esma European Securities and Markets Authority

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ESMA Report on Trends, Risks and Vulnerabilities No. 1, 2019

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No. 1, 2019

 The reporting period for this Report is 1 July 2018 to 31 December 2018, unless otherwise indicated. The reporting quarter for the Risk Dashboard in the Risk Section is 4Q18. Legal reference for 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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Executive summary

Trends and Risks

ESMA risk assessment

Risk segments	Level	Outlook
Overall ESMA remit	orange	→
Systemic stress	yellow	→
Securities markets	red	→
Investors	yellow	→
Infrastructures and services	yellow	→

Risk categories	Level	Outlook
Liquidity	orange	→
Market	red	→
Contagion	orange	→
Credit	orange	→
Operational	yellow	↗

Risk sources	Outlook
Macroeconomic environment	→
Interest rate environment	↗
EU sovereign debt markets	→
Infrastructure disruptions, including cyber risks	↗
Political and event risks	↗

Note: Assessment of the main risks by risk segments for markets under ESMA's remit since the last assessment, and outlook for the forthcoming quarter. Assessment of the main risks by risk categories and sources for markets under ESMA's remit since the last assessment, and outlook for the forthcoming quarter. Risk assessment based on categorisation of the European Supervisory Authorities (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 and 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: The second half of 2018 was characterised by increasing market nervousness and sensitivity amid global trade tensions, weakening growth prospects, reduced global monetary policy stimulus and political uncertainty in the EU related to Brexit. In this context, volatility on equity and sovereign bond markets increased in 4Q18, equity prices continued to decrease, repricing on corporate and sovereign bond markets continued, and regional developments led to localised sell-offs and increased short-selling activity. Market risk thus remains very high. Our outlook for liquidity, contagion and credit risk remains unchanged. Operational risk remains elevated with a negative outlook, as cyber threats and Brexit-related risks to business operations continue to be a major concern. Going forward, the 29 March 2019 deadline for the withdrawal of the UK from the EU is a critical date for financial markets in the EU and beyond. Concerns over a potential no-deal withdrawal increasingly weigh on economic and market expectations, and market participants have been called on to prepare diligently for any contingencies. Overall, weakening growth prospects and political and geopolitical tensions are likely to be the main drivers of volatility looking forward.

Securities markets: EU securities markets have entered a new phase as uncertainty at global and regional levels takes hold, increasing investor sensitivity to weakened economic fundamentals and political events. In 2H18, securities markets experienced several episodes of short-term volatility. EU equity markets suffered sharp declines from October onwards, erasing all the gains made in 1H18. Bond yields and corporate bond spreads increased, as bond markets gradually adjusted to the new environment, characterised by tighter financial conditions and a deterioration in credit quality. European developments, such as the protracted Brexit negotiations and the subsequent failure in the UK to adopt the withdrawal agreement in 2018, as well as delays in ensuring the compliance of the Italian draft budget with EU standards, have added to investor uncertainty and contributed to localised sell-offs.

Investors: Funds experienced significant outflows in 2H18, amid negative performance across almost all asset classes in a context of reduced risk appetite. A further tightening of global financial conditions could have a sizeable impact, with High Yield (HY) and Emerging Market (EM) funds most vulnerable. However, our scenario analysis suggests that, overall, bond funds could withstand the interest-rate increases as tested in our model. For Money Market Funds (MMFs), important requirements under the new EU Money Market Fund Regulation (MMFR) – a key part of the EU's post-crisis measures – become effective in 2019. For UCITS, annual net returns decreased in 2018 to 0.2% (7.1% in 2017), driven by deteriorating market conditions, while costs declined slightly.

Infrastructures and services: Since the entry into force of MiFID II/MiFIR and its Double Volume Cap (DVC) mechanism, trading volumes executed in the EU via periodic auctions increased at the expense of dark pool trading. Despite the equity market sell-off in the first half of October, with an associated jump in circuit-breakers, the number of weekly circuit-breaker occurrences was below average in 2H18. Market glitches reoccurred, as shown by the recent three-hour delay in Euronext market opening. Newly calculated central clearing rates on the EU OTC derivatives market showed increasing clearing rates

over the course of 2017 for credit and interest rate derivatives, providing evidence for the effectiveness of the clearing obligations. As announced by Nasdaq Clearing, the failure of one individual clearing member on 11 September 2018 triggered initial default procedures, including utilisation of the default fund, followed by a replenishment, and an increase in required margin levels.

Products and innovation: FinTech continues to drive innovation in financial services, with potentially far-reaching consequences for both end-users and service providers. Crypto Assets (CAs) and Initial Coin Offerings (ICOs) have been the focus point of attention recently because of the cash inflows that they have attracted. Relevant developments are also taking place in relation to other applications of Distributed Ledger Technology (DLT) and Regulatory Technology (RegTech). ESMA's product intervention measures, which imposed a prohibition on the marketing, distribution or sale of binary options to retail investors from 2 July 2018, and a restriction on the marketing, distribution or sale of Contracts for Difference (CFDs) from 1 August 2018, have recently been renewed.

Vulnerabilities

RegTech and SupTech – change for markets and authorities: Regulatory and supervisory technologies are developing in response to various demand and supply drivers. On the demand side, regulatory pressure and budget limitations are pushing the market towards an increased use of automated software to replace human decision-making activities. This trend is reinforced by supply drivers such as increasing computing capacity and improved data architecture. Market participants are increasingly using new automated tools in areas such as fraud detection, regulatory reporting and risk management, while potential applications of new tools for regulators include greater surveillance capacity and improved data collection and management. With these new tools come challenges and risks, notably operational risk. However, with appropriate implementation and safeguards, RegTech and SupTech may help improve a financial institution's ability to meet regulatory demands in a cost-efficient manner and help regulators to analyse increasingly large and complex datasets.

Retail Alternative Investment Funds – heterogeneity across the EU: This article provides an overview of the EU market for Alternative Investment Funds (AIFs) sold to retail investors. It presents the first EU-wide analysis of the structure of the retail AIF market, drawing from data collected as the result of the reporting obligation set out in the Directive on Alternative Investment Fund Managers (AIFMD). Overall, the size of AIFs sold to retail investors accounted for 18% of the AIF market in terms of net asset value (NAV) in 2017. Potential risks related to liquidity transformation and liquidity mismatch are analysed. 2017 data suggest no significant signs of liquidity mismatch for AIFs held exclusively by retail clients. The article also describes the heterogeneity across the EU regarding the distribution of retail AIFs which falls under national law.

DVC mechanism – impact on EU equity markets: We provide evidence on the impact of MiFID's DVC mechanism on European equity markets in the first six months of its application. The DVC mechanism introduces limits on the amount of transactions executed in dark pools and aims to protect the price discovery process in equity markets. We find that, overall, for equities, most of the trading is executed in lit markets. We also analyse the impact of the DVC mechanism on market liquidity in lit markets, building on a set of market liquidity indicators. The results are mixed. For equities banned by the DVC mechanism, market liquidity in lit markets improved in terms of tightness, breadth and depth (measured by bid ask spreads, turnover, and the Amihud index), while it worsened when measured by the turnover ratio and average trade size.

MMFs in the EU – new stress-testing requirements: MMFs play an important role in the EU money market by connecting investors investing in short-term liquid products with governments and institutions that are in need of short-term funding. The new EU MMFR aims at increasing the resilience of the sector by addressing the issues identified, such as the "first-mover advantage". The Regulation introduces new stress-testing requirements, as part of fund risk management and regulatory disclosure. ESMA will design common parameters and scenarios to coherently capture the risks of the sector. Stress test results will be reported to ESMA and the National Competent Authorities (NCAs).

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Trends

Market environment

In the second half of 2018 (2H18), positive tailwinds from the macroeconomic outlook were subdued, as growth started to slow down in the European Union (EU). At the same time, political risks related to Brexit, mounting trade tensions at the international level and turmoil in some emerging economies weighed on financial markets. The tightening of global financial conditions was coupled with a spike in volatility and an equity sell-off that started in October. Reduced global monetary stimulus resulted in an increase in yields, leading to negative performance and significant outflows for bond funds. Going forward, weakened economic fundamentals and continued political uncertainty can be expected to provide an increasingly risky backdrop for financial market activity.

In 2H18, the positive tailwinds from the **macroeconomic environment** slowed down, with risks mainly tilted to the downside. In the EU, the European Commission revised down its forecast of GDP growth for 2019 to 1.5% (against 2.0% six months ago), while forecasts for global economic growth have also been cut (3.5% expected in 2019, revised down 0.4 percentage points since April).[1] The EU aggregate deficit continues to decline, with the 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, increasingly weighing on economic and market expectations, and reflected in the surge in GBP exchange rate implied volatility (A.5). 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 a no-agreement scenario by March 2019.

Moreover, increased trade tensions and the risk of a wider escalation of protectionist measures contributed to a rise in political uncertainty globally (T.3). Along with a slowdown in China and in some emerging economies, those risks represent key concerns for investors and could have an 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 in some Emerging Markets (EMs), driving outflows from EM bond funds. In the EU, **market confidence** is worsening (T.4) amid a moderation of GDP growth.

Against this background, **financial conditions** tightened in 2H18. Equity markets suffered a sell-off that started in October, while bond yields increased amid reduced global monetary policy stimulus. The US Federal Reserve has continued to raise its policy interest rate until end-2018, before marking a pause early 2019, while the European Central Bank (ECB) ended its net purchases of sovereign bonds in December 2018.

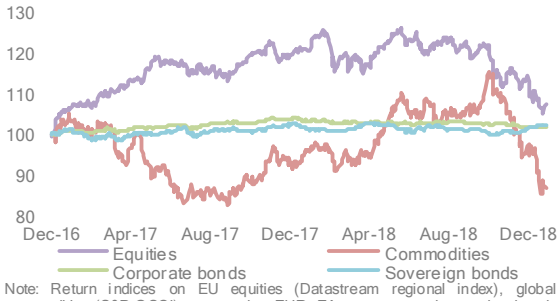
EU securities **market performance** was negative during the reporting period (T.1), erasing the gains since the beginning of 2018 across asset classes (including Environmental, Social and Governance (ESG) equity indices). The equity sell-off was coupled with a spike in market volatility (T.2), which appears to be more persistent than previous episodes (T.9).

Euro area (EA) investors reduced their risk appetite in 2H18 for foreign assets, with a reduced pace in their net purchases, as reflected in **capital flows**. Net monthly purchases of foreign equities by EA residents averaged EUR 1.5bn in July-October 2018 compared with EUR 10bn in the previous six months (T.5). Foreign investors started shifting the composition of their exposures to the EA by selling long-term debt securities, with cumulative net sales of EUR 115bn in May-October 2018 and purchasing EA equities for EUR 93bn. EA residents' securities investment declined in 2Q18, in particular towards banks (T.6). EU institutional investment flows moderated, with outflows from bond funds (T.7).

Capital market financing growth slowed down significantly in 2018 after strong growth in 2017 (T.8). European corporate market financing increased by 3% in 1H18, compared with an increase of more than 13% in 2017. Diversification in the sources of financing for EU economies progressed as debt securities were stable and loans decreased.

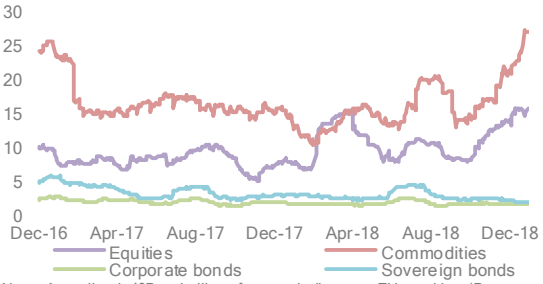
[1] International Monetary Fund, 'World Economic Outlook Update', January 2019, and European Commission, 'Winter 2019 economic forecast'.

T.1
Market performance
Sharp drop for equities and commodities



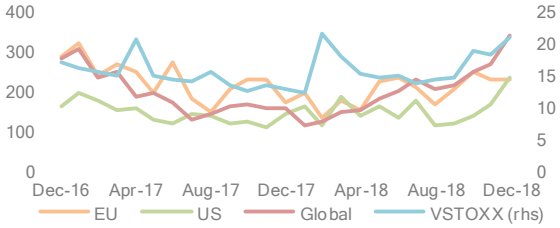
Note: Return indices on EU equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx EUR, all maturities). 01/12/2016 = 100.
Sources: Thomson Reuters Datastream, ESMA.

T.2
Market volatilities
Volatility increasing in 2H18



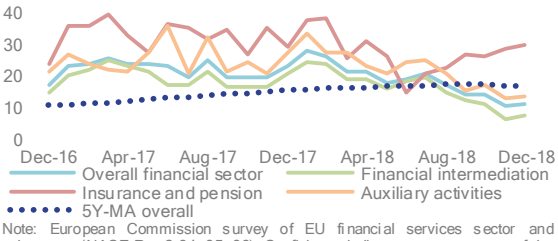
Note: Annualised 40D volatility of return indices on EU equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx Euro, all maturities), in %.
Sources: Thomson Reuters Datastream, ESMA.

T.3
Economic policy uncertainty
Increased economic policy uncertainty globally



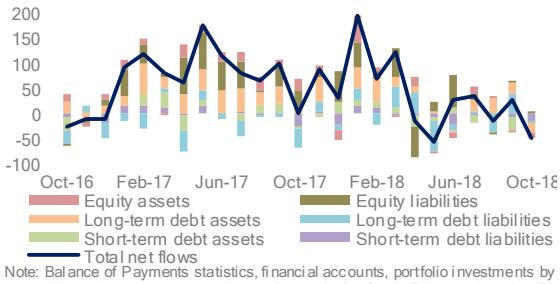
Note: Economic Policy Uncertainty Index (EPU), developed by Baker et al. (www.policyuncertainty.com), based on the frequency of articles in EU newspapers that contain the following triple: "economic" or "economy", "uncertain" or "uncertainty" and one or more policy-relevant terms. Global aggregation based on PPP-adjusted GDP weights. Implied volatility of EURO STOXX 50 (VSTOXX), monthly average, on the right-hand side (rhs).
Sources: Baker, Bloom, and Davis (2015); Thomson Reuters Datastream, ESMA.

T.4
Market confidence
Decline in confidence



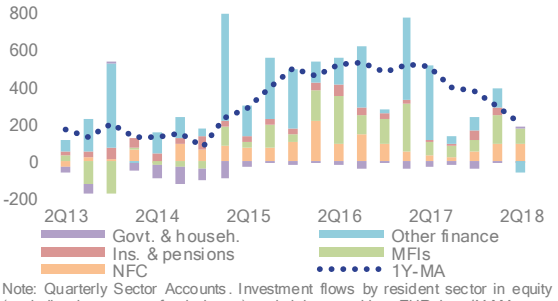
Note: European Commission survey of EU financial services sector and subsectors (NACE Rev.2 64, 65, 66). Confidence indicators are averages of the net balance of responses to questions on development of the business situation over the past three months, evolution of demand over the past three months and expectation of demand over the next three months, in % of answers received.
5Y-MA: 5 year moving average.
Sources: European Commission, ESMA.

T.5
Portfolio investment flows
Net outflows from EA



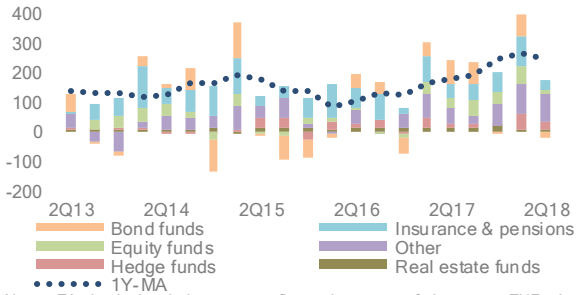
Note: Balance of Payments statistics, financial accounts, portfolio investments by asset class. Assets = net purchases (net sales) of non-EA securities by EA investors. Liabilities = net sales (net purchases) of EA securities by non-EA investors. Total net flows=net outflows (inflows) from (into) the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

T.6
Investment flows by resident sector
Decline in financial sector investments



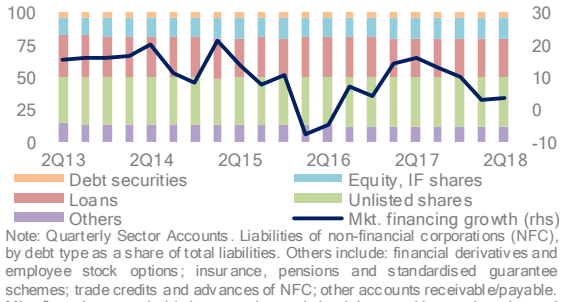
Note: Quarterly Sector Accounts. Investment flows by resident sector in equity (excluding investment fund shares) and debt securities, EUR bn. 1Y-MA=one-year moving average of all investment flows.
Sources: ECB, ESMA.

T.7
Institutional investment flows
Outflows from bond funds



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 slows



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

EU securities markets have entered a new phase as uncertainty at global and regional levels takes hold, increasing investor sensitivity to weakened economic fundamentals and political events. In 2H18, securities markets experienced several episodes of short-term volatility. EU equity markets suffered sharp declines from October onwards, erasing all the gains made in 1H18. Bond yields and corporate bond spreads increased, as bond markets gradually adjusted to the new environment, characterised by tighter financial conditions and a deterioration in credit quality. European developments, such as the protracted Brexit negotiations and the subsequent failure in the UK to adopt the withdrawal agreement in 2018, as well as delays in ensuring the compliance of the Italian draft budget with EU standards, have added to investor uncertainty and contributed to localised sell-offs.

Equity: sharp price falls and persisting short-term volatility spikes

In line with 1H18, EU equity markets were characterised by episodes of short-term **volatility**. Implied equity price volatility in the EA rose above 20% in October, for the third time this year (A.20). Unlike in February 2018, the recent spike in volatility appears more likely to persist (T.9).

T.9
Recent increase in volatility
The return of volatility

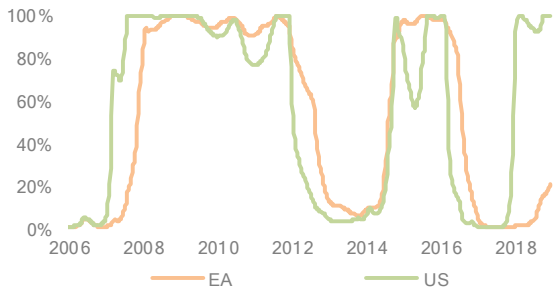
Equity markets in Europe and the US have experienced bouts of volatility during 2018, such as the VIX tantrum in February 2018, which have proven to be short lived. More recently, equity markets have seen an uptick in volatility.

To assess whether financial markets might be on the edge of a period of high volatility, we use an econometric approach (Markov-Switching GARCH models) to estimate the probability of being in a period of persistent high volatility.[2] We use data on weekly returns of the Euro Stoxx 50 and the Dow Jones index over the period 1999-2018 and estimate the model by maximum likelihood.

Before 2018, the model identifies two main periods of high volatility for the EA and the US (T.10). The first prolonged period ranges from 2008 to 2012, and includes the global financial crisis of 2008, which was followed by the EA sovereign crisis of 2010-2012. The second period covers 2014-2016 with durable bouts of volatility, albeit at levels lower than observed during the first period (T.11).

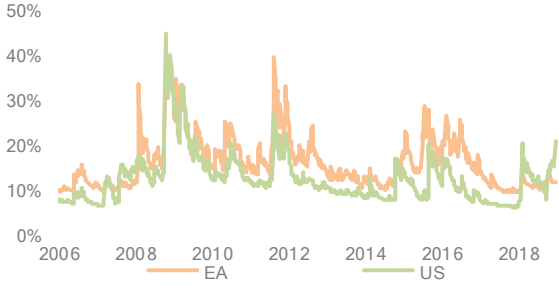
The estimates show that the current period is still characterised by low volatility in the EA, despite an increase in the probability of being in a high-volatility period since October 2018. For the US, the model indicates that equity markets are already in a high-volatility episode. This high-volatility episode started early in 2018 and, after a short relapse during the summer, came back in October 2018.

T.10
Equity market volatility
Increased probability of high-volatility period



Note: Estimates based on a MS-GARCH(1,1) model based on weekly returns.
Sources: Thomson Reuters Datastream, ESMA.

T.11
Equity market volatility
Higher levels of volatility



Note: Estimates of conditional volatility based on a MS-GARCH(1,1) model based on weekly returns.
Sources: Thomson Reuters Datastream, ESMA.

Global shocks were the main drivers of equity markets in 2H18, as concerns around trade tensions and expectations of tighter monetary policy in several parts of the world continued to weigh on investor sentiment. EU equities slightly underperformed other regions in 2H18, with **equity prices** down more than 12% since end-June compared with a decline of around 9% in the MSCI World Equity Index and a fall of 8% for US equities (A.15). Although they tend to be less volatile, ESG equity indices experienced a comparable decline (A.21).

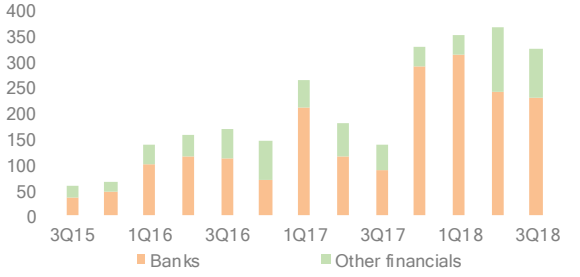
Two regional factors appear to have played a role. First, investors have become more sensitive

[2] For further details, see Hass, M., Mittnik, S. and Paolella, M. (2004), "A New Approach to Markov-Switching GARCH Models", Journal of Financial Econometrics, Volume 2, Issue 4, 1 September 2004, pp. 493-530.

to Brexit-related news, as the March 2019 deadline approaches, and because the agreement that has been reached between the EU27 and the UK government has not yet been ratified by UK parliament. Reflecting this, the FTSE 100 and the EuroStoxx 50 have both lost around 12% since the end of 1H18 (A.16). Second, delays in striking an agreement between the EU Commission and the Italian government around Italy's 2019 budget have weighed on the overall performance of Italian assets, including equities (FTSE MIB –15% over the same period) and sovereign bonds (increase of 50 basis points (bps) in spreads). Following the announcement of an agreement between the two parties on 19 December 2018, sovereign yields started to decline but remained elevated at end-December (10-year yield and spread at 2.8% and 250bps, respectively).

Banking sector shares declined the most, with Italian bank share prices down 25% due to their exposure to Italian government bonds. The larger number of publicly disclosed **net short positions** on Italian banks since 4Q17 highlights an increase in short-selling activity on the sector (T.12).[3] Following a more than 10% decline in their share price from the previous day, Consob introduced temporary short-selling restrictions on two banks during the first weeks of October 2018.[4]

T.12
Number of public net short positions on IT financial shares
Short selling of Italian bank shares increased



Note: Number of publicly disclosed net short positions on Italian banks and other financials. The public disclosure threshold under the EU Short Selling Regulation is 0.5% of issued share capital.
Sources: Consob, Thomson Reuters EIKON, ESMA.

EU **equity issuance** decreased sharply, with volumes down 50% in 4Q18 in comparison with a year earlier, to EUR 22bn (A.13). A sharp decline in issuance from EU financials and utilities (more than 70%) accounts for most of the slowdown (A.14).

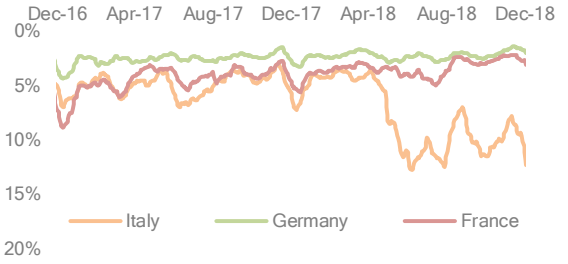
Indicators of **equity market liquidity** provide mixed signals. Price indicators such as average bid-ask spreads were down slightly from 1H18, pointing to some improvement of liquidity, while our composite equity illiquidity indicator deteriorated in September and October (A.25 and A.26).

Bonds: on-going repricing

The broad-based widening in EU sovereign and corporate bond spreads continued in 2H18. Ten-year **sovereign bond yields** rose 20bps on average across EU countries in 2H18, following the ECB announcement of the scheduled end of its asset purchase programme. Corporate bond yields rose another 20bps (A.32 and A.53). The gradual reduction in ECB monthly asset purchases appears to have been absorbed by the market without major disruptions so far.

While bond market repricing has so far taken place in an orderly manner, one key question going forward is whether this gradual readjustment can be sustained given the end of ECB net purchases in December 2018. Risks are particularly acute in Italy, the largest supplier of EU government bonds, which experienced a sharp widening of the 10-year BTP spread to German Bund (A.33) amid a significant deterioration in **liquidity** in futures markets (T.13). A recent increase in **borrowing fees** suggests that investors have taken a bearish view on Italian government bond prices (T.14), also visible in the Credit Default Swap (CDS) market (A.43).

T.13
Liquidity in sovereign bond futures
Liquidity deterioration in Italian bond futures



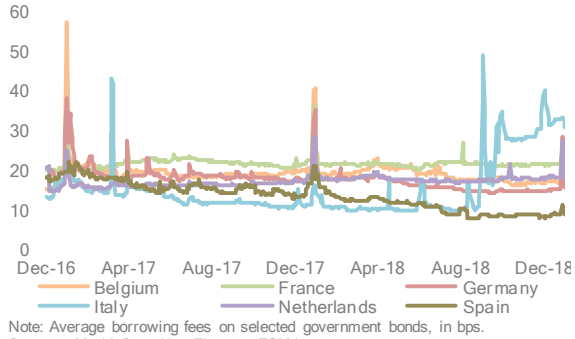
Note: Hui-Heubel illiquidiy indicator based on 10Y sovereign bond futures, 20-day moving average, in percent.
Sources: Thomson Reuters Datastream, ESMA.

[3] Under the EU Short Selling Regulation, net short positions that are above 0.5% of issued share capital must be publicly disclosed, and again at each 0.1% increment. The higher number of publicly disclosed net short positions from 4Q17 reflects both an increase in the number of investors holding a large net short position (above the public disclosure threshold) and an increase in the number of publicly disclosed positions per investor. Both are indicative of increased short selling activity.

[4] For further details, see:

http://www.consob.it/web/area-pubblica/comunicati-stampa

T.14
Borrowing fees for Italian government bonds
Italian bonds more expensive to borrow



Note: Average borrowing fees on selected government bonds, in bps.
Sources: Markit Securities Finance, ESMA.

T.15
Credit quality
Increase in riskier borrowing

Note: Share of BBB-rated bonds in ICE BoAML Investment Grade corporate bond indices, in %.
Sources: Thomson Reuters Datastream, ESMA.

Bond market issuance was resilient in 3Q18, with corporate bond market issuance volumes increasing by 20% compared with a year earlier. The particularly strong growth in Investment Grade (IG) issuance (+45%) suggests that some EU corporates might have front-loaded issuance to take advantage of the still-favourable IG bond market conditions at the time. However, corporate bond issuance dropped by 25% in 4Q18 reflecting the slowdown in economic activity and reduced appetite from investors (A.45).

Corporate bond spreads have widened significantly in 2H18, mainly reflecting a repricing of risk given the growth slowdown and political uncertainty, in a context of ECB tapering of corporate bond net purchases, which ended in December. Compared with 1H18, credit risk premia increased across rating categories. However, the hike has been particularly relevant for lower-rated bonds, with spreads on BBB-rated bonds growing 65bps to reach the highest values since the beginning of 2016 (A.54).

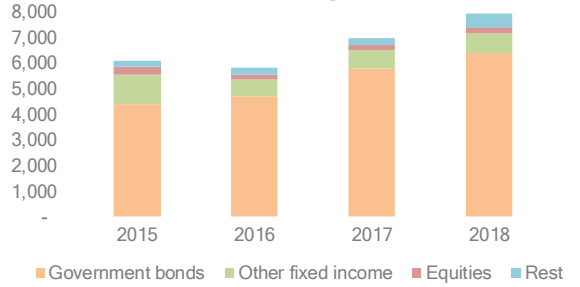
At the same time, the **credit quality** of corporate bonds is deteriorating, albeit at a slower pace in 4Q18. Lower-rated IG bonds (BBB) account for the largest share of IG bonds outstanding in the EU, US and globally, at around 50% (T.15). As the economic cycle matures, lower-rated IG corporates could be downgraded, which would have a significant impact on IG indices, given their share.

Indicators of **corporate bond market liquidity** show mixed signals in EUR corporate markets: bid-ask spreads increased (A.55) while the Amihud ratio improved and turnover remained stable (A.56). The picture in sovereign debt markets was slightly more negative, with conditions deteriorating in several countries, resulting in slightly higher EU average bid-ask spreads, a development confirmed by ESMA's composite indicator of sovereign bond market liquidity (A.41 and A.42).

Market-based finance: SFTs expand, ABS recover

In line with the trend over the last two years, volumes traded in EU **securities financing markets** continued to expand. In 2H18, daily trading volumes in centrally cleared EA sovereign repos increased by 10% in comparison with the same period a year earlier, while on-loan balances of EU securities increased by 7%. Most of the growth in volumes observed since 2016 has come from government bonds, reflecting the growing role of Securities Financing Transactions (SFTs) in Europe to mobilise collateral, e.g. for margining or regulatory purposes (T.16). The ability to efficiently source and allocate collateral has become essential to EU market participants, as the available supply of high-quality collateral dwindled in recent years, owing in part to EU governments' public finance consolidation (A.59). While the risk of supply and demand imbalances in the market for high-quality collateral remains, it appears to have decreased slightly, as reflected by lower collateral scarcity premia on EA government bonds (A.74).

T.16
Volumes of EU SFTs outstanding
Government bonds drive growth



Note: Gross sum of European repos and reverse repos outstanding, and EU securities on loan, as of end-June of each year, EUR bn. The asset classes capture the type of collateral used in repos and the type of securities on loan.
Sources: ICMA European Repo Market Survey, Markit Securities Finance, ESMA.

While assessing trends in EU SFT markets remains a challenge, considering the limited information available, the data gap should be closed in the future, with the expected entry into force of the EU Securities Financing Transaction Regulation (SFTR). In July 2018, the European Commission communicated its intention to endorse ESMA's SFTR draft Technical Standards, which will increase SFT market transparency and allow public authorities to improve their risk monitoring for financial stability purposes.[5]

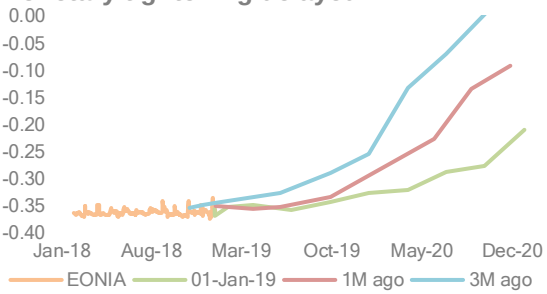
The long-term decline in **securitisation** volumes appears to have bottomed out, with securitised product issuance amounting to EUR 250bn in the four quarters to 2Q18, up 13% compared with a year earlier (A.84). The proportion of placed issuance (as opposed to issuances retained by banks for posting as collateral against central bank funding) rose to 55% in 1H18, up from a trough of 25% in 2H15, a sign that demand from investors may be recovering. As a result, the amount of securitised products outstanding has stabilised at around EUR 1.2tn. However, the collateral composition appears to be shifting, with the share of mortgage-backed securities declining to 60% of the total outstanding over the last few years, while the share of other asset-backed securities gradually increased.

As part of a broader effort to revise the EU securitisation market, ESMA published draft technical standards in July and August 2018 on the EU Securitisation Regulation, including on the "Simple and Transparent Securitisation" (STS) criteria and on disclosure requirements for securitisation. The objective of the Regulation is to increase transparency in EU securitisation markets and diversify the sources of financing of the EU economy by promoting high-quality securitisation standards, as part of the EU Capital Markets Union initiative.[6]

Money markets: monetary tightening delayed

The deterioration of macroeconomic conditions has led market participants to revise their expectations of future **money market rates**. While the Euro Overnight Index Average (EONIA) and three-month Euro Interbank Offered Rate (Euribor) remain virtually unchanged, at –0.3% (A.93), market participants now expect rates to normalize in the second half of 2020, against end-2019 three month ago (T.17).

T.17
EONIA forward curve
Monetary tightening delayed



Note:Euro overnight index swap forwards, in %.
Sources: Thomson Reuters Datastream, ESMA.

In secured lending markets, sovereign repo rates have edged up by around 4bps between 3Q17 and 3Q18 (A.77). While this should not have an immediate impact, and some degree of normalisation seems warranted following several years of ultra-low rates, higher short-term financing costs for the European banking sector will eventually feed through to the rest of the economy (i.e. households and non-financial corporates). Combined with rising bond yields, this may weigh on future economic activity.

In USD interbank markets, the end of the year was characterized by a sharp increase in LIBOR-OIS spreads (A.94). The increase reflects a combination of factors. Large banks tend to reduce their balance sheets before year-end for regulatory purposes, which leads to a reduction in interbank activity. At the same time, monetary policy tightening by the US Federal Reserve in 2H18 has led to a reduction of banks excess reserves and further reduction in dollar funding.

[5] https://ec.europa.eu/transparency/regdoc/rep/3/2018/EN/C-2018-4730-F1-EN-MAIN-PART-1.PDF

[6] See Amzallag, A. (2018), "Enhancing transparency of EU securitisations" in ESMA Report on Trends, Risks and Vulnerabilities, No.2, pp.43-51.

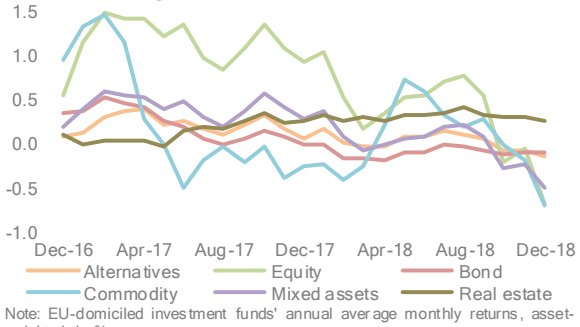
Investors

Funds experienced significant outflows in 2H18, amid negative performance across almost all asset classes in a context of reduced risk appetite. A further tightening of global financial conditions could have a sizeable impact, with High-Yield (HY) and Emerging Market (EM) funds most vulnerable. However, our scenario analysis suggests that, overall, bond funds could withstand the interest-rate increases as tested in our model. For Money Market Funds (MMFs), important requirements under the new EU Money Market Fund Regulation (MMFR) – a key part of the EU's post-crisis measures – become effective in 2019. For UCITS, annual net returns decreased in 2018 to 0.2% (7.1% in 2017), driven by deteriorating market conditions, while costs declined slightly.

Fund performance: broad-based decline

Investment **fund performance** deteriorated significantly in 2H18 for almost all fund categories (T.18). Returns for equity funds turned negative in October amid the equity market sell-off, while bond fund underperformance continued in 2H18, with annualized returns of –1.2% year-to-date, amid rising interest rates outside of the EU, political uncertainty and concerns regarding some EU sovereign bond issuers.

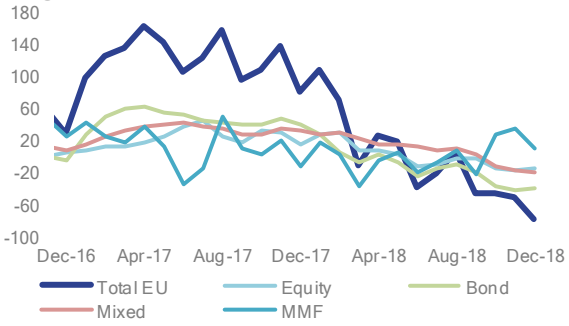
T.18
Fund performance
Deteriorating across asset classes



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

Against a backdrop of deteriorating performance, **fund flows** since June 2018 turned negative (T.19). Bond funds experienced record high outflows in 2H18 (EUR 75bn), followed by equity funds (EUR 40bn) and mixed funds (EUR 21bn). Only MMFs and real estate funds recorded inflows in 2H18 (EUR 8bn and EUR 3bn respectively). Within bond funds, all types of funds had outflows in 2H18, independently of their regional investment focus (A.125), or the underlying asset class, as government and corporate bond funds both had sizeable outflows (A.127).

T.19
Fund flows
Large outflows for bond funds



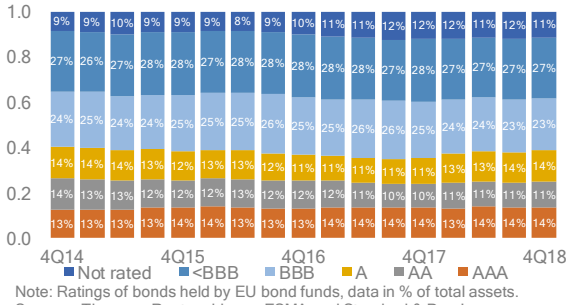
Note: EU-domiciled funds' 2M cumulative net flows, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

Bond fund risks: sudden repricing as the main concern

The **credit risk profile** of bond funds is stable (T.20). Diversified bond funds hold 30% of assets with high credit risk (bonds rated below BBB or unrated). This proportion varies widely across bond fund categories. HY funds hold around 80% of assets rated below BBB or unrated, although the share of unrated assets decreased by 3 percentage points year-on-year. Similarly, ESMA's fund liquidity indicator, which takes account of portfolio composition and credit quality, is stable on average (A.129).

Therefore, the **liquidity risk profile** resulting from the combination of asset liquidity and asset maturity is unchanged for most bond funds except for HY funds, whose risk profile slightly deteriorated due to an increase in the maturity of their assets.

T.20
Bond fund credit risk profile
Stable in 2H18



Note: Ratings of bonds held by EU bond funds, data in % of total assets.
Sources: Thomson Reuters Lipper, ESMA and Standard & Poor's.

Very low levels of interest rates and risk premia across asset classes raise the risk of a sudden shift in investor sentiment. The impact of a sudden **repricing of risk premia** could be significant for bond funds; however, EU bond funds appear to be globally resilient under such a scenario, with HY and EM funds potentially more vulnerable (T.21).

T.21

Impact of a global tightening of financial conditions

EU bond funds globally resilient, with HY and EM funds potentially more vulnerable

The potential impact of a sudden repricing of risk premia on EU bond funds can be assessed with a scenario analysis. Under the scenario, sovereign yields and credit spreads would increase significantly in a short period of time, leading to lower bond fund prices and investor outflows due to the negative fund performance.

Methodology

Shocks are calibrated based on past episodes of market turbulence over the period 2000-2018. The shocks would amount to an increase of 50 bps for EA and US sovereign yields, around 60 bps for IG bonds and around 150 bps for HY and EM bonds (T.22).

T.22
Assumptions used in the scenario
Shocks to bond yields (increase in basis points)

	Sovereigns		Corporates		Other
	EA	US	IG	HY	EM
Risk-free rate	45	50	47.5	47.5	50
Spread	–	–	15	100	95
Total yield shock	45	50	62.5	147.5	145

Note: Increase in yields corresponding to the 5% highest monthly increases over 2000-2018. Sovereign yield data for the 10-year tenor, and corporate and EM bond data based on Bloomberg Barclays indices. Sovereign yields are adjusted by central bank policy rates to control for increases in yields due to monetary policy decisions.
Sources: Thomson Reuters Datastream, ESMA.

The scenario analysis presented here focuses on first-round effects and does not include the potential price impact that selling pressure from bond funds could have on the market. In addition, the scenario follows a partial equilibrium approach, as only yields are subject to an increase, while other macrofinancial variables (such as volatility) are assumed to be constant.

The increase in yields causes mark-to-market losses for bond funds according to the duration of the funds, which is proxied by the duration of bond indices. The increase in yields would lead to negative returns for bond funds, which would in turn generate investor outflows.

The sensitivity of investors to past performance is estimated for four main types of bond funds: HY, EM, global and euro fixed-income funds, with the two latter categories investing mainly in sovereign and IG bonds. The sensitivity of investors to outflows is around 0.5 on average (i.e. a 1% decline in returns leads to 0.5% outflows) across bond funds, using data for a sample of bond funds covering around EUR 1.5 trillion in assets (T.23).

T.23

Sample of funds
Impact of shocks to bond yields

	HY	EM	Global	Euro fixed-income	Total
Total net assets (TNA) (EUR bn)	217	233	405	603	1533
Decline due to price shock (% of TNA)	–6.1	–8.3	–3.6	–4.0	–4.9
Decline due to outflows (% of TNA)	–2.8	–4.6	–1.7	–2.3	–2.6
Overall decline (% of TNA)	–8.9	–12.9	–5.3	–6.2	–7.5

Note: The decline due to price shock is based on the initial shocks and the duration of bond indices. The decline due to outflows is based on investors' sensitivity to past performance estimated over 2008-2018.
Sources: Morningstar, Thomson Reuters Datastream, ESMA.

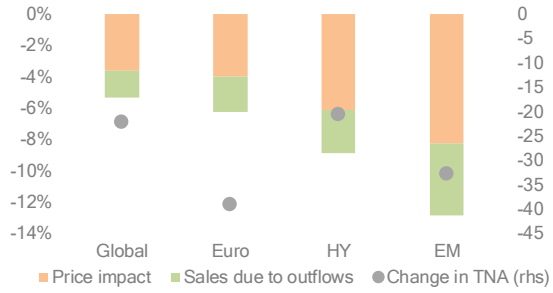
Results

A sudden repricing of risk premia would result in a decline of bond funds' net asset value (NAV) by around 7.5% (EUR 110bn), mainly due to shock to yields (accounting for 70% of losses).

Bond funds exposed to less liquid and more risky assets (HY and EM funds) would suffer larger losses than bond funds exposed to IG and sovereigns (T.24). Overall, net outflows from bond funds would range from around –2% for diversified funds to –2.8% for HY funds and –4.6% for EM funds. While the impact of EU bond flows of a sudden shift in risk premia is significant, especially for HY and EM bond funds, in the past funds were able to cope with such stress without resorting to liquidity management tools.

T.24

Scenario analysis: rise in yields
Impact on EU bond funds



Note: Impact of a rise in yields on EU bond funds, in EUR bn and % of TNA.
Sources: Morningstar, Thomson Reuters Datastream, ESMA.

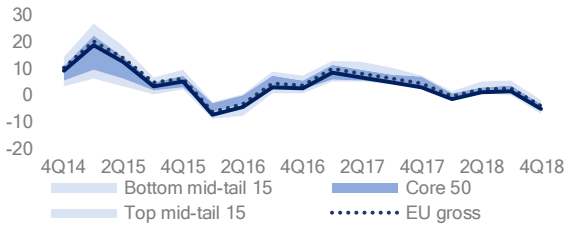
Overall, a further tightening of global financial conditions could have a sizeable impact, with HY and EM funds most vulnerable. However, our scenario analysis suggests that bond funds could withstand the interest-rate increases tested in our model. Going forward, this type of scenario analysis is intended to be repeated as part of ESMA risk monitoring.

UCITS: performance down from 2017, costs decrease slightly

Annual **gross returns** for EU UCITS turned negative in 2H18, declining from 1% in 1H18 to –0.7% across asset classes. Compared to 2017, annual gross performance declined by more than 90% (0.2% in 2018 versus 7.1% in 2017).

Annual **net returns**, equal to gross returns minus ongoing costs, subscription and redemption fees, were already negative in 1H18 at –0.1% and continued to decline, standing at –1.8% in 2H18 (T.25). Net returns were also lower than a year ago (4% in 2H17). Most of the changes in net returns are due to gross returns, since costs moved only slightly. By fund category, net returns for equity funds were around –2.3% on average for 2H18, further declining from 1H18 (–0.9%). For bond and mixed funds, performance in net terms was also negative in 2H18, at –1.7% and –0.12% respectively.

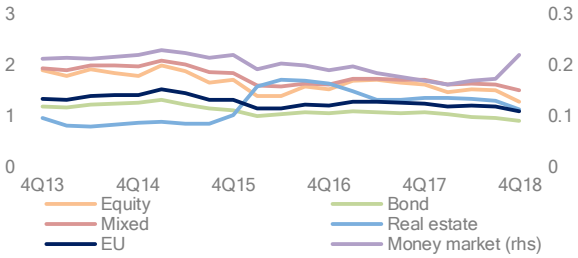
T.25
Net returns of UCITS funds
Negative with low dispersion



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.

Cost levels, as measured by **ongoing costs and subscription and redemption fees** on EU UCITS fund shares, declined slightly for most asset classes, with the exception of MMFs (T.26). Average costs, computed on a yearly basis, stood at around 1.1ppt in 2H18, down from 1.2ppt in 1H18 and 1.3ppt in 2H17.[7]

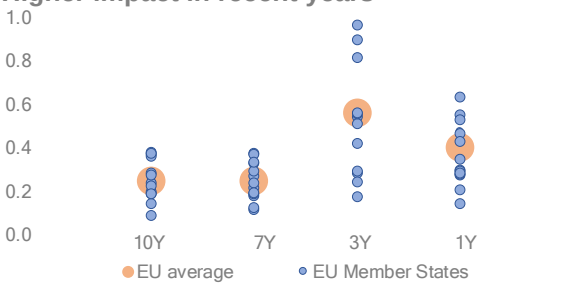
T.26
Cost impact on UCITS share returns by asset class
Slight decline in 2H18, except for MMFs



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

Chart T.27 shows the percentage of return that UCITS investors lose due to fund fees. The cost impact has increased recently: over the last year and the last three years, the impact has been higher than over the past seven and ten years. As cost levels changed only marginally, this was due to lower gross returns over more recent years (T.27). Across asset classes, retail investors lost respectively about 60% and 40% of their gross returns over a 3Y and 1Y time horizon due to fund costs, compared with around 25% over the last seven and ten years. Dispersion across EU member states has increased in recent years, driven by diverging asset market performance.

T.27
Impact of fund costs on investor returns
Higher impact in recent years



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.

MMFs: transition process ongoing

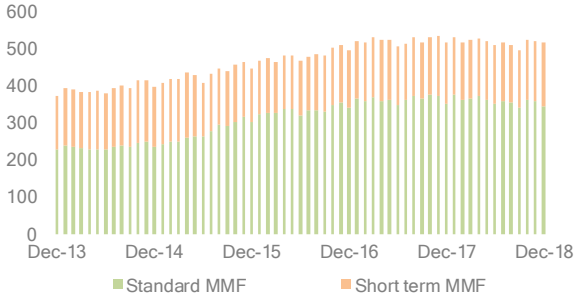
The average **return** on EU MMFs increased slightly but remained negative, at –0.4%, in line with money market rates (A.131). Funds have experienced low or even negative returns for a prolonged period due to the low interest-rate environment. This has led some investors to pull money out of short-term MMFs and move it to longer term MMFs, which can generate higher returns through longer asset maturity and slightly higher yield. Among EUR-denominated funds, the share of short-term funds fell by 6 percentage points over the last five years to 33% (T.28). This

[7] For more details on calculation of annual performance and costs see ESMA Annual Statistical Report – Performance and costs of retail investment products in the EU, January 2019.

shift has, however, remained limited by investor's lack of willingness to take risks.

In addition, the share of non-EUR denominated MMFs (USD and GBP), which offer higher returns, increased to account for 53% of EU-domiciled funds.

T.28
EUR denominated MMFs by category
Relative decline of EUR short-term MMFs



Note: Note: NAV of EUR MMF, EUR bn .
Sources: Thomson Reuters Lipper, ESMA.

