming quarter. Systemic risk assessment based on categorisation of the ESA Joint Committee. Colours indicate current risk intensity. Coding: green=potential risk, yellow=elevated risk, orange=high risk, red=very high risk. Upward arrows indicate a risk increase, downward arrows a risk decrease. ESMA risk assessment based on quantitative indicators and analyst judgment.

R.32

Complaints indicator by rationale

Increase in volumes in 2Q18

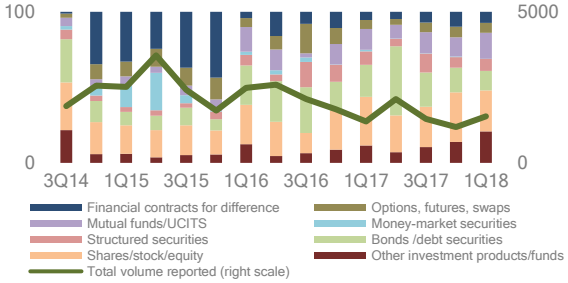


Note: Complaints reported directly to 18 NCAs: AT, BG, CY, CZ, DE, DK, EE, ES, FI, HR, HU, IT, LT, LU, MT, PT, RO, SI. Line shows total volume of these complaints. Bars show % of total volume by cause. Data collected by NCAs.
Sources: ESMA complaints database

R.33

Complaints indicator by instrument

Related mainly to equity and bond instruments

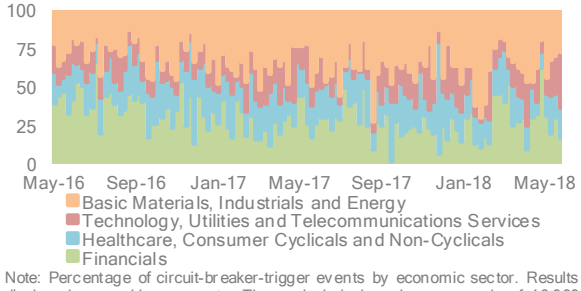


Note: Complaints reported directly to 18 NCAs: AT, BG, CY, CZ, DE, DK, EE, ES, FI, HR, HU, IT, LT, LU, MT, PT, RO, SI. Line shows total number of these complaints. Bars show % of total volume by type of financial instrument.
Source: ESMA complaints database

R.34

Circuit-breaker-trigger events by sector

Higher share for Technology

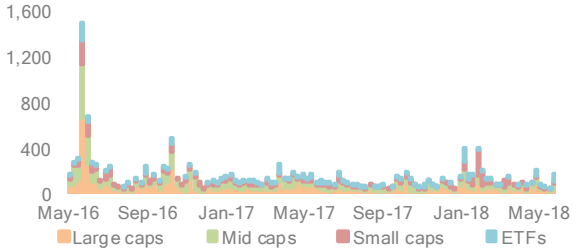


Note: Percentage of circuit-breaker-trigger events by economic sector. Results displayed as weekly aggregates.The analysis is based on a sample of 10,000 securities, including all constituents of the STOXX Europe 200 Large/Mid/Small caps and a large sample of ETFs tracking the STOXX index or sub-index.
Sources: Morningstar Real-Time Data, ESMA.

R.35

Circuit-breaker occurrences by market capitalisation

CBs four times higher during February turbulence

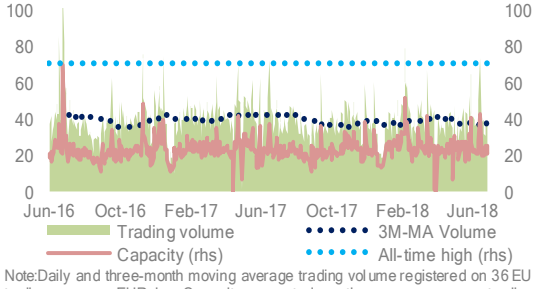


Note: Number of daily circuit-breaker-trigger events by type of financial instrument and by market cap. Results displayed as weekly aggregates.The analysis is based on a sample of 10,000 securities, including all constituents of the STOXX Europe 200 Large/Mid/Small caps and a large sample of ETFs tracking the STOXX index or sub-index.
Sources: Morningstar Real-Time Data, ESMA.

R.36

Trading system capacity proxy

Volumes at 25% of capacity on average

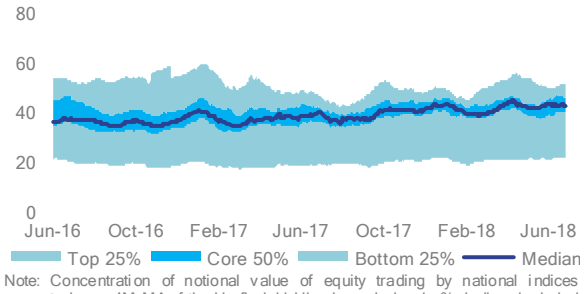


Note:Daily and three-month moving average trading volume registered on 36 EU trading venues, EUR bn. Capacity computed as the average across trading venues of the ratio of daily trading volume over maximum volume observed since 31/03/2016, in %.
Sources: Morningstar Realtime, ESMA.

R.37

Equity market concentration

Stable level of concentration

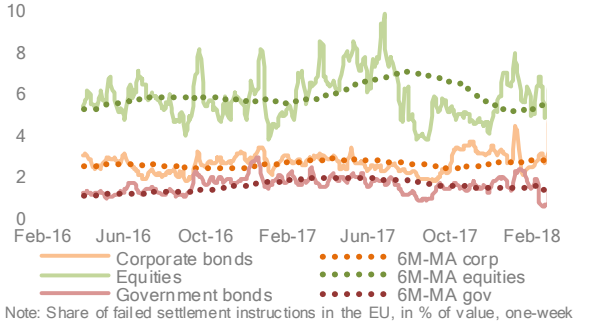


Note: Concentration of notional value of equity trading by national indices computed as a 1M-MA of the Herfindahl-Hirschman Index, in %. Indices included are FTSE100, CAC40, DAX, FTSE MIB, IBEX35, AEX, OMXS30, BEL20, OMXC20, OMXH25, PSI20, ATX.
Sources: BATS, ESMA.

R.38

Settlement fails

Volatile for equities and corporate bonds

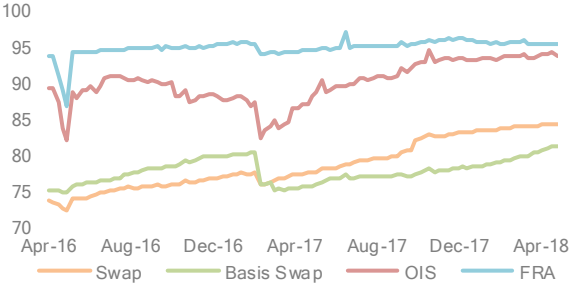


Note: Share of failed settlement instructions in the EU, in % of value, one-week moving averages.
Sources: National Competent Authorities, ESMA.

R.39

IRS CCP clearing

Basis and regular swap clearing rates increase



Note: OTC interest rate derivatives cleared by CCPs captured by Dealer vs. CCP positions, in % of total notional amount. Spikes due to short-term movements in non-cleared positions.
Sources: DTCC, ESMA.

R.40

Difference between the Euribor and the maximum contribution

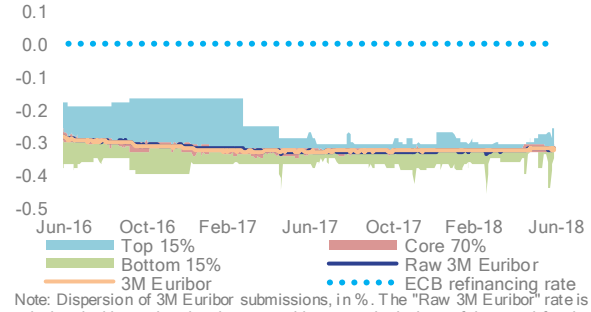
Return to low levels after end-of-the-year spike

Note: Normalised difference in percentage points between the highest contribution submitted by panel banks and the corresponding Euribor rate. The chart shows the maximum difference across the 8 Euribor tenors.
Sources: European Money Markets Institute, ESMA.

R.41

Euribor – Dispersion of submission levels

Low and stable overall dispersion

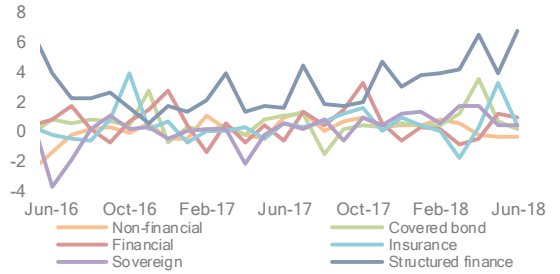


Note: Dispersion of 3M Euribor submissions, in %. The "Raw 3M Euribor" rate is calculated without trimming the top and bottom submissions of the panel for the 3M Euribor.
Sources: European Money Markets Institute, ESMA.

R.42

Rating changes

Positive for structured finance instruments

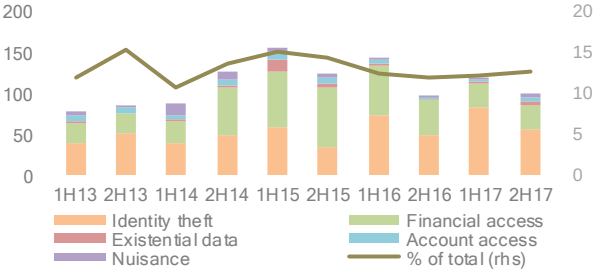


Note: Net change in ratings from all credit rating agencies, excluding CERVED and ICAP, by asset class computed as a percentage number of upgrades minus percentage number of downgrades over number of outstanding ratings.
Sources: RADAR, ESMA.

R.43

Financial services data breaches

Mostly related to identity thefts



Note: Estimated number of data breaches, financial services only, worldwide, by type. Breaches in financial services sector as % of total data breaches across all sectors (secondary axis). Both series as reported by the Gemalto Breach Level Index. The underlying data were gathered by Gemalto from publicly available reports of information breaches.
Sources: Gemalto Breach Level Index, ESMA.

Vulnerabilities

Investor protection

Enhancing transparency of EU securitisations

Contact: adrien.amzallag@esma.europa.eu[54]

The EU Securitisation Regulation includes a number of due diligence and monitoring requirements for investors. ESMA is tasked with developing draft transparency technical standards that will assist investors in fulfilling these obligations, in line with its investor protection mandate. At the same time, securitisation capital requirements are also changing, with important implications for the types of transactions to be observed in the future. This article uses a loan-level and tranche-level dataset of 646 securitisations to simulate the securitisation features that can arise when originators seek to use securitisation as part of their capital management exercises. The draft ESMA disclosure templates can assist investors in fulfilling their due diligence and monitoring tasks to better understand the risks and aspects of these instruments.

After several years of development, the Securitisation Regulation – a key pillar of the Capital Markets Union – will enter into force on 1 January 2019. The Regulation includes a number of due diligence and monitoring requirements for actual and potential securitisation investors. In addition, it establishes a set of transparency obligations for originators, sponsors, and Securitisation Special Purpose Entities (SSPE).

As part of these provisions, ESMA has been mandated to develop draft technical standards specifying both the content and format of securitisation disclosures. These technical standards aim to cover all salient features of securitisations deemed capable of standardisation, while limiting the reporting burdens for originators, sponsors and SSPEs. In line with its investor protection mandate, ESMA considers that the draft technical standards will allow potential investors to form an independent opinion on whether a securitisation is in line with their risk appetite, while also helping investors to monitor the performance of their investments.

Coupled with the parallel amendments to securitisation capital requirements in the Capital Requirements Regulation (CRR), the wide-ranging provisions of the Securitisation Regulation are likely to significantly alter originator and sponsor incentives to issue new securitisations or, alternatively, to sell off retained tranches of existing securitisations, all else being equal.

This article provides simulations of the features of securitisations that are likely to be selected by issuers, via the less-explored perspective of managing capital requirements through securitisation. At a high level, an originating bank may choose to securitise assets for two reasons: obtaining funding for illiquid assets and/or reducing its capital requirements. In recent years, the funding channel has been the most important driver of securitisation issuance, as stressful market conditions have steered securitisation originators (chiefly banks) towards additional, secured forms of financing. At the same time, lengthy regulatory uncertainty over the capital treatment of securitisations also made it challenging for originators to consider securitisations as viable avenues for their capital management exercises. Finalisation of the Securitisation Regulation and amendements to the CRR both reduce this uncertainty, raising the possibility, relative to the past few years, of greater use of securitisation by originators to manage their capital positions. By doing so, originators may transfer exposures to their underlying assets to other investors in EU financial markets; to the extent that such securitisations are high-quality, this may be in line with the objectives of the Securitisation Regulation to help re-start high-quality EU securitisation markets and support a Capital Markets Union. ESMA plans to follow market developments closely in this regard, in line with

[54] This article was authored by Adrien Amzallag.

its investor protection and financial stability mandates.

As discussed in this article, managing capital via securitisation relies upon a delicate combination of specific underlying exposures with precise securitisation features, and this combination will be altered as capital requirements formulae and calibrations evolve. This subtle mix of underlying exposures and securitisation features is in turn expected to command close attention by investors (especially investors in less senior tranches), who will require appropriate transparency in order to meet their due diligence and monitoring obligations. This article therefore seeks to demonstrate how ESMA's draft disclosure requirements and templates can meet these investors' needs. Given the scope of the CRR, the article focuses on incentives for bank originators[55] of securitisations and on the more commonly-found non-Asset-Backed Commercial Paper securitisations.

The remainder of the article is structured as follows: The first section sketches a brief background on the technique and motivation for securitisation, followed by an overview of the main transparency-related provisions introduced in the Securitisation Regulation. The subsequent section introduces the key transparency arrangements under the Securitisation Regulation. The sections thereafter discuss issuer considerations for structuring securitisations aimed at releasing capital under the modified CRR, and the data and methodology used for the simulations. Afterwards, the simulation results are presented and examined from the perspective of transparency and investor protection, before the concluding summary.

Background on securitisation and due diligence requirements

In its simplest form, securitisation involves an institution taking the future rights to cash flows from an asset it owns and selling those rights to investors. Often, the rights to many assets (e.g. loans) are grouped together and, furthermore, different priorities on these future cash flows are sold off to investors (i.e. tranches). Institutions that securitise assets they own in this way are called 'originators' in the Securitisation Regulation.

Securitisation is often, though not exclusively, performed by banks. There are several reasons why a bank might conduct such an operation. For example, a bank may seek to raise funds from investors, rather than wait a long time to receive cash flows on the same assets. This can also help the bank diversify its sources of funding, in order to complement more traditional issuance of debt or equity, or to replace more short-term sources of funding such as interbank financing.

From a similar perspective, securitisation involves a transfer of risk from the bank to investors. By transferring sufficient risk to investors a bank can, under certain regulatory conditions, adjust the capital it is required to set aside. This capital motivation is the chief focus of the note and is further explored below.

Securitisations can be highly attractive for certain classes of investors, so long as the products are adequately understood. For example, securitisations can have relatively long maturities, stretching into several decades. Institutional investors with long-dated liabilities, such as life insurers and pension funds, can invest in securitisations to help reduce mismatches in maturity profiles between their liabilities and their assets – a key risk for these investor groups. More generally, securitisations offer the potential for investors to diversify their exposure to sectors of the economy that are less liquid and thus more difficult to access otherwise. Indeed, EU securitisations include a wide variety of assets, such as residential mortgages, commercial mortgages, loans to small and medium-sized enterprises (SMEs), equipment leases, auto loans/leases, consumer loans, credit card receivables, and others.

At the same time, securitisations are often complex products. This implies that investors must devote considerable effort on conducting due diligence on a possible securitisation investment, and must afterwards regularly monitor the various factors within a securitisation that may drive the performance of their holdings. The Securitisation Regulation establishes a number of elements that investors and potential investors must take into account, including the performance of the securitised assets (referred to hereafter as 'underlying exposures'), the quality and role of service providers such as swap counterparties, the degree of legal ring-fencing of their underlying exposures relative to the originator ('bankruptcy-remoteness'), and other aspects. In line with its investor protection

[55] Rather than non-bank originators, such as private equity firms.

mandate, ESMA plans to continue monitoring EU securitisation markets over the coming years.

The next section of this note goes on to discuss the transparency arrangements under the Securitisation Regulation, which aim to provide an adequate basis for investors to meet these due diligence and monitoring requirements.

Key transparency arrangements under the Securitisation Regulation

As mentioned in the previous section, the Securitisation Regulation establishes new requirements regarding transparency, both in terms of transaction documentation and data on underlying exposures and transaction features. ESMA is mandated to develop draft technical standards setting out precise details on what underlying exposure and transaction features and elements should be reported, as well as the standardised templates to be used. These draft technical standards, which were consulted on in Q1 2018, cover two main categories of information:

- underlying exposures data (such as on interest rates, outstanding amounts, etc.) and
- data on all other aspects of the transaction (e.g. investor reports, inside information, and significant events) – hereafter designated as 'investor report templates' for the sake of simplicity.

Several underlying exposure templates have been developed, covering the major types observed in EU securitisations: residential mortgages, commercial mortgages, as well as auto loans/leases, consumer loans, corporate loans (including SME loans), credit card receivables, and leases. The draft templates leverage on previous contributions, including ESMA's own draft CRA3 RTS on securitisation disclosure requirements in June 2014, the Joint Committee's Task Force on Securitisation Report in May 2015, and the ECB and Bank of England's respective loan-level requirements. Furthermore, wherever possible the draft templates aim to be consistent with parallel reporting arrangements in practice, such as those set out in the AnaCredit Regulation and in ESRB (2017).

ESMA's draft underlying exposure templates cover exposure-level (e.g. loan-level) details on the underlying exposure product, borrower, performance since origination, and collateral (at the level of each collateral item). Similarly, the draft investor report templates cover essential information on all elements of the securitisation besides underlying exposures, including information on the overall securitisation, tranche/bond, account-level information, counterparty information, tests/trigger-related information, cash-flow information, as well as a free-text section entitled 'other information'. Each template has been developed to facilitate both the due diligence and monitoring of individual securitisations as well as a wider understanding of the evolution of securitisation structures and arrangements across the European Union (including for financial stability purposes). In line with its mandates under the Securitisation Regulation, ESMA has developed these templates for use by potential and actual investors, as well as the public authorities named in the Securitisation Regulation. In so doing, ESMA has also sought to leverage on the knowledge gained from its investor protection activities, as well as its experience in developing large-scale data reporting requirements, such as under MiFID II and EMIR.

Why securitise? The capital management channel

When considering the use of a securitisation in a capital management exercise, the originator will compare its return on risk-adjusted capital (RORAC) before and after securitisation. If the RORAC after securitisation is inferior to the RORAC before securitisation, there are few capital-related incentives for the originator to create the transaction.[56] This condition can be summarised using the following inequality[57]:

$$RORAC_{post\_securitisation} > RORAC_{pre\_securitisation}$$

The 'return' aspect of $RORAC_{pre\_securitisation}$ consists of the spread on the portfolio, in other words, the income earned on the underlying exposures that have been securitised, such as

[56] One potential reason to persist with the securitisation nonetheless may be to meet leverage ratio requirements. However, in this case it may be more efficient to sell off the loans directly without incurring the costs associated with securitisation (e.g. third-party service provider fees).

[57] Alternatives to securitisation include issuing equity, outright sales of the underlying exposures, or purchasing credit protection on the underlying exposures. So even if RORAC inequality is satisfied, an originator would need to verify that the costs of securitisation were the lowest (relative to capital saved) among these alternatives. This is not explored further here, because RORAC inequality is a necessary precondition for this second step and the topic is less relevant to the benefits of transparency for investors.

interest payments, less a benchmark rate.[58] Similarly, 'return' in $RORAC_{post\_securitisation}$ consists of the spread on the portfolio less the costs associated with operating the securitisation (such as legal fees, any rating agency fees, and payments to third-parties such as trustees and swap counterparties) and also less the yield paid on any securitisation tranches that are sold off.

The 'capital' aspect of $RORAC_{pre\_securitisation}$ refers to the funds an originator must set aside to cover extreme losses on the underlying exposures.[59] In contrast, 'capital' in $RAROC_{post\_securitisation}$ denotes originator funds set aside to cover extreme losses on securitisation tranches that are held by the bank and not sold off to investors, according to the provisions of the modified CRR.

Based on these considerations, RORAC inequality can be represented as follows:

$$\frac{Income_{u.exposures} - Cost\ of\ structure - Yield\ paid}{Capital_{post_{securitisation}}} > \frac{Income_{u.exposures}}{Capital_{pre\_securitisation}}$$

Filling in the terms in this inequality represents a challenging exercise for any originator interested in managing their capital using securitisation. This is because the above variables are generated on the basis of numerous assumptions, including:

- prepayment and dilution risks on the underlying exposures, thus affecting $Income_{u.exposures}$
- credit risk migration and loss given default, which impacts $Income_{u.exposures}$ and $Capital_{pre\_securitisation}$
- the amount of tranche notes that are able to be sold (i.e. a bid/cover ratio of at least 1), thus influencing $Yield\ paid$ and $Capital_{post\_securitisation}$
- yield conditions for different tranches in the capital structure at the time of marketing (i.e. potential investors' Internal Rate of Return), which will impact $Yield\ paid$
- the market rate of any third-party services deemed necessary to mitigate risks on the securitisation and thus improve investor take-up and/or pricing. This includes the cost of contracting swaps (e.g. for basis risk, fixed/floating mismatches, or currency mismatches), bank accounts (e.g. for commingling risks), and custodial services. On the one hand, contracting these necessary services in-house will lower the $Cost\ of\ structure$ measure; however it also raises the possibility of diminishing investor appetite, particularly among investors in lower-ranked tranches of the securitisation.[60]

Simulation approach

Despite the number of assumptions required, it is still possible to simulate situations in which RORAC inequality is likely to hold. For this exercise, a dataset of traditional[61] residential mortgage-backed securitisations (RMBS) providing loan-level and tranche-level data is employed. This is inevitably an imperfect exercise, not least because RMBS may not necessarily be the first choice of securitisation for capital management purposes, given the comparatively lower capital charges on these assets in contrast to exposures to small and medium-sized enterprises (SMEs) for example.

On the other hand, assumptions for determining capital requirements on residential mortgages are relatively easier to find. Furthermore, the exercise can be instructive in illustrating which securitisations among this class appear able to successfully adjust the originator's capital position (i.e. satisfy the above RORAC inequality) under certain conditions. This in turn helps highlight which underlying exposures and structural features help satisfy the above inequality, and therefore which aspects may be particularly relevant for due diligence and monitoring purposes.

Moreover, the use of actual loan-level data ensures that realistic credit risk metrics can be derived for $Capital_{pre\_securitisation}$ and $Capital_{post\_securitisation}$ in the above. Elsewhere, the use of actual securitisations preserves the

58 The return can be defined as either including ('gross') or excluding ('net') operating costs and taxes. For the sake of simplicity the gross return is used in this article.

59 In the simulations below we also include expected losses in the measure of capital, where the originator is assumed to apply the Internal Ratings-Based Approach (IRBA) as per Article 255(3) of Regulation 2017/2401 amending the Capital Requirements Regulation.

60 See Amzallag and Blau (2017) for further discussion.

61 In contrast to synthetic securitisations—see Article 2(9) and 2(10) in the Securitisation Regulation for definitions.

link between the underlying exposures and relative size of tranches of different seniority (i.e. the relative size of junior, mezzanine and senior tranches as well as the use of reserve funds and overcollateralisation) — a key choice for originators.

As a result, this simulation exercise is both grounded empirically and represents a lower bound on what securitisation capital management outcomes are achievable.[62] A total of 646 RMBS across nine countries are used, covering a total of around 12mn underlying exposures worth around EUR 1.3tn at origination (V.1). All loan-level data items are measured at the time of loan origination, in order to capture the conditions of a 'new' securitisation.

V.1
Summary statistics
RMBS simulation dataset

	Deals	Expo-sure	Bal-ance	Capital	Loss	Interest rate
BE	19	1.0	90	7.9	0.06	2.6
DE	8	0.8	84	7.7	0.07	3.2
ES	206	1.6	211	11.7	0.24	3.5
FR	33	2.3	217	9.6	0.06	3.0
IE	30	0.3	60	11.8	0.17	3.7
IT	131	1.2	139	8.1	0.36	3.5
NL	142	2.9	293	4.5	0.04	4.2
PT	39	0.5	37	7.7	0.15	3.9
UK	38	1.2	140	4.8	0.03	3.9

Note: Deals: number of deals; Exposure: number of underlying exposures (mn); Balance: total balance in EUR bn; Capital: average capital required (IRB) per deal (in %). IRB: Internal Ratings Based Approach, including expected losses as per Article 255(2) of Regulation 2017/2401. Losses: average expected losses per deal (in %). Interest rate: average interest rate (in %).
Sources: European DataWarehouse, Fitch Ratings, ESMA.

Using loan-level data, it is possible to estimate the weighted-average interest rate spread at origination for the pool of underlying exposures, i.e. $Income_{u.exposures}$. Elsewhere, publicly available rating agency assumptions are used to derive the necessary probability of default (PD) and loss given default (LGD) inputs for calculating capital requirements. The assumptions allow loan-specific and property-specific features to be linked with credit risk variables, for example riskier repayment features (e.g. interest-only loans), borrower profiles (e.g. unemployed borrowers), lending standards (e.g. high debt-to-income ratios), property characteristics (e.g. illiquid properties), and recovery situations (e.g. regions with higher foreclosure costs and longer recovery timing).[63] These inputs are used to calculate $Capital_{pre\_securitisation}$ and also enter into $Capital_{post\_securitisation}$ above.[64] $Cost\ of\ structure$ is set at a range of 0.05-0.25% of the underlying exposure pool balance, based on market intelligence, rating agency assumptions, and the number of non-affiliated counterparties operating in the securitisation (using the database in Amzallag and Blau 2017).[65]

Given these calibrations, the following variables are simulated:

— amount of tranche notes sold by the originator, subject to minimum regulatory requirements to qualify for capital adjustment via securitisation.[66]

62 Many securitisations in recent years were structured for funding purposes and not capital management; they may therefore have less optimal structures than those tailored for capital-release purposes. So if the simulation exercise suggests that even 'not optimised for capital management' securitisations can still achieve some adjusted capital requirements (under the forthcoming modified rules), this implies that even greater amounts of such capital management securitisations are possible than suggested in this exercise.

63 See Amzallag et al. (2018) for further details.

64 For all capital-related measures (i.e. for underlying exposure and securitisation tranches) we use the IRBA and, alternatively, the Standardised Approach (SA). This also reflects the relative order of these approaches in the hierarchy available to bank originators (the third and last is the External Ratings-Based Approach) and, furthermore, the fact that capital management securitisations are not always rated by rating agencies. The applicable securitisation capital caps and floors set out in Regulation 2017/2401 amending the Capital Requirements Regulation are also incorporated.

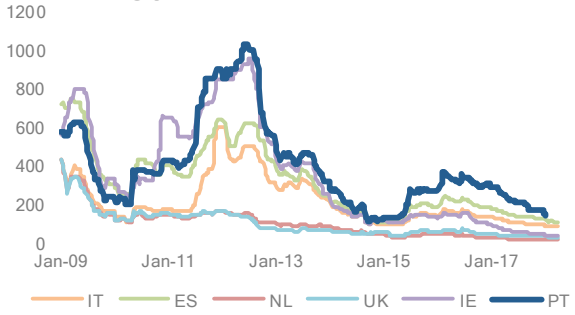
Lastly, it is assumed that the risk retention requirements in Article 6 of the Securitisation Regulation are satisfied using the option set out in Article 6(3)(c) (randomly selected exposures)—thus for example for a portfolio of loans worth EUR 105mn, the originator retains EUR 5mn of randomly selected exposures and the remaining EUR 100mn are securitised. This appears to be the least capital-intensive method available to bank originators under the Capital Requirements Regulation (e.g. compared with the 'vertical slice' option).

65 It is assumed that securitisations with more non-affiliated counterparties (such as swap providers, account banks, back-up servicers, etc.) are likely to have to pay greater costs than securitisations relying more on themselves or intra-group entities to fulfil key roles in the transaction (although this appears riskier for investors—Amzallag and Blau 2017)

66 In other words, various possibilities exist for how many tranche notes are sold off. One scenario could be to assume that 50% of the senior tranche, 50% of the mezzanine, and 0% of the junior are sold off, while another could be 100% of the senior tranche, 100% of the mezzanine, and 50% of the junior, etc. However, the scenarios are structured so that they always respect the minimum requirements for significant risk transfer (e.g. 50% of mezzanine notes are sold off or, if there are no mezzanine tranches, 80% of the junior tranches are sold off) set out in Article 244 of Regulation 2017/2401 amending the Capital Requirements Regulation.

— adjusting $Yield\ paid$[67] based on country-specific and tranche-specific securitisation market data (V.2).[68]

V.2
Selected EU RMBS senior tranche yields
Decreasing yields



Note: Selected EU RMBS senior tranche yields in basis points.
Sources: JP Morgan, ESMA.

The simulations are run using 75 tranche sale scenarios and 38 scenarios for market conditions (corresponding to quarterly average observations of market conditions over January 2009 – April 2018), for a total of 2,850 scenarios per securitisation. For each scenario, those securitisations that are able to satisfy the above RORAC inequality are recorded. The features of these transactions can then be compared with securitisations not satisfying the inequality in that scenario.

Results and ESMA perspective based on draft disclosure requirements

We analyse the correlation between the likelihood of a securitisation's satisfying the above RORAC inequality, based on the various tranches sold and scenarios of market conditions, and several variables in the RORAC inequality above (V.3). The information used to produce these explanatory variables is derived from the information that will be available to potential and actual investors in the forthcoming ESMA templates. The present information is also available in the non-regulatory loan-level templates, but not on an as-required basis and not covering all publicly-listed securitisations.

The simulation results provide an early indication of some important features that potential and actual investors may need to consider as part of their due diligence and monitoring efforts, and thus help justify the amount of transparency set out in ESMA's draft disclosure technical standards. This link between investors' needs and the transparency required was first outlined in the Joint Committee's Task Force on Securitisation Report in May 2015. At the time, the Joint Committee Report judged that this conceptual link should be a key guiding principle for policymakers seeking to establish transparency requirements for securitisation – this concept was in turn reflected in the Securitisation Regulation's transparency provision. The simulation results therefore aim to provide additional evidence, using the comparatively less-rich (but still highly useful) information available to market participants, of the link between risks and the transparency needed to understand those risks.

V.3

Regression results

Likelihood of securitisations fulfilling RORAC inequality

	(1)	(2)	(3)	(4)
Capital pre-securitisation	-1.618***	-1.629***	2.323***	1.722***
	(0.305)	(0.304)	(0.477)	(0.431)
Income on exposure	8.279***	8.496***	10.273***	7.956***
	(1.078)	(1.053)	(1.030)	(0.935)
Cost of structure	0.001	0.000	0.002	0.001
	(0.001)	(0.001)	(0.002)	(0.001)
Pool granularity	0.010	0.010	0.018*	0.014*
	(0.008)	(0.008)	(0.010)	(0.008)
Average tranche thickness	-0.573***	-0.543***	-0.718***	-0.639***
	(0.068)	(0.071)	(0.086)	(0.078)
R squared	0.377	0.384	0.305	0.269

Note: (1): RBA; (2): IRBA_STS; (3): SA; (4): SA_STS. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Sources: European DataWarehouse, Fitch Ratings, JPMorgan, ESMA.

Results are reported for different capital requirement approaches – Internal Ratings Based (both non-STS and STS) and

67 In doing so it is assumed that there is little correlation between the spread on the underlying exposures (i.e. $Income_{u.exposures}$, which does not change per scenario) and the spread on the tranches simulated. In other words, this assumes that investors' pricing of securitisation tranches is driven mainly by wider considerations than lending rates on underlying exposures, for instance the pricing of nearby substitutes such as covered bonds, general risk appetite, liquidity conditions, regulatory treatment (e.g. in the Liquidity Coverage Ratio), eligibility as collateral for central bank credit operations, and ratings (which include considerations on loans but also wider features such as the strength of any third-party service providers). At the same time, pricing on less senior tranches (e.g. junior and mezzanine tranches) is likely to focus relatively more on the credit risk of the underlying loans - which, in practice, is also likely to be reflected in the interest rate margin on those exposures. Nevertheless, there are many other drivers of interest rates on underlying exposure; see Amzallag et al. (2018) and the references therein.

68 Monthly averages of weekly data are taken. Where a tranche category is not available (e.g. spreads for junior tranches), a fixed mark-up over that country's next-closest available tranche is applied.

Standardised (both non-STS and STS). The results are interesting insofar as they illustrate the extent to which investors may need to pay attention to key aspects of securitisation. For example, it appears that less risky underlying exposure pools in the IRB approach tend to make it more likely that the above RORAC inequality is satisfied, whereas under the less risk-sensitive Standardised Approach the opposite effect holds: riskier exposure pools increase the chance of adjusting the originator's capital position via securitisation.[69] These results also reflect the fact that the riskiness of the underlying exposures enters twice into the RORAC inequality: first via $Capital_{pre\_securitisation}$ and also as an input into the CRR formulae to calculate $Capital_{post\_securitisation}$; this implies more subtle outcomes. Thus, from the perspective of transparency requirements, this finding suggests that investors in such capital management securitisations may need to pay close attention to both the sophistication of the originating bank and also the various underlying exposure features that are associated with higher credit risk. In this regard, the draft ESMA disclosure templates have been set up to capture a wide range of characteristics, including:

- borrower features, including income, employment status, resident or not of the country where the underlying exposure is located, whether occupying the property or not;
- loan maturity (a key input in the IRB capital formula in particular);
- loan default/status variables: number of days in arrears, date of default, the type of any restructuring arrangements, whether any litigation proceedings are under way;
- repayment arrangements: repayment frequency (monthly, quarterly, annual, etc.), amortisation type (linear, increase, bullet, etc.);
- lending practices: how the borrower income was verified, the purpose of the loan (e.g. property purchase or equity release), the origination channel of the loan (e.g. in branch, via a broker, via the internet, etc.);
- property features: the original and current loan-to-value ratios and their dates, the property's geographic region, valuation method used for the property value estimates;
- losses on any sale of property collateral; and
- where applicable, guarantee information on the underlying exposure.

Moreover, the findings presented (in V.3) have important implications for the type of securitisation structure that is likely to be observed. This reflects the fact that the RORAC condition has a time dimension: Bank originators will seek to maintain the RORAC inequality over time, which includes maintenance of the capital position of the underlying exposures, all else being equal. One way to achieve this is to employ 'revolving' arrangements that allow originators to replenish pools of underlying exposures with additional exposures over time as the initial exposures that were securitised amortise.

This implies that investors may wish to consider the type of securitisation and, once it has been determined that it is a 'revolving' structure, pay even closer attention to the order of priority of their tranche(s) in the securitisation structure, even after having purchased the tranche notes (since orders of priorities can change). The draft ESMA disclosure templates include standardised fields to facilitate this activity, including:

- information on the securitisation structure: whether it is revolving or not, the type of securitisation waterfall (i.e. general order of priority of payments), the type of master trust (if this is used);
- information on any tests or triggers that may affect the securitisation (e.g. events of default or changes to the order of priority of payments); and
- information on the tranche notes: the order of priority of the specific tranche in the waterfall.

