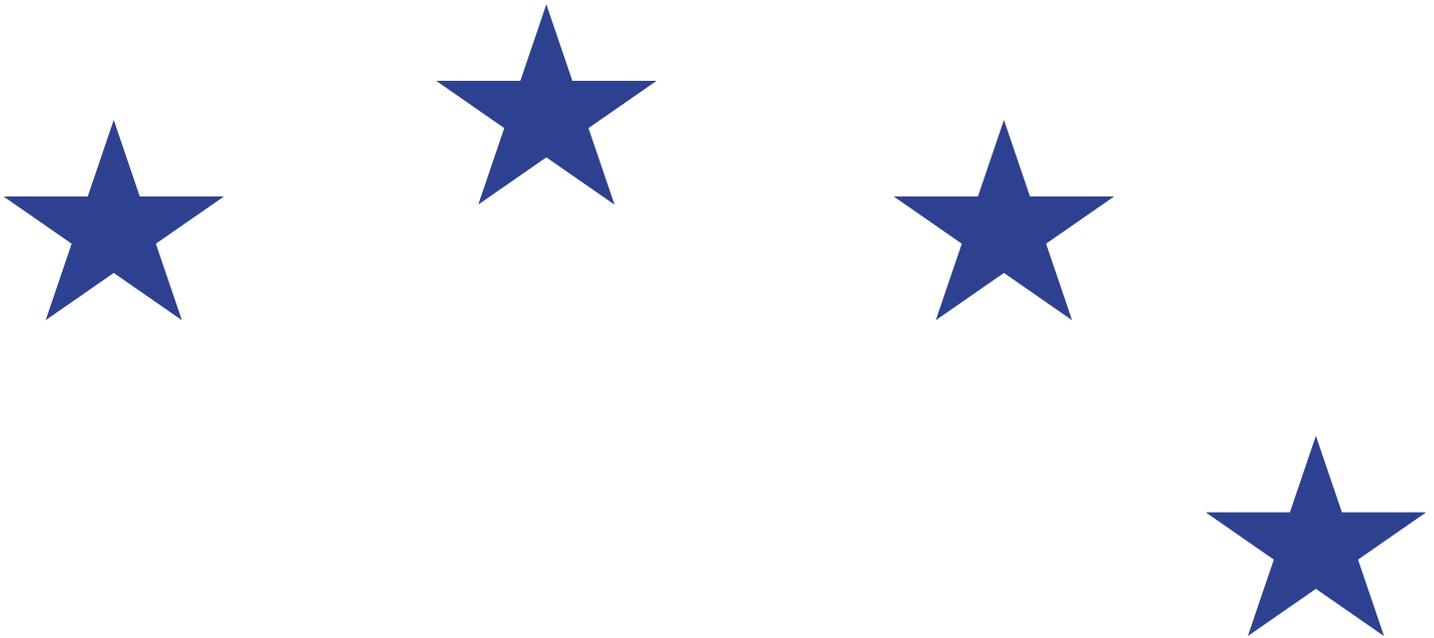


# TRV

ESMA Report on Trends, Risks and Vulnerabilities

No. 2, 2021

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1 September 2021

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ESMA Report on Trends, Risks and Vulnerabilities  
No. 2, 2021

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# Executive summary

## Market monitoring

### ESMA risk assessment

#### Risk summary

EU financial markets continued their recovery during the first half of 2021 with valuations at or above pre-COVID-19 levels, as the global economic outlook improved, with COVID-19 vaccine roll-outs and amid sustained public policy support. Fixed income valuations, notably for HY corporate bonds are now far above their pre-COVID-19 levels in a context of increasing corporate and public debt. Increased risk-taking behaviour has led to volatility in equity (e.g. GameStop related market movements) and crypto asset markets, as well as to the materialisation of event-driven risks such as in the case of Archegos or Greensill. Going forward, we expect to continue to see a prolonged period of risk to institutional and retail investors of further – possibly significant – market corrections and see very high risks across the whole of the ESMA remit. Current market trends will need to show their resilience over an extended period of time for a more positive risk assessment to be made. The extent to which these risks will materialise will critically depend on market expectations on monetary and fiscal policy support, as well as on the pace of the economic recovery and on inflation expectations.

ESMA remit	Level Outlook	Risk categories	Level Outlook	Risk drivers	Outlook
Overall ESMA remit		Liquidity		Macroeconomic environment	
Securities markets		Market		Interest-rate environment	
Infrastructures and services		Contagion		Sovereign and private debt markets	
Asset management		Credit		Infrastructure disruptions	
Consumers		Operational		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 is based on the 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-pointing arrows indicate an increase in risk intensity, downward-pointing 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 analysts' judgement.

**Market environment:** The economic outlook continued to improve in 1H21, reflected in further improved gross domestic product forecasts and despite a remaining high degree of uncertainty concerning the ongoing economic impact of the COVID-19 pandemic. However, rising valuations across asset classes, massive price swings in cryptoassets and event-driven risks observed in 1H21 amid elevated trading volumes raise questions about increased risk-taking behaviour and possible market exuberance. Rising commodity prices and volatility have contributed to increased concerns about inflation expectations, even though the medium-term outlook for EU inflation remains subdued. In a context of continued accommodative monetary policies and fiscal support, concerns around the profitability of banks and insurers, as well as elevated corporate and government debt levels, continue to weigh on the medium-term economic outlook.

**Securities markets:** In 1H21 equity markets rallied on expectations of economic recovery, with share valuations in the EU recovering from the March 2020 drop. Heterogeneity in performance across EU countries and sectors continues to persist, with financial sector share performance catching up. Fixed-income markets continued to show elevated valuations amid continued monetary policy support and improving economic outlooks. Inflation concerns in the US started a global bond sell-off, which had some spillover effects in the EU with a slight increase in most EA sovereign yields. High-yield corporate bonds continued to gain market value at a brisk pace highlighting continued search-for-yield behaviour. A surge in commodity prices can be attributed to economic recovery and expectations of an inflation upswing.

**Infrastructures and services:** Equity trading volumes in European venues increased significantly compared to 2H20, partially due to the relocation of EEA share trading linked to the share trading obligation. Central clearing volumes increased for products subject to clearing. Settlement activity also

increased, while settlement fails remained more frequent than before the pre-COVID-19 crisis for equities, and slightly above 2H20 levels across security types. Finally, a transition to new benchmarks, including the euro short-term rate (€STR) is underway, with a stable €STR rate fixing, and increasing volumes, notably on interest-rate swap markets. Credit rating agencies continued to improve their outlook, with ratings drift starting to return to pre-pandemic levels for most products, though commercial mortgage-backed securities (CMBS) continued to experience significant downgrades early in 2021. Fallen angels continued to decrease, but a growing share of BBB-rated debt in corporates and structured finance shows ongoing vulnerability to future stresses.

**Asset management:** Equity funds outperformed the rest of the fund sector in 1H21 in terms of both flows and performance, resulting in a growth of 40 % of their assets under management year-on-year. Most fund categories received positive flows in 1H21 except money market funds (MMFs), illustrating a general risk-taking preference among investors. Overall, risks have remained elevated in the fund sector, with an increase in credit risk as the impact of the COVID-19 pandemic on corporate solvency is reflected in the quality of fund portfolios. In contrast, MMFs have increased their liquidity since the onset of the crisis but remain a core concern for regulators due to their structural vulnerabilities. The alternative investment fund (AIF) sector remained stable in terms of both size and risk, but the failure of Archegos in the US further raised concerns regarding leveraged funds.

**Consumers:** Investor confidence increased, linked to increased asset valuation amid remaining uncertainty surrounding the economic impacts of the COVID-19 pandemic. The performance of retail investor instruments, such as EU UCITS funds (Undertakings for collective investment in transferable securities), strongly improved, accompanied by large inflows into UCITS. A surge in retail trading during the COVID-19 pandemic has been driven by a range of factors, including innovation. New online and mobile trading platforms offer convenient, easy-to-use investment services. Zero-commission business models and gamified features may further attract consumers, but also prompt investor protection concerns. Concerns have also risen around the rise of trading encouraged by social media and online message boards, as in the GameStop episode of 1Q21.

**Market-based finance:** Primary markets showed overall resilience in the post-pandemic transition. The annual growth rate of capital market financing for non-financial corporates began positively at the beginning of the year, after being negative during the most acute phase of the crisis. In line with elevated equity valuations, primary equity markets scored record levels of issuance both in both initial public offerings and secondary offerings. Corporate fixed income market issuance continued to be elevated, with the average issuance quality remaining stable at BBB-rated bonds. Concerns of debt sustainability in the medium to long term remain, as levels of outstanding corporate bonds have continued to increase and the markets for leveraged loans and collateralised loan obligations (CLOs) are recovering and reaching levels higher than before the COVID-19 pandemic. Although access to capital markets for small and medium-sized enterprises (SMEs) remains limited, SME share trading continues to improve, especially on SME Growth markets.

**Sustainable finance:** Sustainable finance continues to expand in Europe, as reflected in the 20 % growth of environmental, social and governance (ESG) fund assets and the 40 % increase in outstanding sustainable debt instruments outstanding from the end of 2020. Recent corporate announcements on 'net zero' emissions reduction targets mark a step forward but lack consistency and details. ESG equity benchmarks delivered a mixed performance relative to non-ESG indices. The equity valuation of clean energy firms increased markedly in two years, despite similar returns on equity to fossil fuel firms. Flows into ESG funds accelerated again, with impact and environmental funds being the fastest-growing strategies. Green bonds continue to dominate the ESG bond market while social bond issuance has accelerated. Innovation can support sustainability by addressing ESG information gaps through Green financial technology (FinTech) solutions, but the environmental cost of one particular innovation – cryptocurrencies – is soaring.

**Financial innovation:** Digitalisation and the use of novel technologies continue to grow, spurred by the COVID-19 impact, but also by the need to accommodate new consumer expectations. This shift has brought efficiency gains for firms and better outcomes for users of financial services, but raises new challenges for regulators, including in relation to security, data management and competition. The European Commission has established an ambitious strategy to address those changes and make sure that the EU regulatory framework remains fit for digital finance. Following a boom in 1Q21, the market capitalisation of crypto assets fell by almost 40 % in May, once again highlighting their high price volatility of those instruments. Meanwhile, Decentralised Finance continues to gain momentum. Finally, regulators' engagement with FinTech through innovation hubs and regulatory sandboxes is becoming mainstream across the EU, with benefits for both parties.

## Risk analysis

**Cloud outsourcing and financial stability risks:** The growing use of cloud service providers (CSPs) by financial institutions can provide benefits to individual firms and the financial system. However, high concentration in CSPs could create financial stability risks if an outage in a CSP affects many of its clients, increasing the likelihood of simultaneous outages. Analysis using a stylised model calibrated with operational risk data suggests that CSPs need to be significantly more resilient than firms to improve the safety of the financial system. In financial settings where only longer (multi period) outages cause systemic costs, the results suggest that CSPs can best address systemic risks by strongly reducing incident resolution times, rather than incident frequency. In the model, using a back-up CSP successfully mitigates the systemic risk caused by CSPs. Backup requirements may need to be mandated however, as the systemic risk is an externality to individual firms. Finally, there is a clear need for detailed data on outages by financial institutions and CSPs.

**COVID-19 and credit ratings:** This article investigates how credit ratings evolved during the exceptional circumstances of early 2020, exploiting ESMA's extensive RADAR database of credit rating actions, which covers not only EU ratings but also a large number of non-EU ratings. It shows that corporate and sovereign ratings were downgraded rapidly following the onset of the pandemic, with non-financial corporates particularly affected. Underlying this were strong impacts on businesses in sectors particularly vulnerable to declining economic activity, such as the energy, and consumer cyclical sectors. Sovereign ratings experienced downgrades in bursts, with many of these occurring with the first and second waves of the pandemic, though the extent of downgrades varied greatly by jurisdiction. In structured finance products, commercial mortgage-backed securities appear by far the most affected, with persistent downgrades reflecting the ongoing challenges to the performance of commercial mortgages. Collateralised loan obligations, a concern before the pandemic, also experienced a wave of downgrades during summer 2020, but otherwise appear to have been relatively resilient, with senior tranches largely unaffected.

**Market for small credit rating agencies in the EU:** In Europe, the three largest CRAs have had an overall market share of more than 90 % for years. EU legislators sought to reduce this imbalance 10 years ago by supporting the use of small CRAs in Europe. This article applies supervisory technology-related techniques to take stock of market conditions since then, using a unique dataset containing all EU ratings since 2015 (when the CRA regulation's reporting requirement entered into force), covering EUR 20 tn worth of EU financial products and more than 6,000 issuer ratings. Using network analysis techniques, it is clear that the landscape for small CRAs at the EU level is a challenging one: Small CRAs are used almost exclusively in local single-rating markets (the 'periphery'), and are locked out of the larger 'core' market (of issuers seeking more than one rating for their products or themselves). This larger market is shared almost exclusively among the three largest CRAs, and the associated industry-wide Herfindahl-Hirschman Index levels are of key interest when compared with corresponding thresholds discussed by European competition authorities. Lastly, the article tracks the evolution in market concentration over time, and introduces a simulation exercise for alternative legislative rules designed to boost competition in EU markets for credit ratings. Strengthening legislative requirements to make use of small CRAs when seeking an additional rating for a product or issuer is associated with an average reduction in the overall EU CRA concentration industry of roughly one-third to one-half, falling below certain thresholds established by EU competition authorities.

**Environmental impact and liquidity of green bonds:** The European green bond market is attracting a growing number of corporate issuers, which has implications for the environmental impact of these instruments and their liquidity. This article first investigates the carbon dioxide emissions of green bond issuers. We show that, between 2009 and 2019, energy firms, utilities and banks that issued a green bond were much more likely to disclose emissions data, and they have on average reduced their carbon intensity to a larger extent than other firms – confirming the view that green bonds act as a signal of firms' climate-related commitments. We then compare the liquidity of green and conventional EUR corporate bonds from green bond issuers using proxy indicators. Green bond liquidity appears to be tighter, but the differential with conventional bonds has remained small and broadly constant during the COVID-19 turmoil, suggesting no particular vulnerability for the green segment of the corporate bond market.

# Market monitoring

# Market environment

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## Summary

The economic outlook continued to improve in 1H21, reflected in further improved gross domestic product forecasts and despite a remaining high degree of uncertainty concerning the ongoing economic impact of the COVID-19 pandemic. However, rising valuations across asset classes, massive price swings in cryptoassets and event-driven risks observed in 1H21 amid elevated trading volumes raise questions about increased risk-taking behaviour and possible market exuberance. Rising commodity prices and volatility have contributed to increased concerns about inflation expectations, even though the medium-term outlook for EU inflation remains subdued. In a context of continued accommodative monetary policies and fiscal support, concerns around the profitability of banks and insurers, as well as elevated corporate and government debt levels, continue to weigh on the medium-term economic outlook.

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**Macroeconomic conditions** improved in 1H21, due to the COVID-19 vaccine roll-out and the gradual easing of containment measures in developed economies. Additional fiscal support, particularly in the United States, has further improved the global economic outlook. However, a high degree of uncertainty remains, and uneven recovery is to be expected across and within countries. The EU economy is now forecast to reach pre-COVID-19 output by the end of 2022, earlier than anticipated. In its Spring forecast, the European Commission increased its GDP growth forecast to 4.2 % in 2021 and 4.4 % in 2022, with significant variations across EU member states.<sup>1</sup>

Against this background, asset valuations continued to rise (T.1) amid elevated trading volumes, receding political uncertainty (T.4), stable volatility levels (T.2), and increasing corporate and sovereign debt levels. The materialisation of event-driven risks (such as Gamestop, Archegos, Greensill), as well as the rising prices and volumes traded on cryptoassets, raise questions about increased risk-taking behaviour and possible **market exuberance**. Hence, concerns about the sustainability of current market valuations remain, and current trends need to show resilience over an extended period of time for a more positive assessment.

Central banks confirmed their accommodative **monetary policy stance**. The ECB increased the pace of the Pandemic Emergency Purchase Programme (PEPP) of buying private and public

sector securities, reaching EUR 241 bn in net purchases in 2Q21 (EUR 186 bn in 1Q21) out of a total target of EUR 1.85 tn.

Rising inflation expectations in 1H21 (T.5) were fuelled by the economic recovery, and rising oil and **commodity prices**. The improved economic outlook has supported elevated demand and pushed prices to multi-year highs in commodities such as grain, lumber and metals. However, EA inflation is projected to strengthen only gradually, amid weak demand, to 1.4 % by 2023.<sup>2</sup>

The profitability of EU **banks and insurers** improved in 1H21, though with continued pressure on interest margins and operating revenues. Rising volumes of forbore loans and expectations of a deterioration in their asset quality<sup>3</sup> show concerns of bank exposure towards SMEs or corporations most affected by the COVID-19 crisis. However, improved market sentiment, linked to a potential steepened yield curve, can be observed in the financials' market valuations catch-up in 1H21.

Debt overhang concerns remain high, as corporate and government **debt levels** continued to increase in 1H21. The EU government-debt-to-GDP ratio increased to 90.7 % in 4Q20, diminishing future fiscal space. Higher net **investment flows** in 4Q20 and 1Q21 (T.6) were mostly linked to an increase in equity purchases by EA investors, and a decrease in purchases of EA securities by non-resident investors.

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<sup>1</sup> See European Commission, "[Spring 2021 Economic Forecast](#)", May 2021.

<sup>2</sup> See European Central Bank, "[Inflation dynamics during a pandemic](#)", April 2021.

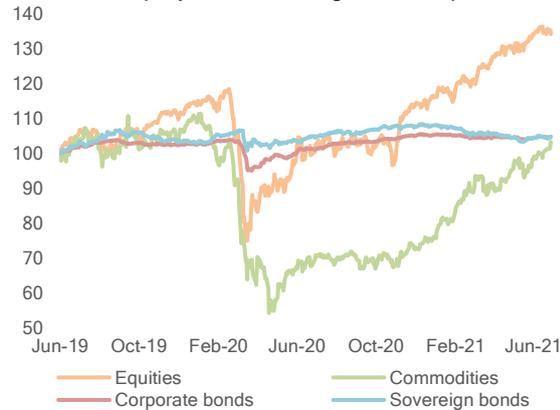
<sup>3</sup> See European Banking Authority, "[Risk dashboard](#)", July 2021.

# Key indicators

T.1

## Market performance

**Elevated equity markets, higher than pre-crisis**

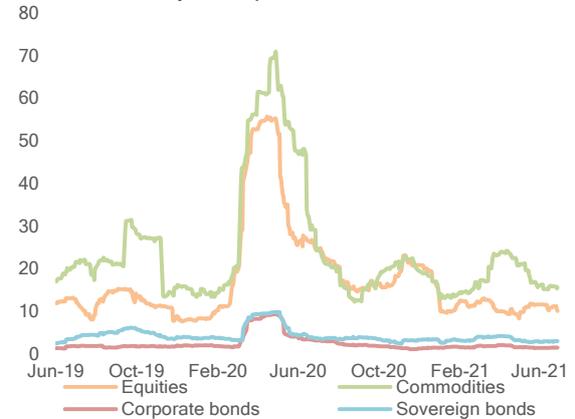


Note: Return indices on EA equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx EUR, all maturities), 01/12/2018=100. Sources: Refinitiv Datastream, ESMA.

T.2

## Market volatilities

**Stable volatility except for commodities**

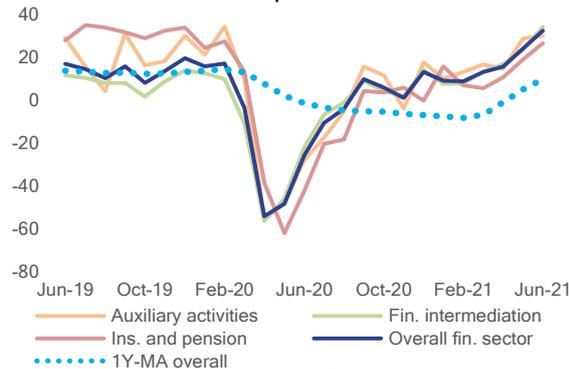


Note: Annualised 40D volatility of return indices on EA equities (Datastream regional index), global commodities (S&P GSCI) converted to EUR, EA corporate and sovereign bonds (iBoxx EUR, all maturities), in %. Sources: Refinitiv Datastream, ESMA.

T.3

## Market confidence

**Confidence still below pre-crisis levels**

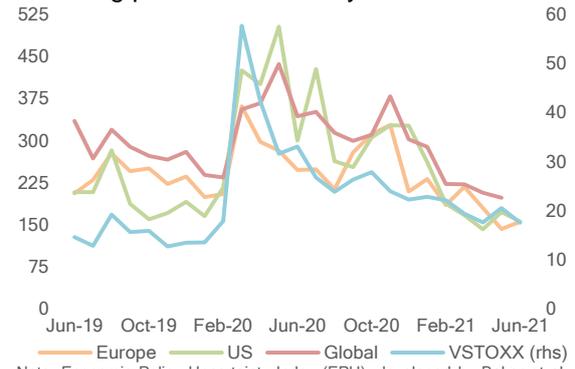


Note: European Commission survey of EU27 financial services sector and subsectors (NACE Rev.2 64, 65, 66). Confidence indicators are averages of the net balance of responses to questions on development of the business situation over the past three months, evolution of demand over the past three months and expectation of demand over the next three months, in % of answers received. Fin.=financial. Ins.=insurance. Sources: European Commission, ESMA.

T.4

## Economic policy uncertainty

**Receding political uncertainty**



Note: Economic Policy Uncertainty Index (EPU), developed by Baker et al. (www.policyuncertainty.com), based on the frequency of articles in European 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. Sources: Baker, Bloom, and Davis 2015; Refinitiv Datastream, ESMA.

T.5

## Inflation expectations

**Rising inflation expectations, esp. in the US**

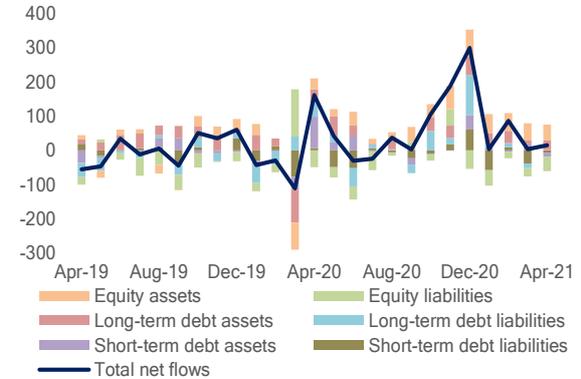


Note: 5 years forward inflation swap rate for the Euro area and the US. Sources: Refinitiv Datastream, ESMA.

T.6

## Portfolio investment flows to and from the EA

**Positive flows in 1H21**



Note: Balance of Payments statistics, financial accounts, portfolio investments by asset class, EUR bn, 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. Sources: ECB, ESMA.

## Market trends and risks

# Securities markets

### Trends

In 1H21, equity markets rallied on expectations of economic recovery, with share valuations in the EU recovering from the March 2020 drop. Heterogeneity in performance across EU countries and sectors continues to persist, with financial sector share performance catching up. Fixed-income markets continued to show elevated valuations amid continued monetary policy support and improving economic outlooks. Inflation concerns in the US started a global bond sell-off, which had some spillover effects in the EU with a slight increase in most sovereign EA yields. High yield corporate bonds continued to gain market value at a brisk pace highlighting continued search-for-yield behaviour. A surge in commodity prices is attributable to economic recovery and expectations of an inflation upswing.

### Risk status

Risk level ■

Outlook ➔

### Risk drivers

- Long-term economic changes due to COVID-19 pandemic
- Asset revaluation and risk re-assessment, amid rising concerns of increasing inflation expectations
- Market events and/or political risk
- Corporate debts

## Equity: valuations up as economic outlook improves

Following the economic recovery and the COVID-19 vaccine roll-out, **equity markets** rallied in 1H21. EU equity markets increased by 14 % in 1H21, reaching pre-COVID-19 valuations. However, compared to the US and other developed markets, the recovery in EU equity valuations remains slower (T.7). Expectations of upcoming inflation growth, signalled by the increase in the 10Y US treasury yield<sup>4</sup>, contributed to push share valuations upwards and to lift commodity prices.<sup>5</sup>

In this context, PE ratios in the EU have consistently increased, surpassing their 10Y historical average by 45 % in May 2021 (see figure A.14 in the statistical annex, published separately). In the US, PE ratios increased even further than in the EU and have reached levels last seen prior to the 2008 financial crisis. Increased retail participation in equity markets, a phenomenon that came under scrutiny during the

GameStop episode in 1Q21 (T.9), may have also played a role in the surging valuations.

### T.7

Equity prices by region

Growth across regions, slower recovery in EU



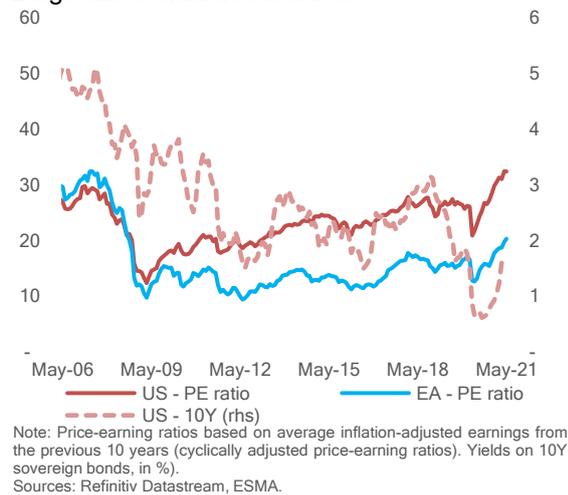
In a period of heightened valuations, the European landscape continues to be differentiated across sectors and countries.

<sup>4</sup> See [Understanding the Rise in Long-Term Rates](#), IMF Blog, April 2021.

<sup>5</sup> See commodities sub-section.

Within the EU, the market performance of Member States has varied greatly: while most national indices have surpassed pre-COVID-19 valuations, others have yet to fully recoup past losses (T.14).

T.8  
Historical PE ratios: US and EU comparison  
Large differential in valuation



**Sectoral differentiation** continued to be significant: financial shares - after recording the largest decrease in value across sectors from February to December 2020 (- 19 %) alongside telecoms (- 21 %) - have experienced the largest valuation increase (+ 26 % in 1H21 with respect to 2H20), followed by consumer discretionary and energy shares (+ 24 % and 20 % respectively) linked to the improved economic outlook (A.13).

Within financials, European **bank valuations** outperformed in 1H21 (+ 34 % with respect to 2H20), benefiting from the expectations of economic growth and a potential upswing of inflation and interest rates (T.15). On the other hand, the healthcare sectoral index performed worse than others, with a marginal valuation increase (+ 3 % in 1H21).

T.9  
Short squeeze and equity trading volumes  
GameStop related trading events in 1Q21

In January 2021, a limited number of listed US companies experienced unprecedented surges in prices and volatility. These companies, such as GameStop and, to a lesser extent, AMC Entertainment, were heavily shorted due to struggling performance and concerns over the sustainability of

their business models during the COVID-19 pandemic (short interest for GameStop reportedly reached 120 % in January 2021).

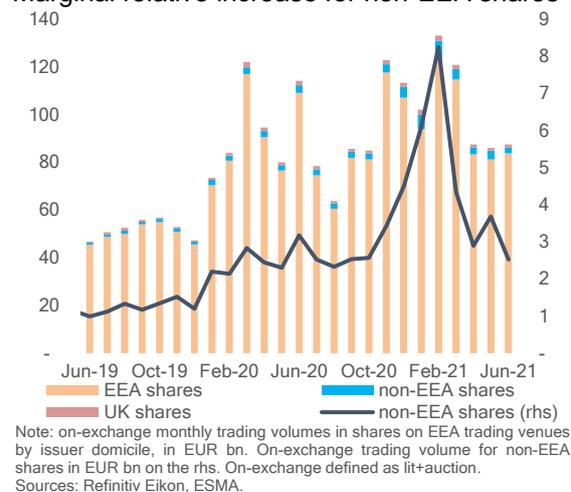
The extreme price jumps were initiated by massive share purchases by retail investors, who also employed leverage through margin trading and purchased short-dated call options. As valuations increased, further price hikes were fuelled by short sellers covering their positions (i.e. a 'short' squeeze) and by underwriters of call options being forced to acquire part of the stock to hedge their positions (i.e. a 'gamma' squeeze), ultimately resulting in heavy losses for selected hedge funds that had large bets on GameStop.

The short squeezes affected overall US trading volumes, which in January 2021 surpassed the levels observed at the height of the COVID-19 market stress. OTC volumes were particularly elevated (+ 130 % and + 235 % in January and February 2021 compared to 4Q20), because a great portion of trading took place through off-exchange wholesalers, which in recent years have gained market share thanks to commission-free trading models.<sup>6</sup> In this regard, potential impacts of heightened OTC volumes on the price discovery mechanism will be monitored.

Despite a short-lived increase in the number of non-EEA shares traded (which, in relative terms, increased from 4 % to 6 % of the total between December 2020 and January 2021), EEA trading volumes were broadly unaffected by the US rally (T.10).

Additionally, ESMA monitored the evolution of heavily shorted shares in the EEA, which amounted to lower numbers and were characterised by lower short positions than their US counterparts on average. In the aftermath of the GameStop rally, a reduction in short levels for these shares was observed, and overall short selling activity was not significantly affected.<sup>7</sup>

T.10  
EEA trading volumes by issuer domicile  
Marginal relative increase for non-EEA shares



<sup>6</sup> See Consumers section (Box T.61), and Financial innovation section, for more details on retail investing developments and commission-free trading models.

<sup>7</sup> See short selling sub-section for more details.

## Fixed Income: rebound continues as yields rise

Fixed income markets continued to improve through 1H21, driven by the gradual economic recovery and sustained monetary policy. Overall, sovereign bond yields moved up amid an improving global economic outlook and increasing inflation expectations which led to a global sell-off in bond markets. In the field corporate bonds, yields slightly increased for investment-grade (IG) bonds as well. Nevertheless, the massive ongoing monetary policy support, together with more optimistic economic data, significantly contributed to keeping borrowing costs low, and favoured higher market valuations, especially for high yield (HY) rated securities. As of June 2021, the PEPP reached almost EUR 1.2 tn of cumulative net purchases, and it continues to be conducted at a faster pace than during the first few months of 2021, and will continue until at least March 2022, or beyond, if necessary. Purchases have targeted public sector bonds (96 %), corporate bonds (2.8 %), commercial paper (0.4 %) and covered bonds (0.4 %).

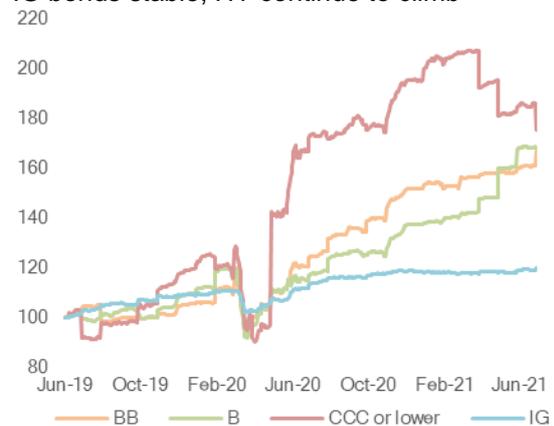
In **sovereign bond markets**, 10Y EA sovereign yields have risen slightly above pre-COVID-19 levels since the end of 1Q21, mostly due to spillovers from US bond market developments. An improving economic outlook, rising inflation expectations and the Fed projections of an increase in interest rates in 2023 markedly pushed US 10Y treasury yields up. In the EU, sovereign yields evolved at a much slower pace amid uncertainty about the speed of the economic recovery and the April ECB announcement to keep interest rates low through accelerated bond purchases (+ 52bps increase in the US vs. + 46bps in FR and + 35bps in DE in 1H21) (T.17). The uneven pace was also reflected in the widening spread between the US and EU yields through 1Q21 (2.1 % as of end-March 2021 vs. 1.1 % a year earlier), which then stabilised to 1.7 % at the end of June. In June, the ECB confirmed its expectation for key interest rates to remain at present levels or lower until the inflation outlook converges robustly towards a level sufficiently close to the target. Within the EA,

spreads relative to the German bund continued to narrow in 1H21, especially for GR (- 30 bps) and IT (- 10bps) (T.17).

**Corporate bond** valuations continued to grow above pre-crisis levels in 1H21, continuing a major and rapid recovery of a kind not seen in previous crises (e.g. global financial crisis 2007-08, European debt crisis 2010-12). The recovery continued to point towards a marked differentiation between HY and IG securities, with IG bond valuations at around 8 % above pre-COVID-19 levels and HY valuations continuing to climb to 46 % above pre-COVID-19 levels. This was particularly true for CCC-rated bonds, which strongly rebounded in the post-pandemic period and whose yields are now at an all-time low (~7.1 % as of 1H21) (T.11).

Demand for EU HY corporate bonds was characterised by a combination of search-for-yield behaviour, policy support for companies hardest hit by the crisis and an improving economic outlook, resulting in lower expected corporate default rates.<sup>8</sup> This coincided with a sustained issuance and supply of corporate bonds concentrated in lower-rated segments.<sup>9</sup>

T.11  
Market value of euro corporate bond indices  
IG bonds stable, HY continue to climb



Note: Change in market value of BoAML Euro IG and HY (by rating) corporate bond indices. 01/007/2019 = 100.  
Sources: Refinitiv Datastream, ESMA.

During 1Q21, IG bonds offered negative returns and appeared to be more sensitive to investors' inflation expectations, as reflected by yields slightly increasing to pre-crisis levels across ratings (T.18).<sup>10</sup> Against this background, re-

<sup>8</sup> See [Europe's Credit Market Comes Full Circle From Pandemic Despair](#), Bloomberg, February 2021.

<sup>9</sup> See market-based finance section for statistics on corporate bond issuance.

<sup>10</sup> See [The bright spot in strained bond markets](#), Financial Times, April 2021.

pricing of financial assets may still represent a risk, especially for the HY segment. On top of this, the elevated levels of indebtedness may increase risks of debt sustainability for EU corporates.

Activity in **money markets** was broadly calm, with money market rates and spreads between 3M interbank rates and overnight index swaps stable. Daily lending volumes on SONIA declined by 20 % against a 7 % increase in €STR volumes.<sup>11</sup>

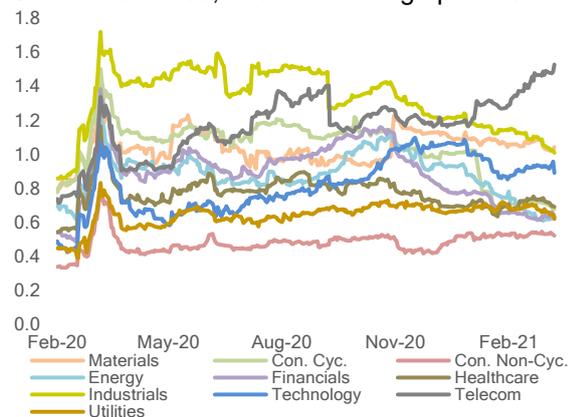
## Short selling, securities lending: stable activity

Overall levels of short selling in the EEA declined in 1Q21, even though **sectoral dynamics** remain differentiated. Short selling activity in the industrial, technology and financial sectors decreased, while net short position levels for telecoms increased over the first months of 2021 (T.12).<sup>12</sup>

T.12

Net short selling positions by sector

Overall decrease, telecom moving upwards



Note: Net short selling positions on blue-chip shares reported by NCAs under Article 5 of SSR as % of total market value of shares listed on a EU Regulated Market by sector. Applied market value for reference as of 10-Feb-20. Sources: FIRDS, NCAs, Refinitiv EIKON, ESMA.

Securities lending markets displayed stable patterns and the sectoral composition remained broadly unchanged, with a growth over 1H21 in utilisation rates for equities, linked to heightened securities lending activity during the dividend season (A.60).

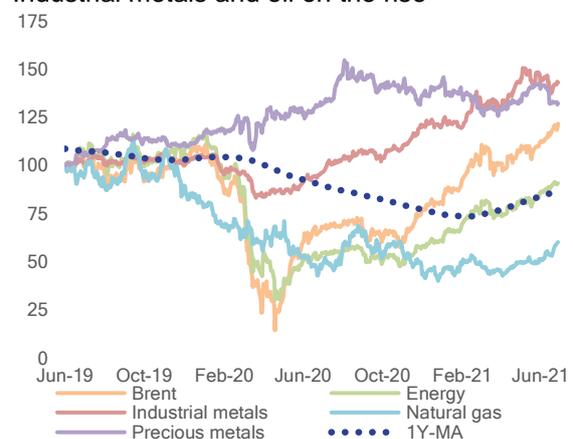
## Commodities: strong price increase

Driven by the positive economic outlook, **commodity markets** experienced a strong surge in prices in 1H21. Industrial metals grew steadily, as a consequence of the economic recovery and the heightened demand linked to green energy commitments, with copper reaching levels last seen in 2011. In addition, economic recovery and supply shortages have propelled the price of some agricultural goods upwards, such as corn and soybeans (T.19). These developments are partially connected with recent monetary inflows by investors looking to hedge their exposures against inflation concerns.<sup>13</sup>

T.13

Commodity prices

Industrial metals and oil on the rise



Note: S&P GSCI commodity indices and Brent price. 01/12/2018=100. 1Y-MA=one-year moving average computed using S&P GSCI. Sources: Refinitiv Datastream, ESMA.

Over the same period, **oil prices** rebounded to pre-COVID-19 levels, pushed by expectations of a demand increase and by continued supply restrictions imposed by OPEC members. A supply shortage combined with increased housing starts in the US, caused a sharp rise in lumber prices, which reached record levels in May, before dropping in June. Consistent with the economic recovery and a reduced demand for safe assets, the growth in value of precious metals slowed down after its peak in 2H20, but remained above pre-COVID-19 levels (T.13).

<sup>11</sup> See infrastructure section for further details.

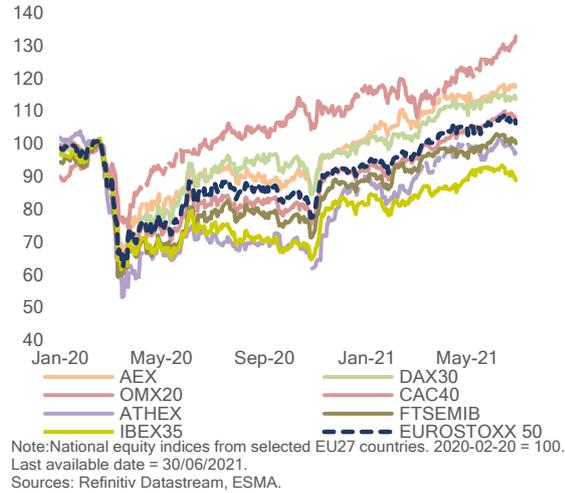
<sup>12</sup> The ad-hoc daily reporting of net short positions under Article 5 of the short-selling regulation from NCAs to ESMA, which started in the context of the COVID-19 crisis, terminated in March 2021. Thus, ESMA is currently

relying on quarterly reporting from NCAs for short selling monitoring and is displaying the most recent information available (T.12).

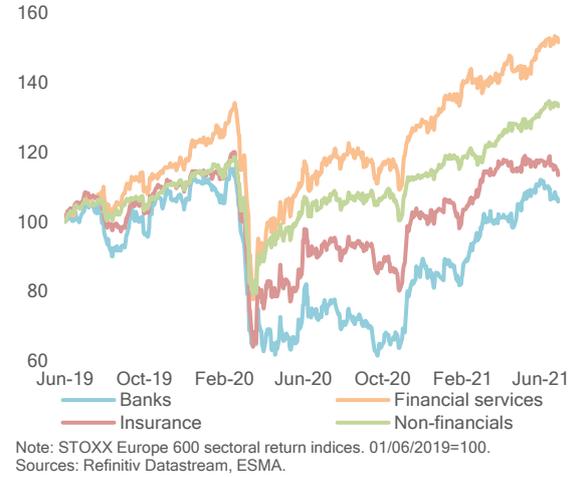
<sup>13</sup> See [Broad commodities price boom amplifies 'supercycle' talk](#), Financial Times, May 2021.

# Key indicators

**T.14**  
National equity indices from selected EU27 countries  
**Heterogeneity in EU equity markets recovery**



**T.15**  
European financials return indices  
**Banks reducing gap in valuation**



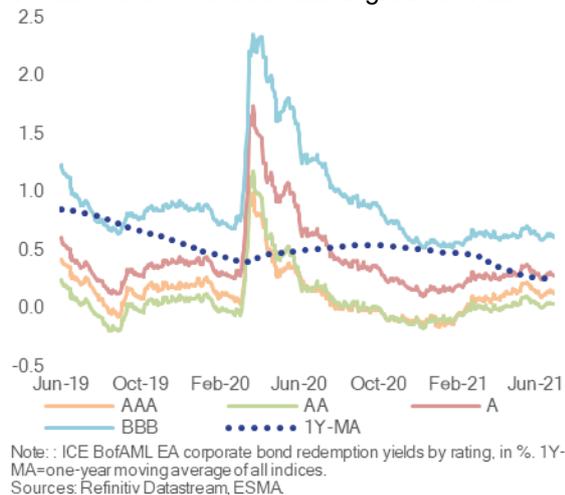
**T.16**  
Change in 10y sovereign yields  
**Mild increase in EA, sharp rise in the US**



**T.17**  
Sovereign bond spreads  
**Narrowing spreads**



**T.18**  
Corporate bond yields  
**Yields rise across investment-grade bonds**



**T.19**  
Commodity prices  
**Surge in price of agricultural goods, copper**



## Market trends and risks

# Infrastructures and services

### Trends

Equity trading volumes in European venues increased significantly compared to 2H20, partially due to the relocation of EEA share trading linked to the share trading obligation. Central clearing volumes increased for products subject to clearing. Settlement activity also increased, while settlement fails remained more frequent than before the pre-COVID-19 crisis for equities, and slightly above 2H20 levels across security types. Finally, a transition to new benchmarks, including the euro short-term rate (€STR) is underway, with a stable €STR rate fixing, and increasing volumes, notably on interest-rate swap markets. Credit rating agencies continued to improve their outlook, with ratings drift starting to return to pre-pandemic levels for most products, though commercial mortgage-backed securities (CMBS) continued to experience significant downgrades early in 2021. Fallen angels continued to decrease, but a growing share of BBB-rated debt in corporates and structured finance shows ongoing vulnerability to future stresses.

### Risk status

Risk level 

Outlook 

### Risk drivers

- Operational risk linked to increased trading activity in a shifting scenario and reporting requirement changes attributable to Brexit
- Increase in post-trading activity (clearing, settlement) directly related to increased trading activity
- Cyber risks in a context of increased digitalisation

## Trading: higher volumes amid changing landscape

The first months of 2021 saw a substantive increase in **equity trading volumes**, with EEA levels surpassing the peak volumes reached during the COVID-19 market stress (T.21). The highest volumes were recorded in March 2021 (EUR 1.5 tn) and were 20 % above March 2020 levels. Overall, 1H21 equity trading volumes were 54 % higher than the 1H20 average, and 99 % higher than in 2H20. This increase in volumes follows reports of heightened retail participation in the equity markets<sup>14</sup> and a partial relocation of trading of EEA shares attributable to the Share Trading Obligation (STO).<sup>15</sup> Despite overall higher volumes, it is worth noting that, when compared with the 2019 EEA average, which included the UK, turnover in 1H21 was 43 % lower.

The significant changes in the relative composition of EEA equity trading observed in 1H21 have been affected by the Brexit transition period finishing at the end of 2020, in terms of both data reporting<sup>16</sup> and market structure. In particular, in order to ensure a consistent representation of equity trading composition, trading reported by or to UK entities from 2020 onwards is not presented.

Trading on EEA venues increased with the **Share Trading Obligation (STO)**, up from 76 % in 1H20 to 98 % of EEA shares on-exchange volumes in 1H21 (T.20). Even though lit volumes increased significantly, the relative share of lit trading decreased from 81 % in 2H20 to 69 % in 1H21 (a drop influenced by the exclusion of UK entities in 2020 – the monthly lit turnover in 1H21 was 9 % below the 2019 average, while its relative share has increased from its 43 % mean in 2019). In addition, the OTC share moved from

<sup>14</sup> See Consumers section.

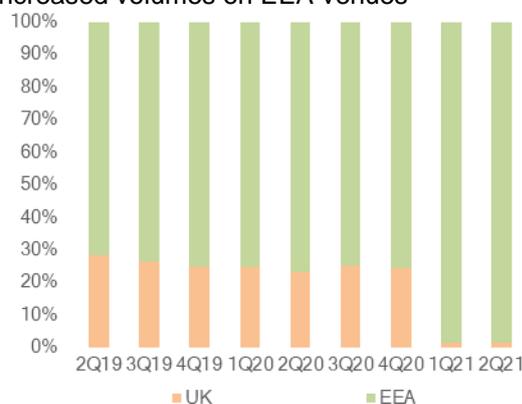
<sup>15</sup> Article 23 of Regulation (EU) No 600/2014. The STO is intended to move OTC share trading onto platforms providing market transparency and concerns all EEA

shares, except those traded in pounds sterling on UK trading venues.

<sup>16</sup> From January 2021 onwards, UK entities no longer report to ESMA.