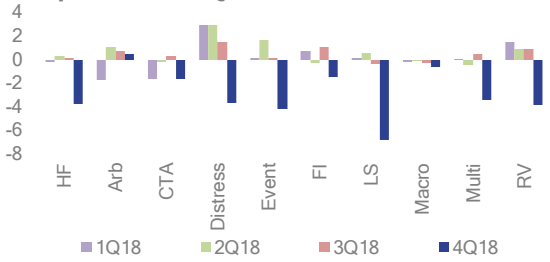
The EU regulatory reforms related to MMFs will lead to further rebalancing between different MMF categories.[8] Under the new rules, only funds investing in short-term public debt will be authorised to maintain a Constant NAV (CNAV). Therefore, investors favouring NAV stability will have the choice between public debt CNAV funds or Low Volatility NAV funds (LVNAV), which offer NAV stability, but are less restricted than CNAV in their investment policy. Conversely, investors in search for yield may not be affected, as they are already invested in Variable NAV funds (VNAV). Fund managers have from 21 July 2018 to 21 January 2019 to submit their application.

ESMA and the National Competent Authorities (NCAs) are monitoring the transition period to prevent any potential disruption. A similar reform in the US led to significant flows from prime to non-prime funds in 2017, with no systemic consequence. Such a high substitution effect is unlikely to happen in the case of the EU reform: a large part of existing non-public debt CNAV funds are expected to convert to the LVNAV category, which offers similar characteristics and should incentivise investors to maintain their investments.

Alternative funds: sharp losses in 2H18

During 4Q18, the global alternative fund industry recorded one of its worst performances since the Global Financial Crisis, resulting in negative **returns** of 3.6% in 2H18 (T.29) amid large outflows. Long-short strategies were the most affected by the equity market sell-off with a loss of 7.1% in 2H18, followed by event driven strategies (–4.0%), relative value (–3.1%), multi-strategy (– 2.9%) and distress debt (–2.2%). Among all strategies, only arbitrage managed a positive return (1.2%). Alternative funds also suffered large **outflows**: EU alternative funds had their largest outflows since 2015 in October and November 2018 (A.145).

T.29
Hedge funds' performance by strategy
Sharp losses in 4Q18

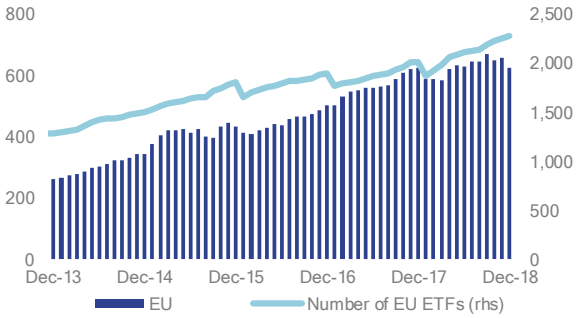


Note: Growth in hedge fund performance indices by strategy: Hedge fund index (Total), arbitrage, Commodity Trading Advisor (CTA), distressed debt, event driven, fixed income, long/short equity, macro, multi-strategy, relative value (RV), in %.
Sources: Eurekahedge, ESMA.

ETFs: growth continues

EU Exchange-Traded Fund (ETF) performance was moderate in 2H18, being close to 0.5%, in line with underlying market developments (A.143). ETF NAV increased by 6.6% to EUR 676bn in 3Q18, confirming their long-term trend with a growth of 175% in the past five years (T.30).

T.30
NAV by asset type
Significant long-term ETF growth



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

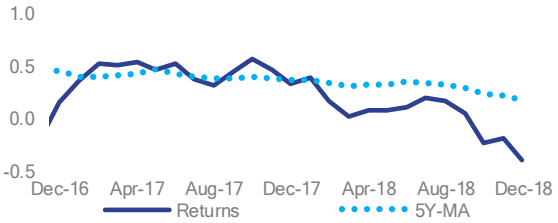
Equity ETFs represent most of the ETF industry, with 72% of **assets under management** (A.152), followed by bond ETFs (24%). ETFs are also growing in less liquid markets such as commodity or HY bonds.

[8] See also the dedicated article on "MMFs in the EU – new stress-testing requirements" pp. 62-66.

Retail investors: weak performance

Retail investor **portfolio returns** were –4.7% over 4Q18, far below the five-year average of 0.18% (T.31). The strongly negative returns were driven by equities, with returns on equity holdings close to –12.0% over this period.

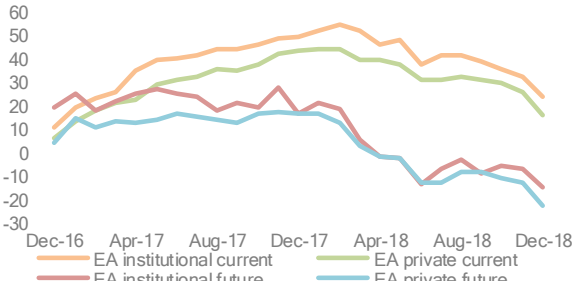
T.31
Retail portfolio returns
Negative retail investor returns in 4Q18



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.

Investor sentiment over a ten-year horizon fell markedly over 2018, among both retail and institutional investors, reaching negative levels in both cases. The measure of sentiment among retail investors regarding current market performance also fell over 2018, but less precipitously. It had reached a ten-year high in February 2018 and held historically high levels to end-May (T.32), becoming significantly weaker by December 2018. The mismatch between current and future expectations may be explained in part by relatively high valuations in asset markets, in turn supported by expansionary monetary policy throughout developed markets. Expectations of future interest-rate rises in the EA following policy tightening in the US may also play a role.

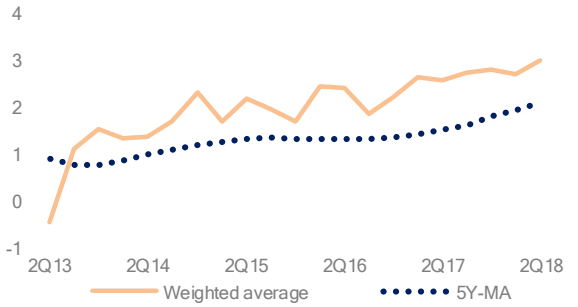
T.32
Investor sentiment
Fall in long-term sentiment



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 rose to 3.0% in 2Q18 on an annualised basis, comfortably above the five-year average of 2.1% (T.33), which may be a factor in why investors' near-term sentiment remained positive, despite a bearish longer-term outlook driven by perceived risks.

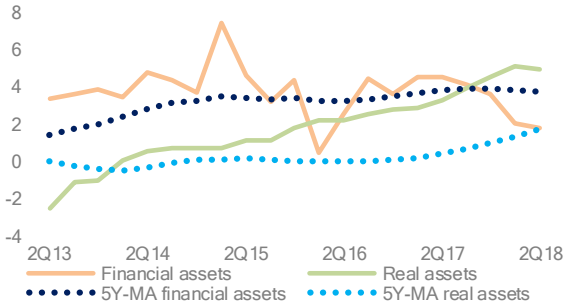
T.33
Disposable income growth
Sustained growth in incomes



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 1.8% and 4.9%, respectively in 2Q18. In the case of real assets, the strong growth was significantly above its five-year average of 3.7%, reflecting positive valuation effects in housing markets. 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.34).

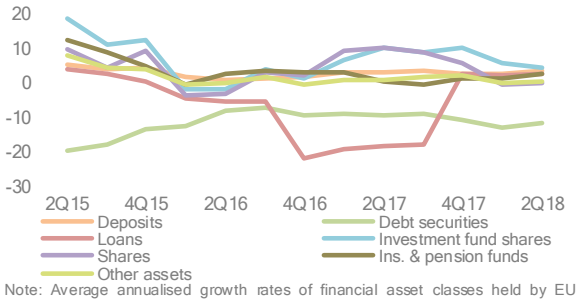
T.34
Asset growth
Increasing real asset growth



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.

Most classes of EA **household financial assets** grew during 1H18 (T.35). The highest growth rate was holdings in investment fund shares (4%), although this was down from a growth rate of 10% during the previous six months. A continuing exception among asset classes was debt securities, which saw strongly negative growth over the five years to end-March 2018, with a rate of –11% for 1Q18. This decline in debt securities was largely driven by Italian households, which have been divesting from bank bonds since 2011, in a context of shifts in portfolio composition towards insurance products and investment funds, and lower issuance by Italian banks.

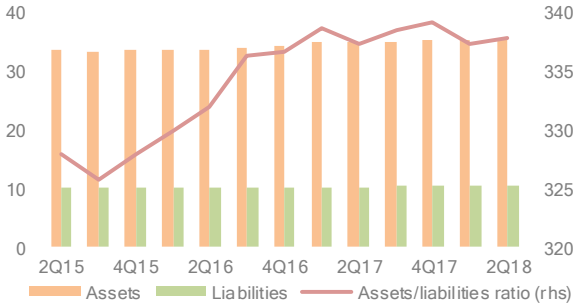
T.35
Growth rates among financial assets by class
Moderate investment fund growth in 1H18



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.36). Underpinned by asset growth, the **household asset-to-liability ratio** fell slightly in 1H18 from 2H17, when it had been at a five-year high. The rate of growth in household financial assets remained broadly flat, in the face of low yields.

T.36
Household assets-to-liabilities ratio
Net wealth dips from five-year high

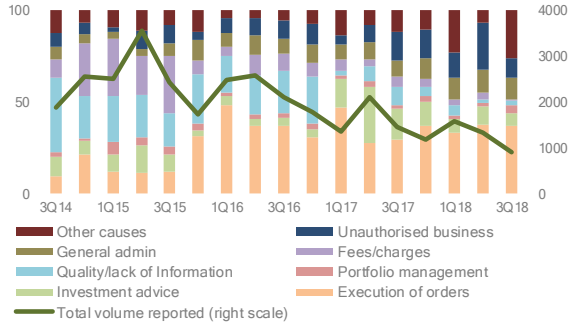


Note: EU households' financial assets and liabilities, EUR tn. Assets/liabilities ratio in %.
Sources: ECB, ESMA.

The incidence of detrimental outcomes, as measured by the overall volume of **consumer complaints** made directly to those NCAs able to provide quarterly data, fell in 3Q18 to a 4Y low (T.37). Interpretation of the trends requires comparison with events from the past few years. In particular, 1H16 had seen a spike in aggregate complaints, attributable to underlying issues in relation to Contracts for Differences (CFDs) in 2015 — complaints being a lagging indicator — and issues around bank resolutions. Complaints relating to CFDs remained at elevated levels for a niche retail product throughout 1H18. In contrast, complaints relating to debt securities fell considerably in 1H18, a broad-based trend across different national markets, following earlier declines in 2H17.

The two primary **causes for complaints** filed with NCAs in 1H18 were the execution of orders (37%) and unauthorised business (11%) (T.38). The execution of orders has been a leading cause of complaint since 2016. The proportion of complaints relating to unauthorized business remained approximately constant. Complaints relating to investment advice, which had been the second-most common cause in 2017, were lower through the first three quarters of 2018. One reason for this trend was a spike in complaints recorded with one NCA in 2H17 about the provision of advice concerning certain investment vehicles.

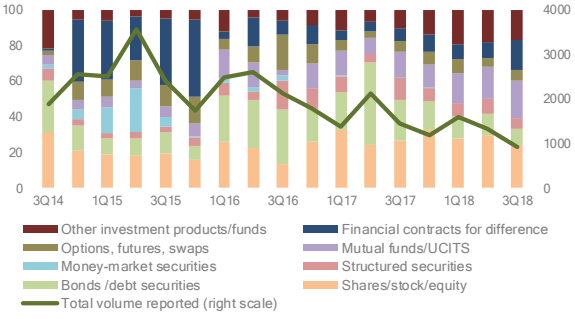
T.37
Complaints filed directly with NCAs, by cause
Execution of orders as the main cause for complaints



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.

Regarding the **type of financial instrument** cited in complaints filed in 3Q18, the proportion of complaints referring to debt securities fell substantially to 9%, around half its level in 2H17 and less than a quarter of its share in 2Q17(A.169). This trend was driven by firm credit events and bank resolutions in more than one country that had led to complaints in late 2016 and early 2017.

T.38
Complaints filed directly with NCAs, by instrument
Complaints regarding debt securities decline



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

Infrastructures and services

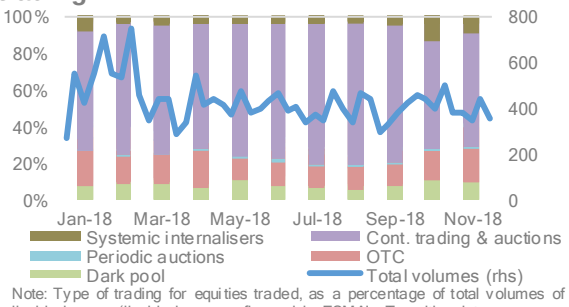
Since the entry into force of MiFID II/MiFIR and its Double Volume Cap (DVC) mechanism, trading volumes executed in the EU via periodic auctions increased at the expense of dark pool trading. Despite the equity market sell-off in the first half of October, with an associated jump in circuit-breakers, the number of weekly circuit-breaker occurrences was below average in 2H18. Market glitches reoccurred, as shown by the recent three-hour delay in Euronext market opening. Newly calculated central clearing rates on the EU OTC derivatives market showed increasing clearing rates over the course of 2017 for credit and interest rate derivatives, providing evidence for the effectiveness of the clearing obligations. As announced by Nasdaq Clearing, the failure of one individual clearing member on 11 September 2018 triggered initial default procedures, including utilisation of the default fund, followed by a replenishment, and an increase in required margin levels.

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 regulatory requirements make more information available and aim at reducing the use of dark pools and OTC trading.

Since MiFID II/MiFIR entered into force, trade volumes of periodic auctions have increased from 0.3% of total volumes in early 2018 to 2% in September (1.5% on average in 2H18). Nevertheless, trading on dark pools didn't decrease continuously over the year, but instead oscillated around the same levels (9.6% of the total trading of liquid shares on average in 2H18, T.39). The DVC mechanism's purpose is to limit the amount of trading under certain equity waivers to ensure that 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 one type of the negotiated transaction waiver (see V-section "DVC mechanism – impact on EU equity markets" pp.54-61 for a detailed analysis and a description of periodic auctions).

T.39
Trading volumes
Increased in systemic internalisers and OTC trading

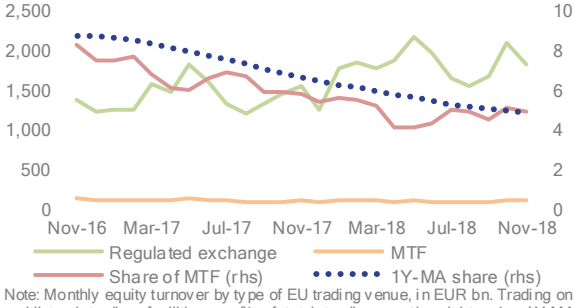


Note: Type of trading for equities traded, as a percentage of total volumes of liquid shares (liquid shares as flagged in ESMA's Transitional transparency calculations). Total volumes in EUR bn.
Sources: ESMA.

Meanwhile, the proportion of trading on Multilateral Trading Facilities (MTFs) remained around its end-1H18 level, standing at 5% in November, as most of the trading continued to take place on regulated markets (T.40).

Trading **turnover** in bonds jumped in August on European exchanges, as they now included new reporting from one large trading venue. Over the semester, trading volumes in equities, UCITS and ETFs increased slightly (A.187).

T.40
Turnover by type of trading venue
Increase in trading on regulated exchanges



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.

The number of weekly **circuit-breaker** occurrences was, on average, 95 in 2H18, with a jump to 295 occurrences during the equity sell-off in the first half of October.[9] Overall, the weekly number of circuit-breaker occurrences was below 1H18 levels (134 on average) and below long-term averages (A.189).[10] Nevertheless, markets are still subject to glitches as shown by a recent three hours delay in market opening of Euronext.

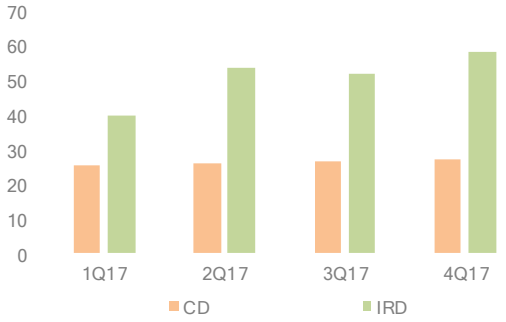
[9] Circuit breakers are trading-venue-based mechanisms designed to manage periods of high volatility by halting trading whenever the price of a security falls out of a predetermined price range; trading resumes after the securities affected are put into auction.

[10] The figures on circuit-breaker occurrences on EU trading venues do not cover XETRA, Euronext or the Irish Stock Exchange.

CCPs: increased CDS clearing

Central clearing of OTC derivatives increased in 2017. Central clearing rates for OTC credit derivatives grew from 25% to 27% in 2017 according to the ESMA methodology[11]. For OTC IRDs, central clearing rates oscillated between 40% in 1Q17 and 58% in 4Q17 (T.41). These figures were calculated on the stock of outstanding contracts, including ones created before the entry into force of the various clearing obligations. Central clearing rates for new contracts are significantly higher, providing further evidence of the effectiveness of clearing obligations.

T.41
OTC central clearing rates
Increase for Credit derivatives and IRDs in 2017



Note: Share of gross notional amount outstanding for credit derivatives (CD) and interest rate derivatives (IRD), in %.
Sources: TRs, ESMA.

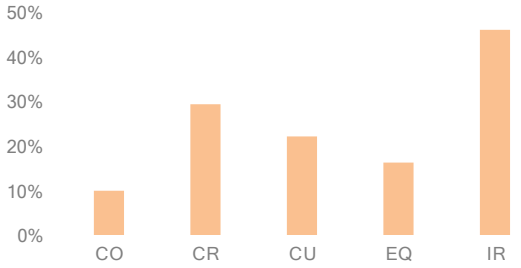
The risk of a disorderly Brexit has been a focus for the central clearing landscape in Europe. In particular, hurdles in the access of EU counterparties to UK CCPs as well of UK counterparties to EU-27 CCPs would reduce the pool of assets available to central clearing for EU entities, with a negative effect on liquidity and netting efficiency (T.42).

In light of the no-deal Brexit risk, several actions have been taken to limit the risk of disruption in central clearing and to avoid any negative impact on the financial stability of the EU. The European Commission adopted, in December 2018, a temporary and conditional equivalence decision[12] determining that the regulatory framework applicable to CCPs in the UK and Northern Ireland is equivalent. On 19 December 2018, ESMA expressed support for continued access to UK CCPs and therefore, aims to recognise UK CCPs and adopt recognition decisions in a timely manner.[13] These decisions would take effect if UK withdraws from the EU in a no-deal scenario, thereby allowing continued access of EU firms to UK CCPs.

T.42
Central clearing continuity in the context of Brexit
High exposures from both the EU27 and the UK

EU27 members clear a substantial share of their notional derivatives exposures at UK CCPs. As of 21 September 2018, 46% (EUR 77tn) of IRDs were cleared at a UK CCP. For credit derivatives, the share of UK-CCP clearing was also high at 29% (EUR 507bn). For other asset classes this share was 22% (EUR 200BN), 16% (EUR 84bn) and 9% (EUR 93bn) for currency, equity and commodity derivatives, respectively (T.43).

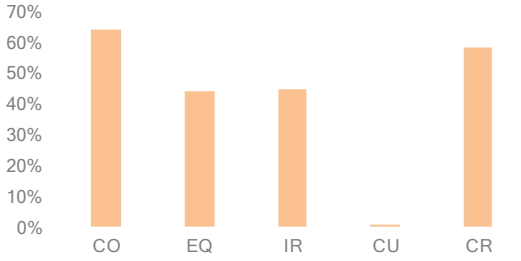
T.43
Central clearing at UK CCPs, by EU-27 clearing members
Between 9% (CO) and 46% (IR)



Note: Clearing done by EU27 participants at UK CCPs, as a percentage of the total clearing done by EU27 participants, as of 21 September 2018. Volumes as gross notional amounts outstanding. Asset classes represented are commodity (CO), credit (CR), currency (CU), equity (EQ) and interest rate derivatires (IR).
Sources: TRs, ESMA.

UK clearing members account for a large share of the clearing done at EU CCPs. For IRDs and equity derivatives, 44% (EUR 3tn) were cleared at EU CCPs by UK clearing members (T.44). This figure is higher for commodity derivatives, at 64% (EUR 82bn), and for credit derivatives at 58% (EUR 390bn).

T.44
Central clearing at EU27 CCPs by UK CMs
42% on average



Note: Clearing done by UK participants at EU27 CCPs, as a percentage of the total clearing volumes at EU27 CCPs, as of 21 September 2018. Volumes as gross notional amounts outstanding. Asset classes represented are commodity (CO), credit (CR), currency (CU), equity (EQ) and interest rate derivatires (IR).
Sources: TRs, ESMA.

Bearing in mind the large share of the clearing done at EU CCP and UK CCPs (as explained above), the final arrangements between the UK and the EU will impact how the CCPs in the UK and the EU will be accessed to clear transactions in the future. The prospect of a no-deal withdrawal raises issues regarding access to central clearing; however, both the UK and the EU are committed to mitigating the disruptions to central clearing in such a scenario.

To mitigate that risk, the ESMA Board of Supervisors supports continued access to UK CCPs. Therefore, ESMA aims to recognise UK CCPs in a timely manner, where the four

[11] ESMA Annual Statistical Report – EU Derivatives Markets, 2018

[12] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2018:325:FULL&from=EN

[13] https://www.esma.europa.eu/press-news/esma-news/esma-ready-review-uk-ccps%E2%80%99-and-csds%E2%80%99-recognition-applications-no-deal-brexit

recognition conditions under Article 25 of EMIR are met, and to adopt the recognition decisions well ahead Brexit date. They will take effect on the date following Brexit date, under a no-deal Brexit scenario[14].

In September, a default of one clearing member occurred on Nasdaq Clearing, resulting in losses for the CCP and participants (T.45).

T.45
Nasdaq Clearing
Large default of one clearing member[15]

On 11 September 2018, a Norwegian trader, who was clearing his own trades at Nasdaq Clearing, was not able to meet margin calls and was declared to be in default by Nasdaq, following a divergence in spreads between Nordic and German power markets. The sequence of events, as reported by Nasdaq Clearing[16], was as follows:

- Following the divergence in spreads, intraday margin calls were made on 10 September to the trader.
- These intraday margins calls were not fully met, and the participant was declared to be in default the following day (11 September) at 08:24.
- Between the morning of 11 September and the evening of 12 September, an ongoing process to close-out the portfolio of transactions in the clearing account was undertaken, including two attempts to sell the portfolio of transactions by auction.
- On the evening of the 12, after the second auction process, where four participants were invited to bid in a closed auction, the CCP accepted the best committed bid;
- On 17 September, the member default fund was fully replenished by clearing members.

The cost of the default was, at the time, covered by the default resources that were available to the CCP including the defaulter's collateral, CCP's own capital (EUR 7mn) and default fund contributions of non-defaulting clearing members (EUR 107mn). In addition, a temporary Junior Capital, funded by Nasdaq Clearing, for the commodity market of SEK 200m (approximately EUR 19mn) was temporarily committed and added to the existing capital in the clearing default waterfall.

Following the event, Nasdaq Clearing has decided to increase margin levels in relation to confidence levels and margins on spread positions.

Nasdaq Clearing's supervisor, Finansinspektionen, is following up on whether Nasdaq Clearing has acted in compliance with current regulation.[17]

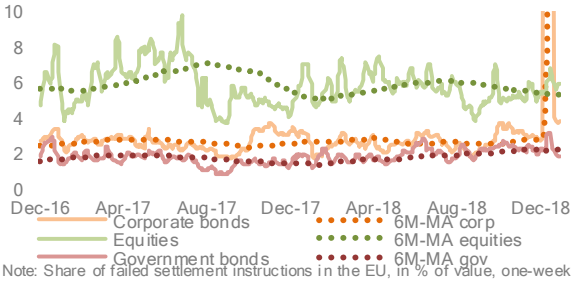
CSDs: volatile rates of settlement fails

Continuing its supervisory convergence effort, in 2H18 ESMA updated its Q&As regarding the implementation of the **Central Securities Depositories Regulation** (CSDR). The latest Q&As cover topics such as the scope and timing of application of a requirement to dematerialise certain transferable securities, some organisational requirements on outsourcing and the provision of services by Central Securities Depositories (CSDs) in another Member State. ESMA has also started issuing Q&As on settlement discipline issues, following the publication of Commission Delegated Regulation (EU) 2018/1229 on settlement discipline on 13 September 2018. The CSDR settlement discipline requirements will enter into force in two years, i.e. on 13 September 2020.

In 2H18 (by the end of October), 7 CSDs were authorised under CSDR, which brought the number of authorised CSDs[18] to 9 by the end of 2018. In December, the European Commission also adopted a temporary and conditional equivalence decisions prolonging the access of EU firms to UK CSDs for a period of 24 months.

Settlement fails for corporate bonds increased at the beginning of October (T.46), while settlement fails for equities remained volatile, for example around the equity market sell-off that started on 10 October. In December, a significant transaction was requested with settlement on the same day and was subsequently cancelled, hence the jump in the corporate bond settlement fail rate around that time.

T.46
Settlement fails
Decrease for equities, higher for corporate bonds



Note: Share of failed settlement instructions in the EU, in % of value, one-week moving averages. Jump in December 2018 due to a single transaction instructed on 10 December with settlement requested on the same day which was finally cancelled on 18 December 2018 (amount of EUR 500bn).
Sources: National Competent Authorities, ESMA.

CRAs: increase in downgrade size for securitised products

In the **Credit Rating Agency (CRA) industry** the number of CRAs registered in the EU has increased to 27. Among the 27 registered CRAs, four operate under a group structure, totalling 19 legal entities in the EU, which means that the total number of CRA entities registered in the EU is 42. On 3 August, Nordic Credit Rating AS (a CRA based in Norway) was registered in cooperation

14 https://www.esma.europa.eu/press-news/esma-news/esma-ready-review-uk-ccps%E2%80%99-and-csds%E2%80%99-recognition-applications-no-deal-brexit

15 Box T.45, including figures, is based on publicly available information as of 27 September 2018.

16 https://business.nasdaq.com/media/Member-Q-and-A-180927_tcm5044-66184.pdf

17 https://www.fi.se/en/published/news/2018/finansinspektionen-follows-closely-the-developments-at-nasdaq-clearing/

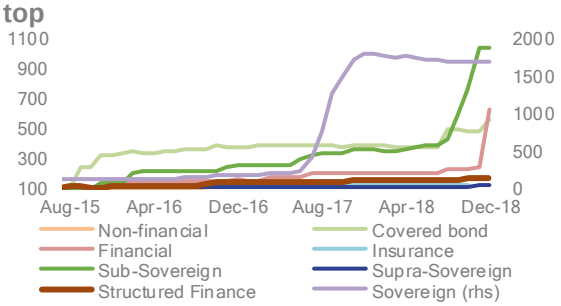
18 The Register of Authorised CSDs under CSDR is published by ESMA at: https://www.esma.europa.eu/sites/default/files/library/esma70-151-889_csd_register.pdf

with the European Free Trade Association[19] On 13 August 2018, ESMA registered Moody's Investors Service (Nordics) AB as a CRA under the CRA Regulation (CRAR). Moody's Investors Service (Nordics) AB is based in Sweden and intends to issue sovereign and public finance ratings, structured finance and corporate ratings.[20] On 14 December 2018, ESMA also registered DBRS Ratings GmbH: a Germany-based CRA. [21]

Another news affecting the CRA industry has been the decision of ESMA to fine Danske Bank, Nordea Bank, SEB, Svenska Handelsbanken and Swedbank EUR 495,000 each for a total of EUR 2.48mn and to issue five public notices for negligently breaching the CRAR. ESMA found that the five banks infringed the CRAR by issuing credit ratings without being authorised by ESMA to do so.[22]

The CRA industry in the EU remains concentrated around three large players (S&P's, Moody's and Fitch Ratings). On the other hand, smaller CRAs are steadily expanding their business, accounting for 27% of the outstanding ratings. In particular, there has been a steep increase in the number of ratings issued on sovereigns driven by one smaller CRA (T.47).

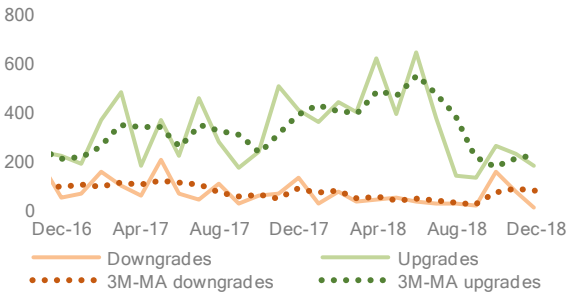
T.47
Evolution of outstanding ratings excluding the big 3 CRAs
Increases for all sectors, with sovereign on top



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

In terms of the **latest rating trends**, the credit quality of securitized assets has continued to decrease in 2H18, with a steep decline in the number of upgrades (T.48) and an increase in the average size of downgrades in September.

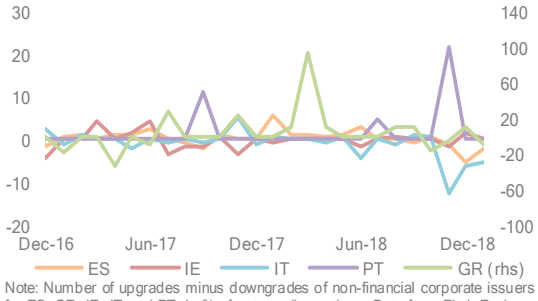
T.48
Number of rating changes on securitised assets
Steep decline in upgrades



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

Italy has experienced a deterioration of non-financial corporation credit quality, with a net increase in the number of downgrades in October (T.49).

T.49
Non-financial rating changes
Decreasing drift for Italy



Note: Number of upgrades minus downgrades of non-financial corporate issuers for ES, GR, IE, IT and PT, in % of outstanding ratings. Data from Fitch Ratings, Moody's, S&P's.
Sources: RADAR, ESMA.

Financial benchmarks: euro short-term rate as new EA risk-free rate

From 3 January 2018, ESMA is publishing the list of Administrators and third country benchmarks, in accordance with the **Benchmarks Regulation** (BMR).[23] As of 17 December, the register listed 21 administrators[24] located in the Union that have been authorised or registered pursuant to Article 34, Article 30(1), Article 32, and Article 33 of the BMR. The register has been set up by ESMA based on information provided by Member States.

19 See https://www.esma.europa.eu/supervision/credit-rating-agencies/risk

20 See https://www.esma.europa.eu/site/default/files/library/press_release_moodys_nordics_ab_esma_registration.pdf

21 See https://www.esma.europa.eu/sites/default/files/library/esma71-99-1076_press_release_dbrs_gmbh_authorisation.pdf

22 See https://www.esma.europa.eu/sites/default/files/library/esma71-99-1017_cra_fine_-_esma_fines_five_banks.pdf

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

24 https://www.esma.europa.eu/benchmarks-register

The EU BMR set 1 January 2020 as a deadline for administrators of benchmarks to apply for authorisation / registration to the relevant NCAs. The deadline is also relevant for the administrator of Euribor and EONIA - European Money Market Institute (EMMI) - and therefore for contracts and financial instruments referencing EONIA and Euribor.

Regarding the Euribor reform, the EMMI published on 17 October 2018 a second Consultation Paper on hybrid methodology for Euribor. The report presents a summary of EMMI's findings during the hybrid Euribor testing phase, along with proposals for calculation parameters.[25] The proposed hybrid methodology relies on euro money market transactions that reflect the underlying interest and on other sources of data, if needed. In the Consultation Paper, EMMI declares its intention to apply to the Belgian Financial Services and Markets Authority for the authorisation of Euribor by 2Q19.

On 13 September 2018, the Euro Risk Free Rate Working Group recommended that the euro short-term rate (ESTER) be used as the risk-free rate for the EA.[26] ESTER is intended to complement and serve as a fall-back to existing critical benchmark rates such as EONIA (T.50). Regarding the transition from EONIA to ESTER, the working group is still discussing which approach to follow.

T.50
Interest rate benchmarks
Differences between ESTER and EONIA

ESTER and EONIA differ in several ways. First, EONIA is administrated by the private sector via a non-profit organisation, EMMI, while ESTER will be administered by the ECB. EONIA relies on voluntary data input by 28 panel banks, while the ECB's new rate will be built on the daily data submissions of the banks reporting in accordance with the Money Market Statistical Reporting Regulation (MMSR). Moreover, EONIA is a weighted average rate of the submitted contributions, while 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.

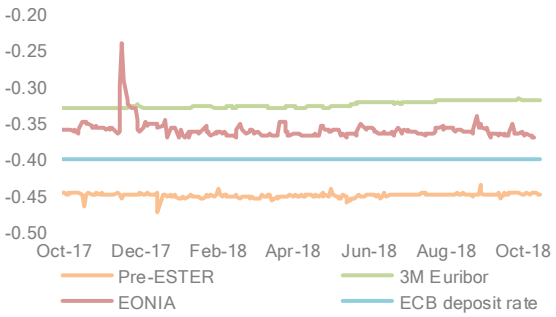
The spread between ESTER and EONIA (T.49) is linked to the structural differences between the two rates as mentioned above as well as to conjunctural factors. Pre-ESTER is lower than EONIA and the ECB deposit rate because it includes bank deposits from financial institutions that do not have access to the ECB deposit.

Following the Global Financial Crisis, the share of the interbank market in the wholesale market became smaller owing to a reassessment of counterparty risk, changing regulations and liquidity conditions. Banks also developed significant money market activity with other entities, such as MMFs, insurance companies and other financial corporations, which do not hold reserves with the ECB and which could lend and borrow at a lower rate than the ECB deposit facility rate. Moreover, monetary policy and regulations affect the level of the rate. Abundant liquidity coming from expansionary monetary policy played a role in lowering the rate as banks apply a punitive rate to depositors, at a level below the deposit rate.

The spread between the pre-ESTER and the ECB deposit rate would still tend to zero owing to the arbitrage mechanism: banks, assuming no counterparty risk, would have an arbitrage opportunity to increase their reserves while borrowing at a lower rate to other financial institutions. However, the cost of the expansion of banks' balance sheets has increased due to capital requirements, making the arbitrage opportunity less profitable and keeping the spread higher.

ESTER will reflect the wholesale euro unsecured overnight borrowing costs of EA banks and it will complement existing benchmark rates produced by the private sector. The ECB will begin publishing ESTER by October 2019.[27] ESTER will be calculated entirely on actual individual transactions in euros that are reported by banks in accordance with the ECB's MMSR.[28] Until ESTER is available, the ECB will publish figures referred to as pre-ESTER, which market participants can use to assess the suitability of the new rate.[29] As of 30 October 2018, pre-ESTER stands at around 8 bps lower than EONIA and 3 bps lower than the ECB deposit rate (T.51).

T.51
Financial benchmarks and money market rates
Pre-ESTER: new risk-free rate



Note: Money market rates, in %.
Sources: Thomson Reuters Datastream, ECB, ESMA.

As of end-2018, Euribor and EONIA are provided by EMMI. In terms of panel composition, the Euribor panel composition remained stable in 2H18, at 20 banks, while 28 banks continued to constitute the EONIA panel (A.205). Our risk indicators do not identify any outlier in Euribor submission and calculation during the reporting

25 https://www.emmi-benchmarks.eu/assets/files/D0373-2018%20Second%20Consultation%20Hybrid%20Euribor_full.pdf

26 https://www.ecb.europa.eu/paym/initiatives/interest_rate_benchmarks/html/index.en.html

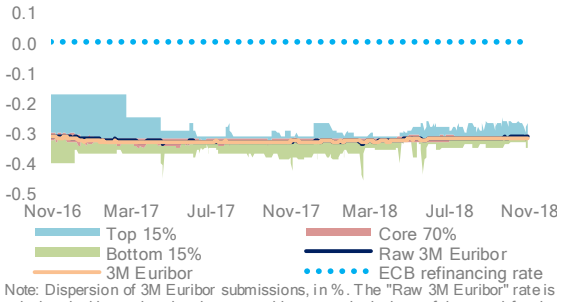
27 https://www.ecb.europa.eu/paym/initiatives/interest_rate_benchmarks/euro_short-term_rate/html/index.en.html

28 See https://www.ecb.europa.eu/stats/financial_markets_and_interest_rates/money_market/html/index.en.html

29 See https://www.ecb.europa.eu/paym/initiatives/interest_rate_benchmarks/shared/pdf/ecb.Pre-ESTER.en.pdf

period.[30] The dispersion of Euribor submission quotes remained stable in 2H18 (T.52).

T.52
Dispersion of submission levels
Submission levels stable in 2H18



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.

In 2H18, the Stockholm Interbank Offered Rate (Stibor) was included in the list of critical benchmarks as implemented by the European Commission. The inclusion is in line with ESMA's opinion setting out that Swedish Finansinspektion had taken into consideration all the elements and criteria included in Article 20(3) of Regulation (EU) 2016/1011 and that it had provided quantitative data to support the case for the recognition of Stibor as a critical benchmark, as well as analytical reasoning highlighting the crucial role of Stibor in the Swedish economy.[31]

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

[31] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.261.01.0010.01.ENG&toc=OJ:L:2018:261:TOC

Products and innovation

FinTech continues to drive innovation in financial services, with potentially far-reaching consequences for both end-users and service providers. Crypto Assets (CAs) and Initial Coin Offerings (ICOs) have been the focus point of attention recently because of the cash inflows that they have attracted. Relevant developments are also taking place in relation to other applications of Distributed Ledger Technology (DLT) and regulatory technology (RegTech). ESMA's product intervention measures, which imposed a prohibition on the marketing, distribution or sale of binary options to retail investors from 2 July 2018, and a restriction on the marketing, distribution or sale of Contracts for Difference (CFDs) from 1 August 2018, have recently been renewed.

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. However, it does not come without challenges, as these innovations may introduce new risks. ESMA established a framework for monitoring financial innovation. This includes a financial innovation scoreboard, namely a methodology that enables ESMA to prioritise and analyse financial innovations relative to ESMA's objectives of investor protection, financial stability and market integrity.[32] The following outlines how the most prominent recent innovations perform on ESMA's scoreboard (T.53).

T.53
Financial innovation scoreboard

Innovation	IP	FS	MI
CAs	🔴	🟠	🔴
ICOs	🔴	🟠	🔴
DLT	🟡	🟡	🔴
Crowdfunding	🔴	🟠	🔴
RegTech/SupTech	🟡	🟢	🟡
Artificial Intelligence (AI) and big data	🟡	🟡	🟡

CAs
IP: mostly outside of the regulated space and extreme price volatility. FS: comparatively small in size but requires monitoring. MI: most CA exchanges are unregulated and are therefore prone to market manipulation and operational flaws.

ICOs
IP, FS, MI: similar to CAs 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. In addition, ICOs could provide a useful alternative source of funding.

DLT
IP: no major risks and 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. In addition, 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.

RegTech/SupTech
IP, FS, MI: the widespread adoption of RegTech/SupTech may reduce certain risks. For example, the use of machine learning tools to monitor potential market abuse practices has the potential to promote market integrity (see Article in the vulnerabilities section).

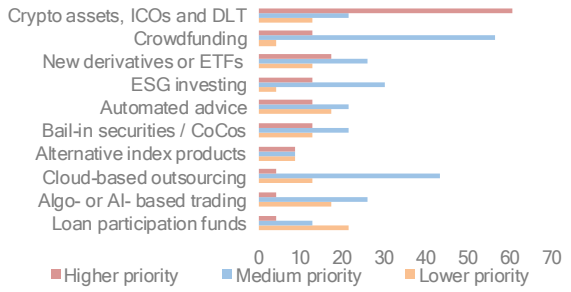
Artificial Intelligence (AI) and big data
IP: the increasing adoption of AI and big data helps financial services companies to be more efficient and therefore may lead to cost reductions for investors. As the phenomenon is still evolving, operational risks are present. FS: not of systemic importance at present. MI: may be used for SupTech tools, though effectiveness depends on quality of underlying data.

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 risk, red = very high risk.

ESMA's work on financial innovation is informed not only by its own direct monitoring of developments but also by monitoring work undertaken by NCAs. In 1H18, NCAs as a group closely monitored FinTech developments such as CAs, ICOs, DLT, crowdfunding and automated advice (T.54). In addition, many NCAs paid keen attention to several areas of innovation in financial instruments including new derivatives and ETFs, and alternative index products. Notably, monitoring may be prompted by expected benefits as well as risks.

[32] 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".

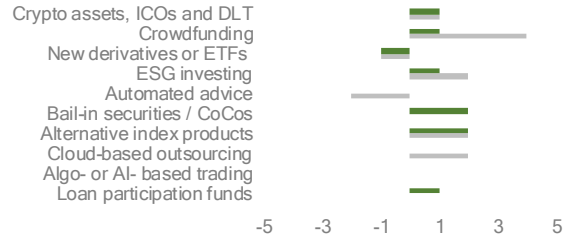
T.54
Monitoring of financial innovation by NCAs in 1H18
Focus on CAs, ICOs and DLT



Note: Percentage of NCAs assigning a given level of priority to selected topics in financial innovation for 1H18 (n=23). "CoCos"=contingent convertible bonds. Not all priorities reported by NCAs are listed; top-10 highest priority topics selected as determined by lexicographic ranking of reported priority levels.
Sources: EMSA financial innovation monitoring database.

Compared with the previous six months, innovation monitoring priorities in 1H18 were fairly stable, although certain topics such as crowdfunding received slightly more emphasis for monitoring purposes (T.55).

T.55
Changes in NCA innovation monitoring
Stable prioritisation among NCAs



Note: Net changes in number of NCAs assigning a given priority level to selected topics in financial innovation for 1H18 compared with 2H17 (n=23). "CoCos"=contingent convertible bonds.
Sources: ESMA financial innovation monitoring database..

Market and regulatory developments

CAs

ESMA continues to closely monitor developments in the CA space. High risks to investor protection have drawn ESMA's attention to CAs and to analyse the CA ecosystem.

After explosive growth in 2017, the market capitalisation of CAs plummeted and continued at comparatively low levels without recovery. As of the beginning of January 2019, it stands at EUR 120bn globally, down from a peak of about EUR 700bn reached about a year ago. This sharp decline and the persistence of low market capitalisation can be attributed to a combination of factors, including actions by regulators globally aimed at warning investors about the high risks of CAs and curbing illicit CA activities.

Bitcoin, and to a lesser extent Ether, continue to dominate the market. But the development of additional CAs since the advance of the ICO phenomenon in early 2017 has led to a slight drop in their combined market share. It continues to fluctuate between 55% and 75% and stands at around 63% as of the beginning of January 2019.

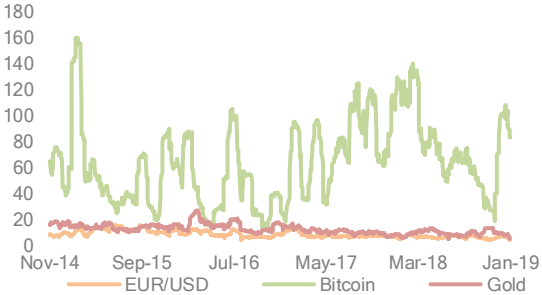
Both Bitcoin and Ether have undergone sharp price corrections since their respective peaks in December 2017 and January 2018. Bitcoin saw more than three-quarters shaved off its peak quotation, while Ether suffered a 90% drop in value (T.56).

T.56
CA prices
CA prices down more than 70%, no recovery

Note: Prices of selected crypto assets (Bitcoin and Ether), in thousand EUR.
Sources: Thomson Reuters, ESMA.

The volatility of CAs remains considerably higher than that of commodities or currencies (T.57). Since January 2018, the Bitcoin average 30-day rolling volatility has oscillated between 20% and 140%. In comparison, the volatility of gold reached a maximum of 60% in October 2008 during the financial crisis and has remained quite stable at around 10% since then. 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.57
CA price volatility
Extreme volatility compared with gold or EUR/USD



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

With CAs, investors not only face high levels of volatility, but also run the risk of losing a large part, or even all, of the money invested. Because many CAs and intermediaries providing services related to CAs are outside the regulated space, consumers will not benefit from the protection that goes with regulated investments. Many CA

investors suffered severe losses, for example through cyber-attacks. On average, 10% of global ICO proceeds are lost due to hacks and cyber-attacks.[33] CA trading platforms acting as wallet providers are particularly vulnerable to cyber-attacks. In that setting, the platform holds the clients' private keys on their behalf, which is required to transact CAs. If the platform is hacked, third parties can get control of the keys and initiate fraudulent transactions towards their own wallets, resulting in losses for clients and platforms. Since 2011, cyber-attacks on CA platforms have resulted in at least EUR 2.9bn in losses globally.[34] Decentralized platforms are partially mitigating the risk of severe losses through hacks, as users keep control of their private keys. However, processing transactions on decentralized platforms can be relatively slow due to heavy reliance on DLT. At the same time, decentralized exchanges often lack proper governance structures.

The distributed nature of the technology creates specific challenges in terms of regulation and 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 risks of CAs and requested that the Financial Stability Board (FSB) and other standard-setting bodies report on their work on CAs. Following this request, the FSB issued a report in October, arguing that the future evolution of CAs could have implications for global financial stability. CA markets represent a small but increasing part of the global financial system. The FSB argues that primary risks are low liquidity, the use of leverage, market risks from volatility and operational risks. Emerging threats are challenging to assess and monitor as there are gaps in the information on for example the extent of leverage in CA markets and the direct and indirect exposures of financial institutions. Apart from that, the FSB also highlights non-financial stability concerns that are worsened by the fact that CAs often are not backed by an accountable entity. These are, for instance, consumer and investor protection and market integrity protocols.

The high interest in CAs is accompanied by an increasing number of traditional players becoming engaged in the CA ecosystem. For example, Intercontinental Exchange (the owner of the New York Stock Exchange), has announced that it will list physically-settled Bitcoin futures contracts and form a new company whose mission is to make Bitcoin a mainstream financial asset. Boerse Stuttgart, the second largest stock exchange in Germany, plans to offer central services along the value chain for digital assets.[35] At the same time, some CA platforms are trying to get regulatory approval to list CAs that resemble financial instruments. Coinbase, one of the largest CA trading platforms, stated in July that it had regulatory approval to list such CAs, as the Financial Industry Regulatory Authority (FINRA) approved its acquisition of currently regulated firms.[36]

ICOs

Around EUR 17bn have been raised through ICOs in 2018 globally, compared with EUR 5.4bn in 2017, i.e. a more than threefold increase year on year.[37] However, almost 90% of the volumes raised in 2018 have been collected in the first half of the year and monthly issuance volumes are now closer to 2017 levels. Since Mastercoin, the first ICO launched in 2013, almost EUR 23bn had been raised through ICOs as of the beginning of January 2019, although these figures need to be taken with caution due to the lack of extensive and reliable data. Volumes raised in an ICO can reach up to EUR 3.3bn, as was shown with the one-year record token sale of EOS.[38] Meanwhile, smaller ICOs may go unaccounted for.[39] While initial ICOs typically involved innovative businesses at an early stage of development, well-established companies got increasingly engaged in ICOs. The investor base has expanded as well, moving from the "blockchain community" to a broader group of investors, including institutional investors (T.58). Nevertheless, global volumes raised in ICO have declined over the past four months, which potentially reflects reactions to the high number of failed ICOs.