We can examine whether further characteristics are associated with greater or less likelihood of capital adjustment via securitisation, among the set of RMBS considered in this analysis. For example, use of the Standardised Approach (SA) to calculate capital requirements, rather than the Internal Ratings-Based Approach (IRBA), carries a different likelihood of capital adjustment. In turn, this implies that originators with relatively more risk-sensitive measurement systems are likely to seek out more capital adjustment transactions. Since originators using the IRBA tend to be larger entities, investors may also find it interesting to

[69] This does not automatically imply that securitisations with riskier underlying exposure pools are riskier for investors, especially senior tranches, depending on where and in what way credit enhancement is used (including reserve funds and overcollateralization – to the extent these make economic sense for such transactions).

examine further characteristics of the originator (or originators) in question. To facilitate these efforts, the ESMA underlying exposure templates include fields for the Legal Entity Identifier (LEI) and matching name of the originator of each underlying exposure, as well as the LEI and name of the original lender (in the event that the underlying exposure was purchased).

Elsewhere, a lower average thickness appears to be associated with a greater likelihood of capital adjustment being obtained via securitisation.[70] This is because the greater the average thinness, relative to the same size of the underlying exposure pool, the more precisely originators are able to set the yield paid on tranches, which generally implies a more sensitive $Yield\ paid$. On the other hand, this also implies that the average tranche sizes are likely to be thinner or have more complex payment dynamics, relative to a securitisation with fewer tranches over the same size of underlying exposures.[71] Given this greater risk of full losses (since losses on a given tranche are allocated on a pro-rata basis), the more thin tranches (i.e. the greater the number of tranches, all else being equal), the more investors might wish to establish a detailed understanding of the tranches and their associated payment dynamics under different scenarios. To facilitate this analysis, the ESMA templates include:

- information on the tranche notes: the order of priority of the specific tranche in the waterfall, the credit enhancement of the tranche (using both regulatory and transaction-specific definitions of credit enhancement), the legal maturity date, and whether there are any extension clauses;
- a 'cashflow information' section that details, in a structured manner and as per each reporting date, all of the inflows from the securitisation underlying exposures (and other sources such as guaranteed investment accounts) and all outflows to tranches and other liabilities (e.g. payments to counterparties providing services to the transaction)

Lastly, the simulations suggest that the 'Simple, Transparent, and Standardised' (STS) designation entails lower capital requirements on securitisation tranches. STS securitisations can thus be associated with capital management operations, suggesting that future securitisations which have been structured to adjust capital are more likely to be STS than non-STS, all else being equal. Nevertheless, as set out in the Securitisation Regulation, investors are expected to avoid relying solely on the STS notification when conducting their due diligence of these securitisations. By setting out standardised requirements for a comprehensive and up-to-date set of information on all aspects of the securitisation (as well as a 'free text' section to capture any relevant features not included), the ESMA disclosure templates also seek to facilitate investors' ability to demonstrate that they make use of additional sources of information beyond the STS notification.

Conclusions

The Securitisation Regulation and accompanying modifications to the Capital Requirements Regulation are likely to substantially affect originators' incentives to structure securitisations, which may include securitisations created as part of capital management exercises. Simulations based on a set of 646 real-life securitisations suggest a key finding from the perspective of ESMA's investor protection mandate: securitisations structured to adjust originators' capital positions may contain relatively riskier underlying exposure pools, more dynamic structures, thinner and/or more complex tranches, and may also at the same time qualify for 'Simple, Transparent, and Standardised' status. Building on past policy recommendations, such as in the Joint Committee's Task Force on Securitisation Report in May 2015, the simulation

[70] Tranche thickness is defined as the difference between the tranche detachment point and the tranche attachment point. The attachment point is the level (in %) at which the specific tranche is exposed to aggregate losses in the portfolio of underlying exposures (a similar measure to the tranche's credit enhancement). In other words, this is the percentage of losses on the portfolio of underlying exposures that are necessary in order for the tranche principal to begin to be written down. The detachment point is the level at which the specific tranche ceases to be exposed to aggregate losses in the portfolio of underlying exposures, in other words the attachment point of the next-more-senior tranche in the priority of payments.

[71] For example, given a securitisation of EUR 1bn of underlying exposures, one possible tranche structure could involve a junior tranche worth EUR 50mn, a mezzanine tranche worth EUR 150mn, and a senior tranche worth EUR 800mn (i.e. 20% credit enhancement). Alternatively, a structure over the same EUR 1bn of underlying exposures could be: a junior tranche of EUR 25mn, a lowest-ranked mezzanine tranche of EUR 25mn, a middle-ranked mezzanine tranche of EUR 50mn, an upper mezzanine tranche of EUR 100mn, and two pari-passu (in terms of principal) senior tranches worth EUR 400mn each (with the first-ranked senior tranche of these two paying out interest first – i.e. still 20% credit enhancement on the senior tranches).

results provide further evidence of the importance of transparency (and ESMA's role in developing adequate draft standards) in order to facilitate an understanding of the key features and risks associated with different securitisation structures and underlying exposure compositions. To this end, the draft ESMA disclosure templates aim to empower investors, through sufficient transparency, to understand and monitor these specific features, in line with their due diligence and monitoring obligations in the Securitisation Regulation.

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Investor protection

Structured Retail Products – the EU market

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Structured products sold to retail investors in the EU are a significant vehicle for household savings. Certain features of the products – notably their complexity and the level and transparency of costs to investors – warrant a closer examination of the market from the perspective of investor protection. Breaking down the EU market geographically into national retail markets reveals a very high degree of heterogeneity in the types of product sold, although among the vast array of different structured products available to retail investors each market is concentrated around a small number of common types. Changes in typical product characteristics are not uniform across national markets. Analysis both at an EU-wide level and in the French, German and Italian retail markets suggests, however, that the search for yield has been a common driver of several changes observed in the distribution of product types.

A vast array of different kinds of structured products is sold to retail investors across the EU. This article studies the development of the market EU-wide and in selected national markets in recent years.

The total outstanding amount of structured products held by EU retail investors at the end of 2017 was around EUR 500bn.[73] In contrast, holdings in UCITS were around EUR 9tn.[74] Structured products therefore comprise a significant vehicle for household savings in the EU, but are far from being the leading destination for such savings. Previous work by ESMA has determined that the systemic risks associated with the market are low.[75] However, understanding the evolution of the market is important from the perspective of ESMA's objective to protect investors, due to the characteristics of the products. In particular, the variety of products on offer, their complexity and the existence of significant costs and charges for retail investors call for continued market surveillance and analysis.

The sheer variety of products on offer can help cater for the different needs of investors by providing different risk and return profiles – such as a degree of participation in an underlying asset with limited downside risk – but at the same time, the breadth of the product range may make it hard for some investors to compare and understand different products. High-quality advice in such situations may be important for these investors.

Product complexity is another potential source of risk for retail investors. Taken individually, the many structured products that fall under MiFID are by definition complex, as they are derivative instruments.[76] For further insight into market developments and the related risks to retail investors, the binary categorisation into complex

[72] This article was authored by Esther Hamourit, Alexander Harris and Maximilian Reisch.

[73] This figure includes structured products in insurance wrappers, which do not fall within the MiFID framework. It has not been possible to identify the precise proportion of non-MiFID products in the total, but they appear to represent a minority of the outstanding volumes reported.

[74] See Chart A.110.

[75] ESMA (2013), "Retailisation in the EU", Economic Report, No. 1, p17. Available at: https://www.esma.europa.eu/document/retailisation-in-eu. More detailed analysis of this point is provided in Bouveret, A. and Burkhart, O., (2012), "Systemic risk due to retailisation?", ESRB Macro-prudential Commentaries No.3, July 2012.

[76] Article 25(4) of directive 2014/65/EU (MiFID II) (in continuation with the previous MiFID framework) allows investment firms, subject to certain conditions, to provide investment services consisting only of execution, reception or transmission of orders without obtaining client information necessary to assess the appropriateness of the product or the service for the client (so-called "execution-only" regime). One of the conditions for the application of Article 25(4) of MiFID II is that the services relate to products which are non-complex. The relevant framework for the definition of complex products for the purposes of the execution-only regime is thus provided by Article 25(4) of MiFID II as complemented by Article 57 of delegated regulation (EU) 2017/565 (MiFID II delegated regulation on organisational requirements and operating conditions of investment firms) and by the ESMA guidelines on complex debt instruments and structured deposits (ESMA/2015/1787).

and non-complex products under MiFID can be viewed alongside other notions of complexity used in the academic literature explored further below. These notions include the number of payoff features of a product and the number of component financial instruments required to replicate a structured product's payoffs.

Another reason why the retail market for structured products is relevant from an investor protection perspective is that such products may involve substantial costs for investors. Costs, in turn, may relate to complexity. First, complexity - in the sense that a product requires many components - generates costs of manufacture, sometimes known as 'hedging costs', which form part of the costs investors face. Not only the level but also the transparency of such costs is an issue from an investor protection standpoint. Second, recent academic research suggests that greater complexity may be associated with greater levels of risk and that complexity can be used to facilitate the offering of higher 'headline rates' (i.e. potential returns quoted in the names of products or otherwise prominently displayed in product documentation) in a low-yield environment.[77] Transparency in the levels of risk and return is therefore an issue for investors.

While the provision of structured products to retail investors is of interest for investor protection reasons, some academic research highlights potential benefits of structured products for such investors. Tufano (2003) surveys the wider literature on financial innovation, noting that a common theme in theoretical work is how innovation can address market inefficiencies. This theory posits that structured products may fill a gap in an incomplete market and cater for different investor preferences. Along these lines, recent empirical research by Calvet, Célérier, Sodini and Vallée (2018) suggests that the introduction of retail structured products thereby raises both the likelihood and extent of stock market participation among households. The authors offer the explanation that such products are beneficial in mitigating behavioural biases such as loss aversion among retail investors.

The next section of this article defines structured products and describes their different types. Subsequent sections present and analyse data from a commercial provider to identify key market developments, first at an EU-wide aggregate level and then by focusing on popular types of products sold in selected large national markets. Notable trends are a steady overall decline in EU-wide outstanding volumes over the last 5 years, with investors turning to shorter-term products (mostly substituting from medium-term products) and increasingly to equity-linked products, which now make up the vast majority of structured product sales to retail investors by volume. However, within the three EU countries with the largest sales volumes – France, Germany and Italy – there is considerable variation in the types of products sold and their overall characteristics. For example, in France the term length across all the most popular types of products increased in the 5 years to end-2017, a clear trend not observed at the EU-wide level.

The article goes on to explore the theme of product complexity via certain simple text-based metrics, drawing on approaches and insights recently developed in the academic literature. The results are consistent with the account that product complexity has been somewhat higher following the financial crisis, but more detailed work is needed to substantiate this possibility and to analyse the possible determinants of such a development.

A final topic examined is the level and transparency of the costs investors face. Commercial data are available for the German market for the period 2014-2017, based on structured product providers' self-reported own estimates of intrinsic costs to investors. These data suffer from certain limitations, in that: (i) they are only available for a minority of volume-weighted sales; (ii) intrinsic costs can be measured in different ways; and (iii) by definition intrinsic costs exclude possible extrinsic costs that investors may face when purchasing a product. Subject to these caveats, indicative results suggest that the intrinsic costs borne by retail investors in Germany during the period were broadly comparable across common payoff types and in line with estimates in some previous studies. Furthermore, costs appear to have moderated somewhat in recent years for some payoff types.

Description of structured products

Structured products are investments whose return is linked to the performance of one or more

[77] Célérier, C. and Vallée, B. (2017), "Catering to Investors Through Security Design: Headline Rate and Complexity". Quarterly Journal of Economics, Volume 132, Issue 3, 1 August, pp.1469–1508, https://doi.org/10.1093/qje/qjx007. See also Henderson, B., and Pearson, N. (2011), "The Dark Side of Financial Innovation: A Case Study of the Pricing of a Retail Financial Product", Journal of Financial Economics, vol. 100, 2011, pp.227–47.

reference indices, prices or rates ('reference values'). Such reference values may include stock indices, the prices of individual equities or other assets, and interest rates. The return on a structured product is determined by a pre-specified formula, which sets out how the product performs in different scenarios defined with respect to the reference value(s). To take just one possible example, if the price of a stock index falls during a given period of time, the formula may determine that the product yields zero return for the investor, who participates to some extent if the index increases in value.

Structured products can be categorised in different ways, but the European Structured Investment Products Association (EUSIPA) provides a reference framework used within the industry, as follows.

Investment products are products for which any downside exposure is no greater than any given percentage price fall in the underlying. These products make up the vast majority (>95%) of the market by volume, and are the focus of this article.[78] They include the following.

- *Capital protection products* guarantee that a fraction of the investment (usually but not necessarily 100%) will be returned to the investor at maturity, unless a default occurs. There is therefore little scope for major losses, outside of counterparty risk. Within this category there are capped products (which specify a maximum return) and uncapped products.
- *Yield enhancement products* offer capped returns and expose investors to potential losses, which are mitigated by a discount.
- *Participation products* offer uncapped participation in any increase in value of the underlying. The upside participation rate may be greater than 100%, e.g. for outperformance certificates. There is also a 1:1 participation in the decline of the underlying.

Leverage products are products with downside exposure than can exceed a price fall in the underlying in percentage terms. Leverage products are mostly sold as warrants and include the following.

- *Leverage products with knock-out features*. 'Knock-out' means the product expires prematurely in certain conditions. For example, expiry may be triggered if the underlying increases – or decreases – by a certain amount, or may be triggered if the underlying decreases by a certain amount.
- *Leverage products without knock-out features*. For example, a leveraged tracker certificate.
- *Constant leverage products*, which are often recalibrated on a daily basis.

Many different variants of payoffs are possible within each of these categories. For example, the way a knock-out is triggered can be varied by changing the threshold level of the underlying or the period over which the underlying is measured. Knock-outs may even be triggered based on various statistics calculated from a basket of reference assets. Equally, 'barriers' (which offer limited or conditional capital protection), coupons and participation rates can be varied by the product designer. The large number of different types of payoff precludes an exhaustive analysis of every product type. Instead, to gain insight into key market developments the analysis in this article focuses on certain common payoff types among investment products.[79] These include the following.

- *Auto-Callable* (*AC*), also known as *Knock-Out* (*KO*): Typically short-term capital protection products offering a fixed return if the reference asset reaches a given level before a predetermined date, in which case the product matures early. In the event that the provider has the right to trigger early maturity in such a case but this is not effected

[78] According to the dataset used in this article, around 97% of sales volumes to retail clients across Europe in 2017 were investment rather than leverage products and around 95% of outstanding amounts by volume were investment rather than leverage products.

[79] Many of the payoffs for investment products have analogous payoffs for leverage products. For example, a Protected Tracker, as described below, offers 1:1 participation in the underlying, typically between a knock-out on the upside and a barrier on the downside. A leverage product with knock-out features could be similarly structured but offer greater than 1:1 participation over a range of values of the reference asset. An exception to this correspondence between investment and leverage product payoffs is that by definition leverage products cannot offer 100% capital protection, so products with such protection must be investment products.

automatically, the product is designated *Callable* (*CA*).

- *Capped Call* (*CC*): A capital protection product that offers capped participation in any increase in value of the underlying.
- *Floater* (*FL*): A capped capital protection product that offers a coupon with a fixed element and a variable element, with the latter depending on the performance of a reference value.
- *Portfolio Insurance* (*PI*): An uncapped capital protection product that typically offers synthetic participation in the performance of a fund.
- *Protected Tracker (PT):* A participation product with 1:1 participation in the underlying, typically up to a knock-out level (at which point the product expires with a maximum return). The 'protection' in a PT may be a positive minimum return but is often a barrier set considerably below the strike price, meaning that if the underlying price falls below this barrier there is then 1:1 downside participation.
- *Reverse Convertible (RC)*: A yield enhancement product. Some RCs have a 'knock-out' feature, meaning that under certain conditions the product expires prematurely. Typically, the product is knocked out if the price of the underlying rises above a certain level. Some RCs have a 'knock-in' feature, also known as a 'barrier', meaning that under certain conditions the payoff function changes. For example, if the underlying price never falls more than 20% below the strike price prior to expiry, the investor receives at least 100% of their capital at expiry, but if the price does fall more than 20% below the strike price prior to expiry, there is 1:1 downside participation.
- *Uncapped Call (UC)*: An uncapped capital protection product that replicates the payoffs of a call option.

Some of these popular payoff types involve greater levels of risk, return or complexity (in the sense of the number of features of the payoff function) than others. For example, a CC involves an additional feature – namely, a capped return – compared to a UC. Both products provide capital protection but may offer different expected returns even if they have the same underlying.

Additionally, within each of the popular payoff types listed above there is scope for varying levels of risk, return and complexity. For instance, RCs may include a 'barrier', as described above, to mitigate some downside risk (while retaining downside tail risk). Alternatively, downside risk may be mitigated by applying a discount.

Data used

The analysis in this article uses data from *StructuredRetailProducts.com*, a large commercial database of structured retail products issued internationally in many different jurisdictions.[80] The sample covers Euro-denominated issuances in EU countries since 2006, for which the database includes around 60 different products. Many variables are reported for each product, including a text description in English (composed by the data provider) of the product and its payoffs, the volume issued, the minimum return,[81] the offer date, strike date and expiry date. Some variables are only available for products that have already matured, such as ex-post annualised returns. Coverage of different variables varies. Annualised returns are recorded for less than 2% of products by volume and by number, and so ex-post returns are not studied in this article. According to an estimate by the data provider, coverage of the volume variable in the dataset used is around 80% of all the products on which some data are available. One reason for this incompleteness is that in a significant number of cases products are offered in the retail market but never sold. Market intelligence suggests that there may also be significant private placements for which firms choose not to provide data in the first place. As issuers provide data to the data provider on a voluntary basis and there is no exhaustive register of such products in a single source elsewhere, it is not possible to derive a reliable estimate of the coverage in the database of numbers of products, compared to the product population as a whole.

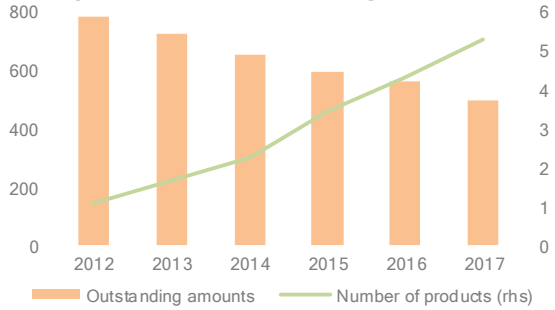
[80] No regulatory data are available on structured retail products in the EU, and ESMA has no legal basis to request relevant data from market participants. ESMA cannot ascertain the quality or accuracy of the data used from structuredretailproducts.com and does not therefore take responsibility for any errors or omissions resulting from the content of this commercial data source.

[81] The level of capital protection for different products can be inferred from the minimum return.

Overview of the EU retail market

The retail market for structured products accounts for around 4% of EU households' financial net worth.[82] A long-term trend for the past several years has been a steady and gradual decline in **outstanding amounts** of structured products (V.4).

V.4
Outstanding amounts of structured retail products in Europe
Steady decline in outstanding amounts

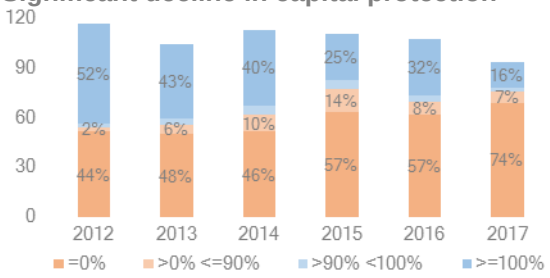


Note: Outstanding amounts, EUR bn. Number of products, in million.
Sources: StructuredRetailProducts.com, ESMA.

In 2017, volumes outstanding stood at around EUR 500bn, down from almost EUR 800bn in 2012. At the same time, the number of outstanding contracts continued to rise, passing the five million mark. The decline in volumes may be related to the supply side, also in the light of changes in market practices, and the regulatory environment. An increasing number of products have been listed on exchanges. On-exchange products tend to be issued in smaller volumes than OTC products, the latter typically being sold through large distribution networks. Several regulatory changes have characterised this market in recent years, both country-specific and EU-wide, aimed at enhancing consumer and investor protection.[83]

Structured products can be classified by the level of **capital protection** they offer the investor, ranging from products with a capital guarantee of greater than 100% (i.e. a guaranteed return) to those with no capital protection (i.e. the capital is at risk if underlying assets fall in value). In the six years to 2017, the share of 100% capital-protected products declined by 36pps; the share of capital-at-risk products increased accordingly by the same amount (V.5). This trend is likely to be at least partly attributable to the low interest rate environment and the consequent search for yield by investors, though supply factors may of course also be an important determinant. Consistently, more than 99% of products issued by number (as opposed to around two-thirds of market share by volume) have zero capital protection. Capital-protected products tend to be more standardised and are thus typically larger in volume but far fewer in number than capital-at-risk products. This development also implies, ceteris paribus, that the risks to retail investors in structured products increased significantly on average over the period.

V.5
Volume of products sold by level of capital protection
Significant decline in capital protection



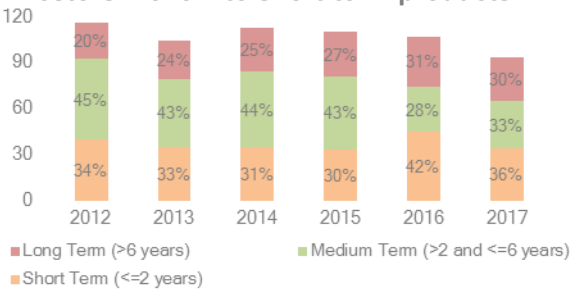
Note: Volumes of structured products sold to retail investors by level of capital protection, EUR bn and expressed as percentages of total.
Sources: StructuredRetailProducts.com, ESMA.

Another variable of interest is the **term** of a structured product (V.6). While the vast majority of products (with respect to the number of products issued) are short-term (< 2 years), as regards volumes the split is more even between short-term, medium-term (2–5 years) and long-term (> 5 years) products. In 2016 short-term products registered higher sales by volume (42%) than either long- or medium-term products (V.6). Data for 2017 indicate a less marked but somewhat similar split among the different term categories of structured retail products, with short-term products still making up a larger share of sales volumes than from 2012 to 2015.

[82] EU households' financial net worth stood at around EUR 24tn in 4Q17 (A.153), compared with outstanding amounts of structured retail products in the EU of around EUR 500bn in Dec 2017, according to the dataset used in this article. By way of comparison, total NAV in UCITS was around EUR 9tn (A.110).

[83] For further details on the evolution of the EU regulatory framework, see ESMA Opinion (2014), "Structured Retail Products – Good practices for product governance arrangements".

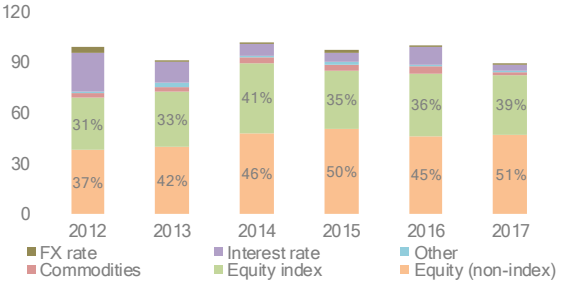
V.6
Volume of products sold by term
Investors move into short-term products



Note: Annual volumes of structured products sold to retail investors by investment term, EUR bn and expressed as percentages of total.
Sources: StructuredRetailProducts.com, ESMA.

The vast majority of **sales volumes** – around 90% in 2017 – relate to products that take equities or equity indices as their underlying, as opposed to other types of underlying such as interest rates, exchange rates or commodities (V.7). This share has grown over the last few years, while sales volumes of products with the next-most popular type of underlying, interest rates, fell to 4% in 2017, down from 23% in 2012. This trend may be connected with the very accommodative monetary environment. Retail investors may have come to expect interest rates would remain near the lower bound during this period and hence looked to riskier assets for real returns.

V.7
Volume of products sold by type of underlying
Vast majority of sales volumes equity-related

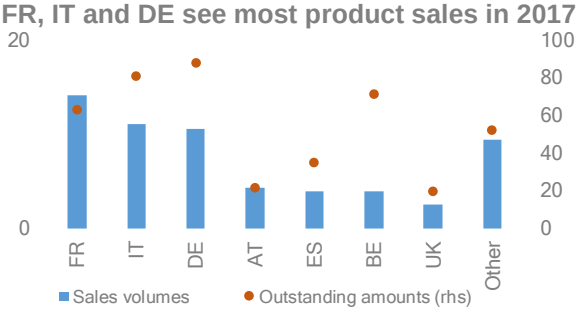


Note: Volumes of structured products sold to retail investors by asset class, EUR bn. Percentage of total annual volumes presented for selected asset classes. Number of products sold, in thousand.
Sources: StructuredRetailProducts.com, ESMA.

Country-specific case studies

In addition to focusing on the most commonly-sold products in terms of payoff types, analysis of some of the largest national retail markets for structured products in the EU also provides detail to complement the EU-wide picture. In particular, attention in this section is devoted to the most popular payoff types (specifically, the top five products by volume sold from 2005 to 2017) in three large national markets – France, Germany and Italy – as measured by sales volumes. One reason for focussing on these markets is their size: they were the leading three countries by sales volumes in 2017, together comprising around 60% of total sales (V.8). In terms of outstanding amounts, Germany and Italy came first and second respectively, followed by Belgium, then France. Sales volumes in 2017 in Belgium were relatively low, however, having suffered a large drop in volumes in 2008 following the financial crisis. France, Germany and Italy together comprised around half of outstanding volumes of structured products in 2017. Another reason for a country-specific analysis in these markets is that they exhibit considerable heterogeneity, highlighting the variation in national market characteristics according to factors such as (i) investor preferences; (ii) different tax regimes; (iii) historical differences in distribution channels, e.g. the popularity of exchange-based products in Germany versus predominantly bank-based distribution to retail investors in Italy.

V.8
Sales volumes and outstanding amounts by country
FR, IT and DE see most product sales in 2017



Note: Sales volumes and outstanding amounts of structured retail products in 2017 for selected countries, EUR bn. "Other"=European countries not otherwise listed, excluding Switzerland.
Sources: StructuredRetailProducts.com, ESMA.

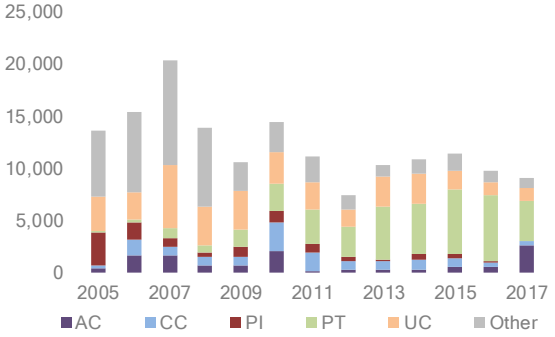
Country-specific analysis reveals certain changes in the types of product and the risk-return profile taken on by investors. In some cases, further insight is gained by examining the extent to which additional features are present among certain types of product. For instance, the prevalence of a "worst of" feature among reverse convertibles monitoring for other features such as barrier level may indicate a change in risk profile within this segment of the market.

France: AC and PT products on the rise

The retail market for structured products in France has been characterised in recent years by a move from capital protection products such as Portfolio Insurance products and uncalled calls to protected trackers (V.9). The latter are participation products, offering some downside

protection but retaining exposure to downside tail risk, as explained above. A driver for this development may be increasing search for yield among retail investors in the country.

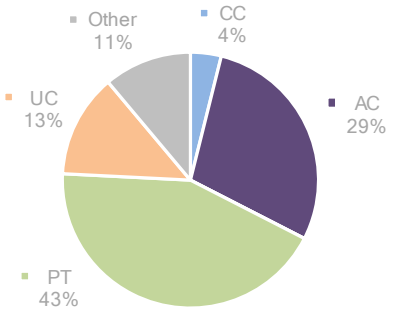
V.9
Sales volumes by payoff type in France
More protected trackers sold in recent years



Note: Sales volumes of products in France by year and by selected payoff types, EUR mn. "CC"=Capped Call. "KO"=Autocallable (or Knock-Out). "PI"=Portfolio Insurance. "PT"=Protected Tracker. "UC"=Uncapped Call.
Sources: StructuredRetailProducts.com, ESMA.

For clarity, sales volumes in 2017 are set out in Chart V.10.

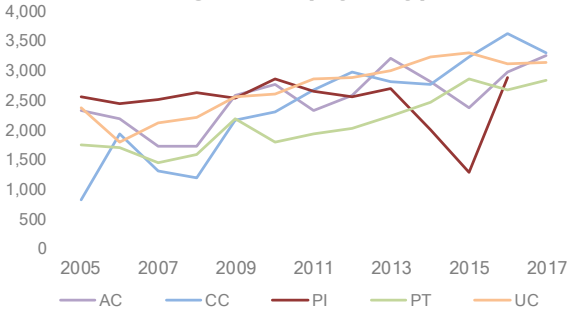
V.10
Sales volumes by payoff type in France in 2017
Protected trackers lead 2017 sales



Note: Shares of sales volumes in France in 2017, selected payoff types. "AC"=Auto-callable. "CC"=Capped Call. "PT"=Protected Tracker. "RC"=Reverse Convertible.
Sources: StructuredRetailProducts.com, ESMA.

Another variable of interest in characterising the structured products sold to retail investors is the term of the product. All else being equal, longer-term products may offer higher annualised expected returns than shorter-term products, as investors tie up their capital for longer, but other influencing factors are the outlook for the underlying market and the interest rate environment. Relative demand for shorter-term compared to longer-term products is also likely to be increasing in households' liquidity requirements. In the case of the retail market in France, the period 2005-2017 saw an upward trend in the average term of all the most popular payoff types (V.11), in contrast to the declining trend seen EU-wide (V.7).

V.11
Average term by payoff type in France
Term increasing across payoff types

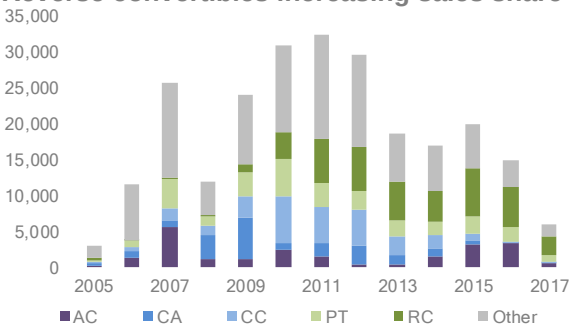


Note: Average term of products sold in France, by selected payoff types, unweighted averages, in days. "AC"=Autocallable. "CC"=Capped Call. "PI"=Portfolio Insurance. "PT"=Protected Tracker. "UC"=Uncapped Call.
Sources: StructuredRetailProducts.com, ESMA.

Germany: drop in sales in 2017

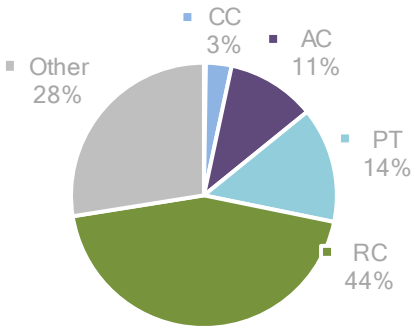
Following the financial crisis, the retail market for structured products in Germany has seen growth in demand for reverse convertibles, while sales volumes of products such as capped calls and auto-callables have declined sharply (V.12). The latter effect has dominated the former, leading to lower overall sales volumes through 2017. As in other markets, search for yield is likely to have been a significant driver of these developments; but specific to the German market as opposed to the other domestic markets examined in depth here (France and Italy) is the resulting demand for reverse convertibles which, as yield-enhancement products, do not offer complete capital protection. To the extent downside risk may be mitigated by a barrier, such products also take on additional complexity.

V.12
Sales volumes by payoff type in Germany
Reverse convertibles increasing sales share



Note: Sales volumes of products in Germany by year and by selected payoff types, EUR mn. "CA"= Callable. "CC"=Capped Call. "KO"=Autocallable (or Knock-Out). "PT"=Protected Tracker. "RC"=Reverse Convertible.
Sources: StructuredRetailProducts.com, ESMA.

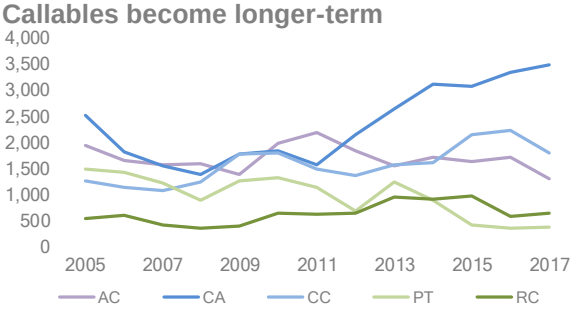
V.13
Sales volumes by payoff type in Germany in 2017
Reverse convertibles lead 2017 sales



Note: Shares of sales volumes in Germany in 2017, selected payoff types. "AC"=Auto-callable. "CC"=Capped Call. "PT"=Protected Tracker. "RC"=Reverse Convertible.
Sources: StructuredRetailProducts.com, ESMA.

Examining the average term length of products sold in Germany over time reveals widening dispersion between different payoff types, with reverse convertibles consistently fairly short-term on average – under three years throughout 2005-2017 – while callables have increased significantly from a low in 2008 of around four years to over nine years in 2017 (V.14). At the same time, such products have become a more niche part of the market (V.13), suggesting the profile of the average investor may be different, resulting in changes in demand.

V.14
Average term by payoff type in Germany
Callables become longer-term

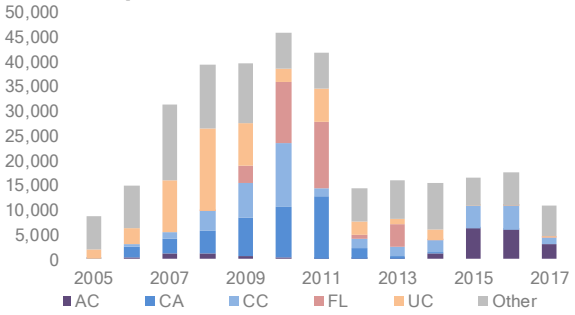


Note: Average term of products sold in Germany, by selected payoff types, unweighted averages, in days. "AC"=Autocallable. "CA"= Callable. "CC"=Capped Call. "PT"=Protected Tracker. "RC"=Reverse Convertible.
Sources: StructuredRetailProducts.com, ESMA.

Italy: subdued sales, ACs dominate

In Italy, the market for investment products in general has traditionally featured significant holdings of debt instruments, rather than other investments such as equities. This tendency has also been broadly observed specifically in the retail market for structured investment products, with coupon-bearing products such as floaters and callables representing the majority of sales in 2010 and 2011, for example, and auto-callables the top-selling payoff type in each of the three calendar years to end-2017 (V.15). However, following 2011 the Italian retail market for structured products appears to have witnessed a collapse in sales volumes overall, possibly influenced by concerns at the time around the creditworthiness of issuers in corporate and sovereign debt markets.