8 % in 2H20 to 21 % in 1H21, with monthly OTC turnover reported in the EEA in 1H21 more than tripling compared to its 2020 average (from EUR 70 bn to EUR 260 bn). However, this increase in OTC trading must be interpreted with caution, as OTC volumes in 1H21 were still below the 2019 mean, which included OTC volumes reported by UK Approved Publication Arrangements (APAs). In this regard, OTC figures in 2020 are underestimated, as they exclude OTC trading reported by UK APAs. Furthermore, other OTC trading in EEA shares between non-EU counterparties may still happen, but will not be reported to EU APAs - hence it will not be observed by ESMA.

T.20  
On-exchange EEA share trading turnover volumes  
Increased volumes on EEA venues



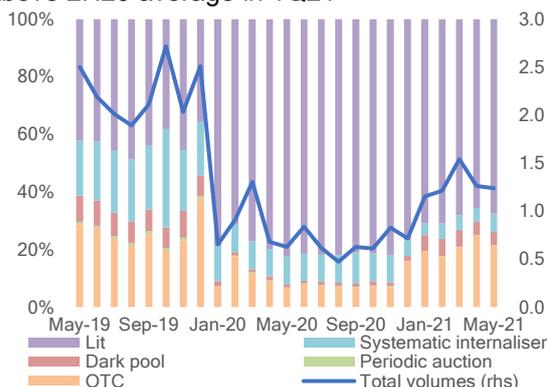
Note: Quarterly share of on-exchange trading turnover volumes of EEA shares by trading venue domicile, in %. On exchange defined as the sum of lit trading and auction.  
Sources: Refinitiv Eikon, ESMA

Increased volumes traded under dark pools (from 1 % of equity trading in 2H20 to 5 % in 1H21) can be attributed to new platforms operating in the EEA (mainly in the NL).<sup>17</sup> Finally, the overall share of SI amounted to 5 % of total trading in 1H21 (down 4 pps from 2H20) (T.21).

The review of MiFID II/MiFIR, currently underway, offers the opportunity to refine and discuss the real weight of OTC and SI trading and their relevance in the price discovery process. In this context, ESMA does not currently receive

information on non-price forming transactions from market participants. However, it recently launched a consultation paper to address these topics<sup>18</sup>, with the aim of developing a more consistent framework on non-price forming transactions and allowing for a better understanding of the equity trading landscape.<sup>19</sup>

T.21  
Total equity trading turnover volumes  
Above 2H20 average in 1Q21



Note: Type of equity trading in the EEA as a percentage of total turnover. Total equity trading turnover in EUR trillion (right axis). Turnover volumes reported by UK TVs and SIs as well as OTC trading reported by UK APAs are included only until the end of 2019. Last available data point is May 2021.  
Sources: FIRDS, FITRS, ESMA

Circuit breaker events remained stable over 1H21, despite a moderate increase during the last week of January 2021 (T.32), corresponding with higher-than-usual trading volumes and the GameStop episode (Box T.9).<sup>20</sup> The distribution across sectors highlighted a decrease in the share of basic materials and industrials (- 2 pps in 1H21, with respect to 2H20), offset by an increase in technology and telecom (+ 1.5 pps), leaving financials, healthcare and consumer cyclicals and non-cyclicals substantially unchanged (A.92).

On 29 April 2021, Euronext officially completed its acquisition of Borsa Italiana from the London Stock Exchange Group, following the group's acquisition of Refinitiv in January 2021.

<sup>17</sup> Specifically, platforms such as Turquoise Europe and Cboe Europe, recently launched in Amsterdam, have seen increased trading after the end of the Brexit transition period – for more details please see ESMA (2021), Report on Trends, Risks and Vulnerabilities, No 1.

<sup>18</sup> See ESMA (2021) [Consultation Paper: On the review of RTS 1 \(equity transparency\) and RTS 2 \(non-equity transparency\)](#).

<sup>19</sup> In particular, the CP proposes amendments to the lists of non-price forming transactions present in Commission Delegated Regulation (EU) 2017/587 and Commission Delegated Regulation (EU) 2017/583.

<sup>20</sup> See Securities markets section for more details.

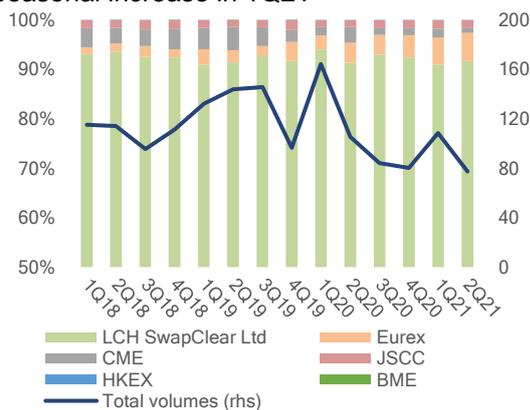
## CCPs: increased volumes, stable margins

**Central clearing volumes** increased in 1Q21 for products subject to a clearing obligation in the EU, amid a more general increase in volumes for interest rate derivatives (IRDs) and credit derivatives over the reporting period.

T.22

Clearing of OTC IRDs in G4

Seasonal increase in 1Q21



Note: Market share on OTC central clearing of basis swaps, fixed-to-float swaps, forward rate agreements and overnight indexed swaps in EUR, USD, JPY or GBP, in %. Quarterly notional volumes cleared, in EUR tn (rh axis). Sources: Clarus Financial Technology, ESMA.

Volumes of OTC IRS in EUR, USD, JPY or GBP went from EUR 80 tn in 4Q20 to EUR 109 tn in 1Q21, only to come back to EUR 78 tn in 2Q21. Despite the increase, volumes remained below their 1Q20 peak, for reasons linked to the COVID-19 related market stress. The share of these products cleared globally by EU CCPs continued to increase while still remaining at low levels, with EU CCPs making up 5.6 % of the market (up from 4 % in 4Q20) and UK CCPs 92 % (T.22). For the Itraxx (Europe and Crossover indices), also part of the clearing obligation, volumes in 1Q21 reached EUR 1.8 tn, up from EUR 1.3 tn in 4Q20, only to decrease to EUR 1.1 tn in 2Q21. For these indices the share of clearing by EU CCPs decreased from 17 % in 4Q20, to 14 % in 2Q21, while the rest was being cleared by either the US or the UK entity of one central clearing group (A.94).

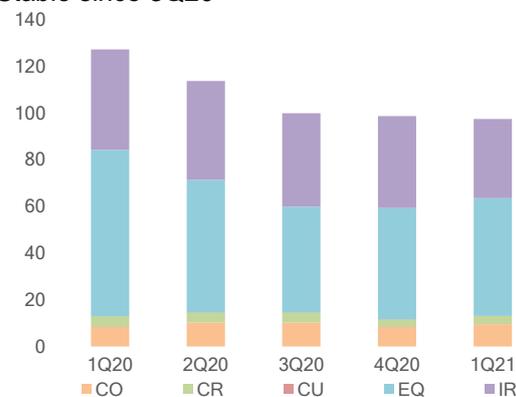
**Initial margins** collected by EU CCPs continued to decrease slowly from the peak that they reached during the COVID-19 related market stress in 1Q20. EU CCP initial margin volumes were at EUR 97 bn in 1Q21, down from EUR 127 bn in 1Q20. Of the margins held, 48 % and 37 % relate to EQ and IR transactions while the rest are held for CO and CR transactions (8 %

and 3 %, respectively). Less than 0.001 % of margins were collected for CU transactions (T.23).

T.23

EU CCPs initial margins (required and excess)

Stable since 3Q20



Note: Outstanding amounts of initial margin required and excess collateral received by EU27 and UK CCPs for derivatives (CCP.A, CC&G, European Central Counterparty N.V and KDPW data missing), in EUR bn. 1Q21 = 2 April 2021. Sources: TRs, ESMA.

The number of margin breaches remained below the high levels of 1Q20 (A.96), and the amount of collateral collected in excess of the required margins is also stable (A.95). Finally, the number of outages as well as their duration was relatively lower in 2020 than in previous years, based on the analysis of a global sample of CCPs (T. 33)

## CSDs: slight increase in settlement-fails

**Settlement fails** remained more frequent than before the pre-COVID-19 crisis for equities, with temporary spikes related to short-lived increases in activity and volatility on equity markets, while being back to pre-COVID-19 levels for corporate and government bonds.

On average, the rate of settlement fails for equities (in value) was 9 % in 1H21, above the 8 % of 2H20. This compares to peaks of 14 % during the COVID-19 related market stress and 7 % in 2H19.

For sovereign and corporate bonds, the rates of settlement fails during 1H21 were on average 3 % and 1.8 % respectively, around longer-term averages, but also slightly higher than their respective 2H20 levels of 2.7 % and 1.6 %. This also occurred in the context of enhanced reporting to ESMA and better monitoring in the context of CSDR (T.24). Settlement activity (in value) of equities and government bonds reached

multi-year highs amid high volumes on these markets, record valuations and wider coverage of the CSDR data (T.35).

T.24  
Settlement fails  
Remaining above pre-C19 levels for equities



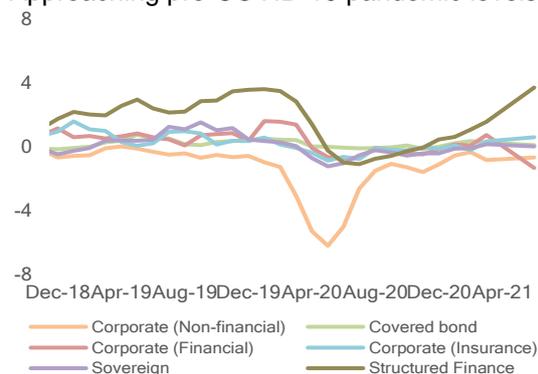
Note: Share of failed settlement instructions in the EEA30, in % of value, one-week moving averages. Missing data for some CSDs prior to mid-March 2020. Dotted lines represent one-year moving averages of the respective asset classes.  
Sources: NCAs, ESMA.

## CRAs: returning to pre-pandemic patterns

Over 2021 CRAs' **outlook for credit risk** has continued to improve across most instruments and issuers. This continues the trend seen in late 2020, when there was a sharp reduction in the number of downgrades, following the surge earlier in the year.

**Ratings drift** is now positive for sovereigns, structured finance products, and insurance firms, and is close to zero for non-financials corporates, which were strongly hit by the pandemic.<sup>21</sup> Levels of rating drift are now not dissimilar from those seen before the COVID-19 pandemic across the different products. There is a drop in corporate financials drift at the end of the period, driven largely by downgrades to a few DE banking groups in June, which are counted multiple times in the drift calculation, because rating downgrades are counted for each subsidiary (T.25).<sup>22</sup>

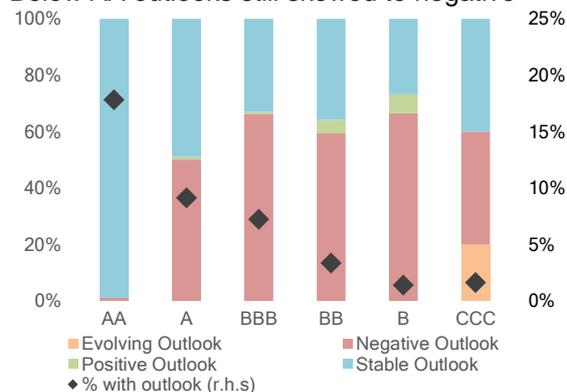
T.25  
Rating drift  
Approaching pre-COVID-19 pandemic levels



Note: 3-month moving average of net rating changes in outstanding ratings from all credit rating agencies, excluding CERVED and ICAP, by asset class, computed as the percentage of upgrades minus the percentage of downgrades. EU-27+UK ratings.  
Sources: RADAR, ESMA.

**Non-financials** remain the corporate instrument most subject to downgrades, but these too are showing signs of returning to positive rating drift. Weekly numbers of non-financials with at least one bond downgraded have fallen to levels last seen at the beginning of 2020 and downgrades became less prevalent than upgrades in April 2021.

T.26  
Non-financial corporate instrument rating outlooks  
Below AA outlooks still skewed to negative



Note: Distribution of outlooks for corporate non financial instruments (ISINs) with outlook, rated by the Big 5 (Fitch, Moody's, S&P, Scope and DBRS) by category value over the total ratings per category value. Cutoff date 19/4/2021.  
Sources: RADAR, ESMA.

However, where ratings have been assigned an outlook, a significant share still have a negative outlook, ranging from 40 % to 60 % for rating

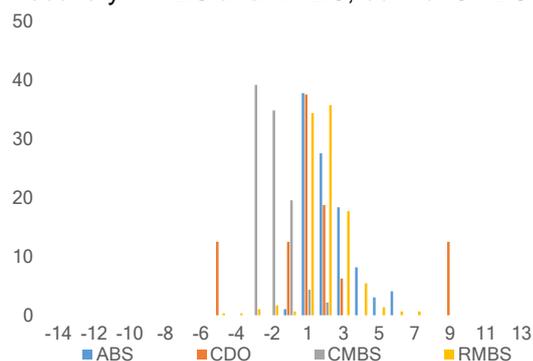
<sup>21</sup> See the article "COVID-19 and credit ratings" in this report for further discussion of how credit ratings evolved in 2020 through the pandemic.

<sup>22</sup> See S&P Global (2021), "[As Near-Term Risks Ease, The Relentless Profitability Battle Lingers For European Banks](#)".

categories below AA, with other outlooks predominantly stable rather than positive (T.26). This shows some ongoing vulnerabilities among non-financial corporates and continuing potential for downgrades.

Some of the negative effects on corporates are also still playing out in **structured finance** ratings. Downgrades have continued to strongly dominate rating changes among CMBS in 2021, continuing the trend seen throughout 2020 and indicative of the ongoing pressures on corporates. This is in strong contrast to both ABS and RMBS, where upgrades strongly outnumber downgrades so far in 2021, while for CDOs the rating changes have been more mixed, though with upgrades being more prevalent than downgrades, indicating continuing signs of a resurgence (T.27).

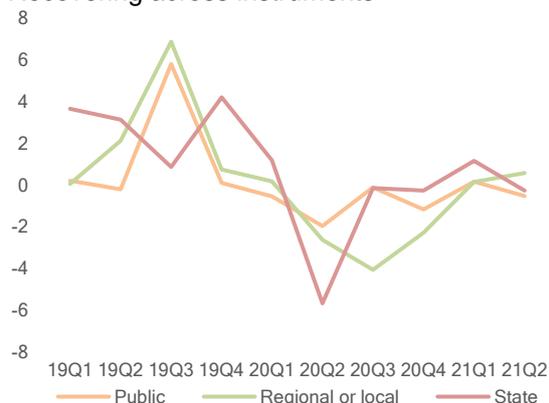
T.27  
Distribution of structured finance rating changes  
Recovery in ABS and RMBS, but not CMBS



Note: 2021 YTD distribution of rating changes on structured finance products (i.e. y-axis shows number of upgrades and downgrades for notches on x-axis). Long-term ratings only. ABS=asset-backed securities; CDO=collateralised debt obligations; CMBS=commercial mortgage-backed securities; RMBS=residential mortgage-backed securities. ABS excluding CDO, CMBS and RMBS.  
Sources: RADAR, ESMA

The unprecedented government measures have increased public debt at a time when tax revenue is being hit by the decrease in economic activity due to the pandemic. Looking at **sovereign and public rating trends**, CRAs appear to be taking the view that the outlook is no longer deteriorating (on average), with levels of upgrades now broadly matching downgrades across all sovereign rating categories (ratings for public, regional and local entities and states), as illustrated by the drift chart below (T.28).

T.28  
Sovereign ratings drift  
Recovering across instruments

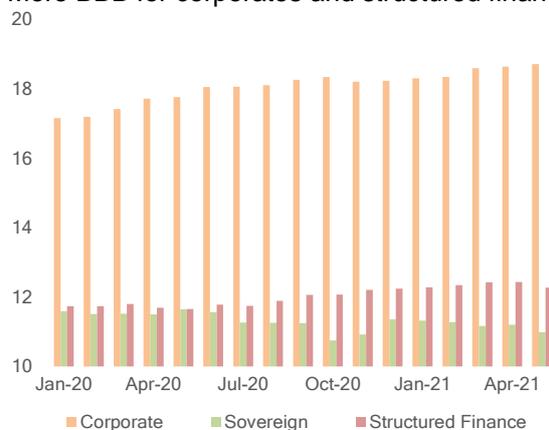


Note: Sovereign ratings drift in percent for ratings issued or endorsed in the EU, for EU entities. International and supranational ratings omitted due to very small sample.  
Sources: ESMA, RADAR

Numbers of **fallen angels** remained relatively low over 1H21. In 1H20, 0.5 % of EU IG corporate ratings were downgraded to HY, driven largely by non-financials, where downgrades to HY represented 1.4 % of ratings. In contrast, in 1H21, the share of fallen angels reduced significantly, to 0.1 % for corporates overall and to 0.3 % for non-financials.

While the number of fallen angels remained limited in 1H21, the proportions of corporate and structured finance instruments rated BBB, just above IG boundary, continued to increase gradually.

T.29  
Proportion of BBB ratings  
More BBB for corporates and structured finance



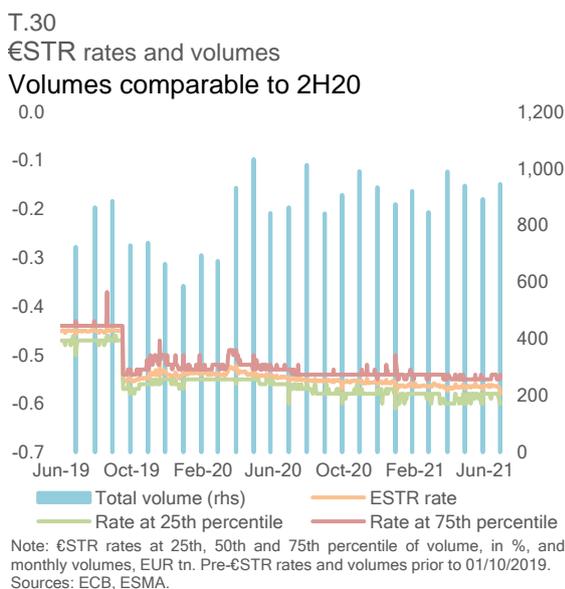
Note: Share of Big 5 CRA ratings rated BBB, by rating type.  
Sources: ESMA, RADAR

At the end of March 2021, 18.7 % of corporate ratings were rated BBB, up from 17 % at the beginning of 2020, while 12.3 % of structured

finance ratings were rated BBB at the end of March 2021, up from 11.7 % at the beginning of 2020 (T.29). This indicates that risks of fallen angels remain elevated, particularly if non-financials corporates were to face further stresses.

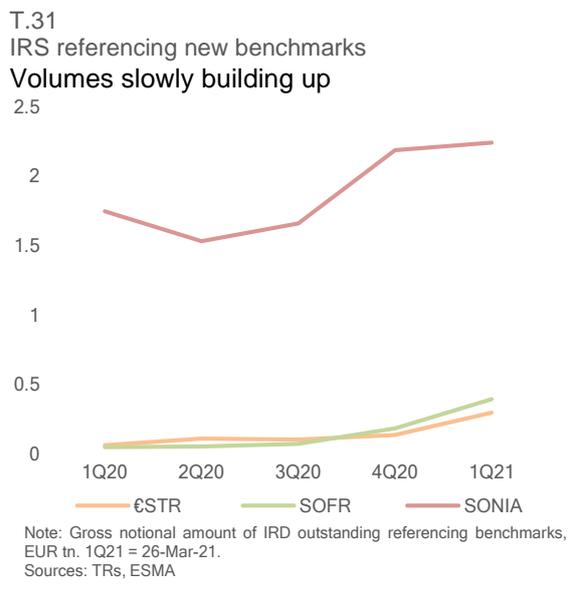
## Benchmarks: transition to new risk-free rates

The new overnight **reference risk-free rate** €STR (previously ESTER) experienced a stable fixing environment in 1H21 with a difference between rates at the 25<sup>th</sup> and 75<sup>th</sup> percentiles of the volumes that was similar on average to the difference experienced in 2H20 (0.04 %). Volumes and median rates were also similar in 1H21 to those in 2H20 (T.30).



On derivatives markets, risk free rates (RFRs) are referenced in several instruments, and in particular in IRS held by EU counterparties. There, outstanding amounts of IRS referencing the new RFRs have increased since the beginning of 2020. These amounts went up from EUR 63 bn in 1Q20 to EUR 300 bn by the end of

1Q21 for the €STR. SOFR related IRS' went up in a similar fashion, increasing from EUR 50 bn in outstanding notional amounts in 1Q20, to EUR 395 bn in 1Q21. SONIA seems to be more mature as a reference rate used in IRS transactions, with outstanding notional amounts of EUR 2.2 tn in 1Q21, up from EUR 1.7 tn in 1Q20.



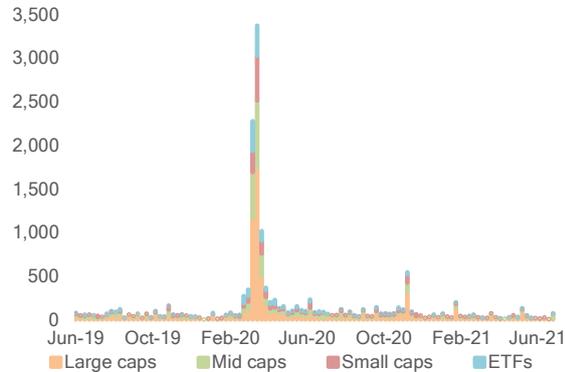
For IRS referencing GBP Libor, notional amounts were rather stable at a low level of EUR 6 tn in 1Q21, considering that that the rate's replacement by SONIA is more advanced than for other risk-free rates, and that it will be discontinued at the end of 2021. For USD Libor, notional amounts peaked in 1Q21. In addition, this rate's discontinuation is planned for June 2023 and we are still observing a rather low volume of SOFR, its possible RFR replacement. Outstanding notional amounts outstanding of USD Libor IRS increased to EUR 23 bn at the end of 1Q21, up from EUR 19 bn in 4Q20. For EURIBOR, outstanding amounts increased from EUR 50 tn in 1Q21 to EUR 57 tn over the course of 1Q21.

# Key indicators

T.32

Circuit breakers

Low incidence of circuit breaker events

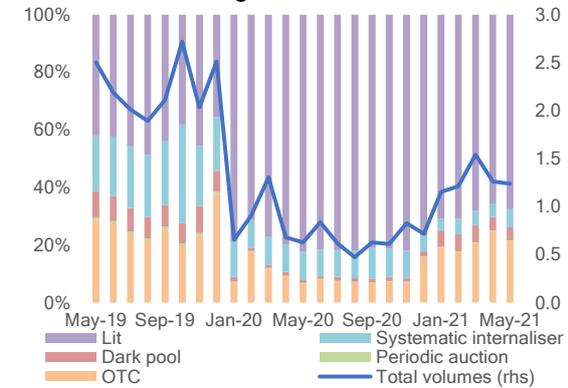


Note: Number of daily circuit-breaker trigger events by type of financial instrument and by market cap registered on 29 EEA30 trading venues for all constituents of the STOXX Europe Large/Mid/Small 200 and a large sample of ETFs tracking these indices or some of their subindices. Results displayed as weekly aggregates.  
Sources: Morningstar Real-Time Data, ESMA.

T.33

Total equity trading turnover volumes

Above 2H20 average in 1Q21

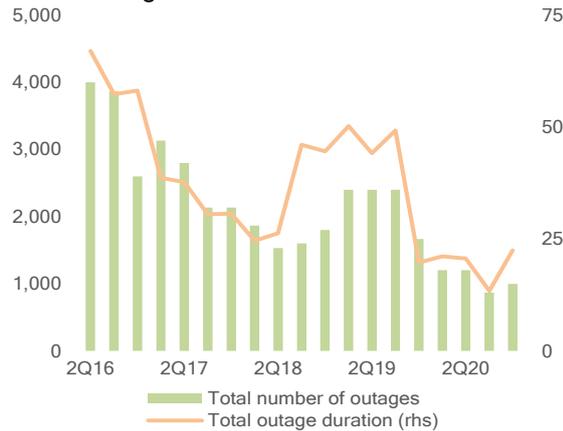


Note: Type of equity trading in the EEA as a percentage of total turnover. Total equity trading turnover in EUR trillion (right axis). Turnover volumes reported by UK TVIs and SIs as well as OTC trading reported by UK APAs are included only until the end of 2019. Last available data point is May 2021.  
Sources: FIRDS, FITRS, ESMA

T.34

CCP outages

Fewer outages in 2020

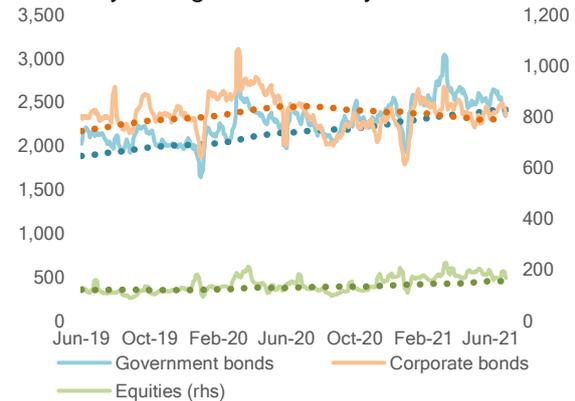


Note: Number of outages and total outage duration in minutes, by quarter, for global sample of CCPs (n=11).  
Sources: Clarus, CCPs, ESMA

T.35

Settlement activity

At multi-year highs in February for Gov. bonds

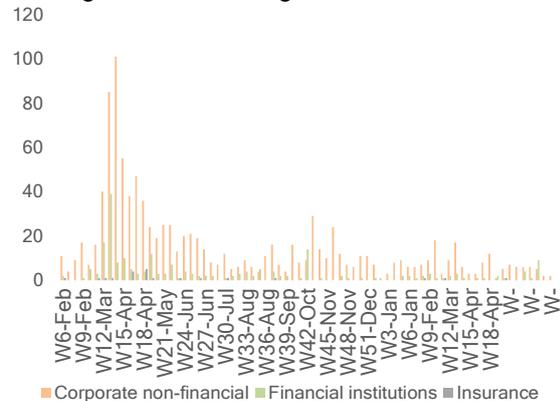


Note: Total value of settlement instructions in the EEA30 as reported by NCAs, in EUR bn, one-week moving averages. Missing data for some CSDs prior to mid-March 2020. Dotted lines represent one-year moving averages of the respective asset classes.  
Sources: NCAs, ESMA.

T.36

Share of issuers with at least one bond downgraded

Downgrades continuing to slow

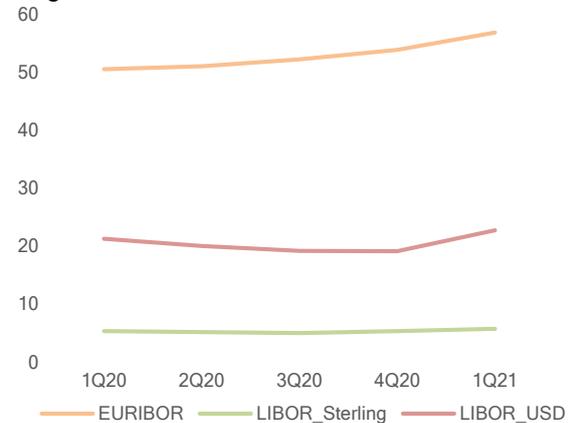


Note: Number of corporate issuers with at least one bond downgraded by the big 5 CRAs (Fitch, Moody's, S&P, DBRS, Scope) per type of institution rated. Issuers with same reported parent treated as one issuer.  
Source: ESMA, RADAR

T.37

IRS linked to EURIBOR and LIBOR

Slight increase for EURIBOR and USD LIBOR



Note: Gross notional amount of IRD outstanding referencing benchmarks, EUR tn. 1Q21 = 26-Mar-21.  
Sources: TRs, ESMA

## Market trends and risks

# Asset management

### Trends

Equity funds outperformed the rest of the fund sector in 1H21 in terms of both flows and performance, resulting in a growth of 40 % of their assets under management year-on year. Most fund categories received positive flows in 1H21 except money market funds (MMFs), illustrating a general risk-taking preference among investors. Overall, risks have remained elevated in the fund sector, with an increase in credit risk as the impact of the COVID-19 pandemic on corporate solvency is reflected in the quality of fund portfolios. In contrast, MMFs have increased their liquidity since the onset of the crisis but remain a core concern for regulators due to their structural vulnerabilities. The alternative investment fund (AIF) sector remained stable in terms of both size and risk, but the failure of Archegos in the US further raised concerns regarding leveraged funds.

### Risk status

Risk level ■

Outlook ➔

### Risk drivers

- Potential overvaluation of asset prices
- Risk sentiment remains fragile
- Funds exposed to liquidity mismatch remain vulnerable

## Fund flows: equity funds outperform

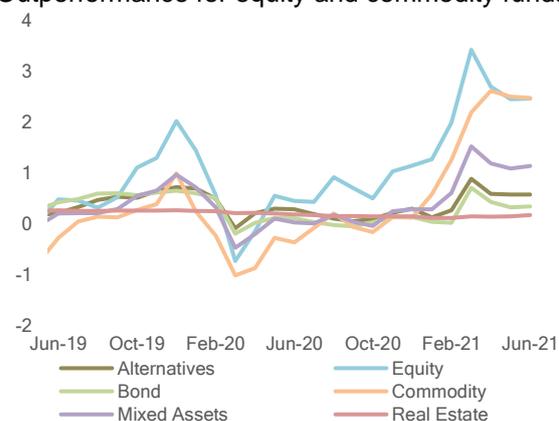
Flows remained positive for most fund categories in 1H21 (T.57), despite the uncertainties surrounding the evolution of the COVID-19 pandemic in the EU. Equity funds recorded among the largest inflows (4.6 % of NAV) followed by mixed funds (3.9 %) and bond funds (2.9 %). This contrasts with the evolution observed in 2020 during the COVID-19 related market stress, where equity funds lost 2 % of their NAV and bond funds close to 4 % before recovering. Another remarkable development is the surge in commodity funds: while these only represent a small part of the industry, they received inflows representing 11.6 % of their NAV in 1H21. In contrast, MMF faced outflows (5.2 % of NAV), thus confirming a general preference for riskier assets over safer ones.

Flows partly reflect the difference in **performance** of the different asset classes. The annual average monthly return of equity and commodity funds was at 5-year highs in 1H21, reaching an average monthly return of 2.5 % at the end of the reporting period for both types, due to the sustained recovery since March 2020.

T.38

Performance

Outperformance for equity and commodity funds

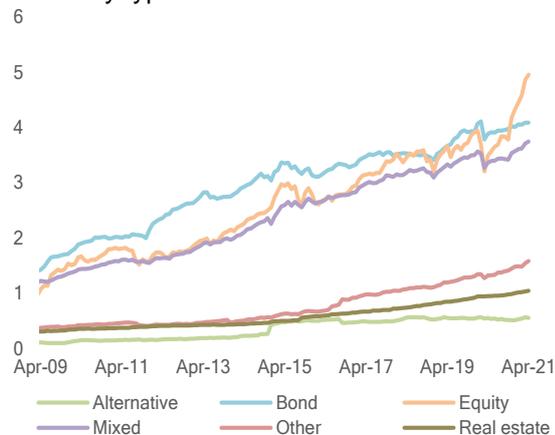


Note: EU27-domiciled investment funds' annual average monthly returns, asset weighted, in %.

Sources: Thomson Reuters Lipper, ESMA.

Overall, most fund types experienced positive performance on average from April 2020 to April 2021, with an average monthly return of 3.9 % for mixed funds and 2.9 % for bond funds.

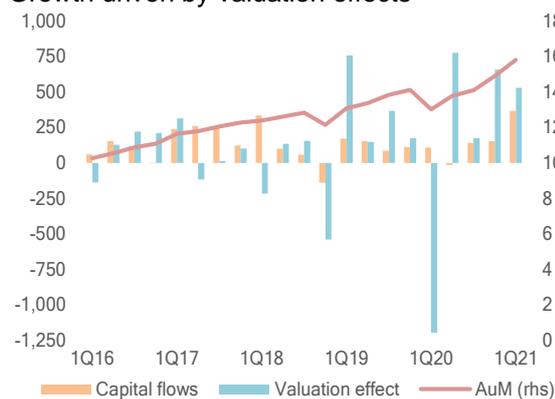
T.39  
Assets under management  
Funds by types



Note: AuM of EA funds by fund type, EUR tn.  
Sources: ECB, ESMA.

The combined effect of positive flows and strong performance led to a strong increase in **assets under management**. Funds in the EA manage EUR 17.4 tn, of which EUR 5.0 tn are held by equity funds (T.39). Equity funds assets increased by more than 40 % year-on-year, mostly due to the valuation effects (T.40). They now represent the main category of funds in the EA (28 %), followed by bond funds (23 %).

T.40  
Net asset valuation  
Growth driven by valuation effects

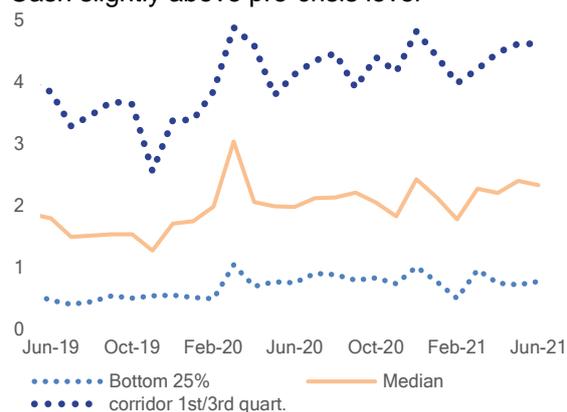


Note: Net valuation effect related to the AuM of EA investment funds, computed as the intraperiod change in AuM, net of flows received in the respective period. Capital flows and valuation effects in EUR bn. AuM expressed in EUR tn.  
Sources: ECB, ESMA.

## Risk outlook: elevated for most funds

Overall, risks have remained elevated in the fund sector amid increased risk taking and high levels of valuation across asset categories. **Liquidity risk** is a concern for some bond funds. Cash holdings decreased sensibly: at the onset of the COVID-19 related turmoil, cash holdings peaked at 3.1 % of assets (median) before unwinding to 2.3 % in 1H21, only slightly above the pre-COVID-19 crisis level (T.41). On the other hand, this also highlights the effects of managers' liquidity management strategy during times of stress: an ESMA report on liquidity risk in investment funds<sup>23</sup> showed that during the period of COVID-19 market stress 8 % (11 % NAV) of UCITS and 11 % (10% NAV) of AIFs have used temporary borrowing to meet higher redemptions.

T.41  
Cash held by bond funds  
Cash slightly above pre-crisis level



Note: Median, top and bottom 25% value of cash held by EU corporate bond funds, in % of portfolio holdings (%). Short positions can have a negative value.  
Sources: Refinitiv Lipper, ESMA.

ESMA's liquidity indicator, which considers cash and liquid assets<sup>24</sup> (with liquidity based on the asset type and credit rating), shows that liquid assets now represent 40 % of bond fund portfolios and 6 % of HY fund portfolios, down by 6pp year-on-year for both categories (T.59). Moreover, the ESMA report on liquidity risk in investment funds highlighted potential liquidity mismatches in funds investing in asset classes illiquid by nature while offering a high redemption frequency. Within a year of the publication of the

<sup>23</sup> ESMA, [Recommendation of the European Systemic Risk Board \(ESRB\) on liquidity risk in investment funds](#), November 2021.

<sup>24</sup> ESMA, [Stress simulation for investment funds](#), September 2019.

report, ESMA will follow-up on further steps undertaken by NCAs regarding the main vulnerabilities identified.

**Credit risk** increased further for bond funds, reflecting the impact of the macroeconomic crisis on corporate solvency and ratings. This is especially the case for HY bond funds, which represent 5% of all bond funds and whose credit risk indicator increased further in 1H21, indicating a portfolio now rated below BB on average. In comparison, the credit risk indicator of IG bond funds only slightly deteriorated, to an average rating between A and BBB.

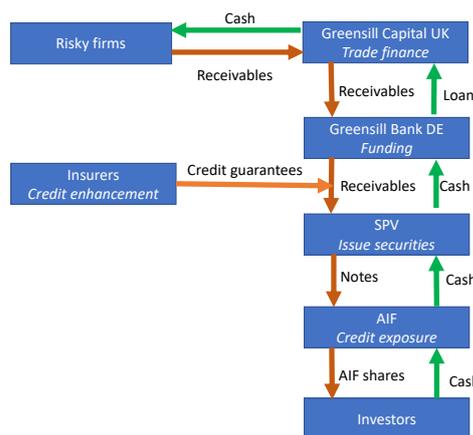
**Duration risk** is another potential concern for bond funds, one which could expose them to credit and interest rate shocks or exacerbate liquidity risk in a stressed environment. In the past, investors have compensated for the declining yields induced by a low-interest environment by increasing the duration of their portfolio (by 1 year since 2016, up 7 years). However, in 1H21 the maturity of bond fund portfolios slightly decreased (T.59).

In addition to these ongoing risks, new concerns have been raised about **interconnectedness** within the financial system following the collapse of Greensill Capital (T.42).

liquidated on 22 April 2021. At the same time, Credit Suisse suspended redemptions for its 8 AIFs exposed to supply chain finance (with a NAV of around EUR 9 bn), due to valuation uncertainties. Since then, the funds with direct exposures to Greensill-related notes have been in the process of being liquidated.

This episode raises concerns about interconnectedness within the financial system as well as potential due diligence, governance and conflict of interest issues for the asset manager.

T.43 Stylized view of Greensill Capital model



T.42  
Supply chain finance  
The collapse of Greensill Capital

In early March 2021, Greensill Capital, a UK firm specialised in supply chain finance, filed for insolvency. Greensill would pay invoices issued by suppliers to its corporate clients, at a small discount, and the clients receiving the goods would pay Greensill some weeks later. Greensill also provided funding to companies secured by “prospective receivables” from “prospective buyers”.

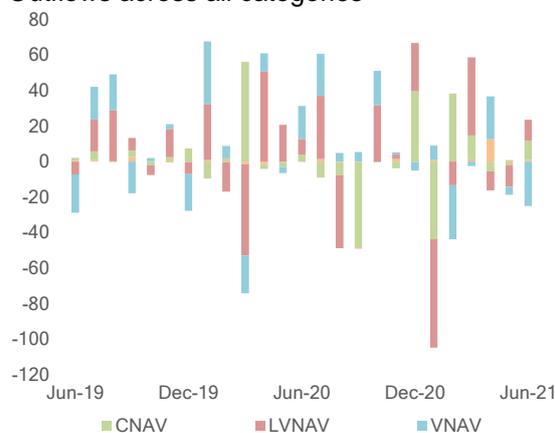
The receivables would be funded partly by Greensill Bank AG, a German credit institution belonging to the same group, and partly through the issuance of notes backed by receivables. Some receivables benefited from credit insurance arrangements provided by insurance companies, to reduce credit risk and make the notes eligible for funds investing in IG instruments. Four AIFs managed by Credit Suisse purchased the notes, and four other AIFs invested in the AIFs with direct exposures to the notes, including one AIF domiciled in Liechtenstein using white label services.

In 3Q20, some insurers refused to renew the credit insurance arrangements related to some receivables, due to credit risk concerns. In early March 2021, BaFIN filed a complaint against Greensill bank management for suspected balance sheet manipulation and froze the bank’s operations after a requested audit. Eventually the parent company was

## MMFs: preference for CNAV

MMFs faced EUR 44.5 bn in **outflows** in 1H21, with outflows concentrated in LVNAV (EUR - 41.5 bn) and VNAV (EUR 30.3 bn) while CNAV attracted positive flows (EUR 11.2 bn).

T.44  
EU MMF flows by type  
Outflows across all categories



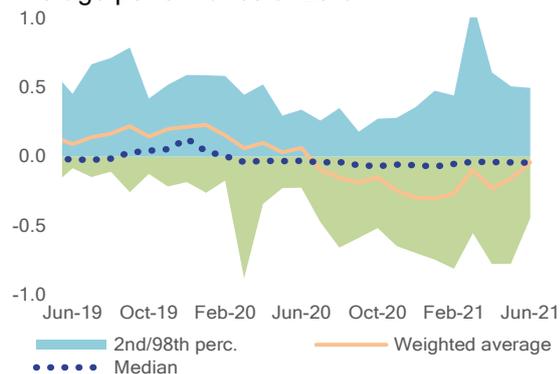
Note: MMF assets by type, in EUR bn.  
Sources: Refinitiv Lipper, ESMA.

While this is comparable to the outflows experienced by LVNAV during the COVID-19 related stress (EUR -51.4 bn), the context is different. In contrast with the events of March 2020, this is not the result of a “dash for cash” in illiquid market conditions but illustrates general investor appetite for riskier assets.

Outflows from MMFs coincide with declining performance overall, with half of the funds displaying negative returns over the last 12 months, in a context of low yield in the money market (T.45). The average monthly return is now zero, with 2 % of the funds displaying monthly returns below - 0.4 %. The worst performing funds are generally labelled in USD, whose value in EUR has been impacted by the depreciation of the USD. However, their performance in local currency is close to that of EUR funds.

T.45  
MMF performance

Average performance at zero



Note: EU27-domiciled MMFs' average yearly returns by month, asset-weighted, in %. The graph shows the median and average asset-weighted returns and the difference between the returns corresponding to the 98th and the 2nd percentile (light blue corridor).  
Sources: Refinitiv Lipper, ESMA.

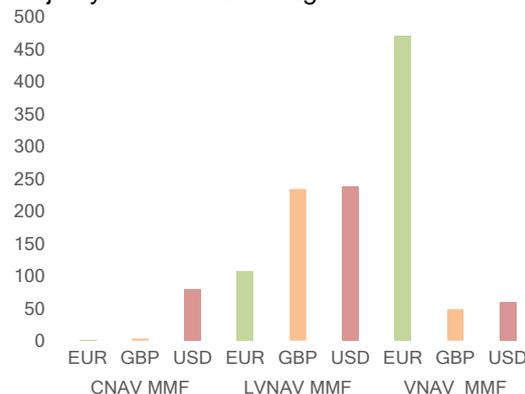
In 1Q21, MMFs represented EUR 1.4 bn in AuM. The sector remains geographically concentrated, with the vast majority of assets in IE (38 % of assets), FR (31 %) and LU (29 %). This also reflects a sectoral specialisation, with FR funds being nearly exclusively VNAV funds denominated in EUR. In contrast, 68 % of IE MMFs are LVNAV denominated in USD and GBP while funds domiciled in LU are predominantly USD LVNAV (30 %) and USD CNAV (15 %).

EU MMFs have increased their liquidity during the COVID-19 related stress, and maintained their share of liquid assets since the crisis began (T.47), as defined by the daily and weekly liquid assets. LVNAVs weekly liquid assets hover around 45 % of NAV (versus 35 % early 2020 and compared with a regulatory requirement of 30 %).

Similarly, this greater proportion of short-term assets kept MMF maturity to low levels, down to 59 days compared with 73 days before the COVID-19 related market stress.

T.46  
MMF assets

Majority of MMFs in foreign currencies



Note: MMF assets by type and by currency, in EUR bn.  
Sources: Refinitiv Lipper, ESMA.

Despite this improvement in MMF liquidity, the market stress in 1Q20 highlighted ongoing structural vulnerabilities. MMFs are exposed to liquidity mismatches as they are used as cash-like instruments by investors, while the instruments they invest in, such as CPs and CDs, may lose their liquidity during periods of stress. CPs and CDs are generally buy-and-hold instruments not frequently traded on the secondary market.

T.47  
MMF liquidity

Liquid assets above pre-COVID-19 crisis level



Note: Median Weekly Liquid Assets (WLA) for LVNAVs, in % of NAV.  
Sources: Crane, ESMA.

In March 2020, some MMFs requested that banks buy back their CPs in the absence of other

buyers, but in a number of cases banks reportedly discouraged or denied the requests<sup>25</sup>. In such circumstances, MMFs can face higher redemption requests but a lack of sufficient portfolio liquidity to meet this increased demand.<sup>26</sup> Against this backdrop, regulators are setting policy proposals to enhance the resilience of the sector (T.48).

T.48

MMF Regulation review

#### Policy initiatives to enhance the resilience of MMFs

In March 2021, ESMA issued a consultation document to discuss the potential reforms of the EU MMF regulatory framework that could be envisaged in the upcoming review of the MMFR in 2022. ESMA sets out four types of potential reforms for MMFs:

- Reforms targeting liability, such as decoupling regulatory thresholds from suspensions/gates to limit liquidity stress, and to require MMF managers to use liquidity management tools such as swing pricing;
- Reforms targeting asset, e.g. reviewing requirements for liquidity buffers and their use;
- Reforms reviewing the status of certain types of MMFs, such as stable NAV MMFs and LVNAV; and
- Reforms that are external to MMFs themselves by assessing whether the role of sponsor support should be modified.

In addition, ESMA is gathering feedback from stakeholders on other potential changes, particularly linked to ratings, disclosure and stress testing.

The ESRB published a note in July 2021 on systemic vulnerabilities in MMFs and policy options that will inform the Commission of the macroprudential aspects of the MMF regulation.<sup>27</sup> The ESRB identified three key desired outcomes of this policy work:

- First, the removal of first-mover advantages for investors, which was also a key consideration in the previous ESRB Recommendation of 2012;
- Second, not limiting the proposals to the LVNAV funds but considering the vulnerabilities of the entire sector;
- Third, ensuring the resilience and functioning of MMFs without the need for central banks to step in during crises.