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

[34] Landau, J.P. and Genais, A., 2018, "Les crypto-monnaies" Rapport au Ministre de l'Economie et Des Finances.

[35] https://www.boerse-stuttgart.de/en/about-us/press-releases/

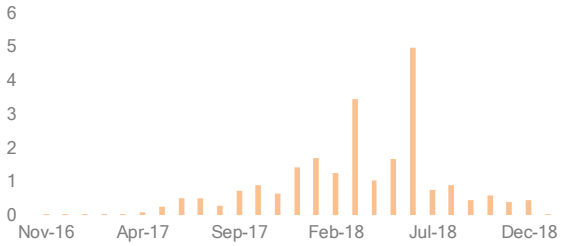
[36] https://www.coindesk.com/coinbase-claims-it-now-has-regulatory-approval-to-list-security-tokens/

[37] https://www.coinschedule.com/stats.html

[38] https://www.crowdfundinsider.com/2018/06/134320-eos-raised-4-billion-in-largest-ico-ever-now-they-are-launching-their-platform/

[39] Zetzsche, D. AA., Nuckleym R. P., Amer, D. W. and Barberis, J.N., 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 that overall funds raised in ICOs were around USD 10bn by late 2017.

T.58
ICO issuances in EUR
Monthly ICO volumes are declining



Note: Global monthly volumes raised in ICOs expressed in EUR bn.
Sources: Coinschedule.com, ESMA.

Regulatory responses to the phenomenon have been diverse. Many regulators have issued warnings to alert investors to the high risks of ICOs. Some, including China and South Korea, have banned ICOs. In the US, the Securities and Exchange Commission (SEC) has recently issued scores of subpoenas and information requests to technology companies and advisers involved in ICOs and CA-related activities.

Some EU regulators are considering or have already implemented bespoke regimes to regulate ICOs and CAs that do not qualify as financial instruments. Malta set up a bespoke framework for ICOs and DLT-related activities in July. The Innovative Technology Arrangements and Services Act provides that the Malta Digital Innovation Authority may certify innovative technology arrangements, e.g., software and architectures that are used in DLT, smart contracts and related applications and register providers of innovative technology services. The Virtual Financial Asset Act regulates ICOs, CAs and service providers involved in ICOs and other CA activities that fall outside the existing regulatory framework.

The French Financial Markets Authority (AMF) recently published a study[40] outlining the features of ICOs globally and in France and is considering a bespoke regime for them. According to the proposal, the AMF would approve 'utility' ICOs that meet certain minimum requirements in relation to disclosure information, funds security and anti-money laundering. This 'white list' approach would be complemented with a 'black list' approach, whereby the AMF would be empowered with enforcement actions against fraudulent ICOs. The AMF sees this opt-in regime as a transition phase, which might become mandatory in the future. In addition, discussions are underway for a regime for secondary trading platforms. The regime aims to address three key areas, namely (i) trading through platforms that look like MTFs; (ii) brokerage services; and (iii) safekeeping. The AMF is also considering some possible additional customer protection provisions, e.g., banning active marketing of CAs to retail.

ESMA has worked with NCAs to analyse the different business models of ICOs and CAs, the risks and potential benefits that they may introduce, and how they fit within the existing EU regulatory framework. Based on this work, including a survey of NCAs on the legal status of crypto-assets during 2018, ESMA has identified a number of concerns in the current financial regulatory framework surrounding CAs. In January 2019, ESMA published its advice on ICOs and CAs to bring these concerns to the attention of the European Commission, Council and Parliament.[41] The Advice clarifies the existing EU rules applicable to CAs that qualify as financial instruments and provides ESMA's position on any gaps and issues in the current EU financial regulatory framework for consideration by EU policymakers.

DLT

During the reporting period, several significant developments in the DLT sector occurred. In August, the world's first public bond created and managed using only DLT found support from seven investors and raised USD 80m for the World Bank.[42] In July, the Shanghai Stock Exchange released plans to use DLT in securities transactions. In the same month, the Swiss Stock Exchange announced that it was planning to build a platform to tokenise traditional securities. The Singapore Stock Exchange announced plans to utilize blockchain in a bid to improve the efficiency of securities settlements. The Australian Stock Exchange will go live with its DLT-based infrastructure in March or April of 2021, after being postponed from the originally scheduled date of the end of 2020.[43] MSX, the FinTech arm of the Malta Stock Exchange, has made deals aimed at creating new marketplaces for

[40] https://www.amf-france.org/en_US/Publications/Lettres-et-cahiers/Risques-et-tendances/Archives?docId=workspace%3A%2F%2FSpacesStore%2F27604d2f-6f2b-4877-98d4-6b1cf0a1914b&langSwitch=true

[41] ESMA, 2019, "Advice on Initial Coin Offerings and crypto-assets". Available at: https://www.esma.europa.eu/press-news/esma-news/crypto-assets-need-common-eu-wide-approach-ensure-investor-protection

[42] hhttps://www.cnbc.com/2018/08/24/world-bank-exceeds-expectations-with-world-first-blockchain-bondcba.html-EMAIL_CAMPAIGN_2018_08_25_09_10&utm_medium=email&utm_term=0_ede4cf6fd3-2454691a37-87357267

[43] For the full news see: https://www.forbes.com/sites/michaeldelcastillo/2018/09/04/reality-check-asx-delays-dlt-launch-amid-user-concerns/#16f8d7a42371

tokenized securities. [44] Deutsche Börse Group, the German exchange organization, works on a blockchain-based platform for securities lending in collaboration with an international group of CSDs. With the planned solution "Liquidity Alliance Ledger", The Canadian Depository for Securities Limited, Clearstream (Luxembourg), Strate (South Africa) and VPS (Norway) want to overcome existing hurdles when moving collateral across various jurisdictions, making the transfer faster and more efficient.

AI and big data

General interest in the application of AI in the financial sector is rising. Among others, two comprehensive reports have been published by the German BaFin[45] and the World Economic Forum (WEF).[46] BaFin is arguing that capital markets are ahead of banks and insurance companies with respect to the application of AI. Furthermore, the self-supporting market penetration process immanent to big data and AI can lead to the emergence of monopoly-like market structures. Dominant providers of big data and AI, on the other hand, can then become of direct or indirect systematic importance for financial markets. For capital markets specifically, BaFin is arguing that big data and AI can lead to greater efficiency and effectiveness. At the same time, they can lead to the emergence of new services and market participants, which in turn leads to higher complexity. The WEF argues that, as AI increases interconnectedness and as many financial services companies use the same tools, there is an increased concentration risk and a higher vulnerability to single points of failure.

Emerging topics

Emergence of third-party service providers: FinTech and TechFins

To date, the relationship between incumbent financial institutions and FinTech firms appears to be largely cooperative in nature. FinTech firms have generally not had sufficient access to the low-cost funding or the customer base necessary to pose a serious competitive threat to established financial institutions in mature financial market segments. Collaborating allows FinTech firms to viably operate while still being relatively small and, depending on the jurisdiction and the business model, subject to limited financial regulation and while benefitting from access to incumbents' client base. At the same time, incumbents benefit from access to innovative technologies that provide a competitive edge.

However, some FinTech firms have started establishing inroads in credit provision and payments. FinTech credit is growing rapidly but is still small when considered as a proportion of overall credit in most jurisdictions. To the extent that technology permits a further unbundling of profitable services traditionally offered by banks and other institutions, its profitability may be negatively affected in the future.

The competitive impact of technology firms that begin to offer financial services (TechFins) (e.g. Alibaba, Baidu, Amazon) is likely greater than that of FinTech firms. TechFins typically have large, established customer networks and enjoy name recognition and trust. In many cases, these companies could also use proprietary customer data generated through other services such as social media to help tailor their offerings to individual customers' preferences. Combined with strong financial positions and access to low-cost capital, TechFins could achieve scale very quickly in financial services.

Technological innovations also involved significant reliance by financial institutions on certain third parties, e.g. in data services, physical connectivity and software. The market for cloud services in particular is currently quite concentrated at a global level. Some analysts postulate that financial services firms will increase their reliance on cloud service providers for core operations in the future, following the trend in other industries. There are benefits, including reduced operational and cyber risks, to individual financial institutions of increasing their use of off-site data centres.

However, third-party service providers present a challenge for the regulatory community. While operational risks may be reduced, concentration of service provision may increase the scope for wider market disruption to arise from a single operational incident. Supervisors' outsourcing policies are intended to ensure that financial institutions properly manage the risks associated with outsourcing, including by ensuring that controls over outsourced service providers are maintained to the same standard as those over the bank's own operations. Some jurisdictions are considering ways to ensure the very high levels of resilience required. The degree of reach which supervisors have over third-party providers – either directly or through contractual arrangements – varies by jurisdiction and by the type of entity involved.

[44] https://www.coindesk.com/malta-stock-exchange-partners-to-build-global-token-exchange/

[45] BaFin,2018, "Big Data meets Artificial Intelligence".

[46] World Economic Forum,2018, "The new Physics of Financial Services".

Product intervention

CFDs and binary options

In March 2018, ESMA announced that its Board of Supervisors had agreed measures under ESMA's new Product Intervention powers restricting the offer of CFDs to retail investors and prohibiting the offer of binary options to retail investors. MiFIR gives ESMA the power to introduce temporary intervention measures for a maximum period of three months unless renewed. The measures started to apply in relation to binary options on 2 July 2018 and in relation to CFDs on 1 August 2018. ESMA has renewed the measures within each subsequent three-month period, including some limited amendments.

ESMA, along with NCAs, identified a significant investor protection concern in relation to CFDs and binary options offered to retail investors (T.59). The measures, which apply throughout the Union, have been taken to protect retail investors.

T.59
Product intervention
The impact of ESMA's binary option ban

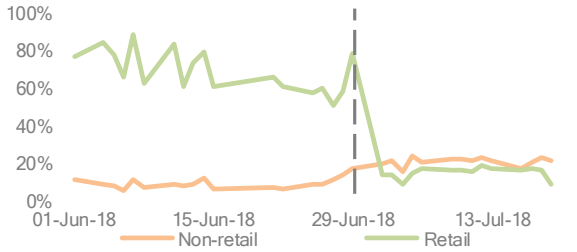
Binary options are exotic financial options with a binary outcome (e.g. either a pay-out or no pay-out), depending on whether a specific event relating to the price of a predefined underlying occurred. [47] The risk of losing the whole investment can be very high (subject to the design of the binary option) and retail clients typically lose money on them. ESMA intervened in this market by adopting a temporary prohibition of the marketing, distribution or sale of binary options to retail clients. The prohibition was published in the Official Journal of the EU on 1 June 2018 and took effect on 2 July 2018.

Like other derivative instruments, options (including binary options) are reported under the European Markets Infrastructure Regulation (EMIR). Options that have a binary outcome are not specifically flagged in EMIR data, therefore the analysis focuses on the whole universe of OTC-traded options, which is mainly driven by retail client trading activity in terms of number of trades. To proxy retail trading activity, we make use of several reporting fields. First, we identify clients that have never cleared or compressed a derivative. [48] Second, we check whether the ID of the other counterparty reported by the option provider is a client code, instead of a standard industry code such as LEI or BIC. [49] If both conditions hold, the trader is flagged as a retail market participant, and the corresponding trades are flagged as retail trades.

At first, we analyse the change in the number of active market participants in OTC-traded options. Through this method, a decline in the number of retail traders amounting to 80% after the ban can be observed in the OTC options market, which is shown in T.60. This suggests that a significant share of the OTC-traded options market was in the form of binary options traded by retail clients. The reason why some retail traders continue to be active after the binary option ban reflects the fact that OTC options include instruments other than binary options (i.e. instruments that are outside the scope of the ban), and possible limitations of the proxy measure used to identify retail investors.

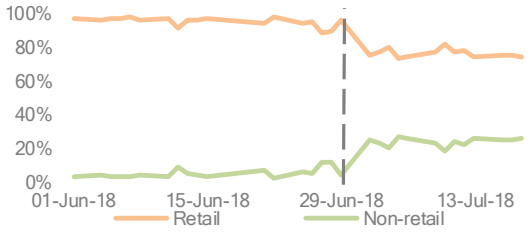
In a second step, we focus on the relative share of retail compared to non-retail clients in the total volumes traded, measured by the number of trades. We observe again a shift in the composition of the trading population, depicted in T.61. The share of OTC options traded by non-retail investors active in the market increased from less than 5% to around one-third of the total. Both results indicate that the ban resulted in a significant decline of retail OTC-traded options.

T.60
Daily number of market participants trading OTC options
Retail participant proxy declines by 80%



Note: Normalized number of market participants trading OTC options. The vertical line shows the date of application of the binary options ban. Retail and Non-Retail traders are categorized by proxy variables (not cleared or compressed, id of other counterparty is a client id) thus the distinction might be imperfect.
Sources: Trade Repositories, ESMA

T.61
Share of OTC options traded
Significant decline in share of retail trades



Note: Relative number of OTC-traded options categorized by retail and professional traders. The vertical line shows the date of application of the binary options ban. Retail and non-retail traders are categorized by proxy variables (not cleared or compressed, ID of other counterparty is a client ID) thus the distinction might be imperfect.
Sources: Trade Repositories, ESMA

[47] For a full definition please see: https://www.esma.europa.eu/sites/default/files/library/esma50-162-214_product_intervention_analysis_binary_options.pdf

[48] By removing clients that have compressed or cleared a derivative (regardless of the type of derivative instrument used or underlying asset class), we aim to exclude from the sample professional clients otherwise engaged in derivatives trading and related services.

[49] Under EMIR, only professional investors are required to report.

Risks

ESMA Risk Dashboard

R.1
Main risks

Risk segments	Level	Outlook
Overall ESMA remit	Orange	→
Systemic stress	Yellow	→
Securities markets	Red	→
Investors	Yellow	→
Infrastructures and services	Yellow	↗

Risk categories	Level	Outlook
Liquidity	Orange	→
Market	Red	→
Contagion	Orange	→
Credit	Orange	→
Operational	Yellow	↗

Risk sources	Outlook
Macroeconomic environment	→
Interest rate environment	↗
EU sovereign debt markets	→
Infrastructure disruptions, including cyber risks	↗
Political and event risks	↗

Note: Assessment of the main risks by risk segments for markets under ESMA's remit since the last assessment, and outlook for the forthcoming quarter. Assessment of main risks by risk categories and sources for markets under ESMA's remit since the last assessment, and outlook for the 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 and 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.

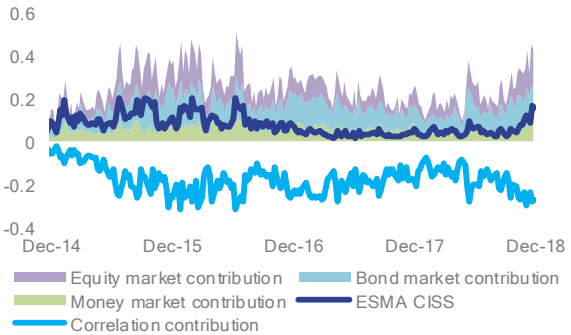
4Q18 was characterised by increasing market nervousness and sensitivity amid global trade tensions, weakening growth prospects, reduced global monetary policy stimulus and political uncertainty in the EU. In this context in 4Q18, volatility on equity and sovereign bond markets increased, equity prices continued to decrease, repricing on corporate and sovereign bond markets continued, and regional developments led to localised sell-offs and increased short-selling activity. Market risk thus remains very high. Our outlook for liquidity, contagion and credit risk remains unchanged. Operational risk remains elevated with a negative outlook, as cyber threats and Brexit-related risks to business operations continue to be a major concern. Going forward, political and geopolitical tensions coupled with weakening growth prospects will likely be the main drivers of volatility. As the Brexit deadline approaches, concerns over a potential no-deal withdrawal increasingly weigh on economic and market expectations.

Risk summary

Market risk remained at a very high level in 4Q18, accompanied by very high risk in securities markets and elevated risks for investors, infrastructures and services. Equity and bond volatility remained high, reflecting sensitivities to events such as trade discussion and geopolitical tensions and the underlying risk of reversal of risk premia. The level of credit and liquidity risk remained high, with a deterioration in outstanding corporate debt ratings and still relatively low corporate and sovereign bond liquidity. Operational risk was elevated as cyber threats and Brexit-related risks to business operations remained major concerns. Investor risks persisted across a range of products and, under the MiFIR product intervention powers, ESMA recently extended the prohibition of binary options and the restrictions on CFDs 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 global trade discussions, 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 to high levels that have been unseen since early 2016. The largest contribution to the increase came from equity markets.

R.2
ESMA composite systemic stress indicator (CISS)
Multi-quarter high, driven by equities



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: Growth forecasts have become more subdued, with downward revisions of the European Commission's EU GDP growth forecast to 1.5% (down from 2.0%) in 2019. Global economic growth has also been revised with projected GDP growth rates of 3.5% for 2019). As regards global economic growth, the expansion has become less balanced and downside risks to global growth have risen in the past six months and have become more differentiated across regions.[50] In the US, stronger-than-anticipated inflation initially reignited investors' fears of more aggressive interest-rate increases. However, in early 2019, the US Federal Reserve put further interest rate rises on hold, citing downside risks to global growth. The macroeconomic environment and its interaction with market expectations, notably over future monetary policy actions, played an active role in recent market sell-offs such as the October equity market price drop. This remains a significant source of risk going forward. Appreciation of the EUR against the USD continued – albeit at a slower pace – with divergences in monetary policies on both sides of the Atlantic.

Interest-rate environment: Risks of a low interest-rate environment now lie the pace of the quantitative easing tapering policies, in the EA and abroad. While search-for-yield behaviour by investors and potential mispricing of assets remain a concern in the short to medium term, market anxiety over signs of a reversal in risk premia was reflected in the global equity sell-off in October. Risk premia on bond markets (both sovereign and corporate) have started showing signs of risk reallocation. Ten-year EA sovereign spreads to the DE Bund increased by 9 bps on average in between the start and the end of 4Q18 (R.9) standing now at a relatively high level. Corporate bond spreads with respect to risk-free rates (as measured by Euribor swap rates) increased significantly for all ratings (R.15), but even more so for lower rated ones, a sign of increased risk premia on these markets. Potential curbing of search-for-yield behaviour is also reflected in the continued net outflows from most fund categories in 4Q18 (R.25, R26). Event risk, for example related to potential escalation of uncertainties in trade discussions is affecting market expectations, thus weighing on the economic outlook and potentially changing anticipations around future monetary policy. In this environment, markets could be more vulnerable to risk premia repricing, hence our continued deteriorating outlook for this risk.

EU sovereign debt markets: In 4Q18, EU sovereign bond yields were characterized by high volatility during short periods of political uncertainty, especially in Italy. Ten-year sovereign yields decreased by 0.2 percentage point on average, although with increases for GR (+0.2 ppt). The Italian ten-year sovereign yield spread to the German Bund climbed above 300 bps several times during 4Q18, higher than at any time since the euro sovereign crisis.

Market functioning: Markets continue to be subject to technical issues as shown by the recent delayed market opening of a German trading venue (15 October). The number of circuit-breaker occurrences was similar to long-term averages over the reporting period, with an average of 129 interruptions per week, and a peak at 295 during the second week of October (compared with a weekly average of 57 during 3Q18, R.35), potentially reflecting higher market volatility. Regarding market infrastructures, central clearing continued to increase amid ongoing implementation of the clearing obligation for derivatives. Central clearing rates for all outstanding OTC credit derivatives grew from 25% to 27% in 2017[51]. For OTC IRDs, central clearing rates grew from 40% in 1Q17 to 58% in 4Q17. On 11 September, following a large divergence in spreads between Nordic and German power markets, a Norwegian power market trader clearing its own trades at Nasdaq Clearing was not able to meet intraday margin calls and declared default. Its positions were subject to a second auction process on 12 September and the cost of the default was at the time covered by the default resources that were available to the CCP including the defaulter's collateral, CCP's own capital (EUR 7mn) and default fund contributions of non-defaulting clearing members (EUR 107mn).

Political and event risk: In the EU, the political risk of a no-deal Brexit, and related developments both in the UK and in the EU remains the most significant risk. At the same time, discussions around the IT budget saw short-lived market reactions, while tensions around potential future reforms in France might be a source of instability. Globally, trade discussions between the US and China were an important driver of equity market volatility, while comments on the future stance of US monetary policy authorities was followed by equity and bond market reactions throughout 4Q18.

Risk categories

Market risk – very high, outlook stable: Equity market price decreased globally in 4Q18.

[50] International Monetary Fund, World Economic Outlook Update, January 2019, and European Commission, Winter 2019 economic forecast.

[51] ESMA Annual Statistical Report – EU Derivatives Markets, 2018

Markets sensitivity to event risks remained high, as a sell-off in US equity markets (–5% in two days) from growing trade tensions and expectations of tighter US monetary policy spread to other regions. EU equities fell heavily this quarter (–13%). Volatility was high on equity (16% at end 4Q18, up from 8% at the beginning of the quarter) and commodity markets (27% at end 4Q18, up from 14% at the beginning of the quarter) this quarter, in what seems to be an end to the artificially low volatilities seen in recent years. Political developments in Europe, together with geopolitical events and discussions over international trade arguments were driving market volatility. On foreign-exchange markets, volatility was high in 4Q18 for the GBP, as Brexit approaches, and for the USD amid a strong US economy and expectations of further monetary tightening from the Federal Reserve, although in early 2019 the central bank signalled that it would put further interest rate increases on hold. Against the EUR, the USD continued to depreciate over the course of the quarter – albeit at a slower pace. As discussed in other sections, interest rate risk represents one of the main market risks in the future.

Liquidity risk – high, outlook stable: Liquidity on equity markets, as measured by the ESMA illiquidity index, started deteriorating during the first half of 4Q18, only to return to its initial level at the end of the quarter (R.4). Sovereign bond market liquidity continued to recover from its very low level of 2Q18, where it was affected by the May sovereign market movements in the EU. Spikes of illiquidity nevertheless occurred in October and December (R.11). On corporate bond markets, the Amihud indicator recovered from September levels, signalling enhanced liquidity; on the other hand, bid-ask spreads first decreased, before increasing again towards the end of the quarter. Trading volumes of centrally cleared repos were subject to seasonal movements only in 4Q18, with long-term growth of volumes appearing to slow down (R.13). Collateral scarcity premia (i.e. the difference between general collateral and special collateral repo rates) increased in December. 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 was high in 4Q18, while the dispersion between Member States has widened (R.19). This is usually a sign of differentiation between a set of core countries and a periphery on EU sovereign markets. Market movements on Italian sovereign bonds only moderately spread to other markets, showing signs of a high but contained contagion risk. Across sectors, the correlation between equity sectoral indices started to increase again in 4Q18 (R.20). Finally, interconnectedness between the non-banking sector, in particular hedge funds, and the banking sector remained at a relatively high level (R.29).

Credit risk – high, outlook stable: In 4Q18, non-financial corporate bond spreads continued to increase largely for lower-rated IG bonds (BBB) but also for other ratings, clearly showing signs of risk premia adjustments. This mainly reflects a repricing of risk given the growth slowdown and political uncertainty in the context of ECB tapering of corporate bond net purchases, which ended in December. Spreads stood within a range of 179bps for BBB-rated securities to 32bps for the AAA class, in comparison with 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, albeit at a slower pace (R.17).

Operational risk – elevated, outlook deteriorating: ESMA recently identified several significant investor protection and conduct risk concerns in the EU. Since 2 July 2018, there has been a ban on the marketing, distribution or sale of binary options to retail investors, which was renewed on 2 January 2019 for a further three months. In addition, since 1 August 2018, CFDs have been subject to a restriction in their marketing, distribution or sale to retail investors, which has been renewed for a further three months, from 1 February 2019 onwards. 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, for both investors and infrastructures, as the possibility of no agreement is significant. Regarding cyber risks, concerns are expected to intensify in the medium to long term, especially with respect to business continuity and the integrity of proprietary data as financial data breaches are increasingly frequent in comparison with breaches in other sectors (R.43.). Finally, the dispersion of Euribor submission quotes decreased slightly in 4Q18 (R.41).

Securities markets

R.3

Risk summary

Risk level

Risk change from 3Q18

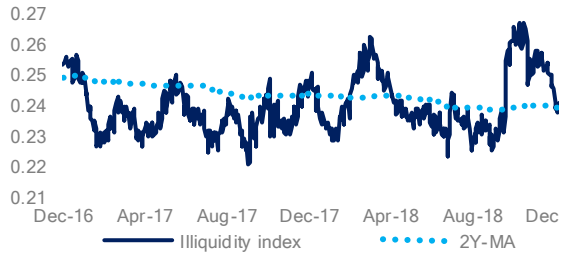
Outlook for 1Q19

Risk drivers

- Reversal of risk-premia
- Political risk
- Geopolitical and event risks, especially Brexit
- Potential scarcity of collateral

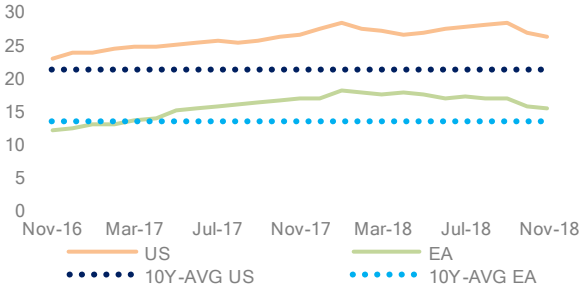
Note: Assessment of the main risk categories for markets under ESMA's remit since the past quarter, and outlook for the forthcoming quarter. Systemic risk assessment based on categorisation of the ESA Joint Committee. Colours indicate current risk intensity. Coding: green = potential risk, yellow = elevated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

R.4
ESMA composite equity illiquidity index
Illiquidity spike at the beginning of 4Q18



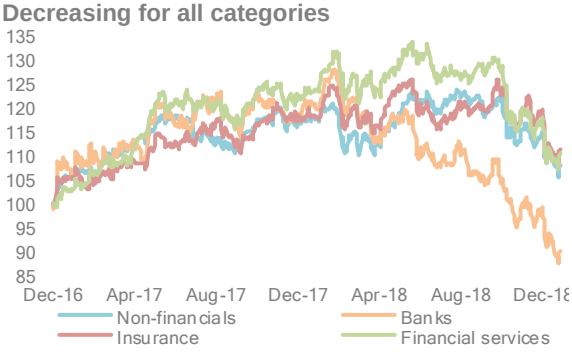
Note: Composite indicator of illiquidity in the equity market for the cur Eurostoxx 200 constituents, computed by applying the principal compor methodology to six input liquidity measures (Amihud illiquidity coefficient, bid- spread, Hui-Heubel ratio, turnover value, inverse turnover ratio, MEC). indicator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

R.5
Equity valuation
Downward trend for EA, decrease in November for the US



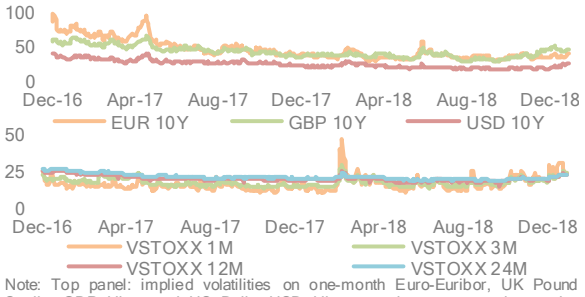
Note: Price-earning ratios based on average inflation-adjusted earnings from the previous 10 years (cyclically adjusted price-earning ratios). Averages computed from the most recent data point up to 10 years before.
Sources: Thomson Reuters Datastream, ESMA.

R.6
Equity prices
Decreasing for all categories



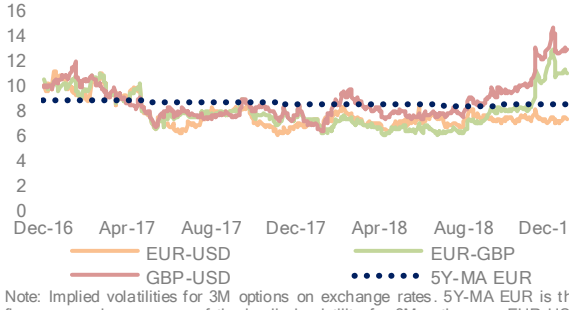
Note: STOXX Europe 600 equity total return indices. 01/12/2016=100.
Sources: Thomson Reuters Datastream, ESMA.

R.7
Financial instrument volatilities
Higher volatilities in 4Q18



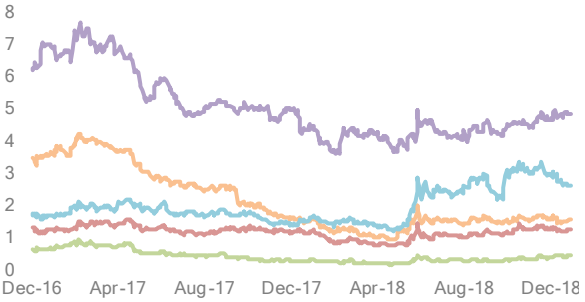
Note: Top panel: implied volatilities on one-month Euro-Euribor, UK Pound Sterling-GBP Libor and US Dollar-USD Libor swaptions measured as price indices, in %; bottom panel: Euro Stoxx 50 implied volatilities, measured as price indices, in %.
Sources: Thomson Reuters EIKON, Thomson Reuters Datastream,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

R.8
Exchange rate volatilities
Jump in volatility for GBP



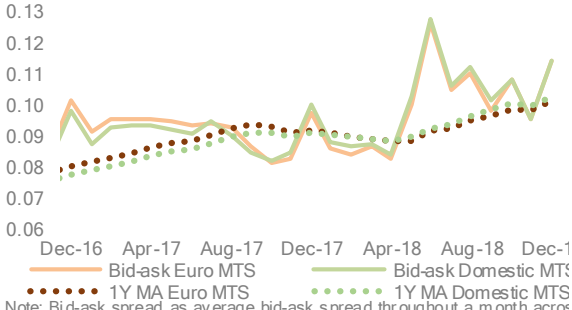
Note: Implied volatilities for 3M options on exchange rates. 5Y-MA EUR is th five-year moving average of the implied volatility for 3M options on EUR-US exchange rate.
Sources: Thomson Reuters EIKON, ESMA.

R.9
Sovereign risk premia
Higher since May 2018



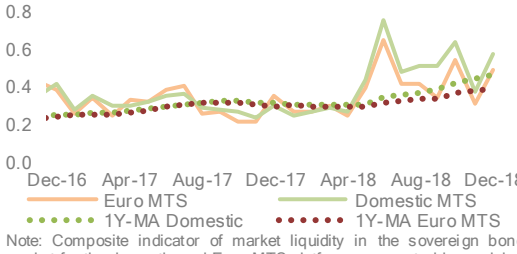
Note: Selected 10Y EA sovereign bond risk premia (vs. DE Bunds), in %.
Sources: Thomson Reuters Datastream, ESMA.

R.10
Sovereign bond bid-ask spreads
Subject to spikes



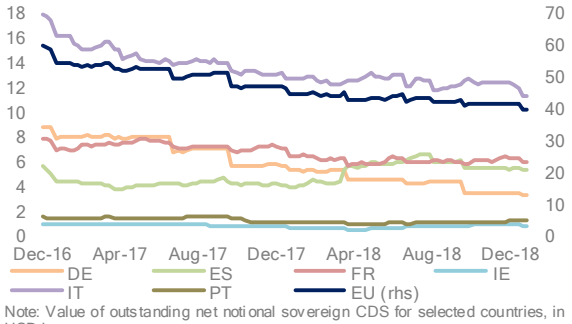
Note: Bid-ask spread as average bid-ask spread throughout a month acros ten EU markets, Domestic and Euro MTS, in %.
Sources: MTS, ESMA.

R.11
ESMA composite sovereign bond illiquidity index
Illiquidity spikes in October and December



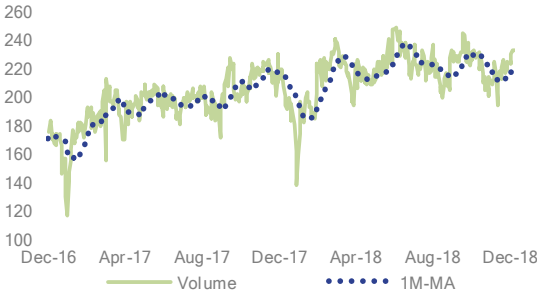
Note: Composite indicator of market liquidity in the sovereign bond market for the domestic and Euro MTS platforms, computed by applying the principal component methodology to four input liquidity measures (Amihud illiquidity coefficient, Bid-ask spread, Roll illiquidity measure and Turnover). The indicator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

R.12
Sovereign CDS volumes
Stable



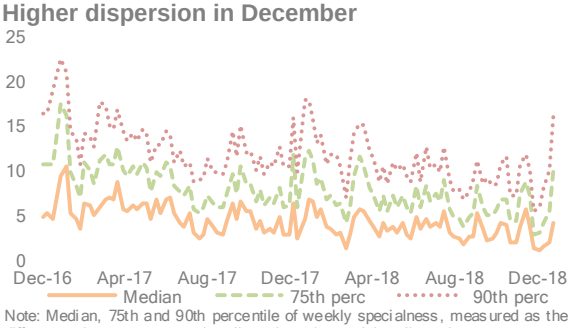
Note: Value of outstanding net notional sovereign CDS for selected countries, in USD bn.
Sources: DTCC, ESMA.

R.13
Sovereign repo volumes
Seasonal movements



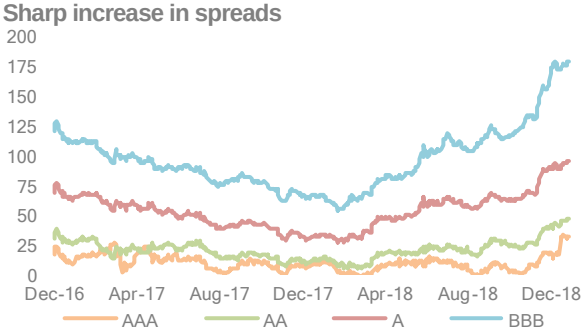
Note: Repo transaction volumes executed through CCPs in seven sovereign EUR repo markets (AT, BE, DE, FI, FR, IT and NL), EUR bn.
Sources: RepoFunds Rate, ESMA.

R.14
Repo market specialness
Higher dispersion in December



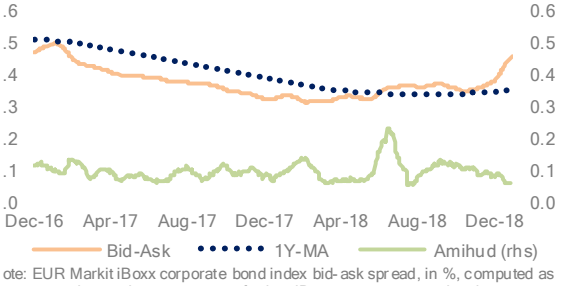
Note: Median, 75th and 90th percentile of weekly specialness, measured as the difference between general collateral and special collateral repo rates on government bonds in selected countries.
Sources: RepoFunds Rate, ESMA.

R.15
Corporate bond spreads
Sharp increase in spreads



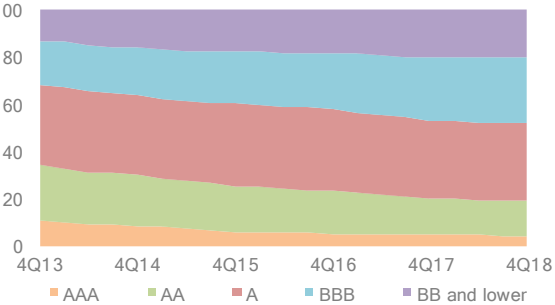
Note: EA corporate bond spreads by rating between iBoxx corporate yields and ICAP Euro Euribor swap rates for maturities from 5 to 7 years, in bps.
Sources: Thomson Reuters Datastream, ESMA.

R.16
Corporate bond bid-ask spreads and Amihud indicator
Lower Amihud indicator despite higher bid-ask



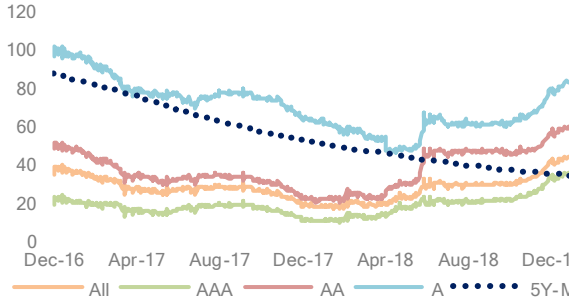
ote: EUR Markit iBoxx corporate bond index bid-ask spread, in %, computed as one-month moving average of the iBoxx components in the current omposition. 1Y-MA=one-year moving average of the bid-ask spread. Amihud iquidity coefficient index between 0 and 1. Higher value indicates less liquidity.
ources: IHS Markit, ESMA.

R.17
Long-term corporate debt outstanding
Rating distribution slightly deteriorating



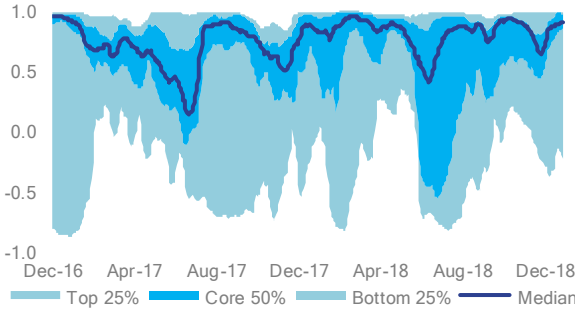
ote: Outstanding amount of corporate bonds in the EU as of issuance date by ating category, in % of the total.
ources: Thomson Reuters EIKON, ESMA.

R.18
Covered bond spreads
Further increase in 4Q18



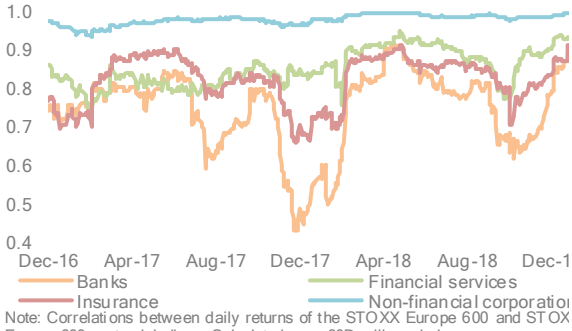
Note: Asset swap spreads based on iBoxx covered bond indices, in bps. 5 MA=five-year moving average of all bonds.
Sources: Thomson Reuters Datastream, ESMA.

R.19
Dispersion in sovereign yield correlation
High correlation



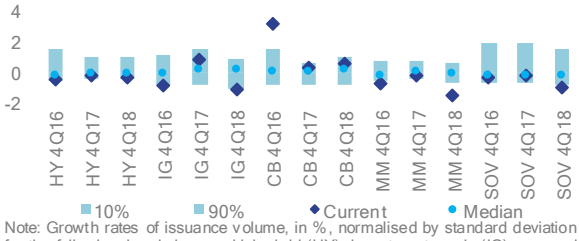
Note: Dispersion of correlations between 10Y DE Bunds and other EU countries' sovereign bond redemption yields over 60D rolling windows.
Sources: Thomson Reuters Datastream, ESMA.

R.20
Sectoral equity indices correlation
Increasing correlations



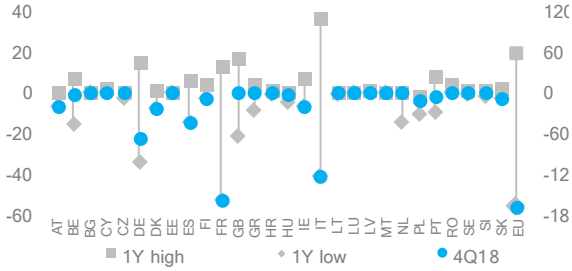
Note: Correlations between daily returns of the STOXX Europe 600 and STOX Europe 600 sectoral indices. Calculated over 60D rolling windows.
Sources: Thomson Reuters Datastream, ESMA.

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



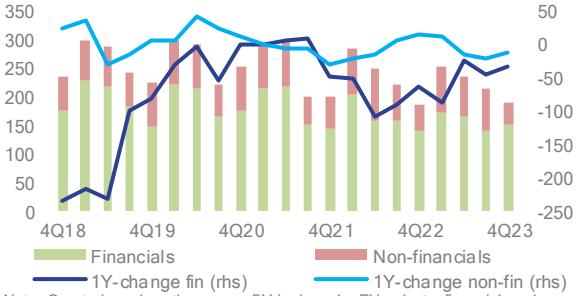
Note: Growth rates of issuance volume, in %, normalised by standard deviation for the following bond classes: high yield (HY), investment grade (IG), covered bonds (CB), money market (MM), sovereign (SOV). Percentiles computed from 12Q rolling window. All data include securities with a maturity higher 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. N issuance calculated as the difference between new issuance over the quarter ar outstanding debt maturing over the quarter. Highest and lowest quarterly n 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-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.

Investors

R.24

Risk summary

Risk level

Risk change from 3Q18

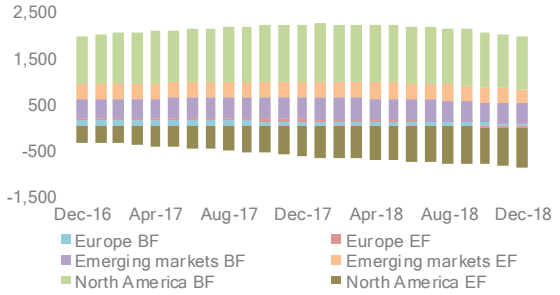
Outlook for 1Q19

Risk drivers

– Asset re-valuation and risk re-assessment
– Correlation in asset prices
– Risky market practices: CAs, ICOs

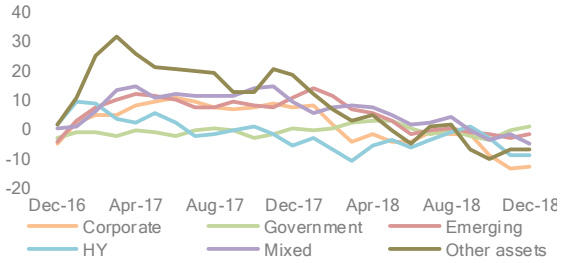
Note: Assessment of the main risk categories for markets under ESMA's remit since the past quarter, and outlook for the forthcoming quarter. Systemic risk assessment based on categorisation of the ESA Joint Committee. Colours indicate current risk intensity. Coding: green = potential risk, yellow = elevated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

R.25
Cumulative global investment fund
Outflows from all fund categories in 4Q18



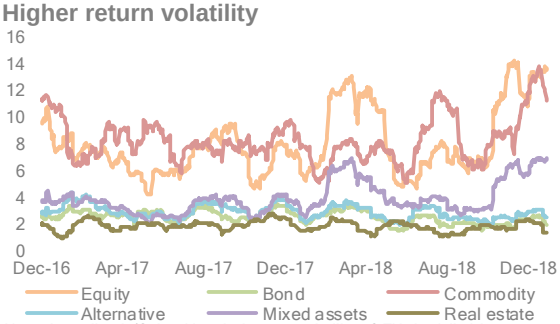
Note: Cumulative net flows into bond and equity funds (BF and EF) over time since 2004 by regional investment focus, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

R.26
EU bond fund net flows
Net outflows for most categories



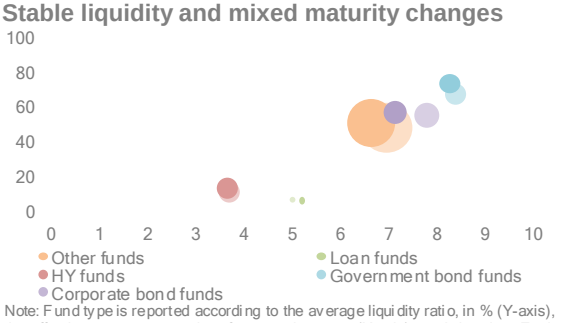
Note: Two-month cumulative net flows for bond funds, EUR bn. Funds investing in corporate and government bonds that qualify for another category are only reported once (e.g. funds investing in emerging government bonds reported as emerging; funds investing in HY corporate bonds reported as HY).
Sources: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

R.27
Rate of return volatilities by fund type
Higher return volatility



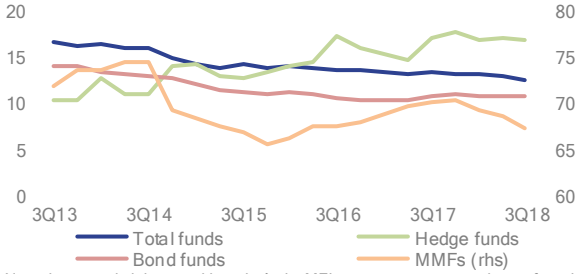
Note: Annualised 40-day historical return volatility of EU-domiciled investment funds, in %.
Sources: Thomson Reuters Lipper, ESMA

R.28
Liquidity risk profile of EU bond funds
Stable liquidity and mixed maturity changes



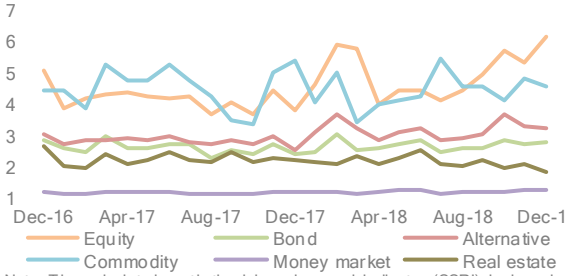
Note: Fund type is reported according to the average liquidity ratio, in % (Y-axis), the effective average maturity of assets, in years (X-axis), and the size. Each series is reported for two years, i.e. 2017 (pale colours) and 2018 (dark colours).
Sources: Thomson Reuters Lipper, ESMA.

R.29
Financial market interconnectedness
High for hedge funds, decreasing for MMFs



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 and commodity funds



Note: The calculated synthetic risk and reward indicator (SSRI) 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 3Q18

Outlook for 1Q19

Risk drivers

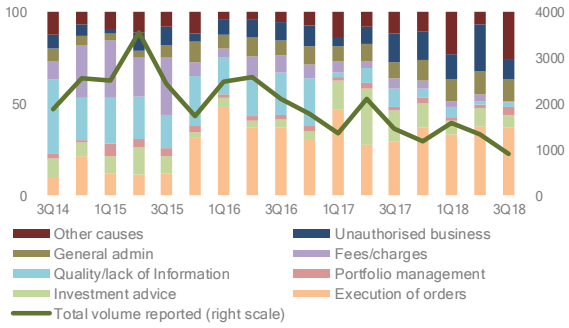
- Operational risks, including cyber and Brexit-related risks
- Conduct risk, including intentional or accidental behaviour by individuals, market abuse
- Systemic relevance, interconnectedness between infrastructures or financial activities, system substitutability

Note: Assessment of the main risk categories for markets under ESMA's remit since the past quarter, and outlook for the 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 and downward arrows a risk decrease. ESMA risk assessment based on quantitative indicators and analyst judgement.