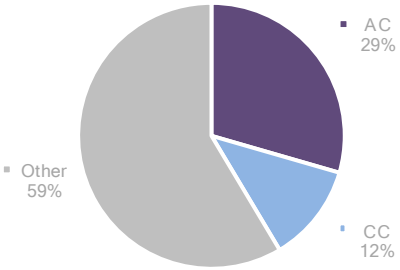
V.15
Sales volumes by payoff type in Italy
Sales fall post 2011, shift to auto-callables



Note: Sales volumes of products in Italy by year and by selected payoff types, EUR mn. "CA"=Callable. "CC"=Capped Call. "FL"=Floater. "KO"=Autocallable (or Knock-Out). "UC"=Uncapped Call.
Sources: StructuredRetailProducts.com, ESMA

In Italy, average terms appear fairly stable across popular payoff types from 2005 to 2017, with the exception of uncapped calls, whose average term increased substantially to around eight years in the two years to end-2017 (V.16).[84]

V.16
Sales volumes by payoff type in Italy in 2017
Auto-callables and capped calls popular

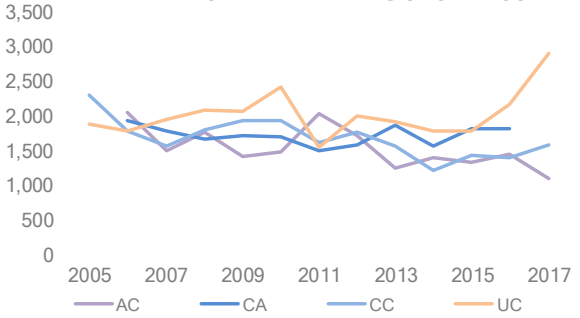


Note: Shares of sales volumes in Italy in 2017, selected payoff types. "AC"=Auto-callable. "CC"=Capped Call.
Sources: StructuredRetailProducts.com, ESMA.

As other payoff types have, on the whole, seen moderate decreases in average term over the same period, this has generated an increase in the dispersion of average terms between different payoff types (V.17).

[84] FL was the product type with the fifth-highest issuance volumes over the sample period. Average FL terms are omitted from V.17 since zero volume was issued for this product in 2015, according to the data.

V.17
Average term by payoff type in Italy
Greater term dispersion among payoff types



Note: Average term of products sold in Italy, by selected payoff types, unweighted averages, in days. "AC"=Autocallable. "CA"=Callable. "CC"=Capped Call. "UC"=Uncapped Call.
Sources: StructuredRetailProducts.com, ESMA.

Product complexity

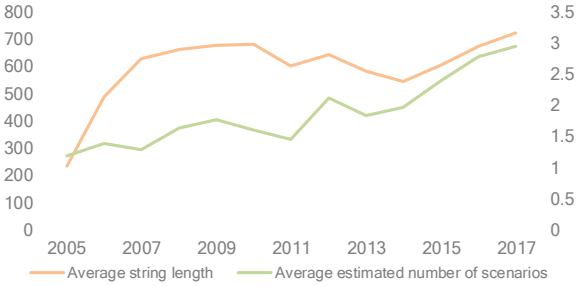
Another metric studied in the context of the national markets examined in this section is the length of the product description for different product types. Clearly, the length of the product description is a far from ideal measure of product complexity, since various factors besides complexity can influence it. For instance, differences in style between the analysts manually composing the descriptions may explain some variation. Another possibility is that a relatively long section of text may describe a single and intuitively simple or straightforward feature of a product. Finally, altered practices by providers, for instance following regulatory changes, can drive changes in product descriptions.

In interpreting complexity metrics, besides noting limitations in the metrics employed it is also worth considering that complexity may in some cases be the result of catering to investor risk preferences, as outlined in the Introduction. However, as also noted there, complexity nonetheless remains a concern from an investor protection perspective.

Recent academic research using a large sample of comparable data from the same commercial database as employed in the present analysis, and covering the years 2002-2010, analysed product complexity with reference to three metrics.[85] The most prominent of these was a measure of the number of features a product has that require lengthy manual analysis.[86] A second measure was the number of 'scenarios' involved in a product's payoffs, estimated by calculating the number of conditional subordinating conjunctions in the product description such as "if", "when" and "whether" in the text description of the payoff formula. Examples of the scenarios which an approach of this kind attempts to measure are the breaching of a knock-in barrier below the strike price (thereby removing conditional downside capital protection) and a knock-out above the strike price capping the product's return. The final measure was the length of the description. The research indicated a reasonable degree of consistency of text length with the more sophisticated measures, motivating the examination of this simple measure in the present analysis. Where ostensible trends in product complexity based on the analysis of description length may be present, further quantitative and qualitative analysis could potentially uncover notable developments, as outlined below.

The use of two simple text-based complexity metrics – a measure of the number of characters used in the description of the product recorded in the data set, and a measure of the number of 'scenarios' as explained above, suggests a slight upward trend in complexity, consistent with academic research (V.18).

V.18
Text-based proxies for product complexity in France
Sustained increase in scenarios



Note: Text-based metrics applied to product descriptions in StructuredRetailProducts.com dataset for products sold in France, by year, averages weighted by sales volume in a given year. "Average string length"=arithmetic mean of number of characters in product descriptions for this sample. "Average estimated number of scenarios"=arithmetic mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description.
Sources: StructuredRetailProducts.com, ESMA.

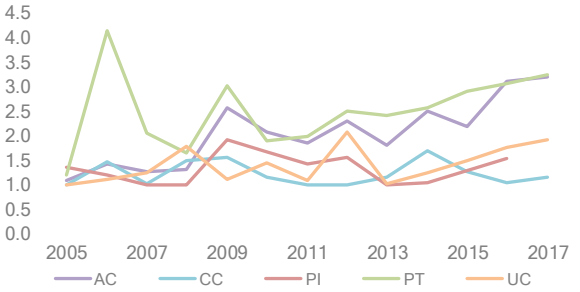
To gain further insight into the estimates of complexity, it is possible to break down the data by payoff type (V.19). This suggests that auto-callables and protected trackers exhibit higher complexity than some of the other popular types of product, possibly associated with the conditions around the knock-out feature of the

[85] Célérier, C. and Vallée, B. (2017), "Catering to Investors Through Security Design: Headline Rate and Complexity". Quarterly Journal of Economics, Volume 132, Issue 3, 1 August, pp.1469–1508, https://doi.org/10.1093/qje/qjx007

[86] 'Features' in this sense captures not only kinks in the payoff profile but also other dimensions such as path-dependence of payoffs.

former and the barrier feature of the latter. The increase in overall apparent complexity of products in France according to the text-based analysis described above appears to be largely attributable to an increase in complexity of the product descriptions for these products.

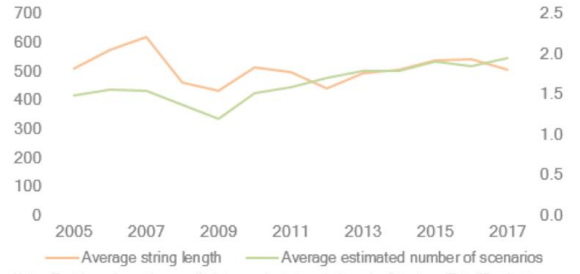
V.19
Text-based proxies for product complexity in France
More scenarios for ACs and PTs



Note: Text-based metric of average estimated number of scenarios applied to product descriptions in StructuredRetailProducts.com dataset for products sold in France, by selected payoff types, by year, averages weighted by sales volume in a given year. Metric is weighted mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description. "AC"=Auto-callable. "CC"=Capped Call. "PI"=Portfolio Insurance. "PT"=Protected Tracker. "UC"=Uncapped Call.
Sources: StructuredRetailProducts.com, ESMA.

Simple complexity metrics do not reveal a clear trend in recent years in Germany (V.20), although it does appear that average product complexity as proxied by textual analysis of numbers of scenarios may have been somewhat elevated from around 2010 to around 2015.

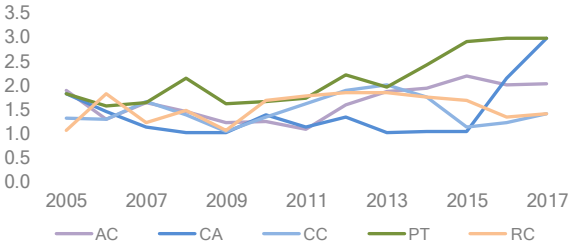
V.20
Text-based proxies for product complexity in Germany
Slow increase in scenarios post-crisis



Note: Text-based metrics applied to product descriptions in StructuredRetailProducts.com dataset for products sold in Germany, by year, averages weighted by sales volume in a given year. "Average string length"=weighted mean of number of characters in product descriptions for this sample. "Average estimated number of scenarios"=weighted mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description.
Sources: StructuredRetailProducts.com, ESMA.

Looking at the number of scenarios by payoff type, an interesting development over 2015 to 2017 is the apparent increase in complexity in callables, traditionally a relatively simple product according to the text-based metric.

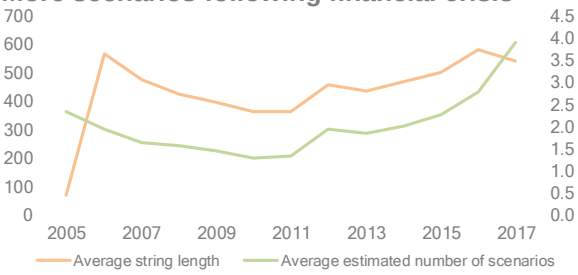
V.21
Text-based proxies for product complexity in Germany
CAs see increase in number of scenarios



Note: Text-based metric of average estimated number of scenarios applied to product descriptions in StructuredRetailProducts.com dataset for products sold in France, by selected payoff types, by year, averages weighted by sales volume in a given year. Metric is weighted mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description. "AC"=Auto-callable. "CA"= Callable. "CC"=Capped Call. "PT"=Protected Tracker. "RC"=Reverse Convertible.
Sources: StructuredRetailProducts.com, ESMA:

In Italy the estimated number of scenarios increased substantially from 2015 to 2017 (V.22). Earlier in the sample period, the number of scenarios had been relatively low compared to France and Germany, consistent with the profile of the products in terms of payoff types (V.21), indicating the popularity in the Italian retail market of debt securities that might be expected to have relatively simple payoffs.

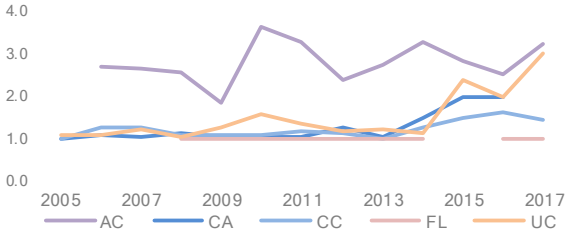
V.22
Text-based proxies for product complexity in Italy
More scenarios following financial crisis



Note: Text-based metrics applied to product descriptions in StructuredRetailProducts.com datasetfor products sold in Italy, by year, averages weighted by sales volume in a given year. "Average string length"=arithmetic mean of number of characters in product descriptions for this sample. "Average estimated number of scenarios"=arithmetic mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description.
Sources: StructuredRetailProducts.com, ESMA.

More insight is obtained by examining the metric as applied to individual payoff categories. As in the French and German markets, auto-callables are estimated to be relatively complex in terms of numbers of scenarios (V.22). The increase in popularity of these products in Italy (V.23) therefore explains the rise in overall measured complexity in the national market.

V.23
Text-based proxies for product complexity in Italy
Most scenarios for ACs



Note: Text-based metric of average estimated number of scenarios applied to product descriptions in StructuredRetailProducts.com dataset for products sold in Italy, by selected payoff types, by year, averages weighted by sales volume in a given year. Metric is weighted mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description. "AC"=Auto-Callable. "CA"= Callable. "CC"=Capped Call. "FL"=Floater. "UC"=Uncapped Call.
Sources: StructuredRetailProducts.com, ESMA.

Costs and pricing transparency

In addition to examining developments in the types of product payoff attracting demand, the data used provide insight into the costs and charges faced by retail investors in these products in Germany. Unlike in many other EU countries, issuers in Germany have for some time reported their *Estimated Initial Value* (EIV) of each product, values captured in the database.[87] EIV expresses the expected value of the product as a percentage of the estimated fair value. Taking the difference between EIV and 100% therefore yields an estimate of the intrinsic cost incurred by the retail investor.

Structured products can be understood as products that combine at least two single financial instruments, at least one of which is a derivative (Das (2000)). The law of one price thus suggests that a structured product's price can be calculated simply by adding together the prices of its components.

For example, in options markets a reverse convertible is a bond that can be exchanged for shares of common stock at the discretion of the issuer. A long position in a reverse convertible can therefore be replicated by a long position in a coupon-bearing bond issued by the issuer of the reverse convertible and a short position in a put option, i.e. a written put. A structured product with reverse convertible payoffs can be similarly priced or valued.

Approaches to replication

If prices are not disclosed by the issuer, or the credibility of the issuer's disclosure is questionable, own estimates can be made. To arrive at a fair price for a structured product, the components of the respective structured product must be identified. For every structured product, there are many ways to replicate its payoff structure. For example, a reverse convertible can be replicated by a long position in a bond and a short position in a put option or by a combination of bonds, a short call, and a forward contract. Nevertheless, economic reasoning suggests that the replication of the structured product with the least products possible is the most efficient one.

Two approaches exist to find the prices of different structured product components. One is to observe the prices of the components that are traded on an exchange and use a financial model for those that are not traded. This approach, used by e.g. Szymanowska et al. (2008), uses few assumptions. However, it will not always be possible to find the respective components on an exchange, as the component sometimes does not exist, or there is no incentive to trade it on an exchange.

Another approach is to use a financial model for all components of the structured product. This approach does not run the risk of issuer bias and virtually every option can be priced. However, using a financial model for the option component can be time-consuming. Additionally, decisions have to be taken with respect to the model that will be used and the inputs. These decisions, as for example the assumed volatility, can significantly impact the price. Replicating prices using financial models is by far the most common approach taken in research. A detailed summary of the results of this approach can be found in Bouveret et al. (2013).

Findings from the literature

Estimating prices requires specific data for each product and the use of a model for the underlying, as described above. A number of empirical studies on structured retail products have been carried out. Significant premia (intrinsic costs to investors) are typically found, with estimated average premia usually ranging between around 2% and 9%. As might be expected, the results

[87] Since May 2014 members of the German derivatives association, the Deutscher Derivate Verband (DDV), have disclosed to the For approval by written procedure (58) - 18.00 CET - Monday 20th August 2018 - Trends, Risks and Vulnerabilities (TRV) No.2, 2018, and the ESMA Risk Dashboard No.3, 2018 detailed information – including information on costs – for many different products, including structured retail products.

vary by market, by the type of product analysed and by the analysis period.

In 2013, ESMA published a report on retailisation in the EU.[88] Part of the report estimated the costs faced by retail investors across a sample of different types of structured products, across several EU countries. EIV was 96% in the case of capital protection products and 94% in the case of other products, with yearly associated costs of 1.2% and 2.1% respectively. There was significant variation in the figures, with the 10th percentile of EIV standing at 90.0% and the 90th percentile at 99.6%.

The results of several similar studies in the US and for some European countries over the last two decades paint a broadly consistent picture (V.24), though there is some variation in results over time and between different payoff types and countries.[89] Other studies report that the mark-up differs from the primary market to the secondary market. Within the same type of SRPs, the time until expiration, the complexity of the product, the issuer's method of pricing and competition can also affect the level of mark-up.

V.24

Summary of literature on EIV of structured retail products

Study	Country & time period	Products	EIV	Cost
Bertrand & Prigent (2014)	FR, 2014	Structured funds	93%-98%	2%-7%
Burth et al (2001)	Switz., '01	RCs and DCs	97% (RCs); 99% (DCs)	3% (RCs); 1% (DCs)
Joergensen et al (2011)	DK, '98-'01	Principal protected notes	94%	6%
Stoimenov & Wilkens (2005)	DE, 2005	Equity-linked products	95%-99%	1%-5%
Szymanowska et al (2008)	NL, '99-'02	RCs	94%	6%
Wilkens et al (2003)	DE, '03	RCs and DCs	97% (RCs); 96% (DCs)	3% (RCs); 4% (DCs)

Note: "EIV"=average Estimated Initial Value of sample of products studied. Cost is estimated intrinsic cost to investor at issuance and is not annualised. Cost=1-EIV. "RCs"=Reverse Convertibles. "DCs"=Discount Certificates. Figures rounded to nearest percentage point.

Tentative evidence from Germany

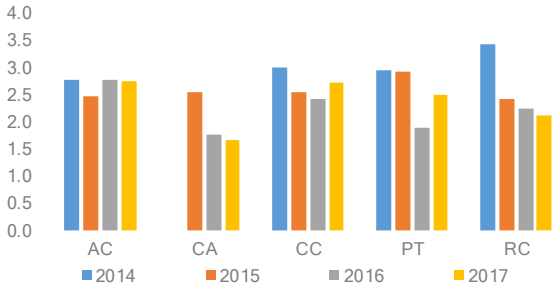
The intrinsic value of structured products typically comprises much of the premium paid by retail investors to the issuer, though it is also possible that products may be sold with additional fees or charges. It is important to note that such fees and charges are not considered here.

In Germany, several issuers have reported EIV on a voluntary basis in the last few years, and coverage of the relevant variable in the data set was around 20% in each of the years 2014-2017 (having been zero before 2014). The simple averages of the relevant variable in the data set for these years may therefore not be representative of true average costs facing investors due to sample bias. The data are self-reported, and providers may use different pricing methodologies, as discussed above. However, the coverage of the variable is stable over time and across payoff types in the sample, meaning that trends within and across payoff types are likely to be informative.

V.25

Issuers' self-reported estimated initial values in Germany

Some costs to investors decrease



Note: Estimated intrinsic cost of product at issuance as a percentage of amount invested, as reported by issuer and recorded in StucturedRetailProducts.com data set. Costs are for term of product and not annualised.
Sources: StructuredRetailProducts.com, ESMA.

Turning to these trends, the discernible increase in intrinsic cost in the case of callables and protected trackers (V.25) is not explained by changes in term length (V.14), as the terms for these products did in fact increase towards the end of the years sampled. Consequently, it appears that the costs facing retail investors in these products in Germany may have fallen somewhat from 2014 to 2017.

Conclusions

Monitoring the retail market for structured products in the EU is relevant to ESMA's objective of ensuring investor protection. Analysis of commercial data covering recent years highlights two important developments regarding the EU-wide retail market.

— Recent years have seen an overall decline in outstanding amounts, consistent with a declining trend in sales volumes despite a

[88] See ESMA (2013).

[89] For ease of exposition, the intrinsic cost (equal to 100% minus EIV) is presented alongside EIV in Table V.24 .

moderate shift from medium-term to shorter-term products.

— Capital protection products have declined as a share of sales and of outstanding volumes, indicating that investors are taking on more risk, possibly as part of search-for-yield behaviour.

Breaking down the EU market geographically into national retail markets reveals a very high degree of heterogeneity in the types of product sold, warranting a country-specific analysis to gain additional insight into key developments. Key insights from national markets are as follows:

— The data suggest that sales volumes in Italy fell sharply in 2012, unlike in France and Germany, the other two national markets examined.

— While the EU-wide trend has been towards decreasing product terms on the whole in recent years, average terms have increased steadily in France among all the most popular payoff types.

— A particular characteristic observed on the German market is that reverse convertibles have grown as a share of sales in recent years, suggesting that investors are willing to take on significant downside exposure in searching for yield.

The market in Germany is of particular interest because several issuers have, on a voluntary basis, provided estimates of costs to investors in recent years, supporting the following tentative finding:

— While the costs investors pay are sizeable, in keeping with the literature on the topic, there is some evidence of a moderation in costs over the years 2014 to 2017. However, more work will be needed in future to provide a fuller analysis and to gain insight into costs and charges elsewhere in the EU. This will be all the more important given the marked heterogeneity between different Member States.

Finally, simple text-based measures of product complexity, while far from definitive, provide some insight into this potential source of risk to investors. Applying these measures to the dataset suggests the following conclusions:

— Results in the different national markets examined – France, Germany and Italy – are consistent with findings from the literature that complexity may have increased shortly following the financial crisis.

— Auto-callables and protected trackers are relatively popular products but appear to involve a comparatively large number of scenarios compared to other leading payoff types.

— In Italy in particular, increases in the estimated number of scenarios are associated with a higher uptake of auto-callable products.

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Financial Stability

Drivers of CDS usage by EU investment funds

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

Introduction

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

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

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

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

UCITS funds and CDS markets

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

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

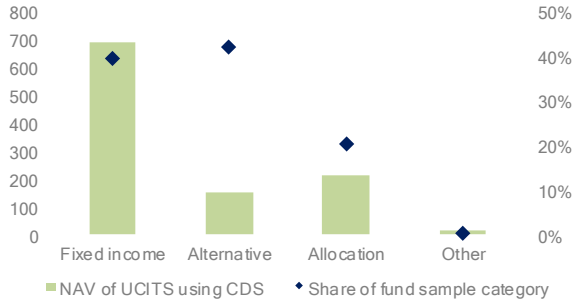
[91] Aldasoro and Ehlers (2018) highlighted that the CDS market has become much more standardised since 2008, reflecting a push by regulatory authorities to reduce counterparty risk by facilitating exposure netting.

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

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

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

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

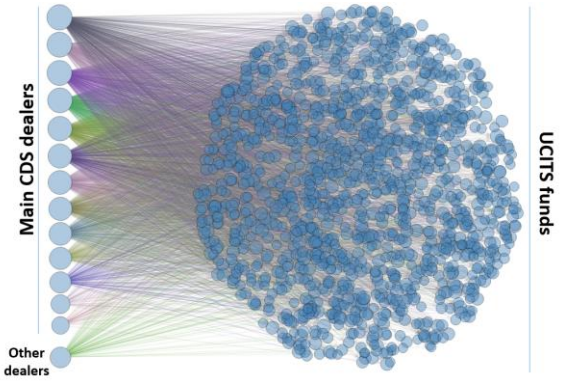


Note: Total net assets of UCITS funds using CDS as of 1 December 2016, by fund category, in EUR bn. Share of fund sample category, right axis, in %.
Sources: Braunsteffer et al. (2018), ESMA.

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

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

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



Note: Relationship network of UCITS funds using CDS, as of 1 December 2016, with dealers on the left and funds on the right. The size of each node reflects the number of CDS relationships that an entity has with other counterparties, regardless of the number or size of transactions. The thirteen main CDS dealers in the dataset are displayed individually and the 23 others regrouped together as "Other dealers".
Sources: Braunsteffer et al. (2018), ESMA.

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

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

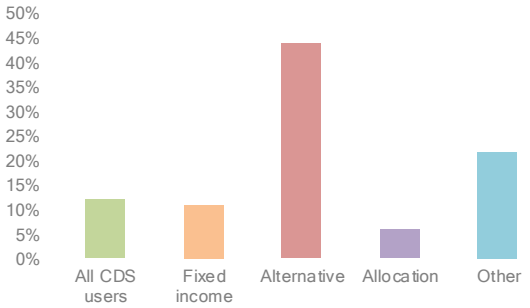
92 Regulation (EU) No 648/2012 on OTC derivatives, central counterparties and trade repositories.

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

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

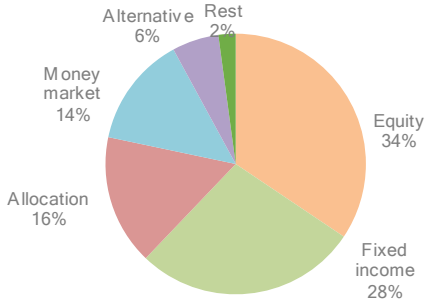
95 The estimate is based on gross notional amounts. This might underestimate the UCITS market share to the extent that banks (the largest actors in CDS markets) frequently enter into interdealer CDS contracts to offset bilateral positions. This would result in a lower net CDS notional amount outstanding.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

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



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

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



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

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

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

Drivers of CDS usage by UCITS funds

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

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

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

Investment fund families

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

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

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

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

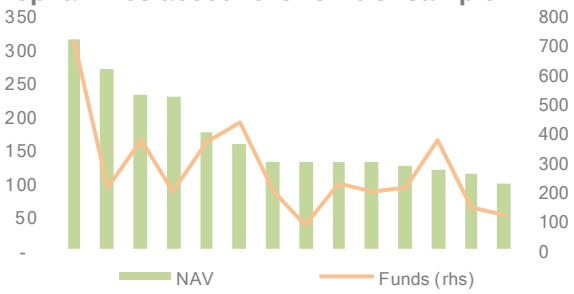
funds owned by the same consolidated group, based on public information.[97] After consolidation, we define two main groups of investment fund families based on the following thresholds:

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

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

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

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



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

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

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

Fund strategies

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

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

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

Model and results

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

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

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

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

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

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

family includes:

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

strategy includes:

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

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

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

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

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

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

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

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

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

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

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

The results confirm our three sets of hypotheses.

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

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

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

Fund drivers of net CDS exposures

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

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

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

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

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

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

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

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

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

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

V.32
Logit results
Drivers of UCITS net CDS positions

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

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

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

In summary, these results show that

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

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

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

The estimates from the quantile regressions show that

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

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

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

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

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

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

V.33

Quantile regression results

Drivers of UCITS net buy CDS notional exposures

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

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

V.34

Quantile regression results

Drivers of UCITS net sell CDS notional exposures

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

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

Analysis of fund CDS underlying

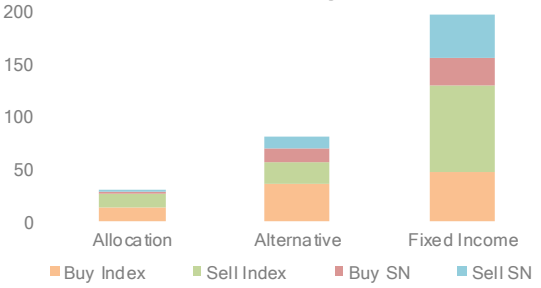
In this final section, we exploit the information reported on CDS underlying under EMIR. More specifically, we rely on the ISIN of the securities used as underlying in single-name CDS (SN-CDS) to investigate the bond-level drivers of the net CDS positions held by UCITS funds.[104]

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

V.35

Gross CDS notional by underlying type and fund category

Fixed-income funds mainly on the sell side



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

Bond drivers of single-name CDS positions

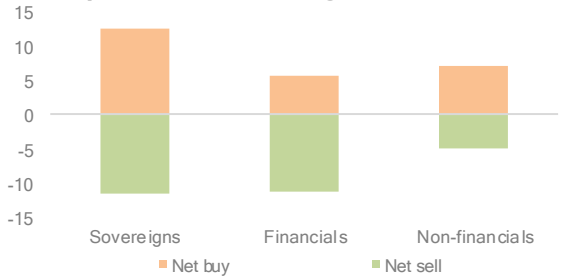
To investigate the bond-level drivers of CDS usage, we restrict the analysis to single-name CDS (SN-CDS), for which identification of the underlying bond is possible, and enrich the dataset with information on the CDS reference entities (i.e. the issuer of the security) from Thomson Reuters Eikon. In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

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

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

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

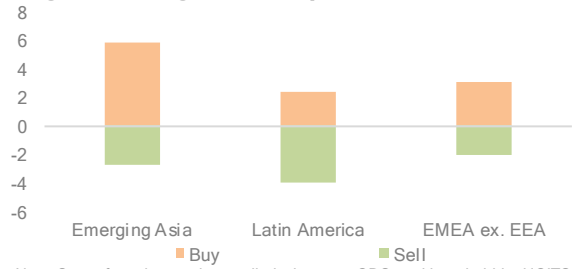
V.36
Funds' net SN-CDS exposure by reference entity sector
Sell exposures in sovereigns and financials



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

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

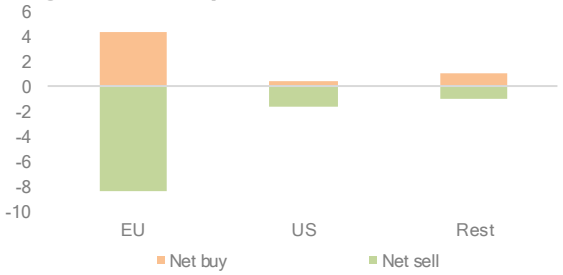
V.37
Funds' net SN-CDS exposure to EM sovereign issuers
Large sovereign CDS exposure to EM Asia



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

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

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



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

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

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

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

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

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

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

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

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

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

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

V.39

OLS regression results

Bond drivers of UCITS net single-name CDS positions

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

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

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

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

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

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

Conclusion

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

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

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

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

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

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

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Orderly markets

Monitoring volatility in financial markets

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Market volatility, and its potential to undermine financial stability as well as to impose unexpected losses on investors, is a subject of concern for securities market regulators. Relatively low or high levels of volatility increase the likelihood of stress in financial markets. Low yields and low volatility characterised the two years between February 2016 and January 2018. In February 2018 equity market volatility spiked as markets globally were affected by a strong correction. The main drivers of the long period of low volatility are related to lower equity return correlation, a low interest rate environment and search-for-yield strategies, and stable macroeconomic and corporate performances. A prolonged period of low volatility may lead to a more fragile financial system, promoting increased risk-taking by market participants driven by the use of VaR models and, more recently, by the growth of volatility targeting strategies. While the AuM of these products may be considered still quite small, the number of products is sufficiently broad to become a key factor driving volatility spikes, like those that occurred in the first week of February 2018.

Introduction

In 2016 and 2017 financial markets were characterised by very low volatility, raising the question of whether volatility measures adequately reflect risks in financial markets. Volatility then spiked in February 2018, with associated pricing corrections in financial markets and losses for investors. This article explains how volatility measures can be used in financial market risk monitoring and provides explanations for the low volatility levels observed in 2016/17.

Volatility is a broad concept, and several volatility measures are used in practice. Volatility refers to the degree to which prices vary over a certain length of time. Most commonly, price volatility is defined as the standard deviation of changes in the logarithmic returns of asset prices.[109]

Asset price volatility is unavoidable – and indeed necessary in that it reflects the process of pricing and transferring risk as market conditions change (e.g. policy changes or macroeconomic shocks) and avoids misallocation of financial resources. The greatest risks to financial stability and investor protection stem from sudden increases in volatility and not generally from periods of sustained volatility.[110] While the value of stocks is expected to grow over time to compensate investors for putting their capital at risk, volatility is not, and one of its most important features is its tendency to follow a mean-reverting process.[111]

In principle, there are two different approaches to estimating volatility:

- historical volatility (or realised volatility): based on the historical time series of actual prices;
- implied volatility: based on the price of an option on the underlying asset. It is a parameter of an option pricing model (i.e. Black-Scholes).

The two are closely related, but historical volatilities are backward-looking and implied volatilities forward-looking. For this reason, market participants and policy makers prefer in principle to rely on the second kind, when available.

From 2016 to January 2018 equity markets were characterised by very low levels of market volatility, which began to increase again in February 2018. The next section describes market volatility trends in equity markets, building on several indicators. The following sections investigate potential drivers of low volatility in

[108] This article has been authored by Federico Ramella and Claudia Guagliano.

[109] Taylor (2007).

[110] Danielsson et al (2016) find that the level of volatility is not a good indicator of a crisis, but that relatively high or low volatility is.

[111] Whaley (2008).

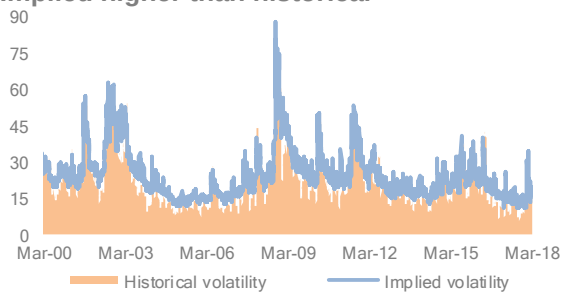
equity markets, while the final section focuses on the related potential risks.

Monitoring market volatility

Asset price volatility characterises financial market activity. Relatively low or high levels of volatility increase the likelihood of stress in financial markets and need to be monitored. In particular, recent empirical analysis (Danielsson et al., 2016) has confirmed Minsky's (1992) instability hypothesis suggesting that economic agents interpret the presence of a low-volatility environment as an incentive to increase risk-taking, which in turn may lead to a crisis ("stability is destabilising"). Against this background, volatility developments are a fundamental topic at the core of risk assessment in financial markets.

The most commonly used volatility indices are the VIX for the US market and the VSTOXX for the European market.[112] The VSTOXX measures the implied volatility of near-term EuroStoxx 50 options, which are traded on the Eurex exchange.[113] Similarly, the US VIX index measures the volatility of S&P 500 index options with a 30-day rolling maturity. It is calculated based on the prices of options listed on the Chicago Board Options Exchange (CBOE).[114] Implied volatility, i.e. investors' expectations of volatility, is generally higher than realized historical volatility (V.40). This is the so-called volatility risk premium, reflecting the extra return required by investors to hold a volatile security. The difference between implied and projected realised volatility can be interpreted as a proxy for investor attitudes towards risk. When volatility spikes in stress episodes, investors' attitude towards risk usually follows, as they are less willing to hold positions in risky assets or to provide insurance against sharp asset price changes. In Europe, the long term (January 1999 - April 2018) average of historical volatility is 20.7%, while the VSTOXX average is 24.4%. The average volatility risk premium in European markets is 3.7%, i.e. the difference between implied and historical volatility. In this article we will use both measures of volatility.

V.40
Market volatilities
Implied higher than historical

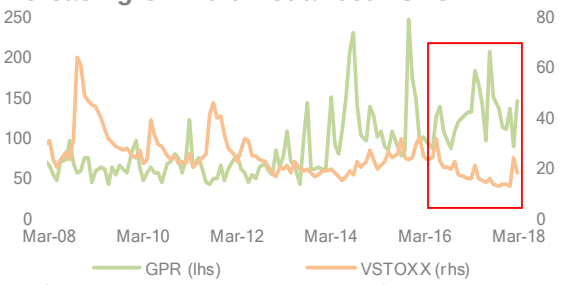


Note: Data from 31/03/1999 to 31/03/2018. Historical vol. is the 30D (calendar days) rolling volatility of EURO STOXX 50 price series. Implied volatility is the daily index price of VSTOXX, data in %.
Sources: Thomson Reuters Datastream, ESMA calculation.

Long period of low volatility in equity markets

In 2016 and 2017 financial markets worldwide experienced falling volatility. Standard deviations of the main equity indices reached extraordinarily low levels by historical standards, with VSTOXX registering its all-time lowest value of 10.7 on 18 December 2017. This was despite increasing geopolitical tensions; indeed volatility seemed to diverge from geopolitical trends as from 2H16 (V.41), with the limited exception of the Korean peninsula tensions in summer 2017,[115] driving both VIX and VSTOXX to their highest values in 2H17 on 10 and 11 August 2017 respectively, when VIX registered 16.0 and VSTOXX 19.3.

V.41
Geopolitical risk & VSTOXX
Increasing GPR did not affect VSTOXX



Note: Caldara, Dario and Matteo Iacoviello, "Measuring Geopolitical Risk," working paper, Board of Governors of the Federal Reserve Board, December 2017. GPR index is computed from January 2009 to March 2018. VSTOXX monthly average.
Sources: Thomson Reuters Datastream, D. Caldara & M. Iacoviello "Geopolitical risk index".

In the US, the VIX index oscillated around 10%, less than half its long-term average of 20%, and reached its all-time lowest closing price of 9.14%

[112] VIX (S&P 500 volatility index) and VSTOXX (STOXX 50 volatility index) are computed on a real-time basis throughout each trading day and represent expected future market volatility over the next 30 calendar days. VIX and VSTOXX are therefore forward-looking measures.