At a global level, several workstreams have started to assess the situation faced by MMFs during this crisis, and the policy options that should be considered and that would potentially further enhance the reforms adopted following the 2008 financial crisis. FSB and IOSCO published the 30 June 2021 a consultation report setting out policy proposals to enhance MMF resilience, including with respect to the appropriate

structure of the sector and of underlying short-term funding markets.

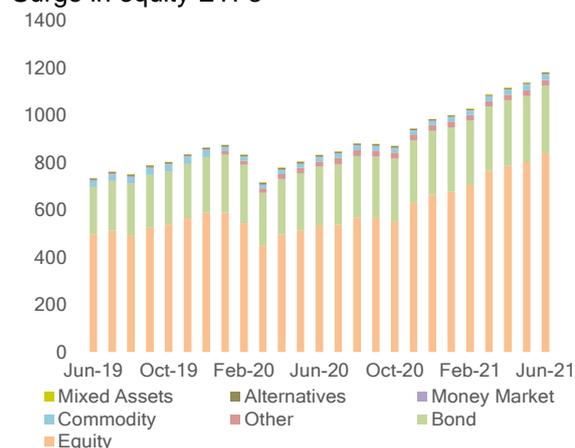
## ETFs: surge in equity funds

Against the background of strong inflows (6% of NAV) and rising equity valuation, equity ETFs surged in 1H21, up to EUR 840 bn (+ 27 %), bringing the size of the whole **EU ETF sector** to EUR 1.2 tn (T.49). Equity ETFs now represent 71 % of the sector, compared to 65 % at the end of 2020, followed by bond ETFs (24 %). The pivot from bond funds to equity funds was mainly driven by the relative performance of the two assets, rather than being the result of fund flows from one fund segment to another.

T.49

EU ETFs

#### Surge in equity ETFs



Note: NAV of EU27 ETFs by asset type, EUR bn.  
Sources: Refinitiv Lipper, ESMA.

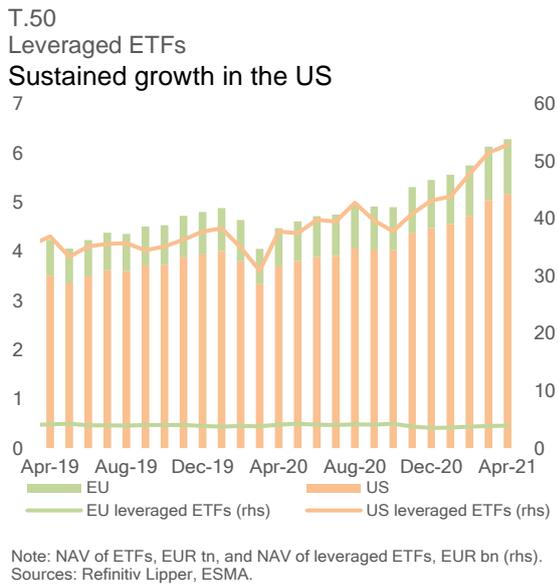
The growth of the EU ETF market was steady in 1H21 although its sheer size is significantly smaller than in the US, where the ETF sector represents a significant part of the passive fund industry with EUR 5.5 tn in NAV. US ETFs are especially popular with retail investors, and the retail so-called “trading boom” was accompanied by a noticeable increase in leveraged ETFs (+35 %) which use derivatives to enhance return (T.50). While the proportion of leveraged ETFs remains small both in the US (1 %) and in the EU (0.4 %), leveraged ETFs, as well as inverse

<sup>25</sup> ECB, [Financial stability review](#), May 2020.

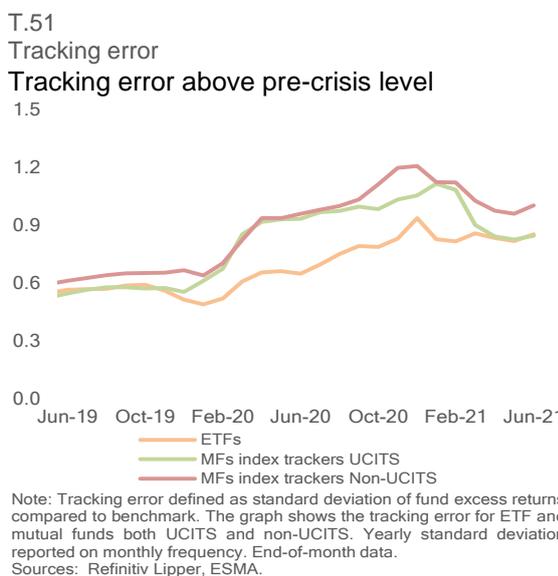
<sup>26</sup> ESMA, [Vulnerabilities in money market funds](#), TRV No. 1, 2021.

<sup>27</sup> ESRB, [Issues note on systemic vulnerabilities of and preliminary policy considerations to reform money market funds \(MMFs\)](#), July 2021.

ETFs, need to be monitored due to their potential procyclical behaviour.<sup>28</sup>



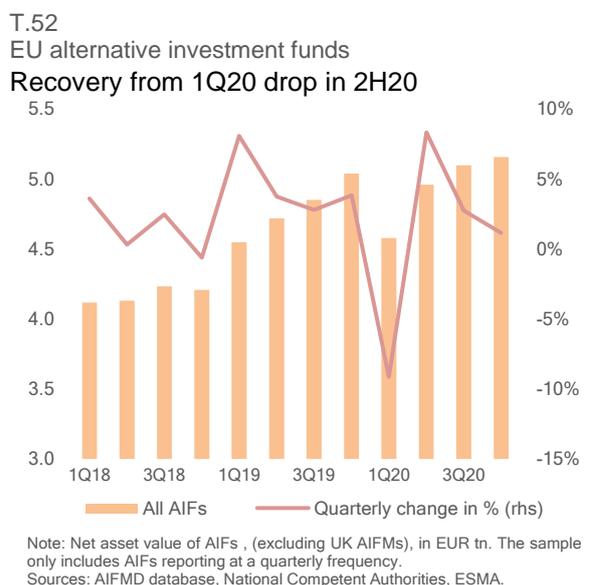
The tracking error of ETFs and other index funds increased during the March 2020 market turmoil and remains above pre-crisis levels, at 0.8 % in 1H21 for ETFs. The higher volatility especially increased the price differences between index trackers and their benchmarks, pushing tracking errors higher.



However, non-ETF trackers have displayed sensibly higher tracking error until 1Q21, thus highlighting the resilience of the structure of ETFs.

## Alternative investment funds: stable size

After experiencing sharp changes in NAV in 1Q20, the size of AIFs recovered in 2H20 (T.52). The end-2020 NAV was close to EUR 5.1 tn for AIFs reporting on a quarterly basis<sup>29</sup>, a slight increase compared to end-2019. In terms of AIF types, funds of funds accounted for 16 % of the NAV, followed by real estate funds (13 %), while ‘Other AIFs’ remained by far the largest category, representing 67 % of NAV. The size of private equity funds remained relatively low, with a NAV close to EUR 140 bn (3 % of all AIFs), but this type of AIF recorded the highest growth (+ 27 % compared to end-2019). The size of the EU AIF hedge fund sector stayed small too, with a NAV of around EUR 77 bn, as most hedge funds sold in the EU are managed outside the EU (primarily in the UK).



Levels of **leverage** in the overall AIF industry remained stable end-2020, with the median adjusted leverage (gross leverage excluding

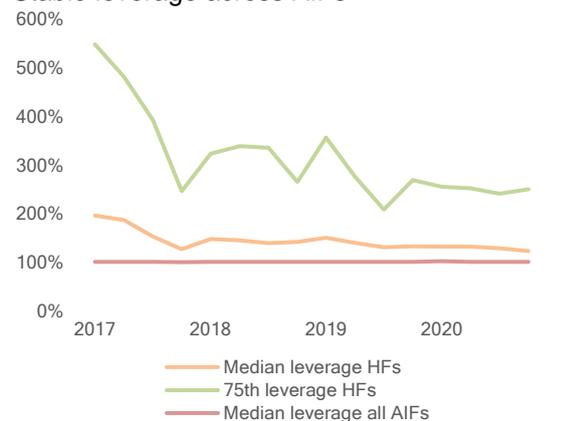
<sup>28</sup> Le Moign, Raillon, “[Heightened volatility in early February 2018: the impact of VIX products](#)”, Autorité des Marchés Financiers, April 2018.

<sup>29</sup> Under the AIFMD, Directive 2011/61/EU, the reporting

frequency is based on the size of the AIF. Only AIFs with (regulatory) AuM above EUR 1 bn report on a quarterly basis. AIFs reporting quarterly account for around 75 % of the AIFs.

interest rate and foreign exchange derivatives) across all AIF types hovering around 102 % (T.53). This measure of leverage includes balance sheet leverage (through borrowings) and synthetic leverage (through derivatives). Hedge fund adjusted leverage declined slightly to reach 124 % of NAV, its lowest value since 2017. For the highest leveraged hedge funds, values remained stable: the adjusted leverage for the third quartile was 251 % end-2020.

T.53  
EU AIFs leverage  
Stable leverage across AIFs

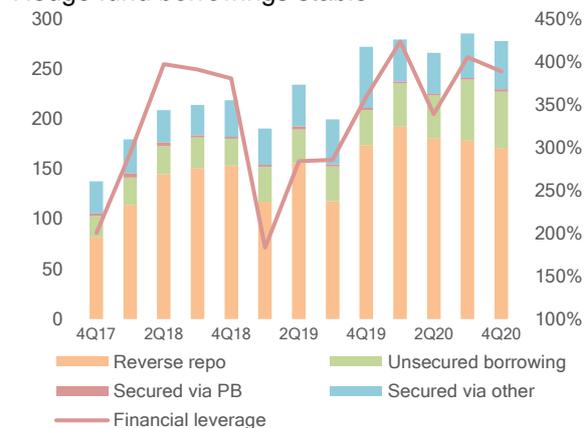


Note: Adjusted leverage (ratio of gross exposures excluding IRDs and FX derivatives to NAV), in % of NAV. The sample only includes AIFs reporting at a quarterly frequency.  
Sources: AIFMD database, National Competent Authorities, ESMA.

**Hedge fund borrowings** were close to EUR 300 bn end-2020 (T.54). Repo remains the main source of funding (around 62 % of the total), followed by unsecured borrowings (20 %). Financial leverage hovered around 390 % in 4Q20.

Leverage can present risks for counterparties, as shown recently by the collapse of Archegos, a highly-leveraged US family office (T.55). The nature of Archegos is part of the problem as family offices are not subject to the stringent requirements applicable to regulated funds. In the EU, it is unclear whether family offices using similar strategies would fall within the scope of the AIFMD even though such investment strategies are very similar to hedge funds.

T.54  
EU hedge fund financial leverage  
Hedge fund borrowings stable



Note: Hedge fund borrowing by source, in EUR bn and financial leverage (borrowing to NAV), in %.  
Sources: AIFMD database, National Competent Authorities, ESMA.

Leveraged EU AIFs exposed to counterparty risks fall within the scope of ESMA guidelines to address risks in the AIF sector.<sup>30</sup> The guidelines follow a two-step approach that identifies leveraged funds that potentially pose risks to financial stability due to their sheer size, the risk of fire sales, the risk of direct spillovers to financial institutions and the risk of interruption of credit intermediation.

T.55  
Leverage and concentrated exposures  
The fall of Archegos

At the end of March 2021, Archegos, a US family office capital management firm, collapsed as it was unable to meet variation margins on derivatives transactions.

Archegos was a highly leveraged institution taking positions on a few stocks in the technology and media sectors. The firm was entering into Total Return Swap (TRS) transactions with a few dealer banks, whereby the bank would deliver the performance of the underlying stock to Archegos. While Archegos had around USD 10 bn in equity, its exposure through TRSs was USD 50 bn, implying a high level of leverage (five times equity).

As the price of the stocks declined, Archegos faced variation margins on its derivatives that it was unable to meet. As the collateral it had posted was not enough to cover the losses, the counterparties liquidated their long positions on the underlying stocks. However, given that Archegos positions were highly concentrated (with equity positions reaching

<sup>30</sup> ESMA, [Guidelines on Article 25 of Directive 2011/61/EU](#), December 2020.

more than 20 % of free float for some stocks), the sales of equities resulted in sharp price drops. As the price of the stocks plummeted, the banks that were slower to sell suffered high losses. Losses are estimated to be higher than USD 10 bn, including more than USD 7 bn for two banks.

This event raises a series of issues. From a risk management perspective, the initial margins on TRSs held by Archegos were too small, allowing the firm to obtain a high level of leverage. Margins should have also included an add-on related to risks stemming from the concentration of exposures. As a family

office, Archegos was exempt from regulatory reporting requirements (such as requirements for private funds to report information on leverage to the SEC), raising the question of whether further regulation of family offices should be considered.

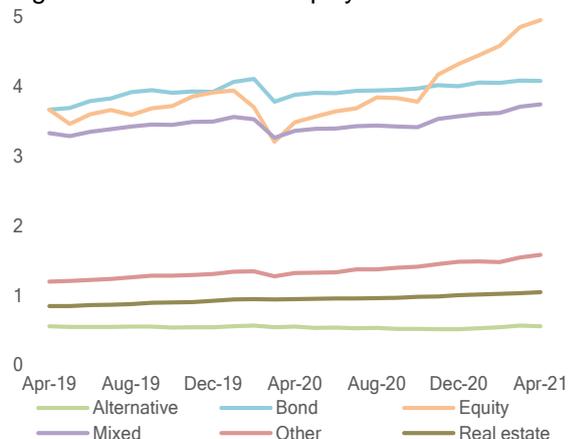
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# Key indicators

T.56

Assets by market segment

Significant increase for equity funds

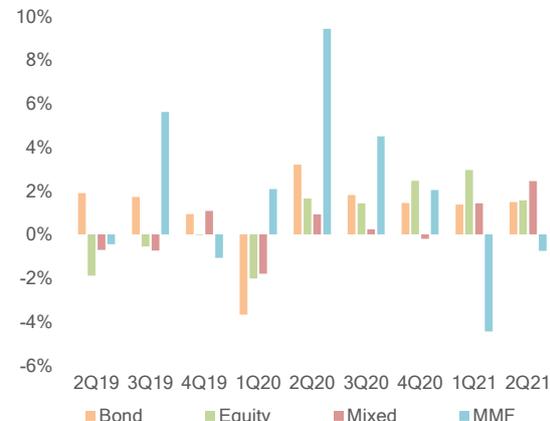


Note: AuM of EA funds by fund type, EUR tn.  
Sources: ECB, ESMA.

T.57

Fund flows by fund type

Preference for riskier assets

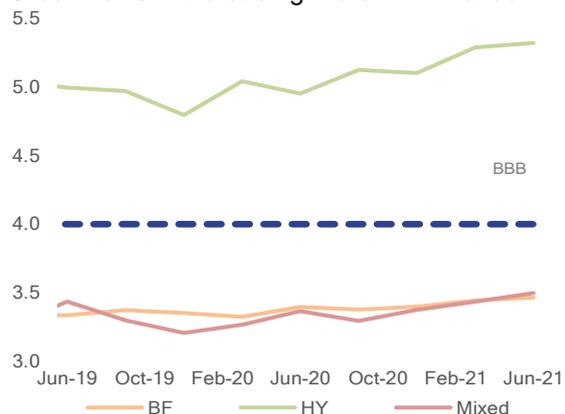


Note: EU-domiciled funds' quarterly flows, in % of NAV.  
Sources: Refinitiv Lipper, ESMA.

T.58

Credit risk

Credit risk still increasing more in HY funds

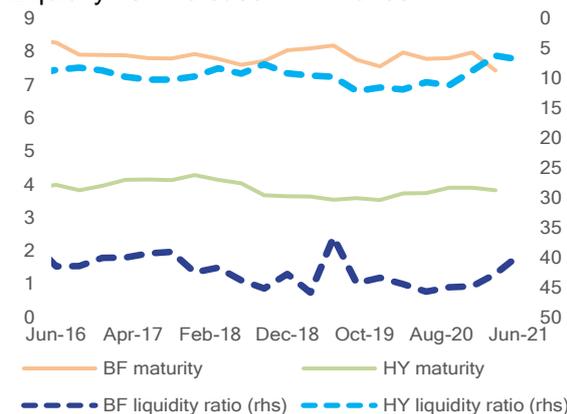


Note: Average credit quality (S&P ratings; 1= AAA; 4= BBB; 10 = D).  
Sources: Refinitiv Lipper, ESMA.

T.59

Maturity and liquidity risk profile

Liquidity risk increase in HY funds

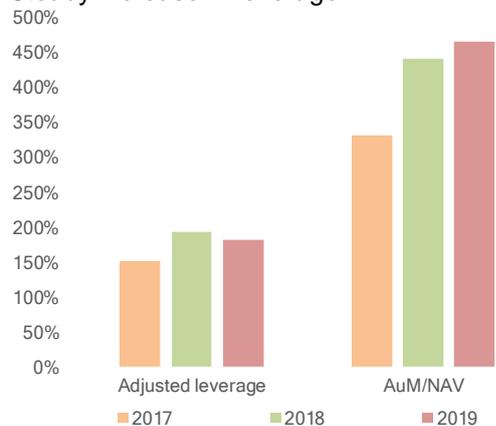


Note: Effective average maturity of fund assets in years; ESMA liquidity ratio (rhs, in reverse order).  
Sources: Refinitiv Lipper, ESMA.

T.60

AIF leverage

Steady increase in leverage

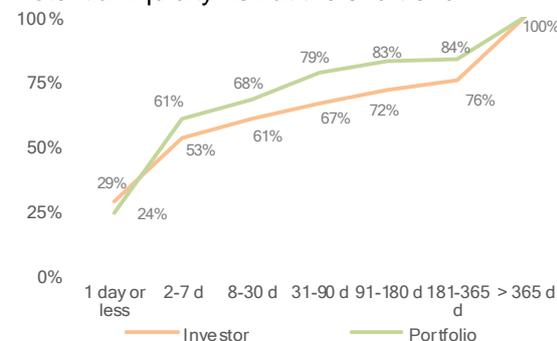


Note: Leverage of all AIF in % of NAV.  
Sources: AIFMD database, National Competent Authorities, ESMA

T.61

AIF liquidity profile

Potential liquidity risk at the short end



Note: Portfolio and investor liquidity profiles of AIFs managed and/or marketed by authorised EU AIFMs, end of 2019. Portfolio liquidity defined as the percentage of the funds' assets capable of being liquidated within each specified period, investor liquidity defined as the shortest period for which investors can redeem. EU and non-EU AIFs by authorised EU AIFMs marketed, respectively, w/ and w/o passport. d= Days. Data for 27 EEA countries.  
Sources: AIFMD database, National Competent Authorities, ESMA.

## Market trends and risk

# Consumers

### Trends

Investor confidence increased, linked to increased asset valuation amid remaining uncertainty surrounding the economic impacts of the COVID-19 pandemic. The performance of retail investor instruments, such as EU UCITS funds (Undertakings for collective investment in transferable securities), strongly improved, accompanied by large inflows into UCITS. A surge in retail trading during the COVID-19 pandemic has been driven by a range of factors, including innovation. New online and mobile trading platforms offer convenient, easy-to-use investment services. Zero-commission business models and gamified features may further attract consumers, but also prompt investor protection concerns. Concerns have also risen around the rise of trading encouraged by social media and online message boards, as in the GameStop episode of 1Q21.

### Risk status

Risk level 

Outlook 

### Risk drivers

- Short-term: strong amelioration in investment performance and investor confidence
- Longer term: low participation in long-term investments, linked to a lack of financial literacy and limited transparency around some products

## Sustained confidence, lingering uncertainty

In line with improvements in macroeconomic conditions and increasing valuations in underlying assets, the value of **household financial resources** grew strongly in 1H20. The annualised growth rate of financial assets, at around 0 % and 2.2 % in 3Q20 for stocks and investment fund shares respectively, sharply increased to 21 % for stocks and 27 % for investment fund shares in 1Q21 (A.167).

This mirrors the amelioration in investor confidence in relation to current market conditions amid underlying uncertainty, driven by the developments related to the COVID-19 pandemic and vaccine deployment. Current **investor sentiment** saw a sustained increase in 1H21 for retail investors especially. When looking at future market conditions, the investor index has been largely above zero and growing,

indicating positive sentiment on future market conditions. (T.64).

The uncertainty related to the unfolding of the pandemic and extended lockdown measures continued to be reflected in the prolonged increase in **household savings**, the year-on-year rate was more than 20 % in 1Q21, up from an already high 19 % in the previous quarter and a 5-year moving average just below 14 % (A.165). This was mainly driven by a drop in consumption expenditure 7 % lower than that of the previous year.<sup>31</sup> Also, the **asset to liability ratio** continued to rise with financial assets increasing at a faster pace than liabilities. Between 3Q20 and 1Q21, assets increased by more than EUR 1.5 tn (5 %) compared to an increase of EUR 140 bn (1.5 %) for liabilities (T.63).

<sup>31</sup> Eurostat, May 2021, "[Impact of COVID-19 on household consumption and savings](#)".

## Retail investment: improved performance

Over the course of 2020, despite a temporary drop in 3Q20, **performance of retail investments** saw an upward trend, which continued in 1Q21 in the wake of elevated valuations of underlying assets remaining broadly stable at high levels in 2Q21. On a stylised retail investor portfolio, annual performance reached an average of +1.4 % in May 2021, up from +0.2 % in December 2020 (T.65).

In January 2021, the prices of several stocks that had been the targets of short selling by some hedge funds (e.g. GameStop and AMC) began to increase sharply, attributable to a surge in trading by retail investors communicating with each other via online message boards.<sup>32</sup> Some of the retail trades may have represented a form of investor activism, which does not have a direct impact on ESMA's investor protection objective. Of greater concern is the extent to which investors may have taken on excess risk relative to their financial position and may have had unrealistic expectations of price performance based on sentiments expressed by fellow retail investors online, which may in turn create bubble risk. The influence of online message boards on investor behaviour is likely to be greater than ever given the popularity of online trading by retail investors since the onset of the pandemic (T.62). The pandemic appears to have acted as a catalyst for this increased trading, against a backdrop of longer-term drivers in the form of digitalisation and platformisation in finance.

T.62

Changing patterns in consumer behaviour

### Technology drives new forms of retail investing

Trading by retail investors has increased markedly during the COVID-19 pandemic.<sup>33</sup> This phenomenon can be explained by several drivers: bouts of market volatility in the early stages of the pandemic may have spurred these transactions, in combination with large increases in

household savings; in addition, trading acts as an outlet for the increased time spent online during lockdowns.

Finally, another important driver of increased retail trading is the availability of technological tools, as consumers now have ready access to online and mobile trading platforms.<sup>34</sup> In the EU, new trading applications are publicising themselves as offering zero-commission investing, following a business model that has become common in the US. Many include 'gamified' features to encourage participation. In response, some longer-established applications have recently started advertising themselves as zero-commission.

In addition to providing consumers with instant and convenient access to financial markets – thereby spurring numbers and volumes of transactions – technology underpins new kinds of retail trading. Online forums and discussion boards act as a means for investors to share their views and, in some cases, to coordinate their behaviour in certain ways. In particular, the rise of social trading – in which investors on a platform can share trading strategies, either directly on the platform or via other online forums – was illustrated in 1Q21. The shares of firms such as US videogame retailer GameStop and US cinema company AMC Entertainment surged several times in price amid high trading volumes and extreme volatility (see box T.9).<sup>35</sup> Large purchases of shares and call options, combined with very high short positions created the conditions for unprecedented price increases and bubble risk.

From an investor protection perspective, assessing the developments is complicated by the fact that some of the retail investors involved appeared to be motivated – at least in part – by goals other than financial returns. In short, their actions were a form of investor activism. Nonetheless, the financial risks were considerable and a potential source of consumer harm.

Another reason for concern from an investor protection perspective is that a zero-fee price structure may involve less obvious costs, such as bid-offer spreads quoted by intermediaries on the securities being traded. This 'payment for order flow' model can also result in misalignment of economic incentives – known in economic terms as a 'principal-agent problem' – whereby the firm executing orders on a client's behalf stands to gain financially by using third parties that offer the greatest payments to the firm. In the EU, firms are required to comply with MiFID II rules on conflicts of interest, best execution and inducement requirements.

In light of the risks to retail investors around social trading of volatile instruments, ESMA published a Statement in

<sup>32</sup> See the discussion under "Equity: decoupling continues", above.

<sup>33</sup> See AMF, 2020, "[Retail investor behaviour during the COVID-19 crisis](#)", April and FSMA, 2020, "[Belgians trade up to five times as many shares during the coronavirus crisis](#)", May.

<sup>34</sup> The large increase in retail trading and investing has been associated with huge price growth in crypto-assets – which are mostly outside the regulatory perimeter – such as BTC. The bubble has been fuelled by the phenomenon of 'social trading', whereby investors share their views via social media

or other online forums. For further details, see the Innovation section of this report.

<sup>35</sup> For further details on the market dynamics of the GameStop episode, see T.9 in the Securities section of this publication. As noted, the technology-driven rise of retail investing – and, in particular, deliberately investing in heavily-shorted stocks as a form of activism – has directly impacted institutional investors, with at least one US-based hedge fund needing to raise capital as a result. However, there appears to be limited scope at present for similar events happening in the EU.

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February 2021.<sup>36</sup> The Statement urges retail investors to be careful when taking investment decisions based exclusively on information from social media and other unregulated online platforms, if they cannot verify its reliability and quality. The Statement also highlights market risks faced by investors, which are exacerbated by leveraged trading, and the risk that organising or executing coordinated strategies to trade or place orders under uncertain conditions and at certain times to move share prices could constitute market manipulation.

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Focusing on **retail investment in UCITS**, 90 % of which is concentrated in equity, mixed and bond funds, average annual gross performance was at 18% in 2Q21 slightly decreasing from the 25 % reached in 1Q21, across asset classes, the highest level in the last 5 years. This strong amelioration in performance was related to the financial market recovery following the first wave of the COVID-19 outbreak. It could be observed across the EU, with some countries reporting performance far above the EU average (A.185). This is mainly related to different market structures and investment focus on different assets across domiciles.

Equity funds were the main driver of this strong increase in performance for retail investment. For funds primarily investing in equity, annual gross performance was 33 % in 2Q21, up from 47 % in 1Q21, as the negative performance in 1Q20 during the COVID-19 related market stress dropped out of annual performance calculations. For bond and mixed funds annual performance was 4.5 % and 15 % respectively in 2Q21, compared to 9 % and 21 % respectively in 1Q21 (T.66). With cost levels broadly stable, the net performance of funds also significantly increased following the boost in annual gross performance.

In line with this sharp increase in performance, **fund flows** broadly rose across asset classes. In 2Q21, very strong annual net inflows of EUR 174 bn were observable for UCITS primarily investing in equity, up from EUR 22 bn in 3Q20. Similarly, net inflows in bond UCITS were above EUR 73 bn, up from EUR 17 bn in 3Q20, and mixed UCITS saw annual net inflows of EUR 64 bn, up from EUR 15 bn a year earlier (T.67).

In terms of UCITS **investment by management type**, passive equity and bond funds accounted for more than 95 % of the passively managed

funds in the EU in 2Q21. Active management continued to be the prevalent form of management, representing 68 % and 82 % of management for equity and bond funds respectively. However, there has been a large growth in passive management and ETFs over the last 5 years. The share of passive equity and UCITS ETFs has increased from 24 % to 32 % from 2Q17 to 2Q21 (A.173). For UCITS primarily investing in bonds, the share of passive management and UCITS ETFs has increased from 12 % to 18 % over the same period (A.175). This results from inflows as well as positive valuation effects.

Focusing on **annual performance** for equity UCITS, during the peak of the COVID-19 crisis weak performance was witnessed across management types and there was no indication of active funds outperforming to passive funds. Moreover, net outflows or weak inflows were more often observed for active funds than for passive funds and ETFs. In 1Q21 and 2Q21, however, gross annual performance significantly improved for actively managed funds compared to the previous year, being just above 33 % in 2Q21 down from 48 % in 1Q21. Similarly to active funds, for passive UCITS, gross annual performance stayed at 33 % in 2Q21, down from 46 % in 1Q21. For UCITS ETFs, annual performance picked up but at a slower pace than UCITS non-ETFs, reaching 31 % in 2Q21, down from 44 % in 1Q21. Even though active and passive funds showed similar gross annual performance, in net terms, passively managed funds (non-ETFs) slightly outperformed active funds, with respective levels of 33 % and 32 %. This was not the case for equity UCITS ETFs whose net annual performance was 31 % (A.187).

This is also reflected in fund flows. There were annual net inflows across management types. However, a strong increase could be observed for actively managed funds on a year-on-year basis. In 2Q21 net inflows for active UCITS were more than EUR 250 bn, up from EUR 42 bn a year earlier. Passive equity UCITS also witnessed an increase in inflows from EUR 11 bn in 3Q20 to around EUR 24 bn in 2Q21 (A.174).

Although they only account for around 4 % of the UCITS market, **structured retail products** in the

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<sup>36</sup> ESMA, 17 February 2020, [ESMA Statement on Episodes of Very High Volatility in Trading of Certain Stocks](#), ESMA70-155-11809.

EU have prompted continued monitoring because of the complexity and variety of the products on offer and the existence of substantial costs.<sup>37</sup>

## Investor protection: closet indexing low

**Closet indexing (CI)** is a practice that can be detrimental to investors both from the point of view of transparency and the information that is conveyed to investors, and in terms of efficient capital allocation. The ESMA indicator aims to identify UCITS exhibiting patterns potentially associated with CI. Confirmation that funds are actually engaging in CI strategies can only be fully established when combined with supervisory scrutiny.

Within the sample identified by ESMA<sup>38</sup>, the decline proportion of closet indexing equity UCITS persisted across the identification criteria. Within the ESMA sample, the 'active share < 60 % and tracking error < 4 %' indicator declined from 10 % in 4Q19 to 5 % in 2Q20 and remained at similarly low levels with 6 % in 4Q20. For the other two criteria, the proportion of potential CI funds out of the total number of funds considered in the sample remained very low, at 3 % and 2 % respectively (T.68). It will be important going forward to monitor whether the low levels of equity UCITS engaging in CI continue to be sustained.

Among NCAs reporting data quarterly, **complaints** in connection with financial instruments – reported via firms as well as

directly by consumers to NCAs – rose sharply in 1Q21 to around twice the 2 year average (A.190). Interpreting trends here requires an understanding not only of recent events but also of data limitations – such as significant time lags – and heterogeneity between countries. The increase in 1Q21 was driven largely by complaints directly raised by consumers with the NCA in DE in connection with equities and unauthorised business. Among complaints with a breakdown by financial instrument, 78 % of the total in 1Q21 were about equities, up from 29 % in 4Q20. The leading cause in 1Q21 was unauthorised business at 57 %, up from 10 % in 4Q20.

Complaints had already been at elevated levels through much of 2020, following the onset of the pandemic. This was a broad-based trend across different types of instruments cited.

Rising and above-average complaints levels may relate to a large increase in retail trading during 2020 (T.62) coupled with other factors, such as losses during periods of market stress. Time lags in the process for recording and reporting complaints affect the reported trends. Relatively high levels of complaints relating to contracts for differences (CFDs) persisted, though the data do not include some major retail markets for CFD (e.g. NL, PL) and only a limited number of complaints can be categorised by financial instrument.

Finally, the most common MiFID service associated with complaints in 1Q21 continued to be execution of orders (80 %).

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<sup>37</sup> An extended analysis of the SRP market is in the [2021 ESMA Annual statistical report on performance and costs of EU retail investment products](#) published in April 2021. Much of the analysis in the report is the result of innovative techniques for data gathering and analysis, detailed in the article on SupTech in this publication.

<sup>38</sup> The ESMA closet index indicator focuses on UCITS EU-domiciled equity funds not categorised as index-tracking

UCITS and having management fees greater than 0.65 % of the NAV of the fund. The sample used is composed of about 1,500 equity UCITS domiciled in the EU, with funds potentially changing over time. The criteria used come from the [ESMA statement of 2016](#).

# Key indicators

T.63

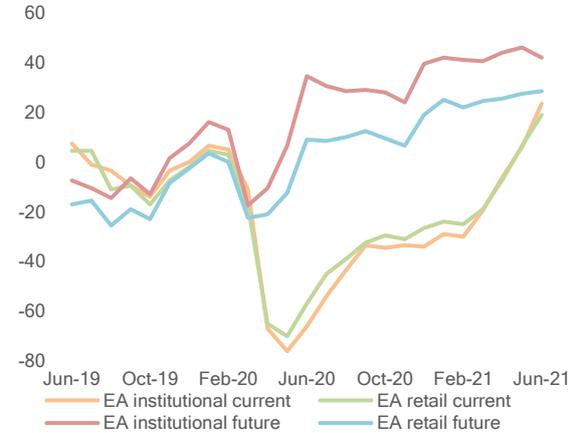
Asset to liabilities ratio  
Steady improvement



Note: Financial assets and liabilities of EU27 households, EUR tn. Assets/liabilities ratio in %.  
Sources: ECB, ESMA.

T.64

Market sentiment  
Upward trend in investor confidence



Note: Sentix Sentiment Indicators for the EA retail and institutional investors on a ten-year horizon. The zero benchmark is a risk-neutral position.  
Sources: Refinitiv Datastream, ESMA.

T.65

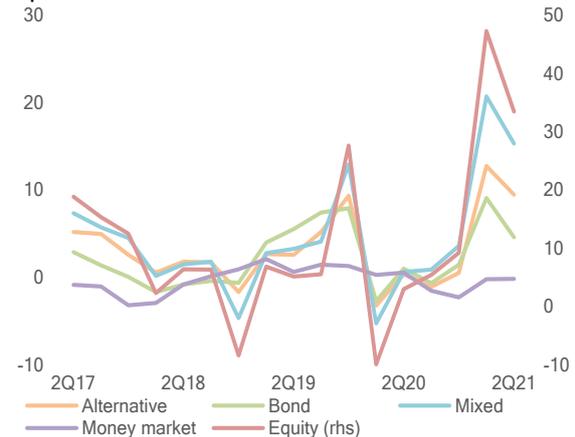
Portfolio returns  
Strong increase in performance



Note: One-year moving average of the monthly gross returns of a stylised household portfolio, in %. Asset weights, computed using National Financial Accounts by Institutional Sectors, are 36% for collective investment schemes, 39% for deposits, 22% for shares and 3% for debt securities. Costs, fees and other charges incurred for buying, holding or selling these instruments are not taken into account.  
Sources: Refinitiv Datastream, Refinitiv Lipper, ECB, ESMA.

T.66

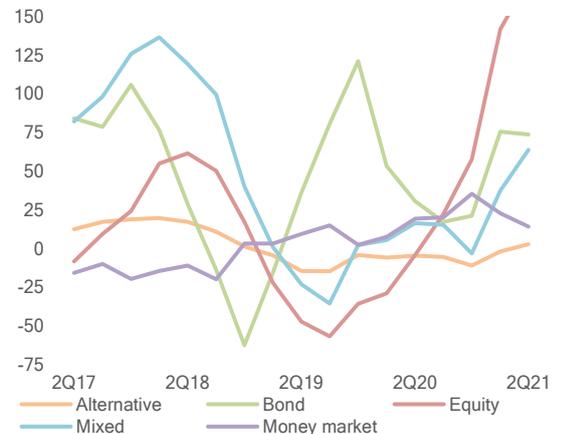
UCITS annual performance by asset class  
Spike for the main retail asset classes in 2Q21



Note Evolution of gross annual performance of EU27 UCITS, retail investors only, by asset class, in %.

T.67

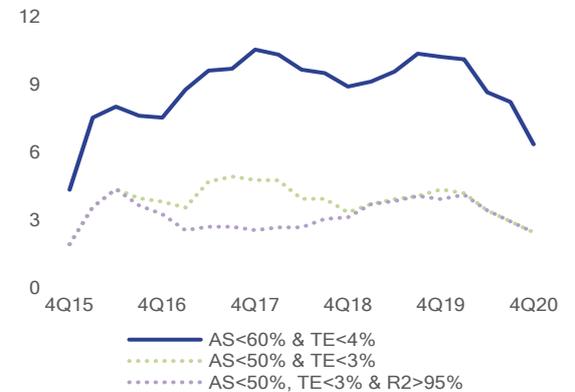
Annual net flows by asset class  
Broad increase in net inflows



Note: EU27 UCITS annual net flows, retail investors only, at quarterly frequency by asset class, EUR bn.  
Sources: Refinitiv Lipper, ESMA.

T.68

ESMA closet indexing indicator  
Sustained decline



Note: EU active equity UCITS share of potential closet index (CI) within our sample. Share of total, %. Potential CI based on three criteria: Active Share (AS) < 60% and Tracking Error (TE) < 4%; AS < 50% and TE < 3%; AS < 50% and TE < 3% and R-squared (R2) > 95%.  
Sources: Morningstar Direct, ESMA.

## Structural developments

# Market-based finance

### Trends

Primary markets showed overall resilience in the post-pandemic transition. The annual growth rate of capital market financing for non-financial corporates began positively at the beginning of the year, after being negative during the most acute phase of the crisis. In line with elevated equity valuations, primary equity markets scored record levels of issuance both in both initial public offerings and secondary offerings. Corporate fixed income market issuance continued to be elevated, with the average issuance quality remaining stable at BBB-rated bonds. Concerns of debt sustainability in the medium to long term remain, as levels of outstanding corporate bonds have continued to increase and the markets for leveraged loans and collateralised loan obligations (CLOs) are recovering and reaching levels higher than before the COVID-19 pandemic. Although access to capital markets for small and medium-sized enterprises (SMEs) remains limited, SME share trading continues to improve, especially on SME Growth markets.

## Corporate financing: growing debt levels

The European corporate sector has been significantly hit by the pandemic, but extraordinary monetary and fiscal stimuli have helped mitigate its impact. In the post-pandemic period, **European capital markets** provided an important anchor for corporate financing.

Market access had already improved in 4Q20, with the annual growth rate of market financing of EA non-financial corporations (NFCs) coming back into positive territory (+1 % year on year). In 1Q21, the trend continued, with growth at around +15 % compared to 1Q20. NFCs exposure to banks continued to be elevated, with the stock of bank loans vis-à-vis NFCs at EUR 4.75 tn, still 6 % higher than pre-crisis levels. This was partly the result of the introduction of public guarantee schemes and loan moratoria, which eased credit access and allowed for the suspension, postponement or reduction of payments within a specified period if business operations were impaired due to COVID-19 related reasons.<sup>39</sup>

In capital markets, the increase in market-based financing was mostly driven by outstanding equity and investment fund shares, which increased from EUR 19 tn in 1Q20 to EUR 23 tn in 1Q21.

Debt securities and unlisted shares continue to account for 3 % and 27 % respectively of total NFC outstanding debt (T.78).

With the increasing outstanding amount of borrowings through loans or capital market deals, debt sustainability remains an ongoing risk for both financial and non-financial corporations.

## Equity markets: record issuance in 1H21

**Primary equity markets** continued their positive end-2020 trend. Total equity issuance reached record amounts in 1H21 (about EUR 93 bn overall), up to levels not seen since 1H14.

In 1H21, **initial public offerings (IPOs)** markets raised more than EUR 30 bn from 180 deals. Overall, the total amount of IPO proceeds in 1H21 exceeded that of the whole of 2020 by around 138 %, and was 164 % above the long-term historical average in 2Q21(T.79). The rise in IPOs reflects a large demand for new listings after subdued activity on this type of deals for the past 2 years. Rallying equity markets were one facilitator of new listings. However, much of the IPO activity in Europe is concentrated in sectors such as technology and consumer goods which have benefited from COVID-19 induced and

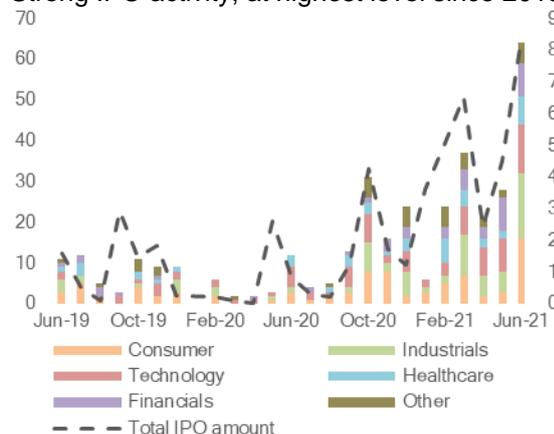
<sup>39</sup> See [Joint Committee report on risks and vulnerabilities in the EU financial system](#).

potentially structural changes in economic demand.<sup>40</sup>

T.69

Number of IPOs by sector

Strong IPO activity, at highest level since 2015



Note: Number of IPOs by economic sector (lhs) and total amount of IPOs, in bn (rhs).  
Sources: Refinitiv Eikon, ESMA.

As of 1H21, IPO activity is dominated by **the industrial and the technological sectors** (each with 39 deals, worth EUR 5.6 bn and EUR 3.5 bn respectively), followed by the consumer goods sector (36 deals worth EUR 7.4 bn) (T.69). Across all the countries, more than half of all EEA IPOs (100) were launched by companies domiciled in the Nordic countries, followed by FR (17) and DE (16).<sup>41</sup>

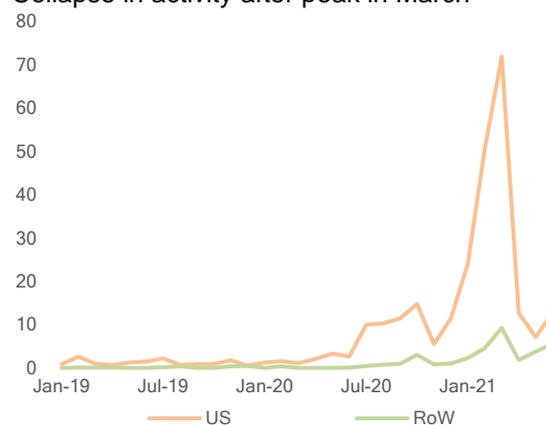
**Special purpose acquisition companies (SPACs)**, whose aim is to raise capital through an IPO for the purpose of acquiring an existing company, have seen a huge growth in activity. Issuance surged in 2020 with EUR 71 bn through 285 deals in global SPAC IPOs (with the US accounting for 90 % of proceeds), followed by more than EUR 162 bn in 647 deals in 1Q21. In the EU, three deals were recorded in 2020 (with EUR 0.5 bn in proceeds) and eight in 1Q21 (EUR 4.5 bn in proceeds).

While EU activity has increased further since then, with 21 deals (EUR 8.2 bn in proceeds), SPAC issuance has collapsed in the US with 145 deals (USD 37.4 bn proceeds compared to USD 146.7bn in 21Q1 across 468 deals), amid negative performance (- 6 % year to date for US SPACs compared with + 15 % for the S&P500) and potential concerns around SPACs (Box T.71).

T.70

SPAC proceeds and number of IPOs

Collapse in activity after peak in March



Note: SPAC proceeds in EUR bn.  
Sources: Refinitiv EIKON, ESMA.

T.71

Special Purpose Acquisition Companies (SPACs)

A closer look at SPAC activity, potential benefits and risks

SPACs, also known as “blank check companies”, are shell corporations listed on a stock exchange with the sole aim of acquiring a private company. The SPAC process has three main steps: the SPAC IPO, the search for a target company and finally the merger (the ‘De-SPAC’ process).

**SPAC IPO.** The first step is listing the SPAC vehicle as a shell company.

The founders of the SPAC (‘sponsors’) set up the company and provide the initial funds (usually 2% of IPO proceeds plus USD2mn) to cover offering expenses and working capital (T.72). Typically, sponsors hold the roles both of founder investors and of SPAC managers, in charge of looking for the private company to be acquired once the SPAC is listed on an exchange. Sponsors receive 20% of the SPAC shares, which are usually subject to anti-dilution protection in case of a merger (unlike public shares). Sponsors are also allowed to purchase warrants on SPAC’s shares.

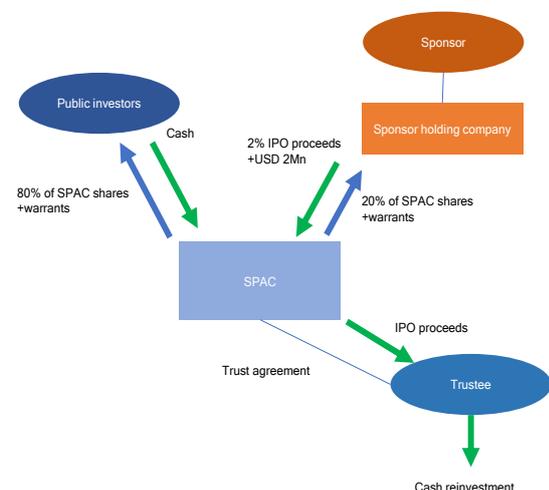
The remaining 80% of the SPAC capital is held by private investors — primarily institutional investors — during the SPAC IPO. Each unit is composed of one share of common stock and a fractional warrant. The warrant works as a call option on common stock. SPAC investors are allowed to redeem their shares (i) ahead of the merger or (ii) if the SPAC is liquidated. In the case of a merger, redeeming investors keep their warrants, and are able to exercise them after the merger.

<sup>40</sup> See [Europe’s Sudden IPO Revival Breaks Slow Two-Year Streak](#), Bloomberg, January 2021.