R.32

Complaints indicator by rationale

Execution of orders as the main cause for complaints

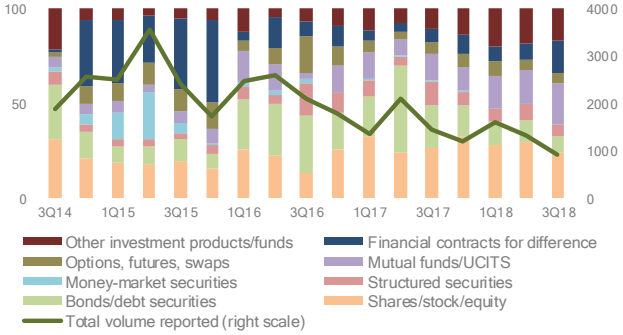


Note: Complaints reported directly to 18 NCAs: AT, BG, CY, CZ, DE, DK, EE, ES, FI, HR, HU, IT, LT, LU, MT, PT, RO, SI. Line shows total volume of these complaints. Bars show % of total volume by cause. Data collected by NCAs.

R.33

Complaints indicator by instrument

Complaints regarding debt securities decline

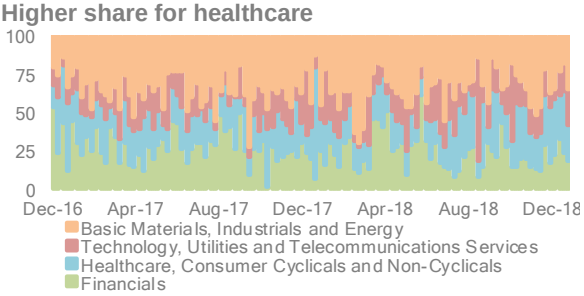


Note: Complaints reported directly to 18 NCAs: AT, BG, CY, CZ, DE, DK, EE, ES, FI, HR, HU, IT, LT, LU, MT, PT, RO, SI. Line shows total number of these complaints. Bars show % of total volume by type of financial instrument.
Source: ESMA complaints database

R.34

Circuit-breaker-trigger events by sector

Higher share for healthcare

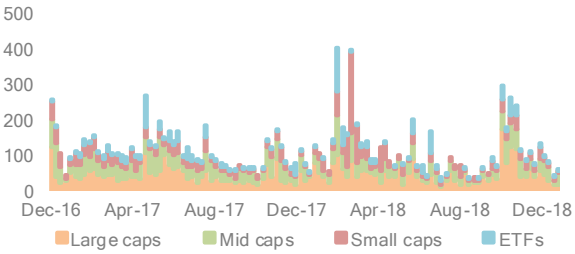


Note: Percentage of circuit-breaker trigger events by economic sector. Results displayed as weekly aggregates.The analysis is based on a sample of 10,000 securities, including all constituents of the STOXX Europe Large/Mid/Small 200 and a large sample of ETFs tracking the STOXX index or sub-index.
Sources: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

R.35

Circuit-breaker occurrences by market capitalisation

Increased number of circuit-breaker triggered

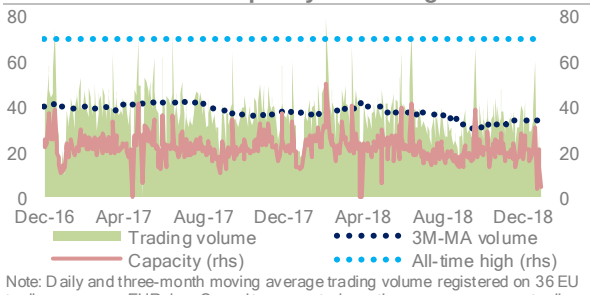


Note: Number of daily circuit-breaker trigger events by type of financial instrument and by market cap. Results displayed as weekly aggregates.The analysis is based on a sample of 10,000 securities, including all constituents of the STOXX Europe Large/Mid/Small 200 and a large sample of ETFs tracking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

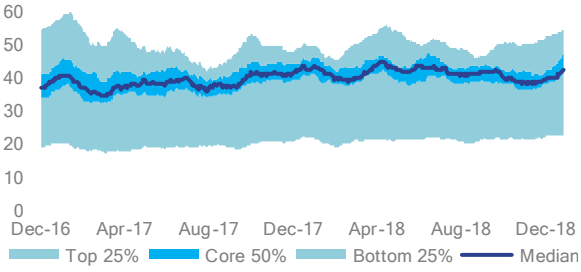


Note: Daily and three-month moving average trading volume registered on 36 EU trading venues, EUR bn. Capacity computed as the average across trading venues of the raio of daily trading volume over maximum volume observed since 31/03/2016, in %.
Sources: Morningstar Realtime, ESMA.

R.37

Equity market concentration

Increasing towards the end of the quarter

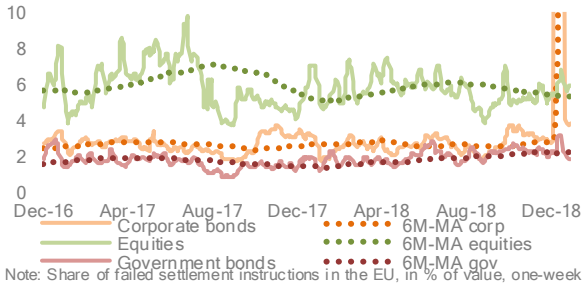


Note: Concentration of notional value of equity trading by national indices computed as a 1M-MA of the Herfindahl-Hirschman Index, in %. Indices included are FTSE100, CAC40, DAX, FTSE MIB, IBEX35, AEX, OMXS30, BEL20, OMXC20, OMXH25, PSI20, ATX.
Sources: BATS, ESMA.

R.38

Settlement fails

Decrease for equities, higher for corporates

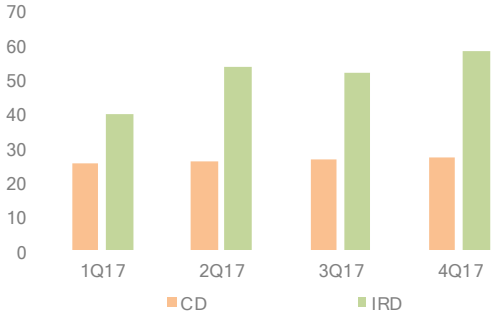


Note: Share of failed settlement instructions in the EU, in % of value, one-week moving averages. Jump in December 2018 due to a single transaction instructed on 10 December with settlement requested on the same day which was finally cancelled on 18 December 2018 (amount of EUR 500bn).
Sources: National Competent Authorities, ESMA.

R.39

OTC central clearing rates

Increasing for credit derivatives and IRDs in 2017

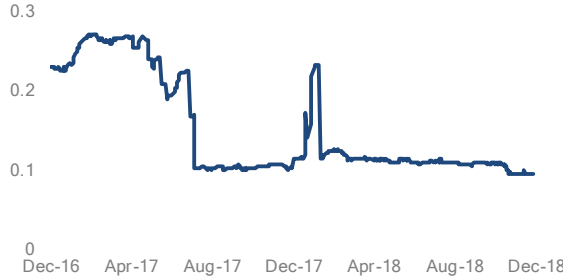


Note: Share of gross notional amount outstanding for credit derivatives (CD) and interest rate derivatives (IRD), in %.
Sources: TRs, ESMA.

R.40

Difference between the Euribor and the maximum contribution

Slightly lower levels in December

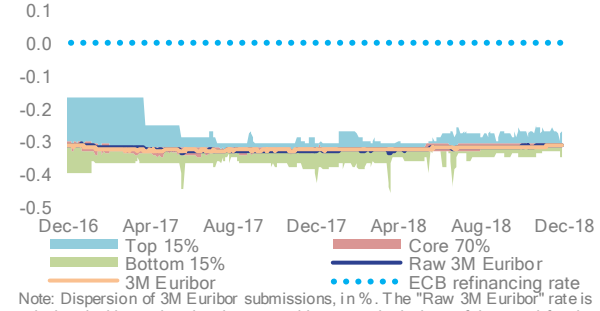


Note: Normalised difference in percentage points between the highest contribution submitted by panel banks and the corresponding Euribor rate. The chart shows the maximum difference across the eight Euribor tenors.
Sources: European Money Markets Institute, ESMA.

R.41

Euribor – dispersion of submission levels

Low and stable overall dispersion

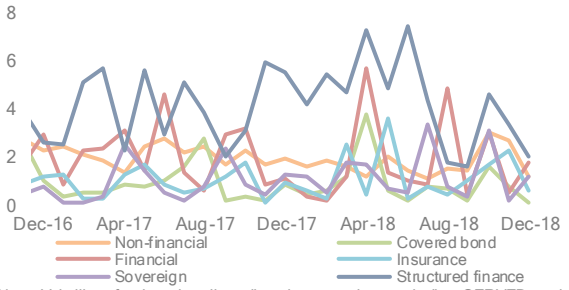


Note: Dispersion of 3M Euribor submissions, in %. The "Raw 3M Euribor" rate is calculated without trimming the top and bottom submissions of the panel for the 3M Euribor.
Sources: European Money Markets Institute, ESMA.

R.42

Rating changes

High rating volatility in October

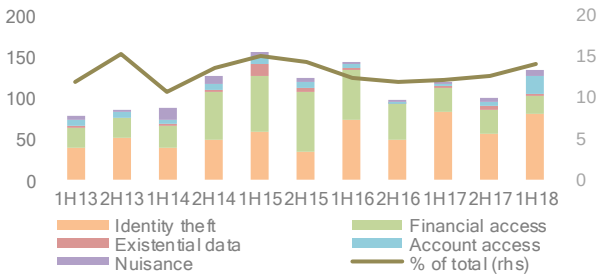


Note: Volatility of ratings by all credit rating agencies, excluding CERVED and ICAP, by asset class computed as number of rating changes over number of outstanding ratings.
Sources: RADAR, ESMA.

R.43

Financial services data breaches

Increasing share for financials



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

Financial innovation

RegTech and SupTech – change for markets and authorities

Contact: patrick.armstrong@esma.europa.eu[52]

Regulatory and supervisory technologies are developing in response to various demand and supply drivers. On the demand side, regulatory pressure and budget limitations are pushing the market towards an increased use of automated software to replace human decision-making activities. This trend is reinforced by supply drivers such as increasing computing capacity and improved data architecture. Market participants are increasingly using new automated tools in areas such as fraud detection, regulatory reporting and risk management, while potential applications of new tools for regulators include greater surveillance capacity and improved data collection and management. With these new tools come challenges and risks, notably operational risk. However, with appropriate implementation and safeguards, RegTech and SupTech may help improve a financial institution's ability to meet regulatory demands in a cost-efficient manner and help regulators to analyse increasingly large and complex datasets.

Background

A combination of supply-based developments and demand-based needs are potentially transforming the way financial institutions comply with regulation and supervisory authorities oversee market participants. This article first seeks to identify the driving forces of this change, and why it is happening now. The article goes on to identify some of the key uses of the technologies being developed and the challenges and risks these technologies may introduce. The analysis has benefitted from numerous correspondence with technological firms at the coal face of these advances, as well as from contact with other global regulators that are seeking to understand how new tools can be best deployed.

The use of technology for compliance and supervisory monitoring predates the financial crisis of 2007. However, the new regulatory landscape, developed in response to the crisis, has been a catalyst for greater use of technology. The use of new technology in this context is evolving on a continuous basis and may soon lead to radical changes in the areas of compliance and supervision.

Foremost among the technological advances are the widespread use of **cloud computing**, the increased acceptance of **Application Programming Interfaces** (APIs) and advances in the fields of **AI and Machine Learning** (AI/ML).

Cloud computing allows for the use of an online network of hosting processors, increasing the scale and flexibility of computing capacity. APIs comprise rules and an interface for communication and interaction between different software programmes. AI is the theory and development of computer systems able to perform tasks that traditionally require human intelligence. ML, a form of AI, is a method of designing a sequence of actions to solve a problem that automatically optimises through experience and with limited or no human intervention.

RegTech describes technology, particularly information technology, used in the context of regulatory compliance, including tasks such as risk management. SupTech is technology used by supervisory authorities.

The next section of this article outlines factors underlying the growth of RegTech and SupTech, characterised in terms of demand and supply, and outlines how these drivers can interact in what is known as a 'regulatory dialectic'. The article goes on to present and discuss RegTech applications by market participants and SupTech applications by firms and describes some challenges for market participants and regulators.

[52] This article was authored by Patrick Armstrong and Alexander Harris.

Drivers

RegTech and SupTech are developing in response to various demand and supply drivers. Demand factors are linked to regulatory changes and market participants' and supervisors' need to process large amounts of data. Supply factors are primarily advances in technology.

Demand drivers

— The regulatory requirements placed on market participants have increased greatly over the past ten years. While many of these regulations were introduced in response to the known market failures that led to and exacerbated the global financial crisis, others reflect the increasingly complex nature of global financial services. Failure to comply with the regulations has significant consequences, which has in turn led to large spending increases on compliance and risk management programs by firms. Examples include increased reporting and compliance obligations implemented pursuant to the Dodd-Frank Act in the US and within the EU the Markets in Financial Instruments Directive (MiFID II).

— There is a continual push for efficiencies and cost savings, particularly for back-end and legacy systems as well as for labour-intensive processes.

— As the financial services sector becomes increasingly digitalised and data-driven the advantages of technology-driven compliance monitoring compared with less automated alternatives have become more and more evident. The increased volume of information needed to monitor and evaluate regulatory compliance creates challenges for enterprise data governance, but also opportunities to use the information for better risk management. Examples include developments in stress testing and enhanced risk monitoring.

— Government-driven mandates in some countries have led firms to implement technologies such as APIs and more effective authentication methods. An example is the Revised Payment Services Directive ('PSD2') in the EU.

— ESMA believes the move towards a more data-driven and pro-active approach will enhance monitoring of the financial sector and help ensure better outcomes for market participants and consumers. As we move towards this more intense, data-driven supervisory process, supervisors and regulators need to adapt. Failure to do so risks undermining the many years of work involved in implementing regulations.

Supply drivers

— In recent years, there has been a sharp drop in the costs of computing power and storage. This enormous increase in capacity is acting as an important catalyst for AI/ML tools, which are extremely data-intensive. Many of these tools are at the heart of the RegTech/SupTech renaissance and could not be deployed in a non-digital infrastructure. For example, cloud computing provides remote access to servers on which large amounts of data can be stored.

— Improved digitalised data architecture minimizes interoperability, reduces redundancy and allows for improved communication among data centres.

— Advances in AI and big data offer new capabilities. For example, pattern-recognition using ML algorithms has wide applications, including in monitoring markets for potential misconduct.

Regulatory dialectic

The emergence of RegTech seems a predictable response to the post-crisis regulatory agenda. It is a clear example of the "regulatory dialectic", whereby regulatory action on the part of public authorities is met by a private-sector response designed to ameliorate the impact of regulations. In some cases, this response may aim to side-step regulations, which may prompt the authorities to tighten the regime further. In other cases, market participants respond by managing their regulatory requirements more efficiently. RegTech fits in to the latter scenario, as it is designed to help firms adapt to regulation in an effective, cost-efficient manner.

RegTech applications by market participants

Regulatory pressure and budget limitations are pushing the market towards an increased use of automated software to replace human decision-making activities. AI/ML tools are often used to implement such automation, with the calibration of the tools based on the recognition of patterns and relationships in large amounts of structured or unstructured data (big data). This section examines the most relevant technologies used in such contexts.

AI and ML

AI/ML techniques can be used to find patterns in large amounts of data from increasingly diverse and innovative sources. AI is a broad field, of which ML is considered a sub-category. Financial firms are exploiting such technologies in the following contexts: (i) customer-focused (or 'front-office') uses such as credit scoring, insurance, and client-facing chatbots; (ii) operations-focused

(or 'back-office') uses, including capital optimisation, model risk management and market impact analysis; (iii) trading and portfolio management in financial markets.

Big data

'Big data' is a term used broadly to describe the storage and analysis of large and/or complicated data sets using a variety of data elaboration techniques. AI/ML tools are generally used in a big data environment, allowing the implementation of new data management platforms that can capture, store and analyse enormous volumes of structured and unstructured data. Financial firms can feed the new data platforms with a variety of data sources:

- Internal sources: customer data are a primary form of proprietary internal data, along with data on all internal operations (assets, liquidity, loans, payments, etc.). Whether from internal or external sources, personal data are subject to strong privacy safeguards under EU legislation. Many datasets are unstructured, making them difficult to work with using traditional infrastructure.
- External sources: a myriad of third-party specialized data providers offer data related to specific contexts, typically via open real-time software interfaces and with standardised query methods.

This large amount and variety of data can be exploited by financial firms using big data technologies to improve business, assure regulatory compliance and analyse trends. Some common RegTech applications by banks and financial services firms are:

- Fraud detection: banks and financial firms use analytics to recognise fraudulent transactions.
- Reporting: regulations require financial firms to report specific business data to authorities.
- Risk management: regulatory schemes require firms to manage a variety of risks in a proper way (e.g.: liquidity risk, operational risk).

SupTech applications by regulators

Regulators are increasingly harnessing the benefits of technology. For example, compliance reporting has frequently not been as efficient as desired. Financial institutions often need to submit information in response to ad hoc requests from regulators. The non-machine-readable data submitted by financial institutions makes the application of data analytics by regulators difficult and time consuming. In turn, some regulators have been investigating how FinTech can be used to make supervision more effective, to improve surveillance and to reduce the compliance requirements imposed on financial institutions.

Potential applications of AI/ML

An area of interest for regulators is the application of AI/ML. Authorities such as the ECB and the US Federal Reserve are using natural language processing (NLP), a form of AI, to help them identify financial stability risks.

Another potential application of AI/ML is to detect trade syndicates in the securities market. Collusive behaviour and price manipulation can be especially hard to detect using traditional methods. Rule-based systems, such as transaction-monitoring systems, have very high false-positive rates, bringing extra, costly, work to both exchanges and regulators. Another challenge that AI/ML tools could help to tackle is complicated network analysis, especially when the network is large and changes over time.

Finally, a challenge for the application of AI/ML arises when a potential misconduct case is detected. At present, external human experts are required to verify that such cases warrant further investigation. As experts are costly to employ and very limited in number, regulators would benefit from any potential extension of AI/ML technologies to this context.

Recent attempts to use ML to detect potential cases of market abuse show some promise. Some regulators, such as the UK Financial Conduct Authority (FCA), have been exploring how best to analyse large datasets to study suspicious trading behaviour. In this context, AI/ML tools may help to identify cases of collusion to manipulate share prices or circular trading to create a false impression of market interest.[53] Such tools can be tested with market data to generate better detection outcome as a result of the following aspects:

- Compared with the high false-positive detection rate of traditional rule-based surveillance systems, ML based surveillance systems have, through mathematical optimisation techniques, been able to reduce false positive rates.
- Some regulators are employing technological tools to reduce the need for humans to manually conduct complicated network analysis. This approach involves analysing years of raw order book data with modern network-analysis techniques. The benefit of this system is not only the processing of large

[53] Relatedly, regulators such as the Bank of Italy are developing AI/ML tools for AML detection.

volumes of data, but also the detection of complicated network relationships across long time periods and often involving substantial numbers of participants.

— ML approaches, especially semi-supervised ML algorithms, can handle certain cases for which human experts' judgement has traditionally been required. In particular, NLP[54] technology could be used to automatically analyse the historical case document and extract meaningful information on which ML algorithms can operate.

Preliminary work by authorities using big data processing systems has made clear that many years of transaction data and even order book data can be analysed. However, further improvement and refinement of these ML-based systems is needed, due to the limited availability of training cases. Other challenges include how ML can be used to detect unknown misconduct and how the results from the ML algorithms can be interpreted.

Risks and challenges for regulators and market participants

Improving data collection and management

A critical step in transforming financial supervision is improving data collection. Currently, the prevalent approach to data collection by regulatory authorities is periodically collecting data in the form of standard reporting templates. Much of the current focus is on creating reporting templates, rather than on the primary data constructing the desired reports. Regulatory reporting can be challenging for financial institutions and is often resource-intensive.

Increasingly, regulatory authorities are exploring opportunities to automate the regulatory processes and create reporting utilities. These are centralised structures that act not only as a common database of reported granular data but also as a repository of the interpretation of reporting rules in a format that is readable by computers. RegTech is therefore offering an alternative and a move away from templates and manual procedures. In the move towards a data-driven supervisory or compliance process, the cleanliness and accessibility of the underlying data is paramount. The use and accuracy of tools such as AI/ML relies upon the strength of the underlying data. This means that prior to the use of data, regulators and supervisors must have the appropriate procedures and systems in place to ensure that the data they receive are of good quality. One possible solution to achieve this is to develop machine-readable regulations, in particular in the field of regulatory reporting. Indeed, the use of IT solutions can help regulators to standardise and codify the information they receive from market participants, making it easier to manage and use the data.

Digital transition

In the wake of the financial crisis, much of the global regulation implemented is highly dependent on technology. A failure on the part of market participants to adapt to the new digitalised infrastructure represents a business risk that may separate winners from losers in the coming years. In addition, failure to adapt to a more automated regulatory compliance process may leave participants with platforms that are ill-suited for the current regulatory framework.

For their part, many in the regulatory community are moving increasingly towards a data driven supervisory process. To process such data, regulators need to invest in the technological tools and human skills that will allow them to effectively analyse the results.[55] In turn, regulators must migrate to a digital-based supervisory process; only then will they be able to cope with the volume of data they will soon receive.

Operational risks

As both regulators and market participants move towards a digitalised architecture, risks related to cyber resiliency must become a core part of their supervisory and compliance strategies respectively. Indeed, as market participants and regulators become increasingly interconnected through regulatory reporting, security risks increase. In addition, reliance on APIs, cloud computing and other new technologies that create increased interconnectivity could potentially make the system more vulnerable to cyber-threats and expose large volumes of sensitive data to potential breaches. A related form of operational risk arising from a move towards greater use of data and risk management tools via third-party providers is concentration risk.

Regulators and market participants will therefore need to devise and implement appropriate strategies to manage these operational risks. To this end, it is important that market participants and regulators cooperate to promote effective

[54] NLP is an interdisciplinary field of computer science, AI and computation linguistics that focuses on programming computers and algorithms to parse, process and understand human language.

[55] One approach may be to set up specific initiatives, such as the Data Science Hub recently set up by the Netherlands Bank. For more detail see Broeders and Prenio (2018).

management and control of cyber-risks and to enhance cyber-resilience.

Risks from strategic incentives

One risk that authorities should bear in mind when developing automated detection tools is the possibility that malicious agents may learn to frustrate the tools by adapting their behaviour. For instance, market participants could, in theory, learn what types of behaviours are likely to cause a flag in a SupTech monitoring system. Using such information, firms might be able to structure their regulatory returns in such a way as to remain undetected. Separately, as firms develop their expertise in RegTech, their systems may become able to identify potential regulatory loopholes.

Conclusion

Just as FinTech is introducing changes to the way in which market participants offer their services, so too will RegTech and SupTech alter the way in which financial institutions and regulators, respectively, comply with the rules and supervise markets. In so doing, these technologies have the potential to reshape the relationship between regulators and market participants. For example, technologies such as APIs are facilitating more efficient filing of regulatory data by market participants, while regulators are looking to develop AI/ML tools to enhance their market surveillance and to improve their capacity for fraud detection. Inevitably, new technological abilities bring with them new challenges and new sources of risk, notably including operational risk. Nonetheless, provided they are implemented correctly and monitored effectively, RegTech tools have the potential to improve a financial institution's ability to meet regulatory demands in a cost-efficient manner and help regulators to analyse increasingly large and complex datasets.

References

Broeders, D. and Prenio, J. (2018), "Innovative technology in financial supervision (suptech) – the experience of early users", FSI Insights No. 9.

Investor protection

Retail AIFs – heterogeneity across the EU

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This article provides an overview of the EU market for Alternative Investment Funds (AIFs) sold to retail investors. It presents the first EU-wide analysis of the structure of the retail AIF market, drawing from data collected as the result of the reporting obligation set out in the Directive on Alternative Investment Fund Managers (AIFMD). Overall, the size of AIFs sold to retail investors accounted for 18% of the AIF market in terms of net asset value (NAV) in 2017. Potential risks related to liquidity transformation and liquidity mismatch are analysed. 2017 data suggest no significant signs of liquidity mismatch for AIFs held exclusively by retail clients. The article also describes the heterogeneity across the EU regarding the distribution of retail AIFs which falls under national law.

Introduction

The global financial crisis highlighted the need for further oversight and transparency to ensure the resilience of the financial system. At the global level, the G20 Summit and the FSB developed a programme to improve global monitoring and regulation of both the banking and the non-banking systems (FSB, 2012), including investment funds.

In the EU, investment funds are regulated under three main fund regimes:

— Undertakings for the Collective Investment of Transferable Securities (UCITS) regime;

— Directive on Alternative Investment Fund Managers (AIFMD) regime which regulates fund investment managers managing alternative investment funds (AIFs) within EU; [57]

— National private placement regimes (NPPR), which regulate the sale of non-EU funds in the EU and enable member jurisdictions to impose national requirements on any sale within national borders.

This article focuses on AIFs sold to retail investors in the context of AIFMD and the marketing of AIFs to retail investors. The article provides the EU regulatory background and gives an overview of the EU retail AIF market.

Background

AIFs

Alternative investment vehicles have gained popularity over the past few years. The low interest rate environment has led several asset classes, especially bonds, to generate insufficient returns for investors. Investors, particularly those who must meet return targets, were therefore encouraged to rely increasingly on alternative assets (ECB (2017)). Indeed, alternative products are characterised by a risk-return profile that is fundamentally different from more traditional forms of investments. Alternative assets can offer potentially high returns, with a higher level of risks than other asset classes.

Regarding investor composition, institutional investors are the largest investors in the alternative market (WEF (2015)). However, a series of changes (such as demographics and pension reforms) are fostering further participation of retail investors in the alternative market. (so-called “retailisation”).

Against this background, regulators and supervisors are keen to ensure access to returns and diversification associated with these products, considering more efficient allocation of capital and increased access to capital markets. At the same time, however, they should guarantee investor protection by providing investors with an adequate degree of transparency and information, as well as additional regulatory and supervisory action if needed.

AIFs under AIFMD

AIFs under AIFMD include a very wide range of investments products and funds, excluding funds authorised under the UCITS Directive. The definition covers not only hedge funds, but also other types of funds, such as private equity funds, real estate, some funds of funds (e.g., funds of hedge funds) and structures that cannot be

[56] Article authored by Lorenzo Danieli, Tania De Renzis, Valeria Salituro.

[57] Directive 2011/61/EU of the European Parliament and of the Council.

regulated under the UCITS regime due to liquidity or portfolio concentration restrictions.

The lack of transparency in the market of non-UCITS investment funds underlines the necessity to introduce an EU-level legislation to regulate managers of AIFs. Although many asset managers were authorised to manage their portfolio and invest under MiFID, several regulatory activities were implemented at the national level. Therefore, the pre-crisis regulatory and supervisory framework for AIFs was not harmonized.

The AIFMD came in as the first form of EU-level legislation aiming to provide an internal market and a harmonised regulatory and supervisory framework for the activities within the EU of all Alternative Investment Fund Managers (AIFMs), regardless of whether they have their registered office in a Member State (EU AIFMs) or a third country (non-EU AIFMs). The Directive deals with the authorisation, ongoing operations and transparency of AIFMs. [58] The AIFMD explicitly requires the NCA of the Member State in which the manager is domiciled to authorise the AIFM to manage or promote a fund. Upon authorisation, AIFMs may access the EU passport for cross-border management of AIFs or cross-border sale of AIF units to professional investors.

The EU passport is not valid under the following requirements:

— Article 36: the AIFM is domiciled in the EU and markets a non-EU AIF in the EU.

— Article 42: the AIFM is not domiciled in the EU, but the AIF is marketed in the EU, regardless of its domicile.

AIFs sold to retail investors: AIFMD regime

The AIFM marketing passport does not extend to the category of retail investors. Nevertheless, the Directive allows AIFMs to market units or shares of AIFs that they manage to retail investors, in their territory, irrespective of whether such AIFs are marketed on a domestic or cross-border basis or whether they are EU or non-EU AIFs. In this instance, Member States may impose stricter requirements than those applicable to AIFs marketed to professional investors.[59]

In other words, besides not directly regulating the products (i.e. the funds), the AIFMD does not cover the marketing of AIFs to retail investors; it only covers marketing to professional investors as defined in MiFID. This is a national prerogative implying a certain degree of heterogeneity and therefore limitations in data availability in terms of Union law. Some examples of different EU national regimes are reported below. We refer to the largest industries in terms of NAV in 2017, according to what has been reported by national jurisdictions to ESMA, within the AIFMD umbrella.

In the UK, restrictions on an AIFM marketing an AIF specify, among other things, that the AIFMD marketing passport cannot be accessed by non-UK managers selling AIFs that are not domiciled in either the UK or the EEA. Such funds are subject to the national private placement provisions in respect of their marketing. Besides general marketing provisions, there are certain cases with specific provisions when marketing is directed to retail investors. [60] Whenever a fund is marketed to a retail client, the EEA AIFM may not sell an AIF unless the FCA has received, from the manager's home state regulator, a notice allowing the marketing of the AIF in relation to the Financial Services and Market Act[61] or it has approved the marketing and not revoked or suspended that approval[62].

Focusing on regulatory fees for AIFs, the variation that exists across jurisdictions should be noted. EEA AIFMs passporting in the UK are required to pay periodic fees in relation to their activities. Charges are based on gross income and funds under management. A discount on fees is allowed according to the fee-block under which the AIFM falls and to the responsibilities that the Member State and the FCA share in it. [63]

In Germany, the marketing of EU AIFs and foreign AIFs, by an EU or foreign AIFM, to retail investors is subject, by law, to certain criteria. These criteria include the following: the AIF and the AIFM being subject to effective public supervision for the protection of investors in the countries in which the AIF and AIFM have their joint registered offices; a satisfying cooperation between BaFin and the foreign supervisory authority of the home countries of the AIF and the AIFM; compliance of the AIFM and its management of AIF with AIFMD; details on, among others, compliance function, depositary, paying agent and asset value; minimum content in fund rules, the articles of association or the company agreement, among others open/closed-

[58] Directive 2014/65/EU of the European Parliament and of the Council.

[59] See Article 43 (1) of Directive 2011/61/EU of the European Parliament and of the Council.

[60] See Regulation 49 of PERG 8.37.2 (1) and (2) of the FCA handbook.

[61] FCA, Financial Services and Markets Act 2000.

[62] See Regulation 54 of Fund 3.12.1 of the FCA Handbook, "Marketing in the home Member State of the AIFM": https://www.handbook.fca.org.uk/handbook/FUND/3/12.html?date=2018-10-01#DES351

[63] See the FCA Handbook.

end fund thresholds; and fees and charges.[64] Further requirements are imposed for foreign AIFs that are being managed by a foreign AIFM. If the notified foreign AIF is managed by a foreign company, BaFin and the supervisory authority of the third country must reach a suitable agreement about their cooperation. The bilateral agreement between the home country and Germany includes, among others, provisions to avoid double taxation and must ensure effective exchange of information on tax matters.[65] Concerning fees and charges, BaFin charges a fee for each EU sub-fund notified (EUR 2,520 until 31 December 2017 and ,as of 1 January 2018, EUR 1,545), plus an annual fee for each EU sub-fund.[66]

In France, all marketing to retail clients is subject to a preliminary authorisation procedure.[67] Marketing with a passport is possible only when the AIF is established in the EU and the manager is domiciled in France. The applicable regime varies according to the domicile of both the fund and the manager. France does not charge an application fee for outward or inward AIFMD passport authorisations. However, the AMF requires AIFMs passporting into France to pay annual fees based on the amount of AuM wherever localised and notified at a specific date. Passporting of a foreign AIF is subject to the payment of an AMF fee of EUR 2,000 per AIF upfront and per-year.[68]

In Luxembourg, the focus is on foreign AIFs marketed to retail investors. Prior to marketing its units or shares to retail investors, any foreign AIF must have obtained authorisation for such marketing by the Commission de Surveillance du Secteur Financier (CSSF). The authorisation request must include all of the relevant information about the AIF. Furthermore, a foreign AIF is authorised to market its units in Luxembourg if it calculates the redemption prices of its shares at least once a month and it demonstrates sufficient risk spreading. Investment restrictions of foreign AIFs are applied if risk-spreading criteria on securities borrowings, use of derivatives, and real estate assets are not fulfilled. [69] For fees, the CSSF charges a fee for each non-LU AIF marketed in Luxembourg. AIFs with single investment portfolios are charged a lump sum of EUR 2,650, while for multiple compartments funds the fee amounts to EUR 5,000. The same annual flat fee is charged for EEA AIFs, while passport notification does not involve any application fee. Again, considering the largest markets, they all report different regimes in terms of applied charges for passporting, products and entities subject to such fees highlighting a significant heterogeneity across the EU.

AIFs sold to retail investors: PRIIPs regime

The examples above demonstrate a lack of harmonisation across EU countries in terms of AIF marketing to retail investors. This is likely to introduce a degree of heterogeneity not only on the functioning of retail AIF markets themselves, but also on the degree of information and transparency at a retail investor level. Adequate data on the performance and costs of retail AIFs are also not available on a consistent basis, implying investor protection risks.

In that context, rules related to the Packaged Retail and Insurance-based Investment Products (PRIIPs) aim at improving transparency. The aim is to establish uniform rules on the transparency that PRIIPs offer to retail investors[70] in the EEA and, from January 2018, on AIFs made available to retail investors in the EU/EEA.[71]

The product manufacturer (i.e. the manager) must produce a Key Information Document (KID) for the product (i.e. the AIF), publish it on its website and provide it to a retail investor in good time prior to the investment. The content of the

64 Section 317 (2) of the German Capital Investment Code (Kapitalanlagegesetzbuch – KAGB).

65 The above-mentioned rules also apply to feeder AIFs. However, further requirements pursuant to section 317 (3) of the German Capital Investment Code (Kapitalanlagegesetzbuch – KAGB) have to be met. In accordance with Article 4(1) (m) of AIFMD, a feeder AIF is an AIF that invests at least 85% of the assets in units or shares of another AIF (the master AIF), invests at least 85% of its assets in two or more AIFs if those AIFs (the 'master AIFs') have identical investment strategies, or otherwise has an exposure of at least 85% of its assets to such a master AIF.

66 Wherever the AIFM is notified (EU or non-EU) charges are identical.

67 AMF Instruction, Procedure for marketing unit or shares of AIFs – DOC-2014-03. Reference texts: Articles 421-A, 421-1, 421-13, 421-13-1, 421-14 and 421-27 of the AMF General Regulation.

68 Article 22 and Article 24 of AMF Instruction, 'Procedure for marketing unit or shares of AIFs' – DOC-2014-03. Article L621-5-3 4 and D621-27-4 Code Monétaire and Financier.

69 CSSF Regulation No. 15/03.

70 A "retail investor" should be equal to "retail client" as in stated in Article 4(1) of MiFID (Directive 2014/65/EU).

71 Regulation (EU) No 1286/2014 of the European Parliament and of the Council of 26 November 2014 on key information documents (KID) for PRIIPs. There is a transitional period applying for UCITS: a KID (in the PRIIPs sense) does not have to be published until January 2020. Until then, a UCITS can refer to its own key investor information document.

KID is set out in the PRIIPs regulatory technical standards.[72]

AIFMD brings access to new reporting data

The reporting obligations established by the AIFMD and the Implementing Regulation provide a standard data collection framework and ultimately improve transparency to NCAs. These obligations together with PRIIPs requirements should ultimately enable NCAs and ESMA to have a complete overview of the AIF and AIFM markets, develop a comprehensive analysis of gross and net performances, and thus better monitor the risks in the EU financial system. This in turns will increase information flows, improve transparency and enhance investor protection. At present, data collected for the end of 2017 cover around 78% of the AIFMs marketing their products in the EU.

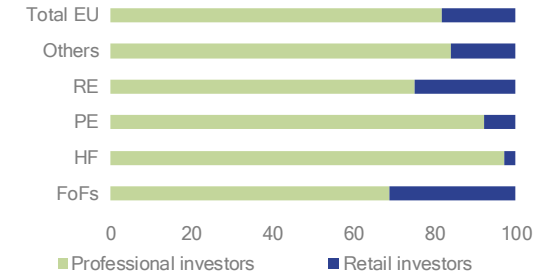
Not all of the data currently reported, however, show an adequate level of quality. Together with the high degree of diversity and complexity in the AIF industry, the quality of relevant information poses challenges from an analytical perspective. ESMA, together with NCAs is currently working on improving the coverage and quality of AIFMD data. From an AIFMD perspective, work is still ongoing trying to ameliorate data quality, but data to be collected from PRIIPs are not yet available.

As already specified in ESMA TRV No.1 2018,[73] the AIFMD reporting obligation represents an unprecedented EU-wide harmonised framework for data collection in the AIF industry and is a first step toward increasing market convergence and integration.

EU retail AIF market: >10,000 funds

The overall EU AIF market size in terms of NAV is around EUR 4.8tn as of end-2017, namely 94% of NAV as reported by the European Fund and Asset Management Association (EFAMA) for the EU AIFs (EUR 5.09tn). V.1 provides a picture of the EU AIF market by AIF types: funds of funds, hedge funds, private equity, real estate and a residual category labelled “others”, distinguishing between retail and institutional investors.

V.1
AIF NAV by type of client
Retail investors focusing on funds of funds and real estate



Note: NAV of AIFs by type of client reported, end of 2017 under the AIFMD, in %. FoFs = fund of funds; HF = hedge funds; PE = private equity; RE = real estate.
Sources: National Competent Authorities, ESMA

The largest share of the market, as expected, is covered by institutional investors. This may be traced back to two forces. Retail investors have focused more on UCITS, as the UCITS Directive was originally developed for retail investors, to increase transparency and reduce risks. Secondly, the AIFMD regulates professional clients whereas retail marketing is left to national regulation. As Member States introduce requirements for AIFs to be marketed to retail investors, we can observe the presence of retail investors in the AIF segment. As of end 2017, 10,179 of the 26,085 AIFs (39% in terms of number of funds) had retail clients among their investors. In terms of NAV, retail clients account for 18% of the market. The investment of retail investors into AIFs is higher for funds of funds (FoFs) and real estate funds (RE), where retail investors account for 31% and 25% of the NAV respectively, while the retail share for hedge funds is around 3%.[74] RE is an asset class that is assuming increasing importance among UCITS mainly investing in alternative assets. Regarding FoFs (Brown et al., 2003), they reduce risks specific to hedge fund and the lack of transparency. FoFs, while also holding shares in hedge funds, provide investors with higher diversification and so probably attract more retail investors. However, as already pointed out by Brown et al., FoFs potential charge high fees , with an incentive fee component that may, in some cases, exceed the realised return on the fund. Furthermore, it must also be highlighted that, typically, FoFs pass on to the investor all of the fees charged by the constituent funds as after-fee returns.[75]

[72] Commission Delegated Regulation (EU) 2017/653 of 8 March 2017 supplementing Regulation (EU) No 1286/2014 on KID for PRIIPs.

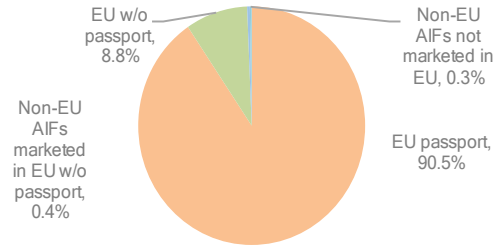
[73] Data relates to data available according to AIFMD reporting at the end of October 2018.

[74] ESMA (2018) reports 35% (FoFs) and 27% (RE) for all investors professional and retail for 2016.

[75] Brown et al., (2003), note, the following: “the more diversified the fund is, the greater the likelihood that the investor will incur an incentive fee regardless of overall fund performance. In fact, there is a significant probability that the incentive fee will be so large that it absorbs all of the annual fund return. […] and diversification does not increase the fee burden as an informed investor would face the same fees if they diversified on their own account. The problem arises because investors lack information necessary to hedge incentive fees charged by the underlying hedge funds and passed on to the investor through the FOF in the form of after-fee returns.”

Focusing on the retail segment, the majority of the assets of AIFs sold to retail investors, 91% (V.2) benefits from the passporting regime, i.e. can be sold across the EU. Similarly, this is the case for professional investors, where AIFs totalling 73% of NAV benefit from the passporting regime.

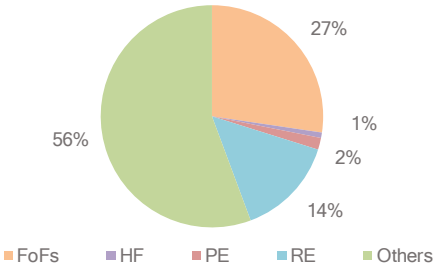
V.2
AIFMD passport by NAV of retail investors AIFs
Large use of passporting regime



Note: NAV of retail AIFs by manager's access to AIFMD passport, end 2017, %. Authorised EU AIFMs access AIFMD passport or market non-EU AIFs to professional investors w/o passport, sub-threshold managers are registered only in national jurisdictions w/o passporting rights.
Sources: National Competent Authorities, ESMA

Looking at the types of AIFs that retail investors invest in, "Other Funds" account for the largest share at 56%, followed by FoFs and RE (V.3). The Others category consists of fixed income funds, equity funds, infrastructure funds, commodity funds and other funds.[76]

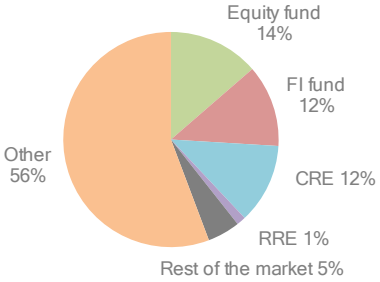
V.3
Retail investor NAV by AIF type
High concentration in "Other", FoFs and RE



Note: Share of NAV of AIF by type, retail clients, end 2017, in %. Reporting according to AIFMD. AIFs managed by authorised and registered managers.
Sources: National Competent Authorities, ESMA

Therefore, we also look at the structure of the retail AIF market according to the strategy classification. According to a previous study focusing on all clients, fixed income held the largest share of NAV in 2016 (ESMA (2018)). Focusing on retail clients, the largest share, in 2017, was the category "Other" with 56% (V.4), which includes FoFs and is in line with what has previously been shown. In the RE there is also a prevalence towards CRE (commercial real estate) which could give rise to prudential risks (ESMA (2018)).

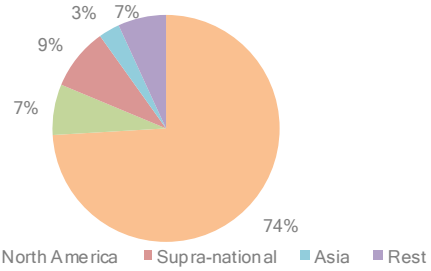
V.4
Retail investors NAV by AIF strategy
Five dominant investment strategies



Note: Share of NAV by investment strategy, end of 2017 retail clients, reporte under AIFMD, in %. FI = Fixed income; CRE = Commercial real estate; RRE Residential real estate.

Looking at the regional investment focus (V.5), according to the data reported by EU-domiciled AIFMs on behalf of their funds, EEA is the dominant investment region for funds with a 100% retail client participation, with 74% of assets domiciled in the EU.

V.5
NAV by regional investment focus
Retail AIF: Europe as key investment area



Note: NAV of AIFs by regional investment focus, retail clients, end of 2017, in %, reporting according to the AIFMD. AIFs managed by authorised and registered AIFMs. Sources: National Competent Authorities, ESMA.

Liquidity risks: elevated, but no systematic mismatches

Liquidity risk is one of the most prominent risks in the fund industry. Funds performing liquidity transformation allow investors to redeem their shares on a daily or weekly basis while investing in illiquid assets. Liquidity risk can be amplified by the use of leverage, exposing investors to potentially large losses. Redemption rights and liquidity mismatches are therefore crucial for clients and especially retail clients, which potentially have a lower degree of information and flexibility than professional investors. Therefore, one of the main features of UCITS products relates to portfolio diversification and eligibility criteria to certain types of assets.

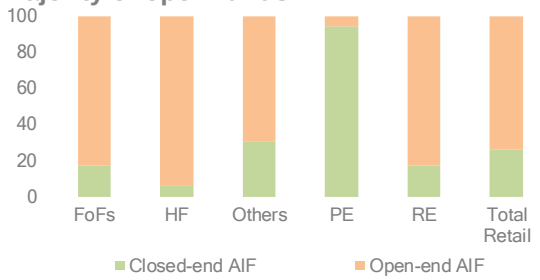
On the AIF side, being alternative implies that these types of products inherently involve a higher degree of risk. Regulators, however, set out specific requirements. Besides, risk management requirements, both the AIFMD and

[76] See Annex IV to Commission Delegated Regulation (EU) No 231/2013 supplementing Directive 2011/16/EU.

the Delegated Regulation No. 231/2013 include provisions to ensure sound liquidity management.[77]

According to the AIFMD sample as reported in 2017, open-ended funds make up the greatest share of NAV, more than 70% of NAV (V.6). The open-ended feature adds to the risk of potential liquidity mismatches. In this respect, the AIFMD requires specific disclosures to NCAs and investors.[78] These include a description of the investment strategy and structure of the AIF as well as information on redemption rights, notice periods, lock-up periods and circumstances in which the normal redemption mechanisms might be suspended.[79]

V.6
Redemption rights to retail investors
Majority of open-funds

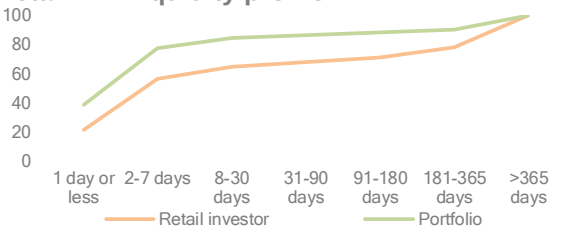


Note: NAV of AIF by redemption rights offered to retail clients, end 2017, %, reporting according to AIFMD. AIFs managed by authorised and registered AIFMs.
Sources: National Competent Authorities, ESMA.

Potential liquidity mismatches may arise from the difference between portfolio and investor liquidity profiles, shown in aggregated terms in V.7. The portfolio liquidity profile refers to the time needed by the fund to liquidate its assets whereas the retail investor profile refers to the shortest period at which the investor itself can redeem the fund.

Overall, as shown in V.7, AIFs with 100% participation of retail clients show no sign of significant liquidity mismatches. The percentage of the fund portfolio that can be liquidated within a specified time period is always higher than potential redemption by investors over the same time frame. The only asset type that presents a different liquidity risk profile is hedge funds with 100% retail client participation. According to reporting, until three months no liquidity mismatches are identified for hedge funds. However, for longer time periods, the percentage of portfolio liquidity is lower than investor liquidity needs.

V.7
Portfolio and investor liquidity
Retail AIF: liquidity profile



Note: AIFs portfolio and investor liquidity profiles, retail investors. The portfolio liquidity profile is determined by the percentage of the fund portfolios that can be liquidated within the period specified on the horizontal axis. The retail investor liquidity profile reflects the shortest period at which the fund could be withdrawn or investors could receive redemption payments.
Sources: National Competent Authorities, ESMA.

Conclusion

This article provides a general overview of the retail AIF market.

The main findings are that:

— professional investors make up the largest proportion of the AIF market;
— as of end 2017, investments by retail investors in AIFs occur in 39% of funds and account for 18% in terms of NAV;
— FoFs and RE funds have the largest share, 31% and 25% respectively;
— 91% of retail AIFs are managed by authorised AIFMs, with significant use of passporting regime;
— 91% of the assets of AIFs sold to retail investors are managed by authorised AIFMs;
— in terms of liquidity risk, overall, AIFs with 100% participation of retail clients show no sign of noteworthy liquidity mismatch. The only asset type that presents a different liquidity risk profile is hedge funds.