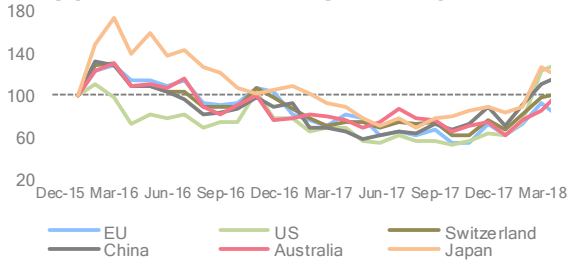
[113] In total, there are 12 VSTOXX indices representing expected future market volatility over different time frames (ranging from 30 days to 360 days) and several VSTOXX sub-indices (with maturities ranging from 1M to 24M). See https://www.stoxx.com/document/Indices/ Common/ Indexguide/stoxx_strategy_guide.pdf for more details.

[114] http://www.cboe.com/products/vix-index-volatility/vix-options-and-futures/vix-index/the-vix-index-calculation.

[115] Financial Times, North Korea: A rising threat, 9 August 2017.

on 3 November 2017. At a global level, implied volatility followed the above trend starting in 2016 and continued to subside across markets. After worldwide indices had reached their minimum values in 2017, in February 2018 they spiked. In January 2018 these indices were oscillating between 60% and 82% of their January 2016 values, while in March 2018 VSTOXX and VIX were 78% and 130% of their January 2016 values respectively, showing a steeper rise in volatility in the US (V.42).

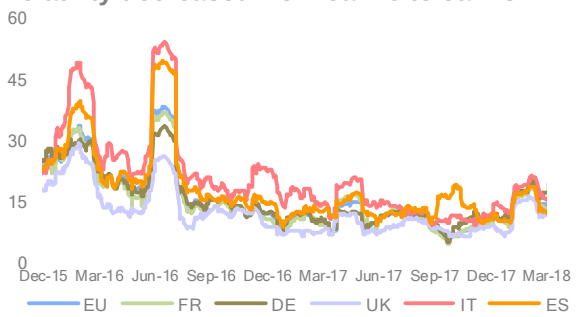
V.42
Market volatilities
Long period of decreasing volatility



Note: Data from 31/12/2015 to 31/03/2018. All indices start from a value equal to 100, the chart shows the value of volatility indexes at the end of the corresponding month. The volatility indices used for calculations are: VSTOXX for EU, VIX for US, VSMI for Switzerland, VXFXI for China, JNIV for Japan and AXVI for Australia.
Sources: Thomson Reuters Datastream, ESMA calculation.

Market volatilities in European markets in January 2018 were way below their January 2016 levels and stable throughout all of 2017, but they increased across all markets in February 2018. At the European level there is a strong correlation across national equity markets, with Italy and Spain showing a higher level of volatility on average (V.43).

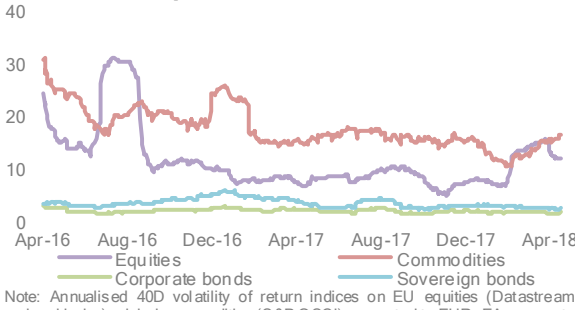
V.43
Market volatilities
Volatility decreased from Jan16 to Jan18



Note: Data from 31/12/2015 to 31/03/2018. Annualised 40D volatility for return indices of European equities, data in %.
Sources: Thomson Reuters Datastream

Volatility traced a downward path across asset classes until January 2018 despite soaring volatility in equities in the summer of 2016. Commodity prices held stable through all of 2017, with no major spike in volatility. The difference in volatility between equities and bonds decreased, reaching its lowest point in November 2017 before increasing sharply in February 2018. (V.44).

V.44
Volatility across asset classes
Increase in equities and commodities



Note: Annualised 40D volatility of return indices on EU equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx Euro, all maturities), in %.
Sources: Thomson Reuters Datastream, ESMA.

The end of low volatility?

EU equity prices rose 10% in 2017, having remained flat in 2016. The upward trend continued until the end of January 2018 when, within a period of two weeks from Friday 26 January to Friday 9 February, the Euro Stoxx 50 suffered a cumulative loss of 10.1%. The 2.5% drop in the Euro Stoxx 50 index on 6 February 2018 was the largest daily fall since 27 June 2016 (- 3.4%). On only four trading days in 2017 had Euro Stoxx 50 prices suffered a downturn by more than 1%. On 6 February 2018, VSTOXX increased to 30.18 (+62% on the previous day) and on 9 February it reached its highest value (34.74) since June 2016. As for VSTOXX, the VIX index experienced a sharp increase at the beginning of February 2018, reaching its highest closing value (37.32) since 24 August 2015.[116] The spike in the VSTOXX index in February 2018 can be considered a consequence of market turmoil rather than political tension. Market perceptions of rising inflation, especially in the United States, and a corresponding adjustment in monetary policy expectations may have been the main drivers. The increased number of products following volatility strategies has also become a key factor in driving volatility spikes.

Markets partially recovered, but uncertainty around US trade policy triggered a renewed decline in EU and US equity markets in early March. Market volatility remained at higher levels in March 2018 before easing in April – without, however, returning to the 2017 levels.

[116] See Securities markets section p.9.

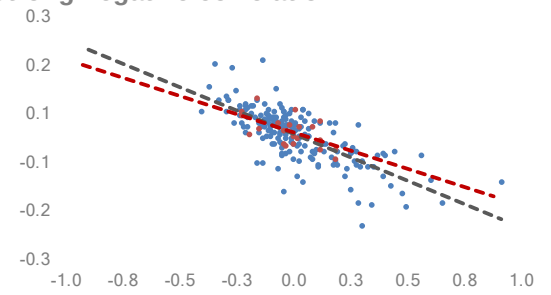
Drivers of low volatility

The very long period of low volatility has been accompanied by several trends in financial markets, such as very good equity performance, lower correlation between the different sectoral equity indices (banks, financial services, insurance and non-financial corporations), and between the constituents of the main equity indices (e.g. Euro Stoxx 50 in Europe). Other factors include the low interest rate environment and stable macroeconomic and corporate performance.

Equity return correlation

Higher levels of volatility are customarily associated with worse equity market performance.[117] In general, the empirical evidence shows that volatility tends to decline as the stock market rises and to increase as it falls. A potential explanation attributes the negative correlation to changes in attitudes towards risk: since low volatility is associated with increased willingness to take on risk, a low-volatility environment is likely to be accompanied by rising asset valuations. Investigating this relationship in the EU equity markets with reference to the Euro Stoxx 50, we find that monthly price changes of Euro Stoxx 50 between February 1999 and March 2018 are negatively correlated with the VSTOXX monthly change (V.45). This indicates a negative relationship between equity market returns and volatility, as confirmed by the contemporaneous low volatility and strong equities performances in 2016 and 2017.

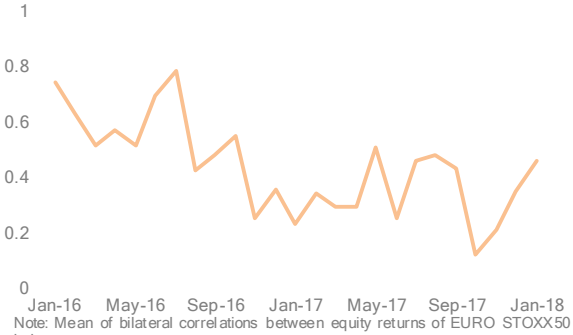
V.45
Correlation between Euro Stoxx 50 and VSTOXX
Strong negative correlation



Note: Points indicate the relation between the monthly returns of the EURO STOXX 50 and the monthly change in the VSTOXX. Blue points refer to January 2001 - June 2016 while red points refer to July 2016 - March 2018, data in %.
Sources: Thomson Reuters Datastream

Low aggregate volatility may be partially explained by the decrease in equity correlations, i.e. the degree to which two different securities move together. Different reactions to events create stronger diversification effects, reducing volatility in the aggregated picture, even when individual stock level volatility does not decrease much. Aggregate volatility is high in periods of close correlation because stocks move in the same direction at the same time and such broad-based movements are reflected in the major indices. Low correlation allows for greater equity portfolio diversification and reduces aggregate volatility at index level (V.46).

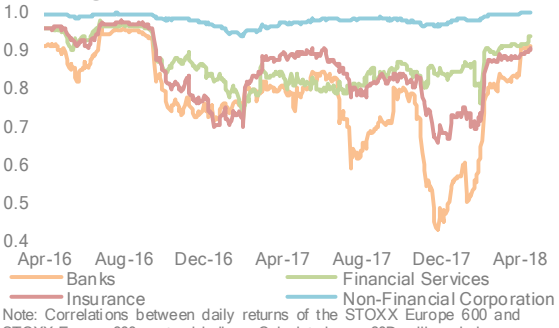
V.46
Correlation of returns
Overall decrease until 3Q17



Note: Mean of bilateral correlations between equity returns of EURO STOXX50 index.
Sources: Thomson Reuters Datastream, ESMA.

Correlation between the banking sector index and the overall equity index in Europe fell below 0.5 in 2H17, the lowest in 15 years (V.47). At the beginning of 2018, correlation increased across different sectors and between the constituents of the Euro Stoxx 50, suggesting more difficult diversification.

V.47
Correlation of sectoral indices with EURO STOXX 600
Banking sector correlation at minimum level



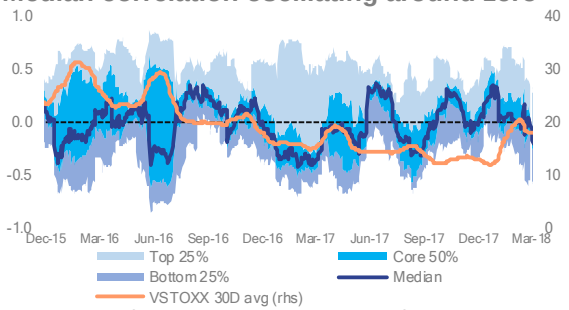
Note: Correlations between daily returns of the STOXX Europe 600 and STOXX Europe 600 sectoral indices. Calculated over 60D rolling windows.
Sources: Thomson Reuters Datastream, ESMA.

The correlation between stocks and bonds is one important input for investors in their asset allocation decisions. At the EU level this correlation tends to swing around zero (V.48). In line with the empirical literature, it does not seem

[117] See Liu et al. (2012) for a detailed analysis of the negative relationship between equity market returns and volatility.

to be correlated with the volatility levels in both markets.

V.48
Equity – sovereign debt correlation dispersion
Median correlation oscillating around zero



Note: Dispersion of the correlation between daily returns of national equity indices and national sovereign debt return index, for 16 countries in the EU, over 30D rolling windows. VSTOXX average over 30D rolling window (rhs), data in %.
Sources: Thomson Reuters Datastream, ESMA.

A prolonged period of a very low-interest-rate environment and generally stable monetary policies may also have contributed to the low asset price volatility. Yield compression in fixed-income markets has forced investors to make substantial portfolio adjustments. The search for yield may have boosted equity valuation globally and generally increased investors' risk appetite (A.27 and A.44).

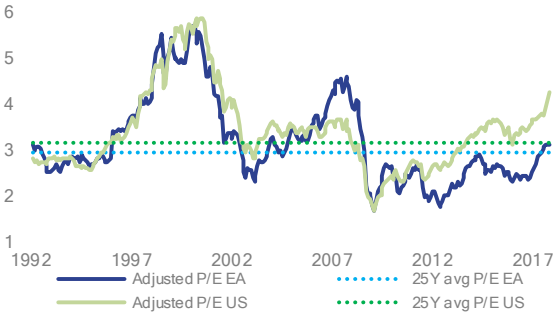
Stable macroeconomic fundamentals

Positive macroeconomic conditions at global and European level may have contributed to the strong equity market performance and low-volatility environment. Global growth in 2017 stood at 3.7% and forecasts for 2018 and 2019 are also positive, with global growth projected at 3.9% for both years.[118] EU output growth is estimated at 2.4% in 2017 and 2.1% in 2018, driven by the cyclical recovery.[119] Favourable financing conditions and positive economic and financial market sentiment are powering economic expansion in the Euro Area. At the same time, the non-financial private sector has continued to recover in line with the ongoing cyclical upturn of the Euro Area economy.

Stable corporate performances

The prolonged rally in equity prices has fuelled fears of overvaluation, especially in US equity markets, possibly contributing to the sharp equity market correction in February 2018. Price-earnings ratios adjusted for the business cycle do indeed show that current equity valuations are high in the US relative to their long-term average. On the other hand, despite having increased to their long-term average, EA equity valuations remain below the previous peaks observed in 1998, 2000 and 2007 (V.49).

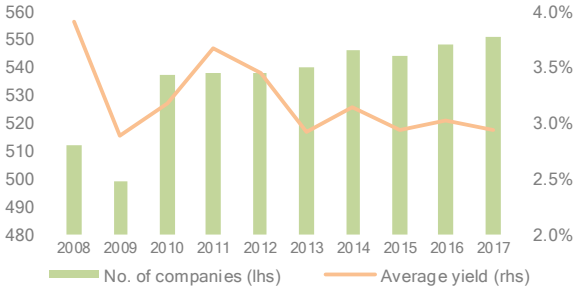
V.49
Cyclically adjusted price-earnings ratio
US valuations above long-term average



Note: Monthly earnings adjusted for trends and cyclical factors via Kalman filter methodology based on OECD leading indicators; units of standard deviation. 25-year averages excluding 1998-2000 asset bubble.
Sources: Thomson Reuters Datastream, ESMA.

Corporates' positive performance is reflected in the increased issuance of dividends by companies composing the Euro Stoxx 600, although the average yield decreased (V.50).[120]

V.50
Dividend yields
More companies issuing dividends



Note: No. of companies shows the number of stocks included in the STOXX 600 that issued a dividend during the year. The average yield is the average of the dividend yield for companies that issued a dividend during the year.
Sources: Thomson Reuters Datastream.

Risks of low volatility

As already mentioned, volatility levels have not delivered any early warning of financial crises in the past. However, periods of low volatility do prompt investors to take extra risks that could lead to a more fragile financial system. This feature is called the volatility paradox.[121] Low

[118] IMF, World Economic Outlook Update, July 2018.

[119] European Commission, Summer 2018 Interim Forecast.

[120] Another consequence of the accommodative monetary policy is the increasing phenomenon of companies' share buybacks. This driver exhibits procyclicality as the low interest rate environment enabled enterprises to borrow at low cost and use the money to buy back their own shares. While this mechanism helped sustain equity prices, it increased the entities' leverage ratio.

[121] Office of Financial Research (2017) and Danielsson et al (2015) confirm Minsky's statement that "stability is destabilising".

volatility can nudge market participants into excessive risk-taking and potentially lead to the build-up of a number of vulnerabilities, such as asset mispricing, increased leverage or an increasing prevalence of one-directional position-taking that relies on continued low volatility.[122]

Long periods of low volatility, such as that experienced in 2016 and 2017, could therefore mask possible threats to financial stability[123] due to the underestimation of risks and consequent excessive risk-taking by market participants. Excessively risky behaviour and the potential capital misallocation this harbours thus remain relevant risk sources in the medium-term. In the context of a persistently low interest yield environment, abrupt increases in yields could lead to losses for investment positions and generate volatility spikes in asset prices.

An abrupt reassessment of the expected pace of monetary policy normalisation could raise the level of asset price volatility.

Value-at-Risk approach

The widespread use of Value-at-Risk (VaR) techniques in risk management may cause a rise in vulnerabilities since the methodology heavily weights the most recent observations of realised volatility. This could ultimately lead to procyclicality. A decline in realised volatility may encourage investors to increase position sizes without breaching VaR risk limits. Then, when volatility increases, investors may be forced to sell off assets to bring their portfolio back within risk limits.[124]

The VaR technique is one of the three approaches for calculating investment funds' exposure in accordance with EU transparency requirements. In the EU, the VaR approach is used by UCITS funds with complex investment strategies and by AIFs. AIFs use VaR when required to do so by NCAs, and the AIFMD makes provision for NCAs to impose limits on fund leverage in order to ensure the stability and integrity of the financial system. ESMA may also issue advice to an NCA, setting out measures that it believes should be taken.[125]

Volatility targeting strategies

Volatility is also a tradable market instrument in itself. Market participants can buy, or sell, volatility. Volatility trading may have a procyclical effect on market volatility. Indeed, when volatility is low, trading tends to lower the bar further. However, in stressed financial markets volatility spikes may be further amplified by volatility trading. Volatility trading is carried out by means of dynamic trading strategies involving options of varying complexity.

Market intelligence suggests that in recent years low-volatility equity strategies have become very popular. In a low interest rate environment, low-volatility strategies have generally outperformed. However, they are particularly exposed to market changes and are suspected of being highly sensitive to interest rate movements. The sensitivity of low-volatility equity strategies to interest rate movements can be broken down into two main components: industry bias towards more defensive sectors and idiosyncratic exposure due to certain stock characteristics (style, structure of their balance sheet, etc.)[126].

According to market intelligence, there has also been an increase in recent years in the use by investors (including non-banks) of strategies that sell insurance against a rise in volatility, for which they are paid a premium. These strategies may potentially amplify the increase in market volatility during periods of stress.

In Europe the AuM of funds following volatility strategies have almost doubled, increasing from EUR 22bn in December 2015 to EUR 44bn in March 2018 (V.51).[127] At the global level, in the same period AuM pursuing volatility strategies increased from EUR 402bn to EUR 461bn.[128] The AuM of EU volatility funds experienced a downturn (-3%) from January to March, following the market turmoil in the opening days of February.

[122] IMF, Global Financial Stability Report, October 2017 and April 2018.

[123] ECB, Financial Stability Review, November 2017, pp 172.

[124] Financial Times, Low volatility paradox will catch out investors and regulators, 21 November 2017.

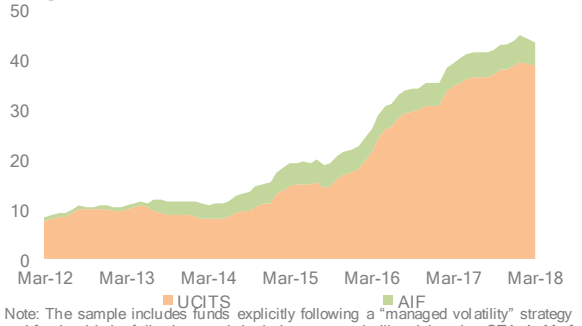
[125] See Haquin and Mazzacurati (2016).

[126] See Stagnol and Taillardat (2017) for an empirical analysis of the exposure of low-volatility equity strategies to interest rates.

[127] The sample includes funds explicitly following a "managed volatility" strategy and funds with the following words in their names: volatility, risk parity, CTA, variable annuity.

[128] The sample is non-exhaustive by nature.

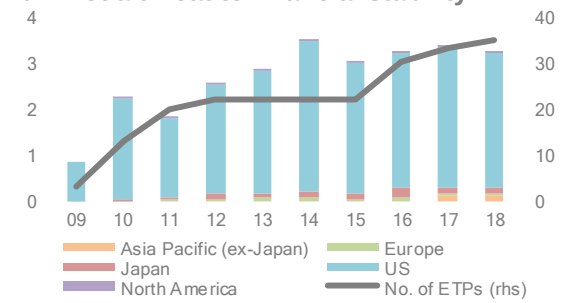
V.51
Volatility funds
Large increase in AuM



Note: The sample includes funds explicitly following a "managed volatility" strategy and funds with the following words in their names: volatility, risk parity, CTA, AuM of EU funds in EUR bn.
Sources: Thomson Reuters Lipper, ESMA..

Worldwide, ETFs tracking a volatility index still have limited AuM of around USD 3.2bn, too low to be considered a threat to financial stability. As of March 2018, less than 2% (USD 55mn) of these assets were held by European ETFs (V.52).

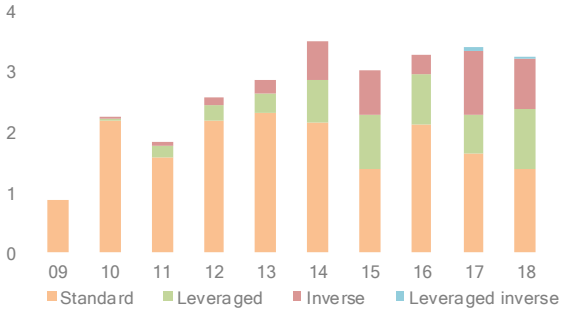
V.52
Volatility ETPs
AuM not a threat to financial stability



Note: AuM of volatility ETPs, in USD bn. Number of ETPs on the rhs. Data for 2018 as March 2018.
Sources: ETFGI.

Although the AuM held by volatility ETFs are limited and have been constant in recent years, the use of leveraged, short and leveraged inverse strategies has increased (V.53), reaching USD 1.8bn in terms of AuM, 55% of total volatility ETF assets. Leveraged inverse strategies have been introduced in the last two years, since betting on low volatility has been profitable. While the AuM may still be considered fairly small, the number of products following volatility strategies is sufficiently broad to become a key factor driving volatility spikes like those that occurred in the first week of February 2018.[129]

V.53
Volatility ETPs
Increased AuM for non-standard ETPs



Note: AuM of volatility ETPs, in USD bn.
Data for 2018 as March 2018.
Sources: ETFGI

Conclusion

Volatility is unavoidable and necessary to reflect the impact of changed market conditions on the process of pricing and transferring risk. However, abrupt increases in volatility, as in the first week of February 2018, may lead to unexpected severe losses for investors and raise financial stability concerns. Against this background, financial asset price volatility is a subject of concern for securities market regulators and needs to be at the core of financial market risk assessment.

A prolonged period of low volatility, like the one characterising the two years between February 2016 and January 2018, may lead to a more fragile financial system. Promoting increased risk-taking by market participants driven by the use of VaR models, it can also pose a threat to financial stability. For a given VaR threshold, lower volatility increases the fraction of the portfolio that a financial institution may hold in risky assets. Once a spike in volatility occurs, the consequent sell-off can further amplify the volatility of the underlying assets and thus lead to procyclicality. Market participants should be aware of this risk. Finally, the growth of volatility targeting strategies and the events of February 2018 show that spikes in volatility could quickly erode the capital invested in low-volatility funds. While the AuM of this investment category may still be rather small, the number of products following volatility strategies is sufficiently broad to become a key factor driving volatility spikes like those that occurred in the first week of February 2018. The spikes in VIX and VSTOXX and the following closure of two ETNs investing in low volatility highlighted the risk of these products causing heavy losses to investors.

[129] See AMF (2018), BIS (2018) and IMF (2018) for an analysis of the 5 February 2018 volatility spike.

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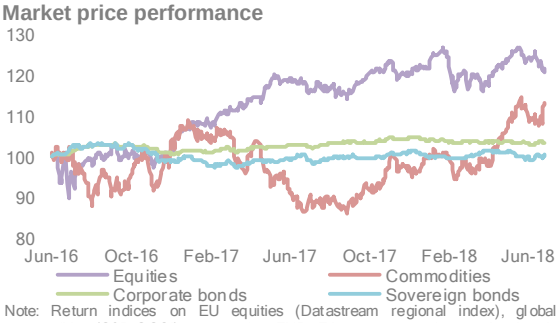
Annexes

Statistics

Securities markets

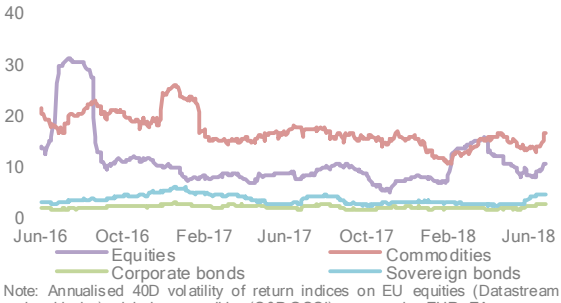
Market environment

A.1
Market price performance



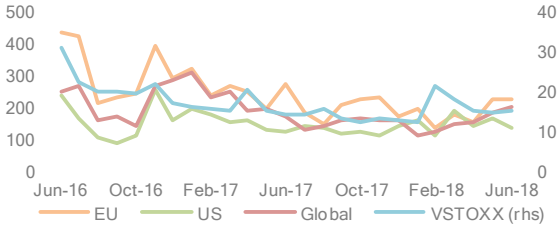
Note: Return indices on EU equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx Euro, all maturities). 01/06/2016=100.
Sources: Thomson Reuters Datastream, ESMA.

A.2
Market volatilities



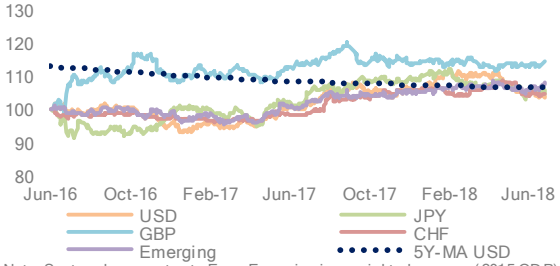
Note: Annualised 40D volatility of return indices on EU equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx Euro, all maturities), in %.
Sources: Thomson Reuters Datastream, ESMA.

A.3
Economic policy uncertainty



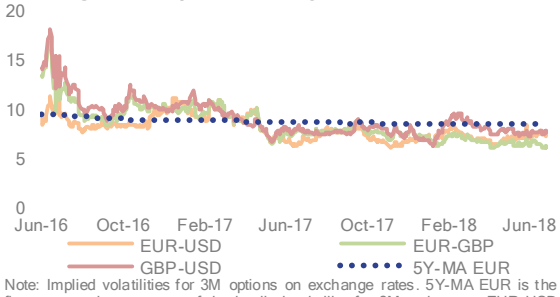
Note: Economic Policy Uncertainty Index (EPU), developed by Baker et al. (www.policyuncertainty.com), based on the frequency of articles in EU newspapers that contain the following triple: "economic" or "economy", "uncertain" or "uncertainty" and one or more policy-relevant terms. Global aggregation based on PPP-adjusted GDP weights. Implied volatility of EuroStoxx 50 (VSTOXX), monthly average, on the right-hand side.
Sources: Baker, Bloom, and Davis 2015; Thomson Reuters Datastream, ESMA.

A.4
EUR exchange rates



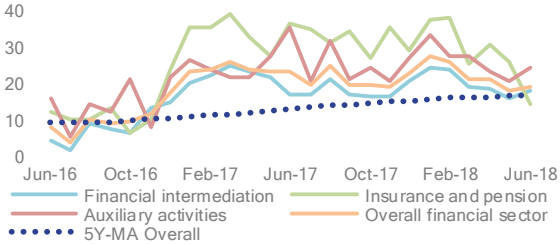
Note: Spot exchange rates to Euro. Emerging is a weighted average (2015 GDP) of spot exchange rates for CNY, BRL, RUB, INR, MXN, IDR and TRY. 01/06/2016=100. Increases in value represent an appreciation of EUR. 5Y-MA USD=five-year moving average of the USD exchange rate.
Sources: ECB, IMF, ESMA.

A.5
Exchange rate implied volatility



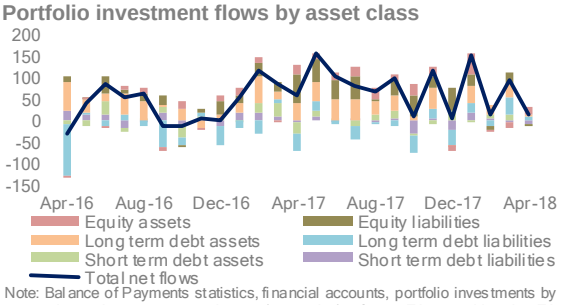
Note: Implied volatilities for 3M options on exchange rates. 5Y-MA EUR is the five-year moving average of the implied volatility for 3M options on EUR-USD exchange rate.
Sources: Thomson Reuters EIKON, ESMA.

A.6
Market confidence



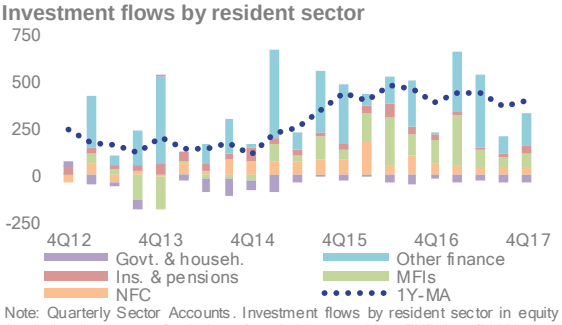
Note: European Commission survey of EU financial services sector and subsectors (NACE Rev.2 64, 65, 66). Confidence indicators are averages of the net balance of responses to questions on development of the business situation over the past three months, evolution of demand over the past three months and expectation of demand over the next three months, in % of answers received.
Sources: European Commission, ESMA.

A.7
Portfolio investment flows by asset class



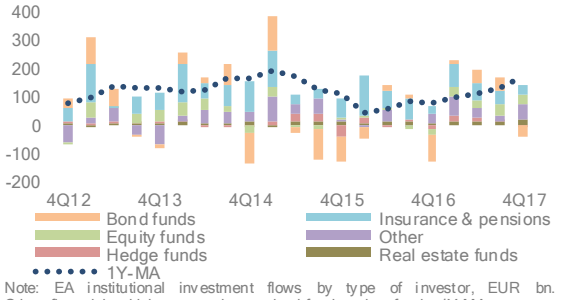
Note: Balance of Payments statistics, financial accounts, portfolio investments by asset class. Assets=net purchases (net sales) of non-EA securities by EA investors. Liabilities=net sales (net purchases) of EA securities by non-EA investors. Total net flows=net outflows (inflows) from (into) the EA. EUR bn.
Sources: ECB, ESMA.

A.8
Investment flows by resident sector



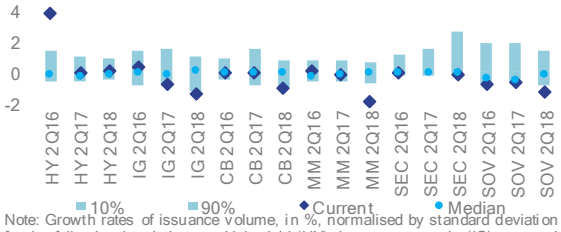
Note: Quarterly Sector Accounts. Investment flows by resident sector in equity (excluding investment fund shares) and debt securities, EUR bn. 1Y-MA=one-year moving average of all investment flows.
Sources: ECB, ESMA.

A.9
Institutional investment flows



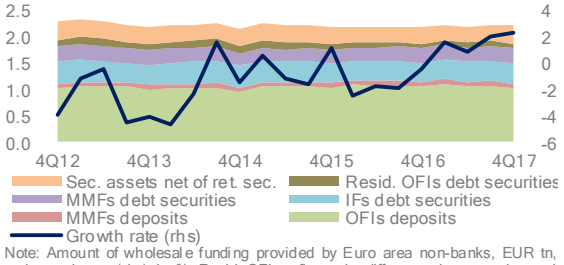
Note: EA institutional investment flows by type of investor, EUR bn. Other=financial vehicle corporations, mixed funds, other funds. 1Y-MA=one-year moving average of all investment flows.
Sources: ECB, ESMA.

A.10
Debt issuance



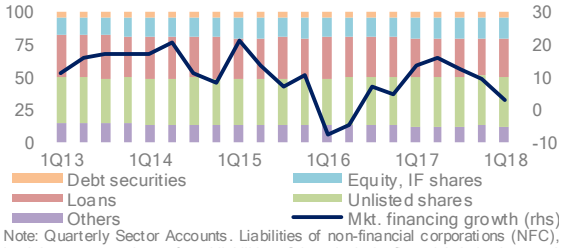
Note: Growth rates of issuance volume, in %, normalised by standard deviation for the following bond classes: high yield (HY); investment grade (IG); covered bonds (CB); money market (MM); securitised (SEC); sovereign (SOV). Percentiles computed from 12Q rolling window. All data include securities with a maturity higher than 18M, except for MM (maturity less than 12M). Bars denote the range of values between the 10th and 90th percentiles. Missing diamond indicates no issuance for previous quarter.
Sources: Thomson Reuters EIKON, ESMA.

A.11
Non-bank wholesale funding



Note: Amount of wholesale funding provided by Euro area non-banks, EUR tn, and growth rate (rhs), in %. Resid. OFIs reflects the difference between the total financial sector and the known sub-sectors within the statistical financial accounts (i.e. assets from banking sector, insurances, pension funds, FVCs, investment funds and MMFs).
Sources: ECB, ESMA.

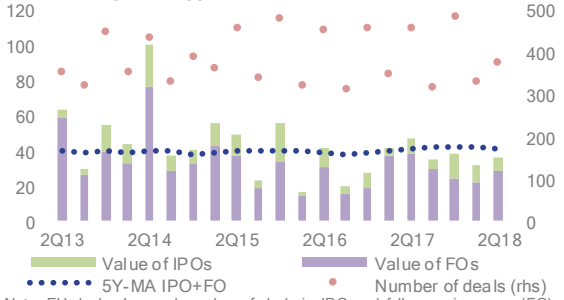
A.12
Market financing



Note: Quarterly Sector Accounts. Liabilities of non-financial corporations (NFC), by debt type as a share of total liabilities. Others include: financial derivatives and employee stock options; insurance, pensions and standardised guarantee schemes; trade credits and advances of NFC; other accounts receivable/payable. Mkt. financing growth (rhs)= annual growth in debt securities and equity and investment fund (IF) shares, right axis, in %.
Sources: ECB, ESMA.

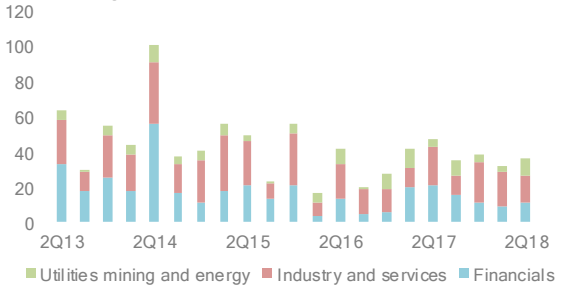
Equity markets

A.13
Issuance by deal type



Note: EU deal value and number of deals in IPO and follow-on issuance (FO). EUR bn. 5Y-MA=five-year moving average of the total value of equity offerings.
Sources: Thomson Reuters EIKON, ESMA.

A.14
Issuance by sector

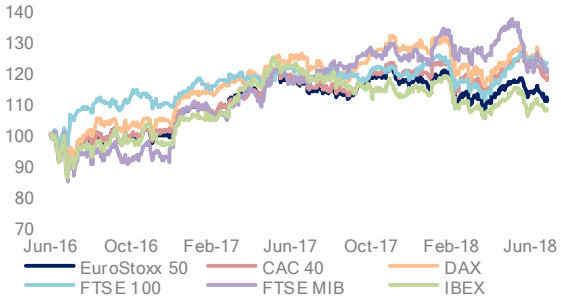


Note: EU equity issuance by sector, EUR bn. Financials includes banking & investment services, insurance, investment trusts and real estate.
Sources: Thomson Reuters EIKON, ESMA.