<sup>41</sup> Nordic countries include Denmark (16), Norway (31), Sweden (53)

The proceeds of the IPO are typically placed in a trust account managed by a third party and reinvested in relatively safe instruments such as government bonds. The proceeds are reinvested so that they could easily be mobilised to pay for investors redemptions.

T.72 Illustrative SPAC capital structure



Note: Stylized capital structure.  
Source: ESMA.

**Search for a target company.** SPACs usually have up to 24 months to find a target company for a merger.

**Merger.** After approval by the shareholders, the SPAC acquires the target which is then 'indirectly' listed and serves as the core operating business of the new company. When the SPAC merges with the target company, it will usually sell new shares below market price to institutional investors through a Private Investment in Public Equity (PIPE). The role of these investors is to (i) ensure the SPAC has enough cash for the merger (especially if IPO investors have redeemed their shares) and (ii) perform additional diligence on the target company, including its valuation.

**Benefits and risks of SPACs.** SPACs can provide benefits to target companies, sponsors, and investors, while the risks are mainly borne by the remaining investors.

*Target companies* have several advantages in going public via a SPAC process instead of a standard IPO. The listing process is quicker (less than 6 months compared to 18 months through IPOs), and less costly as underwriting fees are borne by the SPAC, and regulatory disclosures are more limited (the documentation ahead of the merger is not subject to scrutiny or approval by NCAs).

*Sponsors* have strong incentives for the SPAC to merge with a company. Sponsors are given 20% of the shares of the post-IPO SPAC in exchange for their

services. Therefore, sponsors are incentivised to find a target company even though doing so would result in a decline in the value of the SPAC's shares, contrary to shareholders' interests. Sponsors also invest in a SPAC at the time of the IPO, which further amplifies their incentives to find a merger to avoid sunk costs.

*SPAC investors* are exposed to risks related to dilution of ownership and misalignment of interests between sponsors and investors. In addition, investors are able to redeem their shares before the merger, while keeping their warrants, which creates a wedge between redeeming and remaining investors. Redeeming investors recoup their initial investment plus returns on the reinvestment of the IPO proceeds in the trust and might profit from the upside by exercising their warrants later on. Remaining investors in contrast, are diluted, and might bear most of the costs associated with the SPAC. Klausner et al. (2020), report that on average redeeming investors account for two thirds of IPO proceeds.<sup>42</sup>

**Potential issues with SPACs.** The rise of SPACs can create risks related to regulatory arbitrage: target companies might opt for a merger with a SPAC to avoid the disclosure and supervisory scrutiny provided for by the Prospectus regulation.

SPACs also raise investor protection issues given the complexity of the product, incentives issues for sponsors, and valuation uncertainty for target companies. In that context, a number of NCAs have recently launched Consultations on SPACs, such as [the FSMA in Belgium](#).

In view of both the complexity and the diversity of SPAC transactions, ESMA has published [a statement](#) setting out its expectations on how issuers should satisfy the specific disclosure requirements of the Prospectus Regulation to enhance the comprehensibility and comparability of SPAC prospectuses.

On top of IPO activity, **follow-on (FO) issuance** continued to grow consistently, as companies sought to raise capital in equity markets in order to refinance debt. Low interest rates were another facilitator of high FO issuance. Total market size of secondary equity offerings more than doubled in 1H21 compared to 1H20, amounting to EUR 63 bn out of 592 deals (T.79). The financial sector dominated FO issuance (EUR 14.6 bn), followed by the consumer (EUR 13 bn) and telecommunication sectors (EUR 8 bn).

In general, equity markets have shown strong resilience in the post-pandemic transition and the gap between new entrants and incumbent firms has narrowed. The extent to which sustained issuance in primary equity markets can continue,

<sup>42</sup> See Klausner, M., Ohlrogge, M. and Ruan, E. (2020) "[A Sober Look at SPACs](#)", Stanford Law and Economics Olin Working Paper, 559. doi: 10.2139/ssrn.3720919.

depends on future market performance and levels of interest rates, as rising yields may revise equity valuations downwards.

## Fixed income: sustained issuance

Monetary and fiscal stimuli in response to the COVID-19 pandemic continued to support elevated **corporate bond issuance** in 1H21. This translated into higher levels of outstanding corporate debt, pointing to risks of debt sustainability issues in the medium to long-term.

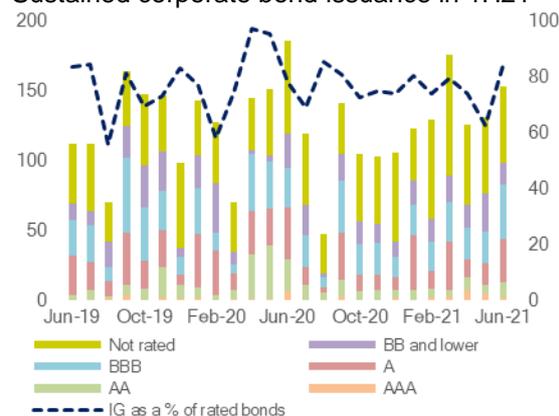
Total long-term corporate bond issuance for the reporting period amounted to EUR 843 bn, a 35 % increase compared to 2H20 and a 2 % increase from the January-June 2020 period.<sup>43</sup> Of this issuance, 57 % was rated (EUR 480bn), while unrated corporate bonds amounted to a total of approximately EUR 362 bn. Short-term issuance stood at EUR 603 bn in 1H21, a decline of 14 % with respect to the same period last year, although still at elevated levels. Debt from financial sector entities accounted for 70 % of total short-term issuance.<sup>44</sup>

Most issuance of long-term rated debt instruments was concentrated in bonds rated A and BBB (EUR 144 bn for A and EUR 157 bn for BBB rated bonds). On average, the share of **investment-grade (IG)** bonds remained stable at 75 % of total issuance of rated long-term corporate debt, accounting for a total market size of EUR 369 bn in 1H21 (T.73). With Central Bank purchases continuing to target lower-rated assets as well, borrowing costs declined further and more risk-seeking borrowers were able to access bond markets more easily. As a result, **high-yield (HY)** bond issuance marked a consistent rebound in 1H21 (+264 % yoy) compared to the low HY issuance during the COVID-19 related market stress in early 2020. Total HY long-term bond issuance throughout the reporting period amounted to slightly more than EUR 110 bn.

Across sectors, the financial sector continued to dominate total issuance in 1H21 (EUR 549 bn), followed by the industry and services sectors (EUR 230 bn), and by the utilities, mining and energy sectors (EUR 64 bn).

### T.73

#### Gross corporate bond issuance by rating Sustained corporate bond issuance in 1H21



Note: Monthly gross long-term corporate bond issuance by rating in the EEA30, in EUR bn (lhs), and share of IG issuance with respect to rated bonds, in % (rhs).  
Sources: Refinitiv Eikon, ESMA

Overall average bond quality remained stable towards BBB, with A and BBB rated bonds accounting for around more than 60 % of total outstanding rated instruments for the reporting period. Ultra-low yields, in combination with improving economic outlook, have also contributed to a larger supply of riskier assets.<sup>45</sup> Overall, the outstanding total corporate bond amount continued to grow (as of mid-2021: EUR 4.8 tn for IG, EUR 1.3 tn for HY and EUR 3.5 tn for unrated bonds), raising concerns about the extent to which European firms can sustain indebtedness in the medium and long term (T.80).

Overall, there are indications that companies have been issuing debt to cover revenue losses and manage cash positions against economic uncertainty. This resulted in cash hoarding accompanied by a decline in both capital expenditure and dividend payments (T.75).

### T.74

#### Bond issuance and liquidity buffers

##### Large cash buffers to cope with uncertainty

According to the IMF, corporate leverage has increased across most regions (including Europe), through either increased bank loans or debt issuance. At the same time the liquidity position of firms has improved, as they have built cash buffers and

<sup>43</sup> Long-term corporate debt refers to corporate bonds with >1-year maturity at issuance. The reported statistics include both rated and unrated long term-debt securities.

<sup>44</sup> Almost all short-term debt instruments were not rated, nor their rating was available on commercial databases.

Around 1% of short-term bonds was rated A-1. Therefore, the whole analysis around ratings refers to long-term debt.

<sup>45</sup> See infrastructures section for further details.

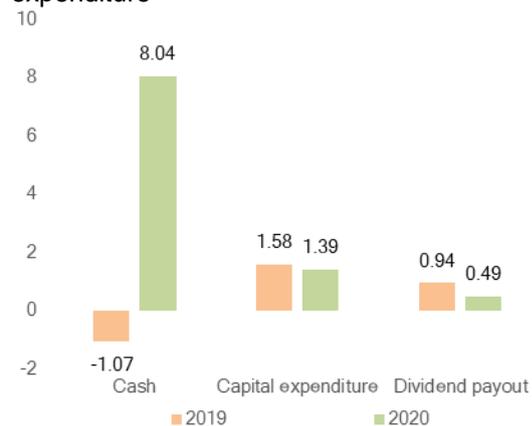
extended maturities.<sup>46</sup> This is consistent with existing evidence that during subdued economic conditions corporate bond markets are crucial for firms' access to liquidity and issuance is used to increase holdings of liquid assets rather than for real investment.<sup>47</sup>

Against this background, we investigate to what extent EEA corporate bond issuance during 2020 was used to accumulate liquidity rather than for investment purposes. We analyse three indicators which measure firms' liquidity management choices: net cumulative cash, capital expenditure and dividend payments. Our sample consists of 134 rated EEA companies (both financial and non-financial), which issued corporate bonds in both 2019 and 2020.<sup>48</sup>

Net cumulative cash is measured as the sum of cash from operating, investing, and financing activities. Furthermore, we look at capital expenditure as a proxy for investment in tangible and intangible assets. Finally, dividend pay-out is the sum of cash dividends paid to shareholders.

#### T.75

Cash, capital expenditure and dividend pay-out  
Increase in cash, decline in capital expenditure



Note: Average net cumulative cash, capital expenditure and dividend payout in EUR bn, of firms that issued corporate bonds in 2019 and 2020.  
Sources: Refinitiv Eikon, ESMA

Evidence from balance sheet data shows that 2020 net cumulative cash increased on average more than eight times for the companies in our sample with respect to 2019 (T.75). At the same time, these firms saw their average capital expenditure and dividend pay-outs decline by 12 % and around 50 % respectively. We then analyse whether there is a correlation between total debt issued and the three variables used as a proxy for liquidity usage. To do so, we compare values of cash, capital expenditure and dividend pay-outs in 2019 and 2020 using a

“before and after” comparison. This allows us to focus on changes in the dependent variables and to control for unobserved factors that differ across firms but do not change over time within the same firm. Moreover, we control for several variables that may influence our dependent variables such as net income, firm size and average issuance quality.

Results show that bond issuance is significantly positively correlated with net cumulative cash (T.76). This effect is smaller for non-financial corporations, although still positive. In terms of magnitude, an average EUR 1 bn increase in issued debt resulted in net cumulative cash being EUR 2.5 bn higher in 2020. For NFCs, the increase in cash was about EUR 280 mn. This shows that debt issuance appears to be one of the factors that led companies to accumulate cash, including fiscal and monetary stimulus. Furthermore, a yearly increase in issuance also had a negative effect on both capital expenditure and dividend pay-out. Therefore, firms with larger debt exposures during the pandemic were more likely to increase their cash position at the expense of investments.

Hence, it is possible to conclude that capital markets play an important role in building liquidity buffers during periods of distress such as the COVID-19 crisis, while they may be used to fund investments in more benign economic conditions.

#### T.76

Regression results

Firms built cash buffers out of issued debt

	Cash	Cash	Capital exp.	Capital exp.	Dividend payout	Dividend payout
Issued	4.53*** (0.00)	2.73*** (0.01)	-0.08*** (0.003)	-0.11*** (0.02)	-0.15*** (0.00)	-0.11*** (0.02)
Issued*NFC		-2.45*** (0.001)		0.08 (0.23)		0.05 (0.30)
Net income		-0.53 (0.47)		0.09*** (0.004)		0.02 (0.37)
Assets		0.25* (0.08)		0.01** (0.04)		-0.007 (0.19)
Rating		15.65 (0.23)		0.730 (0.27)		0.79 (0.26)
N	268	268	268	268	217	217
N clust.	134	134	134	134	126	126

<sup>46</sup> See Chapter 1 of [IMF Global Financial Stability Report, April 2021: Preempting a Legacy of Vulnerabilities](#)

<sup>47</sup> See Darmouni, O., & Siani, K. (2020). [Crowding Out Bank Loans: Liquidity-Driven Bond Issuance](#). Available at SSRN 3693282.

<sup>48</sup> The sample is limited only to firms that issued corporate bonds and its construction was driven by data availability

on commercial databases. There were 244 firms in 2019, and 221 in 2020, that issued corporate bonds and whose data were available on commercial databases. The final sample, 134 firms, is composed by firms that issued bonds in both years and whose information were retrievable on Refinitiv Eikon.

R2 0.618 0.699 0.170 0.478 0.414 0.476

Note: Sample period from end-2019 to end-2020. NFC takes the value of 1 if economic sector is not "Financials", 0 otherwise. Rating has a minimum value of 1 if debt is rated D and a maximum value of 22 if debt is rated AAA. P-values in parentheses; \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

Source: Refinitiv Eikon, ESMA.

In **primary sovereign bond markets**, long-term issuance almost halved in 1H21 with respect to 1H20 (EUR 565 bn for EEA sovereigns vs. EUR 780 bn in 1H20) (A.21). Debt raised by European governments through syndication in 1H21 stood at around EUR 336 bn, close to record levels in 1H20.<sup>49</sup>

## Other deals: revival of leveraged loans

Although they declined compared to 4Q20, **securitisation** markets showed signs of revival in a YoY comparison. Industry statistics show estimated total gross issuance to be around EUR 49bn in 1Q21, EUR 30 bn (or ~60 %) of which was placed (A.197). This marked a 26 % decline from 4Q20, but an 18 % increase compared to 1Q20.

European **syndicated loan** issuance jumped to EUR 230 bn in 1Q21, representing the highest level of first quarter activity in EEA corporate loan markets since 1Q17, and continued to be elevated in 2Q20 at EUR 204 bn. Most of the proceeds (63 %, i.e. EUR 277 bn) were used for general corporate purposes and 23 % (EUR 102 bn) were devoted to acquisition finance. Compared to 2020, leveraged and highly leveraged loan issuance increased from February and March 2021. In 1H21, these types of deals accounted for 31 % (EUR 138 bn) and 3 % (EUR 14 bn) of total syndicated loan issuance respectively, compared to 27 % and 1 % during the same period in 2020 (T.81).

The outlook for **collateralised debt obligations (CLOs)** markets turned positive in 1H21, with issuance back to 2019 levels. The market size of

CLO issuance in 1H21 was EUR 15.5 bn out of 39 deals.<sup>50</sup> In terms of amounts, this market has grown by 54 % with respect to the same period in the previous year and by 6 % compared to 1H19.

## SMEs: increasing volumes on growth markets

**Small and medium enterprises (SMEs)** were especially affected by the COVID-19 related economic downturn, with remaining concerns about their financing conditions, especially for young firms.<sup>51</sup> Although it improved in 1H21, access to capital markets for European SMEs continued to be limited, as bank loans and government policy support remained the main source of **external financing**. Credit conditions for SMEs have also been eased by the introduction of loan moratoria.

SMEs have increased their use of subsidised loans during the pandemic, with market based-instruments likely to be considered a potential source of finance, especially after the pandemic period.<sup>52</sup> In this context, statistical evidence shows that there were few SMEs using corporate bonds as a source of funding. In equity markets, only 7 % of total issuance in 1Q21 (EUR 3 bn in terms of IPO and FO) originated from SMEs, 2pp less than in 4Q20 despite increased overall primary equity issuance.<sup>53</sup>

In order to bridge the gap between small firms and equity capital markets, MiFID II/MiFIR introduced the possibility of registering a multilateral trading facility (MTF) operator as an **SME growth market (GM)**.<sup>54</sup> By providing for lighter reporting burdens and reduced compliance costs for applicants, GMs provide improved opportunities for SMEs willing to list their shares. In 1H21, there were no new entities being authorised as GM among the 145 existing EEA MTFs operators. To date, there are still 17 MTFs classified as GMs in the EEA, DE being the country with the most GMs (3).

Transparency data reported by EEA trading venues show that there were ~8,000 SMEs that have issued shares available for trading as of

<sup>49</sup> See [Europe breaks records with government bond issuance surge](#), Financial Times, April 2021.

<sup>50</sup> Statistics according to JP Morgan data.

<sup>51</sup> See [One year of SME and entrepreneurship policy responses to COVID-19: Lessons learned to "build back better"](#), OECD, April 2021.

<sup>52</sup> See Survey on the access to finance of enterprises, ECB, June 2021.

<sup>53</sup> Source: Refinitiv Eikon and ESMA calculations.

<sup>54</sup> Provided that at least 50% of the issuers with shares available for trading on the relevant segment have a market capitalisation of less than EUR 200mn. The full set of conditions to be met is included in Article 33 of MiFID.

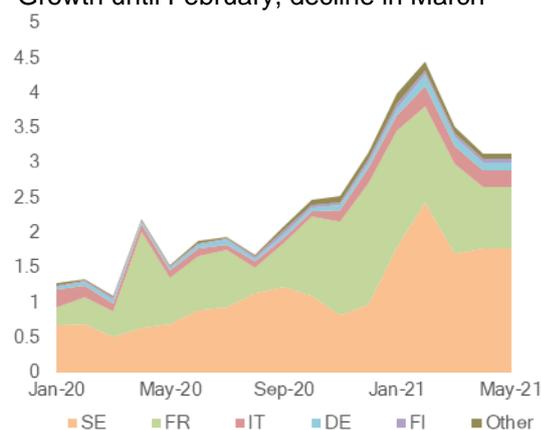
mid-2021.<sup>55</sup> The majority of SMEs (7,800) have issued shares that are available for trading on MTFs, with around 1,500 issuing shares also available for trading on RMs.

In 1Q21, total trading volumes of SMEs in the EEA represented 2 % of total trading in shares on average. Overall, SME trading volumes slightly picked up in 1Q21 to a monthly average of EUR 22 bn in 1H21 from EUR 17 bn in 2H20, declining in 2Q21 to an average of EUR 16 bn. Nevertheless, the amount of trading activity significantly declined from elevated trading volumes during the COVID-19 related market stress in 1Q20. By region, shares by Irish and Swedish SME issuers recorded the largest trading volumes during the reporting period, accounting for 37 % and 11 % (or EUR 36 bn and EUR 14 bn) of total SME trading respectively.

T.77

SME growth markets

Growth until February, decline in March



Note: SME trading volumes on GMs by segment MIC domicile, in EUR bn.  
Sources: FIRDS, FITRS, ESMA

From a trading venue perspective, more than half of total SME trading volumes (EUR 52 bn) occurred on an MTF as of May. Within this type of trading, the combined trading volumes of the 17 SME GMs amounted to slightly less than EUR 18 bn during 1H21 with SE (EUR 9 bn) and FR (EUR 6 bn) as the largest GMs. Before falling to end-2020 levels in March 2021, the trade on GMs continued to see a steady growth (T.77).

## Market based credit intermediation

After the decline observed in 1H20, the size of entities engaged in **market-based credit intermediation** remained stable in 2H20, representing EUR 35.9 tn (T.82). Investment funds in particular, grew by 8 % (EUR 14.9 tn) owing to valuation effects. Other financial institutions, on the other hand, saw a 4 % decline in total assets over the reporting period, down to EUR 17.5 tn. Since the Great Financial Crisis, the relative size of the non-banking sector compared to the banking sector had been constantly increasing, representing 60 % of the EA banking sector assets in 2009 and reaching 120 % in 2018. But it is now following a downward trend, representing 106 % of the size of the banking sector at the end of 2020.

**Wholesale funding** (T.83) increased by 4.3 % and continued to support bank liquidity needs. Other financial institutions' (OFI) deposits still represent nearly half (49%) of the total wholesale funding (EUR 2.5 tn). But in relative terms, the growth of MMF deposits is particularly noticeable (14.9 % and 80 % year-on-year).

<sup>55</sup> In our methodology, the classification of SME issuers is based on market capitalisation reported in 2020. Only share issuers with a valid legal entity identifier for which the market capitalisation meets the relevant MiFID II

conditions have been considered SMEs. A combination of the two conditions above implies an underestimation of the number of issuers and trading volumes in 2021.

# Key indicators

T.78

Market financing

Positive growth since 4Q20



Note: Liabilities of EA 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 (rhs)= annual growth rate in debt securities, equity and investment fund (IF) shares, in %.  
Sources: ECB, ESMA.

T.79

Equity issuance

Spike in equity issuance in 1Q21

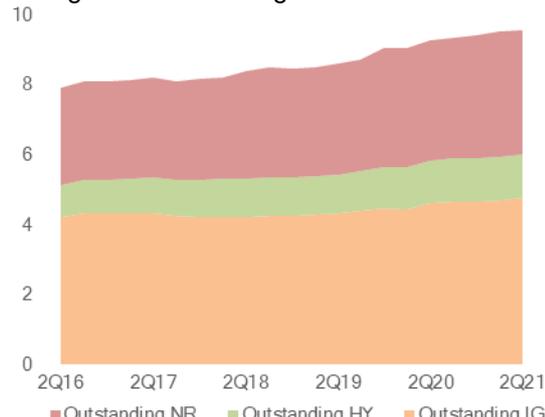


Note: Equity gross issuance in the EEA30 by type, EUR bn, and number of equity offerings. 5Y-MA=five-year moving average of the total value of equity offerings.  
Sources: Refinitiv EIKON, ESMA.

T.80

Corporate bond outstanding

Rising debt outstanding amounts

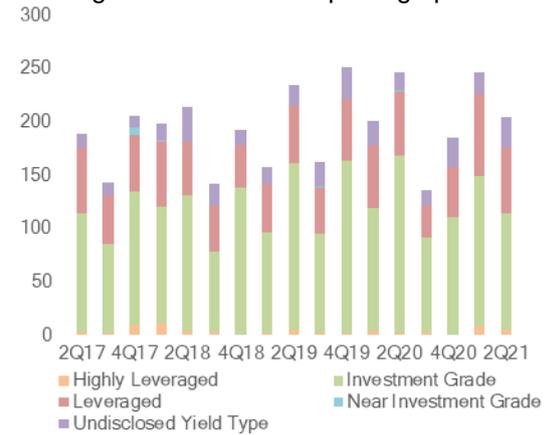


Note: Quarterly investment-grade (rating >= BBB-), high-yield (rating < BBB-) and non-rated corporate bond gross issuance in the EEA30 (rhs), EUR bn, and outstanding amounts, EUR tn. Maturities < 12 months are excluded.

T.81

Syndicated loans

Leveraged loans issuance picking up

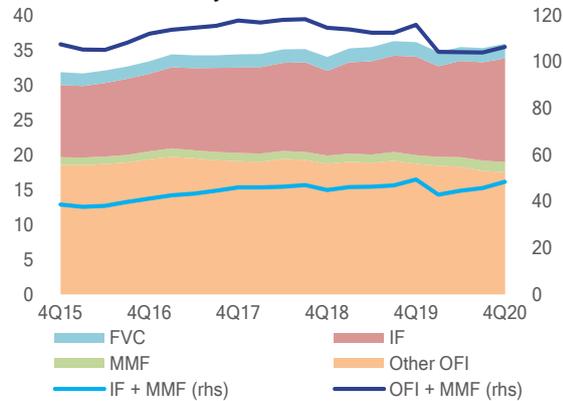


Note: Quarterly syndicated loan issuance in the EEA30, EUR bn.  
Sources: Refinitiv Eikon, ESMA.

T.82

MMFs and other financial institutions

Increase driven by investment funds

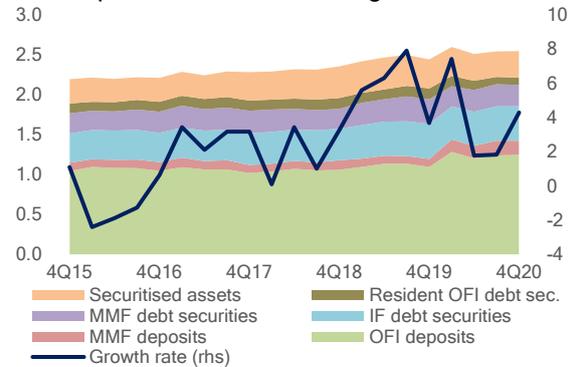


Note: Total assets for EA MMFs and other financial institutions (OFI): investment funds (IF), financial vehicle corporations (FVC), Other OFI estimated with ECB Quarterly Sector Accounts, in EUR tn. Expressed in % of bank assets on rhs.  
Sources: ECB, ESMA.

T.83

Non-bank wholesale funding

OFI deposits and MMFs drive growth



Note: Amount of wholesale funding provided by EA non-banks, EUR tn, and growth rate (rhs), in %. Securitized assets are net of retained securitisations. Resident OFI 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, financial vehicle corporations, investment funds and money market funds).  
Sources: ECB, ESMA.

## Structural developments

# Sustainable finance

### Trends

Sustainable finance continues to expand in Europe, as reflected in the 20 % growth of environmental, social and governance (ESG) fund assets and the 40 % increase in outstanding sustainable debt instruments outstanding from the end of 2020. Recent corporate announcements on 'net zero' emissions reduction targets mark a step forward but lack consistency and details. ESG equity benchmarks delivered a mixed performance relative to non-ESG indices. The equity valuation of clean energy firms increased markedly in two years, despite similar returns on equity to fossil fuel firms. Flows into ESG funds accelerated again, with impact and environmental funds being the fastest-growing strategies. Green bonds continue to dominate the ESG bond market while social bond issuance has accelerated. Innovation can support sustainability by addressing ESG information gaps through Green financial technology (FinTech) solutions, but the environmental cost of one particular innovation – cryptocurrencies – is soaring.

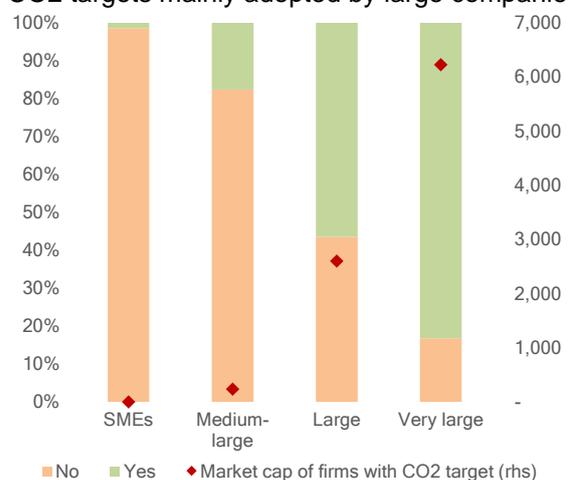
## Climate transition finance: focus on 'net zero'

As climate change awareness grows, the corporate sector has turned its attention to the Paris agreement objectives, and in particular the need for global carbon emissions to reach 'net zero' around the middle of the century.<sup>56</sup> Together with the realisation that inaction might lead to reputational risk and damage business, this is leading to a flurry of corporate announcements and initiatives targeting 'net zero' greenhouse gas emissions.<sup>57</sup>

Emissions reduction targets are a useful way for firms to signal their intention to reduce their carbon footprint. However, they are not a reliable source of information for the moment, due to different target years, inconsistent definitions, and varying company perimeters. Moreover, current targets aim for levels of emissions well above those of the Paris agreement objectives<sup>58</sup> and remain scarce: only 10 % out of the roughly 8,000 listed companies in the EU have disclosed any targets. These tend to be concentrated in very large firms more exposed to public scrutiny,

representing 69 % of the combined market capitalisation of listed EU firms (or EUR 6.2 tn; T.84).

T.84  
EU firms and CO2 emissions reduction targets  
CO2 targets mainly adopted by large companies



Note: Share of EEA firms with a CO2 emissions reduction target by market capitalisation (horizontal axis), and aggregate market capitalisation of firms with a target (right axis) in EUR bn. SMEs=below 200mn; Medium-large=from 200mn to 2bn; Large=from 2bn to 20bn; Very large=above 20bn. Sources: FIRDS, Refinitiv EIKON, ESMA.

<sup>56</sup> Art.4(1) of the Paris Agreement stipulates that the signatories aim to undertake rapid reductions of greenhouse gas emissions "so as to achieve a balance between anthropogenic emissions by sources and removals by sinks" in the second half of the century.

<sup>57</sup> According to a report by Oxford Net Zero, one fifth of the world's largest publicly listed companies have committed

to 'net zero' emissions; and there are three UN-convened 'Net Zero' alliances for banks, insurance and institutional investors, in addition to the industry-led initiatives such as the 'Net Zero Asset Managers Initiative'.

<sup>58</sup> Oliver Wyman and Carbon Disclosure Project (2021), "Running hot: Accelerating Europe's Path to Paris".

While ‘net zero’ targets represent an encouraging push towards greater emissions reductions, the decarbonisation pathways that companies must choose in order to achieve these remain by and large absent from many announcements.

Grasping the implication of these pathways requires diving into a technical discussion on netting emissions, otherwise known as carbon offsetting. There are three main categories of offsets: avoided emissions, i.e. emissions reductions resulting from the use of certain products (e.g. fuel-saving tires) compared with a reference product; removal of CO<sub>2</sub> from the atmosphere followed by sequestration; and carbon capture and storage *before* it enters the atmosphere. However, due to the absence of established methodology to measure the impact of carbon offsets, there are concerns that this could lead to greenwashing by firms, taking attention away from the importance of cutting emissions at the source.

This matters greatly when it comes to assessing the nature and scale of future efforts to lower net emissions. In the financial sector, reducing ‘gross’ emissions means divesting from carbon-intensive sectors and firms; offsetting emissions entails investing in new technologies, but leads to greater uncertainty about the outcome. Both have potentially significant and different long-term implications for capital allocation, business models and risk management. There are also trade-offs between the intensity of these efforts (and their impacts) in the short-term and the long-term environmental gains.<sup>59</sup>

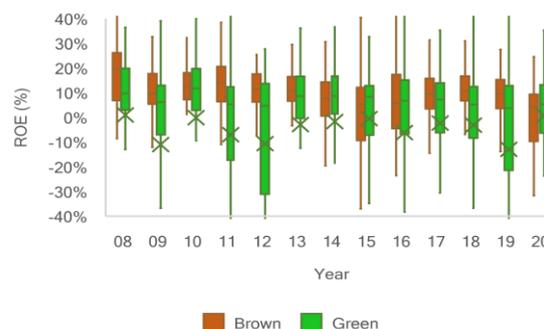
By setting out clear trajectories, interim targets and methods, companies’ decarbonisation pathways would help investors better understand these choices. However, for such forward-looking information to be turned into usable data for investment purposes, further progress will be needed on the disclosure and verification of sustainability-related information, which has so far focused so far on backward-looking information. Robust industry standards can improve, as a first step, the reliability of estimation methodologies and comparability of data.

## ESG investing grows amid valuation concerns

The mixed performance of **ESG equity benchmarks** observed in late 2020 has continued. Since the beginning of the year, the Euro STOXX ESG Leaders 50 index has underperformed the Euro STOXX 50 by 0.2 percentage points, while the MSCI EMU ESG Leaders index has outperformed broader MSCI EMU index by 0.4 percentage points. Differences in the relative performance of ESG indices come from the choice of ESG ratings used to construct them.<sup>60</sup>

The surge in **green asset prices** over the last few years has fuelled concerns of a ‘green bubble’.

T.85  
Return on Equity of green and brown EU firms  
Green firm return on equity often lower



Note: Annual RoE of constituents of the World - oil, gas, coal - index ('Brown'), and the Global Renewable Energy Index + the Global Water Index ('Green'), from 2008-2020. The horizontal line within each box denotes the median for that group. Box edges are the 25th and 75th percentiles for PE ratio within each group of firms.

Sources: Refinitiv EIKON, Datastream, ESMA

Looking at a sample of ‘green’ firms (in the water and renewable energy sectors) and ‘brown’ firms (in the oil, gas and coal sector)<sup>61</sup>, the Return on Equity (RoE) of ‘green’ sector firms has tended to be lower than that of companies in the fossil fuel sector (T.85). More specifically, the mean RoE of ‘green’ firms has been negative in all years except 2008 (0.9 %) and 2020 (0.7 %). Judging from past data, there is little to suggest a sustained (and statistically significant) outperformance relative to ‘brown’ firms’ RoE.

<sup>59</sup> “A larger and longer temperature overshoot increases the risk for irreversible climate impacts” and implies “greater reliance on practices or technologies that remove CO<sub>2</sub> from the atmosphere.” Intergovernmental Panel on Climate Change (2016), “Mitigation pathways compatible with 1.5C in the context of sustainable development”.

<sup>60</sup> See ESMA (2021), “ESG ratings – Status and key issues ahead”, [Report on Trends, Risks and Vulnerabilities, No.1](#).

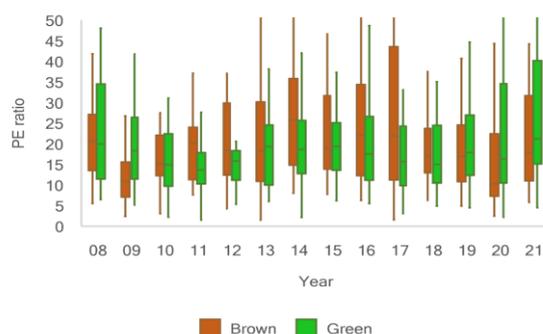
<sup>61</sup> Based on a portfolio of 310 companies that belong to Refinitiv’s Global Renewable Energy Index (66), Datastream Global Water Index (20), and Datastream World oil, gas and coal index (224).

In contrast, past P/E ratios of 'green' firms have not significantly diverged from those of 'brown' firms, and may even signal that 'green' firm shares have been trading at a discount in some years (i.e. a lower P/E ratio compared with 'brown' firms, while still achieving similar RoE (T.86). However, in 2019, for the first time since 2010, the median P/E of 'green' firms exceeded that of 'brown' firms. Since then, P/E ratios for 'green' companies have often exceeded those of 'brown' firms, despite comparatively weak RoE.

Higher P/E ratios indicate that investors are betting on future growth of these companies, supported by an apparent shift among many governments across the planet. In turn, many 'green' firms are investing heavily in new technologies to support the transition to a net zero economy. However, low profitability leaves 'green' firms particularly vulnerable to changes in sentiment. Moreover, the historical divergence between the relatively forward-looking P/E ratio and out-turn RoE suggests that overvaluation risks cannot be ruled out.

#### T.86

Price-to-earnings ratio of 'green' and 'brown' EU firms  
P/E ratios of green firms have shot upwards



Note: Annual Price-to-earnings (PE) ratio of constituents of the World - oil, gas, coal - index ('Brown'), and the Global Renewable Energy Index + the Global Water Index ('Green'), from 2008-2020. The horizontal line within each box denotes the median for that group. Box edges are the 25th and 75th percentiles for PE ratio within each group of firms.  
Sources: Refinitiv EIKON, Datastream, ESMA

Despite these concerns, EU **ESG fund assets** increased 20 % in the first 6 months of 2021, to EUR 1.5 tn.<sup>62</sup> ESG equity funds have collected EUR 71 bn in net flows so far this year, compared with EUR 69 bn for non-ESG peers. With the exception of March 2020, this marked the 39<sup>th</sup> consecutive month of net inflows for these funds.

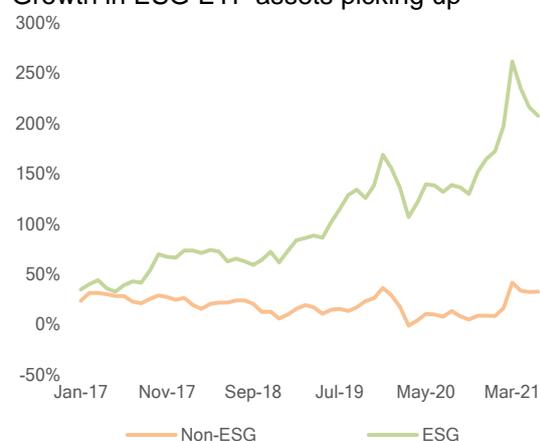
ESG equity funds also slightly outperformed non-ESG funds.

As ESG investing continues to take hold, a wide array of new products is becoming available in the market. Offerings of EU **ESG ETFs**, in particular, jumped to 90 in 2020, exceeding the number of new non-ESG ETFs (62) for the first time as some ETF providers delayed the launch due to uncertain market conditions. Although ESG ETFs only hold 12 % of EU ETF assets, they are catching up fast with an annual growth rate above 200 % in 1H21, versus 27 % for non-ESG ETFs (T.87).

#### T.87

Annual growth in EU ETF assets

Growth in ESG ETF assets picking up

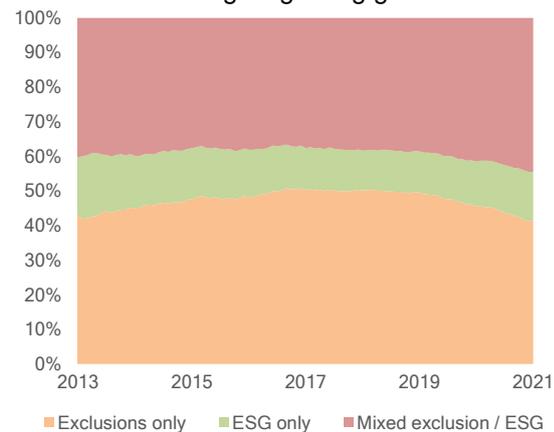


Note: Annual AuM growth of EU-domiciled ESG and non-ESG ETF, in %.  
Sources: Morningstar, ESMA.

The growth in ESG fund assets (+ 5 % of AuM in 2020) over the last 2 years also highlights the declining popularity of exclusions-based only strategies— whereby funds exclude entire sectors or companies (e.g. due to their involvement in controversial or unethical activities). Instead, a growing share of funds now combine such exclusions with **ESG fund strategies** (+27 % of AuM in 2020; T.88).

<sup>62</sup> ESG funds are identified here using Morningstar's definition of 'Sustainable investment'.

## T.88

EU fund assets by sustainable investment strategy  
ESG-based strategies gaining ground

Note: Share of EU funds applying exclusions and ESG strategies, % of AuM.  
Sources: Morningstar, ESMA.

Among ESG strategies, impact funds (aiming to achieve quantitative ESG targets) and funds focused on environmental sectors have experienced particularly strong growth, with AuM up 37 % and 48 % respectively for these strategies in 2020, which now represent around 40 % of ESG fund assets. Upcoming disclosure requirements under SFDR will bring further transparency on the implementation of ESG fund strategies and their impact on environmental and social aspects (T.89).

## T.89

Sustainable Finance Disclosure Regulation (SFDR)  
A step forward in combating greenwashing

The recent wave of private and public sector actors stipulating numerous sustainability targets<sup>63</sup> has increased the spotlight on impact-washing risks and led to publicly raised doubts over the credibility of these endeavours. On 10 March 2021, the SFDR entered into force and is expected to alleviate some of the concerns about the financial services sector. Moving forward, financial market participants and financial advisors (FMPs) are obliged to disclose a comprehensive set of sustainability information in their periodic reports, in pre-contractual information and on their websites.<sup>64</sup> Under SFDR and the 'double materiality' approach, FMPs need to disclose both sustainability risks with potential material impacts on

investment values and the principal adverse impacts (PAI)<sup>65</sup> that their investment decisions and value chains have on the environment and society, e.g. working conditions at investee companies. The double materiality principle applies at both entity and product level. Indeed, FMPs will need to disclose their entities' due diligence and remuneration policies in light of sustainability risks, and issue a statement reporting how PAIs of investee companies are considered in the investment process. This reporting is based on a set of 64 indicators, 18 of which are mandatory and cover environmental and social factors.<sup>66</sup>

FMPs further need to break down their offerings into Article 8 products, which promote environmental or social characteristics, and Article 9 products, which have sustainable investment as their objective.<sup>67</sup> In practice, this process introduces a new approach to classifying ESG funds, although it may take some time and additional regulatory and supervisory guidance for the market to coalesce around certain practices. For example, a number of asset managers consider engagement strategies a pivotal part of any active ESG approach. However, ESG engagement strategies are not sufficient by themselves for a fund to qualify as Article 9 products, unless a concrete sustainability objective has been set out. The distinction between Article 8 and Article 9 products is further complicated by the wide variety of ESG strategies and approaches.

Early findings on SFDR application indeed highlight that asset managers are taking different approaches to the classification of their funds.<sup>68</sup> This preliminary evidence shows that around 20 % of total European funds fall under Article 8 and 9 products, bringing the European ESG fund market to an estimated EUR 2.5 tn. This not only confirms the high level of interest in sustainable investing, but also further stresses the need for the clear categorisation and disclosure requirements. A harmonised supervisory approach by national authorities should help achieve convergence and foster clarity and transparency, further supporting the growth and good functioning of the sustainable investment market.

Concerns have been raised by FMPs about limited data availability and high data collection costs. Public sector initiatives, including the proposed EU Corporate Sustainability Reporting Directive (CSRD), aim to strengthen the availability, comparability and reliability of ESG-related disclosures by extending the scope to all listed issuers (except micro-enterprises)

<sup>63</sup> See for example [BlackRock letter to CEOs](#), the [Petersberg Climate Dialogue](#), [Standard Chartered SDG commitment](#), [Tesco commitment to public health](#)

<sup>64</sup> While the level 1 provisions on pre-contractual and website disclosures already apply from 10 March, the level 2 requirements on product-level information in the periodic report will only apply from 1 January 2022.

<sup>65</sup> FMPs within the scope of the SFDR will need to start disclosing PAI indicators on entity level in a specific report

from June 2023 with reference to the previous calendar year. On product level, FMPs will need to disclose indicators in periodic reports from 30 December 2022.

<sup>66</sup> For a complete list of indicators, see Annex I in the relevant [draft regulatory technical standards under SFDR](#).

<sup>67</sup> According to Art.6 FMPs also need to clearly state if a product does not consider sustainability factors at all.

<sup>68</sup> Morningstar (2021), "SFDR: The first 20 days", March.

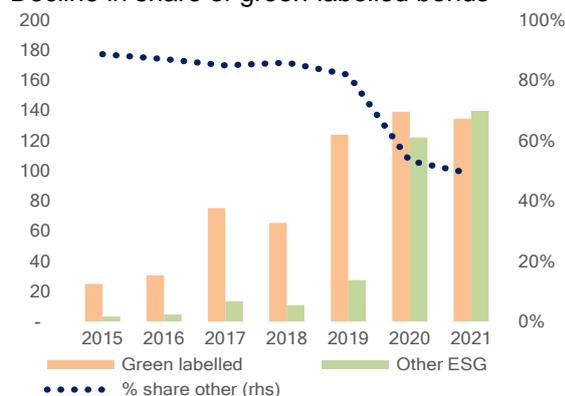
and introducing more detailed reporting requirements.<sup>69</sup>

Taken together, these initiatives have the potential to substantially shape and support the EU sustainable investment market. Indeed, the SFDR has a pivotal role to play in investor protection in terms of increasing the transparency and credibility of the market.

## Sustainable bonds: market growth continues

The EU **sustainable bond** market growth accelerated again (+41 % in 1H21), with total market value now worth EUR 888 bn. The sustainable bond market is still dominated by **green bonds**, which grew 28 % in 1H21 to reach EUR 581 bn (T.90). The European share of the market's global value remains sizeable, at more than 53 %, and up to 75 % of the social bond market.

T.90  
Annual issuance volumes of EU ESG bonds  
Decline in share of green-labelled bonds

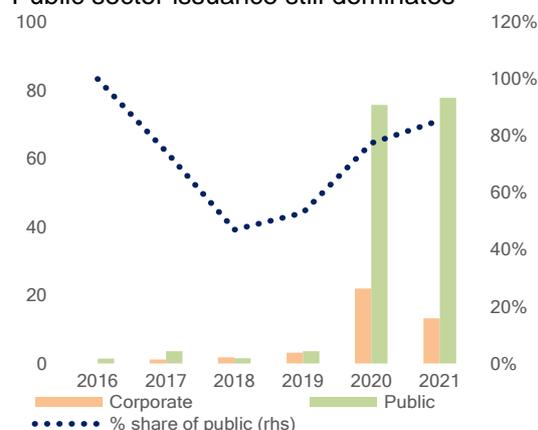


Note: Annual gross issuance volumes of green labelled and other ESG bonds by EEA- and UK-domiciled issuers, EUR bn, and share of other ESG bonds (right axis) in %. Green labelled bonds are certified by the Climate Bond Initiative and/or aligned with the ICMA Green Bond Principles.  
Sources: CBI, Refinitiv EIKON, ESMA.

Public sector issuers continue to dominate the social bond landscape, accounting for 85 % of issuance volume in 1H21 (T.91). Since the start of the pandemic, healthcare-related issues remained a prominent choice for proceed allocation, with volumes of EUR 19 bn in the first half. This was only exceeded by financing of social infrastructure and services, at EUR 60 bn.

Trading volumes increased substantially, averaging EUR 26 bn in 1Q21, up 25 % from 4Q20.

T.91  
Gross annual issuance of EU social bonds  
Public sector issuance still dominates



Note: Annual gross issuance volumes of social bonds by EEA- and UK-domiciled issuers, EUR bn, and public sector share (right axis) in %.  
Sources: CBI, Refinitiv EIKON, ESMA.