[77] Article 16 of Directive 2011/61/EU of the European Parliament and of the Council states that AIFMs shall for each fund managed that is not closed-ended, employ an appropriate liquidity management system. Article 43 of the Delegated Regulation 231/2013 requires that managers demonstrate to the relevant NCAs of their home Member State that an appropriate liquidity management system and effective procedures are in place in relation to the investment strategy, liquidity profile and the redemption policy of the AIF they manage.

[78] See Articles 23 and 24 of Directive 2011/61/EU of the European Parliament and of the Council. Reporting template for regulatory disclosures 2013/1359.

[79] ESMA (2018) reports that half of the open-ended AIFs analysed in the cited paper, including open-ended AIFs that this report refers to, disclose that they require redemption notice to investors. The use of lock-up period is limited.

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Orderly markets

DVC mechanism – impact on EU equity markets

Contact: claudia.guagliano@esma.europa.eu[80]

We provide evidence on the impact of MiFID's DVC mechanism on European equity markets in the first six months of its application. The DVC mechanism introduces limits on the amount of transactions executed in dark pools and aims to protect the price discovery process in equity markets. We find that, overall, for equities, most of the trading is executed in lit markets. We also analyse the impact of the DVC mechanism on market liquidity in lit markets, building on a set of market liquidity indicators. The results are mixed. For equities banned by the DVC mechanism, market liquidity in lit markets improved in terms of tightness, breadth and depth (measured by bid ask spreads, turnover, and the Amihud index), while it worsened when measured by the turnover ratio and average trade size.

Background

In the past ten years European equity markets have changed profoundly owing to several factors, including the implementation of MiFID combined with the effect of technological advances. Following the introduction of MiFID, competition between venues in the trading of financial instruments has increased significantly. Across countries, in 2018 the market share of the incumbent national exchange was, on average, between 60% and 70% of total European electronic order book trading in equities.[81] The rapid technological changes and, in particular, the growth of automated trading and high-frequency trading have raised concerns about possible new risks to the orderly functioning of markets. Moreover, the financial crisis highlighted the weaknesses in the functioning and the transparency of financial markets, and the need to strengthen the regulation. Against this background, MiFID II and MiFIR were published in 2014[82], triggering a major overhaul of European securities legislation.

A key goal of MiFID II/MiFIR is to ensure a higher level of transparency. For equity trading this goal is related to the need to ensure the proper functioning of the price-formation process and it has been translated in the so-called DVC mechanism. The DVC mechanism introduces limits on the amount of transactions executed in dark pools and aims to protect the price discovery process in equity markets.

In this article we focus on the impact of the DVC mechanism on European equity markets in the first six months of application. After providing a review of the regulatory background, we present some empirical evidence for the period between January 2018 and September 2018, based on MiFID DVC data, related to the changed trading patterns in EU equity markets. We find that, overall, for equities most of the trading is executed in lit markets. For the equities banned by the DVC mechanism in March 2018 and for which the ban ended in November 2018, the amount of trading executed in dark pools[83] dropped as expected, from more than 7% in January 2018 to less than 1% of the total in August 2018,[84] while the share of trading in periodic auctions increased over the same period from virtually 0% to 4% of the total. However, as the restriction for a number of instruments ended in September, the volume of trading executed in dark pools increased to more than 5% and the volume in periodic auctions declined to 2%. Then, using commercial databases for the period between January 2018 and August 2018, we analysed the impact of the DVC mechanism on market liquidity in lit markets, building on a set of market liquidity indicators. The results are mixed. For equities banned by the DVC mechanism, market liquidity in continuous trading and auction

[80] The article has been authored by Claudia Guagliano, Cyrille Guillaumie, Alessandro Spolaore and Arianna Zanon.

[81] See Fidessa Fragmentation Index https://fragmentation. fidessa.com/ and FESE (2018).

[82] Directive 2014/65/EU (MiFID II) https://eur-lex.europa.eu /legal-content/EN/TXT/HTML/?uri=CELEX:32014L0065& from=en and Regulation No. 600/2014 (MiFIR) https://eur-lex.europa.eu/legal-content/EN/TXT /HTML/ ?uri=CELEX:32014R0600&from=EN.

[83] In this article we define trading in dark pools as the trading happening under the negotiated transactions waiver or the reference price waiver.

[84] As explained in the section "Regulatory background", the share of trading in dark pools for the banned equities is higher than 0 because for some ISINs the ban can be applied to one trading venue.

markets (lit markets) generally improved in terms of breadth, tightness and depth (measured by bid ask spreads, turnover, and the Amihud index and the turnover ratio) but it worsened when measured by the turnover ratio and the average trade size.[85]

Regulatory background

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 published 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, resulting in a lack of price discovery. To address this issue, MiFID II introduced the DVC mechanism to limit the amount of dark trading in equities allowed under the reference price waiver and the negotiated trade waiver for liquid instruments.[86] 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 EU 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.[87]

When the percentage of trading in a financial instrument carried out on a trading venue under the waivers has exceeded the 4% limit, the use of those waivers in the financial instrument is suspended on that venue for a period of six months. When the percentage of trading in a financial instrument carried out on all trading venues across the EU under those waivers has exceeded the 8% limit, the use of those waivers is suspended in all trading venues across the EU for a period of six months.[88]

Every month the DVC is calculated per instrument (ISIN) on the basis of the average of trading executed in that instrument over a rolling period of twelve months.

ESMA regularly publishes the results of the DVC on its website in the Double Volume Cap Register. The results were first published on 7 March 2018.[89]

As of September 2018, the application of the DVC resulted in the suspension of dark trading for more than 1200 instruments, mainly equities.

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85 The sample used for the econometric analysis is based on commercial databases and includes a subset of the equities banned by the DVC mechanism.

86 The volume cap mechanism shall not apply to negotiated transactions which are in a share, for which there is not a liquid market (MiFIR article 5). In a liquid market a share is traded daily where the market is assessed according to the following criteria: i) the free float is not less than EUR 100 million for shares admitted to trading on a regulated market and not less than EUR 200 million for shares that are only traded on MTFs; ii) the average daily number of transactions in the share is not less than 250; iii) the average daily turnover for the share is not less than EUR 1 million (Commission delegated regulation (EU) 2017/567).

87 According to Article 5(1) of MiFIR, to ensure that the use of the negotiated trade waiver and of the reference price waiver (provided for in Article 4(1)(a) and 4(1)(b)(i) of MiFIR) does not unduly harm price formation, trading under those waivers is restricted as follows: (a) the percentage of trading in a financial instrument carried out on a trading venue under those waivers shall be limited to 4% of the total volume of trading in that financial instrument on all trading venues across the Union over the previous 12 months. (b) overall Union trading in a financial instrument carried out under those waivers shall be limited to 8% of the total volume of trading in that financial instrument on all trading venues across the Union over the previous 12 months.

88 See Article 5(2) of MiFIR: "When the percentage of trading in a financial instrument carried out on a trading venue under the waivers has exceeded the limit referred to in paragraph 1(a), the competent authority that authorised the use of those waivers by that venue shall within two working days suspend their use on that venue in that financial instrument based on the data published by ESMA referred to in paragraph 4, for a period of six months". See also Article 5(3) of MiFIR: "When the percentage of trading in a financial instrument carried out on all trading venues across the Union under those waivers has exceeded the limit referred to in paragraph 1(b), all competent authorities shall within two working days suspend the use of those waivers across the Union for a period of six months".

89 ESMA shall regularly publish the results of the DVC mechanism on its website in the Double Volume Cap Register. On a temporary basis, the results of the DVC mechanism will be published on the ESMA website in spreadsheet format. https://www.esma.europa.eu/double-volume-cap-mechanism

Periodic auctions

With the application of MiFID II and MiFIR on 3 January 2018, periodic auction trading systems have been rapidly gaining market share. This trend has further accelerated following the start of the first suspensions of trading under the DVC waivers for instruments in March 2018.

Sometimes also called auctions on demand, the periodic auction trading systems for equity instruments are auctions of a very short duration triggered by market participants ('frequent batch auctions') and occurring during the trading day.[90] MiFID II and MiFIR do not provide a definition of periodic auction trading systems as such. However, Commission Delegated Regulation 2017/587 further specifies the pre-trade transparency requirements for different types of trading systems, including periodic auction trading systems. According to Table 1 of Annex I of the Delegated Regulation a periodic auction trading system is 'a system that matches orders based on a periodic auction and a trading algorithm operated without human intervention'.[91]

Trading venues operating periodic auction systems collect offers to sell (buy) financial instruments at or above (below) a minimum (maximum) price by the selling (buying) firm. Based on those offers, the trading algorithm determines a single 'uncrossing' price which maximises the volume of instruments that can be executed at that price.

Periodic auctions are not a new development; they have been used for a long time, either in the form of closing and opening auctions to set the price for the beginning or the closure of the trading day or, for less liquid instruments, in the form of intra-day auctions to gather sufficient liquidity to allow trading. Moreover, following a trading interruption due to market volatility, most trading venues resume normal operations via an auction. Those trading systems can be labelled as 'conventional periodic auction systems'.

Recently, with frequent batch auction systems a new type of periodic auction trading system has gained market share. While those frequent batch auctions, including auctions on demand, function in a similar way to conventional periodic auctions operated by many trading venues, two differences between conventional periodic auctions and the frequent batch auctions can be noted.

First, the duration of frequent batch auctions is very short and lasts only some milliseconds, as opposed to conventional periodic auctions that last several minutes. Second, whereas conventional periodic auctions are scheduled by the trading venue, for frequent batch auctions two different models for triggering an auction exist. One commonly used approach is to collect trading interest throughout the day, and to trigger a 'call period' every time a pair of opposing orders can be matched. Another frequent approach is to trigger an auction as soon as one order has been submitted.

On 9 November 2018, ESMA published a call for evidence on this issue to gather further insights from stakeholders before concluding its assessment and considering whether further ESMA measures or recommendations are needed for those new types of trading systems.[92]

Empirical evidence

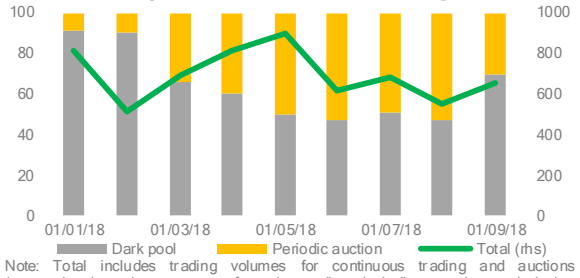
ESMA published the calculations related to the DVC mechanism for the first time on 7 March 2018, and, since then, it has published the results monthly. The total number of ISINs in the DVC mechanism scope was more than 25,000 as of September 2018. Overall, for the ISINs included in the sample, volumes of continuous trading and auctions (including opening and closing auctions and post-circuit-breaker auctions) represent most of trading, being constantly well above 90%. In the overall sample, periodic auctions increased from less than 0.1% at the beginning of 2018 to around 2% in September 2018. Trading in dark pools under the reference price waiver, and the negotiated trade waiver, decreased from around 5% at the beginning of 2018 to less than 3% in September 2018. During the same period, the total volume traded remained broadly stable, around EUR 680bn on average over ten trading days (V.1).

[90] Budish et al (2015) find that when high-frequency trading is prevalent, frequent batch auctions may eliminate the mechanical arbitrage rents, enhance liquidity for investors, and stop the high-frequency trading arms race.

[91] Commission Delegated Regulation 2017/583 (RTS 2) provides for the same definition for periodic auction trading systems for non-equity instruments.

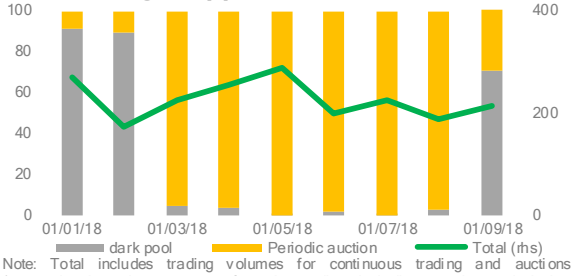
[92] https://www.esma.europa.eu/press-news/esma-news/esma-launches-call-evidence-periodic-auctions-equity-instruments. The call for evidence ended on 11 January 2019.

V.1
Trading volumes for all ISINs in DVC scope
Increase in periodic auction trading



Note: Total includes trading volumes for continuous trading and auctions (conventional auctions as part of regular trading, including opening and closing auctions and post-circuit breaker auctions), periodic auctions and under the waivers trading, in EUR bn. Trading volumes under the waivers and in periodic auction expressed as a share of the sum of under the waivers and periodic auctions.
Sources: ESMA.

V.2
Trading volume for banned ISINs
Dark trading dropped for banned ISINs



Note: Total includes trading volumes for continuous trading and auctions (conventional auctions as part of regular trading, including opening and closing auctions and post-circuit breaker auctions), periodic auctions and dark pool trading, in EUR bn. Trading volumes in dark pool and periodic auction expressed as a share of the sum of dark pools and periodic auctions.
Sources: ESMA.

The number of ISINs banned by the DVC mechanism as of September 2018 was 1,356 (around 5% of the total).[93]

For the ISINs banned by the DVC publications, volumes of continuous trading and auctions (including opening and closing auctions and post-circuit-breaker auctions) also represent more than 90% of the volumes traded. The ban introduced by the DVC publication mostly affects the share of volumes traded in periodic auctions and in dark pools under the reference price waiver and the negotiated trade waiver. For the 618 ISINs that were banned in March 2018 for the following six months, and for which the ban was removed in September 2018, traded volumes in dark pools experienced large fluctuations. In January 2018, the sum of volumes traded in dark pools and periodic auctions amounted to 8% of the total volume traded, then it declined to less than 3% in March 2018, and then gradually increased to 4% in August and to 7% at the end of September 2018.[94] In particular, the decline was driven by the drop of dark pool volumes which shrank from more than 7% to 0% of the total in August 2018. Over the same period, the volume traded in periodic auctions – i.e. recurring auctions on individual ISINs, based on distinct order books – increased from 0.2% to almost 4% of the total between January and August 2018. When, in September 2018, the ban was removed, the volume traded in dark pools immediately surged to more than 5% of the total, while the share of trading volume in periodic auctions declined to 2% (V.2).

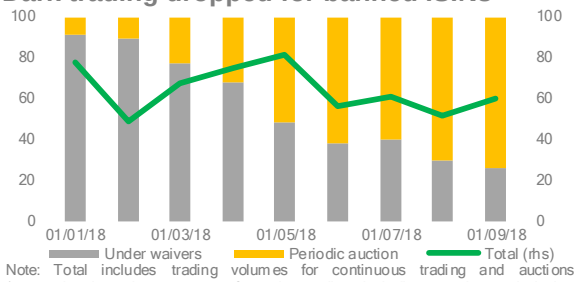
For the ISINs banned by one of the DVC publications between March and September 2018, excluding the ISINs for which the suspension was removed in September 2018, volumes of continuous trading and auctions (including opening and closing auctions and post-circuit-breaker auctions) represent most of the trading, being constantly above 90%. These ISINs experienced a decline of the trading volumes in dark pools, like the ISINs banned by the DVC mechanism in March 2018.[95] However, in contrast with the previous category, in September 2018, the share of trading in dark pools continues to decline and no structural change is observed. In particular, dark pool volumes shrank from almost 8% to 2% of the total between January 2018 and September 2018, while volume traded in periodic auctions – i.e. recurring auctions on individual ISINs, based on distinct order books – increased from 0.7% to 2.4% of the total over the same period (V.3).

93 The large majority of suspensions involved equities for which their percentage of trading across all trading venues under the waivers goes beyond 8% of the total volume of trading in that financial instrument across all EU trading venues over the previous twelve months. Less than 1% of suspensions concerned equities for which their percentage of trading on a single trading venue under the waivers went beyond 4% of the total volume of trading in those financial instruments across all EU trading venues over the previous twelve months.

94 Volumes traded under the large in scale waiver are excluded from the analysis as they are outside the scope of the DVC publication.

95 The decreasing share of trading in dark pools derives directly by the increasing number of ISINs getting banned by the subsequent publications.

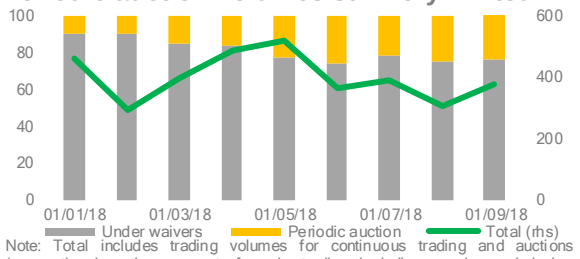
V.3
Trading volume for banned ISINs
Dark trading dropped for banned ISINs



Note: Total includes trading volumes for continuous trading and auctions (conventional auctions as part of regular trading, including opening and closing auctions and post-circuit breaker auctions), periodic auctions and under the waivers trading, in EUR bn. Trading volumes under the waivers and in periodic auction expressed as a share of the sum of under the waivers and periodic auctions.
Sources: ESMA.

Finally, for the ISINs that have never been affected by the ban introduced by the DVC mechanism over the period considered (around 24,000 ISINs), trading volumes remained broadly stable in relative terms and no structural changes in trading could be identified. Continuous trading and auctions represent 96% of the total trading volume (up from 95% at the beginning of the year), while volumes traded in periodic auctions slightly increased from less than 0.1% to around 1% of the total; trading volumes in dark pools under the reference price waiver and the negotiated trade waiver slightly decreased from around 4% at the beginning of the year to around 3% of the total volume traded in September 2018 (V.4).

V.4
Trading volumes for non-banned ISINs
Periodic auction volumes still very limited



Note: Total includes trading volumes for continuous trading and auctions (conventional auctions as part of regular trading, including opening and closing auctions and post-circuit breaker auctions), periodic auctions and under the waivers trading, in EUR bn. Trading volumes under the waivers and in periodic auction expressed as a share of the sum of under the waivers and periodic auctions.
Sources: ESMA.

Market liquidity impact

We investigate market liquidity in EU equity markets in the period between 1 January 2018 and 30 November 2018, focusing on the impact of the publication of the first calculations of the DVC mechanism by ESMA on 7 March 2018. We analyse market liquidity in continuous trading and auction markets and assess if a different impact on market liquidity could be identified for the equities affected by the DVC ban on 7 March and for those that have not been affected by the ban in the observation period.

It is widely recognised that liquidity is not a concept that is directly observed or uniquely defined and cannot be captured by one single metric. In line with the related literature, we analyse several dimensions of market liquidity building on liquidity proxies that can be meaningfully developed, also relying on trade level data: tightness, depth, breadth and resilience.[96] Tightness identifies the possibility of executing transactions at a low cost. Depth, which using order-level data refers to the existence of enough orders at prices above or below market price, can also be meaningfully proxied by looking at volumes of trades. Breadth can be defined as the ability to transact large volumes with a minimum impact on prices: it can be proxied by the Amihud illiquidity index, by the turnover ratio and by the average trade size. Finally, resilience refers to the availability of liquidity in periods of higher volatility and market stress.[97]

Data used

For this analysis, we use ESMA's Financial Instruments Transparency System (FITRS) data as the primary source. [98] Our sample comprises 1,934 ISINs corresponding to liquid equities. The sample covers 129 trading venues between 1 January 2018 and 30 November 2018. All trading venues on which trades occurred for the ISINs in the sample during the observation period are included. For each ISIN, information is available about the relevant trading types: continuous trading and auction, dark, OTC[99], periodic auction and systematic internaliser. Over the analysed period, 82% of the trades and 64%

[96] We could not analyse those dimensions of market liquidity that require order-level data to more precisely measure liquidity, such as, immediacy, considered as the speed at which orders can be executed.

[97] See De Renzis et al (2018) for a review of market liquidity indicators.

[98] https://www.esma.europa.eu/policy-activities/mifid-ii-and-mifir/transparency-calculations

[99] OTC is identified by the Market Identifier Code (MIC) 'XOFF' corresponding to financial instruments admitted to trading, or traded on a trading venue or for which a request for admission was made, where the transaction on that financial instrument is not executed on a trading venue, SI or organised trading platform outside of the Union, or where an investment firm does not know it is trading with another investment firm acting as an SI.

of the turnover happened in continuous trading and auction markets (V.5).[100]

V.5
Summary statistics
The dataset: trading venue information

	Number of trading venues	Turnover	Number of trades
Continuous trading and auctions	66	372	69,730
SI	38	26	228
Dark	15	58	13,690
Periodic auction	10	7	1,051
OTC	-	123	67

Note: Continuous trading and auctions comprise continuous trading and conventional auctions as part of regular trading (including opening and closing auctions and post-circuit breaker auctions). Periodic auction is a system that matches orders based on a periodic auction and a trading algorithm operated without human intervention. Number of trading venues per type. Turnover in EUR bn, computed as a monthly average. Number of trades in thousands, computed as a monthly average.
Sources: ESMA.

We augment the database with data from Thomson Reuters Eikon to increase the information available for each equity.[101] Following the matching of the two datasets, our sample includes 537 ISINs.

The sample period includes the entry into force of MiFID 2/MiFIR, with the first publication of the results of the DVC mechanism on 7 March 2018. To analyse the impact of the DVC mechanism on the trading structure in the EU markets we keep only those ISINs that do not change status (banned vs non- banned) after the first publication of the DVC mechanism on 7 March 2018. As a result, we are left with 481 ISINs, including 217 banned ISINs and 265 non-banned ISINs.[102]

At the ISIN level, daily information is retrieved from Thomson Reuters Datastream about mid-price, bid-ask spread, returns, returns volatility and market capitalisation (V.6).

V.6
Summary statistics
The dataset: ISIN level information

	Banned	Non-banned
Bid-ask spread	0.002	0.003
Returns	0.002	0.002
Returns volatility	0.7	0.6
Market capitalisation	7.6	8.8
Number of ISINs	217	265

Note: The summary statistics represent monthly averages of January and February 2018. Bid-ask spread in basis points; market capitalisation in EUR bn. Returns are computed as a weekly average and are expressed as a percentage.

Sources: Thomson Reuters Datastream, ESMA.

Empirical approach

We analyse the impact of the DVC mechanism on market liquidity in continuous trading and auction markets following a difference-in-difference approach. The baseline model is the following:

$$Y_{it} = \alpha_i + \beta Ban_{it} + \gamma Event_t + \delta ISIN_{it} + \epsilon_{it}$$

where:

— *i* represents the ISIN included in the analysis and t is a time variable for each trading day between 1 January 2018 and 30 November 2018.

— Y_{it} is one of our liquidity measures. To obtain a comprehensive assessment of the impact on market liquidity, we employ more than one dependent variable measuring its different dimensions: turnover, bid-ask spreads, the turnover ratio, the average trade size and the Amihud illiquidity index.

— Ban_{it} is a dummy variable equal to one for the banned instruments after the first publication of the DVC mechanism on 7 March 2018.

— $Event_{it}$ is a dummy variable equal to one after the first publication of the DVC mechanism on 7 March 2018.

— $ISIN_{it}$ includes the other relevant controls at the ISIN level.

The control variables included at ISIN level are:

— A fragmentation index calculated as the inverse of the Herfindahl-Hirschman Index which is a widely used measure to determine the concentration of a market. This is in line with the Fidessa Fragmentation Index. As shown by Degryse et al (2015) fragmentation may have a significant impact on market liquidity. In particular, visible fragmentation improves liquidity aggregated over all visible trading venues but may lower liquidity in the traditional market.

— The periodic auction share of trading volume, which is closely related to the fragmentation indicator. A larger portion of trading happening in periodic auctions may be negatively related to market liquidity in continuous trading and auctions markets. In the same spirit, the share of daily SI and OTC trading at ISIN level is added.

[100] Volumes traded and transactions in all categories except lit markets may be underestimated. The bias may be particularly relevant for periodic auctions (one trading venue available), dark pools (two trading venues) and OTC (five trading venues).

[101] To analyse market liquidity price information as bid-ask spreads and end-of -day prices are particularly relevant.

[102] The share of banned ISINs in the sample we use for the econometric analysis is much larger than in the sample of ISINs included in the DVC scope (58% vs less than 1%).

— Tick size, which is important for market liquidity. If the tick size is too small, the outbidding cost is extremely low, and liquidity does not aggregate effectively as there are too many increments of possible prices. If the tick size is too large the passive execution latency increases and can discourage investors from placing orders in the book.[103]

— Market capitalisation, which is used to control for firm size. As larger firms generally benefit from larger coverage by financial analysts, they tend to have larger trading volumes and possibly higher market liquidity.

— The lagged volatility of returns, which is added to consider market developments and uncertainty in the market.[104]

Finally, we add time fixed effects in the panel estimation.

Results

The effect of the ban on market liquidity seems to be overall positive (V.7).[105] On the one hand, consistently with the scope of the DVC mechanism, the turnover in continuous trading and auction markets of banned ISINs significantly increased following the ban, meaning that a portion of trading shifted from dark pools to continuous trading and auction markets. This happened even though trading volume in our sample has generally decreased in the same period, as underlined by the sign and the statistical significance of the coefficient of the dummy variable *Event*. In addition, banned instruments have reduced their price responsiveness to volumes traded, since their Amihud illiquidity index is negatively correlated with the *Ban* dummy, suggesting an increase in market liquidity.

Banned instruments experienced a decrease in the bid-ask spread compared with the ISINs not affected by the ban after the first publication of the DVC mechanism, pointing to a lower tightness in the market.

On the other hand, the ban reduced the average trade size and the turnover ratio for the affected ISINs, signalling a potential slight deterioration of market liquidity.

Overall trading in the equities included in our sample has been lower over the analysed period following the first publication of the DVC mechanism, and this may have had an impact on the results. [106]

V.7
Econometric results
DVC mechanism impact on market liquidity

	Turnover	Bid-Ask	Trade Size	Turnover Ratio	Amihud index
Ban	+***	-*	-***	-	-***
Event	-***	+*	-	-***	-***
Fragmentation	+***	+	+***	-	+***
Capitalisation	+***	-***			-
Tick Size	+	-	-***	+	-*
Periodic Auction	-***	-	-***	-***	+***
SI	-	+	-***	-**	-***
OTC	-	-	+***	+***	-
Volatility	+	+*	-	+*	+
Observations	75,993	75,993	75,993	75,993	75,993

Note: Estimated coefficients from a fixed-effects panel regression, where the dependent variables represent different dimensions of liquidity. A positive coefficient indicates that the explanatory variable and the liquidity measure considered are positively correlated. ***Statistically significant at 99%, **Statistically significant at 95%, *Statistically significant at 90%.
Sources: ESMA.

An increase in the tick size has a significant and negative effect on average trade size and on the Amihud index, while it does not have a significant impact on turnover, the turnover ratio and the bid-ask spread in our estimates.[107]

As expected, a rise in the share of auction trading negatively affects liquidity in continuous trading and auctions markets, as shown by the negative coefficient relative to turnover, the turnover ratio, the average trade size and the positive coefficient for the Amihud index.

Market fragmentation is related to larger volumes and larger trade size in lit markets but with lower market liquidity in lit markets when measured by bid-ask spreads, the Amihud ratio, trade size and the turnover ratio.

These preliminary results point to a mixed impact of the DVC mechanism on market liquidity in the lit markets, depending on the dimension of market liquidity analysed. Overall, it is possible to state that bid-ask spreads, turnover and price response to volumes have improved, even though the turnover ratio and the average trade size seem to have been adversely affected.

Conclusion

In this article we focus on the impact of the DVC mechanism on European equity markets in the first six months of application. After providing a review of the regulatory background, we present

[103] See AMF (2018) for a first analysis of the new tick size regime introduced by MiFID 2/MiFIR.

[104] The lagged returns are calculated for each ISIN as the returns of the week preceding time t.

[105] We have picked the most representative specification, but the results are relatively consistent across different ones.

[106] This result is confirmed when time fixed effects are added to the regressions.

[107] A comprehensive analysis of the impact of tick size on market liquidity is left for future research. The preliminary results obtained are not completely consistent with AMF (2018), in which an increase in the tick size is positively correlated with a widening of the spreads.

some empirical evidence related to the changed trading patterns in EU equity markets. We find that, overall, for equities most of the trading is executed in lit markets. For equities banned by the DVC mechanism in March 2018, the amount of trading in dark pools dropped as expected from more than 7% in January 2018 to less than 1% of the total in August 2018 while the share of trading in periodic auctions increased over the same period from virtually 0% to 4% of the total. However, as the restriction ended in September, the volume of trading executed in dark pools increased to more than 5% and the volume in periodic auctions declined to 2%. We then analyse the impact of DVC mechanism on market liquidity in lit markets, building on a set of market liquidity indicators. The results are mixed. For equities banned by the DVC mechanism, market liquidity in lit markets improved in terms of tightness, breadth and depth (measured by bid ask spreads, turnover and the Amihud index) while it worsened when measured by the turnover ratio and average trade size.

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Financial stability

MMFs in the EU – new stress-testing requirements

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MMFs play an important role in the EU money market by connecting investors investing in short-term liquid products with governments and institutions that are in need of short-term funding. The new EU MMFR aims at increasing the resilience of the sector by addressing the issues identified, such as the "first-mover advantage". The Regulation introduces new stress-testing requirements, as part of fund risk management and regulatory disclosure. ESMA will design common parameters and scenarios to coherently capture the risks of the sector. Stress test results will be reported to ESMA and the National Competent Authorities (NCAs).

Introduction

MMFs are investment funds that invest essentially in money market instruments issued by banks, governments or corporates. Money market instruments traditionally include public debt, commercial paper or certificates of deposit. Unlike other investment funds, some MMFs offer a redemption at par called Constant Net Asset Value (CNAV). By contrast MMFs valuing share prices at market value are called Variable Net Asset Value (VNAV) MMFs. CNAV MMFs are necessarily short-term (their residual maturity shall not exceed 397 days) while VNAV MMFs be either short-term or standard (residual maturity up to 2 years).

Due to their important role in the money market, and especially in bank funding, any disruption affecting the MMF market can be destabilising and can have systemic consequences. The financial crisis rightly highlighted some vulnerabilities, especially MMFs' difficulty to maintain liquidity and stability in face of investors "runs", thus posing a risk of contagion. Eventually the FSB classified MMFs as shadow banking entities involved in credit intermediation, maturity and liquidity transformation.

The MMFR[109], which was implemented in July 2018, aims at addressing MMF vulnerabilities and preventing the risk of contagion. One of the tools to assess the resilience of funds is stress testing: Article 28 of the Regulation also requires ESMA to develop guidelines on stress testing and to update them annually[110]. The objective of this article is to present the upcoming guidelines following the 2018 consultation.

Financial stability risks posed by MMFs

MMF vulnerabilities

The financial crisis highlighted the vulnerability of MMFs and the risk of contagion to other financial institutions and to banks in particular. Certain features of MMFs make them particularly susceptible to "first-mover advantage" such as the daily liquidity and the stable share value. This is particularly the case for CNAV MMFs which offer a redemption at par (and to a lesser extent for VNAV MMFs). Therefore, when a fund incurs a loss, redeeming investors are still expecting to receive the par value even though it is above the current share market value. If investors expect this loss to be durable or to increase, for example in a stressed market environment, they are incentivised to be the first to redeem. Indeed, if the market value drops significantly below the fixed price per share the MMF may eventually have to discount the share price. This, in turn, can prompt more redemptions and pulls the NAV down.

This is even more likely because a significant part of MMF investors are risk-averse institutional investors that use MMFs as a substitute for bank deposits. Since MMFs play the role of short-term funding suppliers to banks, any disruption affecting MMFs can spread quickly to the money

[108] This article was authored by Jean-Baptiste Haquin.

[109] Regulation (EU) 2017/1131 of the European Parliament and of the Council of 14 June 2017 on money market funds http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017R1131

[110] A consultation paper on these Guidelines has been published on 13 November: https://www.esma.europa.eu/sites/default/files/library/esma34-49-144novbos_cpon_mmfguidelinesreporting.pdf

market, thus becoming a risk of contagion to banking institutions.

Sponsors also play a role in the way MMFs can affect financial stability. Some parent banks gave support to troubled MMFs during the crisis, by buying assets from them, issuing guarantees or providing capital[111]. Moreover, since sponsorship is generally implicit, the support is expected but not guaranteed: this uncertainty may amplify the incentive to withdraw.

Evidence from the financial crisis

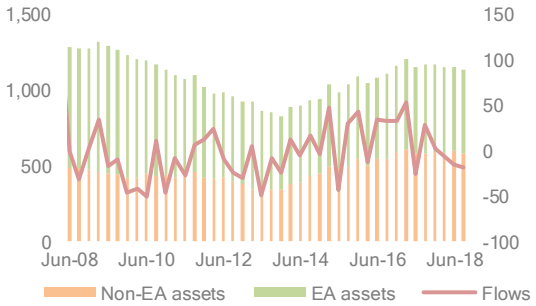
Some of those risks materialised in the EU in 2007 and 2008. In the wake of the subprime crisis, MMF-like bond funds that invested in ABS were particularly affected by the depreciation and sudden lack of liquidity of those assets. In 3Q07, they experienced significant redemption pressure which triggered the suspension of redemption for several funds and/or the call for support from the parent bank: 4 funds closed definitely.

Similarly, EU MMFs experienced significant redemption requests in 4Q08, in the aftermath of the Lehman Brothers failure. Moreover, due to the freeze of the money market, there was a significant shift of MMF assets into overnight assets which aggravated the situation in the money market itself. In addition, during the 2011 EU sovereign debt crisis, US MMFs withdrew funding to European banks thus exacerbating the pressure on EU banks short-term funding.

EU MMF landscape at the time of the reform

In 1H18, EA MMFs were managing nearly EUR 1.2tn assets (V.1). Although the sector has been growing steadily since end-2013, this is still 13% lower than in 1Q08 when the EA MMF industry represented more than EUR 1.3tn.

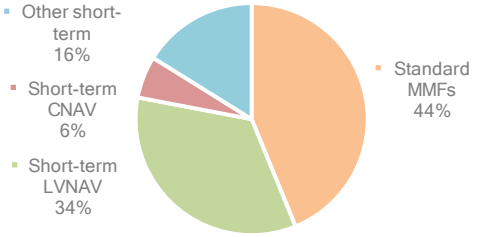
V.1
EA MMF assets



Note: EA MMF flows (rhs) and AuM of EA MMFs by origin of the assets (lhs), EUR bn.
Sources: ECB, ESMA.

Short-term MMFs, including CNAV funds, represent more than half of the EU sector (V.2). Moreover, 52% of assets are invested in non-euro denominated assets (mainly US and GBP).

V.2
EU MMF categories



Note: NAV of EUR MMF, EUR bn. The figures take into account the reclassification of CNAV funds into LVNAV since 2018. Other short-term funds include VNAV funds and short-term MMFs whose classification is unknown.
Sources: Thomson Reuters Lipper, ESMA.

The EU MMF industry is concentrated in France, Ireland and Luxembourg, which hold 98% of EA MMF assets. However, there are significant national differences: French MMFs are mostly EUR-denominated VNAV funds while CNAV funds are predominantly domiciled in Ireland and Luxembourg, with a significant part (68%) not denominated in EUR.

Overview of the MMFR

The new MMFR entered into force in July 2018 with a transition period until January 2019 for existing funds, with the objective of preventing "run" risk and contagion. It introduces tighter rules on portfolio diversification, liquidity and transparency (V.3). Sponsor support is explicitly prohibited. Moreover, it redefines MMF categories:

— short-term and standard VNAV funds are similar to pre-reform categories;

[111] As a background for its Recommendation on money market funds, the ESRB reports that over 60 funds benefited from support between 2007 and 2009 (Moody's data). https://www.esrb.europa.eu/pub/pdf/recommendations/ESRB_2012_1_annex.en.pdf?7fcb74273989dece83c6d6e18780841d

— CNAV is restricted to funds investing at least 99,5% of their assets in public debt;

— LVNAV funds are allowed to keep a constant NAV if it doesn't deviate from the mark-to-market NAV per share by more than 20 bps.

The MMFR also introduces new risk management requirements which impose stress testing and internal processes to determine credit quality for money market instruments, and "Know Your Customer" policies and procedures.

V.3
MMF categories
Summary of the main requirements

	Short-term MMFs			Standard MMFs
	Public debt CNAV	LVNAV	VNAV	
Eligible assets	– 99.5% public debt, cash or reverse repo backed by government assets.	– Money market instruments, securitizations and ABCPs; – Deposits; – Cash from reverse repo; – OTC derivatives – MMF shares.		
Valuation method	– Amortized cost	– Amortized cost (maturity <75D) – Or Mark-to-market	– Mark-to-market	– Mark-to-market
Residual maturity	<397D	<397D	397D	<2 years (max 397D to IR reset)
Weighted average maturity (WAM)	<60D	<60D	<60D	<6M
Weighted average maturity (WAL)	<120D	<120D	120D	<12M
Daily maturing assets	>10%	>10%	>7.5%	>7.5%
Weekly maturing assets	>30%	>30%	>15%	>15%
Diversification	– Public debt: Max 100% of assets, across at least 6 issues, max 30% per issue. – Money market instruments, securitizations and ABCPs; deposits; cash from reverse repo: <15% per issuer with sub-limits by instrument. – MMFs: <10% per MMF and max 17.5% in aggregate.			
Liquidity fees, redemption gates, suspension of redemption.	– Possible: If weekly liquid assets <30% and the daily redemptions >10% of total assets. – Mandatory: If weekly liquid assets <10% and the daily redemptions>10% of total assets. – Conversion to VNAV if a redemption suspension is 15D or more within a 90D period.		– UCITS (or AIFMD) rules.	

Note: Please refer to the legal text for the comprehensive and detailed requirements.
Sources: MMF Regulation, ESMA.

ESMA stress test guidelines

The MMFR requires managers of MMFs to conduct regular stress tests as part of their risk management and regulatory disclosure. Funds must put in place sound stress testing processes, including identifying stress events, or future changes in economic conditions, and assess the impacts that these different scenarios may have on (the NAV and/or liquidity of) the MMF.

In addition, Article 28 of the MMFR provides that ESMA shall develop guidelines to be included in the stress tests that managers of MMFs are required to conduct. The guidelines must include common reference parameters considering the following hypothetical risk factors:

— liquidity changes of the assets held in the portfolio of the MMF;

— credit risk, including credit events and rating events;

— changes in interest and exchange rates;

— redemptions;

— spread changes of indexes to which interest rates of portfolio securities are tied; and

— macro-economic shocks.

Liquidity risk

In times of market stress, a liquidity risk of portfolio assets can materialise, thereby having an impact on the value of a security. One measure of liquidity is the difference between the bid and the ask prices i.e. the price at which a seller is ready to sell a certain quantity and the price at which a buyer is ready to buy a certain quantity. When the spread between bid and ask widens, the cost of trading increases, indicating that the asset has become less liquid.

In the context of the guidelines, the impact of market liquidity will be simulated as a widening of bid-ask spread by type of security and by maturity. The discount factors will be calibrated using commercial data and based on past stress episodes with the indicative level of detail:

— For each relevant security (i.e. corporate and government bonds), the discount factors should be applied to the bid prices used for the valuation of the fund observed in an active market at the time of reporting, according to their type and maturity, to derive an adjusted bid price.

— The manager of the MMF should estimate the impact of the potential losses by valuing the investment portfolio at the derived adjusted bid price, to determine the stressed NAV and report the impact as a percentage of the reporting NAV.

Credit risk

MMFs invest in debt instruments and are subject to credit risk, including credit events and rating events. For the first update of the guidelines ESMA, in cooperation with the European Systemic Risk Board (ESRB) and the ECB, will publish changes in credit spreads to be used by

fund managers, similarly to the European Banking Authority (EBA) stress test.

— The change in spread would affect the value of the securities according to their duration.

— An MMF manager would have to reprice all securities and measure the impact on NAV.

In addition to the credit stress, the guidelines will require the managers of MMFs to simulate the default of their two main exposures (including deposits, repos and derivatives) considered at the group level (all entities from the group being in default). The purpose of this additional stress is to capture concentration and counterparty risk, particularly for exposures that are not affected by the credit spread shock. The resulting impact on NAV would then be reported separately from the credit risk scenario based on credit spread.

Interest rate and exchange rate risks

Similarly, debt instruments in MMF portfolios are subject to interest-rate and exchange-rate risks. Regarding interest rates, the guidelines differentiate between risks related to hypothetical movements of interest rates and the widening or narrowing of indices to which interest rates of securities are tied. Regarding exchange rates, risks depend on the denomination of the fund, i.e. EUR or non-EUR. Therefore 2 different scenarios (EUR appreciation and EIR depreciation) will be proposed

Similar to the 2018 EBA and European Insurance and Occupational Pensions Authority (EIOPA) stress tests, ESMA is developing risk parameters in close cooperation with the ESRB and the ECB to assess the three scenarios. Results of the three scenarios would be reported separately.

Redemption

MMFs may face redemption pressures challenging their ability to redeem holdings at the request of investors in a short period of time. Such pressures take the form of stressed outflows over a certain time horizon; for example, one week. The stressed outflows will be calibrated by ESMA based on commercial data from the period 2007-2013 on the worst percentile of the period. In addition, the assumption is made that retail investors are more stable and thus a smaller shock can be applied to them. ESMA suggests measuring the impact in two ways:

— Reverse liquidity stress test: Assuming that the manager of the MMF wants to keep its strategy unchanged to ensure fair treatment of all investors, it will be required to produce a self-assessment on the maximum size of outflows the fund can face in one week without distorting portfolio allocation (especially asset class, geographical allocation and sectoral allocation). This assessment should also consider the capacity to comply with the weekly liquid assets requirements specified in Article 24(1) of the MMFR;

— Weekly liquidity stress test: Weekly outflows will be compared with available weekly liquid assets, considered as the sum of highly liquid assets and weekly maturing assets.

In addition, MMFs will have to simulate a final scenario assessing the redemption of its two main investors. The impact of the stress test will be assessed according to the reverse liquidity stress test and the weekly liquidity stress test methodologies.

Macro-systemic shock

Macro-systemic shock simulates adverse macro-economic developments or uses as a basis a major systemic event that affected the economy as a whole in the past, such as the Lehman Brothers bankruptcy event.

In future versions of the guidelines, ESMA intends to develop an ad hoc multi-variate scenario, with stressed parameters different from the individual scenarios. This would include a narrative, i.e. would simulate the impact of a particular or historical stress event.

However, ESMA proposes that the methodology be kept simple for the 2018 guidelines and asks MMF managers to report the combined impact of the different risk scenarios, including the redemption shock. In other words, MMF managers would be asked to use the same parameters they used for the different scenarios, but in a combined fashion.

In concrete terms, the scenario supposes a “run” of some investors followed by a macro systemic shock. MMF managers would thus have to measure the combined effect of all risk factors at the same time. In most cases the results from the macro systemic shock should differ from the simple aggregation of the individual shocks, for example due to the non-linearity of the impacts.

Conclusion

Similar to the AIFMD, the MMFR is part of the regulatory response to the crisis. Its primary objective is to increase the resilience of the MMF sector, due to its prominent role in the money market but also due to the vulnerabilities identified during the crisis. MMFR will also contribute significantly to the supervision of the fund sector through the implementation of a regular reporting, including stress test results. The NCAs and ESMA will be able to conduct a

fund-by-fund comparison, but also an overall assessment of the risks of the sector.

The draft ESMA stress-test guidelines will now be revised to consider the comments received during the consultation and the calibration of the common reference stress test scenarios to be used by fund managers. It will be published in a sufficiently timely manner so that managers of MMFs receive the appropriate information on these fields to complete in the reporting template defined in the technical advice and implementing technical standards on the establishment of a reporting template and the timing of implementation of the corresponding database.

References

ESMA (2018), 'Consultation paper on draft guidelines on stress test scenarios under the MMF Regulation ', https://www.esma.europa.eu/file/49366/download?token=YnlETB_K

European Systemic Risk Board (2013), 'Recommendation of the European Systemic Risk Board of 20 December 2012 on money market funds (ESRB/2012/1) and related annex', ESRB/2012/1, https://www.esrb.europa.eu/pub/pdf/recommendations/ESRB_2012_1.en.pdf?8e57aeb9f953421e526109380cec78bc

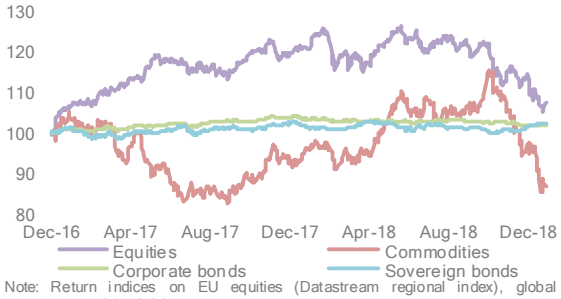
Annexes

Statistics

Securities markets

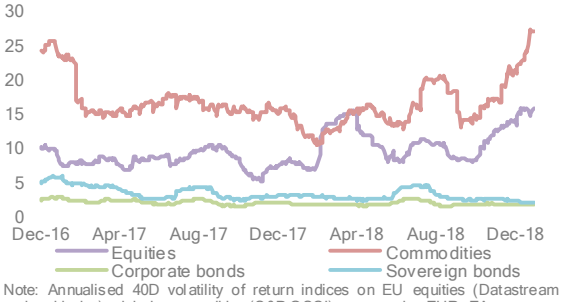
Market environment

A.1
Market price performance



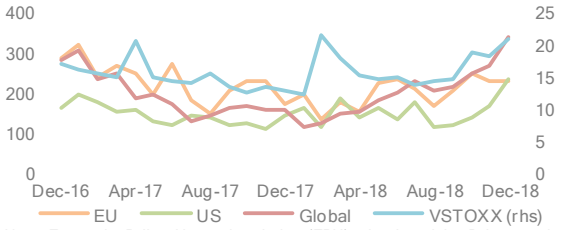
Note: Return indices on EU equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx EUR, all maturities). 01/12/2016 = 100.
Sources: Thomson Reuters Datastream, ESMA.

A.2
Market volatilities



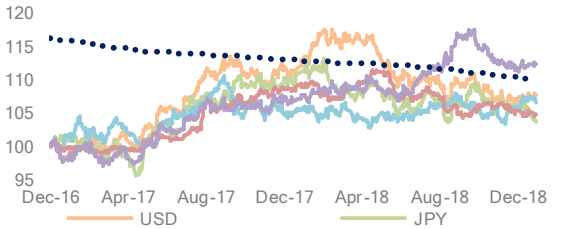
Note: Annualised 40D volatility of return indices on EU equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx Euro, all maturities), in %.
Sources: Thomson Reuters Datastream, ESMA.

A.3
Economic policy uncertainty



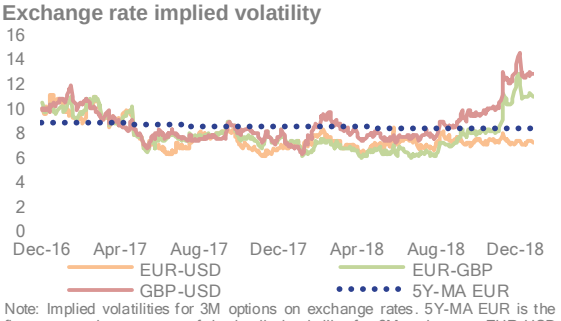
Note: Economic Policy Uncertainty Index (EPU), developed by Baker et al. (www.policyuncertainty.com), based on the frequency of articles in EU newspapers that contain the following triple: "economic" or "economy", "uncertain" or "uncertainty" and one or more policy-relevant terms. Global aggregation based on PPP-adjusted GDP weights. Implied volatility of EURO STOXX 50 (VSTOXX), monthly average, on the right-hand side (rhs).
Sources: Baker, Bloom, and Davis (2015); Thomson Reuters Datastream, ESMA.