A.15
Price performance

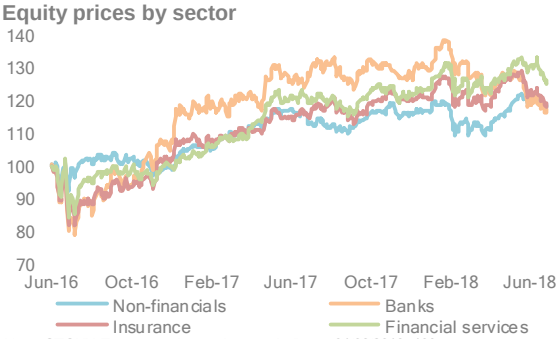
Note: Datastream regional equity indices for the EU, the US and Japan, indexed with 01/06/2016=100. Indices in their regional currency.
Sources: Thomson Reuters Datastream, ESMA.

A.16
Price performance of national indices



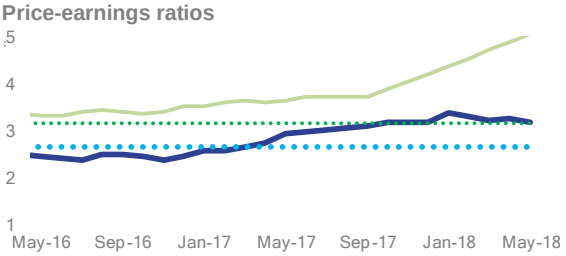
Note: National equity indices, selected EU members, indexed with 01/06/2016=100.
Sources: Thomson Reuters Datastream, ESMA.

A.17
Equity prices by sector



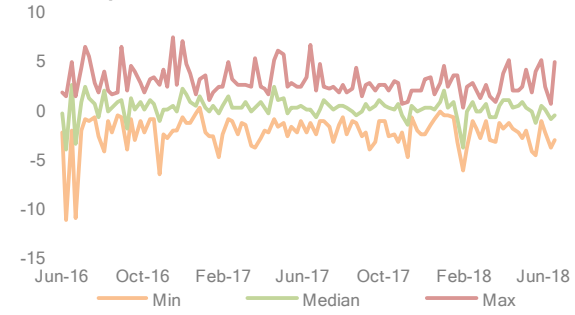
Note: STOXX Europe equity total return indices. 01/06/2016=100.
Sources: Thomson Reuters Datastream, ESMA.

A.18
Price-earnings ratios



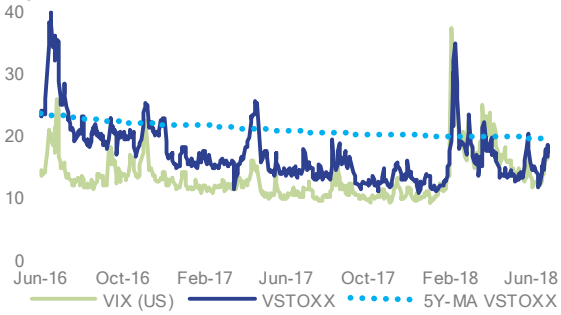
Note: Monthly earnings adjusted for trends and cyclical factors via Kalman filter methodology based on OECD leading indicators; units of standard deviation; averages computed from 8Y. Data available until May 2018.
Sources: Thomson Reuters Datastream, ESMA.

A.19
Return dispersion



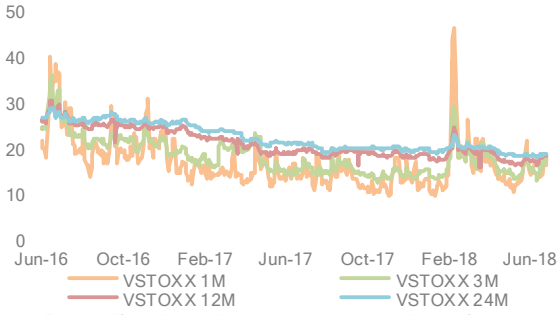
Note: Dispersion of the weekly returns on the main equity indices in the EU.
Sources: Thomson Reuters Datastream, ESMA.

A.20
Implied volatilities



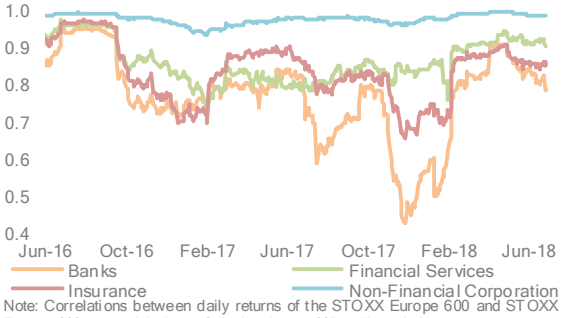
Note: Implied volatility of EuroStoxx50 (VSTOXX) and S&P 500 (VIX), in %.
Sources: Thomson Reuters Datastream, ESMA.

A.21
Implied volatility by option maturity



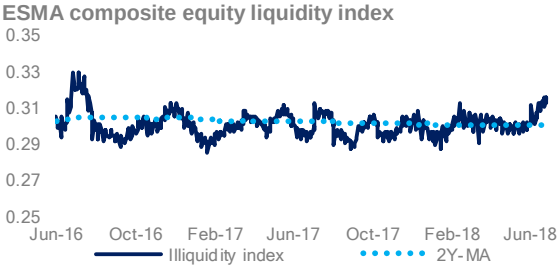
Note: Eurostoxx50 implied volatilities, measured as price indices, in %.
Sources: Thomson Reuters Datastream, ESMA.

A.22
Correlation STOXX Europe 600 and sectoral indices



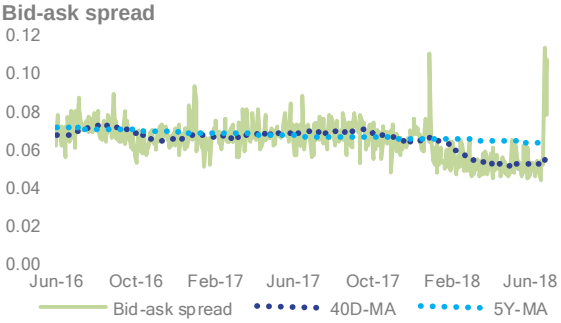
Note: Correlations between daily returns of the STOXX Europe 600 and STOXX Europe 600 sectoral indices. Calculated over 60D rolling windows.
Sources: Thomson Reuters Datastream, ESMA.

A.23
ESMA composite equity liquidity index



Note: Composite indicator of illiquidity in the equity market for the current Eurostoxx 200 constituents, computed by applying the principal component methodology to six input liquidity measures (Amihud illiquidity coefficient, bid-ask spread, Hui-Heubel ratio, turnover value, inverse turnover ratio, MEC). The indicator range is between 0 (higher liquidity) and 1 (lower liquidity).
Sources: Thomson Reuters Datastream, ESMA.

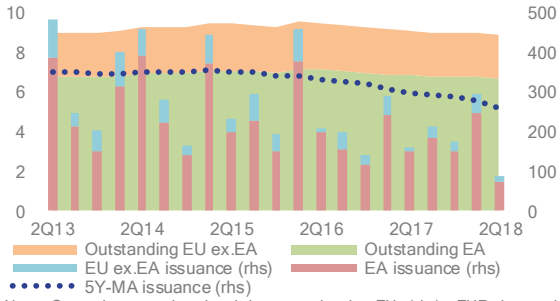
A.24
Bid-ask spread



Note: Liquidity measure as median of the bid-ask price percentage difference for the current EU constituents of Stoxx Europe Large 200, in %.
Sources: Thomson Reuters Datastream, ESMA.

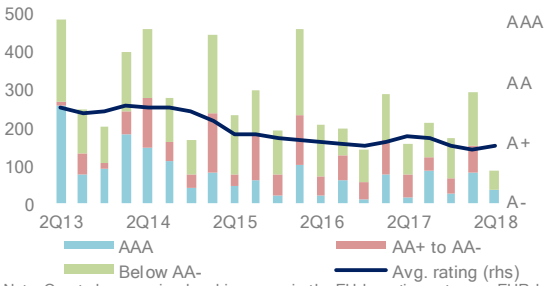
Sovereign-bond markets

A.25
Issuance and outstanding



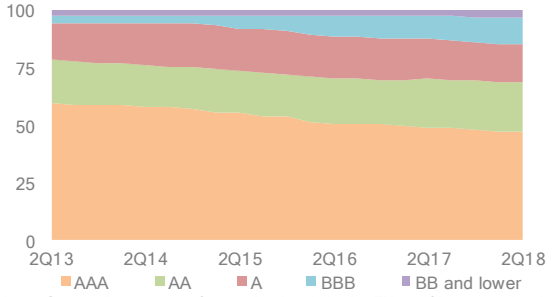
Note: Quarterly sovereign bond issuance in the EU (rhs), EUR bn, and outstanding amounts, EUR tn.
Sources: Thomson Reuters EIKON, ESMA.

A.26
Issuance by credit rating



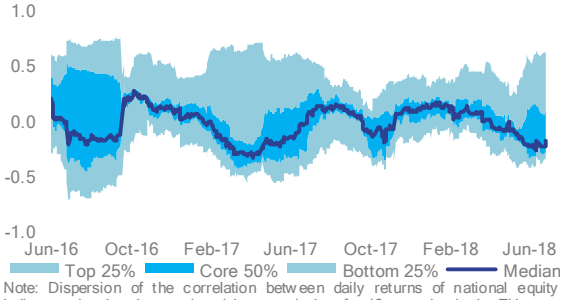
Note: Quarterly sovereign bond issuance in the EU by rating category, EUR bn. Avg. rating=weighted average rating computed as a one-year moving average of ratings converted into a numerical scale (AAA=1, AA+=2, etc).
Sources: Thomson Reuters EIKON, ESMA.

A.27
Rating distribution



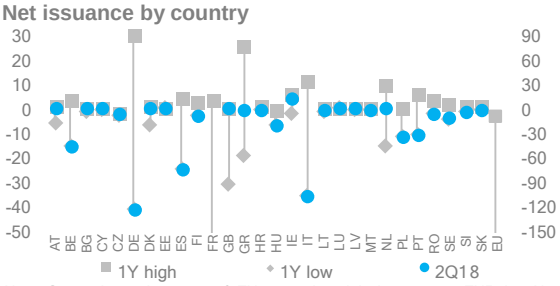
Note: Outstanding amount of sovereign bonds in the EU as of issuance date by rating category, in % of the total.
Sources: Thomson Reuters EIKON, ESMA.

A.28
Equity-sovereign bond correlation dispersion



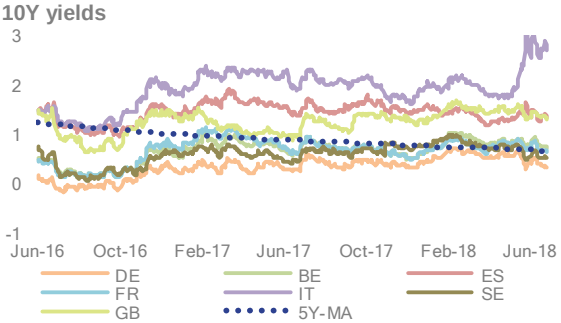
Note: Dispersion of the correlation between daily returns of national equity indices and national sovereign debt return index, for 16 countries in the EU, over 60D rolling windows.
Sources: Thomson Reuters Datastream, ESMA.

A.29
Net issuance by country



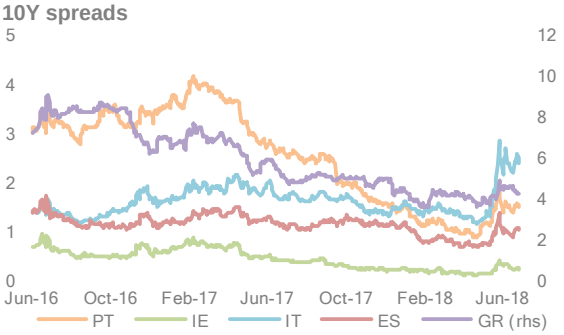
Note: Quarterly net issuance of EU sovereign debt by country, EUR bn. Net issuance calculated as the difference between new issuance over the quarter and outstanding debt maturing over the quarter. Highest and lowest quarterly net issuance in the past year are reported. EU total on right-hand scale.
Sources: Thomson Reuters EIKON, ESMA.

A.30
10Y yields



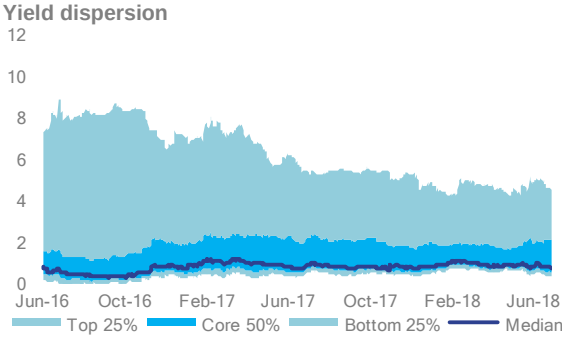
Note: Yields on 10Y sovereign bonds, selected EU members, in %. 5Y-MA=five-year moving average of EA 10Y bond indices computed by Datastream.
Sources: Thomson Reuters Datastream, ESMA.

A.31
10Y spreads



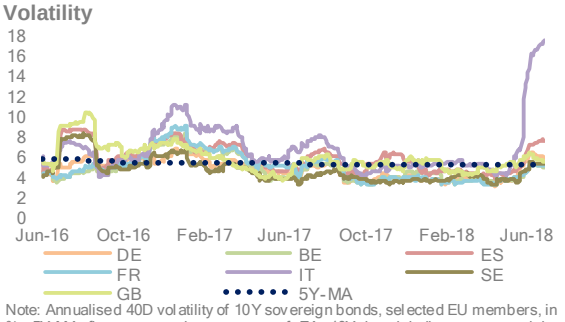
Note: Selected 10Y EA sovereign bond risk premia (vs. DE Bunds), in %.
Sources: Thomson Reuters Datastream, ESMA.

A.32
Yield dispersion



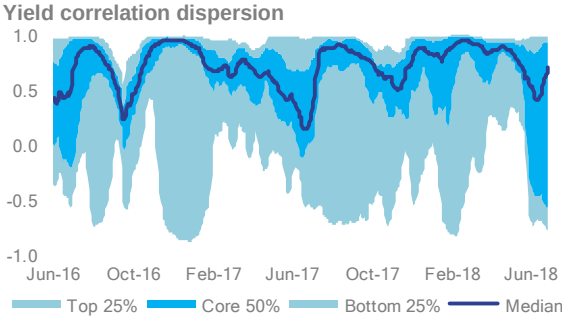
Note: Dispersion of yields on 10Y sovereign bonds of EU 17 countries, in %.
Sources: Thomson Reuters Datastream, ESMA.

A.33
Volatility



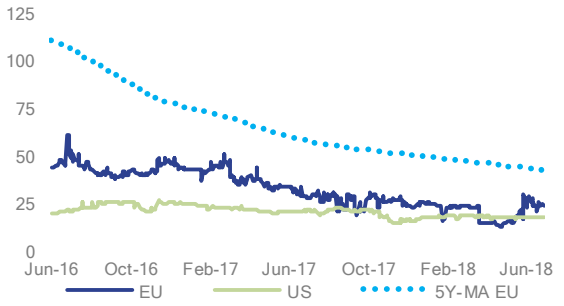
Note: Annualised 40D volatility of 10Y sovereign bonds, selected EU members, in %. 5Y-MA=five-year moving average of EA 10Y bond indices computed by Datastream.
Sources: Thomson Reuters Datastream, ESMA.

A.34
Yield correlation dispersion



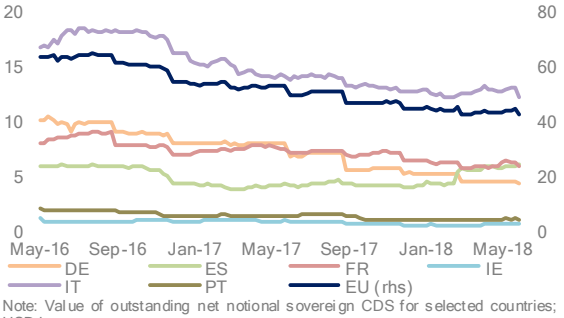
Note: Dispersion of correlations between 10Y DE Bunds and other EU countries' sovereign bond redemption yields over 60D rolling windows.
Sources: Thomson Reuters Datastream, ESMA.

A.35
CDS spreads



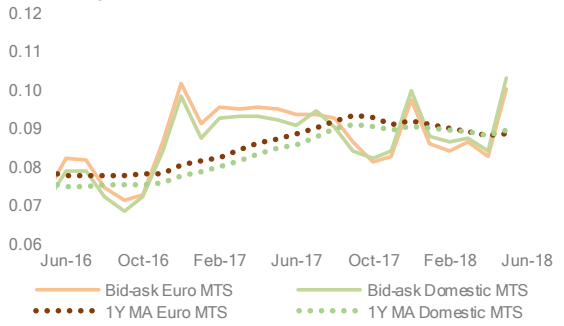
Note: Datastream CDS sovereign indices (5 years, mid-spread).
Sources: Thomson Reuters Datastream, ESMA.

A.36
CDS notionals



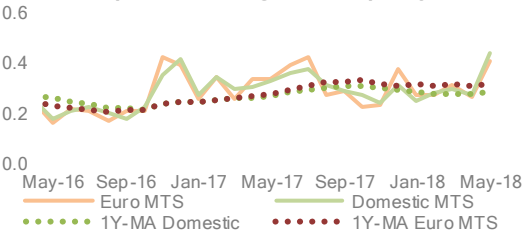
Note: Value of outstanding net notional sovereign CDS for selected countries; USD bn.
Sources: DTCC, ESMA.

A.37
Bid-ask spreads



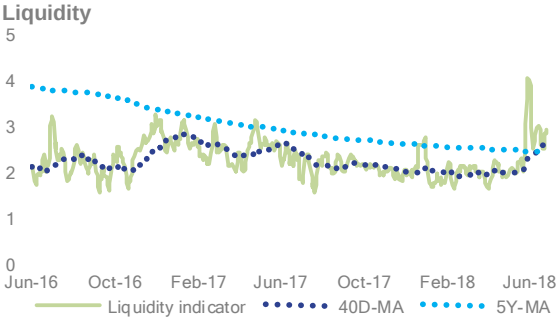
Note: Bid-ask spread as average bid-ask spread throughout a month across ten EU markets, Domestic and Euro MTS, in %.
Sources: MTS, ESMA.

A.38
ESMA composite sovereign bond liquidity index



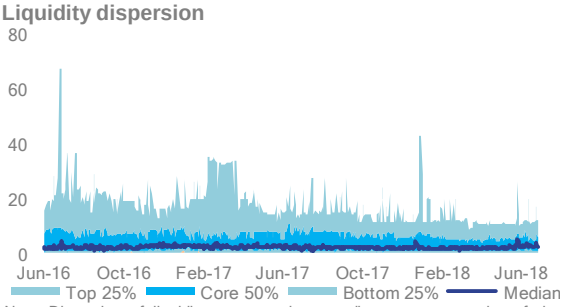
Note: Composite indicator of market liquidity in the sovereign bond market for the domestic and Euro MTS platforms, computed by applying the principal component methodology to four input liquidity measures (Amihud illiquidity coefficient, Bid-ask spread, Roll illiquidity measure and Turnover). The indicator range is between 0 (higher liquidity) and 1 (lower liquidity).
Sources: MTS, ESMA.

A.39
Liquidity



Note: Liquidity measured as median across countries of the difference in bid-ask yields for 10Y sovereign bonds, in basis points. 21 EU countries are included.
Sources: Thomson Reuters EIKON, ESMA.

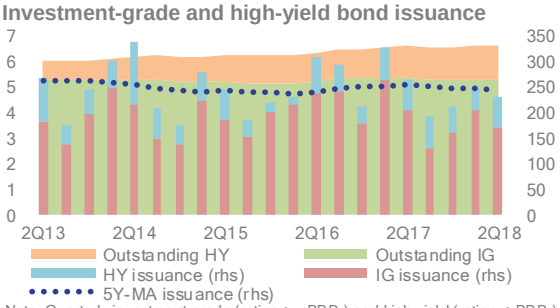
A.40
Liquidity dispersion



Note: Dispersion of liquidity measured as median across countries of the difference in ask and bid yields for 10Y sovereign bonds, in basis points. 21 EU countries are included.
Sources: Thomson Reuters EIKON, ESMA.

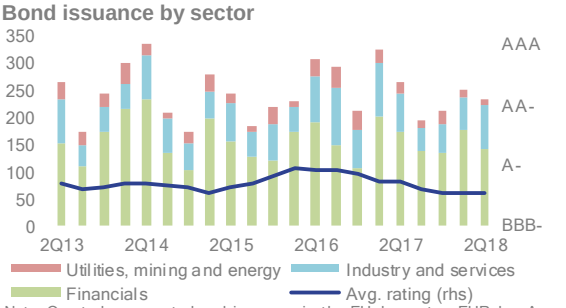
Corporate-bond markets

A.41
Investment-grade and high-yield bond issuance



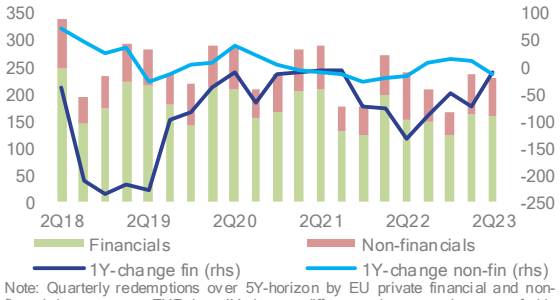
Note: Quarterly investment-grade (rating >= BBB-) and high-yield (rating < BBB-) corporate bond issuance in the EU (rhs), EUR bn, and outstanding amounts, EUR tn.
Sources: Thomson Reuters EIKON, ESMA.

A.42
Bond issuance by sector



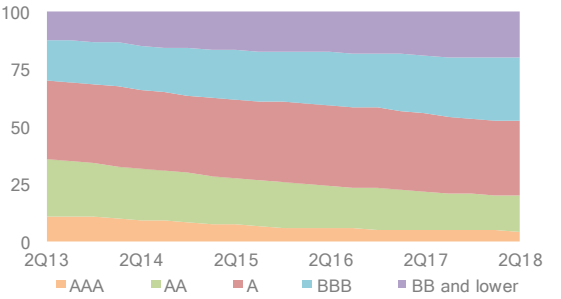
Note: Quarterly corporate bond issuance in the EU by sector, EUR bn. Avg. rating=weighted average rating computed as a one-year moving average of ratings converted into a numerical scale (AAA=1, AA+=2, etc).
Sources: Thomson Reuters EIKON, ESMA.

A.43
Debt redemption profile by sector



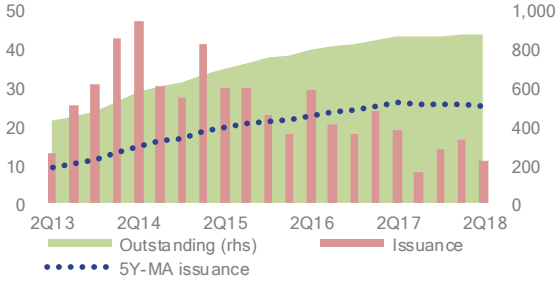
Note: Quarterly redemptions over 5Y-horizon by EU private financial and non-financial corporates, EUR bn. 1Y-change=difference between the sum of this year's (four last quarters) and last year's (8th to 5th last quarters) redemptions.
Sources: Thomson Reuters EIKON, ESMA.

A.44
Rating distribution



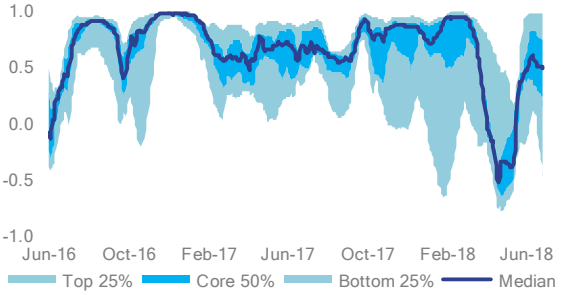
Note: Outstanding amount of corporate bonds in the EU as of issuance date by rating category, in % of the total.
Sources: Thomson Reuters EIKON, ESMA.

A.45
Hybrid capital instruments



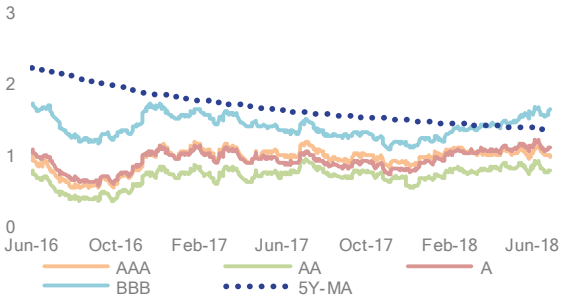
Note: Outstanding amount of hybrid capital instruments in the EU, EUR bn. According to Thomson Reuters EIKON classification, hybrid capital refers to bonds having the qualities of both an interest-bearing security (debt) and equity.
Sources: Thomson Reuters EIKON, ESMA.

A.46
Sovereign-corporate yield correlation



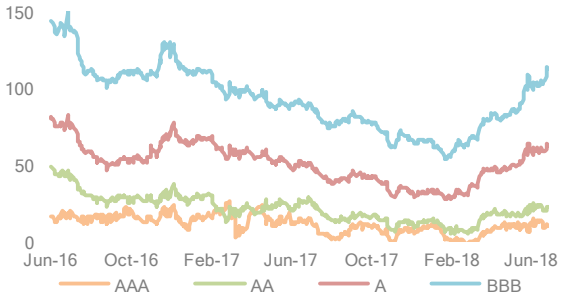
Note: Dispersion of correlation between Barclays Aggregate for corporate and 10Y sovereign bond redemption yields for AT, BE, ES, FI, FR, IT, NL.
Sources: Thomson Reuters Datastream, ESMA.

A.47
Yields by credit rating



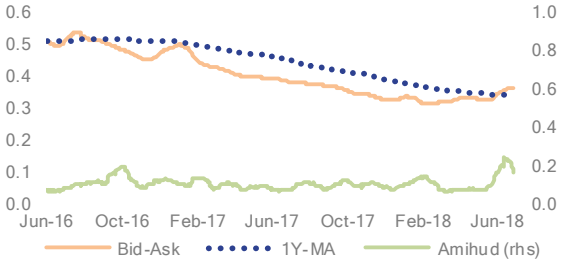
Note: Markit iBoxx euro corporate bond indices for all maturities, in %. 5Y-MA=five-year moving average of all indices.
Sources: Thomson Reuters Datastream, ESMA.

A.48
Spreads by credit rating



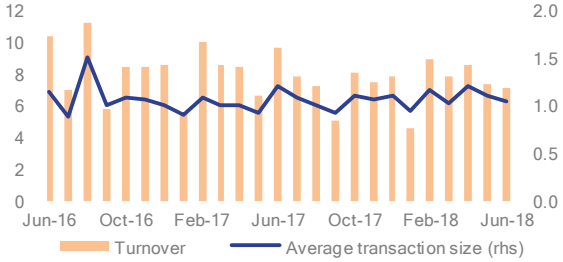
Note: EA corporate bond spreads by rating between iBoxx corporate yields and ICAP Euro Euribor swap rates for maturities from 5 to 7 years, in bps.
Sources: Thomson Reuters Datastream, ESMA.

A.49
Bid-ask spreads and Amihud indicator



Note: Markit iBoxx EUR Corporate bond index bid-ask spread, in %, computed as a one-month moving average of the iBoxx components in the current composition. 1Y-MA=one-year moving average of the bid-ask spread. Amihud liquidity coefficient index between 0 and 1. Highest value indicates less liquidity.
Sources: IHS Markit, ESMA.

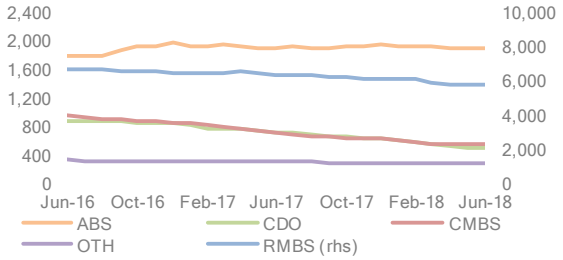
A.50
Turnover ratio and average trade size



Note: Average transaction size for the corporate bond segment as the ratio of nominal amount of settlement instructions to number of settled instructions, in EUR mn. Turnover is the one-month moving average of the ratio of trading volume over outstanding amount, in %.
Sources: IHS Markit, ESMA.

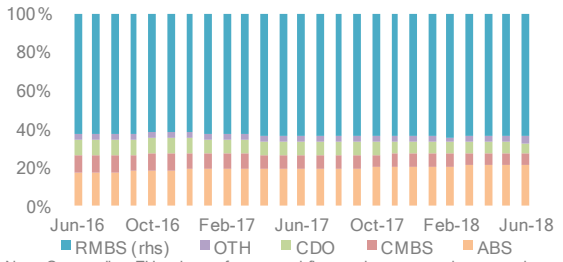
Credit quality

A.51
SFI ratings issued by collateral type



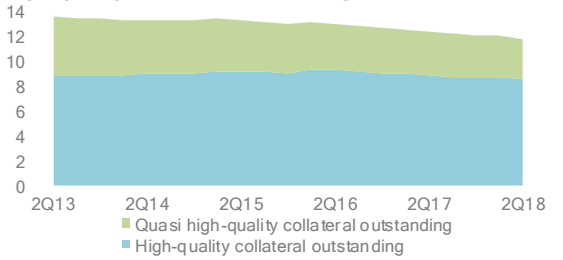
Note: Number of rated structured finance instruments by asset class. ABS=Asset-backed securities; CDO=Collateralised debt obligations; CMBS=Commercial mortgage-backed securities; OTH=Other; RMBS=Residential mortgage-backed securities.
Sources: RADAR, ESMA.

A.52
SFI ratings outstanding by collateral type



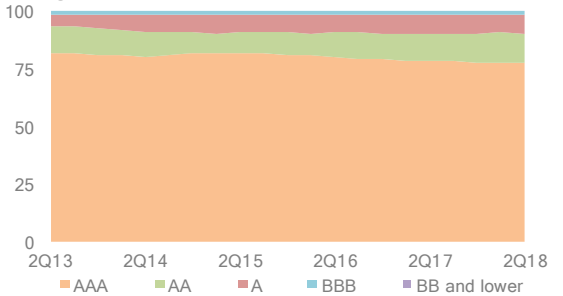
Note: Outstanding EU ratings of structured finance instruments by asset class, in % of total. ABS=Asset-backed securities; CDO=Collateralised debt obligations; CMBS=Commercial mortgage-backed securities; OTH=other; RMBS=Residential mortgage-backed securities.
Sources: RADAR, ESMA.

A.53
High-quality collateral outstanding



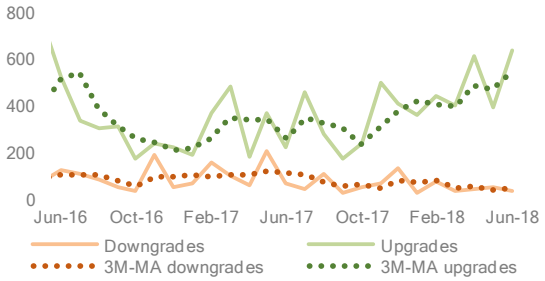
Note: Outstanding amount of high-quality collateral in the EU, EUR tn. High-quality collateral is the sum of outstanding debt securities issued by EU governments with a rating equal to or higher than BBB-. Quasi high-quality is outstanding corporate debt with a rating equal to or higher than AA-.
Sources: Thomson Reuters EIKON, ESMA.

A.54
Rating distribution of covered bonds



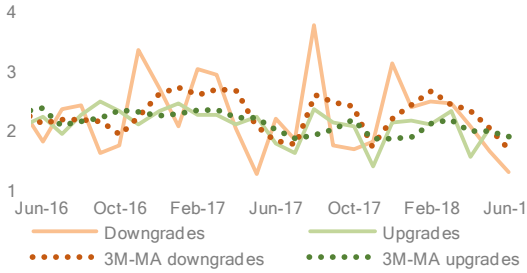
Note: Outstanding amount of covered bonds in the EU as of issuance date by rating category, in % of the total.
Sources: Thomson Reuters EIKON, ESMA.

A.55
SFI rating changes



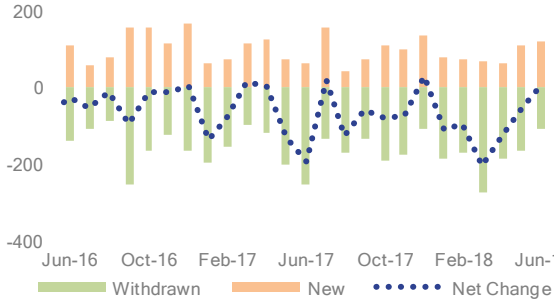
Note: Number of rating changes on securitised assets.
Sources: RADAR, ESMA.

A.56
Size of SFI rating changes



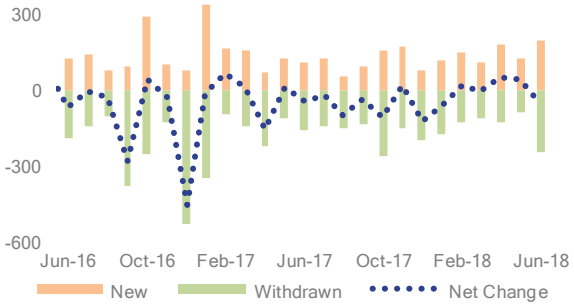
Note: Average size of upgrades and downgrades when credit rating agencies took rating actions on securitised assets, number of buckets traversed.
Sources: RADAR, ESMA.

A.57
Change in outstanding SFI ratings



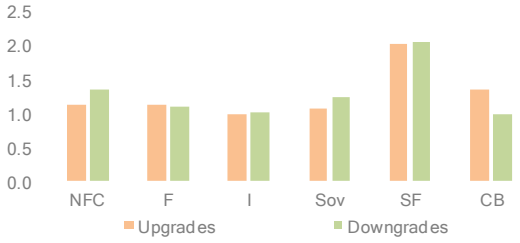
Note: Number of withdrawn and new ratings for structured finance instruments.
Sources: RADAR, ESMA.

A.58
Change in outstanding covered bond ratings



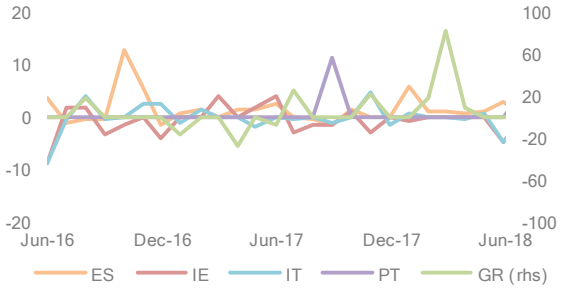
Note: Number of withdrawn and new ratings for covered bonds.
Sources: RADAR, ESMA.