Another noteworthy development is the recent growth in **unlabelled green bonds**. Any issuer can claim that their bonds finance environmentally friendly activities, but voluntary standards such as the Green Bond Principles<sup>70</sup> aim to foster transparency and integrity of the market, for example through the publication of information on the project financed or recourse to an external reviewer. While the vast majority of outstanding green bonds in the EU have such recognised labels, the share of unlabelled bonds in gross corporate green bond issuance has almost doubled in 2021 from last year, to 8 %.

**Green debt labels** do not provide any legal guarantee against potential greenwashing. However, there is evidence that bond valuations reflect the green credentials of these instruments, in particular those involving an external verifier, which is perceived as a signal of firms' climate-related engagement.<sup>71</sup> The proposed EU on green bond regulation should help cement the credibility of the market while ensuring that instruments with a positive environmental impact benefit from favourable financing conditions (Box T.92; see also the article *'Environmental impact and liquidity of green bonds'*).

<sup>69</sup> CSRD extends the existing NFRD scope to all large companies and all companies listed on regulated markets, except micro-enterprises, resulting in a widening of scope from ca. 11,000 to 50,000 companies.

<sup>70</sup> See ICMA [Green Bond Principles](#).

<sup>71</sup> Fatica, S. and R. Panzica (2020), "Green bonds as a tool against climate change?", European Commission Joint Research Centre.

T.92

EU Green Bond Standard

**Promoting transparency and robust standards**

On 6 July, the European Commission published a proposal for a European green bond standard<sup>72</sup>. The main objective of the proposal is to ensure that the proceeds of green bond issuances are used to finance projects with a positive environmental impact, which will channel private capital to help finance the EU Green Deal. By introducing robust standards and adequate supervision of external reviewers, the new European green bonds (EuGBs) will also strengthen investor protection and remove some of the obstacles to potential market growth.

To achieve this, EuGBs will rely on several fundamental rules:

- **Common definitions:** The EuGB proceeds should exclusively finance projects or activities that meet the requirements set out in the EU Taxonomy Regulation. The use of established definitions will reduce the uncertainty and search costs associated with assessing the environmental impact of green bonds.
- **Transparency:** EuGB issuers are required to publish a fact-sheet before issuance, yearly allocation reports until the full bond proceeds have been allocated, and an impact report after the allocation of the full proceeds, on their website. Reference to the EuGB must also be made in the prospectus.
- **External review:** EuGB issuances must be reviewed by a third-party entity registered and supervised by ESMA. External reviewers will have to publish pre- and post-issuance reviews on their website.

The EuGB label will be voluntary, meaning that issuers may still choose to issue green bonds under a different (industry) label. Sovereign green bonds may use the EU standard, including to finance other types of activities (e.g. relevant fixed assets, tax reliefs or subsidies), and can rely on state agencies not registered with ESMA for the external review.

*Improving trust in external reviews*

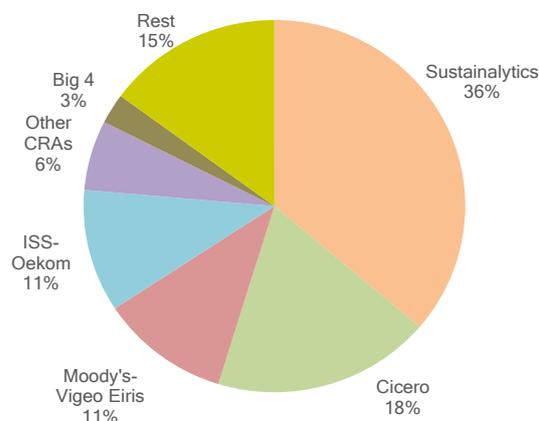
The proposal envisages that external reviewers put in place organisational requirements to ensure there are sufficient levels of quality, transparency and protection against conflicts of interest to deliver investor protection. This includes the establishment of a compliance function. It also introduces requirements regarding arrangements such as

outsourcing. A register of entities which meet the requirements of the regulation and have been approved by ESMA to provide external review services for EuGBs will be published on ESMA's website.

Such requirements will not be new to some green bond reviewers active in the market whose other activities may already supervised by ESMA or NCAs under other EU frameworks, such as credit rating agencies and benchmark administrators. However, the external review market in Europe<sup>73</sup> is currently dominated by four firms that together account for more than 75 % of all reports, three of which are not under ESMA supervision (T.93).

T.93

EU market share of green bond external reviews

**Four firms account for 75% of EU market**

Note: Share of external review reports for green bonds aligned with the ICMA Green Bond Principles, in %. Data as of June 2021. Sources: ICMA, ESMA.

## Innovation: take-off of green FinTech

As market demand for ESG-related technological solutions increases, **Green FinTech** supply is also on the rise. Among the most prominent offerings are the platforms enabling retail investors to make more informed ESG investments (e.g. Globalance World<sup>74</sup>, Sugi, Yova, FossilFreeFunds<sup>75</sup>, Persefoni<sup>76</sup>, and

<sup>72</sup> Proposal for a Regulation (EU) 2021/0191 on European green bonds.

<sup>73</sup> The European market is proxied here by firms providing external review services for green bonds aligned with the Green Bond Principles (the main green bond label in Europe). These market shares may vary when considering alternative labels.

<sup>74</sup> Financial Times, "It's time we had a better way to judge where to put our money", 15 November 2020.

<sup>75</sup> Financial Times, "The fintechs trying to turn retail investors green", 29 March 2021.

<sup>76</sup> ESG Today, "Carbon Measurement Platform Persefoni Raises \$9.7 Million", 15 April 2021.

Aladdin Climate<sup>77</sup>), data solutions facilitating reporting and disclosure (e.g., S&P<sup>78</sup> and Apex<sup>79</sup>); and artificial intelligence-enabled tools allowing to analyse companies and their data for greenwashing (e.g. the ClimateBert<sup>80</sup> platform). A recent study on the link between sustainability, finance and technology concluded that FinTech applications can fill gaps in the sustainable finance framework (e.g. transparency, verification, or data).<sup>81</sup>

The growing interest for Green FinTech was stressed by the recently announced G20 TechSprint, an international contest in finding innovative solutions to resolve operational problems in green and sustainable finance.<sup>82</sup> This initiative not only highlighted the need for ESG enabling technologies, but also proposed to classify green innovative solutions into three groups: i) technological solutions in the area of data collection, verification and sharing; ii) tools enabling analysis and assessment of transition and physical climate-related risks, and iii) technologies that can support a better connection between projects and investors. Parallel initiatives aimed at supporting Green FinTech are also on-going.<sup>83</sup>

Regulators are becoming more alert to new technologies with the potential to tackle challenges in green and sustainable finance. In the past months, some innovation hubs and sandboxes have been established in Member States to interact with innovative FinTech.<sup>84</sup> Moreover, Member States supported the inclusion of Green FinTech as one of the thematic areas in the 2021-2022 Work Programme of the European Forum for Innovation Facilitators, a

network of innovation hubs and regulatory sandboxes in Europe.<sup>85</sup> Innovation facilitators from Member States work together to identify use cases of technologies that help channel investments into sustainable initiatives.

While innovation and digital technologies can help meet sustainability objectives, their impact on ESG factors is not yet addressed in regulation. This issue is becoming increasingly relevant with the soaring environmental costs of bitcoin mining, which could consume as much energy as Italy and Saudi Arabia combined by 2024 if not contained.<sup>86</sup> Beyond the environmental impact, the production of specialised mining devices might exacerbate the global shortage of chips that are indispensable for digitalisation and the production of electronic cars.<sup>87</sup>

New online tools provide estimates of bitcoin and other cryptocurrencies' energy consumption and promote discussion of the sustainability of proof-of-work-based blockchain in general.<sup>88</sup> Estimates vary but they agree that the carbon footprint of cryptocurrencies is far from negligible.

Possible solutions proposed for Bitcoin-related environmental problems include moving away from the proof-of-work validation method, using mining for heating<sup>89</sup>, or transforming the bitcoin network into a unique energy buyer to deploy more solar and wind power capacity.<sup>90</sup> These developments trigger discussions about possible regulatory responses to the unintended consequences of innovation, and in particular of crypto mining.

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<sup>77</sup> Finextra, "Blackrock unveils Aladdin Climate module", 1 December 2020.

<sup>78</sup> ESG Today, "S&P Global Launches Data Solution to Help Investors with SFDR Disclosure Requirements", 3 April 2021.

<sup>79</sup> ESG Today, "Apex Launches Toolset For Asset Managers to Comply with Upcoming EU SFDR Requirements", 19 January 2021.

<sup>80</sup> Financial Times, "AI can shine digital sunlight on to company greenwashing", 17 March 2021.

<sup>81</sup> Macchiavello E., M. Siri (2020), "Sustainable Finance and FinTech: Can Technology contribute to achieving environmental goals? Preliminary assessment of "green FinTech", EBI Working Paper Series, 2020 – no. 71.

<sup>82</sup> This initiative is organised by the BIS Innovation Hub and Banca d'Italia as part of the G20 Italian Presidency. See: [https://www.bis.org/hub/2021\\_q20\\_techsprint.htm](https://www.bis.org/hub/2021_q20_techsprint.htm)

<sup>83</sup> For example, the Zurich-based incubator and accelerator F10 has established a collaboration with New Energy Nexus, a non-profit.

<sup>84</sup> See innovation hubs and sandboxes update in the innovation section.

<sup>85</sup> More information about EFIF is available at <https://www.esma.europa.eu/cross-sectoral-work>

<sup>86</sup> Jiang, S., Li, Y., Lu, Q. et al. (2021), "Policy assessments for the carbon emission flows and sustainability of Bitcoin blockchain operation in China". Nat Commun 12, 1938

<sup>87</sup> Alex de Vries (2021), "Bitcoin boom: What rising prices mean for the network's energy consumption", Joule, Volume 5, Issue 3, 17 March, Pages 509-51

<sup>88</sup> See e.g. [Digiconomist energy consumption index](#), [Cambridge bitcoin electricity consumption Index](#).

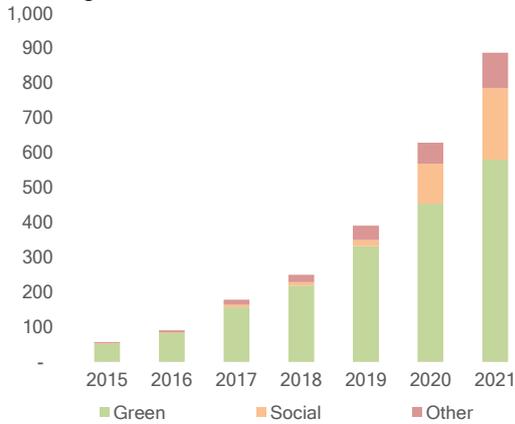
<sup>89</sup> See Smith T. (2019), "Heating My Home with Crypto Mining", 16 December.

<sup>90</sup> Square (2021), "Bitcoin is Key to an Abundant, Clean Energy Future", April.

# Key indicators

T.94

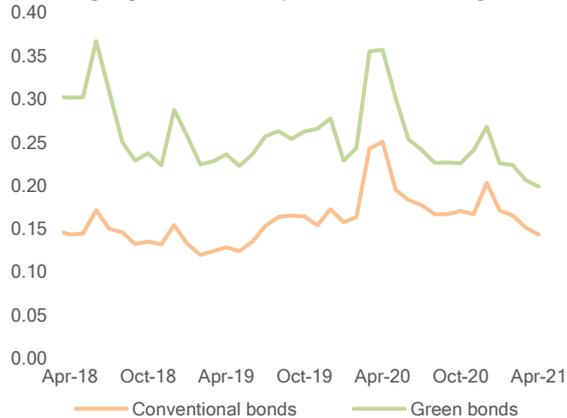
Outstanding ESG bonds  
Growing share of social bonds



Note: Total amount of ESG bonds outstanding issued by EEA-domiciled issuers, EUR bn.  
Sources: CBI, Refinitiv EIKON, ESMA.

T.96

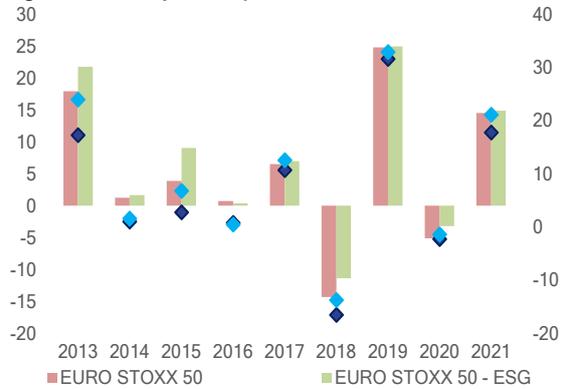
Sovereign green bond and conventional bond liquidity  
Sovereign green bond spreads narrowing



Note: Average bid-ask spread for green bonds and other bonds issued by the same sovereign issuer and traded on EuroMTS, in EUR.  
Sources: Refinitiv Datastream, ESMA.

T.98

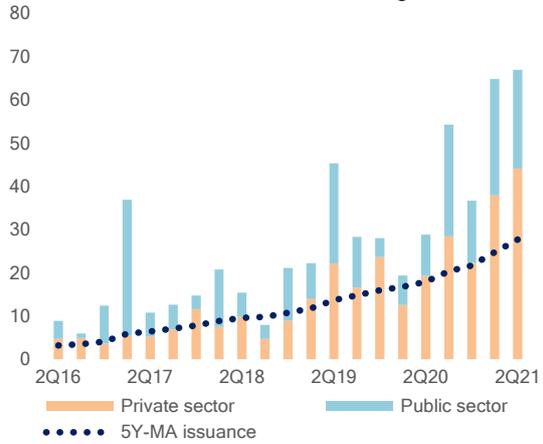
ESG leaders index risk-adjusted returns  
Higher risk-adjusted performance for ESG index



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

T.95

Green bond quarterly issuance  
Private sector issuance increasing



Note: Green bond gross issuance in the EEA30 by sector, EUR bn.  
Sources: Refinitiv EIKON, ESMA.

T.97

ESG fund assets  
ESG fund growth continuing, equity dominating



Note: AuM of EU-domiciled ESG funds by type of fund, EUR bn, and share of ESG fund AuM in total fund AuM (rhs), in %.  
Sources: Morningstar, Refinitiv Lipper, ESMA.

T.99

Emission allowance spot prices  
Carbon prices doubled in 1H21



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

## Structural developments

# Financial innovation

### Trends

Digitalisation and the use of novel technologies continue to grow, spurred by the COVID-19 impact, but also by the need to accommodate new consumer expectations. This shift has brought efficiency gains for firms and better outcomes for users of financial services, but raises new challenges for regulators, including in relation to security, data management and competition. The European Commission has established an ambitious strategy to address those changes and make sure that the EU regulatory framework remains fit for digital finance. Following a boom in 1Q21, the market capitalisation of crypto assets fell by almost 40 % in May, once again highlighting their high price volatility of those instruments. Meanwhile, Decentralised Finance continues to gain momentum. Finally, regulators' engagement with FinTech through innovation hubs and regulatory sandboxes is becoming mainstream across the EU, with benefits for both parties.

## Digitalisation is topical for both firms and investors

Wider COVID-19 impacts continue to foster the uptake of new technologies and digitalisation at firms. Nearly two thirds of executives plan to invest more in the internet of things, artificial intelligence (AI) and cloud services in the next 2 years according to a recent survey by EY-Parthenon and CB Insights, with a view to addressing changes in working practices, business processes, supply chain dynamics and customer engagement.<sup>91</sup> In the financial sector, half of banks polled in a summer 2020 Bank of England survey said the COVID-19 crisis has made machine learning and data science more important for the future.<sup>92</sup> Indeed, spending for cloud services, which facilitate a wide range of activities, from data analytics to AI and machine learning, continues to grow and reached about EUR 35 bn in 1Q21 globally, representing a 35 % year on year growth.

Unsurprisingly, large technology companies continue to benefit from these changes. Amazon Web Services (AWS), Microsoft Azure and Google Cloud represented 58 % of the total cloud

market in 1Q21.<sup>93</sup> AWS alone has a 32 % market share and reported a 32 % annual growth in cloud revenues in 1Q21. Microsoft Azure comes second with a 19 % market share and a 50 % growth in cloud revenues for the third consecutive quarter. Interestingly, Microsoft Azure recently launched a cloud for financial services with a focus on retail banking.<sup>94</sup> The rising market capitalisation of large technology companies also illustrates this trend. The GAFAM<sup>95</sup> have a combined market capitalisation of EUR 7.2 tn, representing 23 % of the S&P 500 in 1H21, and a rise in value of EUR 2 tn over a year.

Following the COVID-19 induced contraction in 1Q20, the subsequent FinTech funding rebound culminated in the largest funding quarter on record in 1Q21. In 1Q21, venture capital-backed FinTechs raised about EUR 19 bn, representing a year-on-year growth of 98 % in value and 15 % in deal activity. This trend continued into 2Q21, with FinTechs attracting around an additional about EUR 29 bn.<sup>96</sup> However, several promising FinTech IPOs have underperformed the broader market so far.<sup>97</sup> Interactions between incumbents and FinTech firms are evolving as well. Incumbents are increasingly teaming up with FinTechs to develop digital infrastructures or

<sup>91</sup> CB Insights "[The EY-Parthenon Digital Investment Index: How Companies are Driving Returns from Digital Transformation](#)", December 2020.

<sup>92</sup> Bank of England "[The impact of Covid on machine learning and data science in UK banking](#)", Q4 2020.

<sup>93</sup> Canalys "[Global cloud services market Q1 2021](#)", April 2021.

<sup>94</sup> Microsoft Industry Blog, "[Announcing: Microsoft Cloud for Financial Services](#)", February 2021.

<sup>95</sup> Google parent Alphabet, Apple, Facebook, Amazon, Microsoft.

<sup>96</sup> The Economist "[Investment in fintech booms as upstarts go mainstream](#)" July 2021.

<sup>97</sup> CBInsights (2021), "[State of Fintech Q1'21 Report](#)", January

address the needs of a new, tech-savvy generation of investors.<sup>98</sup> In turn, FinTechs seem more eager to develop partnerships with incumbents, leveraging on their ability to launch new products and services quickly.

Digitalisation and new technologies are also a relevant current area of investment for retail and institutional investors, as evidenced by the steady inflows into EEA-domiciled AI and FinTech funds (T.104). Indeed, these funds attracted EUR 1.5 bn of new money in 1H21, representing almost a tenth of their AuM. FinTech ETFs, including those with a distributed ledger technology (DLT) focus, attracted c. EUR 120 mn inflows in April 2021.<sup>99,100</sup> One-year projected sales growth suggests that this trend is here to stay, and that tech-themed ETFs are continuing to be of high interest to investors. Indeed, ETFs with a focus on cloud computing are expected to see a 25.8 % sales growth over the next 12 months, followed by FinTech with 23.9 %<sup>101</sup>, yet cloud computing and FinTech focused ETF's growth projection exceeds the average ETF growth rates<sup>102</sup> by approximately 4 -6 %. Still, thematic ETFs, including those with an innovation-themed focus, may have a comparatively narrow focus, which can leave them exposed to higher volatility swings.

Overall, digitalisation can bring opportunities and benefits for investors and firms but is not free of challenges and risks. The dominance of large technology companies raises competition issues, and possible concentration risks and financial stability concerns, due to the complexity and lack of substitutability of the services that they offered. Digitalisation makes cyber and operational resilience even more paramount. Not only does evidence suggest an increase in the number of cyberattacks and scams since the start of the COVID-19 crisis and subsequent changes in the

use of technology, but the forms of cybercrime also continue to evolve. Last year saw a substantial increase in ransomware hacking attacks, with the number of attacks in 1H21 exceeding those in 1H20 by almost 60%.<sup>103</sup> Relatedly, the average ransom payments increased by around 50 % between 1Q20 and 1Q21.<sup>104</sup>

The EC has established an ambitious strategy to address the issues raised by digital finance. This includes a Digital Finance package<sup>105</sup> and a Digital Services Act package. The latter includes a regulation on a Digital Markets Act<sup>106</sup> which aims to address the risk of gatekeeping positions held by large online platforms with a view to ensuring fair competition in the EU capital market and supporting consumer protection. The draft Digital Services Act sets out new rules for online intermediary services and addresses transparency and accountability concerns regarding online platforms.<sup>107</sup> In addition, the EC has proposed new rules and actions for excellence and trust in AI, with a view to fostering innovation in the sector while addressing potential ethical risks.<sup>108</sup> Elsewhere, the EC has launched a public consultation on EU digital principles to strengthen and uphold EU values in the digital space.<sup>109</sup>

Finally, the request to the ESAs for technical advice on digital finance<sup>110</sup> aims to capture remaining issues of relevance to the digitalisation of the financial services sector that have not yet been addressed through specific initiatives. In particular, the ESAs are asked to assess the necessary adaptations to the existing EU regulatory and supervisory framework as regards fragmented value chains, platforms, and mixed-activity groups, with a view to embracing digital finance. ESMA recently published a call for evidence to gather relevant information from

<sup>98</sup> Deloitte "[FinTech: On the brink of further disruption](#)", December 2020.

<sup>99</sup> Global X "[European Thematic ETFs Report](#)" April 2021.

<sup>100</sup> FinTech ETFs are recording strong inflows which are in size only exceeded by ESG-themed ETFs. For more information see the Sustainable Finance section.

<sup>101</sup> ETF Trends, "[The Next Big Theme: February 2021](#)", February 2021.

<sup>102</sup> For further information, see the asset management section.

<sup>103</sup> Blackfog "[The State of Ransomware in 2021](#)", July 2021.

<sup>104</sup> Coveware, "[Ransomware attack vectors shift as new software vulnerabilities exploit about](#)", April 2021.

<sup>105</sup> For further details on the package, see ESMA report on Trends, Risks and Vulnerabilities No. 1-2021.

<sup>106</sup> For the full proposal, see: [The Digital Markets Act: ensuring fair and open digital markets | European Commission \(europa.eu\)](#).

<sup>107</sup> To view the full proposal see: [The Digital Services Act: ensuring a safe and accountable online environment | European Commission \(europa.eu\)](#).

<sup>108</sup> For further information, see [Europe fit for the Digital Age: Artificial Intelligence \(europa.eu\)](#).

<sup>109</sup> For further information, see [Europe's Digital Decade: EU digital principles \(europa.eu\)](#).

<sup>110</sup> EC, [Request to EBA, EIOPA and ESMA for technical advice on digital finance and related issues](#), February 2021.

external stakeholders to inform its work on the matter.<sup>111</sup>

T.100

Financial innovation scoreboard

### Assessment of risks and opportunities

The ESMA financial innovation scoreboard ranks product features based on how they relate to ESMA's objectives, in order to prioritise the financial innovations that require deeper analysis and potential policy responses.

#### Crypto assets – high price volatility

Most cryptoassets (CAs) are highly volatile in price and operate outside of the existing EU regulatory framework, which raises investor protection issues. Interconnectedness risk requires monitoring as CAs grow in size. The upcoming MiCA regulation intends to address those risks.

#### Distributed Ledger Technology – some interesting use cases

DLT has the potential to enhance firms' efficiency and improve consumer outcomes but applications are still limited. Scalability, interoperability and cyber-resilience will require monitoring as DLT develops. Other challenges include anonymity as well as governance and privacy issues. The energy consumption of certain DLT protocols is also a source of environmental concern.

#### Artificial intelligence, machine learning and big data – increased uptake and regulatory focus

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. There are operational risks, along with risks around the explicability of AI-based recommendations, strategies and analysis, something that the proposed regulation on AI intends to address.

#### Cloud and digitalisation – growing with positive outcomes but risks as well

Covid-19 has accelerated the adoption of the cloud and digitalisation, with beneficial outcomes for investors. However, these changes also exacerbate concentration risks and the need for digital operational resilience.

#### Regulatory and supervisory technology – potential benefits

The widespread adoption of regulatory technology (RegTech) and supervisory technology (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.

#### Crowdfunding – market remains muted

Crowdfunding improves access to funding for start-ups and other small businesses, but the projects funded have an inherently high rate of failure. The relative anonymity of investing through a crowdfunding platform may increase the potential for fraud.

#### Platformisation – new business models bring benefits and risks

Digital platform models offering different financial products and services, ranging from trading to wealth management or robo-advisers may lower the barrier to investment services

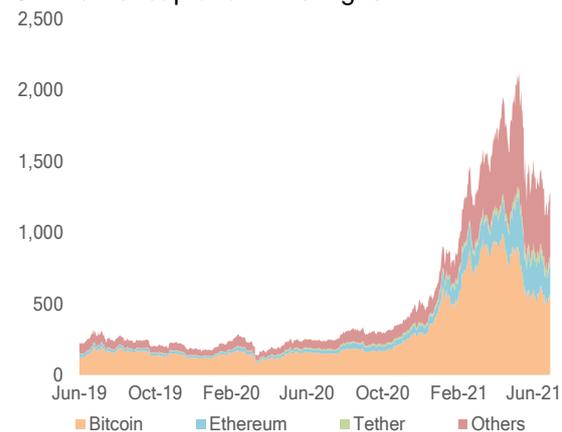
for the wider public. At the same time, the wide use of automated services, personal data collection to tailor offerings and anonymity of platforms may pose investor protection risks.

## Plunge in cryptoasset market capitalisation

The market capitalisation of CAs totaled around EUR 1.3 tn at the end of 1H21 (T.101), up from EUR 500 bn in 2H20, but down from its early-May peak of about EUR 2 tn. CA prices continued to soar through 1Q21, on the back of strong interest from investors, both retail and institutional, and positive news flows. Yet, Bitcoin (BTC) suffered a severe plunge in mid-May, when Tesla's CEO announced it would no longer accept the coin as a means of payment due to its environmental impact.

T.101

### Cryptoasset market capitalisation CA market cap at all-time highs



Note: Market capitalisation of Bitcoin, Ethereum, Tether and other crypto-assets, in EUR bn.

Sources: CoinMarketCap, ESMA.

BTC reached an all-time high of nearly EUR 53,000 in mid-April 2021, more than double its price in December 2020, and up 233 % from its historical peak in 2017. By the end of May 2021 though, its price had fallen to around EUR 30,000, and has since stagnated at this level. Similarly, by mid-May the price of Ether (ETH) had reached an all-time high of EUR 3,500, more than quadruple its value at the end of 2020, and then dropped by almost half at the end of the month (T.107). These price swings once again illustrated the high volatility of these

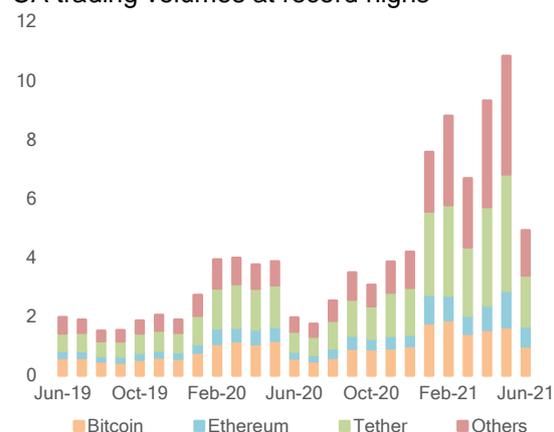
<sup>111</sup> For further information, see [Call for evidence on Digital Finance \(europa.eu\)](https://www.europa.eu).

instruments, namely four times that of gold or equities (T.108).<sup>112</sup>

As a result, while during 2020 BTC share of total CA market cap oscillated between 60-70 %, it began to decline in 1Q21 and dropped to around 40 % towards mid-May for the first time since 2018. Conversely, ETH share has surged recently, representing roughly 17 % of the market share. The share of other CAs in the total market capitalisation has risen by nearly 80 % compared to end-2020. Even though BTC remains the largest CA in size, investors are starting to become more comfortable using a variety of CAs to diversify their portfolios. At the same time, institutional investors are starting to consider BTC's environmental impact in terms of their ESG targets, making ETH a more appealing alternative as its new upgrade is less damaging for the environment. The success of ETH can also be attributed to the recognition of its smart contract functionality, the growing interest in decentralised finance (see below) and its popularity as the medium of exchange for non-fungible tokens (NFTs).

Trading volumes for CAs continued to rise over the first months of 2021. In May, they reached a daily average of around EUR 360 bn, roughly EUR 60 bn more than the high reached in January 2021. In particular, while BTC and ETH account for about two thirds of the CA market, Tether, the largest stablecoin, has surpassed both BTC and ETH in trading volumes since July 2019, a difference that has further broadened in 2021. However, in June volumes dropped by over 50 % (T.102), which was mostly driven by a decrease in trading volumes of Tether and other CAs different from BTC and ETH.

T.102  
Crypto Asset trading volumes  
CA trading volumes at record highs



Note: Trading volumes of Bitcoin, Ethereum, Tether and other crypto-assets, in EUR tn.  
Sources: CoinMarketCap, ESMA.

The total value of stablecoins (SCs) more than tripled in 1H21 to exceed EUR 92 bn. Tether is the largest stablecoin, with a market capitalisation of EUR 52 bn, followed by USD Coin at EUR 20 bn and Binance USD at EUR 7.8 bn (T.103). Trading volumes for SCs have also rallied in the first months of 2021 and are almost seven-fold those of the same period in 2020. Yet SC volumes, mirroring previous seasonal patterns, have also significantly decreased in June, again mostly driven by lower trading volumes of Tether, the leading stablecoin (T.106).

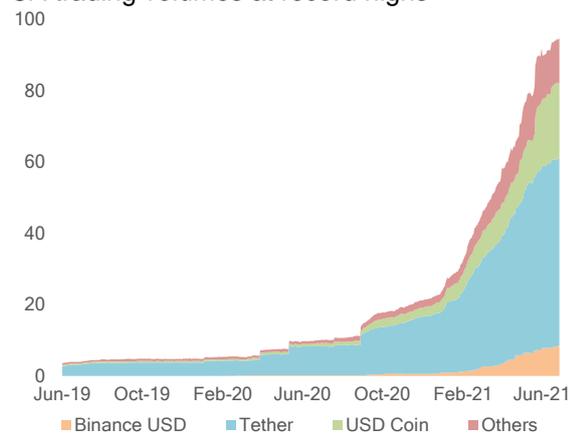
<sup>112</sup> CAs are highly volatile and bear high risks for investors, as highlighted by the three ESAs in their 2018 warning. ESMA, the European Banking Authority and the European Insurance, Occupation and Pensions Authority,

[“ESMA, EBA and EIOPA warn consumers on the risks of virtual currencies”, February 2018.](#)

T.103

Stablecoin market capitalisation

CA trading volumes at record highs



Note: Market capitalisation of Binance USD, Tether, USD Coin and other stablecoins, in EUR bn.  
Sources: CoinMarketCap, ESMA.

Canada approved the first-ever bitcoin ETF in February 2021, followed by 18 other ETF listings on the Toronto Stock Exchange holding BTC and ETH as underlying.<sup>113</sup> In March, Brazil became the second country to approve a BTC ETF.<sup>114</sup> Several other jurisdictions, including Australia<sup>115</sup> and Dubai<sup>116</sup>, are discussing the possibility of listing of CA ETFs. In the US, the SEC has received at least 12 applications for listings of BTC ETFs.<sup>117</sup> The SEC has delayed a decision on whether to approve applications several times pending further opinions from investors and academics. In the EU, several ETPs with CAs as underlying are available, with EUR 5.6 bn in assets in early July. NCAs also reported around 40 AIFs providing exposure to CAs, with EUR 15 bn in AuM as of April 2021. These figures remain low but are increasing.

Regarding CA derivatives, CME launched ETH futures in February, with a minimum purchase amount of 1 contract (or 50 ETH). CME's ETH futures volumes reached around USD 7.4 bn in June, up 350 % from March, and open interest stands at around 3,200 contracts on average in June. Meanwhile CME's BTC futures trading

volumes decreased to around EUR 24 bn and open interest has also slightly declined with respect to the start of the year and remains relatively low at around 7,000 contracts (T.109). In May, the CME also launched 'micro' bitcoin futures with the size of one tenth of a bitcoin, with the aim of providing access to bitcoin trading strategies to a wider array of market participants. Volumes for these micro bitcoin futures during June are estimated at around 440,000 contracts (worth EUR 1.2 bn), in comparison with approximately 178,000 contracts for regular bitcoin futures over the same period (worth EUR 24 bn).<sup>118</sup>

## DeFi growing rapidly, from low base

Decentralized Finance (DeFi) is a catch-all term for financial products built on peer-to-peer networks, such as the Ethereum blockchain. These services promise to provide traditional centralised financial (CeFi) services related to CAs in an open, permissionless and decentralised way. DeFi effectively expands the use of blockchain from simple value transfer to more complex financial use cases, building on decentralised applications and smart contracts. The most popular DeFi applications cover three broad activities: lending, trading (through decentralised exchange platforms) and asset management.

DeFi as a concept is not new, but the phenomenon has attracted growing interest recently. The total value locked<sup>119</sup> in DeFi is estimated at EUR 47 bn at the end of 1H21, down from EUR 70 bn as of mid-May, but up 1200 % from end-July 2020 (though from a very low starting point of EUR 3.5 bn).

DeFi holds the same benefits as the blockchain technology on which it is built, namely disintermediation, round-the-clock availability and censorship resistance. It also faces similar

<sup>113</sup> Coindesk, '[Canada's 4<sup>th</sup> Ether ETF begins trading on the TSX](#)', April 2021.

<sup>114</sup> Coindesk, '[Brazil becomes second country in the Americas to approve a Bitcoin ETF](#)', March 2021.

<sup>115</sup> Financial Review, '[VanEck, BetaShares in race for bitcoin ETF](#)', May 2021

<sup>116</sup> Coindesk, '[3iQ plans to raise USD 200m+ from Bitcoin ETF's Dubai listing: report](#)', April 2021.

<sup>117</sup> Financial Times, '[Bitcoin ETF applications gather dust as SEC's Gensler frets over 'gaps'](#)', June 2021

<sup>118</sup> For further information on the CME's offering of products with cryptocurrencies as underlying please visit [cmegroup.com/markets/cryptocurrencies.html](https://cmegroup.com/markets/cryptocurrencies.html)

<sup>119</sup> It is important to be cautious with TVL as a measure of growth in the DeFi space, as recent controversies of the metric have found that there may be problems of double counting (e.g. DAI loaned in one project is used as the collateral on a separate platform, and are both counted towards TVL) and that it may not apply to every DeFi protocol (e.g. automated market makers).

challenges and risks, including in relation to operational resilience, scalability, and governance. Likewise, the potential introduction of Central Bank Digital Currencies (CBDCs) and the increasing use of stablecoins as well as the increased interest on CAs by institutional investors is making more porous the boundaries between the traditional CeFi system and DeFi more porous, increasing the risks of potential spillover of DeFi risks to the real economy. These risks are further intensified by the rapid growth of DeFi and the recent price performance of the main CAs.

Although the size of the DeFi market itself is not yet large enough to be considered a risk to financial stability, it is still worth regulators and supervisory authorities closely monitoring its developments and better understanding its activities, structures potential benefits and underlying risks. In this context, ESMA will continue to monitor developments in DeFi, as it may raise specific regulatory and supervisory challenges.

## CBDCs gain momentum, stablecoins under scrutiny

Central Bank Digital Currencies (CBDCs) are digital money issued by a central bank in a national unit of account, offering the general public a new way of holding money. The most common set of motivations for central banks to consider issuing a CBDC are financial inclusion and payments efficiency and safety. However, the need to thoroughly examine the associated risks and operational challenges remains prominent.

The pandemic has highlighted consumers' demand for more accessible and lower-cost digital payments. COVID-19's impact on retail payments, including a sharp fall in the use of physical cash by consumers, and private initiatives around stablecoins, have contributed to a shift in sentiment towards CBDCs among central bankers, which could in turn facilitate the uptake of DLT in financial securities markets. This shift is illustrated by, for example, the statement by Christine Lagarde's statement in

March 2021 that the ECB 'could have a digital euro within 4 years', or the statement made by an official of the Bank of England in May 2021 that it 'plans to launch a bitcoin'.<sup>120</sup>

Other central banks, including Sweden's Riksbank, the Swiss National Bank, Norway Central Bank, the Bank of Russia, South Korea's Shinhan Bank, and the People's Bank of China, are further ahead with equivalent projects of their own. The Bahamas launched the first nationwide CBDC in the world in February 2021. In the US, the Federal Reserve has started to assess the pros and cons of CBDCs.<sup>121</sup> It is important to be cautious about these developments and not prejudice an increase in general interest with policy decisions on whether to actually launch a CBDC.

In January 2021 the Bank for International Settlements published the results of a global survey of 65 central banks about their developments in the area of CBDC.<sup>122</sup> According to the responses, 86 % of central banks are now actively engaging in some form of CBDC work. Central banks are also moving towards more advanced stages of CBDC engagements, progressing from conceptual research stages to developing proof of concept (60 %) and pilot experimentation (14 %). In contrast, the IMF reviewed the central bank laws of 174 of its members and estimated that close to 80 % of the world's central banks are either not allowed to issue a CBDC under their existing laws, or have unclear legal frameworks.<sup>123</sup>

In April 2021, the ECB published a report on the digital euro following a public consultation in October 2020. The report analyses the over 8,000 responses gathered, in which privacy was ranked as the most important feature of a digital euro. Respondents also stressed the need for the digital euro to be secure, cheap and easy to use throughout the EA.<sup>124</sup>

Market developments around private stablecoins continue to be under scrutiny by global regulators, given the potential impact mass stablecoin adoption could have on financial systems. This call for more transparency and legal certainty has been reinforced as Tether, the

<sup>120</sup> Cunliffe, J., [Do we need 'public money'?](#), 2021.

<sup>121</sup> BoG of the Federal Reserve system, [Preconditions for a general-purpose central bank digital currency](#), 2021.

<sup>122</sup> BIS, [Ready, steady, go? Results of the third BIS survey on central bank digital currency](#), 2021.

<sup>123</sup> IMF, [Legally speaking, is digital money really money?](#), 2021.

<sup>124</sup> ECB, [Report on the public consultation on a digital euro](#), 2021.

largest stablecoin, presented a breakdown of its reserves for the first time in May 2021.

Authorities around the globe are aiming to reduce uncertainty surrounding digital assets, including stablecoins. In the EU, discussions continue on the proposed CA regulatory framework and the obligations that potential systemic stablecoins should have. The ECB also issued an opinion in February 2021 saying that stablecoin issuance in the EU should fall within its exclusive competence.<sup>125</sup> In the US, the OCC has opened a pathway for traditional finance to live test digital assets by granting national banks and federal savings associations permission to use stablecoins to ease payment activities and other functions.<sup>126</sup>

After scaling back its ambitions in 2020, the Facebook-backed Diem project, plans to launch a digital currency stablecoin pilot in 2021 under a single stablecoin pegged to the USD. The Diem Association announced in May 2021 that it would move its operations out of Switzerland and withdraw its application with FINMA for a Swiss payment license. Instead, it will seek registration as a money services business with FinCEN and has partnered with a US bank (Silvergate) to issue the stablecoin.

## Innovation hubs considered efficient

EU NCAs continue to engage with FinTech companies through their innovation hubs and regulatory sandboxes.<sup>127</sup> All Member States now have an innovation hub (sometimes even more than one per jurisdiction if the hubs are sector specific). Regulatory sandboxes remain a less explored area, with only eight currently operating in the EU, and some being still very recent.<sup>128</sup> MT,

AT and ES launched their sandbox in 2H20 respectively. Other countries, including CY, GR and SK are in the process of establishing or considering sandboxes.

Both regulators and innovators increasingly recognise the benefits of innovation hubs and regulatory sandboxes, namely spurring innovation while staying alert to emerging risks. A recent BIS study also provided evidence on the effectiveness of sandboxes in improving fintechs' access to finance through reduced asymmetric information and reduced regulatory costs or uncertainty.<sup>129</sup>

The innovation hubs and regulatory sandboxes operate at the national level in the EU. However, the European Forum for Innovation Facilitators (EFIF)<sup>130</sup>, which was established in 2019, supports coordination and cooperation across these initiatives. In the past 2 years, the EFIF has promoted a convergent approach to hubs and sandboxes, supported supervisory convergence and contributed to the scaling-up of innovation in the EU. The most recent EFIF initiative is the development of a cross-border testing framework that would enable innovators to test their products, services or business models across more than one country and engage with more than one regulatory sandbox.<sup>131</sup>

NCAs have observed an increase in their engagement with FinTech firms through innovation hubs and sandboxes over the past years. For example, in its recent activity report, the Central Bank of Ireland highlighted that its Innovation Hub received a total of 70 enquiries from innovating firms in 2020 (a 25 % increase over 2019) and a 20 % year-on-year increase in authorisation-related enquiries.<sup>132</sup> COVID-19 impacted innovation hubs and sandboxes to a different extent. Several authorities reported a

<sup>125</sup> ECB, [Opinion of the ECB on a proposal for a regulation on Markets in Crypto-assets, and amending directive \(EU\) 2019/1937](#), 2021.

<sup>126</sup> Office of the Comptroller of the Currency, [Federally chartered banks and thrifts may participate in independent node verification networks and use stablecoins for payment activities](#), 2021.

<sup>127</sup> For the definition of "innovation facilitators" [a term that refers to innovation hubs and regulatory sandboxes together], their design and operation see the ESAs' Joint Report, "[FinTech: Regulatory sandboxes and innovation hubs](#)", 2019.

<sup>128</sup> The List of innovation facilitators is available at <https://esas-joint-committee.europa.eu/efif/innovation-facilitators-in-the-eu>

<sup>129</sup> The November 2020 BIS Report "[Inside the Regulatory Sandbox: Effects on Fintech Funding](#)" analyses how

entering the UK regulatory sandbox affects fintechs' ability to raise funding. It concludes on a significant increase of 15% in capital raised post-entry, relative to firms that did not enter; and their probability of raising capital increases by 50%.

<sup>130</sup> See more about the EFIF at <https://esas-joint-committee.europa.eu/Pages/Activities/EFIF/European-Forum-for-Innovation-Facilitators.aspx>

<sup>131</sup> The development of a procedural framework for launching cross-border testing has been assigned to the EFIF by the Digital Finance Strategy for the EU, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0591&from=EN>

<sup>132</sup> See Central Bank of Ireland, [Innovation Hub 2020 Update](#).

decrease in the number of queries received through their hubs, but others did not report significant changes. All had to adapt their means of interaction, communicating remotely through calls and virtual meetings.

The areas that are the subject of the most enquiries from firms include artificial intelligence (AI), machine learning (ML) and Big Data analytics; tokenisation and distributed ledger technologies (DLT); open finance and application programming interfaces (APIs); platforms facilitating the provision of financial services (retail and institutional) and digital finance; RegTech; and the use of innovative technology for customer due diligence (CDD). More recent trends include a growing interest from firms in 'Green' or 'Sustainable' FinTech, i.e., innovative technologies that help channel investments into sustainable objectives and assist the transition to a greener economy and the growth and maturity of blockchain.

## Digital platforms: efficiency potential, new risks

Financial institutions may increasingly rely on multi-sided digital platforms as their preferred business model, leveraging large ecosystems with a view to addressing new consumer needs and distributing their products and services to a wider range of potential investors. Additionally, digital platforms facilitate access to consumer data through digital transaction processes, which in turn may enable financial institutions to tailor their offerings more specifically to different segments of the market.<sup>133</sup> On the other end, investors and consumers stand to benefit from the breaking down of barriers to access and potential lower costs, making digital platforms a potentially attractive entrance point for first-time retail investors.

The growing interest in digital platforms is further illustrated by their ability to attract funding. For example, four digital investment platforms raised EUR 387 mn globally in 1Q21.<sup>134</sup> This could spur the diversification of existing business models, services and product ranges in the near future.

Digital platforms are already offering a relatively wide product range, from plain vanilla instruments to more complex and high-risk financial products such as derivatives or CAs. This may pose risks to retail investors with little experience in and knowledge of trading in complex financial instruments. These concerns are reinforced by the on average low barriers to opening accounts on digital platforms. For example, investors may only need to 'tick a box' confirming that they have read the terms and conditions and are aware of the risks associated with a given instrument, before being able to access a trading platform.

Digital platforms of relevance to the investment services sector can take different business models and offer a wide range of services. Models may include trading platforms, marketplaces or robo-advisers through which services such as portfolio management, data analytics or daily trading are offered, often including a mix of the above.<sup>135</sup> Digital trading platforms are sometimes dubbed 'neo-brokers' or 'zero-commission brokers', referring to their habit of advertising 'low' or 'zero costs' as part of their business model and marketing strategy. This model has come under scrutiny lately, with growing concern that some of the advertised zero costs are simply hidden cost that are later added through mechanisms such as payment for order flow.<sup>136</sup><sup>137</sup> These new platforms also make use of gamification. Aiming to make investing more appealing to a younger generation of investors, gamification elements may consist of confetti appearing when the user achieves an investment milestone or receiving fun-looking rewards alongside investment progress. However, while this may incentivise investors, it can also encourage a habit of gambling, and the use of gamification has been observed in the context of increasing fraction trading. Some digital platforms have removed gamification elements in response to regulatory concerns.<sup>138</sup>

The combination of human-centric approaches with new innovative technologies, such as AI, to provide a range of services, leveraging the vast

<sup>133</sup> KMPG, "[The rise of digital platforms in financial services](#)" January 2018.

<sup>134</sup> CBI Insights, "[FinTech report Q1 2021](#)", 2021, page 53. Stash, Public.com, Webull, and Freetrader raised a total of EUR 387 mn in 1Q21.