A.4
EUR exchange rates



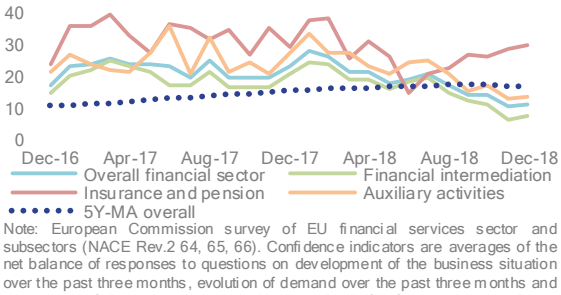
Note: Spot exchange rates to Euro. Emerging is a weighted average (2016 GDP) of spot exchange rates for CNY, BRL, RUB, INR, MXN, IDR and TRY. 01/12/2016=100. Increases in value represent an appreciation of EUR. 5Y-MA USD=five-year moving average of the USD exchange rate.
Sources: ECB, IMF, ESMA.

A.5
Exchange rate implied volatility



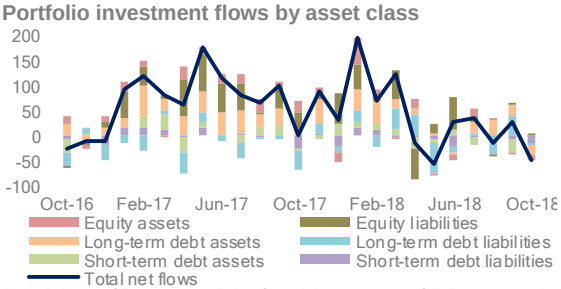
Note: Implied volatilities for 3M options on exchange rates. 5Y-MA EUR is the five-year moving average of the implied volatility for 3M options on EUR-USD exchange rate.
Sources: Thomson Reuters EIKON, ESMA.

A.6
Market confidence



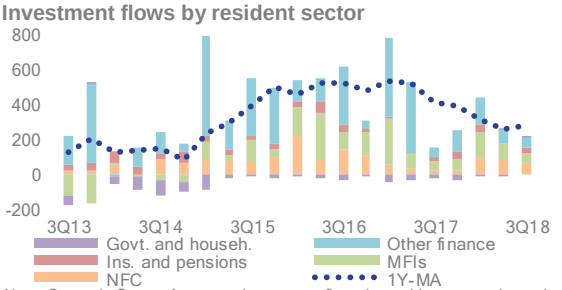
Note: European Commission survey of EU financial services sector and subsectors (NACE Rev.2 64, 65, 66). Confidence indicators are averages of the net balance of responses to questions on development of the business situation over the past three months, evolution of demand over the past three months and expectation of demand over the next three months, in % of answers received.
5Y-MA: 5 year moving average.
Sources: European Commission, ESMA.

A.7
Portfolio investment flows by asset class



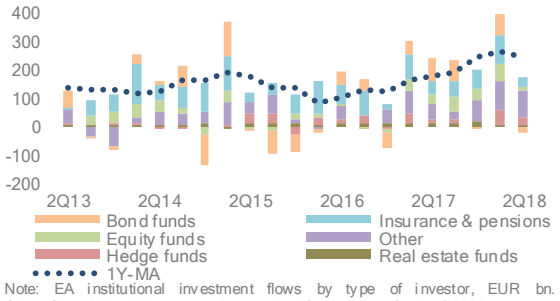
Note: Balance of Payments statistics, financial accounts, portfolio investments by asset class. Assets = net purchases (net sales) of non-EA securities by EA investors. Liabilities = net sales (net purchases) of EA securities by non-EA investors. Total net flows=net outflows (inflows) from (into) the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

A.8
Investment flows by resident sector



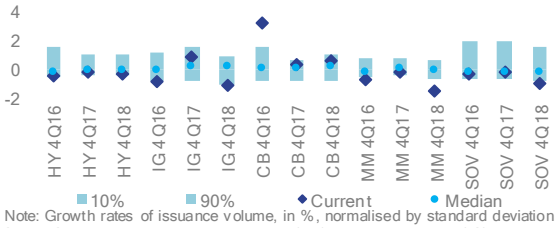
Note: Quarterly Sector Accounts. Investment flows by resident sector in equity (excluding investment fund shares) and debt securities, EUR bn. 1Y-MA=one-year moving average of all investment flows. NFC: non-financial corporates.
MFIs: monetary and financial institutions.
Sources: ECB, ESMA.

A.9
Institutional investment flows



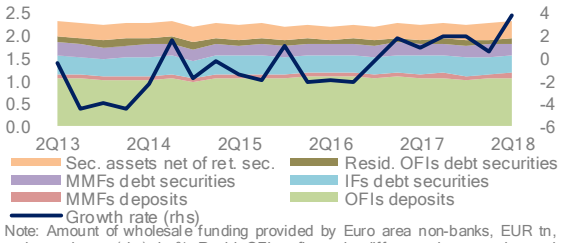
Note: EA institutional investment flows by type of investor, EUR bn. Other=financial vehicle corporations, mixed funds, other funds. 1Y-MA=one-year moving average of all investment flows.
Sources: ECB, ESMA.

A.10
Debt issuance



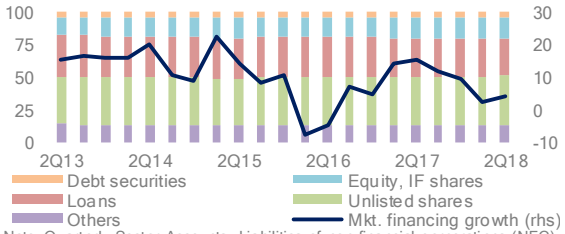
Note: Growth rates of issuance volume, in %, normalised by standard deviation for the following bond classes: high yield (HY), investment grade (IG), covered bonds (CB), money market (MM), sovereign (SOV). Percentiles computed from 12Q rolling window. All data include securities with a maturity higher 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). OFIs: other financial institutions. FVCs: financial vehicle corporations.
Sources: ECB, ESMA.

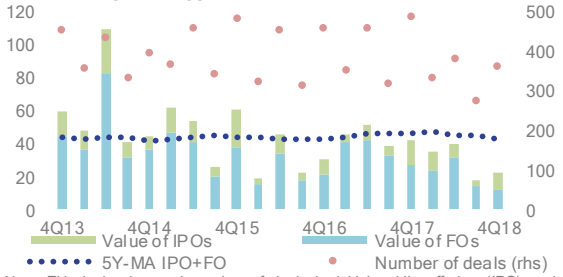
A.12
Market financing



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.

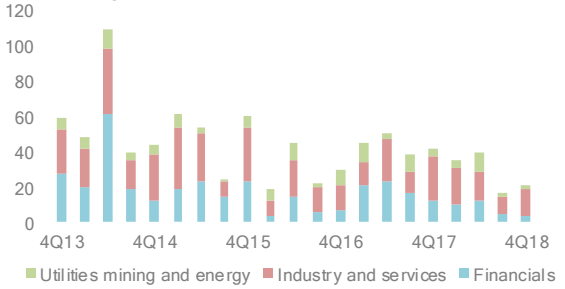
Equity markets

A.13
Issuance by deal type



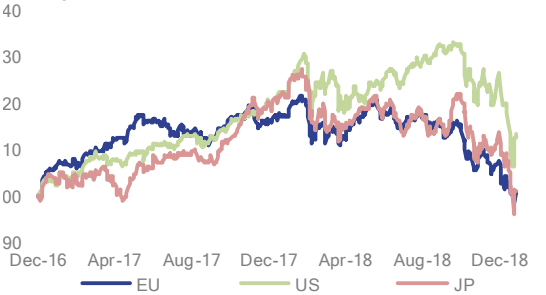
Note: EU deal value and number of deals in initial public offering (IPO) and follow-on issuance (FO). EUR bn. 5Y-MA=five-year moving average of the total value of equity offerings.
Sources: Thomson Reuters EIKON, ESMA.

A.14
Issuance by sector



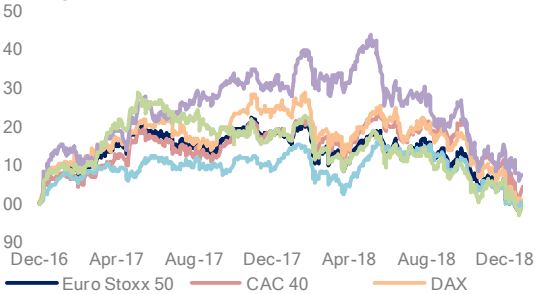
Note: EU equity issuance by sector, EUR bn. Financials includes banking & investment services, insurance, investment trusts and real estate.
Sources: Thomson Reuters EIKON, ESMA.

A.15
Price performance



ote: Datastream regional equity indices for the EU (in EUR), the US (in USD) nd Japan (in JPY). 01/12/2016=100.
ources: Thomson Reuters Datastream, ESMA.

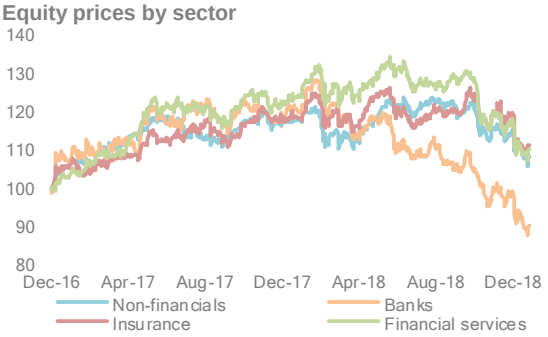
A.16
Price performance of national indices



ote: National equity indices from selected EU members. 01/12/2016=100.
ources: Thomson Reuters Datastream, ESMA.

A.17

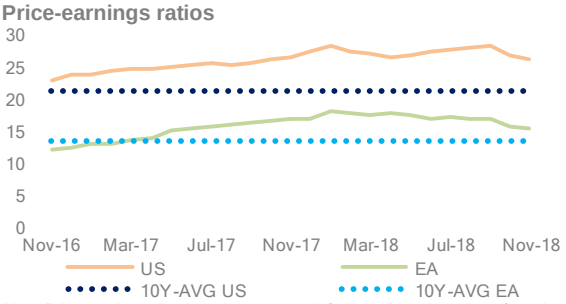
Equity prices by sector



Note: Stoxx Europe 600 sectoral return indices. 01/12/2016=100.
Sources: Thomson Reuters Datastream, ESMA.

A.18

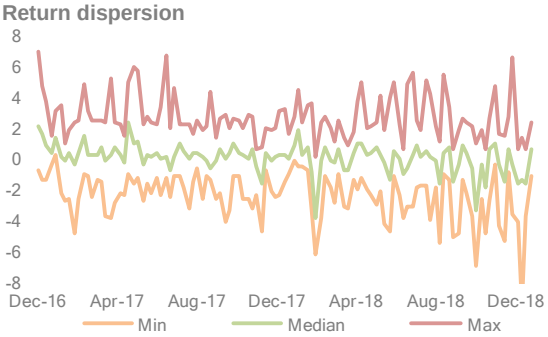
Price-earnings ratios



Note: Price-earning ratios based on average inflation-adjusted earnings from the previous 10 years (cyclically adjusted price-earning ratios). Averages computed from the most recent data point up to 10 years before.
Sources: Thomson Reuters Datastream, ESMA.

A.19

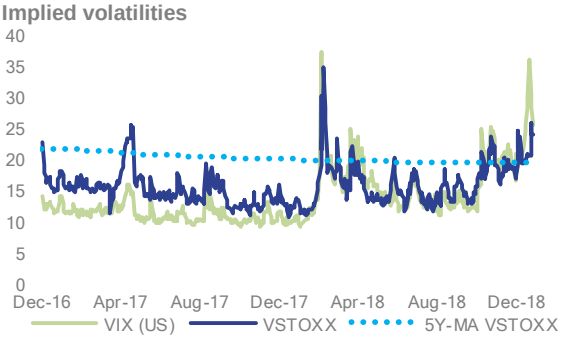
Return dispersion



Note: Dispersion of the weekly returns on the main equity indices in the EU.
Sources: Thomson Reuters Datastream, ESMA.

A.20

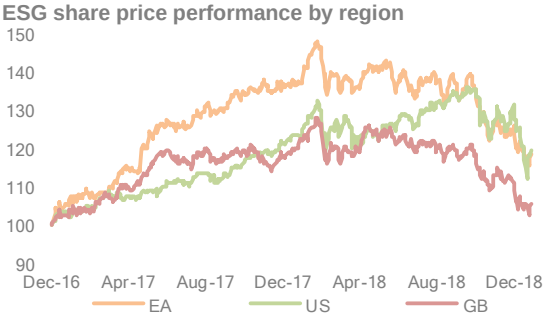
Implied volatilities



Note: Implied volatility of Euro Stoxx 50 (VSTOXX) and S&P 500 (VIX), in %.
Sources: Thomson Reuters Datastream, ESMA.

A.21

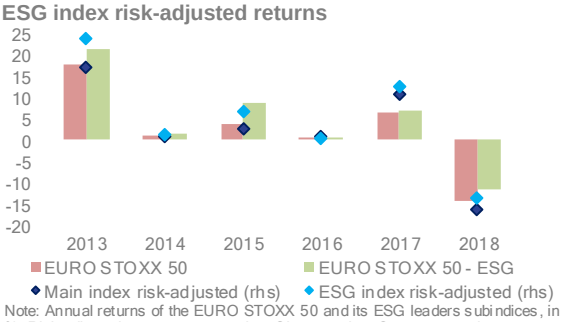
ESG share price performance by region



Note: MSCI ESG leaders total return indices, denominated in USD, indexed with 01/11/2016=100.
Sources: Thomson Reuters Datastream, ESMA.

A.22

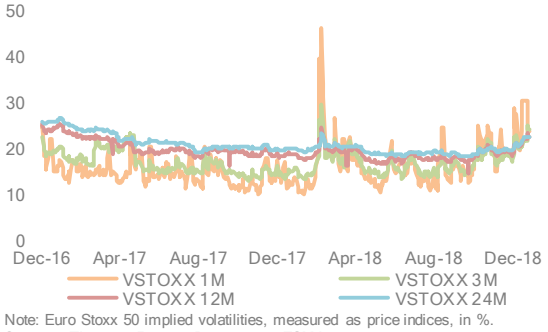
ESG index risk-adjusted returns



Note: Annual returns of the EURO STOXX 50 and its ESG leaders subindices, in %. Risk-adjusted returns measured as Sharpe ratios. Current year data year-to-date.
Sources: Thomson Reuters Datastream, ESMA.

A.23

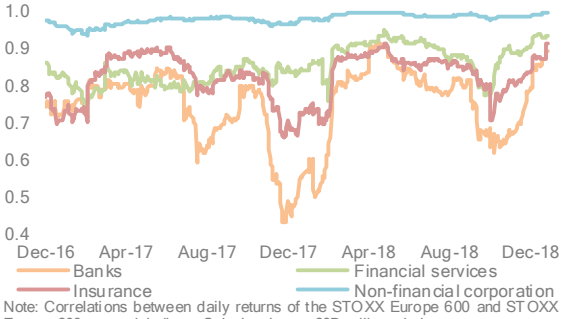
Implied volatility by option maturity



Note: Euro Stoxx 50 implied volatilities, measured as price indices, in %.
Sources: Thomson Reuters Datastream, ESMA.

A.24

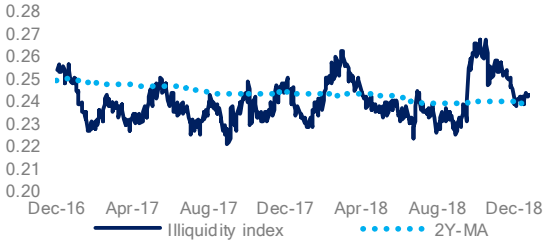
Correlation STOXX Europe 600 and sectoral indices



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.25

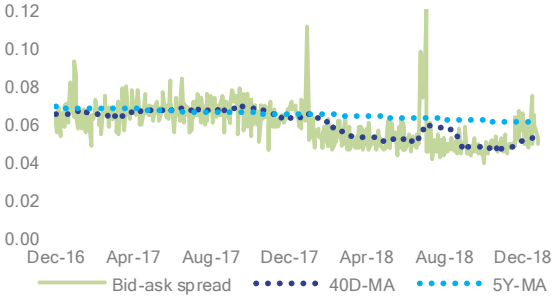
ESMA composite equity liquidity index



Note: Composite indicator of illiquidity in the equity market for the current Stoxx Europe Large 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.26

Bid-ask spread

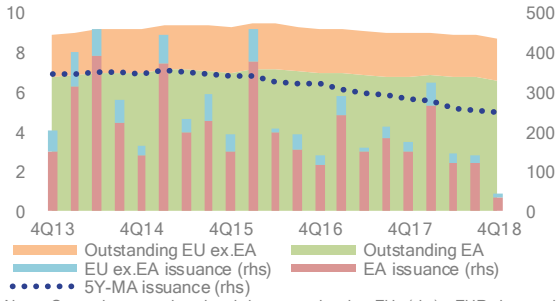


Note: Liquidity measure as median of the bid-ask price percentage difference for the current EU constituents of Stoxx Europe Large 200, in %.
Sources: Thomson Reuters Datastream, ESMA.

Sovereign-bond markets

A.27

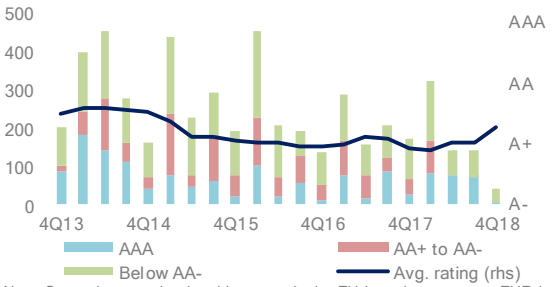
Issuance and outstanding



Note: Quarterly sovereign bond issuance in the EU (rhs), EUR bn, and outstanding amounts, EUR tn.
Sources: Thomson Reuters EIKON, ESMA.

A.28

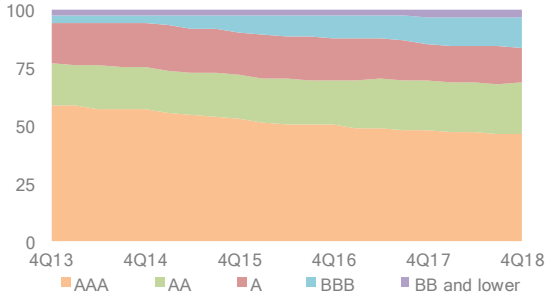
Issuance by credit rating



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.29

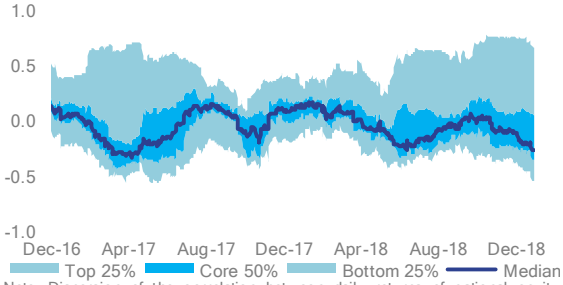
Rating distribution



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.30

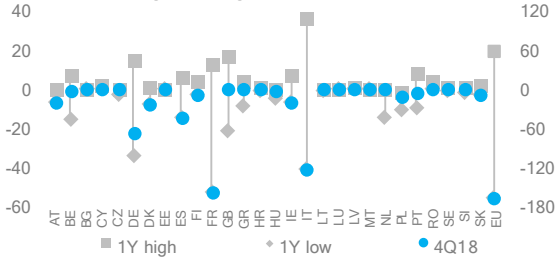
Equity-sovereign bond correlation dispersion



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.31

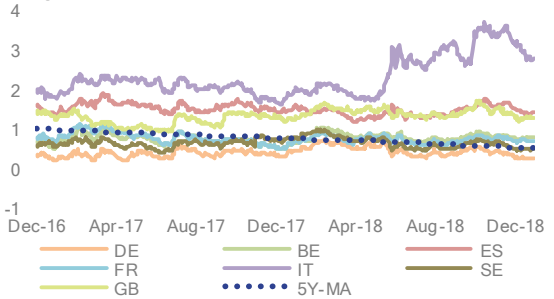
Net issuance by country



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.32

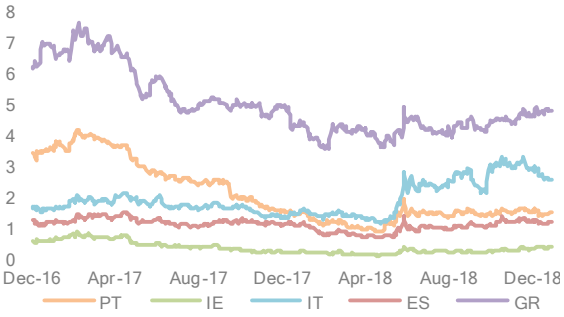
10Y yields



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.33

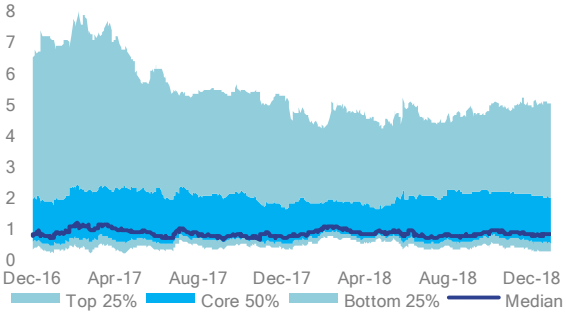
10Y spreads



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

A.34

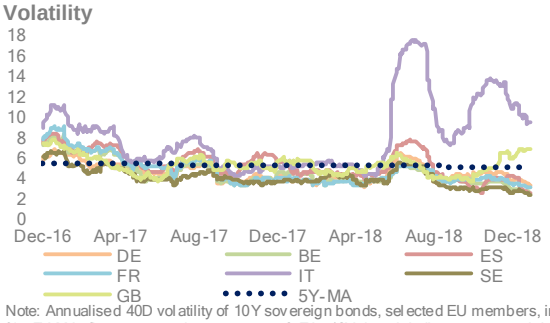
Yield dispersion



Note: Dispersion of yields on 10Y sovereign bonds of 17 EU countries, in %.
Sources: Thomson Reuters Datastream, ESMA.

A.35

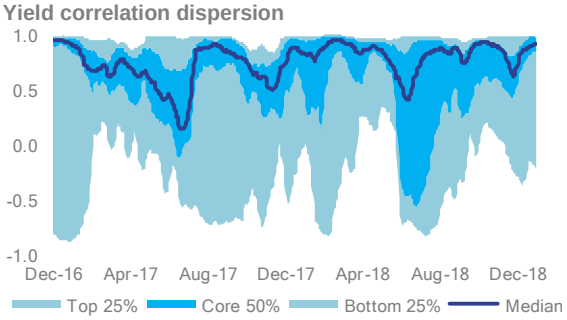
Volatility



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.36

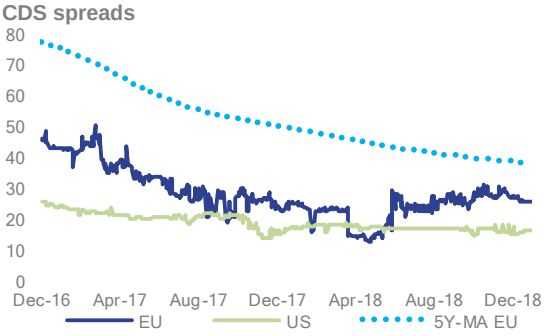
Yield correlation dispersion



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.37

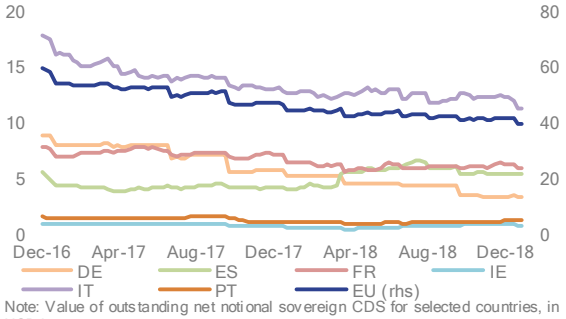
CDS spreads



Note: Datastream CDS sovereign indices (5 years, mid-spread).
Sources: Thomson Reuters Datastream, ESMA.

A.38

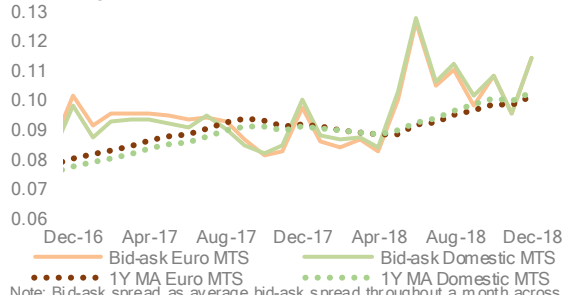
CDS notionals



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

A.39

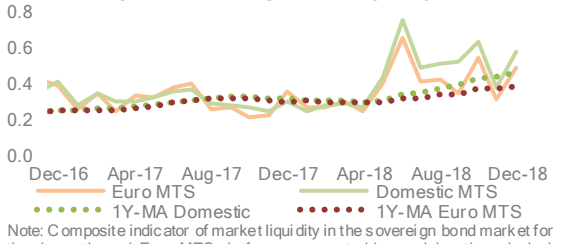
Bid-ask spreads



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

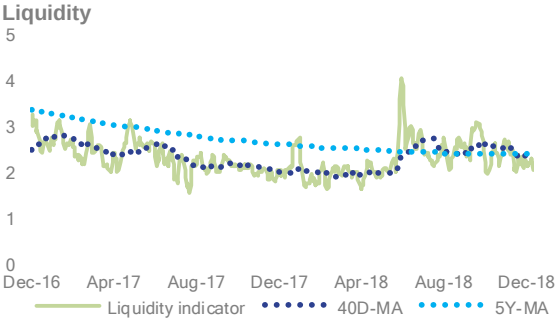
A.40

ESMA composite sovereign bond liquidity index



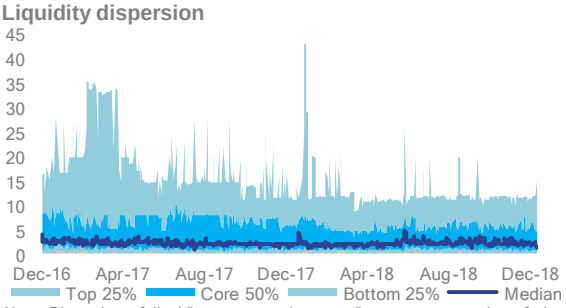
Note: Composite indicator of market liquidity in the sovereign bond market for the domestic and Euro MTS platforms, computed by applying the principal component methodology to four input liquidity measures (Amihud illiquidity coefficient, Bid-ask spread, Roll illiquidity measure and Turnover). The indicator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

A.41
Liquidity



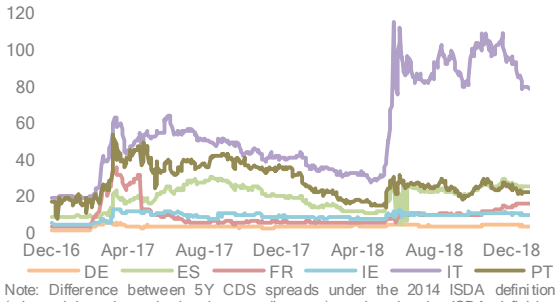
Note: Liquidity measured as median across countries of the difference in bid-ask yields for 10Y sovereign bonds, in basis points. 21 EU countries are included.
Sources: Thomson Reuters EIKON, ESMA.

A.42
Liquidity dispersion



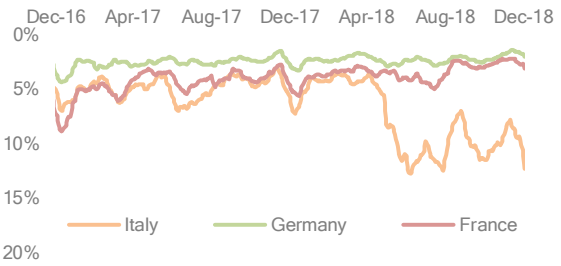
Note: Dispersion of liquidity measured as median across countries of the difference in ask and bid yields for 10Y sovereign bonds, in basis points. 21 EU countries are included.
Sources: Thomson Reuters EIKON, ESMA.

A.43
Redenomination risk



Note: Difference between 5Y CDS spreads under the 2014 ISDA definition (where debt redenomination is a credit event), and under the ISDA definition (where it is not), in bps.
Sources: Thomson Reuters Datastream, ESMA.

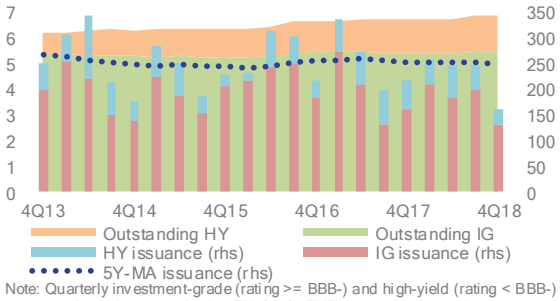
A.44
Bond futures liquidity



Note: Hui-Heubel illiquidiy indicator based on 10Y sovereign bond futures, 20-day moving average, in percent.
Sources: Thomson Reuters Datastream, ESMA.

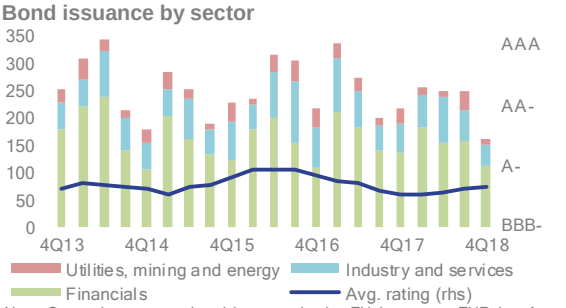
Corporate-bond markets

A.45
IG and HY bond issuance



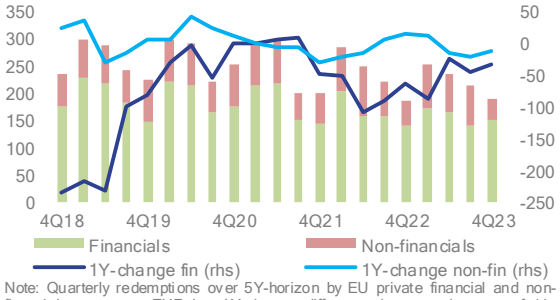
Note: Quarterly investment-grade (rating >= BBB-) and high-yield (rating < BBB-) corporate bond issuance in the EU (rhs), EUR bn, and outstanding amounts, EUR tn.
Sources: Thomson Reuters EIKON, ESMA.

A.46
Bond issuance by sector



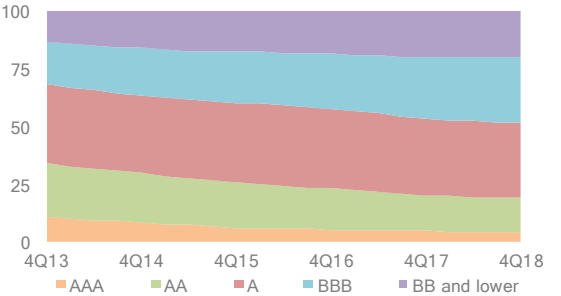
Note: Quarterly corporate bond issuance in the EU by sector, EUR bn. Avg. rating=weighted average rating computed as a one-year moving average of ratings converted into a numerical scale (AAA=1, AA+=2, etc.).
Sources: Thomson Reuters EIKON, ESMA.

A.47
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.

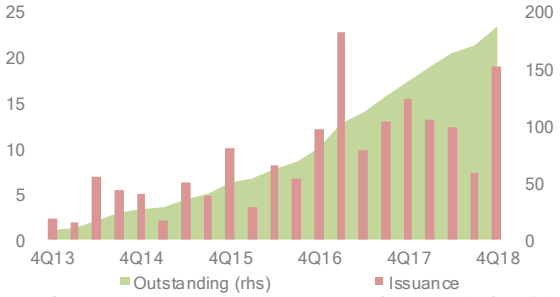
A.48
Rating distribution



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.49

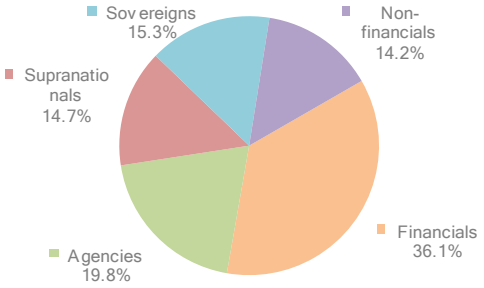
Green bond issuance



Note: Quarterly issuance and outstanding amount of green bonds from EU-domiciled issuers (including all sectors), EUR bn.
Sources: Thomson Reuters EIKON, Climate Bonds Initiative, ESMA.

A.50

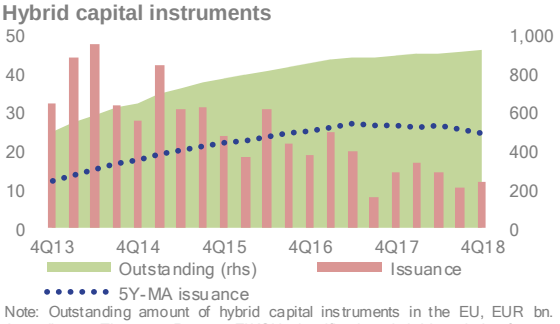
Green bond outstanding by sector



Note: Share of green bonds outstanding from EU-domiciled issuers, by issuer sector.
Sources: Thomson Reuters EIKON, Climate Bonds Initiative, ESMA.

A.51

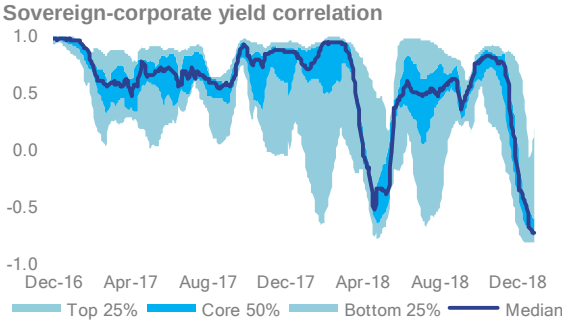
Hybrid capital instruments



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.52

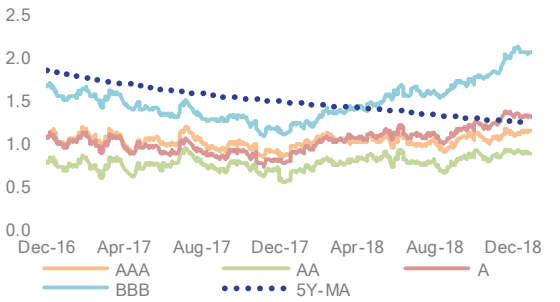
Sovereign-corporate yield correlation



Note: Dispersion of correlation between Barclays Aggregate for corporate and 10Y sovereign bond redemption yields for AT, BE, ES, FI, FR, IT and NL.
Sources: Thomson Reuters Datastream, ESMA.

A.53

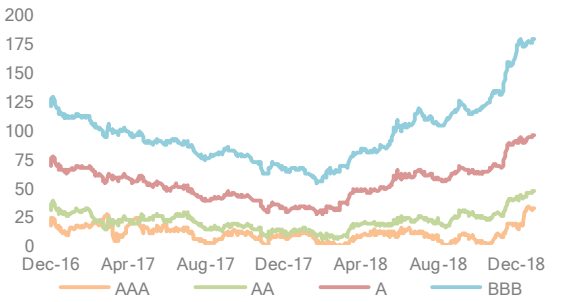
Yields by credit rating



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.54

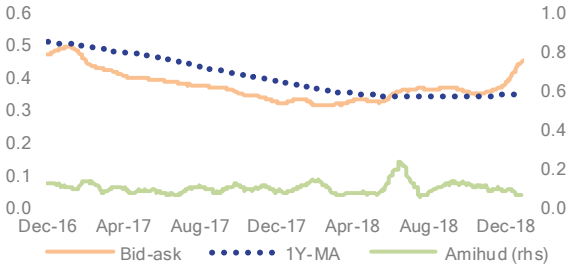
Spreads by credit rating



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.55

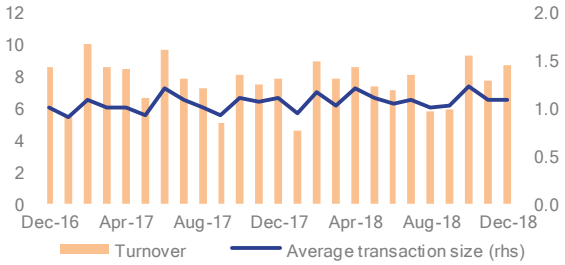
Bid-ask spreads and Amihud indicator



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.56

Turnover ratio and average trade size

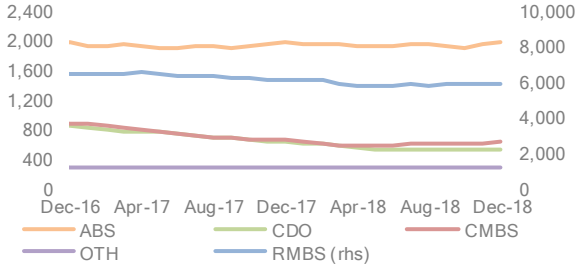


Note: Average transaction size for the corporate bond segment as the ratio of nominal amount of settlement instructions to number of settled instructions, in EUR mn. Turnover is the one-month moving average of the ratio of trading volume over outstanding amount, in %.
Sources: IHS Markit, ESMA.

Credit quality

A.57

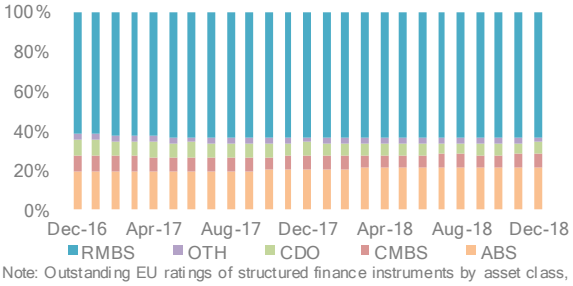
Structured finance instrument ratings issued by collateral type



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.58

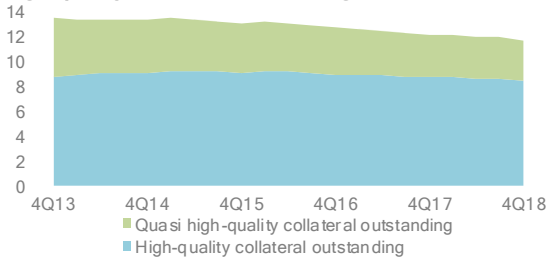
Structured finance instrument ratings outstanding by collateral type



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.59

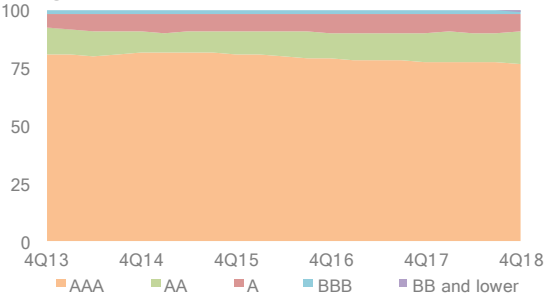
High-quality collateral outstanding



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 collateral is outstanding corporate debt with a rating equal to or higher than AA-.
Sources: Thomson Reuters EIKON, ESMA.

A.60

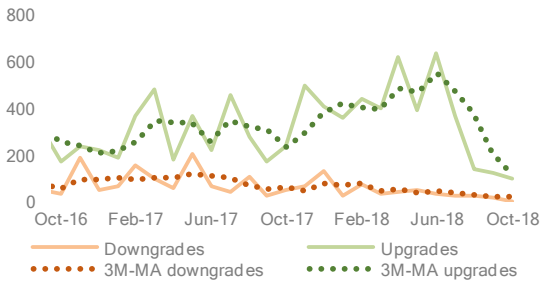
Rating distribution of covered bonds



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.61

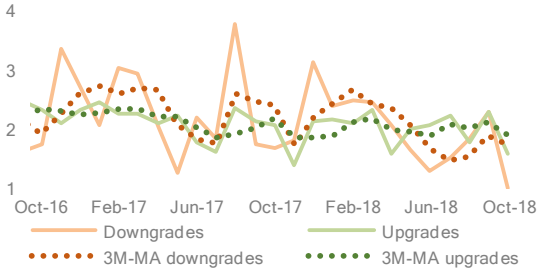
tructured finance instrument rating changes



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

A.62

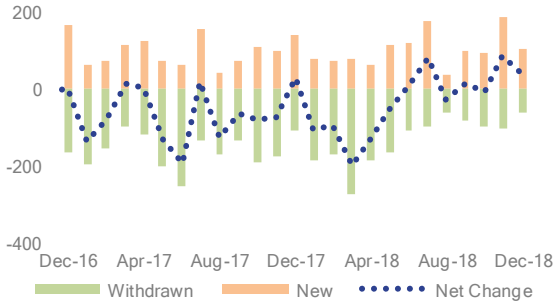
Size of structured finance instrument rating changes



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.63

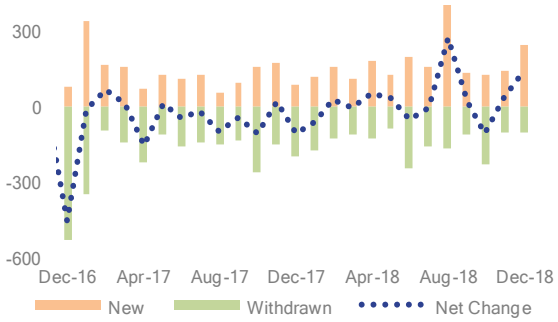
Change in outstanding structured finance instrument ratings



Note: Number of withdrawn and new ratings for structured finance instruments.
Sources: RADAR, ESMA.

A.64

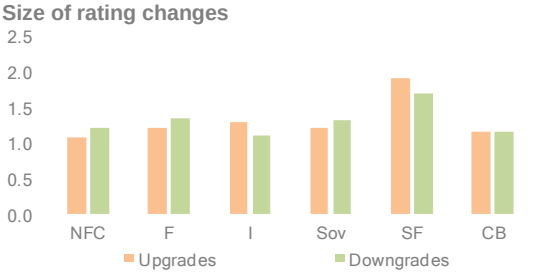
Change in outstanding covered bond ratings



Note: Number of withdrawn and new ratings for covered bonds.
Sources: RADAR, ESMA.

A.65

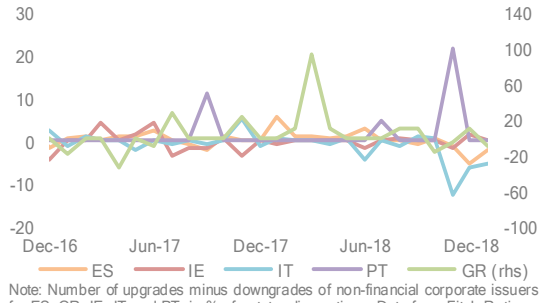
Size of rating changes



Note: Average size of upgrades and downgrades, excluding CERVED and ICAP, by asset class for 2H18, in number of notches. NFC=Non Financials, F=Financials, I=Insurance, Sov=Sovereign, SF=structured finance, CB=Covered Bonds.
Sources: RADAR, ESMA.

A.66

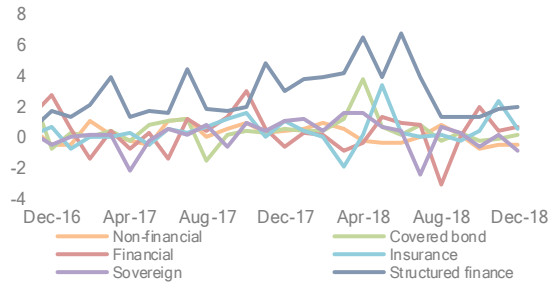
Non-financial corporate rating changes



Note: Number of upgrades minus downgrades of non-financial corporate issuers for ES, GR, IE, IT and PT, in % of outstanding ratings. Data from Fitch Ratings, Moody's, S&P's.
Sources: RADAR, ESMA.

A.67

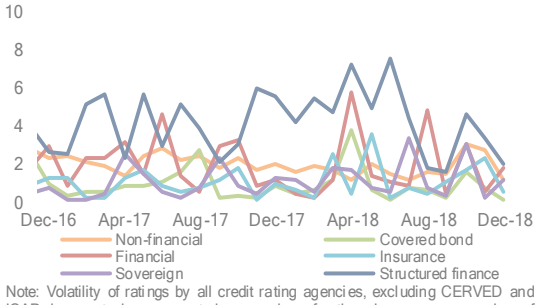
Rating drift



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.68

Rating volatility

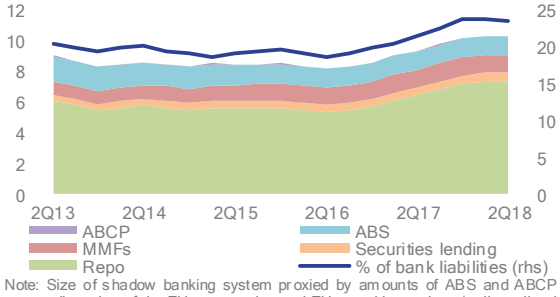


Note: Volatility of ratings by all credit rating agencies, excluding CERVED and ICAP, by asset class computed as number of rating changes over number of outstanding ratings.
Sources: RADAR, ESMA.