A.59
Size of rating changes



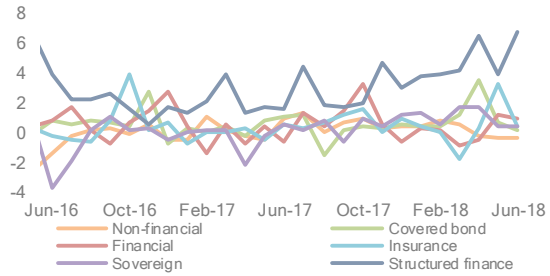
Note: Average size of upgrades and downgrades from all credit rating agencies, excluding CERVED and ICAP, by asset class for 18H1, average number of notches. NFC = Non Financials, F = Financials, I = Insurance, Sov = Sovereign, SF = structured finance, CB = covered bonds.
Sources: RADAR, ESMA

A.60
Non-financial corporates rating changes



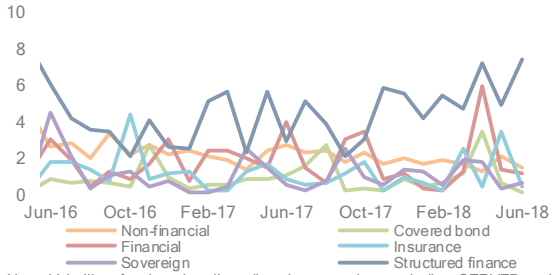
Note: Number of upgrades minus downgrades for ES, GR, IE, IT and PT, in % of outstanding ratings. Data from Fitch Ratings, Moody's, S&P's.
Sources: RADAR, ESMA.

A.61
Rating drift



Note: Net change in ratings from all credit rating agencies, excluding CERVED and ICAP, by asset class computed as a percentage number of upgrades minus percentage number of downgrades over number of outstanding ratings.
Sources: RADAR, ESMA.

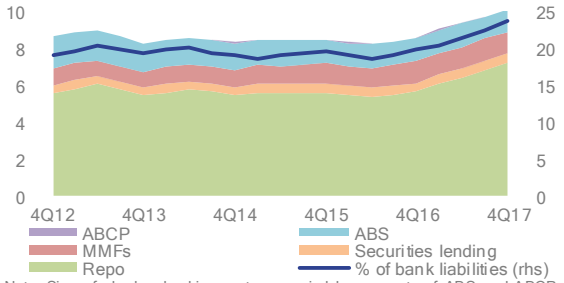
A.62
Rating volatility



Note: Volatility of ratings by all credit rating agencies, excluding CERVED and ICAP, by asset class computed as number of rating changes over number of outstanding ratings.
Sources: RADAR, ESMA.

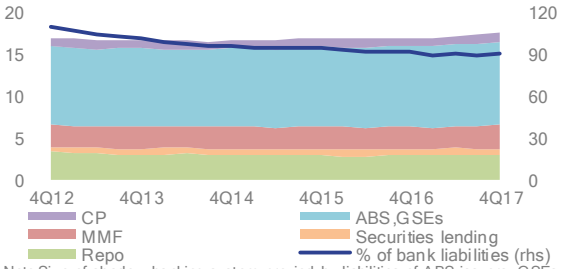
Market-based credit intermediation

A.63
EU shadow banking liabilities



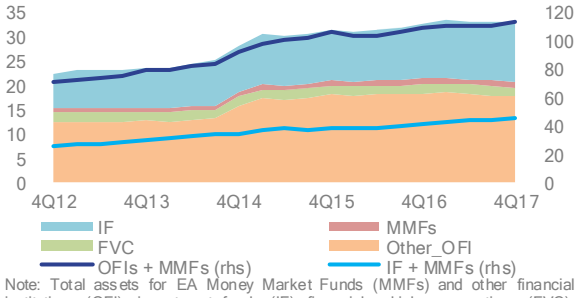
Note: Size of shadow banking system proxied by amounts of ABS and ABCP outstanding, size of the EU repo market and EU securities on loan (collateralised with cash), and liabilities of MMF, in EUR tn. In % of bank liabilities on rhs.
Sources: ECB, AFME, ICMA, Markit Securities Finance, ESMA.

A.64
US shadow banking liabilities



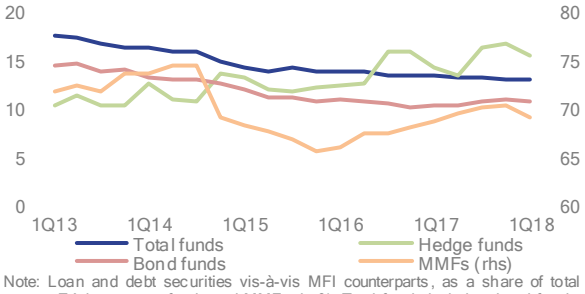
Note:Size of shadow banking system proxied by liabilities of ABS issuers, GSEs and pool securities, open commercial paper (CP), size of the US repo and securities lending (collateralised with cash) markets, and liabilities of Money Market Funds, in USD tn. In % of bank liabilities on rhs.
Sources: Federal Reserve Flow of Funds, Thomson Reuters Datastream, ESMA.

A.65
MMFs and other financial institutions



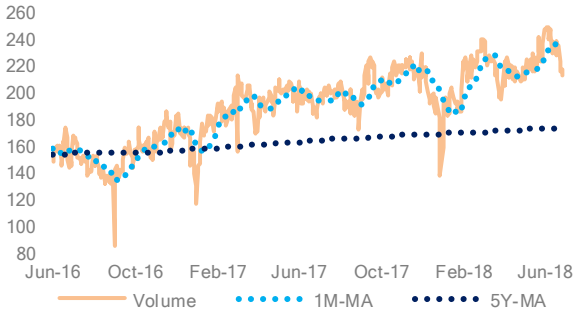
Note: Total assets for EA Money Market Funds (MMFs) and other financial institutions (OFI): investment funds (IF), financial vehicle corporations (FVC), other OFI estimated with ECB Quarterly Sector Accounts, in EUR tn. In % of bank assets on rhs.
Sources: ECB, ESMA.

A.66
Financial market interconnectedness



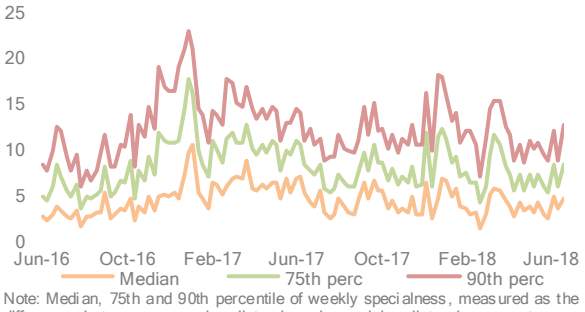
Note: Loan and debt securities vis-à-vis MFI counterparts, as a share of total assets. EA investment funds and MMFs, in %. Total funds includes: bond funds, equity funds, mixed funds, real estate funds, hedge funds, MMFs and other non-MMF investment funds.
Sources: ECB, ESMA.

A.67
Sovereign repo volumes



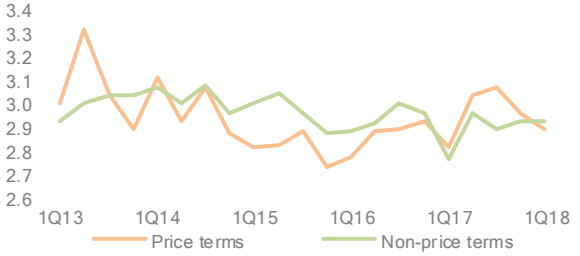
Note: Repo transaction volumes executed through CCPs in seven sovereign EUR repo markets (AT, BE, DE, FI, FR, IT and NL), EUR bn.
Sources: RepoFunds Rate, ESMA.

A.68
Sovereign repo market specialness



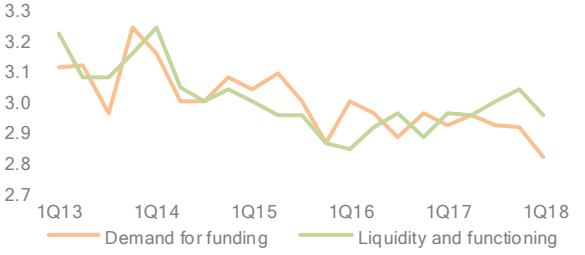
Note: Median, 75th and 90th percentile of weekly specialness, measured as the difference between general collateral and special collateral repo rates on government bonds in selected countries.
Sources: RepoFunds Rate, ESMA.

A.69
Credit terms in SFT and OTC derivatives



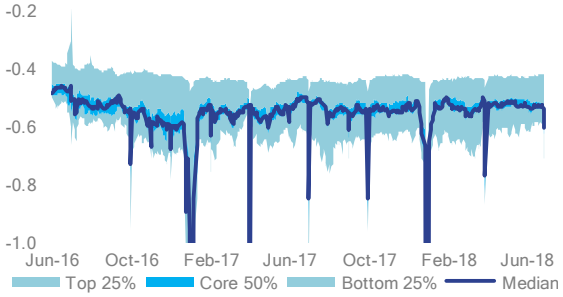
Note: Weighted average of responses to the question: "Over the past three months, how have terms offered as reflected across the entire spectrum of securities financing and OTC derivatives transaction types changed?" 1=tightened considerably, 2=tightened somewhat, 3=remained basically unchanged, 4=eased somewhat, and 5=eased considerably.
Sources: ECB, ESMA.

A.70
Securities financing conditions



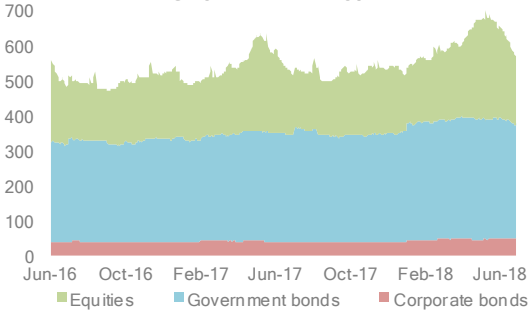
Note: Weighted average of responses to the questions "Over the past three months, how has demand for funding / how have liquidity and functioning for all collateral types changed?" 1=decreased / deteriorated considerably, 2=decreased / deteriorated somewhat, 3=remained basically unchanged, 4=increased / improved somewhat, and 5=increased / improved considerably.
Sources: ECB, ESMA.

A.71
Sovereign repo dispersion



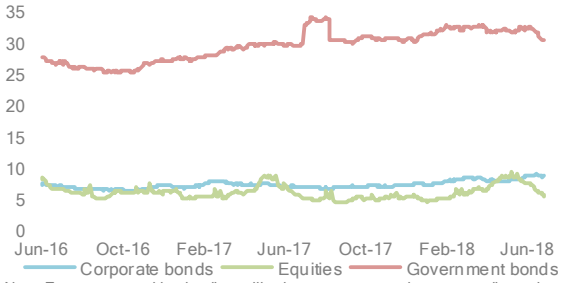
Note: Dispersion of seven sovereign EUR repo markets (AT, BE, DE, FI, FR, IT and NL), volume-weighted average of fixed-rate index value, in %.
Sources: RepoFunds Rate, ESMA.

A.72
Securities lending by instrument type



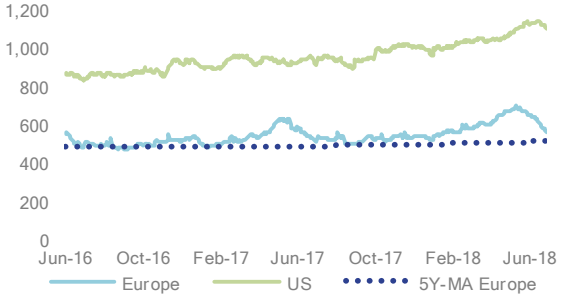
Note: Total value of European securities on loan, EUR bn.
Sources: Markit Securities Finance, ESMA.

A.73
Securities utilisation rate



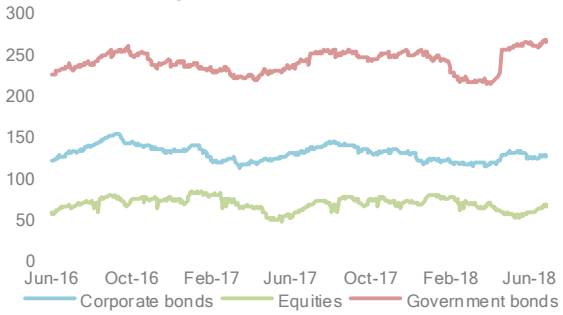
Note: European securities lending utilisation rate, computed as outstanding value of securities on loan over outstanding total lendable value, in %. Corporate bonds comprise EUR-denominated bonds only.
Sources:Markit Securities Finance, ESMA.

A.74
Securities lending by region



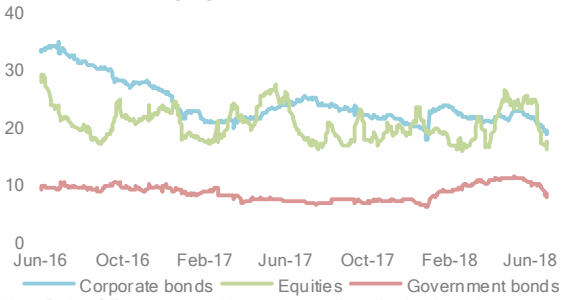
Note: Total value of European and US securities on loan, EUR bn. 5Y-MA Europe=five-year moving average for European securities.
Sources: Markit Securities Finance, ESMA.

A.75
Securities lending contract tenure



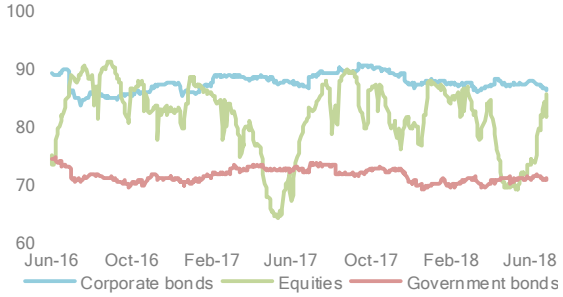
Note: Average European securities lending contract tenure, in days.
Source: Markit Securities Finance, ESMA.

A.76
Securities lending against cash collateral



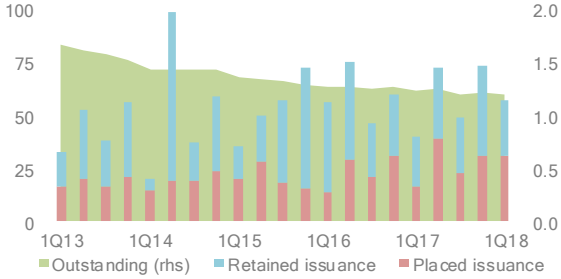
Note: Ratio of European securities on loan collateralised with cash over total securities on loan, outstanding values, in %.
Source: Markit Securities Finance, ESMA.

A.77
Securities lending with open maturity



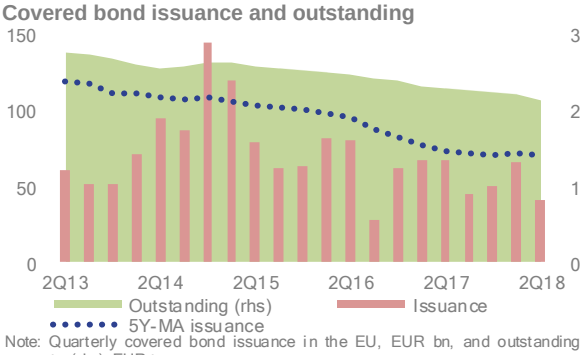
Note: Ratio of European securities on loan at open maturity over total securities on loan, outstanding values, in %.
Sources: Markit Securities Finance, ESMA.

A.78
Securitised product issuance and outstanding



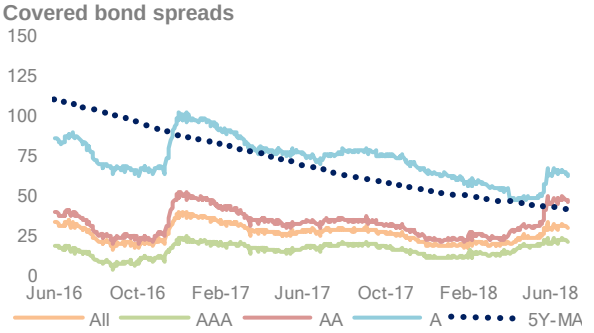
Note: Issuance, EUR bn, and outstanding amount, EUR tn, of securitised products in Europe (including ABS, CDO, MBS, SME, WBS), retained and placed.
Sources: AFME, ESMA.

A.79
Covered bond issuance and outstanding



Note: Quarterly covered bond issuance in the EU, EUR bn, and outstanding amounts (rhs), EUR tn.
Sources: Thomson Reuters EIKON, ESMA.

A.80
Covered bond spreads



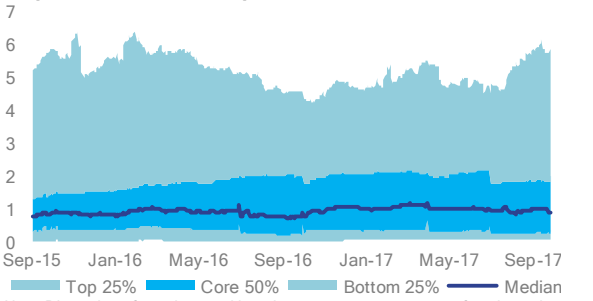
Note: Asset swap spreads based on iBoxx covered bond indices, in bps. 5Y-MA=five-year moving average of all bonds.
Sources: Thomson Reuters Datastream, ESMA.

Short selling

A.81
Value of net short positions in EU shares

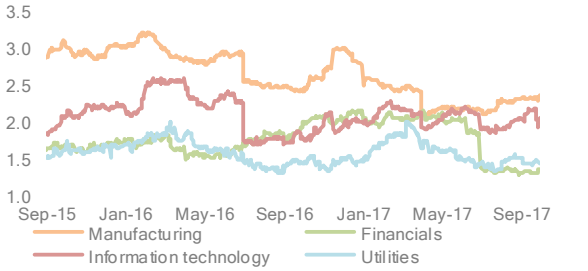
Note: Market value of short selling positions as percentage of total market value in the EU. Number of shares part of a main national index on which short positions were reported by NCAs under the EU Short Selling Regulation (rhs).
Sources: National Competent Authorities, Thomson Reuters Datastream, ESMA.

A.82
Dispersion of net short positions in EU shares



Note: Dispersion of net short positions by country as percentage of market value of those positions relative to each country's blue chip index market value.
Sources: National Competent Authorities, Thomson Reuters Datastream, ESMA.

A.83
Value of net short positions in EU shares by sector



Note: Average of net short positions in EU shares for manufacturing, financials, information technology and utilities, in % of share capital issued.
Sources: National Competent Authorities, ESMA.

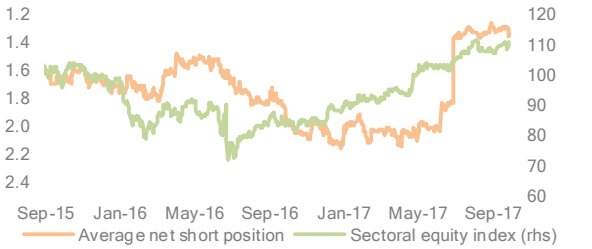
A.84
Value of net short positions in EU sovereign debt

Note: Duration-adjusted short positions held on sovereigns in the EU, EUR tn.
Sources: National Competent Authorities, ESMA.

A.85
Net short positions in industrial shares and equity prices

Note: Average of net short positions in EU manufacturing shares, in % of issued share capital (left axis, inverted), and EU industrials equity benchmark (right axis), indexed 01/06/2015=100.
Sources: Thomson Reuters Eikon, National Competent Authorities, ESMA.

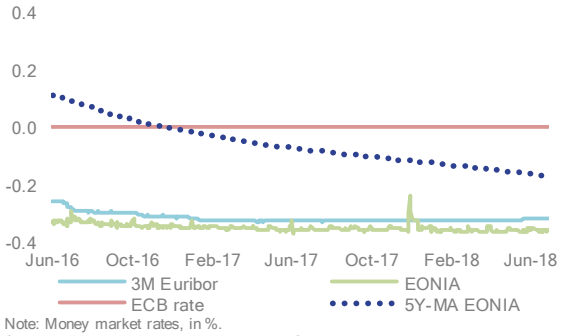
A.86
Net short positions in financial shares and equity prices



Note: Average of net short positions in EU financial shares, in % of share capital issued (left axis, inverted), and EU financials equity benchmark (right axis), indexed 01/06/2015=100.
Sources: Thomson Reuters Eikon, National Competent Authorities, ESMA.

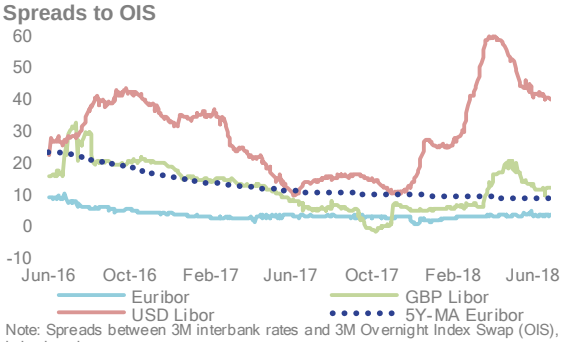
Money markets

A.87
Interest rates



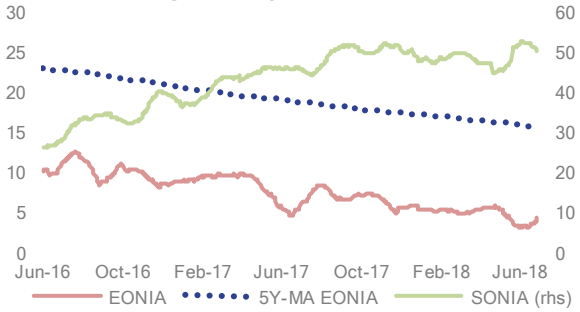
Note: Money market rates, in %.
Sources: Thomson Reuters Datastream, ESMA.

A.88
Spreads to OIS



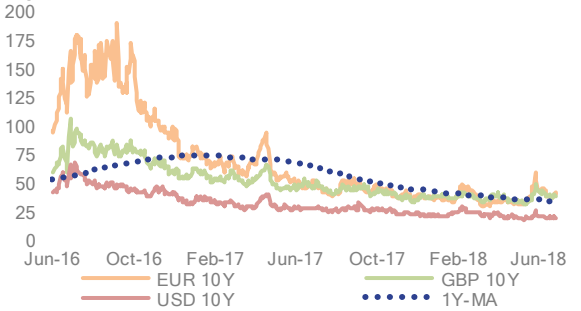
Note: Spreads between 3M interbank rates and 3M Overnight Index Swap (OIS), in basis points.
Sources: Thomson Reuters Datastream, ESMA.

A.89
Interbank overnight activity



Note: 1M-MA of daily lending volumes on Euro Overnight Index Average (EONIA), EUR bn, and Sterling Overnight Index Average (SONIA), GBP bn.
Sources: ECB, Thomson Reuters EIKON, ESMA.

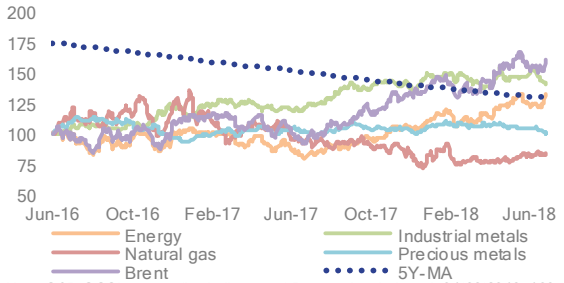
A.90
Implied volatilities



Note: Implied volatilities on one-month Euro-Euribor, UK Pound Sterling-GBP Libor and US Dollar-USD Libor swaptions measured as price indices, in %.
Sources: Thomson Reuters EIKON, ESMA.

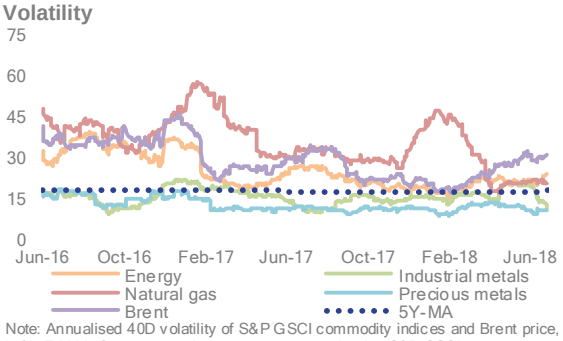
Commodity markets

A.91
Prices



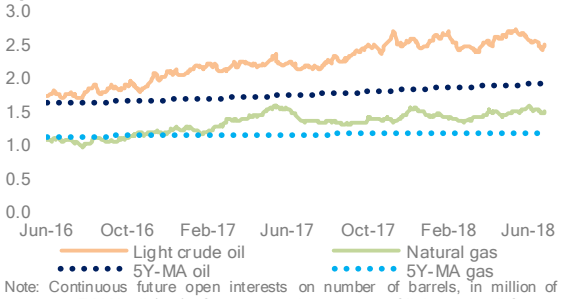
Note: S&P GSCI commodity indices and Brent price, indexed, 01/06/2016=100. 5Y-MA=five-year moving average computed using S&P GSCI. Indices denominated in USD.
Sources: Thomson Reuters Datastream, ESMA.

A.92
Volatility



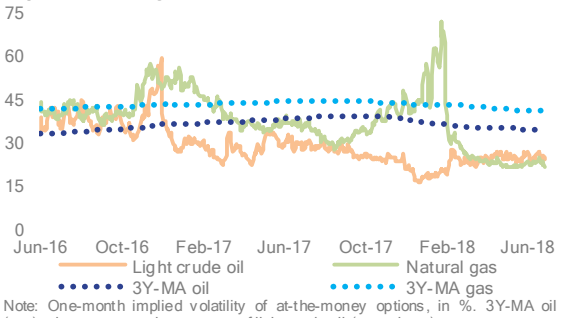
Note: Annualised 40D volatility of S&P GSCI commodity indices and Brent price, in %. 5Y-MA=five-year moving average computed using S&P GSCI.
Sources: Thomson Reuters Datastream, ESMA.

A.93
Open interest



Note: Continuous future open interests on number of barrels, in million of contracts. 5Y-MA oil (gas)= five-year moving average of light crude oil futures (natural gas futures).
Sources: Thomson Reuters Datastream, ESMA.

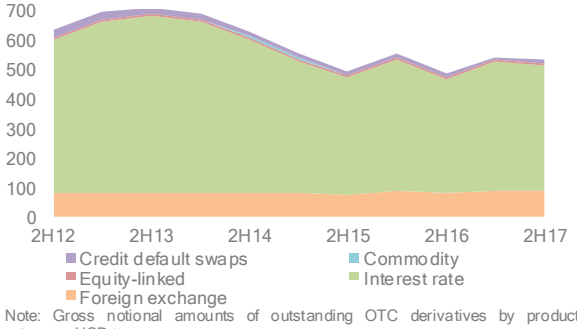
A.94
Implied volatility



Note: One-month implied volatility of at-the-money options, in %. 3Y-MA oil (gas)= three-year moving average of light crude oil (natural gas).
Sources: Thomson Reuters Datastream, ESMA.

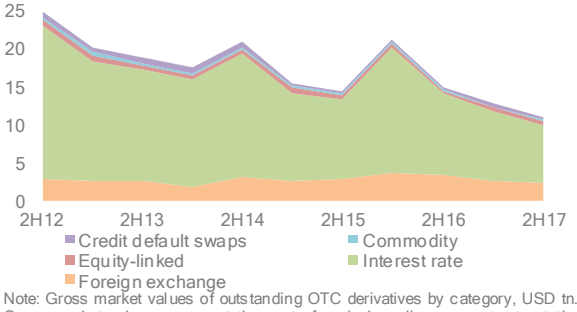
Derivatives markets

A.95
OTC notional outstanding



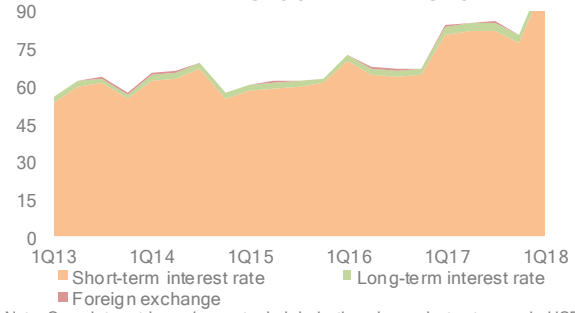
Note: Gross notional amounts of outstanding OTC derivatives by product category, USD tn.
Sources: Bank for International Settlements, ESMA.

A.96
OTC market value



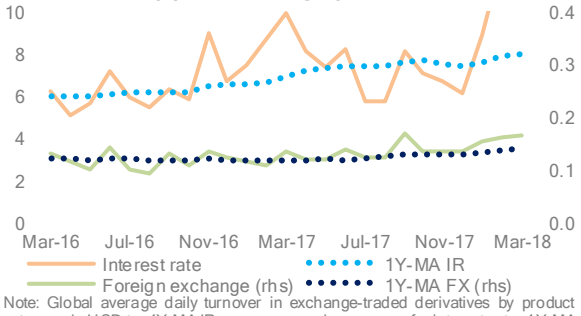
Note: Gross market values of outstanding OTC derivatives by category, USD tn. Gross market values represent the cost of replacing all open contracts at the prevailing market prices.
Sources: Bank for International Settlements, ESMA.

A.97
ETD notional outstanding by product category



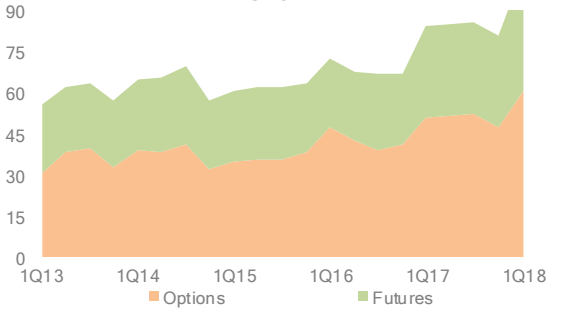
Note: Open interest in exchange-traded derivatives by product category, in USD tn.
Sources: Bank for International Settlements, ESMA.

A.98
ETD turnover by product category



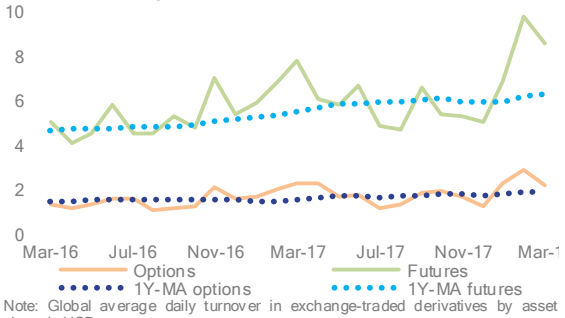
Note: Global average daily turnover in exchange-traded derivatives by product category, in USD tn. 1Y-MA IR=one-year moving average for interest rate, 1Y-MA FX=one-year moving average for foreign exchange.
Sources: Bank for International Settlements, ESMA.

A.99
ETD notional outstanding by asset class



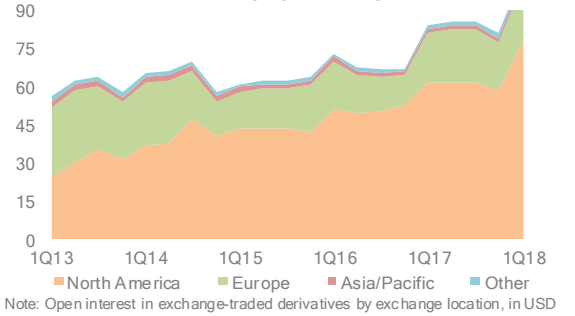
Note: Open interest in exchange-traded derivatives by asset class, in USD tn.
Sources: Bank for International Settlements, ESMA.

A.100
ETD turnover by asset class



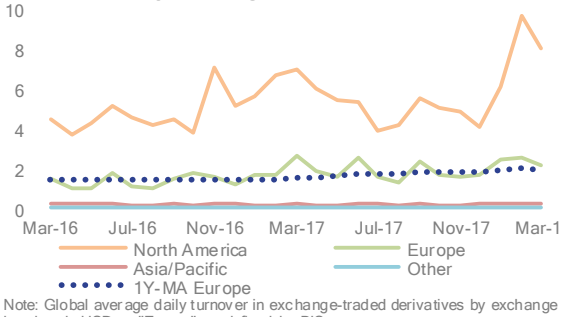
Note: Global average daily turnover in exchange-traded derivatives by asset class, in USD tn.
Sources: Bank for International Settlements, ESMA.

A.101
ETD notional outstanding by exchange location



Note: Open interest in exchange-traded derivatives by exchange location, in USD tn.
Sources: Bank for International Settlements, ESMA.

A.102
ETD turnover by exchange location

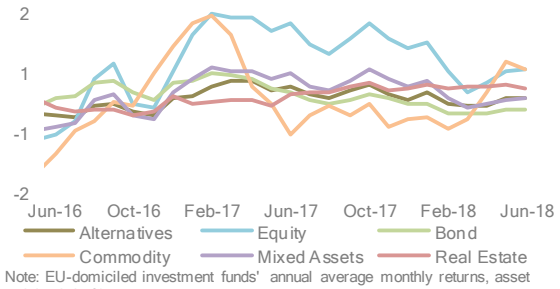


Note: Global average daily turnover in exchange-traded derivatives by exchange location, in USD tn. "Europe" as defined by BIS.
Sources: Bank for International Settlements, ESMA.

Investors

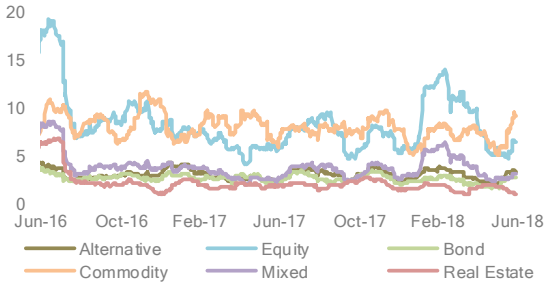
Fund industry

A.103
Fund performance



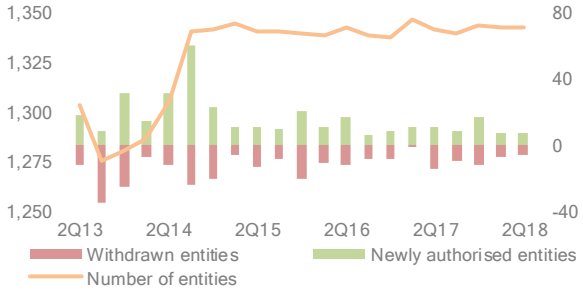
Note: EU-domiciled investment funds' annual average monthly returns, asset weighted, in %.
Sources: Thomson Reuters Lipper, ESMA.

A.104
Fund volatility



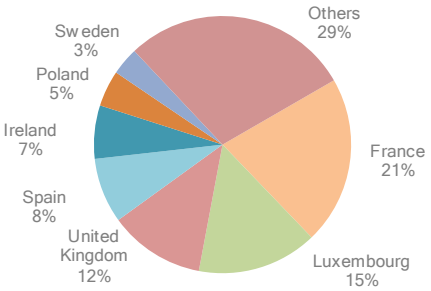
Note: Annualised 40D historical return volatility of EU domiciled mutual funds, in %.
Sources: Thomson Reuters Lipper, ESMA.