<sup>135</sup> The existence of digital platforms in both the banking and insurance sector, including the different forms and models occurring throughout these sectors, is duly noted but not discussed in this section.

<sup>136</sup> CNBC "[Robinhood-GameStop hearing will scrutinize how brokerages get paid for trades](#)" February 2021.

<sup>137</sup> For further details on the market dynamics of the GameStop episode see T.9 in the Securities Markets section. For further details on the concept of payment for order flow and investor protection risks see T.62 in the Consumer section of this report.

<sup>138</sup> Financial Times, "[Robinhood is Eliminating Controversial Gamification Feature](#)", April 2021.

amount of data collected and stored on the platforms, has sparked further concerns about data security and data use. This is especially true in the context of advice provided through platforms, such as in the form of robo-advisers leveraging customer data. Investors do not always have a clear understanding of the underlying technology or the process upon which such advice is formulated. Many platforms provide access to 'education sections', which hold information about investing and different kinds of financial products. Similarly, some products may be advertised directly to the investor, for example via pop-up windows, as part of a general 'consumer-oriented' marketing technique. Even though these do not fall within the scope of regulated advice they may be perceived as such.

Similarly, the use of social media as a source of recommendation or a means to collude on investment strategies is increasingly being observed and may pose risks to investor protection. While allowing investors to compare different sources at practically zero cost and engage in one-on-one discussions with other, professional, and retail<sup>139</sup>, traders across geographic locations, the insights stemming from these exchanges are not verified nor subject to any regulatory or supervisory oversight. The anonymity of social media adds to the difficulties in differentiating between well-meant recommendations and strategies to artificially inflate specific asset prices. Yet again, a new generation of retail investors is opting for this so-called 'self-directed investment journey', which aligns with the personalised, self-focused approach provided by many social media platforms.

At the same time, digital platforms have learned to leverage social media to advertise specific products and services.<sup>140</sup> Simultaneously, rising number of investment influencers, including investment professionals, are taking to social media platforms and providing engaging and eye-catching content, using the wide reach of social media platforms to convey their recommendations.<sup>141</sup>

Social media techniques are also at the core of 'social trading' communities, illustrating how digital and social media platforms can foster the democratization of investment process. These include following other users' portfolios, 'famous' best-in-class traders, chatrooms to elaborate on investment trends, and links to other social media networks. The resulting network effect may facilitate runs on specific assets due to the scope and speed of online information.<sup>142</sup>

Thus, despite accounting for a number of benefits, including the democratisation of investment services, the ease of access provided by digital platforms, coupled with the widespread use and reach of social media as a tool to facilitate communication among different investor classes may have potentially far-reaching consequences, including on company valuations, as shown during the recent Gamestop rally<sup>143</sup> and on financial stability and market integrity, e.g., by exacerbating herd behaviour and/or market speculation. In the wake of these developments, several regulators have issued statements or warnings hinting at the risks posed by social media as a source of investment advice, including the need to understand how social sentiment may drive the information provided.<sup>144</sup>

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<sup>139</sup> Interestingly, not only retail investors are increasingly making a habit of consulting social media as part of their investment strategy. A 2019 study by Greenwich Associates has found that institutional investors are turning increasingly to social media, with 68 % of surveyed participants naming research as a main driver, followed by the wish to connect with executives at investment firms (64 %) or other peers (63 %), the intention to join groups and observe discussions (62 %) or the aim to share product or service related information online (61 %).

<sup>140</sup> Financial Times "[How to handle the gamification of investing](#)", March 2021.

<sup>141</sup> BritainThinks "[Understanding self-directed investors](#)" 2021.

<sup>142</sup> For further details on how these dynamics can impact the markets, including recent examples, please view T.1. in the Consumer section of this report.

<sup>143</sup> Please refer to the Consumer section of this report for more information.

<sup>144</sup> U.S. Securities and Exchange Commission "[Thinking About Investing in the Latest Hot Stock?](#)", January 2021; FINRA "[Following the Crowd: Investing and Social Media](#)", Januar 2021; ESMA "[Episodes of very high volatility in trading of certain stocks](#)", February 2021.

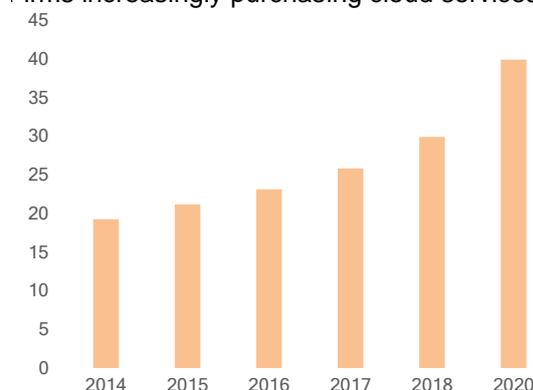
# Key indicators

**T.104**  
Fund strategies focused on AI and FinTech  
Drop in net inflows in 2Q21



Note: Total AuM, 12-month rolling average, EUR bn, and monthly net flows, EUR mn, for selected EEA-domiciled funds (n=31) whose name includes reference to AI, automation, FinTech or robotics.  
Sources: Morningstar Direct, ESMA

**T.105**  
Cloud services revenues  
Firms increasingly purchasing cloud services



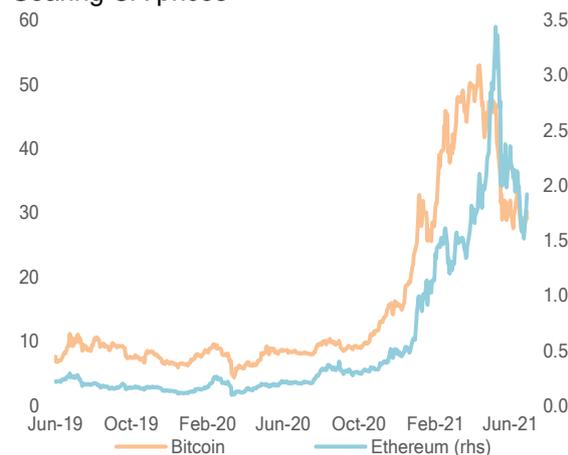
Note: Percentage of businesses purchasing cloud computing services by year in 22 EU countries, %. Countries included: AT, BE, CZ, DE, DK, EE, ES, FI, FR, GR, HU, IE, IT, LV, LT, LU, NL, PL, PT, SI, SK, SE. Firms across the economy with at least 10 employees were surveyed.  
Sources: OECD, ESMA

**T.106**  
Stablecoin trading volumes  
SC trading volume rally in 2021



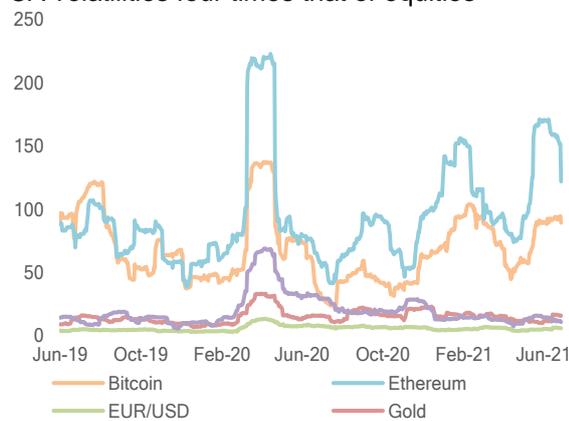
Note: Trading volumes of Binance USD, Tether, USD Coin and other stablecoins, in EUR tn.  
Sources: CoinMarketCap, ESMA.

**T.107**  
Crypto Asset prices  
Soaring CA prices



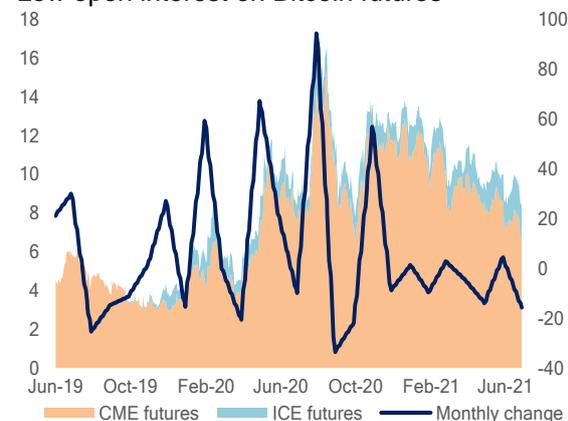
Note: Prices of selected crypto-assets, EUR thousand.  
Sources: Refinitiv Datastream, ESMA.

**T.108**  
Crypto Asset price volatilities  
CA volatilities four times that of equities



Note: Annualised 30-day historical volatility of EURO STOXX 50, EUR/USD spot rate returns and USD-denominated returns for Bitcoin, Ethereum and gold, in %.  
Sources: Refinitiv Datastream, ESMA.

**T.109**  
Bitcoin futures market  
Low open interest on Bitcoin futures



Note: Total open interest in Bitcoin futures, in thousand of contracts, and change in monthly average total open interest, in %.  
Sources: Refinitiv Datastream, ESMA.

# Risk analysis

## Financial stability

# Cloud outsourcing and financial stability risks

Contact: alexander.harris@esma.europa.eu<sup>145</sup>

### Summary

The growing use of cloud service providers (CSPs) by financial institutions can provide benefits to individual firms and the financial system. However, high concentration in CSPs could create financial stability risks if an outage in a CSP affects many of its clients, increasing the likelihood of simultaneous outages. Analysis using a stylised model calibrated with operational risk data suggests that CSPs need to be significantly more resilient than firms to improve the safety of the financial system. In financial settings where only longer (multi period) outages cause systemic costs, the results suggest that CSPs can best address systemic risks by strongly reducing incident resolution times, rather than incident frequency. In the model, using a back-up CSP successfully mitigates the systemic risk caused by CSPs. Backup requirements may need to be mandated however, as the systemic risk is an externality to individual firms. Finally, there is a clear need for detailed data on outages by financial institutions and CSPs.

## Introduction

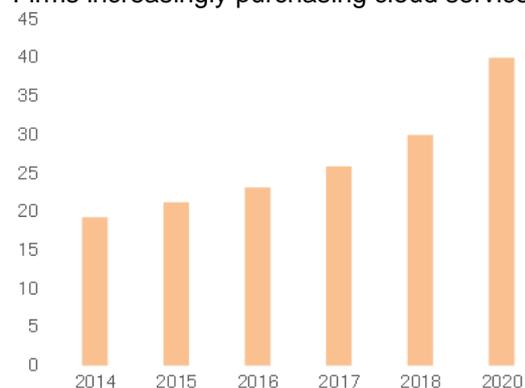
The use of cloud services by financial institutions has risen in recent years, as firms are increasingly outsourcing parts of their IT infrastructure. Cloud computing is an innovation that allows for the use of an online network ('the cloud') of hosting processors to increase the scale and flexibility of computing capacity (FSB, 2019).

While cloud computing is still a topic of research, it has become key to the digital economy. The use of cloud has significantly increased in the last few years (RA.1), a trend which has been further accelerated by the COVID-19 pandemic, as firms have had to set up remote working facilities.

There are many benefits associated to using cloud computing in the financial system. Cloud technology can help firms reduce the costs of developing and maintaining IT systems, as

financial services firms seldom have the scale and capacity to set up such infrastructures.

RA.1  
Percentage of EU firms purchasing cloud services  
Firms increasingly purchasing cloud services



Note: Percentage of businesses purchasing cloud computing services by year in 22 EU countries, %. Countries included: AT, BE, CZ, DE, DK, EE, ES, FI, FR, GR, HU, IE, IT, LV, LT, LU, NL, PL, PT, SI, SK, SE. Firms across the economy with at least 10 employees were surveyed.  
Sources: OECD, ESMA

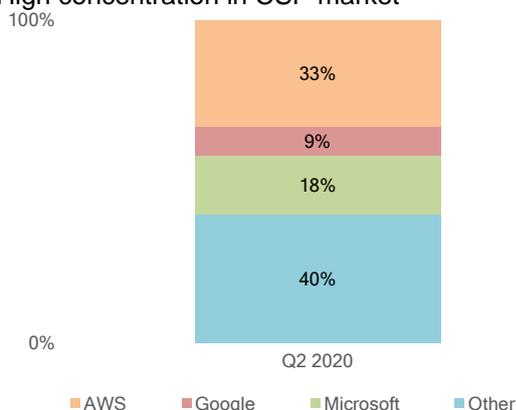
<sup>145</sup> This article was written by Carolina Asensio, Antoine Bouveret and Alexander Harris. It summarises a more detailed analysis and discussion by Asensio, Bouveret and Harris (2021, forthcoming).

Likewise, CSPs can also increase the resilience of financial institutions as they invest heavily in security and spread their infrastructures across geographical areas.

Cloud computing can also help firms expedite and scale up processes, increase flexibility and operational efficiency, and enhance their ability to identify business opportunities and revenue streams. Another key benefit is risk mitigation through enhanced information security and disaster recovery plans, given that the cloud can provide efficient solutions to mitigate traditional technology risks, such as capacity, redundancy, and resiliency concerns. Equally, cloud migration plays a huge role in enabling the use of other innovative technologies such as AI, big data and DLT.

But while migrating to the cloud provides a range of benefits to firms, it can also raise challenges at firm level in terms of governance, data protection and information security. Operational risks are also relevant, as they result from inadequacies or failures of internal processes, people, and systems, or from external events, and they may impact financial institutions in different ways. For instance, data losses could happen due to failures, deletion or disasters that occur at CSPs, or when CSPs outsource some of their functions to third parties, or 'fourth parties'. Cyber risk is also important to consider, as massive amounts of data are stored in cloud ecosystems. 'Vendor lock-in' is also relevant when financial institutions rely strongly on the services of one CSP.

RA.2  
Global market share of cloud infrastructure services  
High concentration in CSP market



Note: Global market share of cloud infrastructure services in Q2 2020, by vendor  
Sources: Synergy Research Group

In addition, the cloud can bring risks at the level of the wider financial system. Given that a limited amount of CSPs can meet the high standards of resiliency requirements that financial institutions

demand, there is high concentration in the provision of cloud services within the financial sector (RA.2). In this context, it is plausible that a sufficiently large number of financial institutions become dependent on a small number of CSPs, meaning that operational incidents may become more correlated. Concentration risk in this context is thus a form of systemic risk.

## A model of concentration risk

We introduce a risk model to investigate the conditions under which outsourcing to the cloud by financial sector firms may generate systemic operational risk as in Asensio, Bouveret and Harris (2021).

### Existing literature

The increasing use of CSPs has been accompanied by emerging literature on the risks and potential impact of CSP outages.

A series of studies estimate the costs related to an outage of cloud providers. Using scenario analysis, Lloyd's estimates global losses ranging from USD 4 bn to USD 53 bn for an outage duration of between 0.5 and 3 days (Lloyd's, 2017), and losses for the largest US firms (corporates and financials) at around USD 10 bn for an outage of the top three CSPs lasting between 3 and 6 days (Lloyd's, 2018).

Using a Value-at-Risk approach, Naldi (2017) provides a measure of potential losses for CSPs, based on outage data and estimated loss per minute. The author models outage frequency using a Poisson distribution and outage duration using a Generalised Pareto Distribution, frequently used to model fat tails in operational risk (Bouveret, 2019). Our model builds on this approach, distinguishing between outage frequency and duration. For tractability, and to prevent time-consistency (i.e. time-overlapping outages for a single area of a firm's operations), we do so in a two-state Markov chain framework. This allows us to analyse alternative technology-based approaches to mitigating systemic risk: preventing outages versus quickly resolving them.

A related strand of the literature examines the impact of using CSPs on the cost of cyber events for individual firms. Using a large dataset of cyber losses, Aldasoro et al. (2020) find that a higher dependence on CSPs, measured by investment in cloud services at country-level, is associated

with lower costs. However, the authors note that this result might not apply to more extreme events since they only have small losses in their database. Harmon, Vytelingum and Babaie-Harmon (2020) put forward an agent-based model with banks and CSPs in a settlement context. CSPs can face outages, the duration of which is assumed to follow an exponential distribution. When a CSP suffers an outage, banks using the CSP cannot proceed with settlement, creating credit risk. The authors estimate the impact on other banks in the network, using contagion measures based on market-based data for banks (Demirer et al., 2018).

### Main features of the model

The model considers a set of financial sector firms in three main scenarios:

1. A setting where no cloud outsourcing is available (the 'no-cloud scenario');
2. A setting where each financial sector firm outsources the time-critical IT service to one of several CSPs (the 'cloud scenario'); and
3. A setting where each financial sector firm outsources the time-critical IT service to a primary CSP and to a secondary provider (the 'multi-cloud scenario').

The risk model does not explicitly consider the firms' decision on whether to outsource to the cloud. Instead, it focuses on the risk implications of the different scenarios. However, the model can readily be understood in a strategic context. Firms will have an incentive to move operations to the cloud – other things being equal and neglecting frictional costs – if cloud outsourcing prevents incidents or improves their resolution speed.<sup>146</sup>

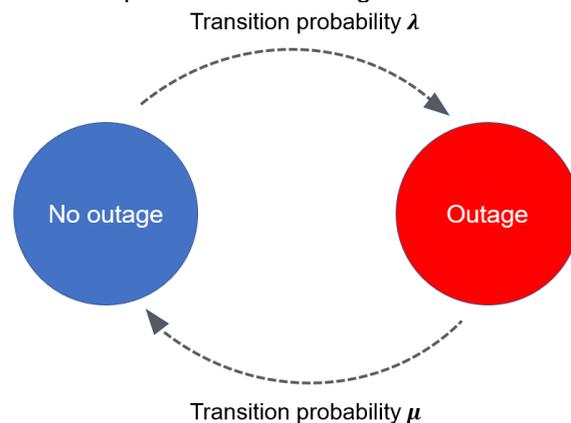
The model considers a set of firms over discrete time periods. In any time period, each firm is in one of two states: *outage* or *no outage*. A firm in an outage state in one period will resolve the outage (i.e. transition to the no outage state) in the next with a constant probability. Conversely,

a firm in a no outage state in one period will experience an outage in the next period (i.e. transition to the outage state) with another constant probability. Importantly, outages are assumed to arise independently across firms.<sup>147</sup>

This arrangement is known as a Markov chain. Regardless of the system's initial configuration, it has long-run *steady state* properties that we can study. For example, given the transition probabilities we can calculate the average amount of time a firm spends in an outage, the average amount of time that two or more firms are in simultaneous outage, and the frequency with which a firm suffers a multi-period outage of a given duration.

In scenario 1, where firms do not outsource to the cloud, the per-period probability of suffering a new outage is denoted  $\lambda$ , known as the *incident rate*. The per-period probability that an outage is resolved is denoted  $\mu$  and known as the *repair rate* (RA.3).

RA.3  
Markov chain diagram for a firm in scenario 1  
Constant probabilities of outage and resolution



Note: Markov chain diagram for a single firm in the no-cloud baseline scenario, in which possible states of the firm are represented by coloured circles.

Given these transition probabilities, the average time a firm spends in outage,  $\tau$ , can be calculated as follows.

<sup>146</sup> Asensio, Bouveret and Harris (forthcoming) examine these incentives formally. A finding is that even if firms find it optimal to migrate to the cloud (scenario 2), they may not find it individually optimal to use a back-up cloud provider (scenario 3). This can happen even if the system would be more efficient if all firms were to back-up. In short, there is a potential externality that may warrant policy intervention.

<sup>147</sup> Independence can to some extent be justified by interpreting the model as a means to study the difference

in systemic risk between scenarios 1 and 2, abstracting away from those risk drivers that are common to both settings. For instance, to the extent the two scenarios face a common risk of a multi-firm malicious attack – which can be perpetrated directly against the firms or via the cloud – we can regard the effect as 'cancelling out' between the scenarios. However, the independence assumption clearly reduces baseline systemic risk in scenario 1, which therefore overstates the extent to which CSPs create additional systemic risk via concentration.

$$\tau = \frac{\lambda}{\lambda + \mu} \quad (1)$$

In scenario 2, firms outsource to the cloud. For a cloud provider, the per-period probabilities of new outages and of resolving existing outages are denoted  $\lambda'$  and  $\mu'$  respectively. The average time in outage is denoted  $\tau'$  and calculated analogously to equation (1). In scenario 2, the firms are assigned to a small number of CSPs, which each have an equal market share. If a CSP suffers an outage, we assume that all its client firms will suffer an outage at the same time.<sup>148</sup> In scenario 2,  $\lambda'$  and  $\mu'$  therefore also represent the transition probabilities for any given firm.

As noted in the introduction the services offered by CSPs may bring a range of benefits as specialist technology providers to client firms, including enhanced operational resilience. This can be represented in the model via the following equation.

$$\tau \geq \tau' \quad (2)$$

Inequality (2) says that in the model, CSPs (and their client firms) have lower average outage time than firms in the no-cloud scenario. A key finding of the illustrative results of the model is that despite assuming this improved resilience for individual firms in the cloud scenario compared to the no-cloud baseline, the former may nonetheless create systemic operational risk. This is due to the assumption that outages in the cloud scenario are correlated, unlike in the no-cloud baseline where they are realised independently. Inequality (2) is consistent with an equilibrium framework in which all firms find it optimal to outsource to the cloud. It is also in line with the calibration data presented below, where we consider an illustrative application of the model to securities markets.

## Applications

The simple, stylised nature of the model makes it versatile. It can be applied to any setting in which costs of simultaneous outages among several firms are greater than if the outages were separate. This is likely to be the case especially where a financial system relies on transactions between a relatively small number of

counterparties, such as in the banking system. Two possible applications to securities are as follows.

### Clearing Members of Central Counterparties

Within financial market infrastructures, the clearing members that allow Central Counterparties (CCPs) to function constitute a possible real-world application of the model.

If clearing members outsource core services, and one or more CSPs suffer an outage, the impact on the financial system could be substantial. First, the failure of some clearing members to post collateral would lead to the liquidation of their positions according to the default management rules used by CCPs, entailing potential losses due to fire sales and the consumption of some of the resources in the default fund. In addition, outages affecting clearing members could prevent some of their clients from clearing transactions with them. This, in turn, could result in additional costs – either in the form of frictional costs incurred by clients switching to other clearing members (where possible) or, worse, the cancellation of transactions where clearing cannot be executed. In its 2020 stress test, ESMA estimated that the failure of the two largest counterparties to a CCP could lead to losses of around EUR 1 bn each for the two largest EU CCPs (ESMA, 2020).

CCPs might not have visibility to assess the concentration risks related to cloud outsourcing by the clearing members.

### Primary dealers and market makers

The model could also be applied elsewhere in financial markets. For example, in sovereign bond markets, primary dealers play an important role not only at the issuance stage, but also by providing market making services in secondary markets. While each country has different rules, primary dealers are usually required to support the liquidity in sovereign markets (AFME, 2020). If a set of primary dealers were unable to operate due to CSP outage, secondary market liquidity would be significantly reduced.<sup>149</sup> Similar effects could also occur in equity markets, although the

<sup>148</sup> This assumption is a simplification and does not reflect the fact that some outages may be local, rather than global.

<sup>149</sup> In a different context, Bouveret et al. (2021) document how liquidity deteriorated on the Italian sovereign bond market on May 29, 2018, when primary dealers retrenched from quoting bonds on the MTS interdealer platform.

fragmentation of trading across venues and the diversity of market makers might mitigate the impact of an outage affecting a few institutions.

## Example calibration

An example calibration using public data suggests that cloud outsourcing (scenario 2) may introduce systemic risk into securities markets compared with the no-cloud baseline (scenario 1). In particular, we consider the first of the applications described above, namely clearing members of CCPs. We set the transition probabilities in scenario 1 for clearing members using available public data<sup>150</sup>, and likewise for the transition probabilities for the clearing members (via CSPs) in scenario 2. For this example calibration, we set the duration of each period at one hour.

To investigate systemic risk, we established the following condition:

- For a systemic event to occur, at least 3 clearing members must be simultaneously unable to operate<sup>151</sup>.

The intuitive assumption is that if large clearing members or a multitude of smaller ones are disrupted, then the CCP will be unable to operate in an orderly manner since several counterparties would be unable to post and receive margins.

This requirement is stricter than the one used for CCP stress tests, where CCPs should be able to withstand their two largest CMs defaulting simultaneously. However, in our model and application we only focus on the number of firms suffering an outage irrespective of their size. Setting a 3-firm minimum requirement for a systemic event is intended to counterbalance this effect.<sup>152</sup>

Regarding the duration of the outages, the Principles for Financial Market Infrastructures (FMIs) put forward by CPMI and IOSCO explicitly specify that FMIs should have a business continuity plan that ensures that critical IT

systems are able to resume two hours after a disruptive event (CPMI-IOSCO, 2012).

### RA.4

Illustrative example calibration of cloud outage model  
Parameter values for clearing members and CSPs based on public data

Parameter	Interpretation	Value
$n$	Number of firms	20
$n'$	Number of CSPs	5
$S$	Minimum number of firms in simultaneous outage for systemic event	4
$\lambda$	Hourly probability of new outage ('incident rate') in no-cloud baseline	0.18%
$\mu$	Per-period probability that an outage is resolved ('repair rate') in no-cloud baseline	78%
$\lambda'$	Per-period probability of new outage ('incident rate') in cloud scenario	0.056%
$\mu'$	Per-period probability that an outage is resolved ('repair rate') in cloud scenario	24%

Note:  $\lambda$ ,  $\mu$  estimated as exponential decay parameters using CCP outage data as a proxy for clearing member outages. CCP outage from 10 CCPs for 2016-2020.  $\lambda'$ ,  $\mu'$  estimated as exponential decay parameters using data on outages and average duration of outages reported by Google Cloud for 2016-2020, taking averages across 16 different service areas. Observations that reported zero outages have been excluded from the analysis.

Sources: 10 CCPs (CME, DTCC, Eurex, ICC\_CDS, ICE NGX, ICEU, ICUS\_F&O, JSCC OTC-JGB, LCH.Clearnet.Ltd, LCH.Clearnet.SA). CSP parameter estimates: Google Cloud.

The longer the duration of the outage, the higher the probability that the event will be systemic. Any event that prevents or impairs end-of-day settlements could then be considered systemic (Brauchle, Göbel and Seiler, 2020).

We consider 3 different minimum-time conditions for systemic events to occur:

- A 1-hour condition, i.e. whenever 3 firms are in a simultaneous outage, a systemic event occurs.

<sup>150</sup> Data on operational risks for clearing members are not available. Instead, we use the quarterly quantitative disclosures by CCPs which provide information about the number of outages over the last 12 months and the total duration of the outages. For CSPs, we use publicly available data from one CSP.

<sup>151</sup> We assume that authorities and CCPs do not react to the outages. However, it is likely that if such event were to occur, they would use back-up procedures (including manual transfer or margins) to mitigate risks for clearing services.

<sup>152</sup> An extension of the model where systemic events are defined based on size could be analysed in future work.

- A 2-hour condition, in line with the CPMI-IOSCO target.
- An 8-hour condition. This reflects the fact that clearing is on a T+1 basis, and 8 hours is the approximate length of a trading day.

Comparing the different results gives insight into the role played by the recovery rate parameter  $\mu'$  in mitigating systemic risk.

## Illustrative results

Given the parameter values and the definition of a systemic event in the present application, we can investigate under what conditions scenario 2 introduces systemic risk compared with scenario 1, and whether these conditions are likely to be met in practice. To do this, we first define the *odds ratio*,  $R$ , as follows.

$$R = \frac{\text{Prob} [\text{Systemic event in scenario 2}]}{\text{Prob} [\text{Systemic event in scenario 1}]} \quad (4)$$

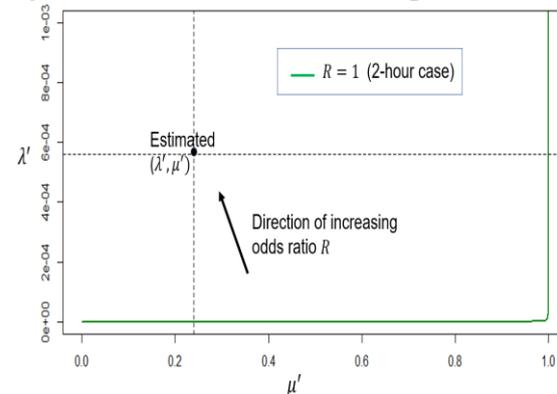
The odds ratio describes how many times more likely a simultaneous outage constituting a systemic event is in scenario 2 than in scenario 1. Intuitively, it describes how much more likely such an outage is made by concentration risk due to cloud outsourcing. If  $R > 1$ , then systemic risk is higher in the presence of cloud outsourcing, according to our stylised model, given the assumptions made and the calibration.

Using the parameter values for  $\lambda$ ,  $\lambda'$ ,  $\mu$  and  $\mu'$  yields the solutions for  $R = 1$  (RA.5). The green line gives  $R = 1$  under the specification that a systemic event requires the same 3 firms to have a simultaneous outage for at least 2 hours. The purple line gives  $R = 1$  on the assumption that a systemic event simply requires the same 3 firms to be in a simultaneous outage.

The purpose of the analysis is not to provide accurate point estimates of the relative risk of systemic events between the two scenarios, given the limitations in the data discussed above and the stylized features of the model such as independence of outages across firms (Assumption 1) and the specification that an outage affecting 3 firms is the threshold for a systemic event. However, the results provide a useful framework for further analysis.

### RA.5

Estimated incident and repair rate for cloud outsourcing compared with solutions for  $R = 1$   
Systemic risk arises in outsourcing scenario



Note: The lines plot values of cloud incident rate  $\lambda'$  and cloud repair rate  $\mu'$ , expressed as per-hour quantities, for which systemic events have the same probability in the no-cloud baseline and the cloud scenario, given the parameter estimates for  $\lambda$  and  $\mu$  based on CCP outage data. A systemic event occurs whenever the same 3 firms are out simultaneously for at least 2 hours. The y-axis is truncated at  $\lambda' = 0.1\%$  for clarity.

The precise parameter values of CSP outage probability  $\lambda'$  and recovery probability  $\mu'$  that we infer from the available data (using the assumptions discussed above) are approximate estimates only. Nonetheless, as order-of-magnitude estimates they appear to be *plausible*, in that they are close to the target values adopted by the CSP in question. Given that these plausible values of  $(\lambda', \mu')$  lie far above the risk-equalization ( $R = 1$ ) lines, we conclude that  $R > 1$  in the present application. In other words, given the available data, our model suggests that outsourcing of core services by clearing members could create a new source of systemic risk, through simultaneous operational outages.

Consequently, as financial sector firms outsource to the cloud for core functions, policymakers should investigate the possibility of additional systemic risk arising. They can do this by:

- seeking and collecting more comprehensive data on outages by clearing members, or by other firms for whom simultaneous outages may have systemic effects; and
- investigating the extent to which the modelling assumptions hold true in practice and adjusting the modelling accordingly

The results (RA.3) indicate that in the most time-critical applications – where two hours of simultaneous outage represents a systemic

event – then there is a non-linear trade-off between the cloud incident rate and cloud repair rate in equalising risk with the no-cloud baseline.<sup>153</sup>

So far, the analysis has only considered the 1 2-hour minimum time threshold for a systemic event. However, it could be argued that the systemic effects of an outage are less time-critical than that. For instance, we could instead assume that CCP outages only have systemic effects after 8 trading hours, given the T+1 clearing cycle. Using an 8-hour minimum makes the probability of a systemic event in the no-cloud baseline vanishingly small in our model for the parameter estimates based on CCP outage data. The implied probability of  $\lambda'$  for  $R = 1$  would accordingly be vanishingly small – in effect requiring CSPs to prevent outages with perfect reliability.

In summary, where systemic events occur only after extended periods of simultaneous outages among firms, our modelling suggests that CSPs would need *perfect* service availability so as not to introduce additional systemic risk compared to the no-cloud baseline. Achieving equality of systemic risk with the no-cloud baseline (the  $R = 1$  line in RA.5 and RA.6) is therefore effectively unattainable for CSPs in the case of an 8-hour minimum for systemic events. This finding illustrates certain limitations with the modelling, however:

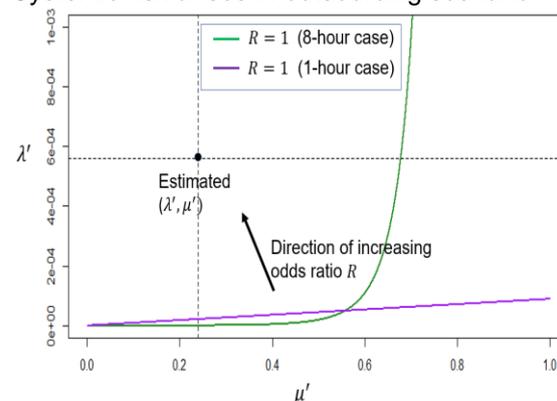
- Policymakers may wish to tolerate more than the level of vanishingly small risk implied by the no-cloud baseline, given other benefits of the cloud computing paradigm.
- The no-cloud baseline risk is based on simplifying assumptions, as set out above.
- The CCP outage data may not provide a true guide to firm-level outage duration. One issue is that the data only report only total outage duration per firm per quarter, rather than the length of each outage. This makes it hard to test the goodness-of-fit of the geometric decay implied by our modelling (as opposed to a fat-tailed distribution). In particular, the data do not identify the number of day-long outages among CCPs.

One way to address these limitations is to consider the values of  $\lambda'$  and  $\mu'$  that are required to achieve a less extreme mitigation of systemic risk, while retaining the 8-hour minimum for

systemic events. This can be done by plotting the  $R = 1$  line while specifying that the repair rate in the no-cloud baseline is now equal to that implied by the CSP data (RA.6). In other words, we now set  $\mu = 24\%$ , rather than  $\mu = 78\%$ . The hourly probability of systemic risk in the no-cloud baseline is now around 1 in 10,000, or roughly one systemic event every 5 years.

With this more modest target for systemic risk, our model indicates that CCPs still have a greater risk of a simultaneous outage of one hour, but a greater risk of a simultaneous outage of 8 hours, i.e. a systemic event. Finally, the scenario where a systemic event is defined simply as occurring after 1-hour is included for comparison.

RA.6  
Estimated incident and repair rate for cloud outsourcing compared with solutions for  $R = 1$   
Systemic risk arises in outsourcing scenario



Note: The lines plot values of cloud incident rate  $\lambda'$  and cloud repair rate  $\mu'$ , expressed as per-hour quantities, for which systemic events have the same probability in the no-cloud baseline and the cloud scenario, given the parameter estimate for  $\lambda$  based on CCP outage data but a lower estimate of  $\mu=24\%$  (equal to that inferred from CSP data). Systemic event occurs whenever the same 3 firms are out simultaneously for at least 8 hours. The y-axis is truncated at  $\lambda = 0.1\%$  for clarity.

The results in RA.4 suggest that starting with the estimates of  $\lambda'$  and  $\mu'$  from the CSP data, systemic risk will be most effectively addressed by improving the cloud repair rate  $\mu'$ . Doubling  $\mu'$  will enable the systemic risk target to be met, while halving the incident rate  $\lambda'$  will not. If  $\mu'$  is increased to nearly 50%, then a far higher outage frequency  $\lambda'$  can be tolerated without introducing systemic risk. Put simply, if cloud outages are almost always repaired in a matter of minutes, then even if they are relatively frequent, they will

<sup>153</sup> If systemic events cover outages lasting at least one hour, then the relationship is linear.

not introduce systemic risks that only emerge after several hours.

### Mitigating risk through back-up: multi-cloud outsourcing

A simple extension of the analysis examines a scenario in which firms have access to a backup cloud service – either from a different provider, or from the same provider such that the back-up version of a given service operates fully independently of the primary version (known as a ‘multi-cloud’ approach). Our focus is on a multi-cloud approach for a given core service, to address risk arising from concentration at system level, in contrast to a multi-cloud approach across services to address risk to the operations of a single firm arising from concentration within the firm (ESMA, 2020b).<sup>154</sup>

This risk mitigation strategy is already offered to some extent by some CSPs by constructing separate groups of cloud computing resources designed to be largely independent of each other, often known as ‘zones’. Zones may be connected to each other within a geographical region. Services can be provided at a regional level, meaning that even if one zone suffers an outage, the services are likely to remain in operation. For example, Google Cloud (2021) aims for each zone to achieve 99.9 % availability (i.e.  $\tau' = 0.1\%$ ) but aims for each region to achieve 99.99 % availability (i.e.  $\tau' = 0.01\%$ ).

To extend the analysis to a multi-cloud scenario, we suppose that each of the 20 clearing members in the application now uses a multi-cloud model – specifically, using a back-up service from a different provider to seamlessly enable them to carry out their functions if their primary CSP suffers an outage. As set out below, a key feature of this new scenario is that a systemic event (again triggered when 3 firms suffer simultaneous outage) now requires 2 providers to suffer a simultaneous outage, rather than one.

For simplicity, as in the general  $n$ -firm case we assume that providers’ clients are shared equally with the other firms. This implies that just as in the primary market, the 4 CSPs have equal market shares in the market for back-up services.

If just one CSP suffers an outage, then its client firms are instantly able to switch to the back-up

service, and their operations are interrupted. If two CSPs suffer a simultaneous outage, then a third of the 5 client firms of each provider suffer an outage (since each backs up one third of the market for the other firms), making a total of  $\frac{10}{3}$  firms. Since the threshold for a systemic outage is  $S = 3$ , a systemic event now requires simultaneous outage by two CSPs.

Assuming a 2-hour minimum for systemic outage, the odds ratio of scenario 2 (cloud outsourcing without back-up) compared with the no-cloud baseline is  $R \sim 10^3$ . In other words, systemic risk is around a thousand times higher in the case with cloud outsourcing.

In contrast, the odds ratio of scenario 2 (cloud outsourcing with back-up) is  $R \sim 1$ , i.e. risk is reduced to around the level of the no-cloud baseline.

In summary, if firms back up their cloud services, the odds ratio decreases by several orders of magnitude. A multi-cloud model is a successful mitigant in the stylised model, based on the parameter calibration examined. However, our model only takes account of the efficacy of risk mitigants, neglecting the costs of improving resilience and security. A relevant policy consideration would be whether the risk reduction outweighs the associated costs.

An important caveat to the finding that back-up is a successful mitigant is that CSP outages are (like firm outages) assumed to be independent. Introducing positive correlation between CSP outages (stemming for example from shared vulnerabilities) would weaken the effectiveness of a multi-cloud policy. Nonetheless, discussion with market participants suggests that CSPs are likely to have different cybersecurity strategies and measures, which limits the scope for common vulnerabilities to malicious actions. Additionally, the scope for common vulnerabilities to natural disasters is limited by geography, in a similar manner to the crucial assumption made in the model of independence of firm-level outages in the no-cloud baseline.

## Conclusion

The growing use of CSPs by financial institutions can provide benefits to individual firms and the

<sup>154</sup> ESMA (2020b) includes guidelines for firms to assess concentration risk both at firm level and at sectoral level,

and for competent authorities to monitor such risks once they are identified.

financial system. However, the high degree of concentration within CSPs might create financial stability risks if CSPs were to suffer an outage that affected their clients, as the likelihood of simultaneous outages might increase.

We discuss several options that can be pursued to mitigate this risk. First, if CSPs are substantially more resilient than individual firms, systemic risk could decline as the additional resilience gained by using CSPs more than compensates for concentration risk. Finally, multi-cloud solutions, where firms use one CSP and then another as backup – or alternatively, the successful provision of cloud services via independent groups of resources by the same provider – may significantly reduce systemic risk. This will only happen, however, if the different CSPs or groups of resources have limited shared vulnerabilities. It is also important to bear in mind that mitigation options are likely to involve costs, and so the optimal solution may be to tolerate a certain level of risk.

Our work also shows the need for detailed data on outages by financial institutions and CSPs. Having consistent data reported by firms and CSPs would allow for better calibration of the model and improve the assessment of trade-offs between different uses of CSPs by firms.

Given the ubiquity of CSPs and continuing migration to use of their services – a trend accelerated by the COVID-19 pandemic – it is crucial for policymakers and market participants to assess the benefits and risks of outsourcing to CSPs. An important example in the EU is the proposed Digital Operational Resilience Act, which envisages a mandate for the European Supervisory Authorities, working with other authorities, to oversee third party providers of critical financial services to address related systemic risks (European Commission, 2020).

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## Financial stability

# COVID-19 and credit ratings

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### Summary

This article investigates how credit ratings evolved during the exceptional circumstances of early 2020, exploiting ESMA's extensive RADAR database of credit rating actions, which covers not only EU ratings but also a large number of non-EU ratings. It shows that corporate and sovereign ratings were downgraded rapidly following the onset of the pandemic, with non-financial corporates particularly affected. Underlying this were strong impacts on businesses in sectors particularly vulnerable to declining economic activity, such as the energy, and consumer cyclicals sectors. Sovereign ratings experienced downgrades in bursts, with many of these occurring with the first and second waves of the pandemic, though the extent of downgrades varied greatly by jurisdiction. In structured finance products, commercial mortgage-backed securities appear by far the most affected, with persistent downgrades reflecting the ongoing challenges to the performance of commercial mortgages. Collateralised loan obligations, a concern before the pandemic, also experienced a wave of downgrades during summer 2020, but otherwise appear to have been relatively resilient, with senior tranches largely unaffected.

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### Introduction

This article investigates how credit ratings responded to the COVID-19 pandemic in 2020. It analyses which ratings were most impacted and how rating changes were correlated with developments related to those of the pandemic and other major events of 2020. Given its broad coverage and space limitations, the aim is primarily to present some of the key rating patterns in 2020 rather than to investigate specific drivers of these rating changes.

To do this, the article uses ESMA's extensive RADAR database of ratings issued in the EU or endorsed for use there.<sup>156</sup> As a result, in addition to including ratings of EU-issued debt, it includes a large number of ratings of debt from outside the EU. Thus, RADAR provides an opportunity to explore credit risk, not just in the EU, but more globally. We exploit this in the paper by looking at some high-level geographical patterns in the EU, United States and United Kingdom. We focus on these jurisdictions because RADAR includes a large number of ratings for debt instruments from

issuers located in these jurisdictions. However, as ratings from non-EU countries are partial, results should be taken as indicative rather than definitive.

## COVID-19 pandemic and credit risk

### The COVID-19 pandemic and responses

The COVID-19 pandemic started in early 2020, with a rapid growth in cases in most continents. Since it began, the pandemic has led to over one 100mn infections and in excess of 3mn deaths globally.<sup>157</sup> It continues to present very significant health risks and challenges worldwide.

The pandemic has proceeded in waves. A first wave began in Europe and North America in March 2020. Countries responded to the pandemic with a range of measures to limit the spread of the disease, strongly limiting permitted activities. These actions restricted consumption

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<sup>155</sup> This article was written by Sylvain Canto, Damien Fennell, and Ana-Maria Rivera-Serrano.

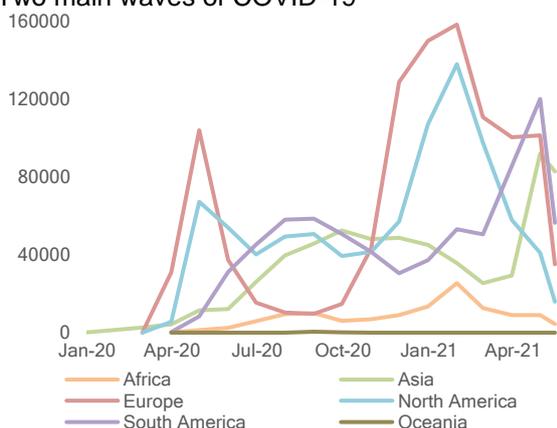
<sup>156</sup> RADAR stands for ESMA's credit RATings DATa Reporting tool. Throughout this paper, RADAR is used to describe the dataset of rating actions reported to ESMA by credit rating agencies (CRAs) under Article 11a(1) of the CRA Regulation: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013R0462&from=EN#d1e1688-1-1>

<sup>157</sup> <https://ourworldindata.org/coronavirus>.

and the ability to work, thus severely reducing economic activity, which led to significant falls in GDP worldwide.

The first wave receded over the summer in the EU27, the UK and the US, as a result of the government interventions to limit movement. A second wave emerged in the US and Europe in the autumn, following the relaxation of policy measures over the summer in response to the earlier decline in cases, and with the emergence of new, more contagious variants. Other continents also faced waves, though to a different extent and at different times, depending on geography, patterns of social interaction, global travel and policy measures taken regionally. Asia and South America, for example, experienced waves a few months later than those experienced in Europe and in the US (RA.7).

RA.7  
Numbers of COVID-19 deaths  
Two main waves of COVID-19



Note: Monthly number of new covid deaths in the world by continents.  
Sources: Our World in Data (<https://ourworldindata.org/>)

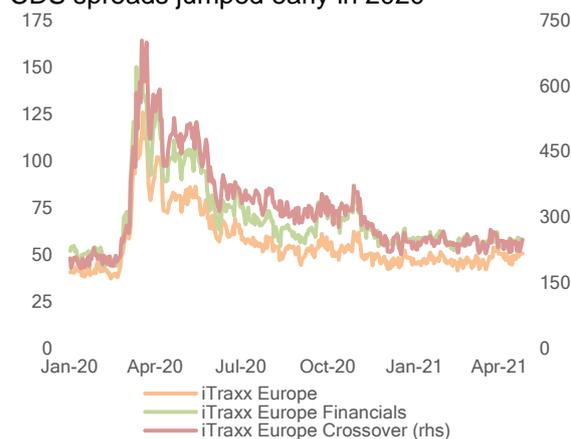
More recently, in 2021, growing vaccinations and new lockdown measures have reduced case and mortality numbers in Europe and the US. Although there have been resurgences from more virulent strains in some other regions, particularly in Asia and in South America.