Market-based credit intermediation

A.69

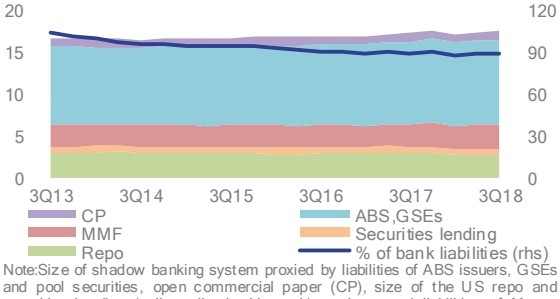
EU shadow banking liabilities



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.70

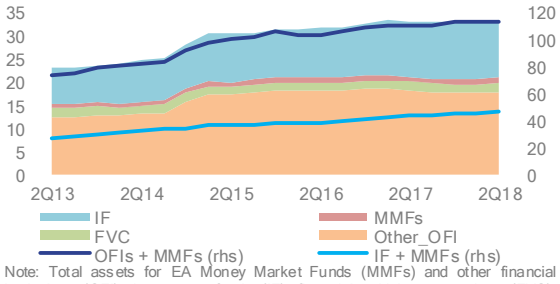
US shadow banking liabilities



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.71

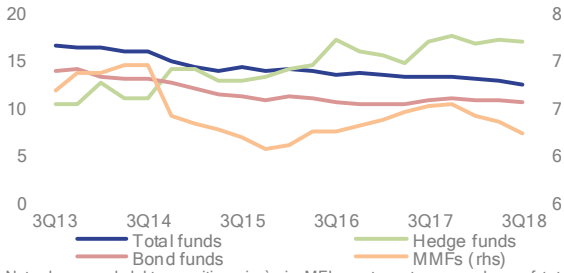
MMFs and other financial institutions



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.72

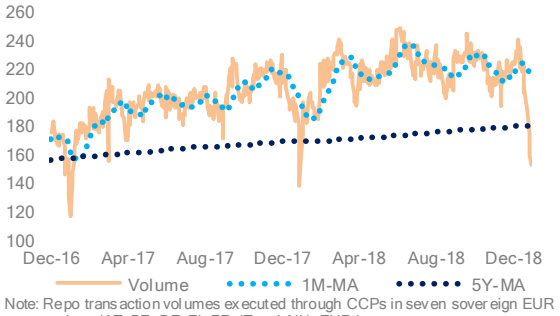
Financial market interconnectedness



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

A.73

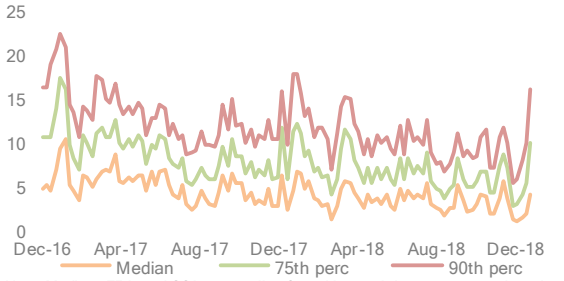
Sovereign repo volumes



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.74

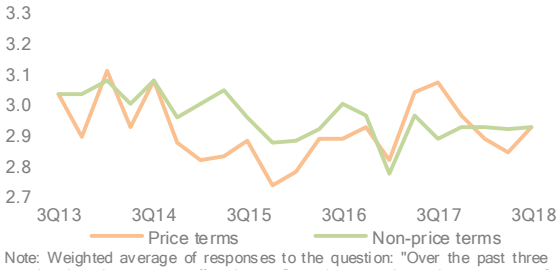
Sovereign repo market specialness



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.75

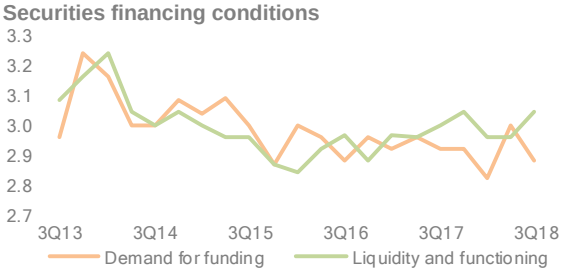
Credit terms in SFT and OTC derivatives



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.76

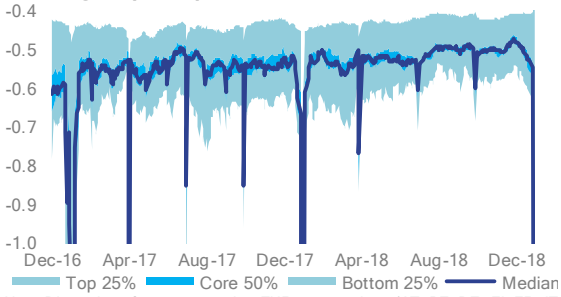
Securities financing conditions



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.77

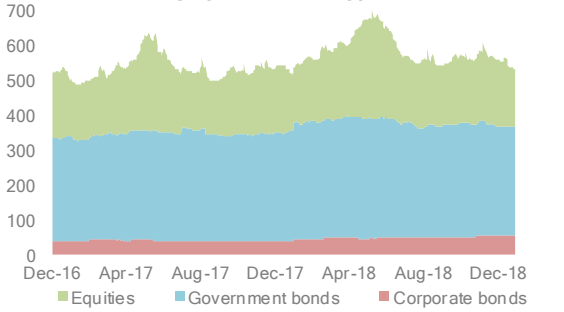
Sovereign repo dispersion



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.78

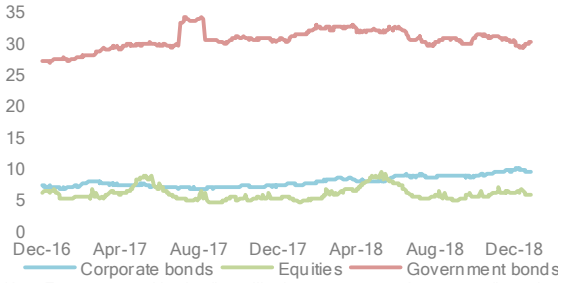
Securities lending by instrument type



Note: Total value of European securities on loan, EUR bn.
Sources: Markit Securities Finance, ESMA.

A.79

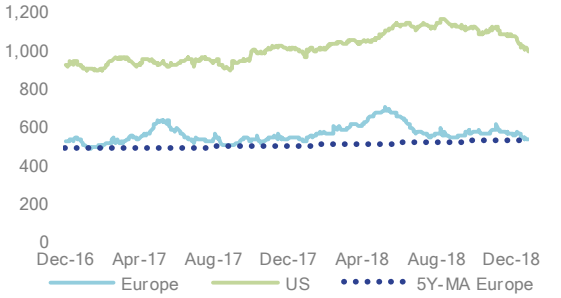
Securities utilisation rate



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.80

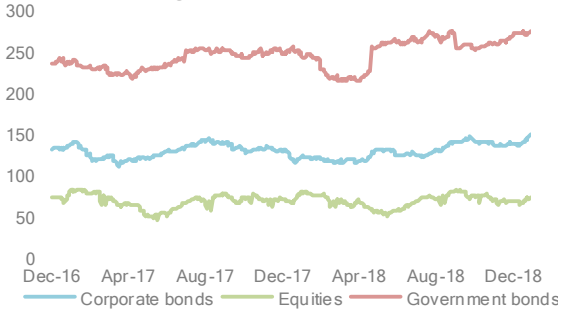
Securities lending by region



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.81

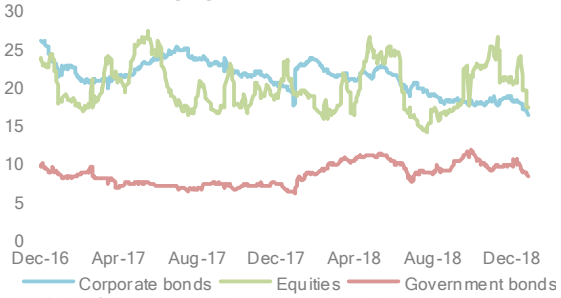
Securities lending contract tenure



Note: Average European securities lending contract tenure, in days.
Source: Markit Securities Finance, ESMA.

A.82

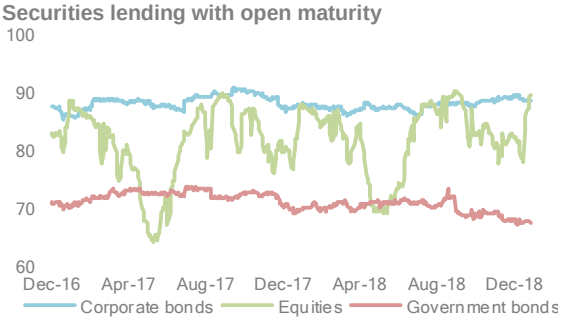
Securities lending against cash collateral



Note: Ratio of European securities on loan collateralised with cash over total securities on loan, outstanding values, in %.
Source: Markit Securities Finance, ESMA.

A.83

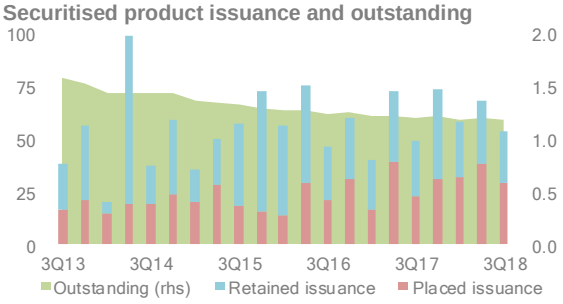
Securities lending with open maturity



Note: Ratio of European securities on loan at open maturity over total securities on loan, outstanding values, in %.
Sources: Markit Securities Finance, ESMA.

A.84

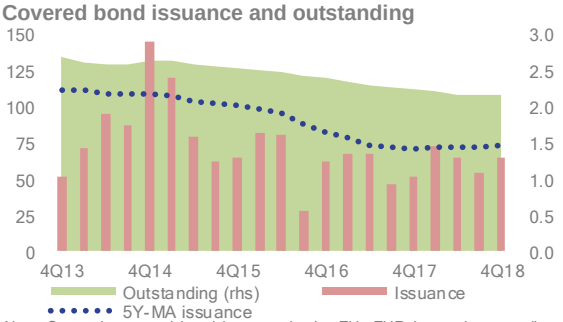
Securitised product issuance and outstanding



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.85

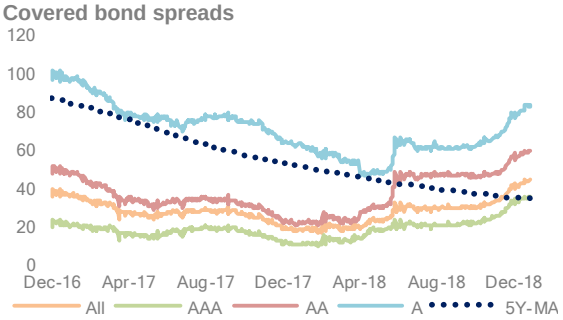
Covered bond issuance and outstanding



Note: Quarterly covered bond issuance in the EU, EUR bn, and outstanding amounts (rhs), EUR tn.
Sources: Thomson Reuters EIKON, ESMA.

A.86

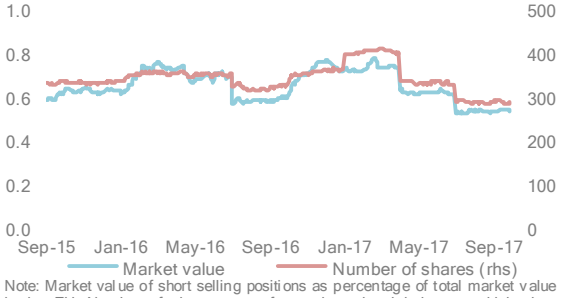
Covered bond spreads



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.

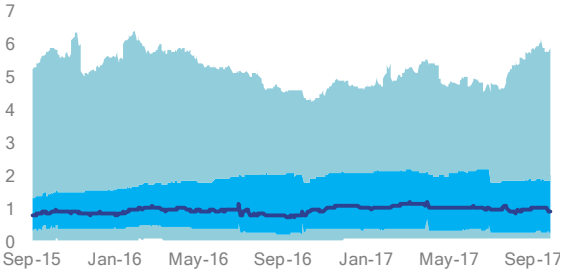
Short selling

A.87
Value of net short positions in EU shares



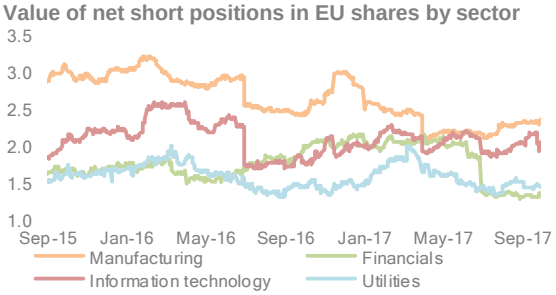
Note: Market value of short selling positions as percentage of total market value in the EU. Number of shares part of a main national index on which short positions were reported by NCAs under the EU Short Selling Regulation (rhs).
Sources: National Competent Authorities, Thomson Reuters Datastream, ESMA.

A.88
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.89
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.

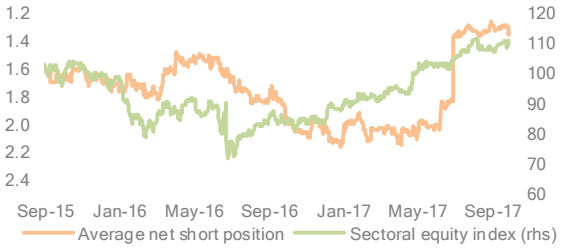
A.90
Value of net short positions in EU sovereign debt

Note: Duration-adjusted short positions held on sovereigns in the EU, EUR tn.
Sources: National Competent Authorities, ESMA.

A.91
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.

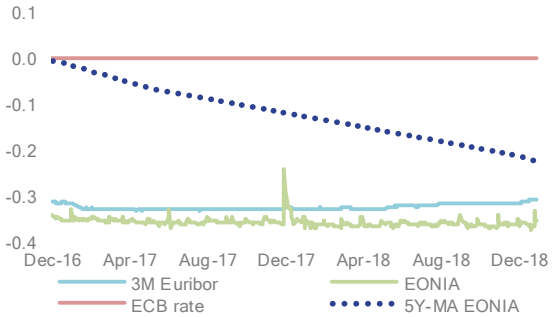
A.92
Net short positions in financial shares and equity prices



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.

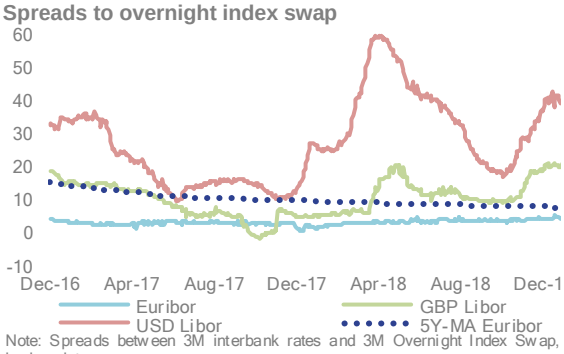
Money markets

A.93
Interest rates



Note: Money market rates, in %.
Sources: Thomson Reuters Datastream, ESMA.

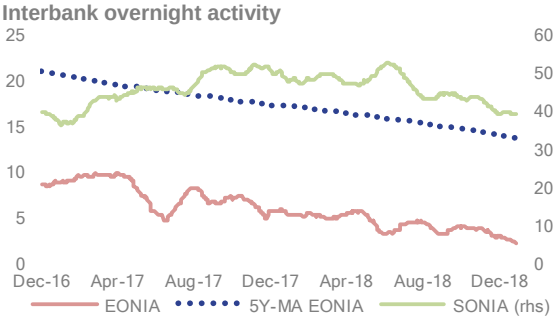
A.94
Spreads to overnight index swap



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

A.95

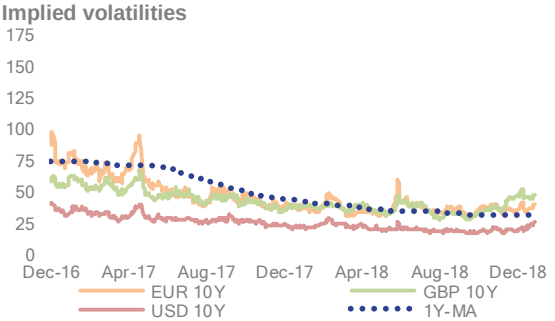
Interbank overnight activity



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.96

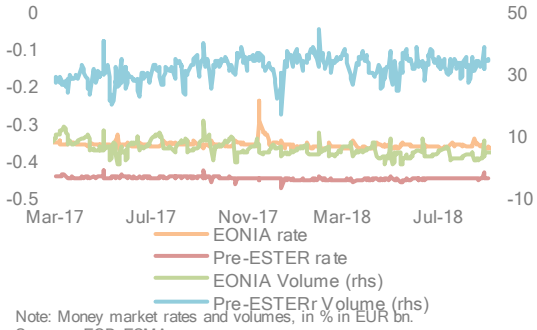
Implied volatilities



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.

A.97

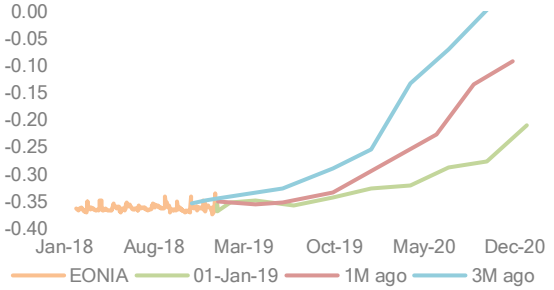
Euro short-term rates



Note: Money market rates and volumes, in % in EUR bn.
Sources: ECB, ESMA

A.98

EONIA forwards

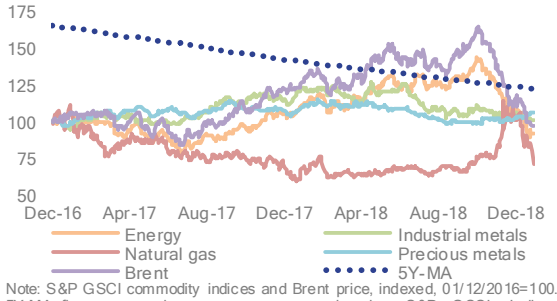


Note:Euro overnight index swap forwards, in %.
Sources: Thomson Reuters Datastream, ESMA.

Commodity markets

A.99

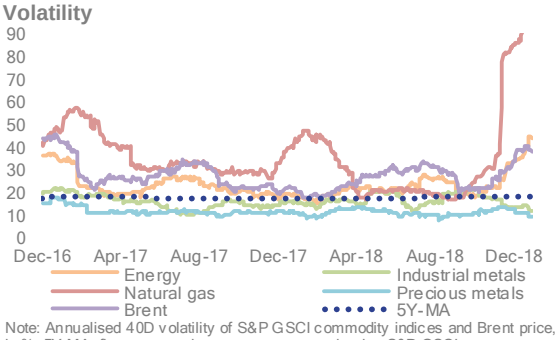
Prices



Note: S&P GSCI commodity indices and Brent price, indexed, 01/12/2016=100. 5Y-MA=five-year moving average computed using S&P GSCI. Indices denominated in USD.
Sources: Thomson Reuters Datastream, ESMA.

A.100

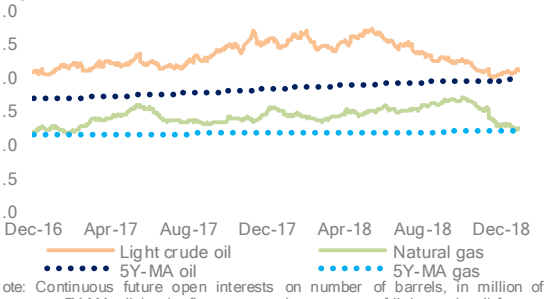
Volatility



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.101

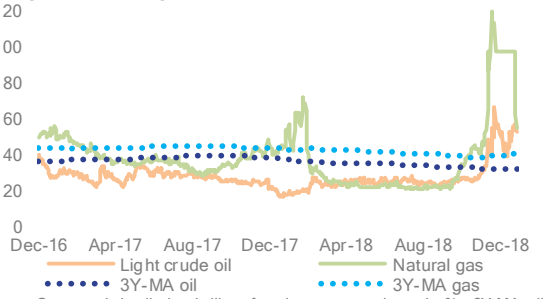
Open interest



ote: Continuous future open interests on number of barrels, in million of ontracts. 5Y-MA oil (gas)= five-year moving average of light crude oil futures atural gas futures).
ources: Thomson Reuters Datastream, ESMA.

A.102

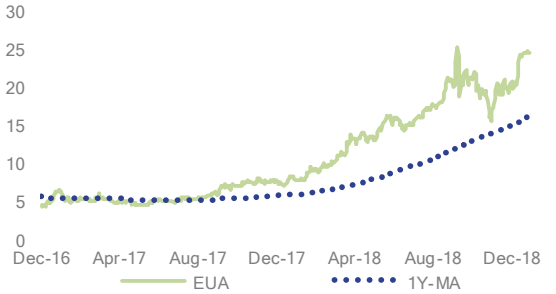
Implied volatility



ote: One-month implied volatility of at-the-money options, in %. 3Y-MA oil as)= three-year moving average of light crude oil (natural gas).
ources: Thomson Reuters Datastream, ESMA.

A.103

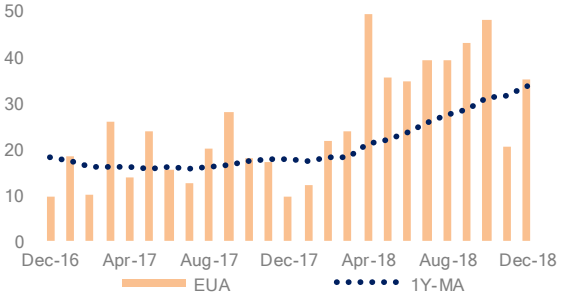
Emission allowances price



Note: Daily settlement price of European Emission Allowances (EUA) on European Energy Exchange spot market, in EUR/tCO2.
Sources: Thomson Reuters Datastream, ESMA.

A.104

Emission allowances turnover

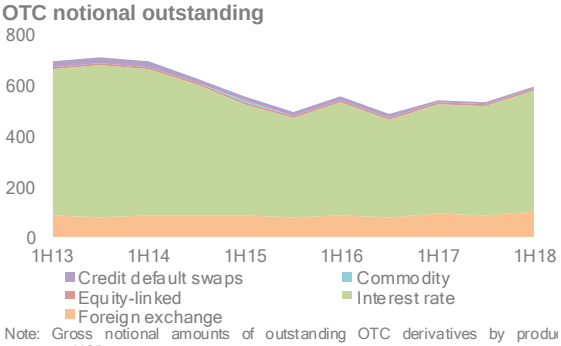


Note: Monthly turnover of European Emission Allowances (EUA) on European Energy Exchange, in EUR mn.
Sources: Thomson Reuters Datastream, ESMA.

Derivatives markets

A.105

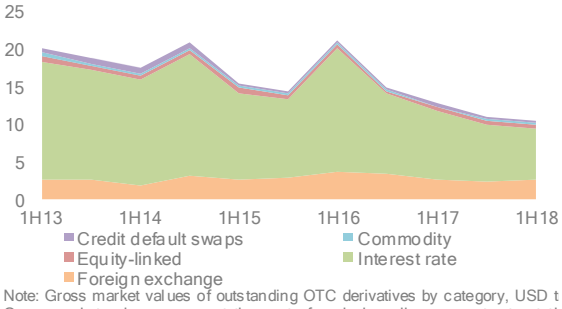
OTC notional outstanding



Note: Gross notional amounts of outstanding OTC derivatives by produ category, USD tn.
Sources: Bank for International Settlements, ESMA.

A.106

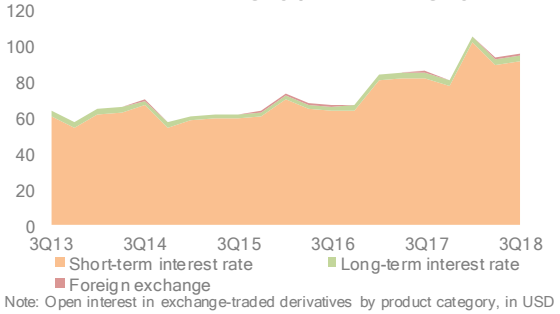
OTC market value



Note: Gross market values of outstanding OTC derivatives by category, USD t Gross market values represent the cost of replacing all open contracts at th prevailing market prices.
Sources: Bank for International Settlements, ESMA.

A.107

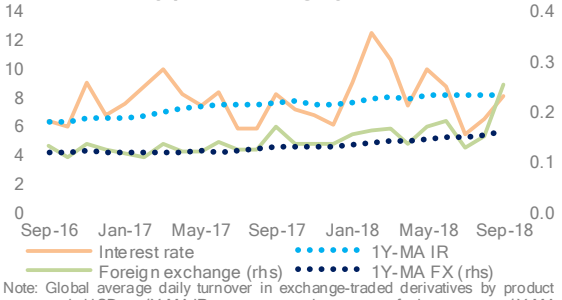
ETD notional outstanding by product category



Note: Open interest in exchange-traded derivatives by product category, in USD tn.
Sources: Bank for International Settlements, ESMA.

A.108

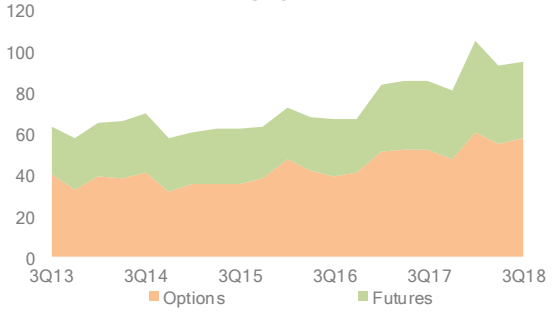
ETD turnover by product category



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.109

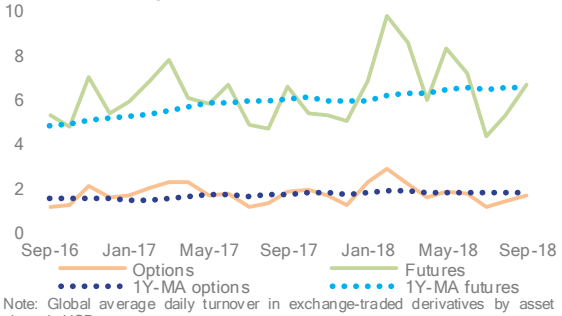
ETD notional outstanding by asset class



Note: Open interest in exchange-traded derivatives by asset class, in USD tn.
Sources: Bank for International Settlements, ESMA.

A.110

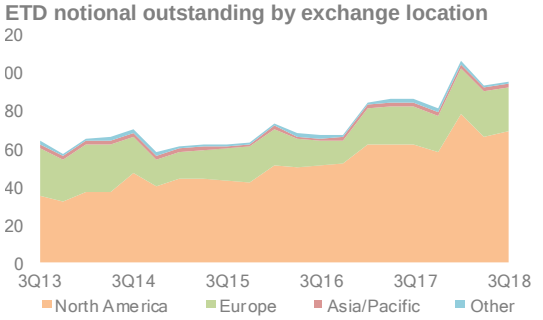
ETD turnover by asset class



Note: Global average daily turnover in exchange-traded derivatives by asset class, in USD tn.
Sources: Bank for International Settlements, ESMA.

A.111

ETD notional outstanding by exchange location

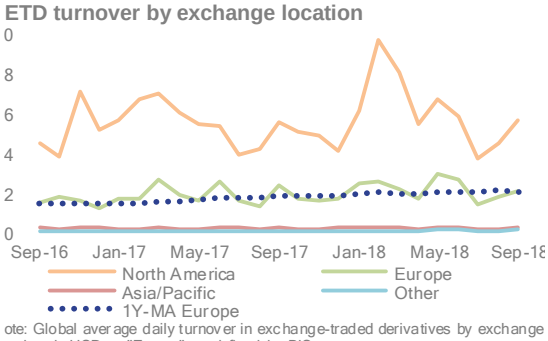


ote: Open interest in exchange-traded derivatives by exchange location, in USD .

ources: Bank for International Settlements, ESMA.

A.112

ETD turnover by exchange location



ote: Global average daily turnover in exchange-traded derivatives by exchange cation, in USD tn. "Europe" as defined by BIS.

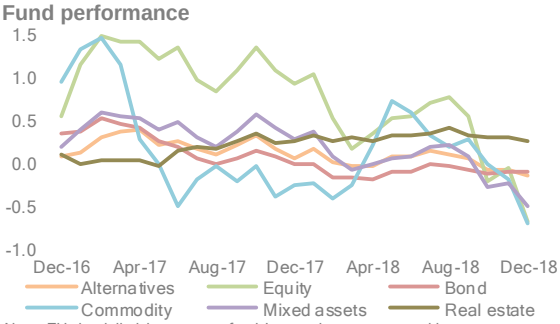
ources: Bank for International Settlements, ESMA.

Investors

Fund industry

A.113

Fund performance

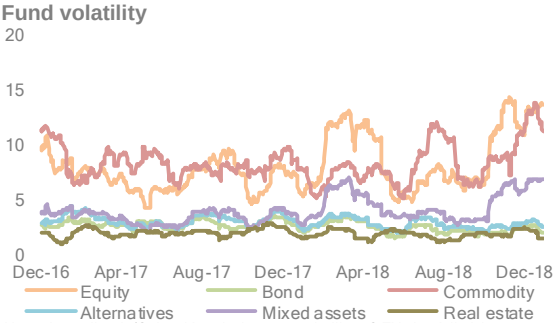


Note: EU-domiciled investment funds' annual average monthly returns, asset-weighted, in %.

Sources: Thomson Reuters Lipper, ESMA.

A.114

Fund volatility

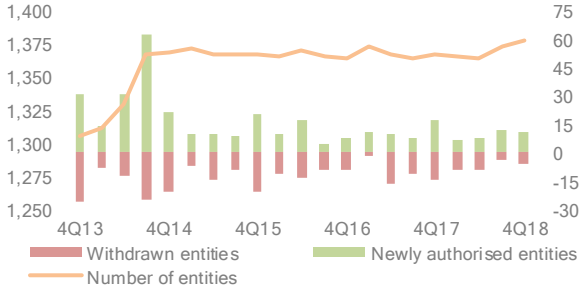


Note: Annualised 40-day historical return volatility of EU-domiciled investment funds, in %.

Sources: Thomson Reuters Lipper, ESMA

A.115

Entities authorised under UCITS

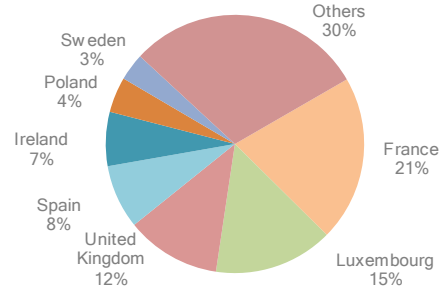


Note: Number of entities authorised under the UCITS Directive by national competent authorities of the Member States and notified to ESMA. Newly authorised entities and withdrawn entities on the right axis.

Sources: ESMA Registers.

A.116

Share of entities authorised under UCITS by country

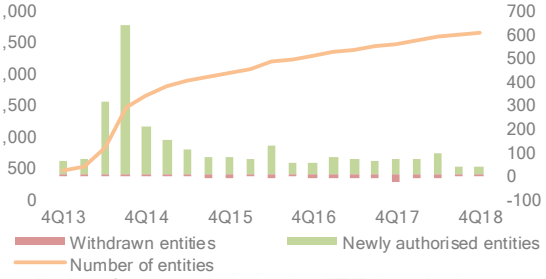


Note: Number of entities authorised under the UCITS Directive by national competent authorities and notified to ESMA, in %.

Sources: ESMA Registers.

A.117

Entities authorised under AIFMD

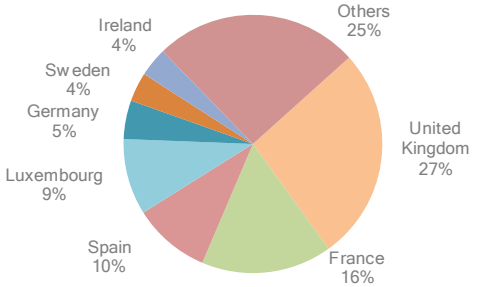


ote: Number of entities authorised under AIFMD by national competent uthorities of the Member States and notified to ESMA. Newly authorised entities nd withdrawn entities on the right axis.

ources: ESMA Registers.

A.118

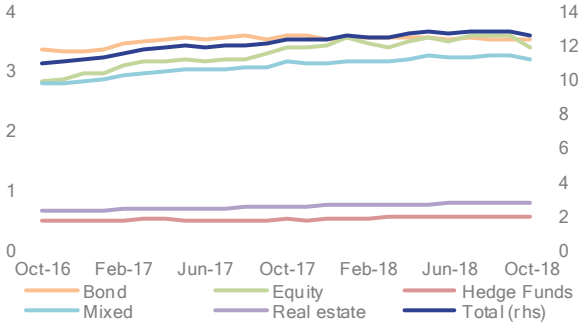
Share of entities authorised under AIFMD by country



ote: Number of entities authorised under AIFMD by national competent uthorities and notified to ESMA, in %.

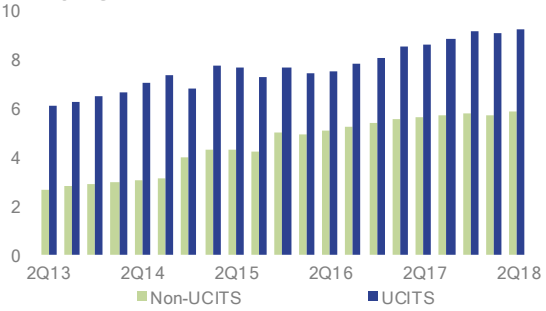
ources: ESMA Registers.

A.119
Assets by market segment



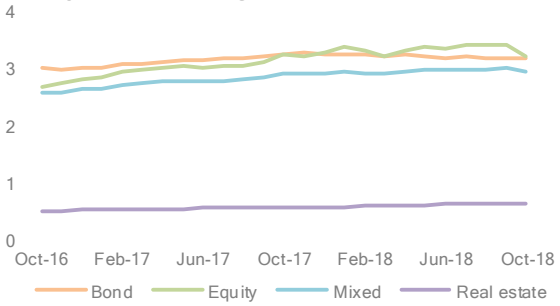
Note: Assets under management (AuM) of EA funds by fund type, EUR tn.
Sources: ECB, ESMA.

A.120
NAV by legal form



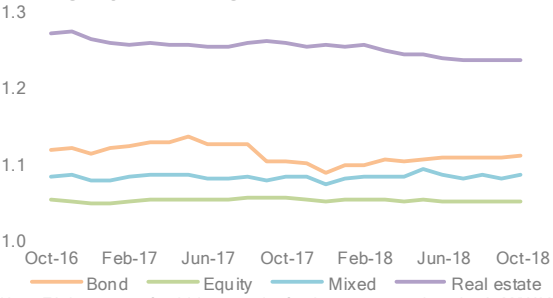
Note: NAV of EU fund industry, EUR tn. Quarterly data.
Sources: EFAMA, ESMA.

A.121
NAV by fund market segment



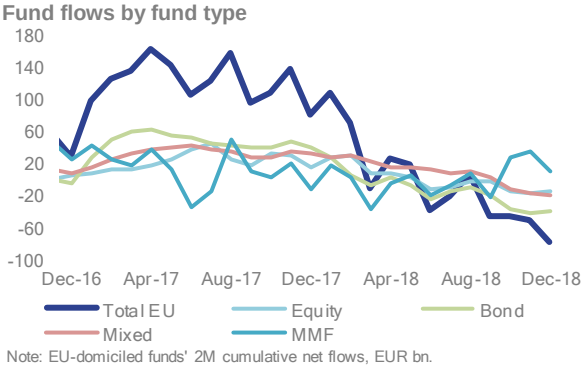
Note: EA investment funds' NAV by fund type, EUR tn.
Sources: ECB, ESMA.

A.122
Leverage by market segment



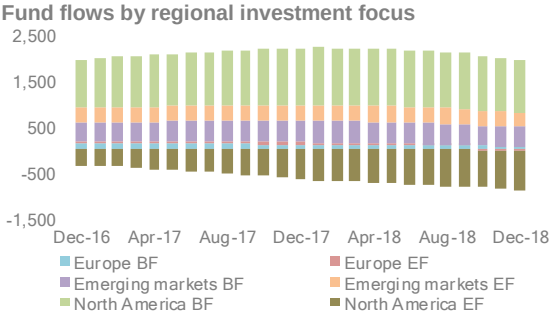
Note: EA investment funds' leverage by fund type computed as the AuM/NAV ratio.
Sources: ECB, ESMA.

A.123
Fund flows by fund type



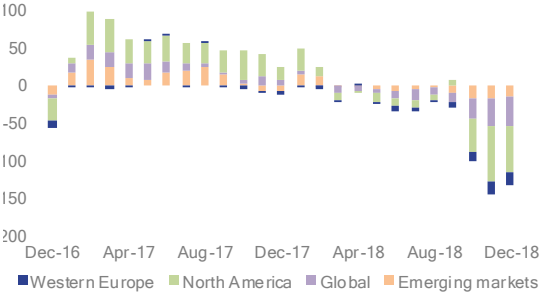
Note: EU-domiciled funds' 2M cumulative net flows, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.124
Fund flows by regional investment focus



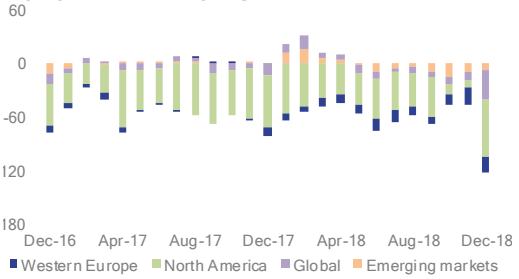
Note: Cumulative net flows into bond and equity funds (BF and EF) over time since 2004 by regional investment focus, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.125
Bond fund flows by regional investment focus



ote: Two-month cumulative bond flows by regional investment focus, EUR bn.
ources: Thomson Reuters Lipper, ESMA.

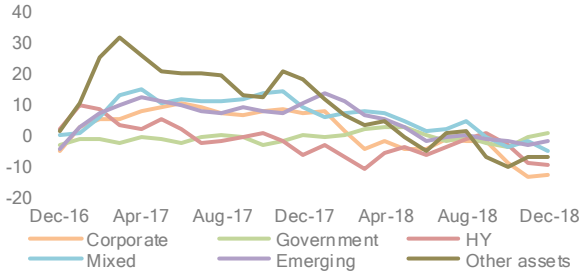
A.126
Equity fund flows by regional investment focus



ote: Two-month cumulative equity flows by regional investment focus, EUR bn.
ources: Thomson Reuters Lipper, ESMA.

A.127

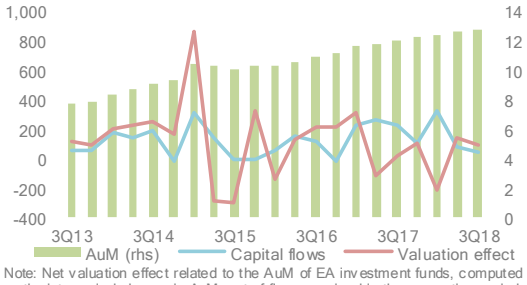
Net flows for bond funds



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 (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.128

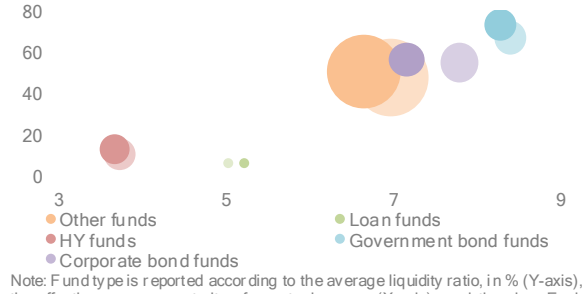
Net asset valuation



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.129

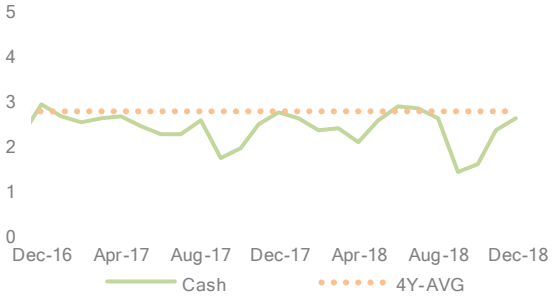
Liquidity risk profile of EU bond funds



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

A.130

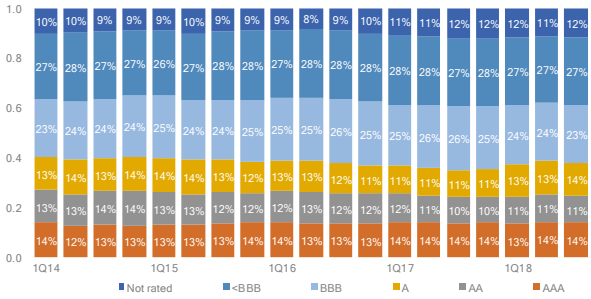
Cash as percentage of assets



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.131

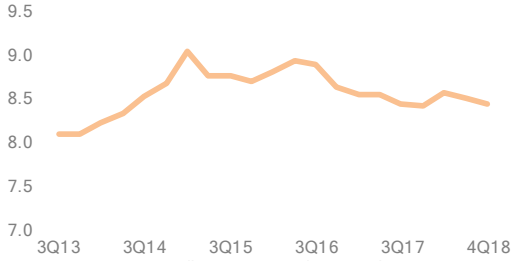
Credit quality of bond funds' assets



Note: Ratings of bonds held by EU bond funds, data in % of total assets.
Sources: Thomson Reuters Lipper, ESMA and Standard & Poor's.

A.132

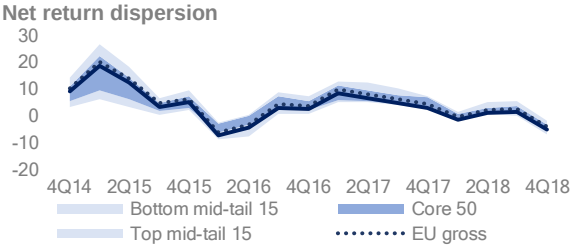
Maturity of EU bond funds' assets



Note: Weighted average effective maturity of EU bond funds' assets, data in years.
Sources: Thomson Reuters Lipper, ESMA

A.133

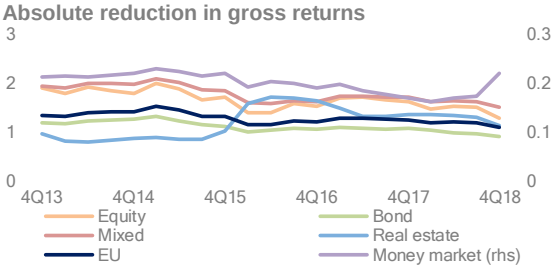
Net return dispersion



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.

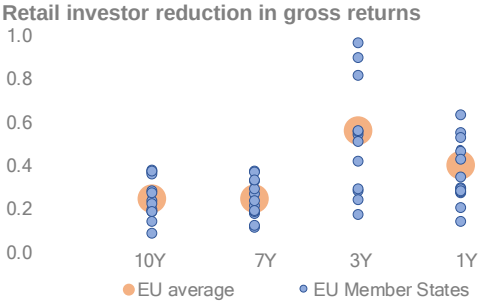
A.134

Absolute reduction in gross returns



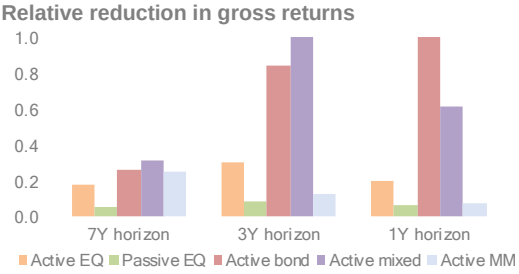
Note: Absolute impact of ongoing costs, subscription and redemption fees on gross returns for UCITS fund shares, in percentage points.
Sources: Thomson Reuters Lipper, ESMA.

A.135
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.

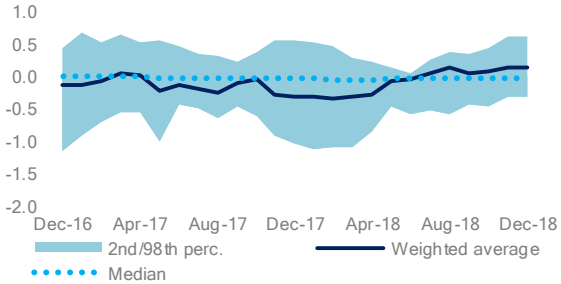
A.136
Relative reduction in gross returns



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 owing to the low sample sizes. EQ=equity; MM=money market.
Sources: Thomson Reuters Lipper, ESMA.

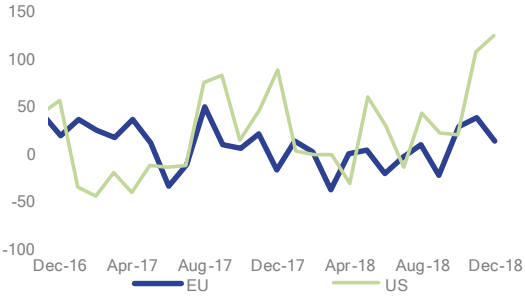
Money market funds

A.137
MMF performance



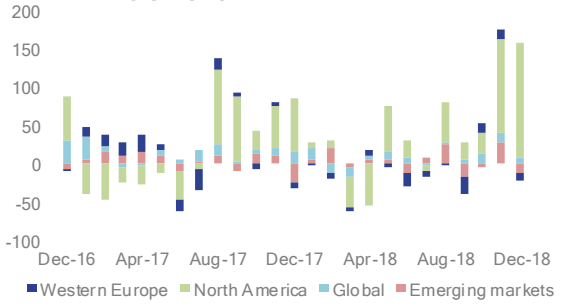
Note: EU-domiciled MMFs' average yearly returns by month, asset-weighted, in %. The graph shows the median and average asset-weighted returns and the difference between the returns corresponding to the 98th and 2nd percentile.
Sources: Thomson Reuters Lipper, ESMA.

A.138
MMF flows by domicile



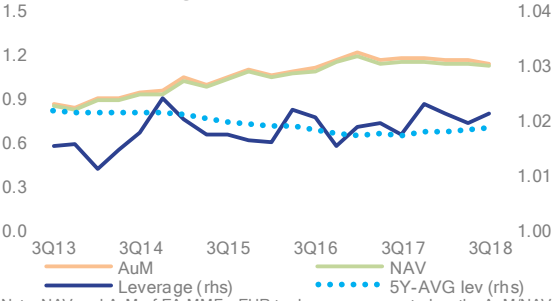
Note: MMF two-month cumulative net flows by domicile, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.139
MMF flows by geographical focus



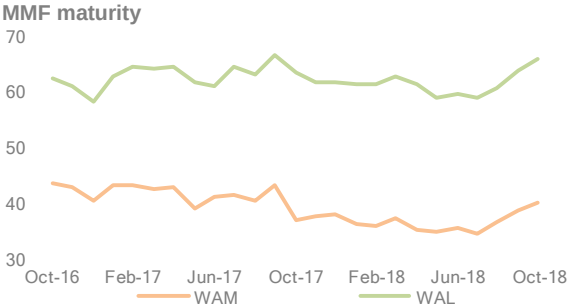
Note: MMF two-month cumulative net flows by geographical focus, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.140
Assets and leverage



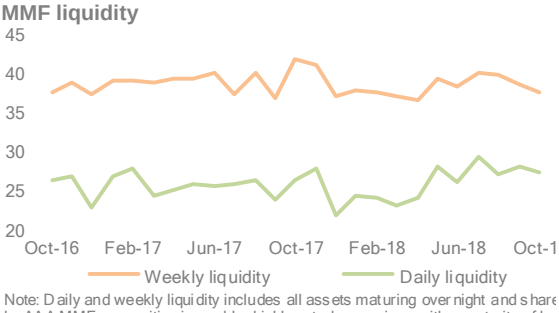
Note: NAV and AuM of EA MMFs, EUR tn. Leverage computed as the AuM/NAV ratio. 5Y-MA lev=five-year moving average for the leverage ratio.
Sources: ECB, ESMA.

A.141
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.