A.105
Entities authorised under UCITS



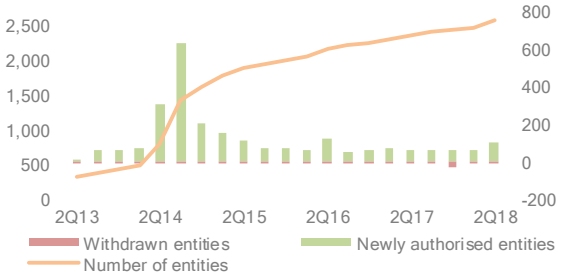
Note: Number of entities authorised under the UCITS Directive by national competent authorities of the Member States and notified to ESMA. Newly authorised entities and withdrawn entities on the right axis.
Sources: ESMA Registers.

A.106
Share of entities authorised under UCITS by country



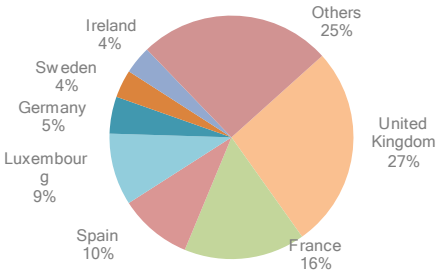
Note: Number of entities authorised under the UCITS Directive by national competent authorities and notified to ESMA, in %.
Sources: ESMA Registers.

A.107
Entities authorised under AIFMD



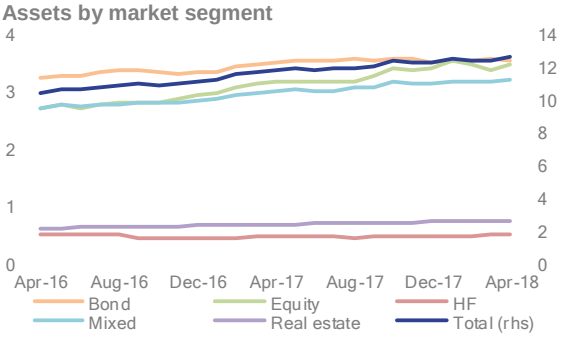
Note: Number of entities authorised under AIFMD by national competent authorities of the Member States and notified to ESMA. Newly authorised entities and withdrawn entities on the right axis.
Sources: ESMA Registers.

A.108
Share of entities authorised under AIFMD by country



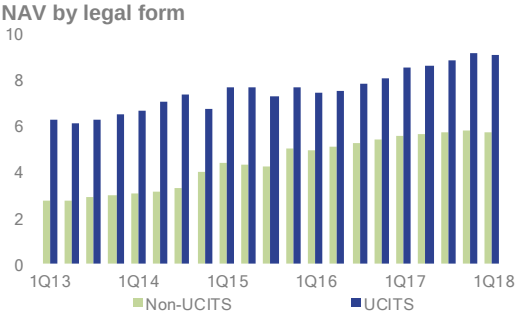
Note: Number of entities authorised under AIFMD by national competent authorities and notified to ESMA, in %.
Sources: ESMA Registers.

A.109
Assets by market segment



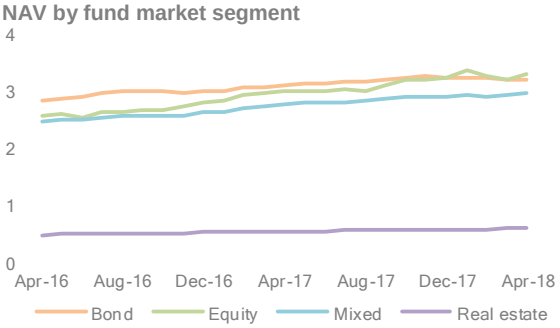
Note: AuM of EA funds by fund type, EUR tn. HF=Hedge funds.
Sources: ECB, ESMA.

A.110
NAV by legal form



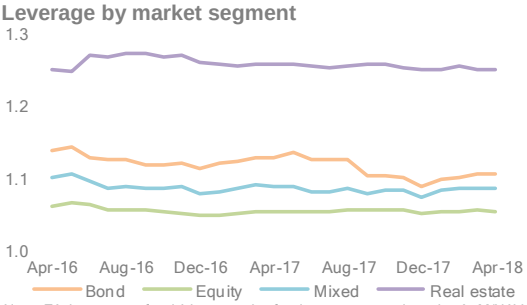
Note: NAV of EU fund industry, EUR tn. Quarterly data.
Sources: EFAMA, ESMA.

A.111
NAV by fund market segment



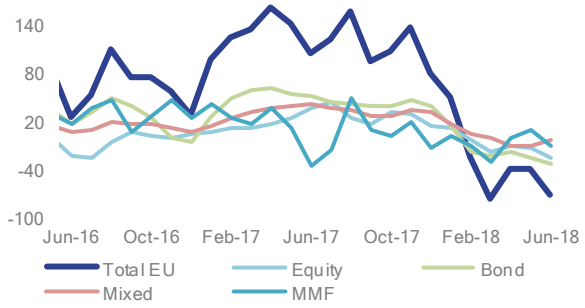
Note: EA investment funds' NAV by fund type, EUR tn.
Sources: ECB, ESMA.

A.112
Leverage by market segment



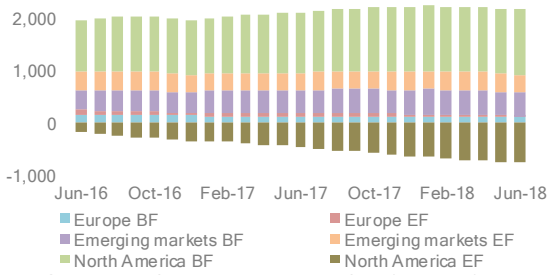
Note: EA investment funds' leverage by fund type computed as the AuM/NAV ratio.
Sources: ECB, ESMA.

A.113
Fund flows by fund type



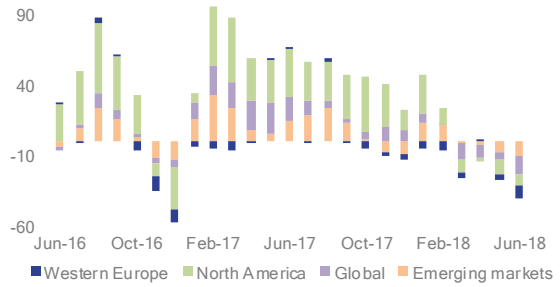
Note: EU-domiciled funds' 2M cumulative net flows, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.114
Fund flows by regional investment focus



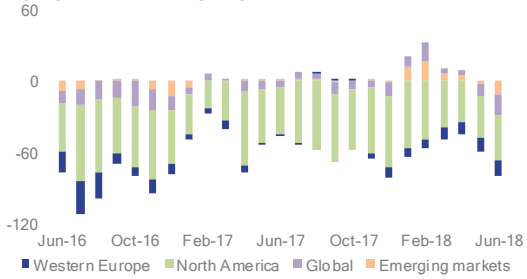
Note: Cumulative net flows into bond and equity funds (BF and EF) over time since 2004 by regional investment focus, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.115
Bond fund flows by regional investment focus



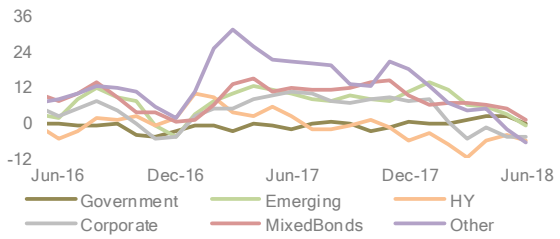
Note: Two-month cumulative bond flows by regional investment focus, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.116
Equity fund flows by regional investment focus



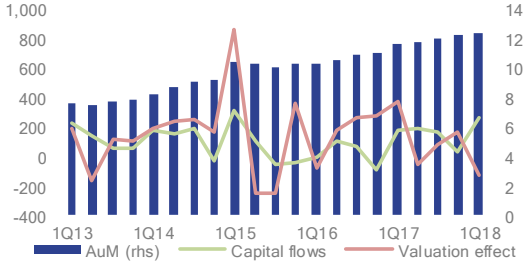
Note: Two-month cumulative equity flows by regional investment focus, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.117
Net flows for bond funds



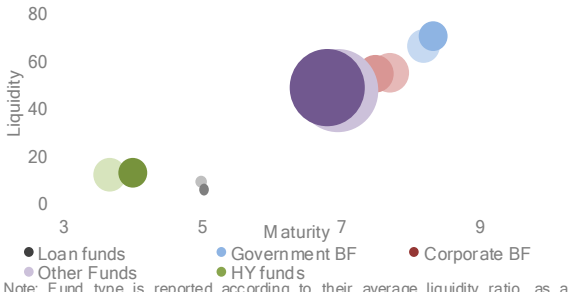
Note: Two-month cumulative net flows for bond funds, EUR bn. Funds investing in corporate and government bonds that qualify for another category are only reported once e.g. funds investing in emerging government bonds reported as Emerging; funds investing in HY corporate bonds reported as HY).
Sources: Thomson Reuters Lipper, ESMA.

A.118
Net asset valuation



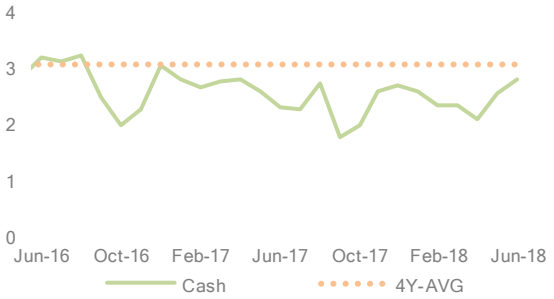
Note: Net valuation effect related to the AuM of EA investment funds, computed as the intraperiod change in AuM, net of flows received in the respective period. Capital flows and valuation effects in EUR bn. AuM expressed in EUR tn.
Sources: ECB, ESMA.

A.119
Liquidity risk profile of EU bond funds



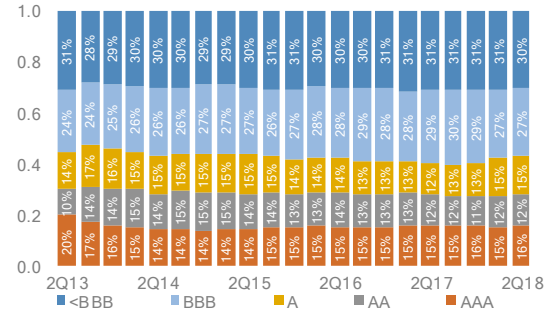
Note: Fund type is reported according to their average liquidity ratio, as a percentage (Y-axis), the effective average maturity of their assets (X-axis) and their size. Each series is reported for 2 years, i.e. 2017 (bright colours) and 2018 (dark colours).
Sources: Thomson Reuters Lipper, ESMA.

A.120
Cash as percentage of assets



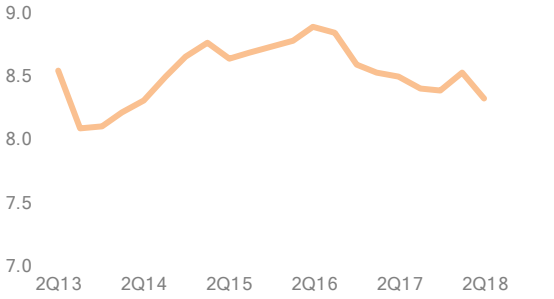
Note: Cash held by EU corporate bond funds, in % of portfolio holdings (%). Short positions can have a negative value.
Sources: Thomson Reuters Lipper, ESMA.

A.121
Credit quality of bond funds' assets



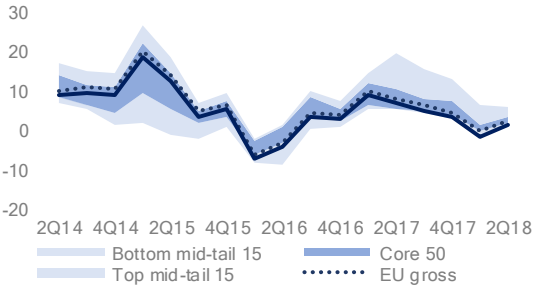
Note: Ratings of bonds held by EU bond funds, data in % of total assets.
Sources: Thomson Reuters Lipper, ESMA and Standard & Poor's.

A.122
Maturity of EU bond funds' assets



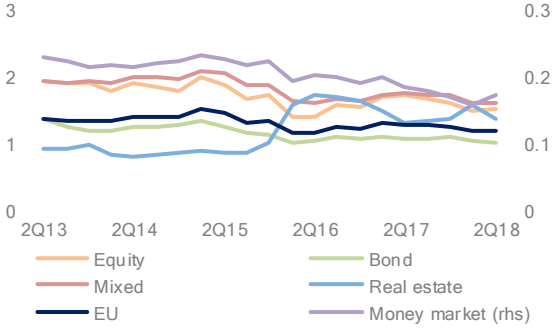
Note: Weighted average effective maturity of EU bond funds' assets, data in years.
Sources: Thomson Reuters Lipper, ESMA

A.123
Net return dispersion



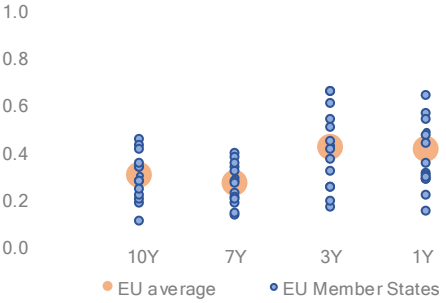
Note: Net returns of UCITS, adjusted for total expense ratio and load fees, in %. Distribution represents selected EU markets. Top mid-tail 15=distribution between the 75th and 90th percentile. Bottom mid-tail 15=distribution between the 10th and 25th percentile.
Sources: Thomson Reuters Lipper, ESMA.

A.124
Absolute reduction in gross returns



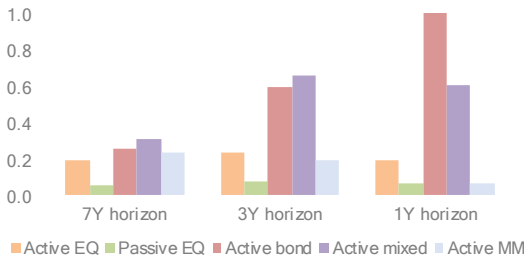
Note: Absolute impact of on-going costs, subscription and redemption fees on gross returns for UCITS fund shares, in percentage points.
Sources: Thomson Reuters Lipper, ESMA.

A.125
Retail investor reduction in gross returns



Note: Fund costs (ongoing costs, subscription and redemption fees) as a ratio of gross returns for UCITS fund shares per investment horizon, in %. Focus on retail investors only.
Sources: Thomson Reuters Lipper, ESMA.

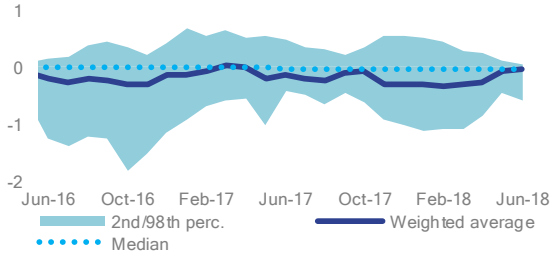
A.126
Relative reduction in gross returns



Note: Fund costs (ongoing costs, subscription and redemption fees) as a ratio of gross returns for UCITS fund shares per investment horizon, in %. Results for Passive Bond, Passive MM and Passive mixed funds are omitted due to the low sample sizes. EQ=equity; MM=money market.
Sources: Thomson Reuters Lipper, ESMA.

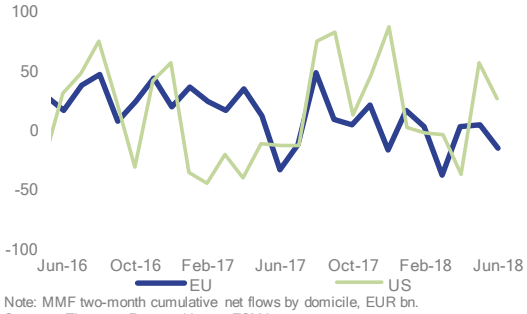
Money market funds

A.127
MMF performance



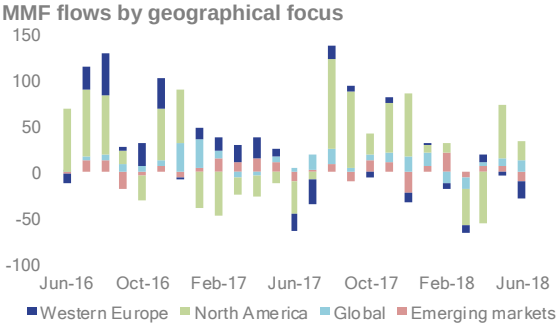
Note: EU-domiciled MMFs' average yearly returns by month, asset-weighted, in %. The graph shows the median and average asset-weighted returns and the difference between the returns corresponding to the 98th and the 2nd percentile (light blue corridor).
Sources: Thomson Reuters Lipper, ESMA.

A.128
MMF flows by domicile



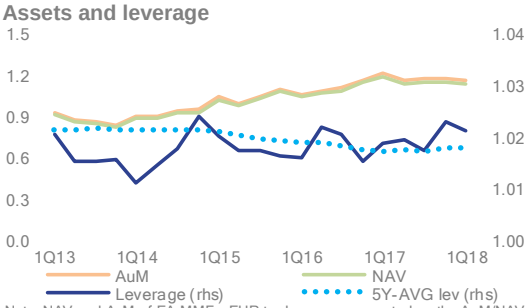
Note: MMF two-month cumulative net flows by domicile, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.129
MMF flows by geographical focus



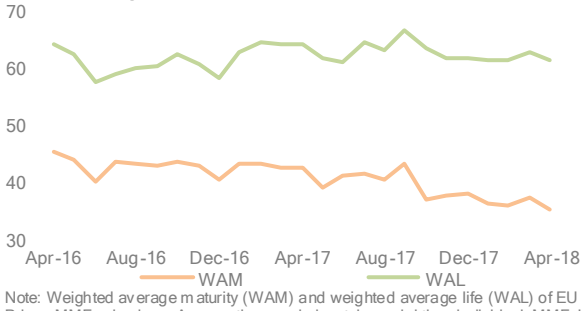
Note: MMF two-month cumulative net flows by geographical focus, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.130
Assets and leverage



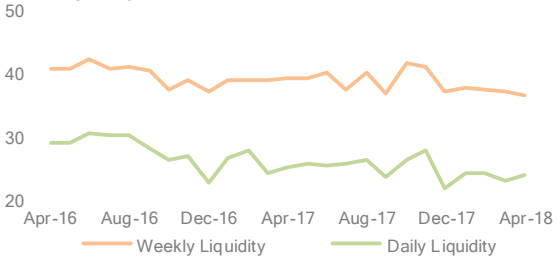
Note: NAV and AuM of EA MMFs, EUR tn. Leverage computed as the AuM/NAV ratio. 5Y-MA lev=five-year moving average for the leverage ratio.
Sources: ECB, ESMA.

A.131
MMF maturity



Note: Weighted average maturity (WAM) and weighted average life (WAL) of EU Prime MMFs, in days. Aggregation carried out by weighting individual MMFs' WAM and WAL by AuM.
Sources: Fitch Ratings, ESMA.

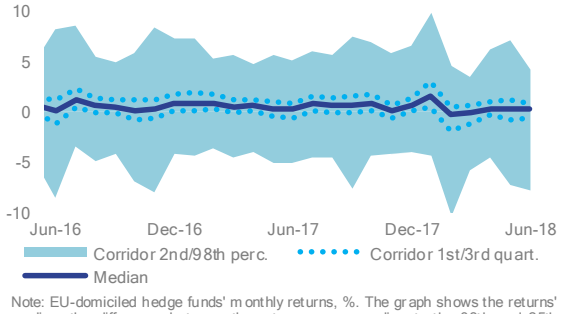
A.132
MMF liquidity



Note: Daily and weekly liquidity includes all assets maturing overnight and shares by AAA MMFs, securities issued by highly-rated sovereigns with a maturity of less than one year, in % of total assets.Aggregation carried out using individual MMF data weighted by AuM.
Sources: Fitch Ratings, ESMA.

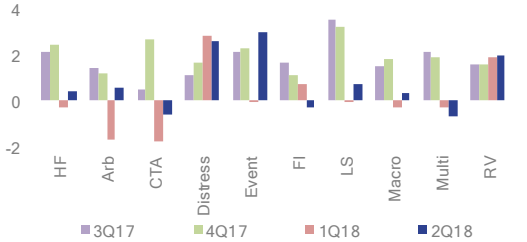
Alternative funds

A.133
Hedge fund returns



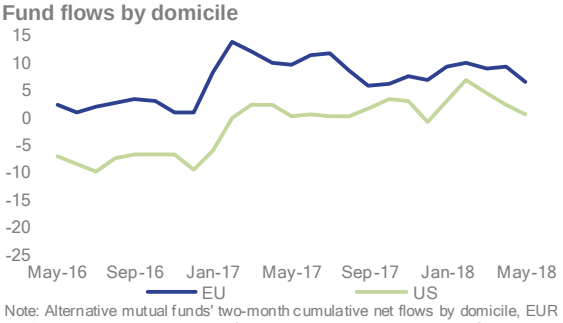
Note: EU-domiciled hedge funds' monthly returns, %. The graph shows the returns' median, the difference between the returns corresponding to the 98th and 25th percentiles (light blue corridor) and the difference between the returns corresponding to the 1st and 3rd quartiles (dotted line corridor).
Sources: Eurekahedge, ESMA.

A.134
Hedge fund performance by strategy



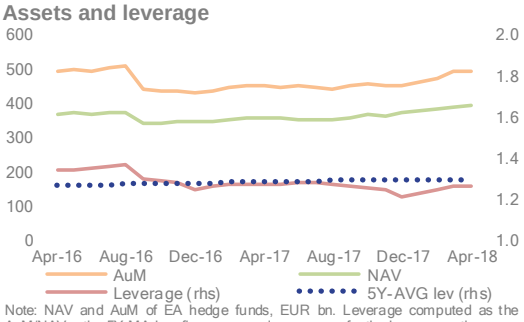
Note: Growth in hedge fund performance indices by strategy: Hedge fund index (Total), arbitrage, Commodity Trading Advisor (CTA), distressed debt, event driven, fixed income, long/short equity, macro, multi-strategy, relative value (RV), in %.
Sources: Eurekahedge, ESMA.

A.135
Fund flows by domicile



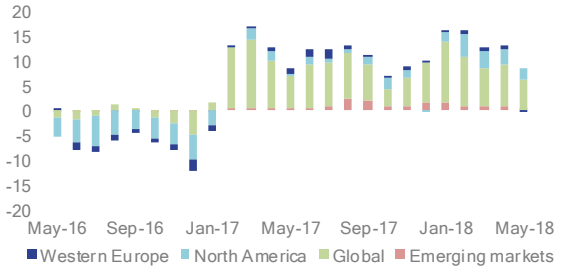
Note: Alternative mutual funds' two-month cumulative net flows by domicile, EUR bn. Data on alternative mutual funds represents only a subset of the entire alternative fund industry.
Sources: Thomson Reuters Lipper, ESMA.

A.136
Assets and leverage



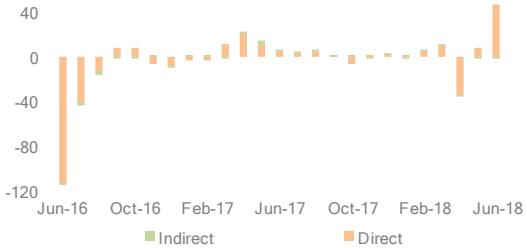
Note: NAV and AuM of EA hedge funds, EUR bn. Leverage computed as the AuM/NAV ratio. 5Y-MA lev=five-year moving average for the leverage ratio.
Sources: ECB, ESMA.

A.137
Alternative fund flows by geographical focus



Note: Alternative mutual funds' two-month cumulative net flows by geographical focus, EUR bn. Data on alternative mutual funds represents only a subset of the entire alternative fund industry.
Sources: Thomson Reuters Lipper, ESMA.

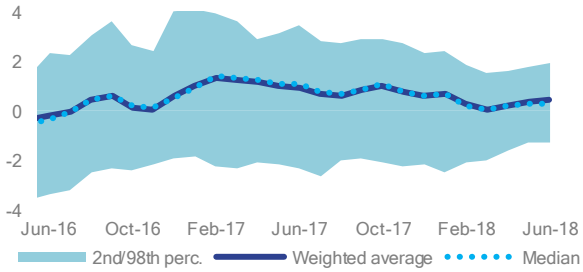
A.138
Direct and indirect property fund flows



Note: Two-month cumulative flows for direct and indirect EU property funds. Indirect property funds invest in securities of real estate companies, including Real Estate Investment Trusts (REITs).
Sources: Morningstar, ESMA.

Exchange-traded funds

A.139
Returns

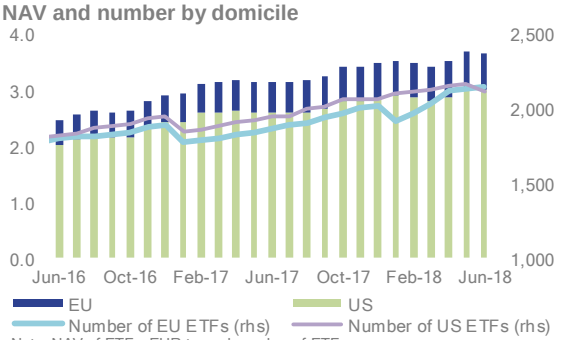


Note: EU-domiciled ETFs' average yearly returns by month, asset-weighted, in %. The graph shows the median and average asset-weighted returns and the difference between the returns corresponding to the 98th and the 2nd percentile (light blue corridor).
Sources: Thomson Reuters Lipper, ESMA.

A.140
Volatility

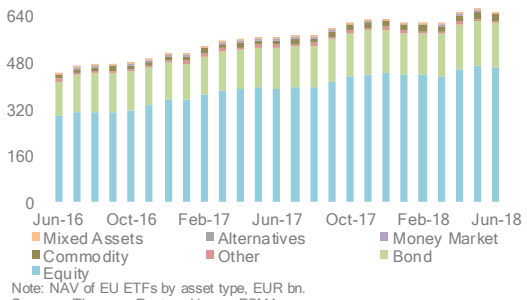
Note: Annualised 40-day historical return volatility of EU-domiciled ETFs, in %.
Sources: Thomson Reuters Lipper, ESMA.

A.141
NAV and number by domicile



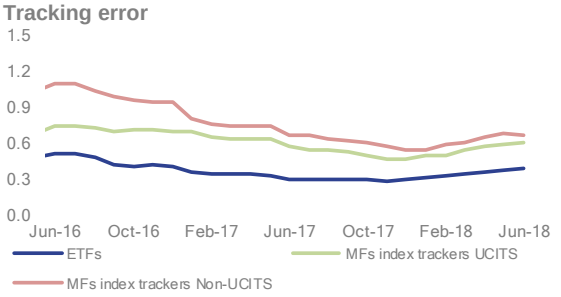
Note: NAV of ETFs, EUR tn, and number of ETFs.
Sources: Thomson Reuters Lipper, ESMA.

A.142
NAV by asset type



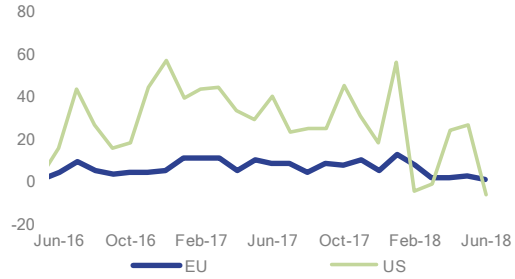
Note: NAV of EU ETFs by asset type, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.143
Tracking error



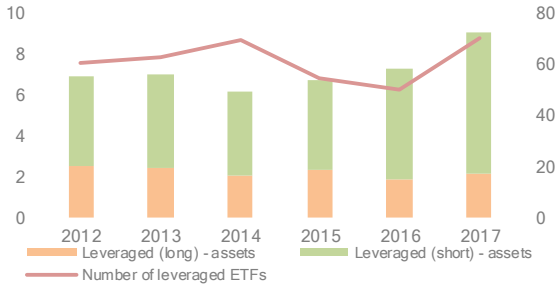
Note: Tracking error defined as standard deviation of fund excess returns compared to benchmark. The graph shows the tracking error for ETF and mutual funds both UCITS and non-UCITS. Yearly standard deviation reported on monthly frequency. End-of-month data.
Sources: Thomson Reuters Lipper, ESMA.

A.144
Flows by domicile



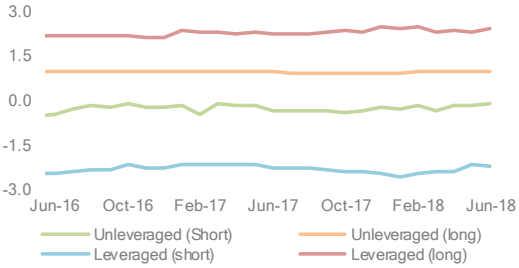
Note: ETF net flows by domicile, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.145
Assets of leveraged European ETFs



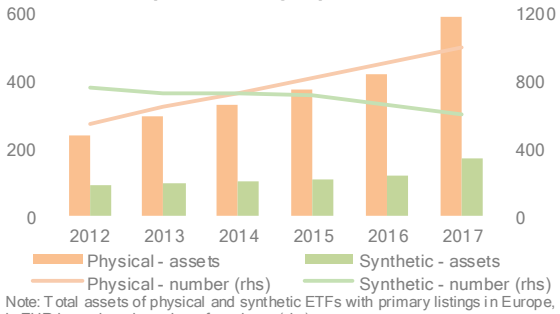
Note: Total assets of leveraged long and leveraged short ETFs with primary listings in Europe, in EUR bn and total number of products (rhs), in thousand.
Sources: ETFGI, ESMA

A.146
Average beta values for European ETFs



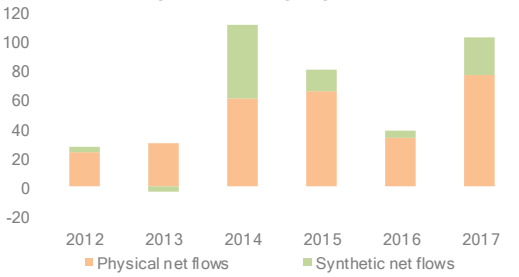
Note: Leveraged ETFs are self-reported. The annual average monthly beta is measured as the volatility of a fund return in comparison to its benchmark. An unleveraged ETF replicating its benchmark will typically have a beta close to 1.0.
Sources: Thomson Reuters Lipper, ESMA.

A.147
Assets of European ETFs by replication method



Note: Total assets of physical and synthetic ETFs with primary listings in Europe, in EUR bn and total number of products (rhs).
Sources: ETFGI, ESMA

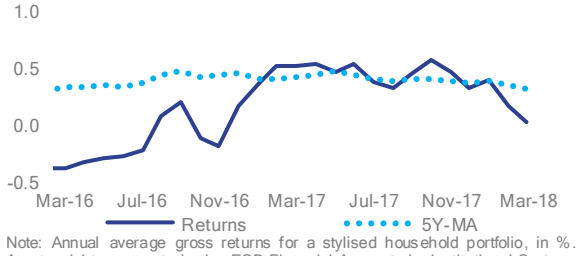
A.148
Flows into European ETFs by replication method



Note: Net flows of physical and synthetic ETFs with primary listings in Europe, in EUR bn.
Sources: ETFGI, ESMA

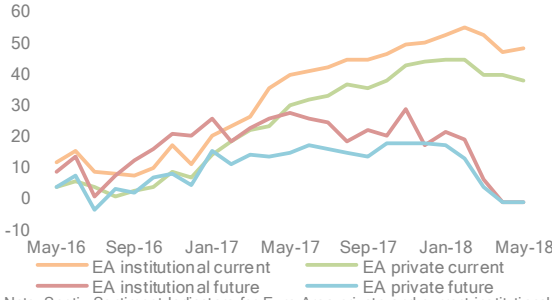
Retail investors

A.149
Portfolio returns



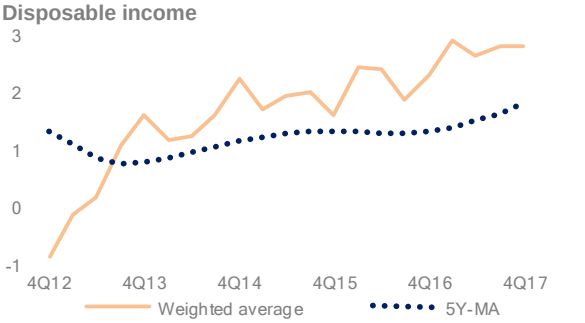
Note: Annual average gross returns for a stylised household portfolio, in %. Asset weights, computed using ECB Financial Accounts by Institutional Sectors, are 37% for collective investment schemes (of which 12% mutual funds and 25% insurance and pension funds), 31% for deposits, 22% for equity, 7% debt securities and 3% for other assets. Costs, fees and other charges incurred for buying, holding or selling these instruments are not taken into account.
Sources: Thomson Reuters Datastream, Thomson Reuters Lipper, ECB, ESMA.

A.150
Investor sentiment



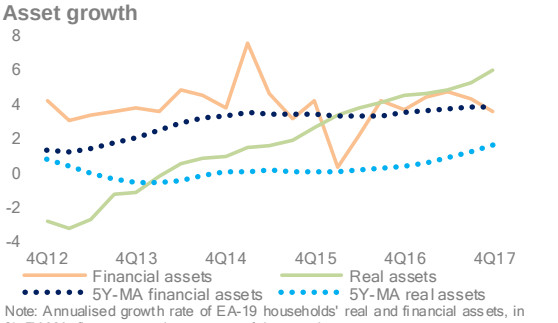
Note: Sentix Sentiment Indicators for Euro Area private and current institutional investors on a 10Y horizon. The zero benchmark is a risk-neutral position.
Sources: Thomson Reuters Datastream, ESMA.

A.151
Disposable income



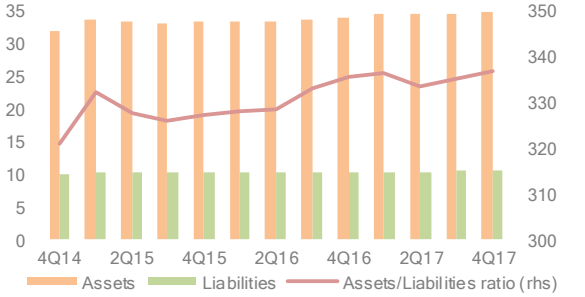
Note: Annualised growth rate of weighted-average gross disposable income for 11 countries (AT, BE, DE, ES, FI, FR, IE, IT, NL, PT and SI), in %.
Sources: Eurostat, Thomson Reuters Datastream, ESMA.

A.152
Asset growth



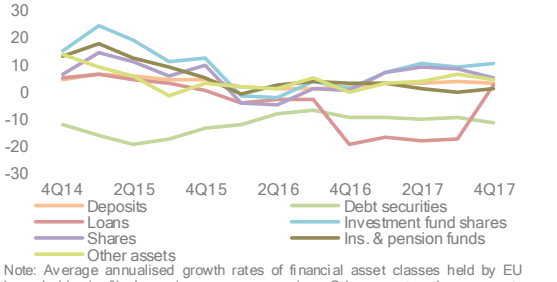
Note: Annualised growth rate of EA-19 households' real and financial assets, in %. 5Y-MA=five-year moving average of the growth rate.
Sources: ECB, ESMA.