### Credit risk deterioration in March 2020

The rapid spread of the COVID-19 pandemic in March 2020, led to a sudden rise in uncertainty about the pandemic’s progression, severity, and economic impacts. Strong government measures to limit the spread of the disease, limiting travel and personal interactions, directly and dramatically reduced the activity of certain businesses, leading to potential viability concerns. The more general drop in economic activity also weakened sustainability of debt for businesses and governments more broadly.

Creditors thus faced a radically changed environment, with a large scale increase in short-term solvency risks for the most-affected corporates and greatly increased uncertainty in the medium term. This increase in credit risk was priced into credit default swaps (CDSs) in early March (RA.8).

RA.8  
Credit risk jump  
CDS spreads jumped early in 2020



Note: CDS spreads on European IG corporates (iTraxx Europe), European HY corporates (iTraxx Europe Crossover) and European Financials, in bps.  
Sources: Refinitiv EIKON, ESMA.

Governments and central banks took unprecedented fiscal and monetary action worldwide to support affected businesses and households and to provide liquidity to financial institutions. This helped to calm financial markets, limit the jump in credit-risk aversion and in associated risk premia, as is visible above from the sudden and then gradual decline in CDS spreads from April.

In the US, the UK and Europe, the economic outlook has also recently become more positive as the proportion of the population vaccinated grows (see the [Market Environment](#) section for more detail).

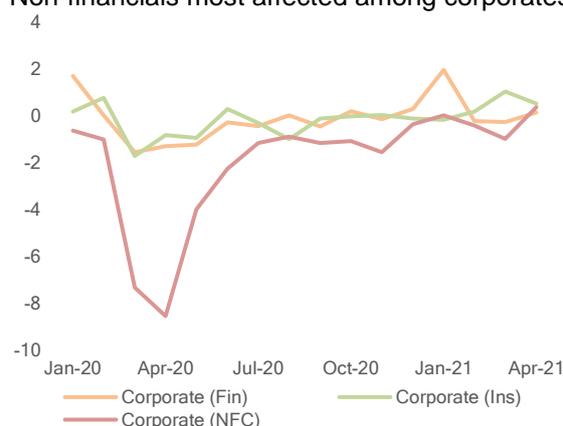
Credit ratings quickly adjusted in response to the changing situation, with corporate ratings in particular showing rapid change, reflecting the deteriorating economic outlook for many businesses. Corporate instruments experienced a sharp wave in downgrades in March and April 2020 (RA.9). Sovereigns and structured finance also experienced a more moderate drift downwards at that time.

RA.9  
Ratings drift globally  
Rapid increase in corporate downgrades



Note: Ratings drift in percent over 2020 for corporate, sovereign and structured finance ratings. Ratings include EU27 and rest of world in RADAR.. Sources: ESMA, RADAR.

RA.10  
Corporate ratings drift  
Non-financials most affected among corporates



Note: Corporate ratings drift in percent over 2020 for non-financials, insurance and financial ratings. Sources: ESMA, RADAR.

Also clear from the chart are subsequent waves of downgrades, visible first for structured finance in the early summer and later for sovereigns in the autumn. These reflect longer-term impacts on the credit quality of these products, for example the underlying credit of some structured finance instruments being particularly affected by the downturn, such as CLOs. Sovereigns were also affected by deteriorating tax revenues and the increase in borrowing to fund regular activities, and their responses to the pandemic and its impacts.

In the sub-sections below, we look in more depth at how ratings for corporates, sovereigns and structured finance products evolved through 2020.

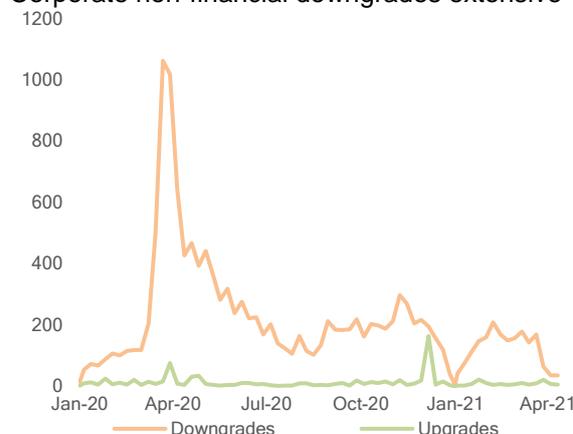
## Corporates

### Non-financials ratings bear the brunt

As mentioned, corporate ratings were particularly impacted by downgrades at the start of the pandemic: financials, insurance, and non-corporate firms all experienced a wave of downgrades that started in March. Non-financial corporate ratings were by far the most affected, reflecting the dramatic direct effects of the pandemic on many businesses (RA.10).

The impact on non-financials was particularly rapid and extreme with, at its peak in late March and April, over a thousand issuers being downgraded, or having an instrument downgraded, per week (RA.11).

RA.11  
Corporate non-financial downgrades and upgrades  
Corporate non-financial downgrades extensive

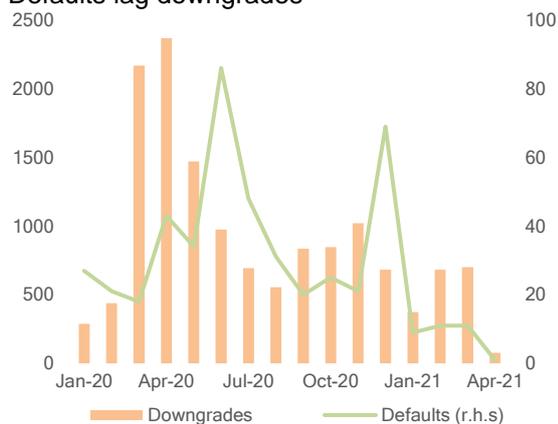


Note: Weekly number of non-financial issuers downgraded or having an instrument downgraded. Sources: ESMA, RADAR.

The sharp and significant increase in the number of non-financial corporate downgrades in 2Q20 was then followed by a gradual decrease in the number of downgrades until 3Q20 when a small increase was again observed, at approximately the same time that the second wave of COVID-19 infections began to affect Europe and the US.

Shortly after the jump in downgrades, there was also a marked increase in defaults among corporates, observed after each of the two waves (RA.12).

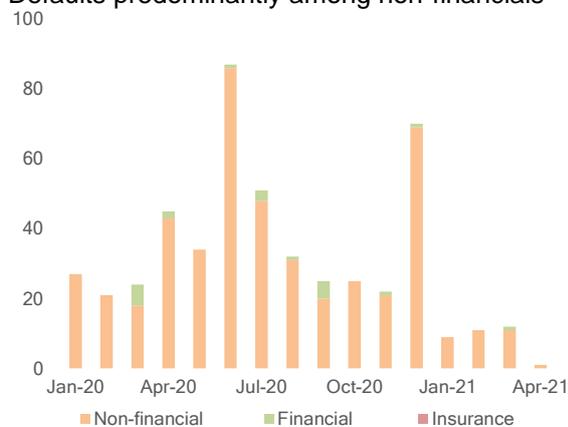
RA.12  
Corporate non-financial downgrades and defaults  
Defaults lag downgrades



Note: Number of corporate non-financial issuers with debt or instrument downgraded per month, and numbers reporting a default per month. Sources: ESMA, RADAR.

As with downgrades, defaults predominantly affected non-financials, though some defaults were also seen among financial firms. In contrast, no defaults were reported among insurance issuers in our dataset (RA.13).

RA.13  
Corporate defaults  
Defaults predominantly among non-financials

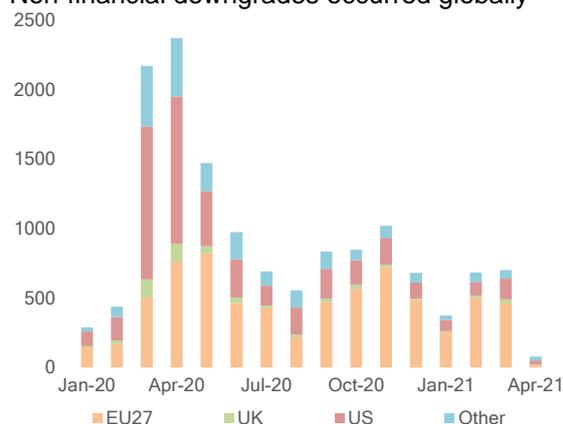


Note: Issuers reporting a default, split by industry. Sources: ESMA, RADAR.

### Impacts felt globally

Looking at how downgrades of non-financials vary geographically, there are significant numbers of downgrades in the EU27, UK and the US and in other countries. Peaks in numbers of downgrades occur in March and April, at the time of the first wave of the COVID-19 pandemic, and again in September, October and November during the second wave (RA.14).

RA.14  
Corporate non-financial downgrades by jurisdiction  
Non-financial downgrades occurred globally



Note: Corporate non-financial issuers experiencing at least one downgrade per month by jurisdiction. Sources: ESMA, RADAR.

Downgrades were less pronounced during the second wave in the UK and the US, likely due to the increasingly positive economic outlook, vaccination advances and renewed government interventions to support businesses.

The rating drift patterns reveal another difference in the EU27, compared to the UK and US (RA.15).

RA.15  
Corporate rating impacts by region  
EU27 ratings drift less volatile



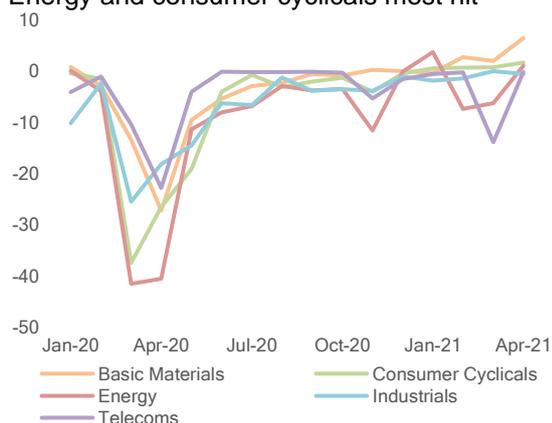
Note: Ratings drift in percent over 2020 for corporate non-financial ratings for EU27, UK and US. Sources: ESMA, RADAR.

They show that non-financials in the EU27 experienced a more limited initial burst of downgrades in the first wave. However, the lower subsequent drift shows that EU27 downgrades then extended for a longer period afterwards. The ratings drift and downgrade charts by jurisdiction also show the gradual reduction in downgrades and the move to positive drift in each of the US, UK and the EU27 by 2021.

## Energy and consumer cyclicals most hit

The pandemic has had very different impacts on different businesses. Here we use a categorisation of into ten sectors to investigate at a high level how different sectors' corporate ratings were affected. This shows that the most affected corporates were those in energy, consumer cyclicals, basic materials, industrials and telecommunications sectors (RA.16).

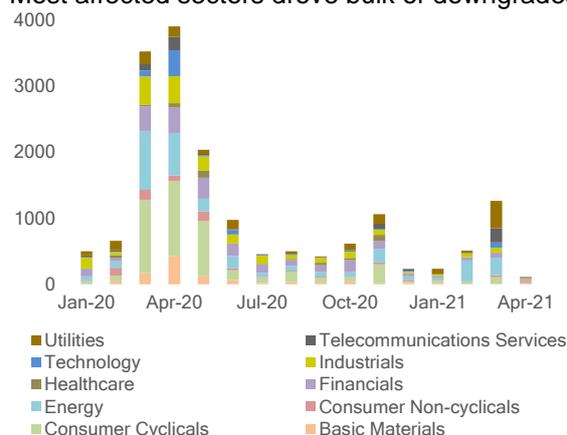
RA.16  
Ratings drift in five most affected sectors  
Energy and consumer cyclicals most hit



Note: Ratings drift for corporate non-financial instruments in percent by sector, for the five sectors with most negative drift over 2020. Sources: ESMA, RADAR, Refinitiv EIKON.

Sectoral impacts were also broadly similar across the EU27, UK and the US. The chart above shows that the most affected sectors were those where demand is particularly sensitive to fluctuations in economic activity. Energy and consumer cyclicals, are the two most affected, followed by basic materials and industrials. Also notable is the extent of the ratings drift shift, with the dips being experienced at levels well beyond what is normal, showing just how extensive downgrades were in the most highly affected sectors. In addition, downgrades in the most affected sectors also accounted for bulk of non-financial corporate downgrades overall (RA.17).

RA.17  
Downgrades of non-financial instruments by sector  
Most affected sectors drove bulk of downgrades



Note: Unique corporate non-financials ISINs downgraded by month, split by sector, rating actions from all jurisdictions. Sources: ESMA, RADAR, Eikon Refinitiv.

At the other end of the spectrum, the healthcare and financials sectors, emerge as the least affected. Both experienced relatively fewer downgrades earlier in the pandemic followed by positive ratings drift in late 2020 and early 2021. These likely reflect the increased demand for healthcare during the pandemic, and the effects of governments' and central banks' strong support measures for capital markets.

## Sovereigns

### Strong variation between countries

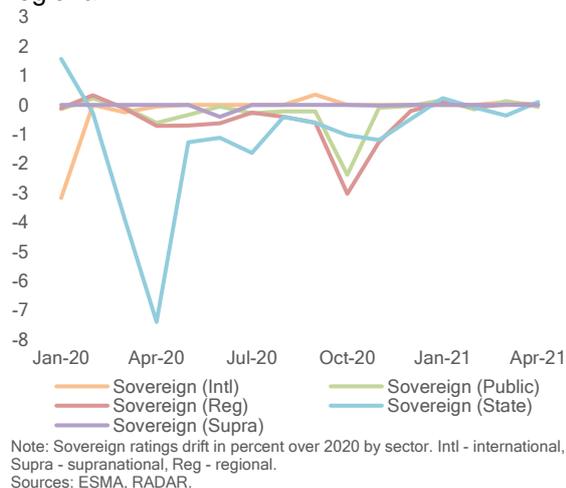
Like corporates, we have observed a sharp increase in downgrades in sovereigns with the pandemic, though impacts vary by jurisdiction.<sup>158</sup>

Looking at the ratings drift by sub-types, a burst of downgrades was observed in spring 2020 for state ratings, following the sharp increase in COVID-19 cases earlier in the year, reflecting the sudden and significant funding challenges faced by governments from lockdown measures dampening economic activity and reducing tax revenue, and from increased government spending to combat the pandemic and to support businesses and households. With the advent of the second wave of COVID-19, we also see a further downward adjustment in credit risk outlook with downgrades increasing, particularly

<sup>158</sup> Note that we analyse not only state-level sovereign ratings but also others, such as ratings for public and regional institutions.

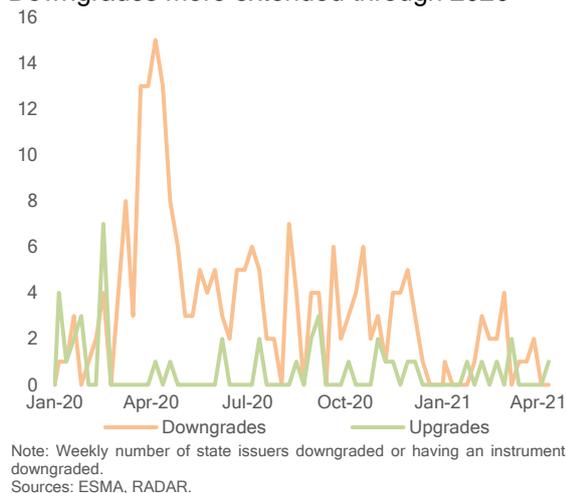
for regional and public ratings, but also state ratings (RA.18).

RA.18  
Sovereign ratings drift  
State downgrades, later falls in public and regional



There have been far more downgrades (165) than upgrades (32) of state issuers since January 2020 (RA.19). While upgrades are rather evenly distributed over time, downgrades are concentrated in the period between the first and second wave of COVID-19, with a peak in spring 2020 at the beginning of the pandemic, showing a broadly similar pattern to corporates.

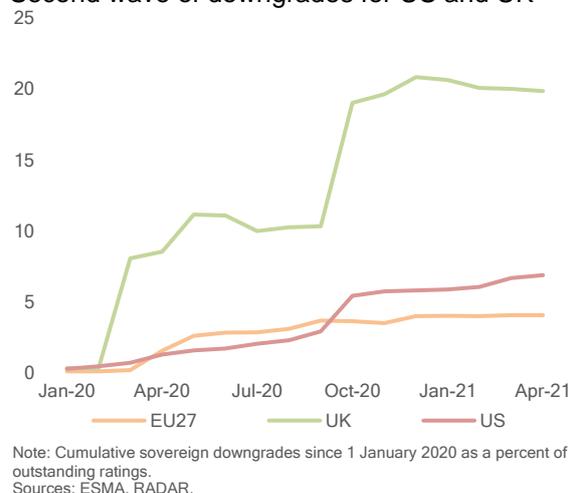
RA.19  
Sovereign downgrades and upgrades  
Downgrades more extended through 2020



Downgrade shocks are distributed heterogeneously across jurisdictions. For

example, the UK experienced two clear waves of sovereign downgrades in spring and autumn 2020, which clearly align with the two waves of the pandemic. This included state-level downgrades in both the spring (Fitch in March) and the autumn (Moody's in October).<sup>159</sup> The US also experienced a jump in sovereign downgrades in the autumn, though less pronounced than the UK. Thus, the EU27 experienced less dramatic rating shifts on average for sovereigns (RA.20). However, impacts across different member states were not uniform.

RA.20  
Cumulative sovereign downgrades from January 2020  
Second wave of downgrades for US and UK



Looking more closely at the EU27 we can see significant differences in how sovereign ratings were affected across member states (RA.21). IT, SK and ES, for example, experienced significant downgrades to their sovereign ratings in the spring.

In contrast, other states were more affected by downgrades around the second wave, such as BE. These large scale downgrades in sovereigns for some of these states are associated with state downgrades (Fitch downgraded IT in April, SK in May).<sup>160</sup>

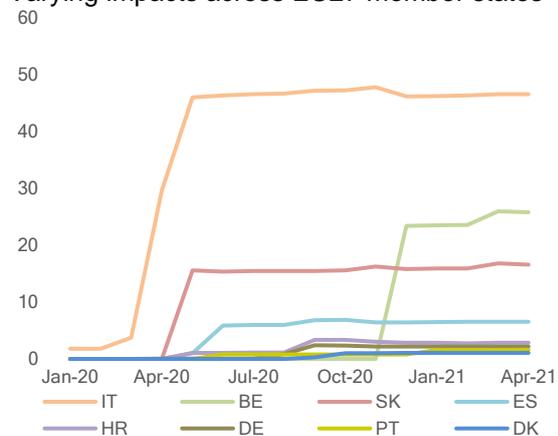
Also, though not very visible in chart RA.21, a large number of member states experienced some downgrades in the autumn – though much fewer than the most affected countries – coinciding with the downgrades for the UK and the US. The timing of downgrades across jurisdictions again appears linked to the waves of

<sup>159</sup> See Fitch Ratings (2020a) and Moody's Investor Service (2020).

<sup>160</sup> See Fitch Ratings (2020b) and Fitch Ratings (2020c).

the pandemic, but with the extent of downgrades varying by country, with some EU27 member states minimally impacted by sovereign downgrades so far during the pandemic.

RA.21  
Cumulative sovereign downgrades from January 2020  
Varying impacts across EU27 member states



Note: Cumulative sovereign downgrades as a percent of outstanding ratings, for 8 most affected EU27 member states.  
Sources: ESMA, RADAR.

## Structured finance

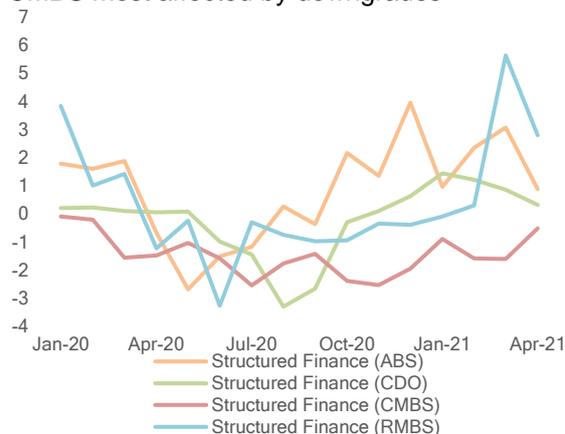
### CMBS most affected

Structured finance product ratings were also strongly affected by the pandemic. The chart below presents ratings drift for the four largest structured finance asset classes, as reported in RADAR (RA.22).

The chart shows a common pattern, a ‘U-shaped’ fall in rating drift, indicative of a gradual increase in downgrades relative to upgrades for each of these types of products, compared with the sharper jump in downgrades in corporates and sovereigns presented above. This is as expected, since the construction of structured finance instruments means that they pool the risks of their underlying portfolios and use waterfall payments to protect more senior tranches, so the effects of the deterioration in credit quality in the underlying debt portfolios are mitigated.

Among structured finance products, CMBS were most affected, with a persistently negative rating drift throughout 2020 and into 2021 (RA.22). In contrast, other instrument types (RMBS, ABS and CDOs) had much shorter periods of negative ratings drift, in the spring and summer, when they experienced a surge of downgrades, and before upgrades began to recover.

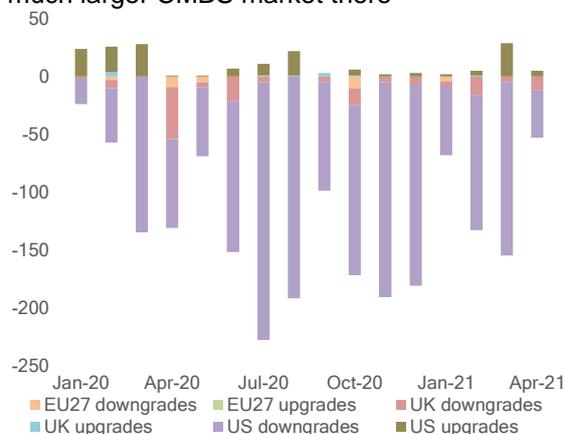
RA.22  
Structured finance ratings drift  
CMBS most affected by downgrades



Note: Structured finance ratings drift in percent over 2020 by sector (ABCP omitted due to a lack of ratings).  
Sources: ESMA, RADAR.

In particular, ABS and RMBS appear to have been on average much less affected by the pandemic. Looking at CMBS in more detail we see that the bulk of the downgrades were in the US (RA.23).

RA.23  
CMBS downgrades and upgrades  
CMBS downgrades mainly in US, reflecting much larger CMBS market there



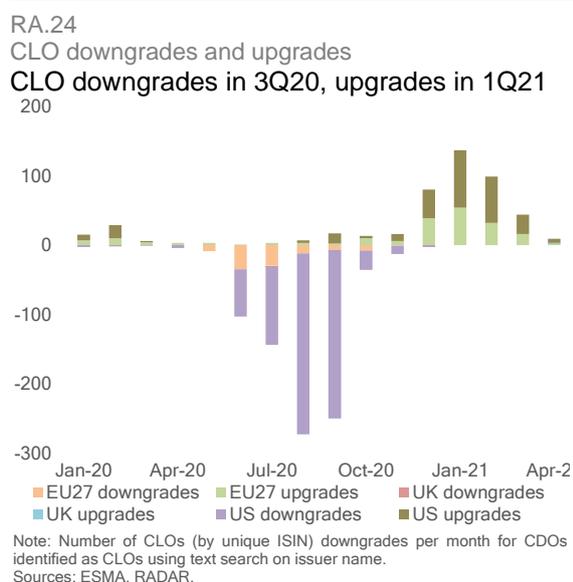
Note: Structured finance CMBS upgrades and downgrades by unique ISIN, split by EU27, UK and US.  
Sources: ESMA, RADAR.

The downgrade patterns for the EU27 and UK, though less visible in the chart, are qualitatively similar with bursts of downgrades at points in 2020 and relatively few upgrades. The strong impacts on CMBS reflect the severe effects of the pandemic on the commercial mortgage performance of businesses such as hotel and retail, whose businesses were severely curtailed. The much larger number of US downgrades compared to those in the EU27 and UK is reflective of the relative size of the CMBS markets in the different jurisdictions rather than a

difference in downgrade pattern (in our data CMBS ratings outstanding for US issuers vastly outnumber those for EU27 or UK issuers).

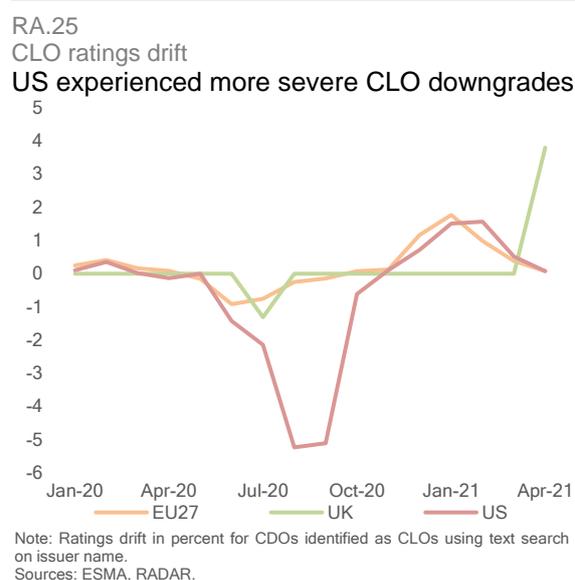
Among other structured finance products, CLOs are of particular interest, because they were already a concern before the pandemic.<sup>161</sup> This was due to their rapid growth in preceding years, increasing levels of leverage in the underlying loans and weakening loan covenants ('covenant-lite' loans) raising concerns that they may not prove resilient in a crisis and that recoveries might be reduced in the case of defaults.<sup>162</sup>

As CLOs are not explicitly reported in RADAR, here we identify CLOs among CDOs using search terms in issuer names indicative of CLOs.<sup>163</sup> In this way, we estimate roughly how many CLO tranches were downgraded over time (RA.24).



The chart shows downgrades occurring in both the EU27 and US in the summer, followed by upgrades in later in the year and into 2021. The downgrades in CLOs took some time to materialise following the first wave of the pandemic, which is likely due to some of their particular characteristics. In particular, CLOs are generally dynamic, meaning they have managers who have some discretion to adjust portfolios in response to a credit deterioration in the underlying loans.

Unlike CMBS, with CLOs the larger number of downgrades in the US than in the EU27 appears to indicate that the pandemic had a greater impact on CLOs issued there. The CLO market, though smaller in the EU than the US, is nonetheless sizeable. Rating drift by issuer jurisdiction shows more extreme shifts in rating drift for US issuers, with a greater, downward shift in the summer (RA.25). Although some caution is needed here, as our dataset may not capture all EU27 and US CLOs both because of the limitations of our method of identifying CLOs among CDOs and because, unlike ratings for EU27 issuers, it is possible that not all US CLO ratings are included in our dataset.



To finish, we look briefly at transition matrices to shed light on which tranches experienced downgrades and to what extent. The CLO transition matrix below presents the rating transitions from 31 January 2020 to 31 October 2020, a period which was chosen because it was the one in which CLOs had experienced downgrades, but upgrades had not yet started (RA.26).

<sup>161</sup> For example, see FSB (2019).

<sup>162</sup> For a detailed discussion of the vulnerabilities of CLOs in crises see Bouveret, A. et al. (2019) and Bouveret, A. et al. (2020).

<sup>163</sup> CDOs with any of the following terms in the issuer name (in upper or lower case) were treated as CLOs: "CLO ", "CLO,", "CLO;", "CLO:", "CLO-", "C.L.O. ", "collateralised loan", "collateralized loan", "levered", "leveraged loan", "leverage loan", "PYME ", "SME ".

RA.26

Transition matrix Jan to Oct 2020

CLOs: More senior tranches resilient

	AAA	AA	A	BBB	BB	B	CCC	CC	D
AAA	100								
AA	0.9	99.0		0.1					
A		0.7	98.6	0.8					
BBB			0.4	92.0	7.3	0.3			
BB				0.1	78.4	19.6	1.9		
B						79.6	20.2	0.3	
CCC							69.2	30.8	
C									100

Note: Percent of Big5 CLO ratings starting in left column rating on 31/1/2020 finish with rating in top row on 31/10/2020. CLOs identified using a term search on issuer names.

Source: ESMA. RADAR.

The matrix shows that the more senior CLO tranches, for example those rated AAA and AA, experienced no or minimal downgrades. Downgrades instead occurred in the lowest rated junior tranches and to a lesser extent, in the mezzanine tranches. Tranches rated BB or lower were particularly impacted, with about a fifth being downgraded.<sup>164</sup>

By way of contrast, the transition matrix for CMBS over the same period shows downgrades across tranches (RA.27).

RA.27

Transition matrix

Transition matrix for CMBS: Jan to Oct 2020

	AAA	AA	A	BBB	BB	B	CCC	CC	C	D
AAA	99.4	0.4	0.2							
AA	0.5	96.6	2.3	0.4	0.1		0.0			
A	0.1	0.7	93.6	4.0	1.2	0.4	0.1			
BBB	0.1		0.2	91.3	4.3	3.6	0.5		0.1	
BB	0.1			0.1	79.5	15.2	4.7		0.2	0.3
B				0.1	0.5	77.7	20.4	0.2	0.3	0.7
CCC						1.2	77.6	5.2	6.8	9.2
CC						1.2	1.2	76.2	8.3	13.1
C				0.2					94.6	5.2

Note: Percent of Big5 CLO ratings starting in left column rating on 31/1/2020 finish with rating in top row on 31/10/2020. CLOs identified using a term search on issuer names.

Source: ESMA. RADAR.

With CMBS, which experienced many more downgrades than CLOs, downgrades occurred in all tranches. As might have been expected, downgrades were, as for CLOs, more prevalent in tranches with a lower initial rating. While some AAA, AA, A and BBB-rated tranches were downgraded, as with CLOs, tranches rated BB or lower were much more impacted, with again about a fifth experiencing downgrades. Perhaps reassuringly, data show that tranches rated IG (BBB or higher) performed better than HY (BB or

lower), with IG tranches being much less likely to be downgraded for both CLOs and CMBS.

Also, noteworthy is that for CMBS some tranches migrated downwards by several rating categories, unlike CLOs where most downgrades were to the next rating category. This highlights the extent to which CMBS have been affected by the pandemic and how CLOs, in particular more senior tranches, have so far proven resilient.

## Conclusion

This article analysed ratings patterns over 2020 to assess which were affected most by the COVID-19 pandemic. It finds that corporates, sovereigns and structured finance were all impacted by downgrades, which came in waves that broadly coincided with the waves of the pandemic.

It also found differences: among corporates, non-financial ratings in particular were impacted more than financial and insurance ratings. In addition, non-financial debt issued in energy and consumer cyclicals was particularly hit, across jurisdictions, reflecting the severe underlying impact of the pandemic on these sectors. For sovereigns, there were differences between jurisdictions, the UK was more impacted by sovereign downgrades than the US and the EU27, but within the EU27 some member states were also strongly affected, such as Italy, Slovakia and Belgium. For structured finance products, CMBS were the most affected, experiencing a persistent flow of downgrades. CLOs were also affected, but more in one wave in the summer, which was later followed by a recovery at the end of 2020. Overall, CLOs have so far performed better than might have been expected, with senior tranches minimally affected by downgrades.

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Bouveret A., Fennell D. and R. Horri R., "Model Risk in CLOs", in ESMA [Reports on Trends,](#)

<sup>164</sup> The transition matrix also shows that all C rated CLOs defaulted. This is due to the one and only C-rated CLO in our sample defaulting.

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## Investor protection

# The market for small credit rating agencies in the EU

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### Summary

In Europe, the three largest CRAs have for years had an overall market share of more than 90 %. EU legislators sought to reduce this imbalance 10 years ago by supporting the use of small CRAs in Europe. This article applies SupTech-related techniques to take stock of market conditions since then, using a unique dataset containing all EU ratings issued and outstanding since 2015 (when the CRA Regulation's reporting requirement entered into force), covering EUR 20 tn worth of EU financial products and nearly 6 000 issuer ratings. Using network analysis techniques, it is clear that the landscape for small CRAs at the EU level is a challenging one: small CRAs are used almost exclusively in local single-rating markets (the 'periphery'), and are locked out of the larger 'core' market (of issuers seeking more than one rating for their products or themselves). This larger market is shared almost exclusively among the three largest CRAs, and the associated industry-wide Herfindahl-Hirschman Index (HHI) levels are consistently at levels usually deemed to be "highly concentrated". Lastly, the article introduces a simulation exercise for alternative legislative rules designed to boost competition in EU markets for credit ratings. Strengthening legislative requirements to make use of small CRAs when seeking an additional rating for a product or issuer is associated with an average reduction in overall EU CRA industry concentration of roughly 40 to 55 %, leading to HHI levels that are no longer "highly concentrated" from a competition perspective.

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### Introduction<sup>165</sup>

In Europe, there are many Credit Rating Agencies (CRAs) whose ratings are eligible to be used for meeting regulatory requirements, such as a minimum number of ratings, and calculations, such as the inputs to capital requirement formulae. However, despite the large number of agencies, the respective market shares achieved by each CRA have evolved little in recent years, including those of small CRAs,

while the aggregate EU market share of the three largest CRAs has consistently exceeded 90 %.

European legislators have previously identified these high levels of market concentration as a key issue, justifying legislative reform. For example, a 2011 European Commission Impact Assessment<sup>166</sup> accompanying a proposal<sup>167</sup> to modify the CRA Regulation (CRAR<sup>168</sup>), noted a number of barriers to effective competition in EU credit rating markets, and noted that "*the structure of the market for rating services unveils a level of concentration which is significantly high*" and that "*For investors...the high market*

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<sup>165</sup> A near-final draft of this article was shared with all currently ESMA-supervised CRAs for a check of any factual errors or inconsistencies.

<sup>166</sup> [Commission Staff Working Paper Impact Assessment accompanying the document Proposal for a Regulation amending Regulation \(EC\) No 1060/2009 on credit rating agencies and a Proposal for a Directive amending Directive 2009/65/EC on coordination on laws, regulations and administrative provisions relating to undertakings for collective investment in transferable](#)

[securities \(UCITS\) and Directive 2011/61/EU on Alternative Investment Fund Managers](#), Brussels, 15.11.2011; SEC(2011) 1354.

<sup>167</sup> [Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Regulation \(EC\) No 1060/2009 on credit rating agencies](#), COM/2011/0747 final - 2011/0361 (COD)

<sup>168</sup> [Regulation \(EC\) No 1060/2009 of the European Parliament and of the Council of 16 September 2009 on credit rating agencies](#).

*concentration emphasizes the problem of overreliance on the few international rating agencies*". The subsequent final modifications<sup>169</sup> in mid-2013 to the CRAR contain several articles that seek to remedy this situation and boost competition among CRAs (discussed in the next section).

Nearly 10 years after the initial Commission proposal, this article aims to take stock of the situation in EU credit rating markets at the current juncture. In particular, the article relies on a unique dataset containing the entire timeline, since 2015 (when the CRAR reporting requirement entered into force), of rating actions on EUR 20 tn worth of EU financial products and nearly 6,000 issuers rated by an EU-registered CRA. The article aims to consider the perspective of a small registered CRA that is active in the EU, and examines the network of joint ratings on the same product and entities to build up a novel picture of concentration in the EU CRA industry. In addition, a simulation exercise examines the possible effect of alternative policy measures on a standard measure of market concentration.<sup>170</sup>

The next section provides further motivation for this analysis, including additional background on the key legislative provisions of the CRAR that aim to stimulate competition among rating agencies.

## Why conduct this analysis

### Background on the CRA Regulation

The CRAR contains several articles that seek to encourage competition in European credit rating markets. In particular, Article 8d requires that, where an issuer or related third party "intends" to appoint two or more CRAs, that issuer or related third party must consider appointing at least one

CRA with no more than 10 % market share (hereafter denoted a "small CRA") if there is one "available" (i.e. with the necessary expertise to rate that product). Article 8d then specifies that, where the issuer or related third party does not appoint at least one small CRA, this should be documented.<sup>171</sup>

ESMA is empowered under the CRAR to register and supervise EU-based CRAs. Registration with ESMA in turn enables CRAs' ratings to be used for regulatory purposes, for example when calculating capital requirements for various products. However, although ESMA supervises CRAs, Article 8d of the CRAR is addressed to issuers and related third parties. The supervision and enforcement of these provisions are therefore entrusted to Sectoral Competent Authorities (Article 25a of the CRAR). In other words, the legislative intent behind Article 8d is to affect the decisions of issuers and related third parties. Over time, it is expected that these decisions will stimulate greater use of small CRAs and, therefore, support the development of competition among all EU-registered CRAs.

The CRAR recognises that it may not always be easy to identify smaller CRAs that could be capable of providing a credit rating for an issuer or its issuances. For this reason, the CRAR requires ESMA to publish an annual report on CRAs' market shares (ESMA, 2020). This report provides statistics—which are aligned with the legal definitions set out in the CRAR—of the respective market share of each ESMA-registered CRA's overall EU market share. This publication can thus enable issuers or related third parties to easily identify an EU registered CRA with less than 10 % market share.

The ESMA CRA market share report also includes an overview of the types of credit ratings offered by each CRA, such as ratings related to non-financial corporate entities and issuances,

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<sup>169</sup> [Regulation \(EU\) No 462/2013 of the European Parliament and of the Council of 21 May 2013 amending Regulation \(EC\) No 1060/2009 on credit rating agencies.](#)

<sup>170</sup> The specific article of the CRAR on which this analysis focuses is not within ESMA's regulatory and supervisory mandates—ESMA is producing this analysis from the perspective of its investor protection mandate, as set out in the ESMA Regulation.

<sup>171</sup> There is a second competition-related article in the CRAR: Article 8c, which requires that at least two different CRAs be hired to rate structured finance instruments (regardless of size). Article 8d covers ratings on both instruments and entities, whereas Article 8c only concerns a subset of instruments (structured finance instruments). Article 8d therefore has a broader scope

than Article 8c. Furthermore, Article 8d is relatively more relaxed than Article 8c: under Article 8d, issuers must only "consider" appointing a small CRA and, if they do not, must "document" this. In contrast, under Article 8c, as soon as a structured finance instrument is issued, it must be rated by two or more CRAs (and the issuer must also, as per Article 8d, "consider" appointing at least one small CRA to rate that structured finance issuance or otherwise "document" that it has not done so).

In addition, a third competition-related article in CRAR is Article 6b, which establishes a rotation requirement among CRAs with respect to re-securitisations. The analysis contained in this paper relates to considerations on the extent of competition between small and large CRAs and, therefore, focuses on Article 8d.

financial institutions (excluding insurers), insurers, sovereign and public finance, and structured finance. Furthermore, the report displays each ESMA-registered CRA's market share by asset class. This asset-specific market share can be useful because some CRAs may have a larger market presence in specific asset classes than is implied by their overall market share.

These additional elements aim to help market participants easily identify small CRAs and, therefore, support the objectives of Article 8d of the CRAR. In addition, with a view to complementing and improving the effectiveness of these provisions and assisting the Sectoral Competent Authorities (SCAs) that supervise the provisions of Article 8d, on 6 April 2017, ESMA published a Supervisory Briefing setting out "A Common Approach to the CRA Regulation's Provisions for encouraging the use of smaller CRAs" (ESMA, 2017). Its purpose was to provide guidance to the SCAs on the application of Article 8d by providing:

- a common Supervisory Approach as to which issuers and related third parties are covered by Article 8d;
- a standard form for issuers or related third parties to "document" cases where a small CRA was not used.

### Why assess the impact of Article 8d

As mentioned in the previous section, Article 8d forms part of the legislator's efforts "to increase competition in a market that has been dominated by three credit rating agencies" (recital 11 of the 2013 CRAR amendment). In line with ESMA's relevant mandates for consumer protection and trends, risks, and vulnerabilities detection (Articles 9(1) and 32 of ESMA's founding Regulation<sup>172</sup>), as well as ESMA's unique access to the European Rating Platform (ERP) dataset—

discussed in the next section—it appears appropriate to examine the extent to which Article 8d has been successful in narrowing the gap between small and large CRAs since June 2015.

This is a topic that has previously been acknowledged as important in theory, but that could not yet be examined using data. In other words, it was previously not easy to understand the effectiveness of Article 8d in supporting the usage of small CRAs.<sup>173</sup>

Moreover, in absolute terms, the sheer size of EU credit rating markets makes it worthwhile to examine this issue. Reporting to the ERP began on 1 July 2015, and by the data cut-off date (3 May 2021), a total of EUR 20 tn worth of instruments had been reported (70 970 total instruments), along with ratings on issuers or related third parties (7 697 entities whose instruments are rated and/or who are themselves rated).<sup>174</sup>

Now that the ERP has been established and functional for several years, such a preliminary assessment can be conducted. The next section describes the dataset in greater detail, as well as some high-level statistics concerning EU credit rating markets.

## European Rating Platform and other data used

### Description of the dataset

The analysis in this article relies primarily on information contained in the ERP, which by law has been collecting information on credit ratings on all outstanding instruments and issuers since 1 July 2015.<sup>175</sup> The ERP dataset includes information on every rating action taken on each

<sup>172</sup> [Regulation \(EU\) No 1095/2010 of the European Parliament and of the Council of 24 November 2010 establishing a European Supervisory Authority \(European Securities and Markets Authority\)](#)

<sup>173</sup> For example, ESMA's Technical Advice to the Commission, provided as part of Article 39(5) of the CRAR, noted that "It is not currently possible to determine the scope of the markets on which Article 8d might have an impact as the number of entities and instruments which have multiple ratings cannot be identified through the CEREP database. However, the ERP will allow investors to see which CRAs have issued a credit rating on a particular entity or instrument so ESMA will be able to carry out this assessment in future." (ESMA, 2015)

<sup>174</sup> Using the maximum value reported per instrument in the ERP anytime since 1 July 2015. The maximum value approach is more accurate than taking the total value in the ERP as at the latest-available data cut-off date, because there are instruments that amortise over time, such as securitisations.

<sup>175</sup> [Commission Delegated Regulation \(EU\) 2015/2 of 30 September 2014 supplementing Regulation \(EC\) No 1060/2009 of the European Parliament and of the Council with regard to regulatory technical standards for the presentation of the information that credit rating agencies make available to the European Securities and Markets Authority](#)

instrument and issuer, and on which CRA took the action and on what date.

The ERP also includes additional descriptors of the instrument (e.g. ISIN code, volume at issuance, issuance date, and maturity date) and of the issuer (e.g. industry and Legal Entity Identifier(LEI)). We then add information from the Financial Instrument Reference Data System (FIRDS) and the Global Legal Entity Identifier Foundation (GLEIF) master copies of the LEI / Entity Name mappings. These supplementary datasets enable quality checks to be performed, for example to confirm that CRAs are reporting issuer LEI codes consistently across instruments and issuers (thus enabling information to be aggregated).

Table RA.28 provides a high-level overview of the size the ERP dataset, broken down by instrument category and issuer rating. The largest category of instruments by number and by value consists of instruments issued by financial institutions (38 089 instruments, worth a total of EUR 8 tn). Finally, the ERP dataset includes 5 917 issuer ratings as well, which brings the total size in terms of number of unique rated instruments or entities to 76 612<sup>176</sup>, from 7 697 unique issuers.

RA.28  
Breakdown of ERP dataset by category  
EUR 20 tn of rated instruments

Category	Value ( tn EUR)	Number	Number of issuers
Instrument: Corporate	6	11 968	1 801
Instrument: Financial	8	38 089	640
Instrument: Insurers	0.3	521	107
Instrument: Sovereign	3	10 371	346
Instrument: Structured Finance	2	10 021	678
Issuer Ratings	N/A	5 917	5 917
<b>Total</b>	<b>20</b>	<b>76 612</b>	<b>7 697</b>

Note: The table displays the information available in the ERP dataset, covering both instrument and issuer ratings with at least one rating action on or after 1 July 2015 (up to and including 3 May 2021). Outstanding amounts are expressed in tn EUR, using the maximum value over the lifetime of the instrument. Issuer ratings total is not equal to sum of table rows: one issuer can both issue rated instruments and be rated itself.

Sources: ERP, FIRDS, GLEIF, Refinitiv, ESMA.

In order to establish some context for the remainder of the analysis, Table RA.29 below summarises the overall market share and number of CRAs that are or have been registered by ESMA and for which instruments are reported in the ERP (only covering solicited ratings for EU issuers, see next section for further details). This table compiles the information provided in ESMA's annual market share calculation reports discussed above. It is clear from this table that the overall EU market share captured by small CRAs has not evolved much over time, despite their regular presence in the market.

<sup>176</sup> Compared with 167 531 instruments in the FIRDS as at the same data cut-off date. In addition, outliers in terms of the nominal outstanding value have been removed out of prudence (using the 97.5th percentile—which is set at

EUR 2.2 bn. This has the effect of removing 2 209 instruments whose nominal value is allegedly EUR 22.6 tn (i.e. c. 53 % of the dataset).