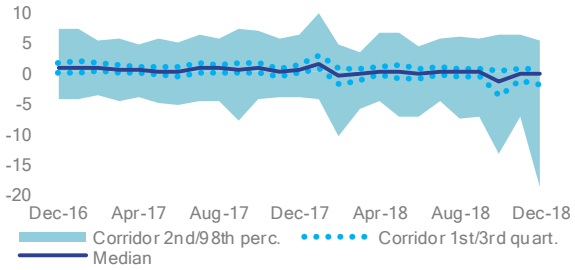
A.142
MMF liquidity



Note: Daily and weekly liquidity includes all assets maturing overnight and share by AAA MMFs, securities issued by highly rated sovereigns with a maturity of les than one year, in % of total assets. Aggregation carried out using individual MM data weighted by AuM.
Sources: Fitch Ratings, ESMA.

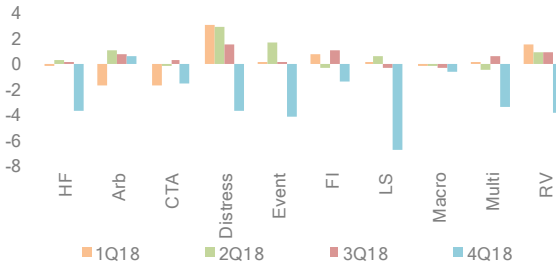
Alternative funds

A.143
Hedge fund returns



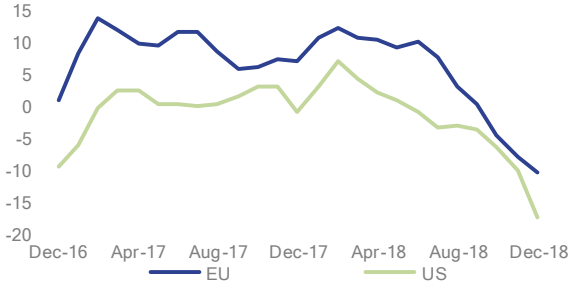
Note: EU-domiciled hedge funds' monthly returns, in %. The graph shows the returns' median, the difference between the returns corresponding to the 2nd and 98th percentiles and the difference between the returns corresponding to the 1st and 3rd quartiles.
Sources: Eurekahedge, ESMA.

A.144
Hedge fund performance by strategy



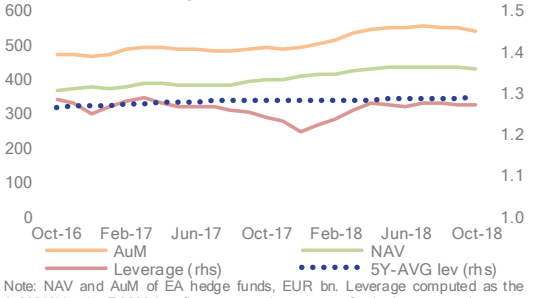
Note: Growth of hedge fund performance indices by strategy: hedge fund inde (HF), arbitrage (Arb), commodity trading advisor (CTA), distressed debt, eve driven, fixed Income (FI), long/short equity (LS), macro, multi-strategy, relati value (RV), in %.
Sources: Eurekahedge, ESMA.

A.145
Fund flows by domicile



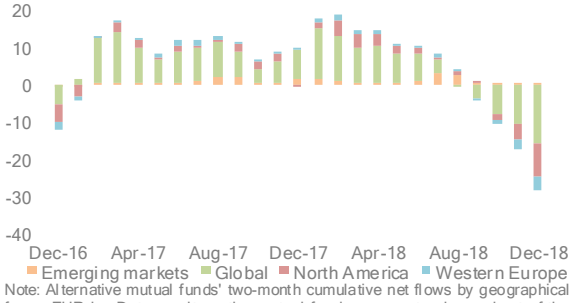
Note: Alternative mutual funds' two-month cumulative net flows by domicile, EUR bn. Data on alternative mutual funds represent only a subset of the entire alternative fund industry.
Sources: Thomson Reuters Lipper, ESMA.

A.146
Assets and leverage



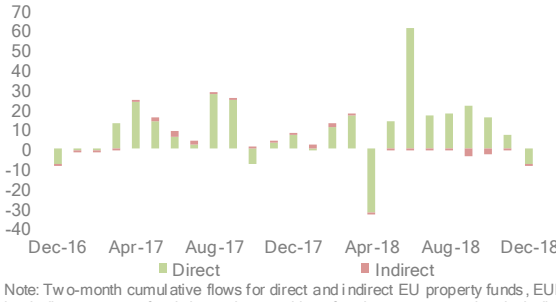
Note: NAV and AuM of EA hedge funds, EUR bn. Leverage computed as the AuM/NAV ratio. 5Y-MA lev=five-year moving average for the leverage ratio.
Sources: ECB, ESMA.

A.147
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 represent only a subset of the entire alternative fund industry.
Sources: Thomson Reuters Lipper, ESMA.

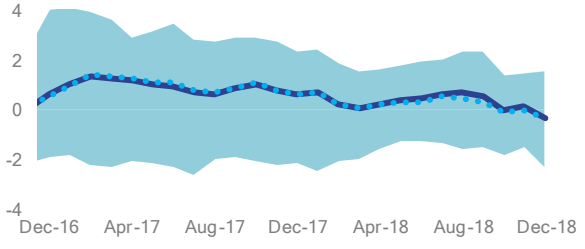
A.148
Direct and indirect property fund flows



Note: Two-month cumulative flows for direct and indirect EU property funds, EU bn. Indirect property funds invest in securities of real estate companies, includin real estate investment trusts.
Sources: Morningstar, ESMA.

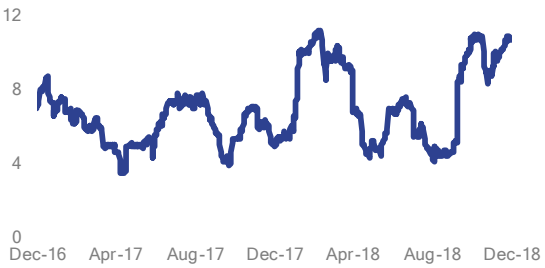
Exchange-traded funds

A.149
Returns



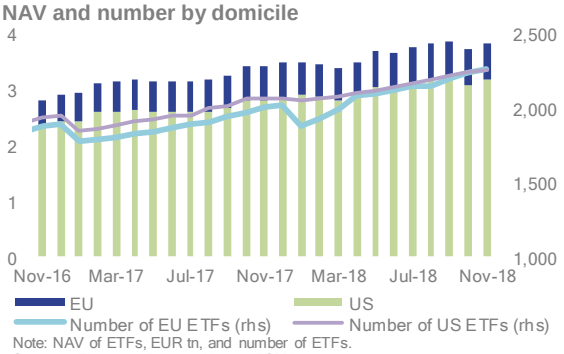
Note: EU-domiciled ETFs' average yearly returns by month, asset-weighted, in %. The graph shows the median and average asset-weighted returns and the difference between the returns corresponding to the 98th and the 2nd percentile (light blue corridor).
Sources: Thomson Reuters Lipper, ESMA.

A.150
Volatility



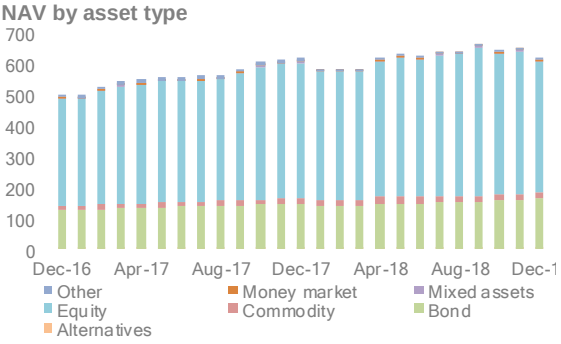
Note: Annualised 40-day historical return volatility of EU-domiciled ETF, in %.
Sources: Thomson Reuters Lipper, ESMA.

A.151
NAV and number by domicile



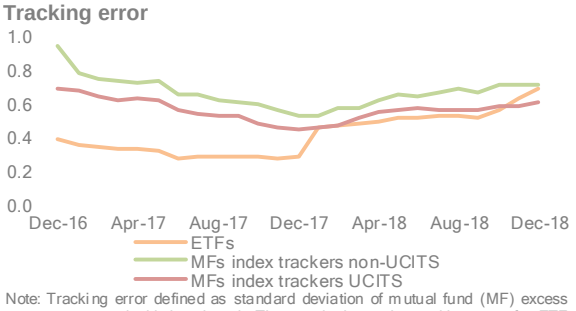
Note: NAV of ETFs, EUR tn, and number of ETFs.
Sources: Thomson Reuters Lipper, ESMA.

A.152
NAV by asset type



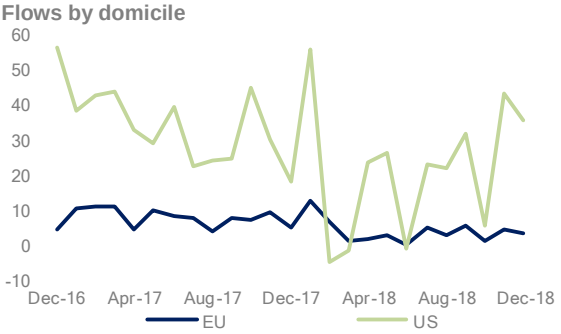
Note: NAV of EU ETFs by asset type, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.153
Tracking error



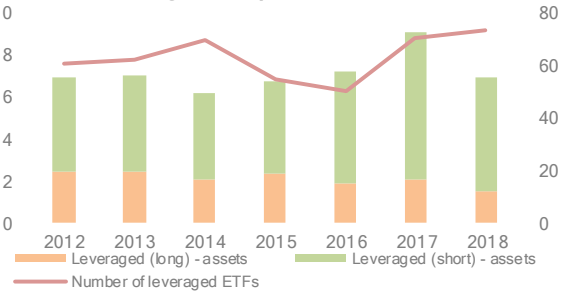
Note: Tracking error defined as standard deviation of mutual fund (MF) excess returns compared with benchmark. The graph shows the tracking error for ETF and mutual funds both UCITS and non-UCITS. Yearly standard deviation reported on monthly frequency. End-of-month data.
Sources: Thomson Reuters Lipper, ESMA.

A.154
Flows by domicile



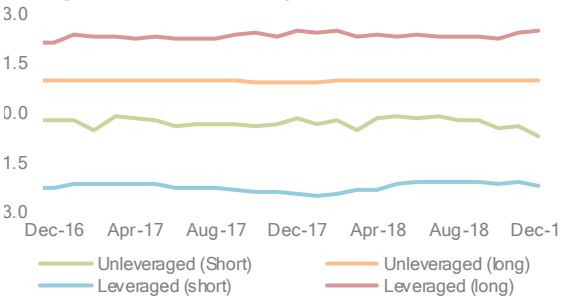
Note: ETF net flows by domicile, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

A.155
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

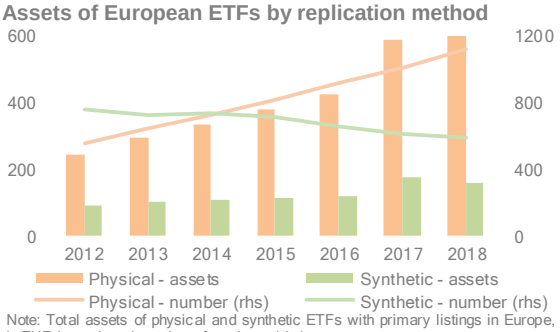
A.156
Average beta values for European ETFs



lote: Leveraged ETFs are self-reported. The annual average monthly beta is
easured as the volatility of a fund return in comparison with its benchmark. A
nleveraged ETF replicating its benchmark will typically have a beta close to 1.0
ources: Thomson Reuters Lipper, ESMA.

A.157

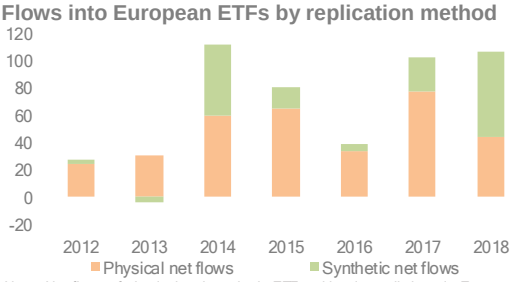
Assets of European ETFs by replication method



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.158

Flows into European ETFs by replication method

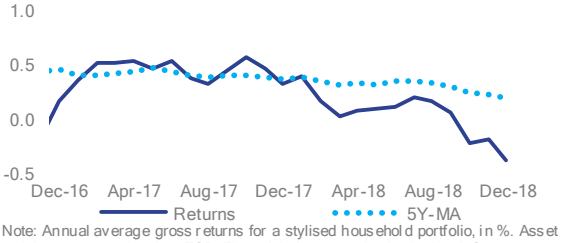


Note: Net flows of physical and synthetic ETFs with primary listings in Europe, in EUR bn.
Sources: ETFGI, ESMA

Retail investors

A.159

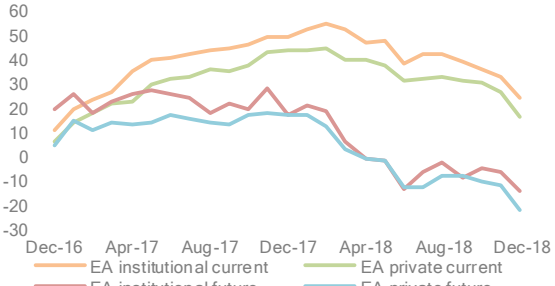
Portfolio returns



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.160

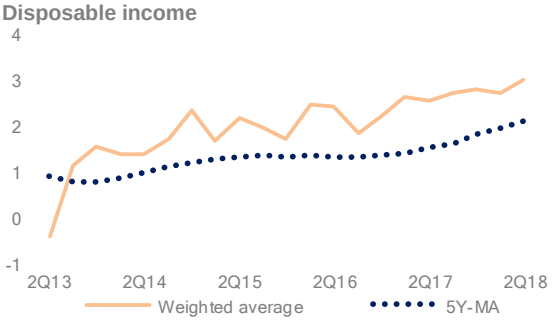
Investor sentiment



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.161

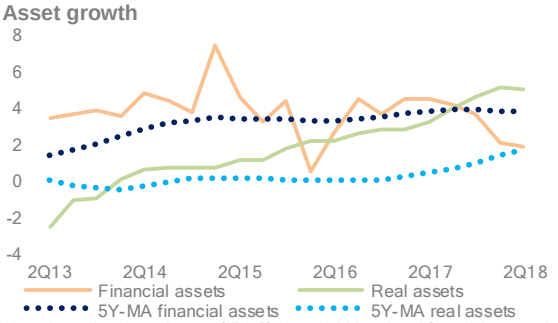
Disposable income



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.162

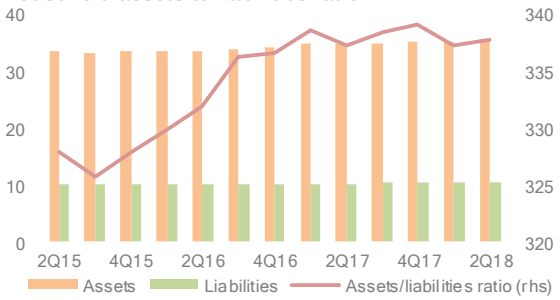
Asset growth



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.163

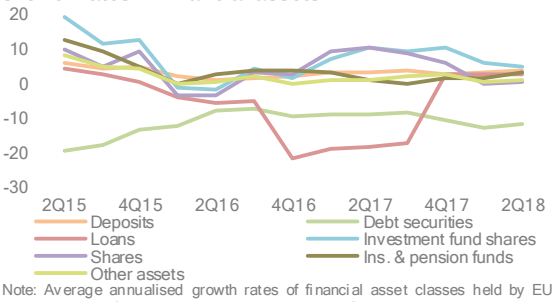
Household assets to liabilities ratio



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

A.164

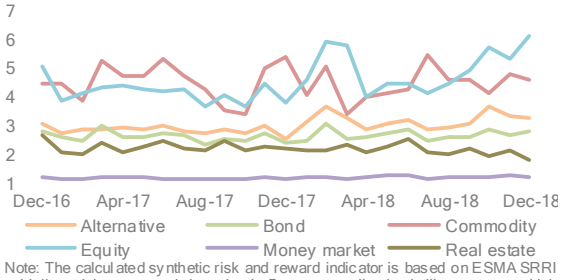
Growth rates in financial assets



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.165

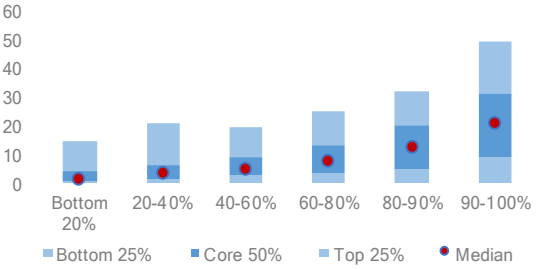
Retail fund synthetic risk and reward indicator



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.166

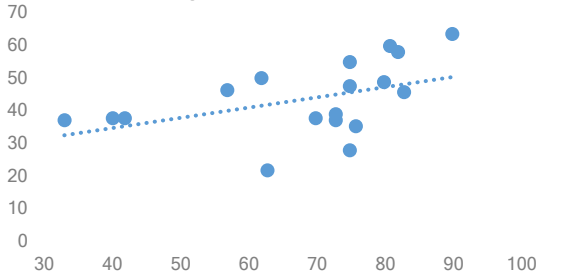
Share ownership by income



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.167

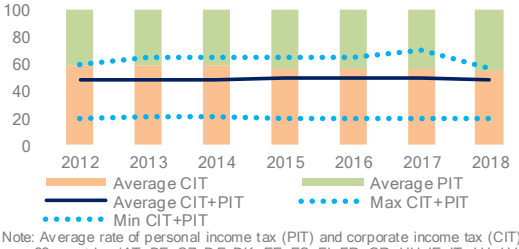
Financial numeracy



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.168

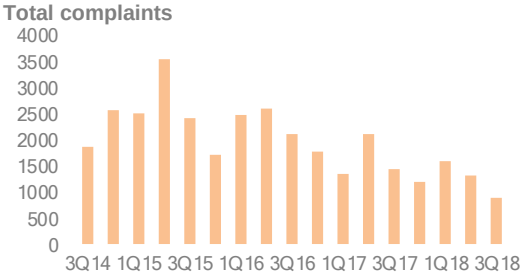
Investment taxation



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.169

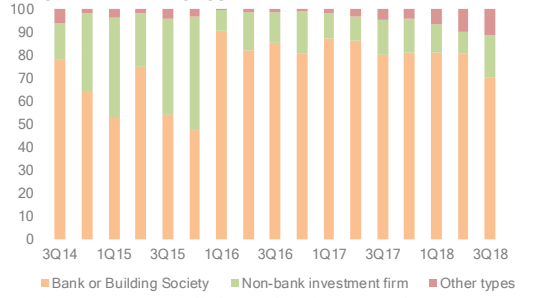
Total complaints



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, total volume estimated by summing highest total among reporting channels for each NCA.
Sources: ESMA complaints database

A.170

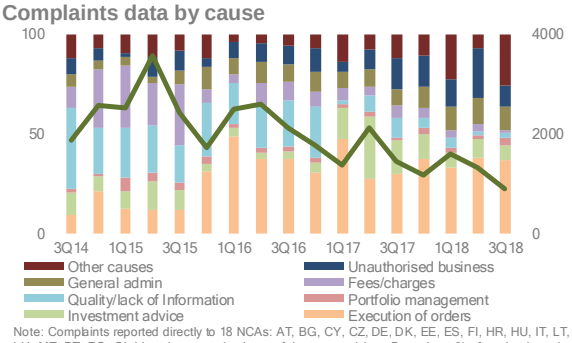
Complaints data by type of firm



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. % of total volume by type of financial instrument.
Source: ESMA complaints database

A.171

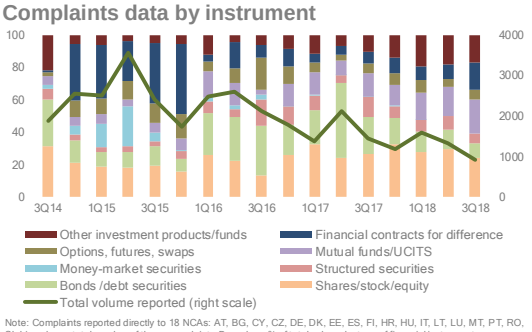
Complaints data by cause



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.

A.172

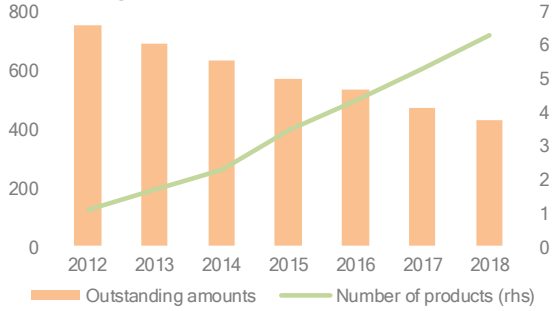
Complaints data by instrument



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

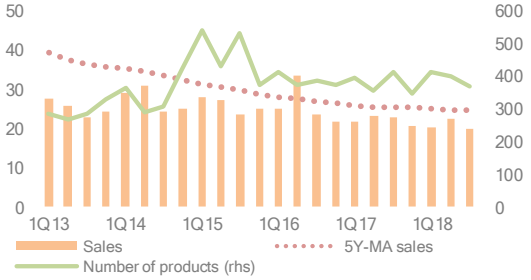
Structured retail products

A.173
Outstanding



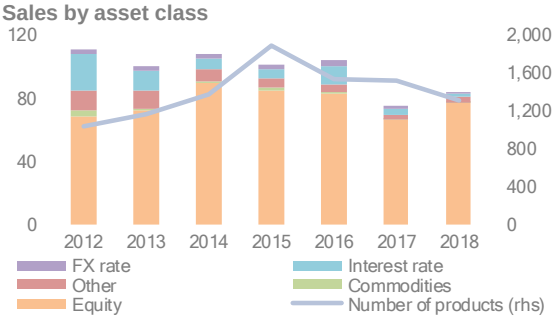
Note: Outstanding amounts, EUR bn. Number of products, in million.
Sources: StructuredRetailProducts.com, ESMA.

A.174
Sales



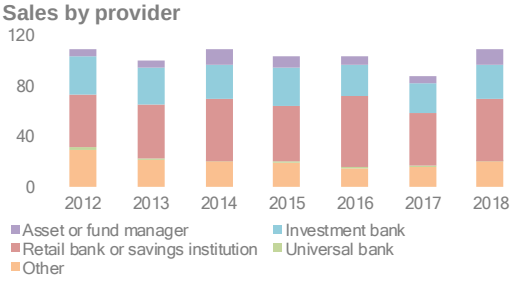
Note: Volumes of structured retail products issued, EUR bn. Number of products, in thousand.
Sources: StructuredRetailProducts.com, ESMA.

A.175
Sales by asset class



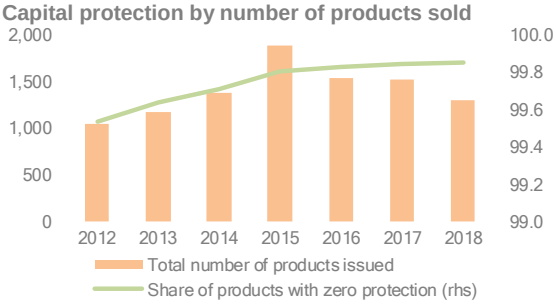
Note: Volumes of structured products sold to retail investors by asset class, EUR bn. Number of products sold, in thousand.
Sources: StructuredRetailProducts.com, ESMA.

A.176
Sales by provider



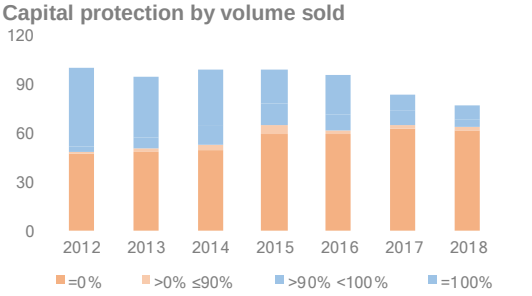
Note: Annual volumes of structured products sold to retail investors by provider, EUR bn. Other includes: academic institutions; asset/fund managers; brokerage; commercial banks; independent financial advisers; insurance and pension companies; private banks or wealth managers; securities companies; SPV.
Sources: StructuredRetailProducts.com, ESMA.

A.177
Capital protection by number of products sold



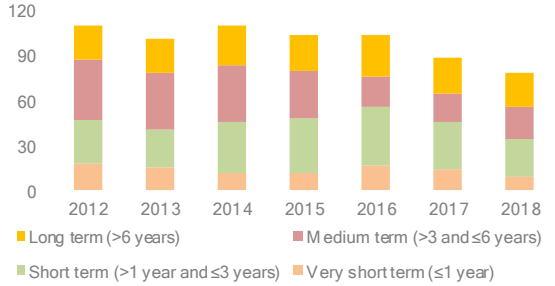
Note: Number of structured products sold to retail investors, thousands. Share of products with zero capital protection, in %.
Sources: StructuredRetailProducts.com, ESMA.

A.178
Capital protection by volume sold



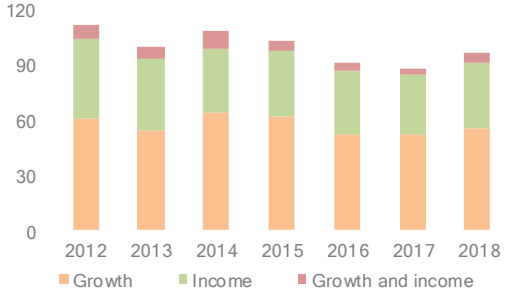
Note: Volumes of structured products sold to retail investors by level of capital protection, EUR bn.
Sources: StructuredRetailProducts.com, ESMA.

A.179
Investment term



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

A.180
Type of product



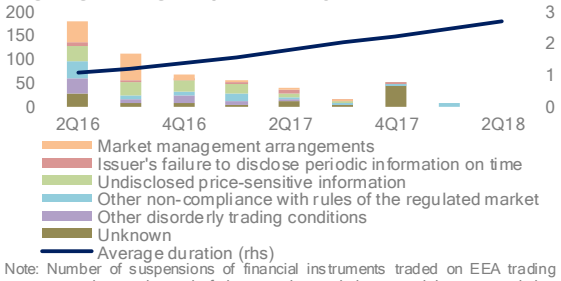
Note: Volumes of structured products sold to retail investors by type, EUR bn.
Sources: StructuredRetailProducts.com, ESMA.

Infrastructures and services

Trading venues and MiFID entities

A.181

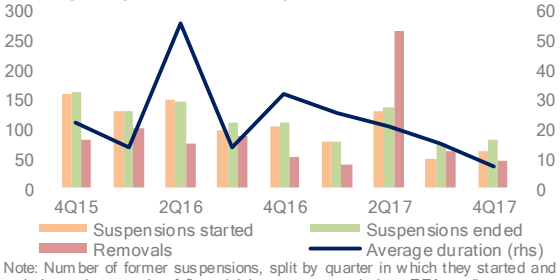
Ongoing trading suspensions by rationale



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.182

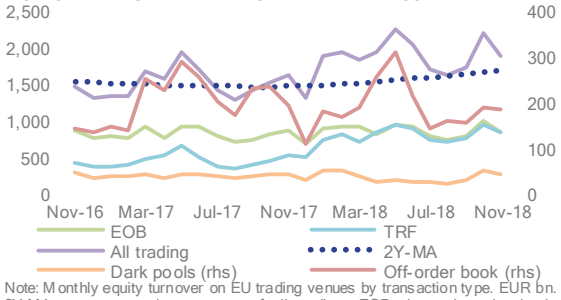
Trading suspensions – lifecycle and removal



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.183

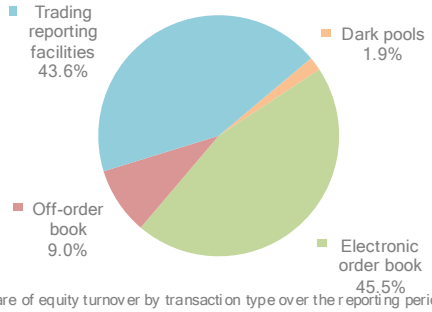
Equity trading turnover by transaction type



Note: Monthly equity turnover on EU trading venues by transaction type. EUR bn. 2Y-MA=two-year moving average of all trading, EOB=electronic order book, TRF=trade reporting facilities.
Sources: FESE, ESMA.

A.184

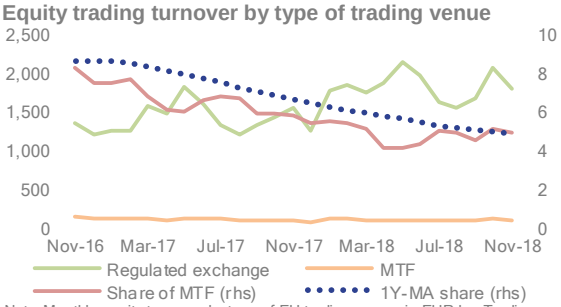
Share of equity trading by transaction type



Note: Share of equity turnover by transaction type over the reporting period, in % of total.
Sources: FESE, ESMA.

A.185

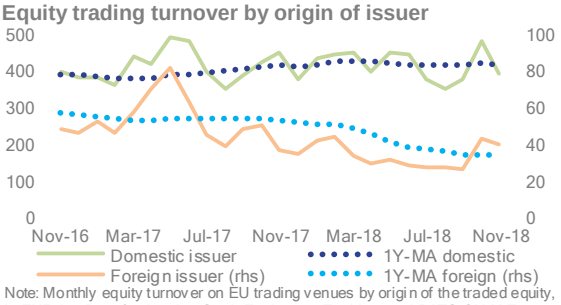
Equity trading turnover by type of trading venue



Note: Monthly equity turnover by type of EU trading venue, in EUR bn. Trading on multilateral trading facilities (MTFs) as % of total trading on the right axis. 1Y-MA share=one-year moving average share of MTFs.
Sources: FESE, ESMA.

A.186

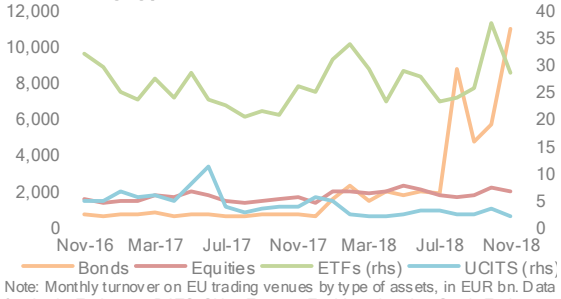
Equity trading turnover by origin of issuer



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.187

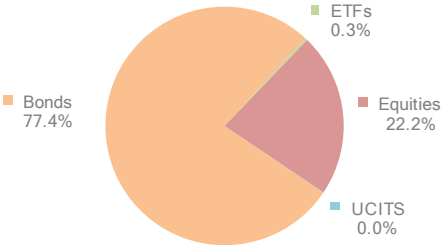
Turnover by type of assets



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.188

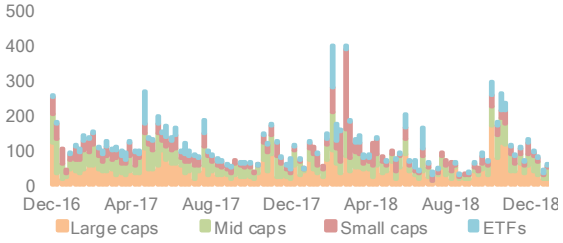
Share of turnover by type of assets



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.189

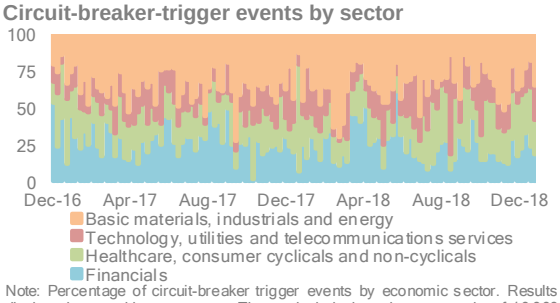
Circuit-breaker occurrences by market capitalisation



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.190

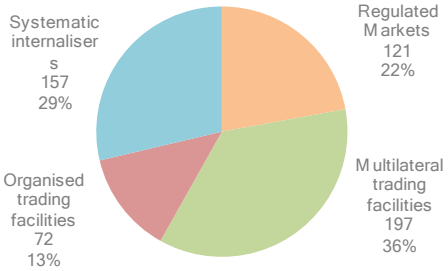
Circuit-breaker-trigger events by sector



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.191

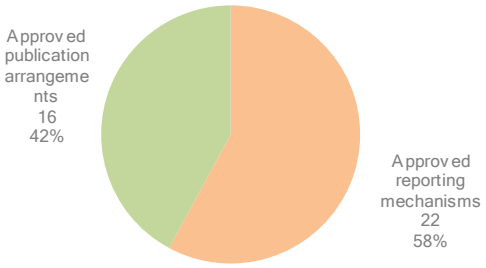
Number of trading venues registered under MiFID II/MiFIR



Note: Number and share of trading venues registered under MiFID II/MiFIR, by type.
Sources: ESMA.

A.192

Data reporting services providers

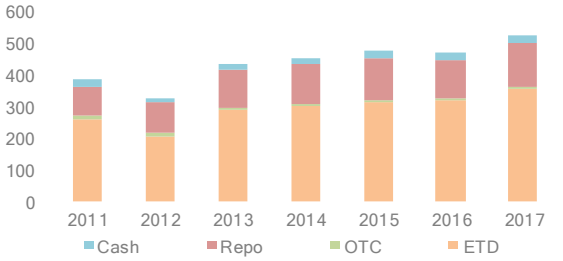


Note: Number and share of data reporting services providers registered under MiFID II/MiFIR, by type.
Sources: ESMA.

Central counterparties

A.193

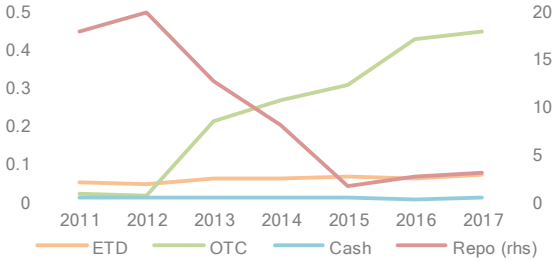
Value cleared



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. ETD: exchange-traded deriivatives.
Sources: ECB, ESMA.

A.194

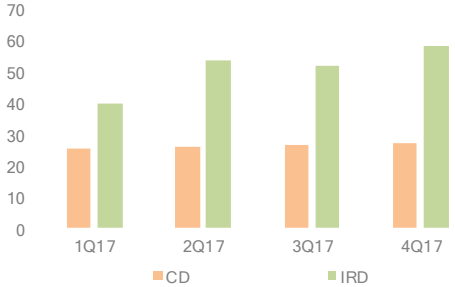
Trade size



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.195

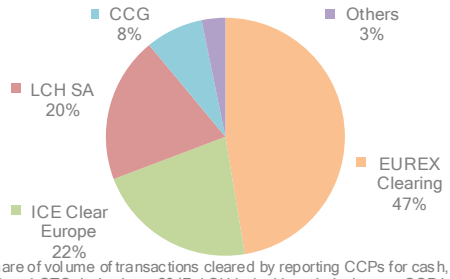
OTC derivatives central clearing rates



Note: Share of gross notional amount outstanding for credit derivatives (CD) and interest rate derivatives (IRD), in %.
Sources: TRs, ESMA.

A.196

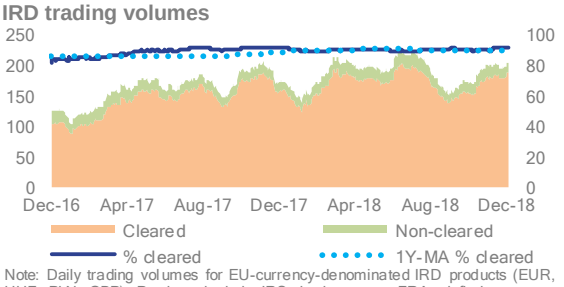
Share of transactions cleared by CCPs



Note: Share of volume of transactions cleared by reporting CCPs for cash, repos, non-OTC and OTC derivatives, 2017. 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.197

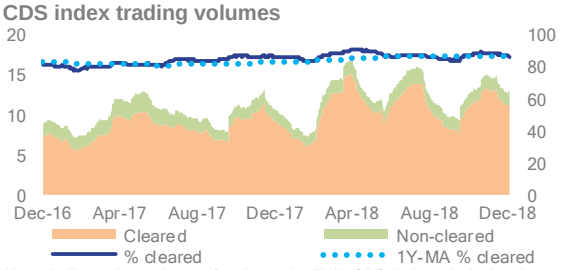
IRD trading volumes



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.198

CDS index trading volumes

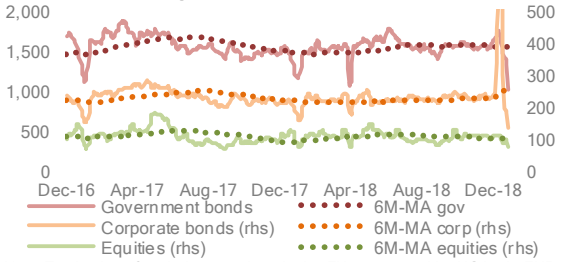


Note: Daily trading volumes for the main EUR CDS indices including Itraxx Europe, Itraxx Europe Crossover, Itraxx Europe Senior Financials. 40-day moving average notional, USD bn. ISDA SwapsInfo data are based on publicly available data from DTCC Trade Repository LLC and Bloomberg Swap Data Repository.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

Central securities depositories

A.199

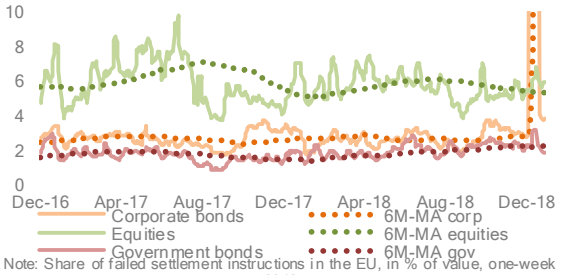
Settlement activity



Note: Total value of settled transactions in the EU as reported by NCAs, in EUR bn, one-week moving averages. Jump in December 2018 due to a single transaction instructed on 10 December with settlement requested on the same day which was finally cancelled on 18 December 2018 (amount of EUR 500bn).
Sources: National Competent Authorities, ESMA.

A.200

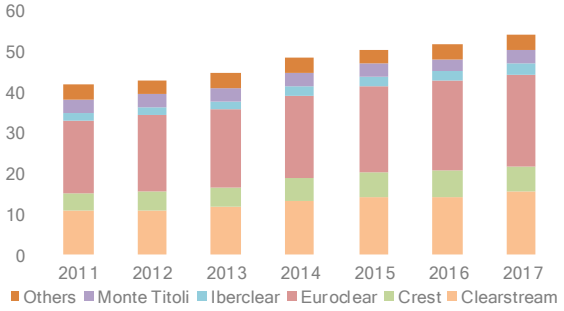
Settlement fails



Note: Share of failed settlement instructions in the EU, in % of value, one-week moving averages. Jump in December 2018 due to a single transaction instructed on 10 December with settlement requested on the same day which was finally cancelled on 18 December 2018 (amount of EUR 500bn).
Sources: National Competent Authorities, ESMA.

A.201

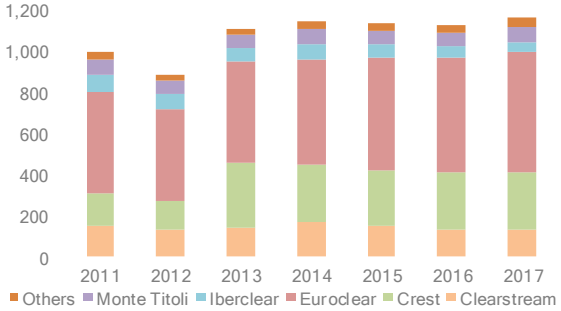
Securities held in CSD accounts



Note: Value of securities held by EU CSDs in accounts, EUR tn.
Sources: ECB, ESMA.

A.202

Value of settled transactions

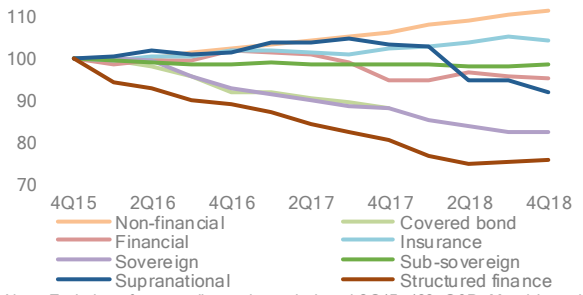


Note: Value of settlement instructions processed by EU CSDs, EUR tn.
Sources: ECB, ESMA.

Credit rating agencies

A.203

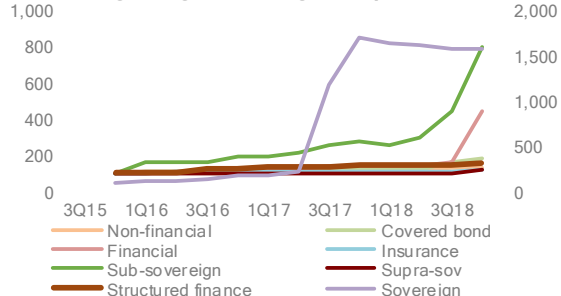
Outstanding ratings issued by the top 3 CRAs



Note: Evolution of outstanding ratings, indexed 3Q15= 100. S&P, Moody's and Fitch.
Sources: RADAR, ESMA.

A.204

Outstanding ratings excluding the top 3 CRAs

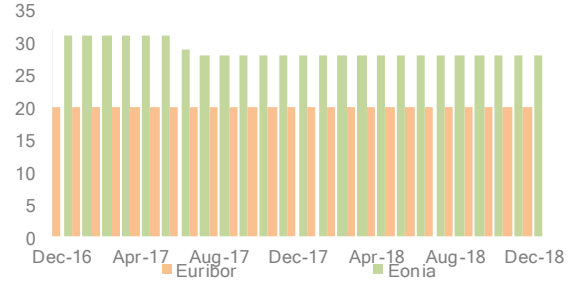


Note: Evolution of outstanding ratings, indexed 3Q15= 100. All CRAs excluding S&P, Moody's and Fitch.
Sources: RADAR, ESMA.

Financial benchmarks

A.205

Number of benchmark panel banks

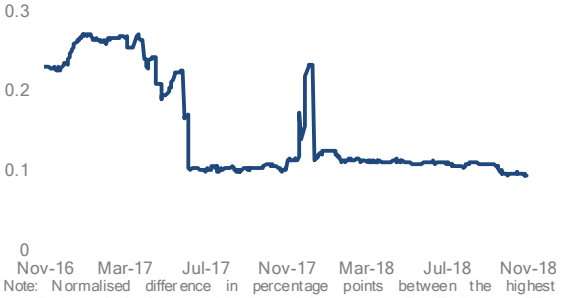


Note: Number of banks contributing to the Euribor and EONIA panels.

Sources: European Money Markets Institute, ESMA.

A.206

Dispersion in Euribor contributions

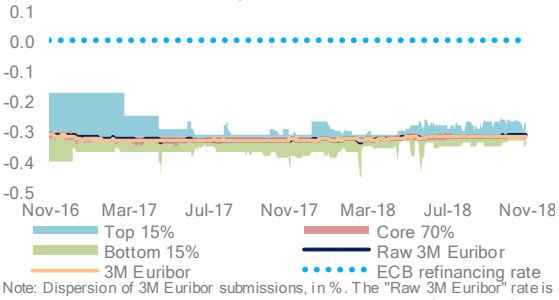


Note: Normalised difference in percentage points between the highest contribution submitted by panel banks and the corresponding Euribor rate. The chart shows the maximum difference across the 8 Euribor tenors.

Sources: European Money Markets Institute, ESMA.

A.207

Euribor submission dispersion

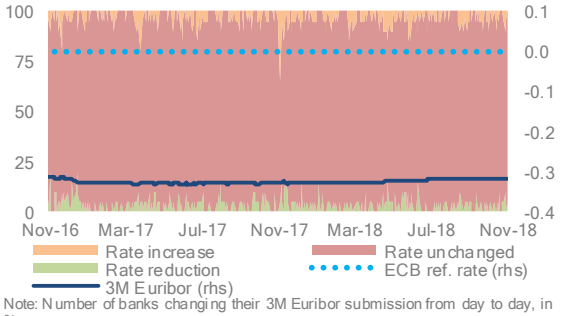


Note: Dispersion of 3M Euribor submissions, in %. The "Raw 3M Euribor" rate is calculated without trimming the top and bottom submissions of the panel for the 3M Euribor.

Sources: European Money Markets Institute, ESMA.

A.208

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

2H(Q)18	Second half (quarter) of 2018
AI	Artificial Intelligence
AIF	Alternative Investment Fund
AIFM	Alternative Investment Fund Manager
AIFMD	Directive on Alternative Investment Fund Managers
AMF	Financial Markets Authority (France)
API	Application Programming Interface
BMR	Benchmarks Regulation
bps	Basis points
CA	Crypto asset
CCP	Central counterparty
CDS	Credit Default Swap
CFD	Contract for Differences
CNAV	Constant net asset value
CRA	Credit Rating Agency
CRAR	Credit Rating Agency Regulation
CSD	Central Securities Depository
CSDR	Central Securities Depositories Regulation
CSSF	Commission de Surveillance du Secteur Financier
DLT	Distributed ledger technology
DVC	Double Volume Cap
EA	Euro area
EBA	European Banking Authority
ECB	European Central Bank
EEA	European Economic Area
EFAMA	European Fund and Asset Management Association
EIOPA	European Insurance and Occupational Pensions Authority
EM	Emerging market
EMIR	European Market Infrastructure Regulation
EMMI	European Money Market Institute
EONIA	Euro Overnight Index Average
ESA	European Supervisory Authorities
ESG	Environmental, social and governance
ESMA	European Securities and Markets Authority
ESRB	European Systemic Risk Board
ESTER	Euro short-term rate
ETF	Exchange-Traded Fund
EU	European Union
Euribor	Euro Interbank Offered Rate
FCA	Financial Conduct Authority
FinTech	Financial technology
FSB	Financial Stability Board
GDP	Gross domestic product
HY	High yield
ICO	Initial coin offering
IG	Investment grade
IRD	Interest-rate derivative
ISIN	International Securities Identification Number
KID	Key Information Document
LVNAV	Low-volatility net asset value
MFIs	Monetary and Financial Institutions
MiFID II	Directive on Markets in Financial Instruments repealing Directive 2004/39/EC
MiFIR	Regulation on Markets in Financial Instruments
ML	Machine learning
MMF	Money market fund
MMFR	Money Market Fund Regulation
MTF	Multilateral Trading Facility
NAV	Net asset value

NCA	National competent authority
NFC	Non-financial corporates
OTC	Over the counter
PRIIP	Packaged Retail and Insurance-based Investment Product
RegTech	Regulatory Technology
SFT	Securities Financing Transaction
SFTR	Securities Financing Transaction Regulation
Stibor	Stockholm Interbank Offered Rate
SupTech	Supervisory technology
TechFin	Technology firm that begins to offer financial services
UCITS	Undertakings for Collective Investment in Transferable Securities
VNAV	Variable net asset value
WEF	World Economic Forum

Countries abbreviated in accordance with ISO standards
Currencies abbreviated in accordance with ISO standards


esma
European Securities and
Markets Authority