A.153
Household assets to liabilities ratio



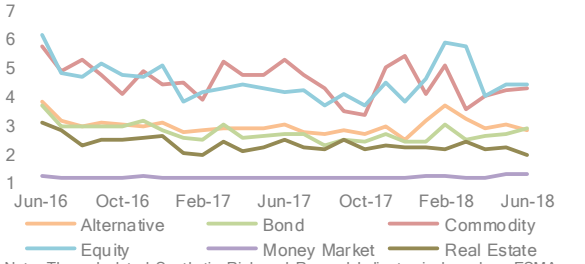
Note: EU households' financial assets and liabilities, EUR tn. Assets/Liabilities ratio in %.
Sources: ECB, ESMA.

A.154
Growth rates in financial assets



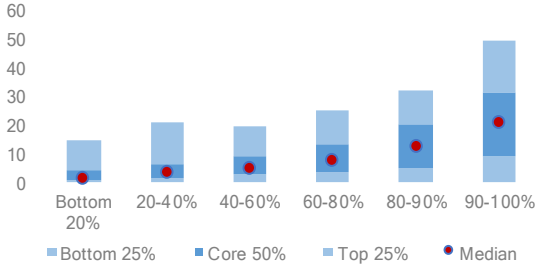
Note: Average annualised growth rates of financial asset classes held by EU households, in %. Ins.= insurance companies, Other assets=other accounts receivable/payable.
Sources: ECB, ESMA.

A.155
Retail fund synthetic risk and reward indicator



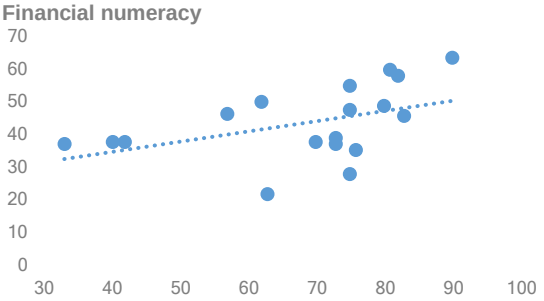
Note: The calculated Synthetic Risk and Reward Indicator is based on ESMA SRRI guidelines. It is computed via a simple 5-year annualised volatility measure, which is then translated into categories 1-7 (with 7 representing higher levels of volatility).
Sources: Thomson Reuters Lipper, ESMA.

A.156
Share ownership by income



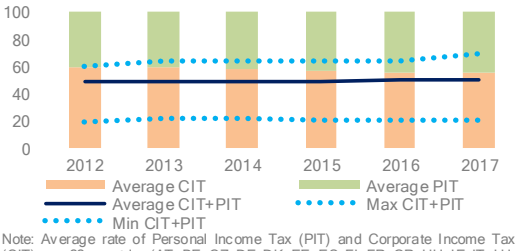
Note: Dispersion of the national percentages of households owning shares, by their income group. Data for EA countries (excl. LT), HU and PL for 2011-2015, %. 'Bottom 25%' represents the range of values from minimum to 1st quartile, 'Core 50%' interquartile range, and 'Top 25%' from 3rd quartile to maximum.
Sources: ECB HFCS, ESMA.

A.157
Financial numeracy



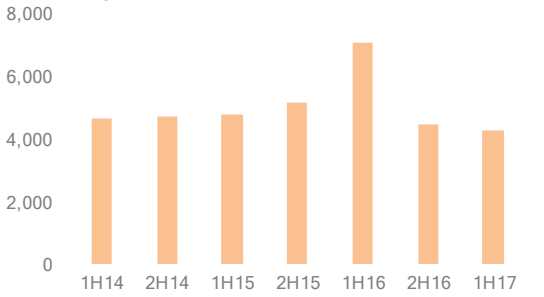
Note: X-axis: Numeracy = share of respondents with correct answers (three numerical questions asked). Y-axis = households in EA (excl. IE, LT), HU and PL holding debt in 2011-2015, %.
Sources: ECB HFCS, ESMA.

A.158
Investment taxation



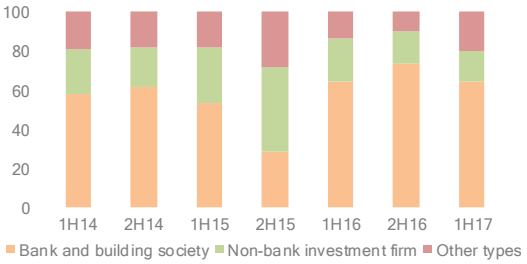
Note: Average rate of Personal Income Tax (PIT) and Corporate Income Tax (CIT) over 22 countries (AT, BE, CZ, DE, DK, EE, ES, FI, FR, GR, HU, IE, IT, LU, LV, NL, PL, PT, SE, SI, SK and UK), weighted by total value of funds, equities and debt securities held by households, plotted with lines. Shares of total tax rate on dividend income via PIT and CIT plotted with bars. Data in %.
Sources: ECB, OECD, ESMA.

A.159
Total complaints



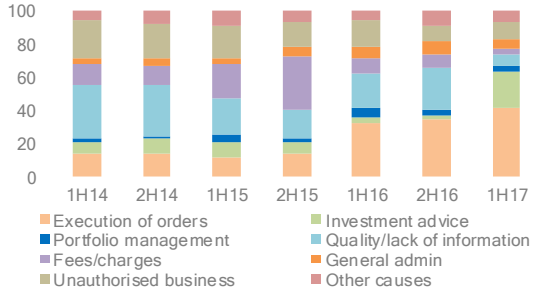
Note: Number of total complaints reported directly to NCAs. Data collected by NCAs.
Sources: ESMA complaints database.

A.160
Complaints data by type of firm



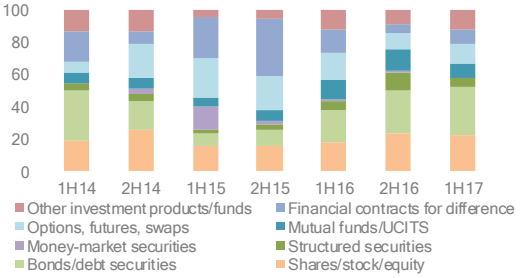
Note: Complaints reported via firms by type of firm, % of total. Data collected by NCAs.
Sources: ESMA complaints database.

A.161
Complaints data by cause



Note: Complaints reported directly to NCAs by financial instrument, % of total. Data collected by NCAs.
Sources: ESMA complaints database.

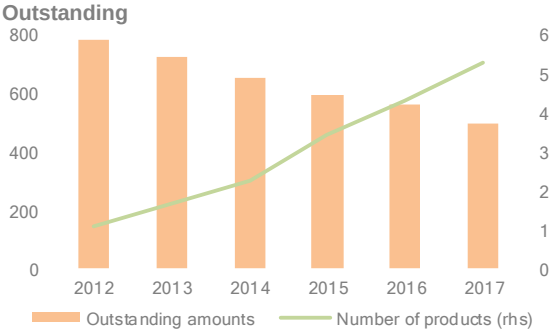
A.162
Complaints data by instrument



Note: Complaints reported by financial instrument, % of total. Data collected by NCAs.
Sources: ESMA complaints database.

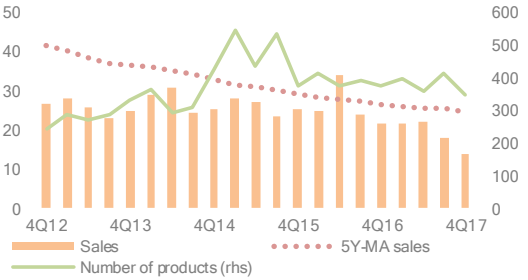
Structured retail products

A.163
Outstanding



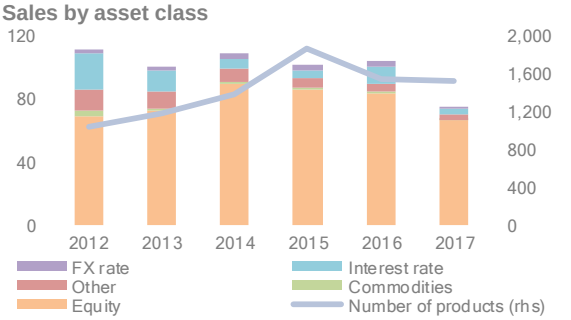
Note: Outstanding amounts, EUR bn. Number of products, in million.
Sources: StructuredRetailProducts.com, ESMA.

A.164
Sales



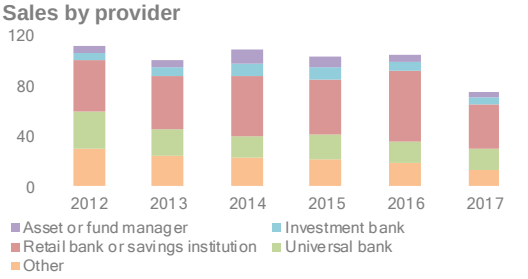
Note: Volumes of structured retail products issued, EUR bn. Number of products, in thousand.
Sources: StructuredRetailProducts.com, ESMA.

A.165
Sales by asset class



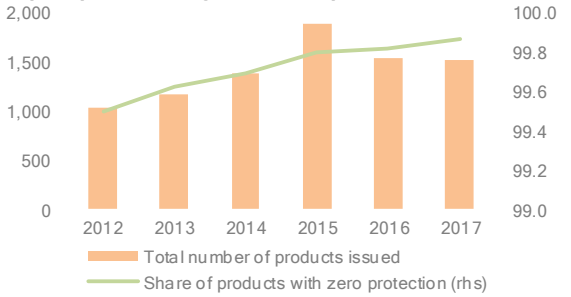
Note: Volumes of structured products sold to retail investors by asset class, EUR bn. Number of products sold, in thousand.
Sources: StructuredRetailProducts.com, ESMA.

A.166
Sales by provider



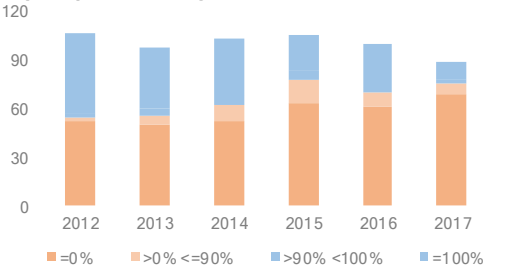
Note: Annual volumes of structured products sold to retail investors by provider, EUR bn. Other includes: academic institutions; asset/fund managers; brokerage; commercial banks; independent financial advisers; insurance and pension companies; private banks or wealth managers; securities companies; SPV.
Sources: StructuralRetailProducts.com, ESMA.

A.167
Capital protection by number of products sold



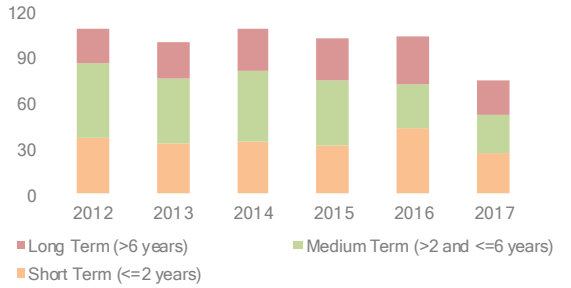
Note: Number of structured products sold to retail investors, thousands. Share of products with zero capital protection, in %.
Sources: StructuredRetailProducts.com, ESMA.

A.168
Capital protection by volume sold



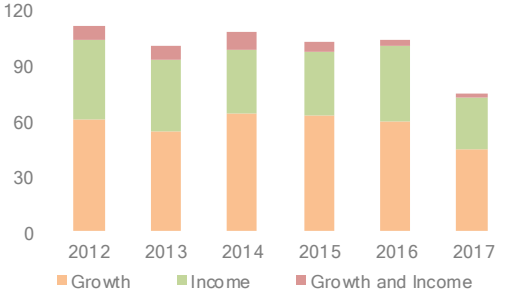
Note: Volumes of structured products sold to retail investors by level of capital protection, EUR bn.
Sources: StructuredRetailProducts.com, ESMA.

A.169
Investment term



Note: Annual volumes of structured products sold to retail investors by investment term, EUR bn.
Sources: StructuredRetailProducts.com, ESMA.

A.170
Type of product

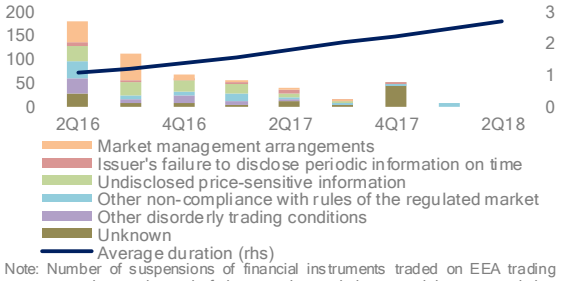


Note: Volumes of structured products sold to retail investors by type, EUR bn.
Sources: StructuredRetailProducts.com, ESMA.

Infrastructures and services

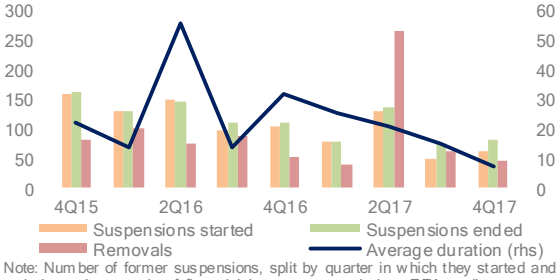
Trading venues and MiFID entities

A.171
Ongoing trading suspensions by rationale



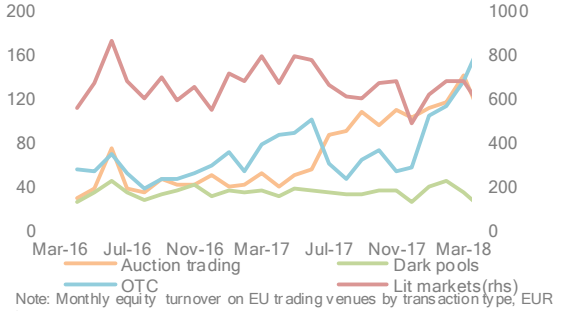
Note: Number of suspensions of financial instruments traded on EEA trading venues ongoing at the end of the reporting period, grouped by quarter during which they started and by rationale. Average duration, in years, computed as the mean of the difference between the end-of-quarter date and the start date.
Sources: ESMA Registers.

A.172
Trading suspensions – lifecycle and removal



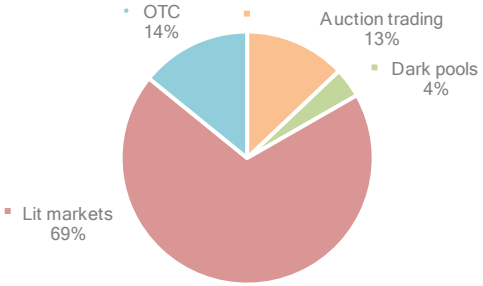
Note: Number of former suspensions, split by quarter in which they started and ended, and removals of financial instruments traded on EEA trading venues. Average duration of former suspensions, in days, computed as the mean of the difference between the end-of-quarter date and the start date.
Sources: ESMA Registers.

A.173
Equity trading turnover by transaction type



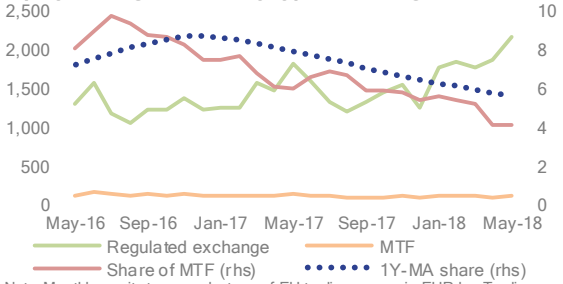
Note: Monthly equity turnover on EU trading venues by transaction type, EUR bn
Sources: Morningstar Realtime data, ESMA.

A.174
Share of equity trading by transaction type



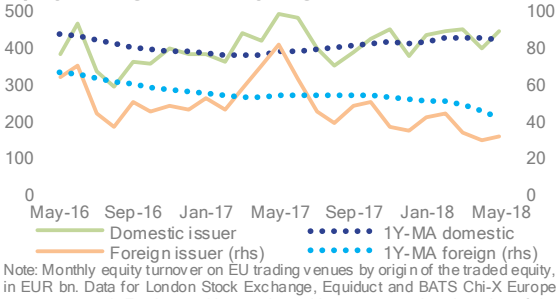
Note: Share of equity turnover by transaction type over the reporting period, in % of the total.
Sources: Morningstar Reatime data, ESMA.

A.175
Equity trading turnover by type of trading venue



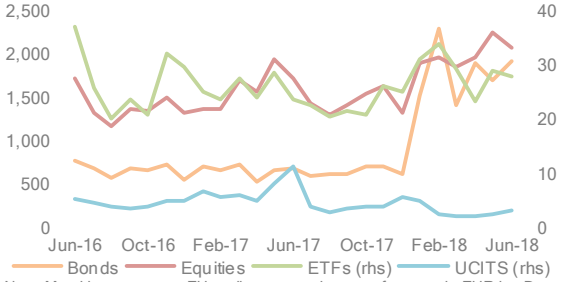
Note: Monthly equity turnover by type of EU trading venue, in EUR bn. Trading on multilateral trading facilities as % of total trading on the right axis. 1Y-MA share=one-year moving average share of MTFs.
Sources: FESE, ESMA.

A.176
Equity trading turnover by origin of issuer



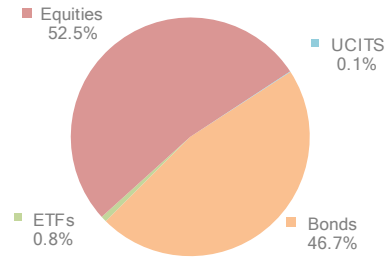
Note: Monthly equity turnover on EU trading venues by origin of the traded equity, in EUR bn. Data for London Stock Exchange, Equiduct and BATS Chi-X Europe are not reported. Foreign equities are issued in a country other than that of the trading venue.
Sources: FESE, ESMA.

A.177
Turnover by type of assets



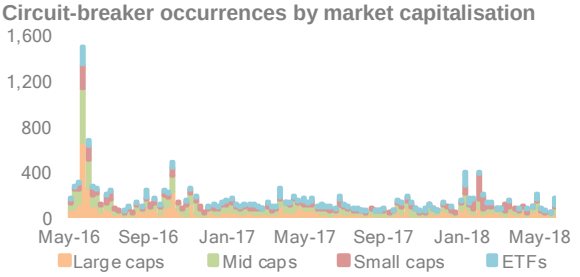
Note: Monthly turnover on EU trading venues by type of assets, in EUR bn. Data for Aquis Exchange, BATS Chi-x Europe, Equiduct, London Stock Exchange, TOM MTF and Turquoise are not reported for bonds, ETFs and UCITS.
Sources: FESE, ESMA.

A.178
Share of turnover by type of assets



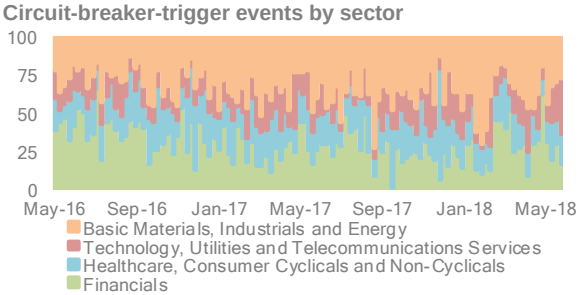
Note: Share of turnover by asset class, in % of total turnover over the reporting period. Data for Aquis Exchange, BATS Chi-x Europe, Equiduct, London Stock Exchange, TOM MTF and Turquoise are not reported for bonds, ETFs and UCITS.
Sources: FESE, ESMA.

A.179
Circuit-breaker occurrences by market capitalisation



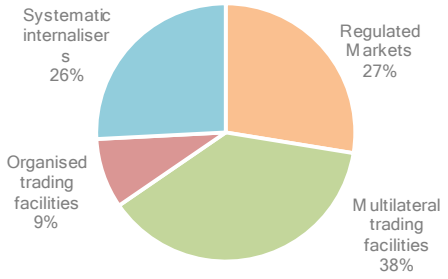
Note: Number of daily circuit-breaker-trigger events by type of financial instrument and by market cap. Results displayed as weekly aggregates.The analysis is based on a sample of 10,000 securities, including all constituents of the STOXX Europe 200 Large/Mid/Small caps and a large sample of ETFs tracking the STOXX index or sub-index.
Sources: Morningstar Real-Time Data, ESMA.

A.180
Circuit-breaker-trigger events by sector



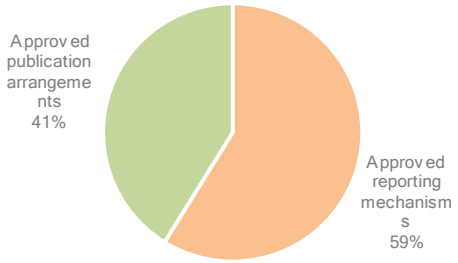
Note: Percentage of circuit-breaker-trigger events by economic sector. Results displayed as weekly aggregates.The analysis is based on a sample of 10,000 securities, including all constituents of the STOXX Europe 200 Large/Mid/Small caps and a large sample of ETFs tracking the STOXX index or sub-index.
Sources: Morningstar Real-Time Data, ESMA.

A.181
Number of trading venues registered under MiFID II/MiFIR



Note: Number of Trading Venues registered under MiFID II/MiFIR, by type.
Sources: ESMA.

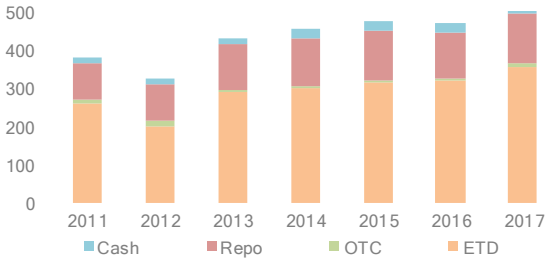
A.182
Data reporting services providers



Note: Number of Data Reporting Services Providers registered under MiFID II/MiFIR, by type
Sources: ESMA.

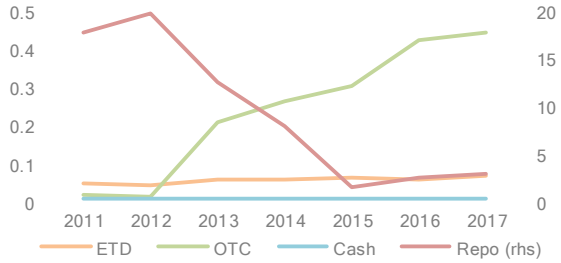
Central counterparties

A.183
Value cleared



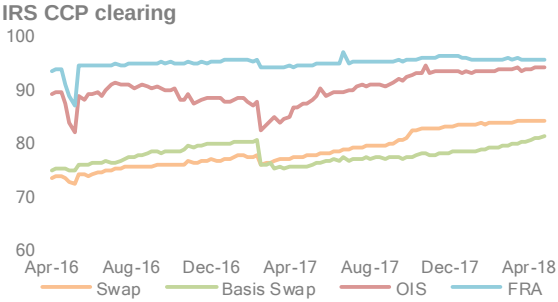
Note: Volume of transactions cleared by reporting CCPs. Annual data, EUR tn, for Cash, Repos, non-OTC and OTC derivatives. LCH Ltd, although the largest CCP in terms of volume in the OTC segment, is not reported due to uneven reporting during the period.
Sources: ECB, ESMA.

A.184
Trade size



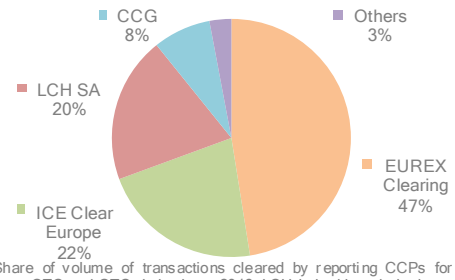
Note: Average size of transactions cleared by reporting CCPs, for Cash, Repos, non-OTC and OTC derivatives. Annual data, EUR mn. LCH Ltd, although the largest CCP in terms of volume in the OTC segment, is not reported due to uneven reporting during the period.
Sources: ECB, ESMA.

A.185
IRS CCP clearing



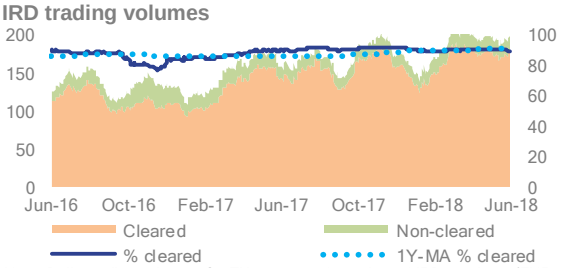
Note: OTC interest rate derivatives cleared by CCPs captured by Dealer vs. CCP positions, in % of total notional amount. Spikes due to short-term movements in non-cleared positions.
Sources: DTCC, ESMA.

A.186
Share of transactions cleared by CCPs



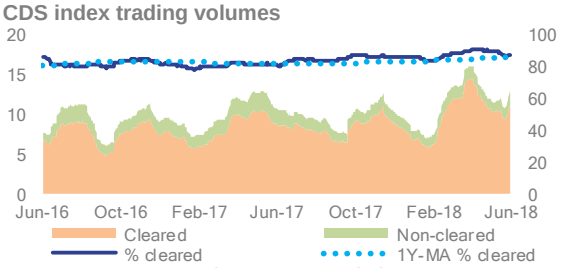
Note: Share of volume of transactions cleared by reporting CCPs for Cash, Repos, non-OTC and OTC derivatives, 2016. LCH Ltd, although the largest CCP in terms of volume in the OTC segment, is not reported due to uneven reporting during the period.
Sources: ECB, ESMA.

A.187
IRD trading volumes



Note: Daily trading volumes for EU-currency-denominated IRD products (EUR, HUF, PLN, GBP). Products include IRS, basis swaps, FRAs, inflation swaps, OIS. 40-day moving average notional, USD bn. ISDA SwapsInfo data are based on publicly available data from DTCC Trade Repository LLC and Bloomberg Swap Data Repository.
Sources: ISDA SwapsInfo, ESMA.

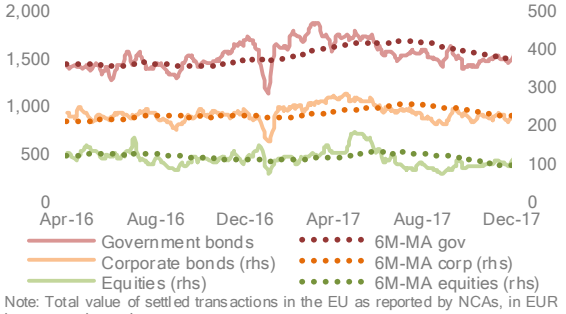
A.188
CDS index trading volumes



Note: Daily trading volumes for the main EUR CDS indices including Itraxx Europe, Itraxx Europe Crossover, Itraxx Europe Senior Financials. 40-day moving average notional, USD bn. ISDA SwapsInfo data are based on publicly available data from DTCC Trade Repository LLC and Bloomberg Swap Data Repository.
Sources: ISDA SwapsInfo, ESMA.

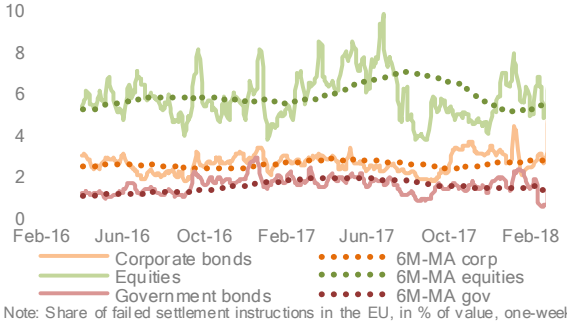
Central securities depositories

A.189
Settlement activity



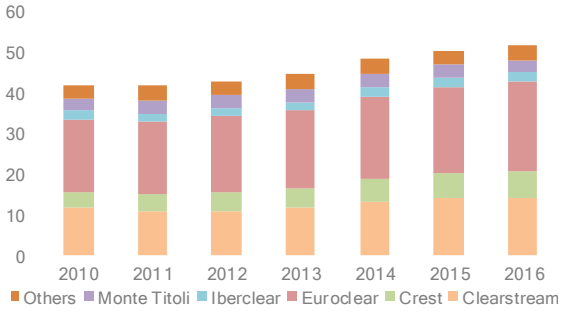
Note: Total value of settled transactions in the EU as reported by NCAs, in EUR bn, one-week moving averages.
Sources: National Competent Authorities, ESMA.

A.190
Settlement fails



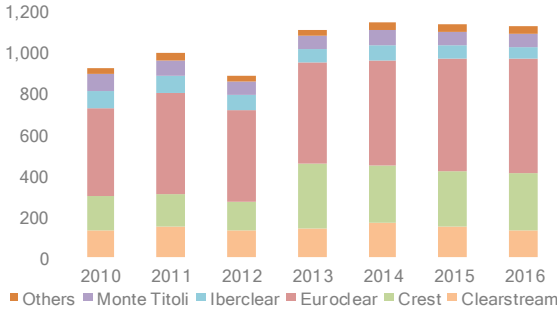
Note: Share of failed settlement instructions in the EU, in % of value, one-week moving averages.
Sources: National Competent Authorities, ESMA.

A.191
Securities held in CSD accounts



Note: Value of securities held by EU CSDs in accounts, EUR tn.
Sources: ECB, ESMA.

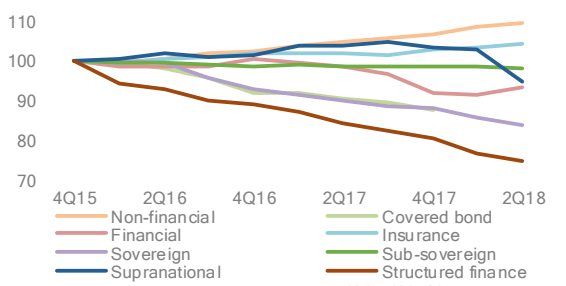
A.192
Value of settled transactions



Note: Value of settlement instructions processed by EU CSDs, EUR tn.
Sources: ECB, ESMA.

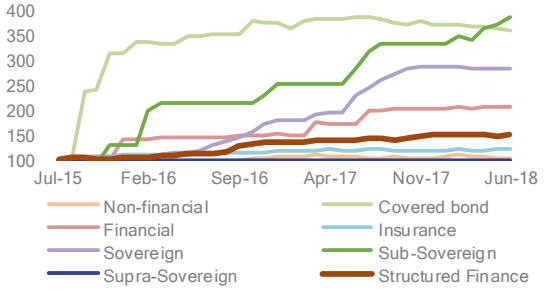
Credit rating agencies

A.193
Outstanding ratings issued by the top 3 CRAs



Note: Evolution of outstanding ratings, indexed 4Q15=100. S&P, Moody's and Fitch.
Sources: RADAR, ESMA.

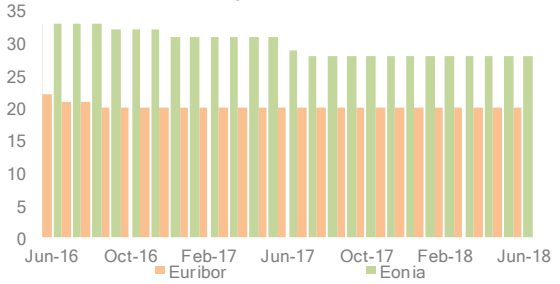
A.194
Outstanding ratings excluding the top 3 CRAs



Note: Evolution of outstanding ratings by asset type. All CRAs excluding S&P, Moody's and Fitch (01/07/2015=100).
Sources: RADAR, ESMA.

Financial benchmarks

A.195
Number of benchmark panel banks

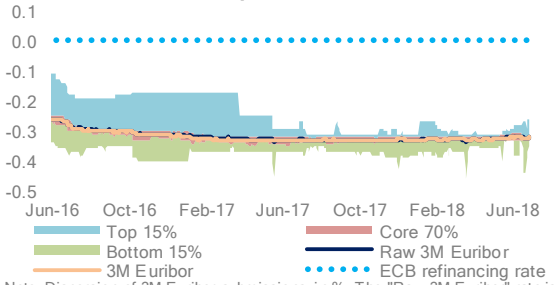


Note: Number of banks contributing to the Euribor and Eonia panels.
Sources: European Money Markets Institute, ESMA.

A.196
Dispersion in Euribor contributions

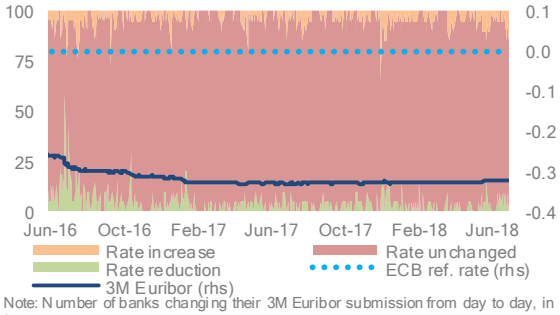
Note: Normalised difference in percentage points between the highest contribution submitted by panel banks and the corresponding Euribor rate. The chart shows the maximum difference across the 8 Euribor tenors.
Sources: European Money Markets Institute, ESMA.

A.197
Euribor submission dispersion



Note: Dispersion of 3M Euribor submissions, in %. The "Raw 3M Euribor" rate is calculated without trimming the top and bottom submissions of the panel for the 3M Euribor.
Sources: European Money Markets Institute, ESMA.

A.198
Euribor submission variation



Note: Number of banks changing their 3M Euribor submission from day to day, in %.
Sources: European Money Markets Institute, ESMA.

List of abbreviations

ABS	Asset-Backed Securities
AuM	Assets under Management
AVG	Average
BF	Bond fund
BPS	Basis points
CAP	Cumulative Accuracy Profile
CCP	Central Counterparty
CDO	Collateralised Debt Obligation
CDS	Credit Default Swap
CRA	Credit Rating Agency
CTA	Commodity Trading Advisors funds
DTCC	Depository Trust and Clearing Corporation
EA	Euro Area
EBA	European Banking Authority
ECB	European Central Bank
EF	Equity fund
EFAMA	European Fund and Asset Management Association
EIOPA	European Insurance and Occupational Pensions Authority
EM	Emerging market
EMIR	European Market Infrastructure Regulation
EOB	Electronic Order Book
EONIA	Euro Overnight Index Average
ESMA	European Securities and Markets Authority
ETF	Exchange Traded Fund
EU	European Union
FRA	Forward Rate Agreement
IMF	International Monetary Fund
IPO	Initial Public Offering
IRD	Interest Rate Derivative
IRS	Interest Rate Swap
LTRO	Long-Term Refinancing Operation
MA	Moving Average
MBS	Mortgage-Backed Securities
MMF	Money Market Funds
MS	Member State
MTN	Medium Term Note
NAV	Net Asset Value
NCA	National Competent Authority
NFC	Non-Financial Corporation
OIS	Overnight Index Swap
OMT	Outright Monetary Transactions
OTC	Over the Counter
RMBS	Residential Mortgage-Backed Securities
SCDS	Sovereign Credit Default Swap
SF	Structured Finance
SFT	Securities Financing Transaction
UCITS	Undertaking for Collective Investment in Transferable Securities
YTD	Year to Date

Countries abbreviated according to ISO standards
Currencies abbreviated according to ISO standards


esma
European Securities and
Markets Authority