## RA.29

Breakdown of ERP dataset by category

Small and large CRAs market shares have not evolved

Year	Market share: Small CRAs	Market share: Large CRAs	Number of small CRAs	Number of large CRAs
2015	8%	92%	24	3
2016	7%	93%	24	3
2017	7%	93%	24	3
2018	7%	93%	25	3
2019	8%	92%	25	3
2020	9%	91%	24	3

Note: The table displays the market share for each registered CRA, as calculated by ESMA in accordance with Article 8d(3) of the CRAR, using the annual turnover generated from credit rating activities and ancillary services at group level in the EU for that CRA or group of CRAs. The number of registered CRAs reflects all CRAs registered with ESMA as presented in its annual market share calculation report. When calculating the number of CRAs, different registered CRAs within the same group are classed as one CRA. INC Rating was de-registered on 26 November 2020—if this is taken into account, the number of small CRAs in 2020 is 23 rather than 24. See <https://www.esma.europa.eu/supervision/credit-rating-agencies/risk>  
Source: ESMA

The next section provides further background on the data sample and methodology for this article.

### Necessary assumptions for the analysis

Some further interpretations of Article 8d and the dataset were necessary in order to be able to produce the analysis in this article.

For example, it is challenging to fully assess the extent to which Article 8d has been respected, insofar as observing whether an issuer has truly “documented” the fact that it did not include a CRA would require detailed investigation of thousands of documents, which is clearly beyond the scope of this analysis (and not within ESMA’s regulatory and supervisory mandates). Instead, the ERP can be used to at least observe the

extent to which small CRAs have been hired when two or more CRAs are rating an instrument or entity.

Further assumptions behind this analysis include:

- *Scope of instruments to include:* Only solicited, long-term, and local currency ratings for instruments and issuers located in the EU have been included in this analysis.
- *Start date:* Only instruments issued on or after 1 July 2015 have been included, plus all issuers in the ERP.<sup>177</sup>
- *No grace period for applicability of Article 8d:* With respect to ratings on instruments, it is assumed that Article 8d applies starting from the issuance date of the instrument. An instrument is still flagged as possibly not complying with Article 8d if it does not meet these articles for even a few days after its issuance date. The rationale is that, from an investor protection perspective, having a rating (and accompanying assessment) from a CRA at issuance can be an important factor in ensuring that investors make informed investment decisions.
- *Time period during which Article 8d applies:* In line with the previous assumption, it is also assumed that Article 8d applies for the entire time that an instrument or issuer is rated by two or more CRAs. This assumption appears the most reasonable of the possible choices: for example, if one instead assumed that Article 8d only applied for the first 3 days after issuance of a 30-year securitisation tranche, then an issuer could in practice seek to comply only for those three days and then remove the second rating for the remaining 29.99 years, which would surely be against the spirit of Article 8d.

Incorporating the above considerations enables some necessary data cleaning steps to be performed.<sup>178</sup> Thereafter, one can examine the impact that Article 8d has had on EU credit rating markets. This is the focus of the following section.

<sup>177</sup> There also exist instruments that were retired or matured before 1 July 2015—these instruments would not be required to be reported to the ERP. In turn, this means that the ERP cannot be considered as an authoritative description of the market for EU credit ratings prior to 1 July 2015.

<sup>178</sup> These include conversion of outstanding amounts to euro using the corresponding exchange rates as of 19 May 2021, checks on the LEI being reported (e.g. for a securitisation, the LEI of the Securitisation Special Purpose Entity or the LEI of the originator of the

underlying assets). Other checks include verifying the most plausible country being reported in the ‘Country’ field of the ERP: the country where the instrument is listed, where the issuer is established, or (for structured finance ratings) where the underlying assets being securitised are located (and, where there are securitised assets located in more than one country, which country is likely to be reported).

## First indications of potential business for small CRAs

As described above, Article 8d specifically applies where at least two or more CRAs have been appointed to rate either an issuer or an instrument. In the dataset, a total of 2 693 issuers or related third parties have been rated by at least two CRAs, out of 7 697 total issuers in the sample. Furthermore, 31 518 instruments have been rated by two or more CRAs, out of 70 970 total instruments in the sample.

Out of the sample of 2 963 issuer ratings and 31 518 instrument ratings rated by at least two CRAs, it appears that 2 684 or about 90 % of multiple CRA-rated issuer ratings (by number), and 30 948 or about 99 % of instrument ratings (by number, worth a total of about EUR 11 tn) have been rated by two or more CRAs, of which none are small.<sup>179</sup> In consolidated terms (since some instruments are rated but the issuer itself is not rated), this implies that 4 169 issuers should be complying with the Article 8d documentation requirement.

The next step would be to determine whether, in all of these cases, the fact that a small CRA was not appointed has been documented by the issuer, as required under Article 8d. Such checks could form part of the supervisory activities of the SCAs—this would involve contacting a total of 4 169 issuers.

Table RA.30 below explores the share of each issuer's instruments that have been rated by two or more CRAs without including any small CRAs and would therefore need to be documented. Table RA.30 in principle could support SCAs' processes to determine which issuers to focus any supervisory efforts on. The table shows that the sample of 30 948 instruments that require documentation under Article 8d is skewed: more than half of issuers in this group have 75% or more of their instruments (in terms of value, i.e. EUR 6.5 tn out of a total of EUR 11.2 tn) rated by two or more CRAs, of which none are small.

RA.30  
Categorising issuers with Article 8d documentation needs  
EUR 11 tn worth of assets need documentation

Share of issuer instruments needing documentation (per cent)	Number of instrument issuers in this category	Total value of instruments in this category (bn EUR)	Number of instruments in this category
0.1 to 25%	139	227	867
25 to 50%	488	1 602	5 535
50 to 75%	286	2 898	7 538
75 to 99.9%	369	4 778	13 277
100%	948	1 745	3 731
<b>Totals</b>	<b>2 230</b>	<b>11 251</b>	<b>30 948</b>

Note: The table allocates issuers in the sample to categories, based on the share of each individual issuer's instruments that are rated by two or more CRAs, none of which are small. The share of each issuer's instruments in this category is expressed as the total value of instruments rated by two or more CRAs (none of which are small), divided by the total value of all instruments issued by that issuer. Instrument value is calculated as the maximum value outstanding over the lifetime of the instrument in the ERP. Only issuers whose instruments have been rated are shown in the first column (issuers that are rated but do not have any instrument ratings are not shown in the table).

Sources: ERP, FIRDS, GLEIF, Refinitiv, ESMA.

## Concentration in EU credit rating markets

The ERP data can also be used to examine the extent to which issuers use certain CRAs—or, from another perspective, the extent to which the market for ratings is dominated by certain CRAs. This issue appears to already have been anticipated in the CRAR: recital 11 therein mentions “*a market that has been dominated by three credit rating agencies*”. Indeed, the cleaned ERP dataset is in fact capturing a network: that of connections between the issuers hiring CRAs to provide ratings and the actual CRAs hired.

Chart RA.31 below illustrates a snapshot of this network, using the set of EU ratings outstanding as at the end of 2020 for ESMA-registered CRAs.

<sup>179</sup> Alternatively: 10 % of issuer ratings and 1% of instruments—both by number—would not need any documentation). In other words, at some point in their (i.e. the instrument's or issuer's) lifetime between 1 July 2015 and the data cut-off date of 3 May 2021, two or more CRAs were providing ratings on 2 684 issuers and 30 948

instruments, and none of these CRAs were “small CRAs”, despite the fact that, in this period, there was at least one small CRA available and capable of rating that instrument and/or issuer

CRAs are represented with red circles, issuers are represented by blue circles, and a connection between an issuer and a CRA (i.e. an issuer appointing a CRA for an instrument or issuer rating) by a black line. The size and position of each CRA reflects the number of ratings that it provides — larger and more centrally-located circles therefore imply a greater market share captured by the CRA.

Chart RA.31 visually confirms that three CRAs capture the vast majority of ratings issued in the EU. The remaining CRAs appear to be far less used and are further away from the 'centre' of the industry, which demonstrates that most of these small CRAs are operating in separate product and geographic markets. Thus, despite the policy intentions set out in the CRAR, including in the above-mentioned recital 11, the 'core' EU market for credit ratings continues to be "*dominated by three credit rating agencies*".

Furthermore, small CRAs appear to be used chiefly when only one rating is required. This can be seen in Chart RA.31 by the fact that many issuers doing business with small CRAs are located (on the graph) near those CRAs and are thus on the outside of the graph. In contrast, many of the issuers that do business with large CRAs are located *between* the large CRAs (i.e. many blue dots are between the large CRAs and have connections — black lines — running to more than one large CRA). The appearance of several circular layers of blue dots in the chart relates to the amount of connections (i.e. the

amount of ratings purchased) by an issuer. Issuers with a greater number of ratings obtained from CRAs (i.e. that provide more business to CRAs) are located more towards the centre of the network.

Similarly, Chart RA.31 suggests that there are comparatively few cases of a small CRA being used in conjunction with a large CRA (i.e. a line from a blue dot to both a CRA located on the periphery of the graph—a small CRA—and to a CRA located in the centre of the graph—a large CRA). In most cases of multiple CRAs being assigned (i.e. more than one black line going from a single blue dot), it is multiple large CRAs that are hired.

Thus, Chart RA.31 suggests that small CRAs tend to have their own clients (which almost exclusively rely on those small CRAs) in smaller markets for credit ratings (i.e. the 'periphery') and to be locked out of the larger 'core' EU market consisting of issuers that seek more than one rating. This larger 'core' market is being shared almost exclusively among the large CRAs.<sup>180</sup>

The present section has taken a backward-looking perspective on the entire universe of CRA ratings at once. The next section takes a more dynamic perspective, and explores the extent to which alternative formulations of Article 8d could have potentially affected the extent of concentration in EU credit rating markets.

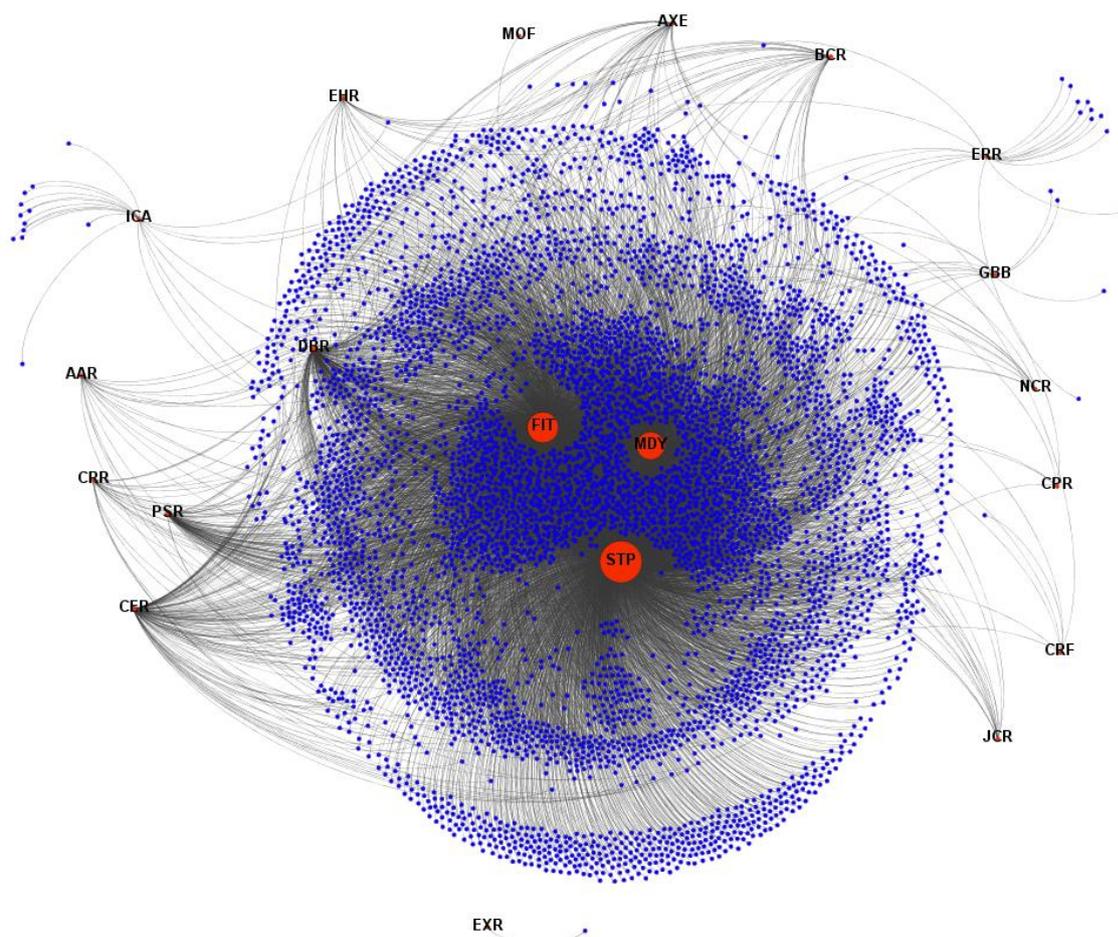
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<sup>180</sup> In this respect the 'core' and 'periphery' structure can potentially be interpreted as the 'international market ratings issued in the EU' versus 'ratings issued in individual national markets within the EU'. Under this perspective, many of the issuers that do business with large CRAs are pan European or global issuers seeking ratings for use in international markets. This stands in

contrast to smaller issuers that seek ratings for products, such as debt issuance, that is only aimed at a domestic investor base. See section 3 (pages 13-57) of ESMA's [Technical Advice: Competition, choice and conflicts of interest in the credit rating industry](#), published on 30 September 2015.

## RA.31

Issuer's use of credit rating agencies in Europe  
Three CRAs dominate the European market for credit ratings



Note: The chart displays the connections between issuers (blue dots) and EU-registered credit rating agencies (CRAs; red bubbles) using the set of outstanding EU ratings as at end-2020 for ESMA-registered CRAs. The number of CRA ratings on issuers' instruments are aggregated for each issuer; the size of each CRA circle reflects the relative number of ratings they provide. CRA names have been shortened to facilitate display.

Sources: ERP, FIRDS, GLEIF, Refinitiv, ESMA.

## Simulating the impact of alternative policies

The ERP dataset also makes it possible to conduct simulations of how EU ratings markets might have developed under alternative policies that aim to stimulate the use of small CRAs in Europe. This section outlines an initial investigation performed in this direction.

The goal is to obtain greater clarity on what alternative policy measures would result in a European market that is no longer “*dominated by three credit rating agencies*”. It is emphasized that there are no correct or incorrect answers to this exercise; like all simulations, the purpose is to better understand the contours of possible courses of action. Whether those actions are

desirable or not is a question for elected representatives.

To perform these simulations, individual EU rating markets are reconstructed at various time windows, using the ERP dataset. In other words, snapshots are produced that reflect the landscape for EU credit rating services at that date. A total of thirteen snapshots are produced: starting from 1 July 2015 to 31 December 2015, and every six months thereafter until the first half of 2021 (i.e. roughly six years of data). Each snapshot reflects outstanding instrument and issuer ratings at that date, plus new issuances between the previous date and the current one, less maturing instruments, rating withdrawals. New CRA registrations and CRA de-registrations are also reflected.

Ratings data on issuers and instruments located in all EU countries (plus the UK—given that the data go back to many years before Brexit) are included, reflecting Corporate, Financial, Insurer, Sovereign, and Structured Finance ratings. Markets are defined at the local level, i.e. for a specific product type (see previous sentence) within a single EU country. This definition reflects the Commission’s own impact assessment as well as ESMA’s 2015 technical advice (see Introduction). This results in a total of 140 local markets within the EU being defined.

At each snapshot date, a standard market share-based measure of market concentration is calculated—the Herfindahl-Hirschman Index (HHI).<sup>181</sup> The HHI approaches 0 when a market is occupied by a large number of firms of relatively equal size. The maximum HHI is 10 000 points, which signals that a market is controlled by a single firm. Thus, the higher the HHI, the more concentrated the market.

The HHI is taken as a rough measure of competition in EU credit rating markets. There are many other ways to assess the extent of competition in a given market, such as the extent of cross-shareholdings, barriers to entry, reputational effects, and so forth.<sup>182</sup> However, the HHI is one of the most well-established measures and, furthermore, can be easily calculated using the ERP dataset. It is commonly used by competition authorities, such as the European Commission’s DG COMP and the United States Department of Justice (DoJ) Antitrust Division,

when considering the competition impact of two or more parties merging.<sup>183,184</sup>

It is generally accepted that a market with an HHI of 2 500 points or above is highly concentrated, and that a high HHI would trigger competition concerns.

The HHI has been calculated for each of the following variations of Article 8d, in each time window mentioned (see the Annex for further details on the simulation steps):

- *Baseline (actual situation)*: Keeping the version of Article 8d as it is in the CRAR—this is the ‘baseline’ against which the subsequent variations are compared. There are no simulation steps here—actual ‘real-life’ data is used to calculate the HHI.
- *Scenario 1: If hiring two CRAs, must use one small CRA*: Article 8d is modified to read that, if an issuer obtains two or more ratings, then the issuer must appoint (rather than “consider” appointing) at least one small CRA.
- *Scenario 2: Must always hire two CRAs, of which one must be a small CRA*: issuers and instruments that seek to be rated must always obtain at least two ratings, of which at least one must come from a small CRA.

These scenarios are intended to assess the impact on local credit rating markets of straightforward modifications to the current Article 8d. Scenario 1 essentially strengthens the language of Article 8d—whereas Article 8d currently provides that an instrument/issuer with two or more ratings must “consider” hiring a small

<sup>181</sup> The Herfindahl-Hirschman Index is equal to the sum of the squared market shares of each CRA active in a given time window, where the shares are percentages in decimal format. Note that market share here is calculated in terms of ratings provided, rather than the revenue-based measure required under the CRAR. The latter has been deemed to be an imperfect measure of market share due to difficulties in estimating revenue from “ancillary services”—see pages 39-40 of ESMA’s [Technical Advice: Competition, choice and conflicts of interest in the credit rating industry](#), published on 30 September 2015.

For example, in a market with only three CRAs, if CRA 1 rates 30 % of outstanding instruments and issuers, CRA 2 rates 40 % of outstanding instruments and issuers, and CRA 3 rates 20 % of outstanding instruments and issuers, then the Herfindahl-Hirschman Index is  $30^2 + 40^2 + 20^2 = 2,900$ . In a market with only two CRAs—as is often the case in many local product markets in the EU—with hypothetical shares of 40 % and 60 %, the Index is  $40^2 + 60^2 = 5,200$ .

In the context of CRAs, the number of ratings (rather than the value) is used to proxy market share, due to changes in the nominal value outstanding over time for some instruments such as structured finance issuances and

also to allow issuer ratings to be considered alongside instrument ratings. More specifically, the relative concentration of the market for issuer and instrument ratings is calculated by counting the number of entity and issuer ratings provided by the CRA in that time window, and dividing that number by the number of ratings provided in the market overall in that same time window. This creates the inputs that are fed into the HHI formula.

<sup>182</sup> With respect to ratings, competition could also be analysed in terms of quality of credit ratings (such as accuracy with respect to default risk probabilities).

<sup>183</sup> DG COMP: [Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings](#), Official Journal C 031, 05/02/2004 P. 0005 – 0018.

<sup>184</sup> The US Department of Justice (DoJ) has also published similar guidelines: [Horizontal Merger Guidelines \(Issued 19 August 2010\)](#), section 5.3. The DoJ considers a market with an HHI that is between 1 500 and 2 500 points to be “moderately concentrated”, while an HHI that is above 2 500 points is considered to be “highly concentrated”. See also <https://www.justice.gov/atr/herfindahl-hirschman-index>

CRA, then scenario 1 replaces “consider” with “shall” hire a small CRA. Scenario 2 extends Scenario 1 by widening the scope of Article 8d to cover all instruments. As discussed above, these scenarios are illustrations to explore possible ways in which one of the aims of the CRAR (a European market that is no longer “*dominated by three credit rating agencies*”) might be achieved. Many other scenarios beyond revisions to Article 8d could be explored as well.

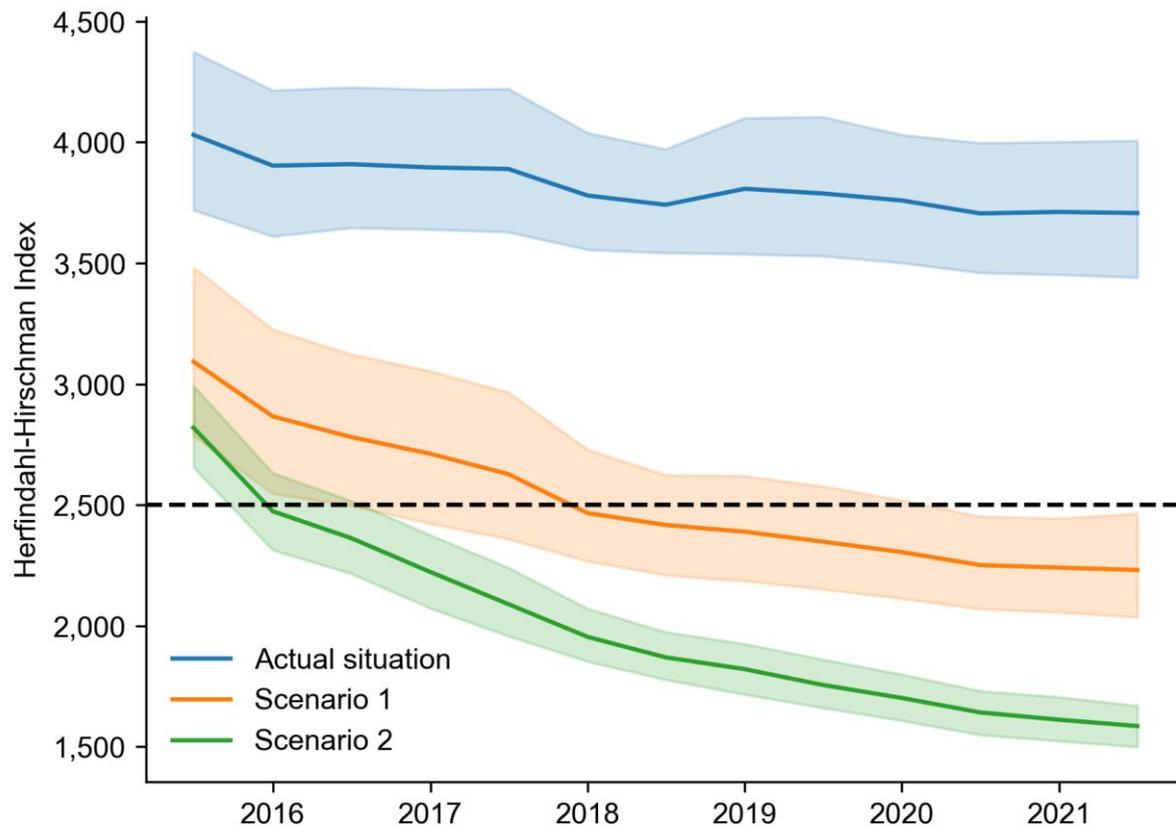
Chart RA.32 below presents the evolution of the HHI for each of the simulations. Each variation displays the range (shaded area) in HHI for the local markets examined, with the average HHI for that variation displayed by the solid line within the shaded area. In other words, the HHI is calculated for each of the 140 local (i.e. within-country and product-specific) markets, for both the baseline and two alternative policy scenarios, at each time window. The chart contains several interesting results:

- The extent of actual (i.e. outturn) concentration in European CRA rating markets, measured by the HHI, and shown by the blue area and line, has stood at 3 707 points as at mid-2021, and had a long-term average HHI of 3 815 points, with local markets tending to range anywhere from 2 323 and 7 350 points in the past six years. These figures are generally above the “highly concentrated” threshold of 2 500 points—shown in the chart by the dashed black line.
- The actual situation (shaded blue area and line in Chart RA.32) also demonstrates that this situation has not evolved since the introduction of the CRAR. In other words, Article 8d, in its present form, does not seem to have led to a different situation from the time of the CRAR’s recital 11, i.e. “*a market that is dominated by three credit rating agencies*”.
- The orange shaded area and line in Chart RA.32 below displays the range in industry concentration for local rating markets in the EU under an adjusted Article 8d. The orange area and line are dramatically lower than the baseline situation (i.e. blue area and line). The orange area demonstrates that, if Article 8d were adjusted in line with scenario 1 (an issuer appointing two CRAs is required to appoint at least one small CRA), CRA industry concentration in the EU would steadily fall, reaching an average HHI across local markets 2 231 points by mid-2021, i.e. nearly 1 400 points lower than the actual situation at the same date and below the “highly concentrated” threshold of 2 500 points. This would constitute an average reduction in market concentration levels (relative to the baseline scenario) of 40 % by mid-2021.
- If Article 8d were adjusted in line with the more ambitious scenario 2 (all instruments must carry at least two ratings, of which at least one must come from a small CRA), then the degree of concentration in the EU market for CRA rating services would fall further, to an average HHI across local rating markets of 1 586 points by mid-2021. Although lower than the HHI under scenario 1, the reduction here is by a comparatively smaller amount (relative to scenario 1) than the reduction achieved when moving from the baseline to scenario 1 (see previous bullet). The evolution in the HHI under scenario 2 is shown in the green shaded area and line in Chart RA.32 below. This would constitute an average reduction in market concentration (relative to the baseline scenario) of 56 % across local rating markets in the EU by mid-2021.

RA.32

Actual and simulated concentration in the European CRAs market

Alternative versions of Article 8d could dramatically reduce concentration in the EU market for credit ratings



Note: Each shaded area and line illustrates the range (95 per cent confidence interval) and average in the local market Herfindahl-Hirschman Index (HHI) under each snapshot date, for the baseline (Actual Situation), and two scenarios. Scenario 1 is summarised as “if hiring two CRAs, must use one small CRA” and Scenario 2 is summarised as “Must always hire two CRAs, of which one must be a small CRA”. Six-monthly snapshot dates are used, starting from 2015H2, i.e. including instruments and issuers newly rated between the start and middle of 2015, as well as outstanding as at mid-2015, less any instruments and issuers whose ratings were withdrawn or suspended, as well as less any instruments that matured in this period. The same rationale applies to subsequent six-monthly snapshot dates, i.e. 2016H1, 2016H2, etc. The HHI measures the extent of concentration among Credit Rating Agencies in the market for providing solicited ratings on instruments and issuers for the specific product type defined in the European Rating Platform (Corporate, Financial, Insurer, Sovereign, and Structured Finance), within each EU country. The HHI is equal to the sum of the squared market share of each CRA active in each time window. Market share is measured in terms of total rated instruments and rated issuers relative to all rated instruments and rated issuers within each industry identified by ESMA’s market share calculations (sovereign, corporate: financial institution + insurance + other corporate, and structured finance). The black horizontal dashed line denotes the generally accepted range for a “highly concentrated” market. Markets with fewer than 20 ratings at a given time interval have been excluded from the visualisation.

Sources: ERP, FIRDS, GLEIF, Refinitiv, ESMA.

It is again emphasized that these results do not necessarily call for adjustments to Article 8d. Rather, the purpose is to illustrate how alternative formulations might meet a specific aim set out in the CRAR.<sup>185</sup> Moreover, like all simulations, further enrichments could be explored to capture more aspects of how CRAs operate in practice and, consequently, how much and how quickly credit rating markets in the EU would react to

alternative Article 8d formulations. Such enrichments could include reflecting the necessary lead time for CRAs to make the required investments in IT and resources prior to significantly expanding their operations. This would ensure that any so-called “teething problems”, as occasionally identified in the past with new CRA entrants in a local market, are captured in the simulations (see COM, 2016).

<sup>185</sup> Concerns are sometimes raised that an increase in competition among CRAs would lead to so-called “ratings shopping” or “ratings inflation”. In the event that these developments were to occur, they could be mitigated by

appropriate supervision, including the regular re-mapping of ratings to standardised credit quality steps. See Bae et al. (2015), COM (2016), and EBA (2021).

## Conclusions

In Europe, despite the large number of registered Credit Rating Agencies (CRAs), the three largest CRAs have for years controlled more than 90 % of the market. Ten years ago, EU legislators sought to reduce this imbalance by supporting the use of small CRAs in Europe. This article has attempted to take stock of the situation since then, using a unique dataset containing the entire timeline, since the CRA Regulation reporting requirements entered into force in mid-2015, of rating actions on EUR 20 tn worth of EU financial products and more than 6 000 issuer ratings.

The article identified cases where multiple ratings have been solicited for instruments and/or issuer ratings, with no small CRA being among the solicited CRAs (i.e. only large CRAs have been contracted). As set out in Article 8d of the CRA Regulation (CRAR), such a situation requires that this fact be documented by issuers for the instrument and/or issuer or related third party in question. According to the CRAR, the supervision and enforcement of Article 8d (i.e. the documentation requirement) is under the purview of Sectoral Competent Authorities (SCAs) at the national level. The SupTech-related techniques set out in this article can help support SCAs' efforts to identify, for example, the issuers with the most instruments that would need to be documented, and thus supports the efficient use of resources within the European System of Financial Supervision.

In addition, using network analysis techniques, it is clear that the landscape for small CRAs seeking to grow is a challenging one. Small CRAs are used almost exclusively on the 'periphery' of the industry, and are locked out of the larger 'core' market consisting of issuers that seek more than one rating for their products or themselves. This larger market is shared almost exclusively among the large CRAs, and the associated market-wide Herfindahl-Hirschman Index levels indicate that these markets are "highly concentrated", using generally accepted benchmarks. In turn, a reduction in market concentration is likely to lead to greater choice of rating services at competitive prices.

Lastly, the evolution in local market concentration over six-monthly periods is examined, and a simulation exercise for alternative legislative rules destined to boost competition in the market is conducted. The aim is not to recommend a particular course of legislative action, but instead to illustrate how quantitative techniques can

support policymakers in achieving their objectives. The simulation exercise suggests that strengthening legislative requirements to make use of small CRAs when seeking an additional rating for a product or issuer is associated with an average reduction in EU CRA market concentration of roughly 40 to 55 %. In turn, the resulting industry concentration figures suggest that EU credit rating markets would no longer be "highly concentrated" from a competition perspective.

Looking ahead, further research could be conducted to support the simulation exercise, for example reflecting additional realities faced by small CRAs that seek to grow their business, such as lead times to make the necessary investments in IT and resources. Other definitions of small CRAs could also be explored and analysed, such as those set out by the European System of Central Banks. Lastly, additional structural aspects that impact EU credit rating market dynamics could be considered, to go beyond the "all else being equal" approach set out in the present article.

## Annex: steps performed for Article 8d simulation

The simulations proceed as follows, taking the "Scenario 1: If hiring two CRAs, must use one small CRA" scenario described above:

- We consider all of the ratings outstanding, by CRAs registered and supervised by ESMA, in the country in question, for the product type in question (issuer/instrument ratings), and for the given snapshot date.
- For that snapshot date and local market, take all of the instruments and issuers that are rated in that time window by at least two CRAs, but with no small CRAs involved (i.e. those instruments and issuers that would need to "document" their departure from the small CRA usage under Article 8d). Keep all of the other instruments and issuers in this time window (i.e. those rated by only one CRA plus those rated by at least two CRAs but with one or more small CRAs involved) as well, to merge back in later on in the simulation.
- Second, for each instrument and issuer in this group, allocate a small CRA to rate that instrument and issuer. This allocation is performed randomly, using the relative market share (among small CRAs) in the previous six-month time window as probabilities for the

- rating to be allocated to one of the small CRAs. Thus if in the previous time window small CRA 1 had a market share of 20 % and small CRA 2 had a market share of 10 %, then there is a 20 % chance that small CRA 1 is allocated to rate this instrument/issuer and a 10 % chance that small CRA 2 is allocated to rate this instrument/issuer.
- This aims to replicate what is likely to happen in reality (and has been observed in past market studies, such as the above ESMA Technical Advice to the Commission): the market shares of CRAs influence their ability to gain new ratings. Where a small CRA is not available in a local market (e.g. because all of the CRAs active in that local market are deemed to be large CRAs, as is often the case with Sovereign ratings for example), then CRAs that are deemed to be “small CRAs” (market share at 10 % or below) at the EU level for that product are considered.
  - Note also that in subsequent time windows the allocation of small CRAs in the past is kept constant—i.e. if a small CRA has been allocated to rate instrument XYZ in the previous time window, then in the current time window that allocation stays the same.
  - Third, at the same time, it is assumed that an issuer will not pay for its instrument or entity rating to be rated by an extra CRA. Therefore, having added a small CRA to rate the issuer or its instrument in the previous step, the issuer will also proceed to stop its contract with one of the two or more existing (large) CRAs that are rating the issuer or its instrument. The removal is also done based on probabilities, using the same approach as described in the previous bullet (i.e. the greater market share of the large CRA relative to the two or more large CRAs rating the product, the greater likelihood that that large CRA is removed).
  - Fourth, once this reshuffling has been done, this group of instruments and issuer ratings is added to the rest of the universe of instruments and issuer ratings (which did not need to be reallocated, according to this version of Article 8d being simulated). This then constitutes the full universe of rated instruments and issuers, and the Herfindahl-Hirschman Index is calculated for this universe.
  - The resulting market shares for each CRA at the level of the local market (i.e. within a given country, for a specific product) are recalculated based on this new information. Note that this can lead to some CRAs being ‘downgraded’ in size from “large” to “small” and others being ‘upgraded’ from “small” to “large” in a given snapshot, which subsequently influences their probability of allocation in subsequent snapshots.

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## Investor protection

# Environmental impact and liquidity of green bonds

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### Summary

The European green bond market is attracting a growing number of corporate issuers, which has implications for the environmental impact of these instruments and their liquidity. This article first investigates the carbon dioxide emissions of green bond issuers. We show that, between 2009 and 2019, energy firms, utilities and banks that issued a green bond were much more likely to disclose emissions data, and they have on average reduced their carbon intensity to a larger extent than other firms – confirming the view that green bonds act as a signal of firms' climate-related commitments. We then compare the liquidity of green and conventional EUR corporate bonds from green bond issuers using proxy indicators. Green bond liquidity appears to be tighter, but the differential with conventional bonds has remained small and broadly constant during the COVID-19 turmoil, suggesting no particular vulnerability for the green segment of the corporate bond market.

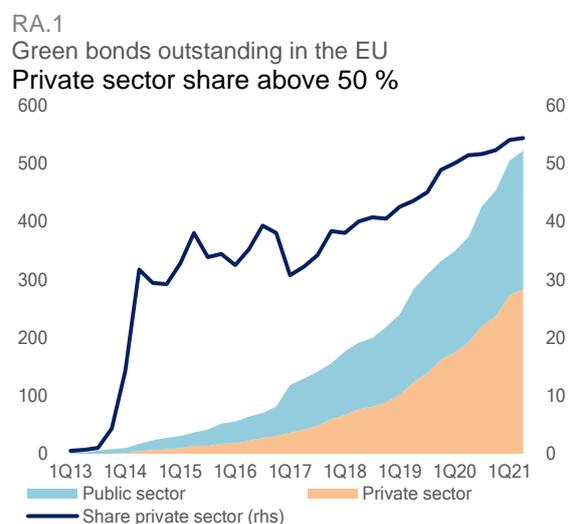
## Introduction

Since the EIB issued the world's first climate bond in June 2007, green bonds have experienced a remarkable development. From almost nothing 10 years ago, the global green bond market has grown to nearly EUR 1 tn today.<sup>187</sup>

One major change that has taken place in recent years is the emergence of a deep private-sector green bond market (RA.1). While this supports the development of green finance and brings diversification benefits, it also has significant implications for the environmental impact of green bonds and their liquidity.

As the EU is set to launch its own green bond label, this article investigates the environmental impact of green bonds, and features several indicators to monitor the liquidity risk attached to these instruments. Initially a niche market involving a small number of supranational issuers, from 2013 the green bond market saw a growing number of local government issuers.

Several EU countries have since had their first sovereign green bond issuances.<sup>188</sup>



The size and success of these auctions contributed to the reputation of green bonds.

<sup>186</sup> This article was authored by Julien Mazzacurati, William Paris and Alexandra Tsiotras.

<sup>187</sup> EIB (2017) and CBI (2020); the EIB issues green bonds under the label 'Climate awareness bonds'.

<sup>188</sup> Early issuers include the World Bank, the Nordic Investment Bank and the EBRD; see World Bank (2019) and EBRD (2021). Local government issuers in 2012 include three regions in France; see CBI (2018). Sovereign issuers include FR, BE, DE, HU, NL, PL and SE.

Auctions in FR, NL and DE involved volumes of below EUR 7 bn and attracted orders in excess of EUR 20 bn (EUR 33 bn in DE).<sup>189</sup>

Another important turning point came with the first green bond issuances from state-owned banks and utilities.<sup>190</sup> The success of these endeavours led to a flurry of other corporate issuers tapping the market. As volumes increased, the growing availability of higher-yielding debt financing green projects helped to expand the universe of potential buyers. In 2Q21, the private sector represent 54 % of the market (EUR 284 bn), with the financial sector accounting for more than half of the volumes outstanding. In total, corporate green bonds amounted to around 3 % of the broader EU corporate bond market. One sign of the positive dynamic underway is the growing share of issuers returning to the market: almost two thirds of the corporate green bonds sold in 2020 were from firms that had already issued a green bond.

## Environmental impact and industry standards

The success of green bonds can to a large extent be explained by the growing prominence of climate-related issues, and a gradual realisation that humans bear some of the responsibility in global warming (Boffo et al., 2020). The 2015 Paris Agreement set out quantitative objectives to combat climate change, paving the way for the European Green Deal. In 2019, the European Commission estimated that EUR 260 bn per year in additional investments would be needed to achieve the 2030 climate and energy targets.<sup>191</sup> With more stringent targets announced since, the financing needs are now likely to be higher.

A significant share of these investments will need to be financed by the private sector, and green bonds have a key role to play: in 2020, EU issuers raised a net EUR 127 bn through green bonds –

almost half of the estimated investment needs – including EUR 79 bn in corporate debt.

A fundamental question is whether green bonds bring clear environmental benefits. This would require two conditions: that green bonds finance projects benefitting the environment; and that green bond issuers do not perform economic activities otherwise harmful to the environment.<sup>192</sup>

Assessing this remains a challenge for several reasons: granular information on the projects being financed or their impact is scant, while broader data on companies' environmental impact (e.g. through climate-related disclosures) remain insufficient despite recent improvements.<sup>193</sup>

The absence of a legal framework and definitions further complicates this assessment. While a growing green bond issuer base helps channel money into green projects, it “also allows a very broad church of firms to issue green bonds, each deemed to be green for different reasons” (Ehlers et. al., 2020). Recent anecdotal evidence shows that there is indeed some misalignment between investor expectations and reality.<sup>194</sup>

Greenwashing concerns in the context of very strong market growth eventually led to the development of industry standards, including mainly the Climate Bond Standards and the Green Bond Principles,<sup>195</sup> which have brought a degree of transparency and standardisation to the market. By spelling out the types of projects eligible for green bond financing, these standards were a first step towards ensuring that green bonds have a positive environmental impact and were met with significant success, with 90 % of the global green bond market using one of these two labels (RA.2).

Under the Green Bond Principles, there are four key aspects involved in the issuance of a green bond (ICMA, 2018):

<sup>189</sup> Data from Agence France Tresor, Deutsche Finanzagentur and Dutch State Treasury Agency.

<sup>190</sup> The public utility Electricite de France and the municipal bank KBN started issuing green bonds in 2013.

<sup>191</sup> European Commission, “[The European Green Deal](#)”, December 2019.

<sup>192</sup> For example, Korea Electric Power Corp. [faced criticism](#) for issuing a USD 500mn green bond while investing in new coal-fired power plants in Southeast Asia.

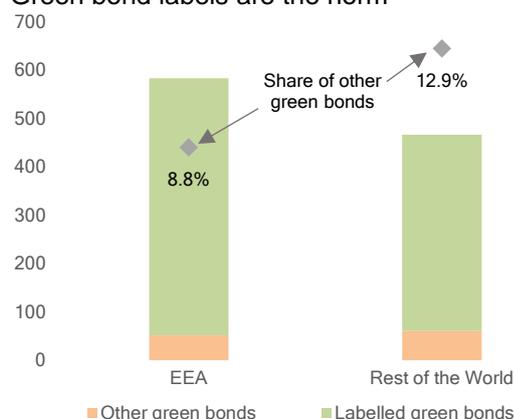
<sup>193</sup> See for example TCFD (2020).

<sup>194</sup> See for example “Bond investor Revolt Brews over Bogus Green Debt Flooding Market”, Bloomberg, 29 March 2021; “Investors probe ESG credentials of bond sellers on ‘greenwashing fears’”, Financial Times, 28 October 2020.

<sup>195</sup> Climate Bonds Initiative, “Climate Bonds Standard – International best practice for labelling green investments”, and International Capital Markets Association, “Green Bond Principles – Voluntary process guidelines for issuing green bonds”.

- **Use of proceeds:** Description of the utilisation of proceeds, including a distinction between new project financing and re-financing; achievement of expected environmental benefits and contribution to environmental objectives;
- **Process for project evaluation and selection:** Description of the process used to determine how the project fits into the eligible green project categories, eligibility criteria, and use of existing standard or certification; recommendation to appoint an agent to provide an external review to confirm alignment with the Principles;<sup>196</sup>
- **Management of proceeds:** Tracking of net proceeds allocated to eligible green projects and of temporary placement for unallocated funds; recommendation to use a third party (e.g. auditor) for verification purposes;
- **Reporting:** Annual reporting on proceed allocation until funds are exhausted, including list of projects, and expected impact; recommendation to use performance indicators.

RA.2  
Global green bond market outstanding  
Green bond labels are the norm



Note: Total outstanding amount of global green bonds by issuer region, EUR bn, as of 30 April 2021. Labelled green bonds are certified by the Climate Bonds Initiative or aligned with the ICMA Green Bond Principles. Other green bonds are bonds with an environmental purpose but without one of these two labels.  
Sources: Climate Bonds Initiative, Refinitiv EIKON, ESMA.

These steps are intended to ensure that the money raised through green bonds finances projects eligible for funds under the Green Bond Principles and that benefit the environment (RA.3). Recourse to an external verifier further

strengthens the project’s credibility but is expensive, at an estimated EUR 40,000 per review.<sup>197</sup> However, these standards are purely voluntary and non-binding, while the absence of a penalty mechanism means that issuers face limited consequences (other than reputational effects) if the bond proceeds are misallocated or the projects bring no environmental benefit.

RA.3  
Green Bond Principles  
Eligible green projects

Category	Description
Renewable energy	Production and transmission of renewable energies; use in appliances and products
Energy efficiency	In new buildings, renovation, energy storage, smart grids, etc.
Pollution prevention and control	Emission reduction or control, waste prevention or reduction, recycling, etc.
Management of natural resources and land use	Sustainable agriculture, fishing, and forestry, biological crop protection, reforestation, etc.
Biodiversity conservation	Protection of coastal and marine environments
Clean transportation	Electric, hybrid or non-motorised transportation, and infrastructure for clean energy vehicles
Water and wastewater management	Infrastructure for clean water and wastewater treatment, sustainable drainage and flood mitigation
Climate change adaptation	Climate observation, early warning or other information support systems
Eco-efficiency and circular economy	Sustainable products with eco-label or environmental certification, resource-efficient packaging and distribution
Green buildings	Certified buildings

Source: ICMA.

## Green bonds and carbon emissions

Although the success of green finance is a testament to firms’ and investors’ the growing awareness of on climate change, one key question is whether it effectively contributes to a reduction of global greenhouse gas (GHG) emissions, including carbon dioxide (CO<sub>2</sub>).<sup>198</sup>

At company level, assessments are hindered by the lack of disclosure on GHG emissions. However, transparency rules and voluntary disclosure by firms are increasing the availability and reliability of this information over time, with a

<sup>196</sup> The Green Bond Principles identify four main types of external review: second-party opinion, verification, certification and green bond scoring or rating.

<sup>197</sup> “Establishment of an EU Green Bond Standard”, European Commission, Inception impact assessment, June 2020.

<sup>198</sup> According to the US Environmental Protection Agency, carbon emissions are responsible for 81 % of overall greenhouses gases emissions. Here we rely on a measure of CO<sub>2</sub>-equivalent emissions, i.e. including other greenhouse gases such as methane.

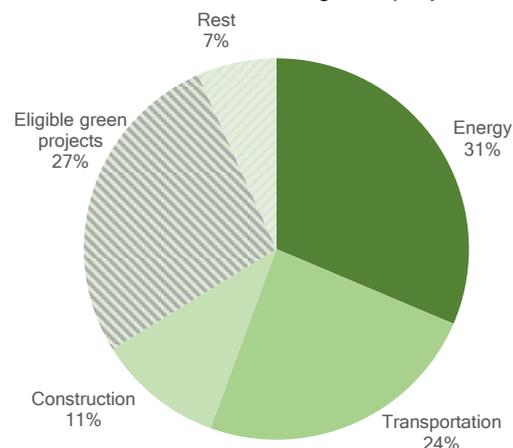
growing number of firms reporting data on emissions under pressure from regulators, investors and consumers. In several jurisdictions, lawmakers have imposed mandatory reporting on firms. At the same time, non-governmental organisations are encouraging and helping business to prepare these disclosures.<sup>199</sup> Commercial data providers are also collecting data on CO<sub>2</sub> emissions, or using models to estimate them where data are not available – although third-party estimates tend to be less consistent than information reported by companies (Busch et al., 2020).

### Impact on firms' CO<sub>2</sub> emissions

As data availability improves, research on the potential drivers of emission reduction, including green bonds, expands. Corporate green bonds can impact firm-level GHG emissions through two main channels: by financing projects leading to a reduction in emissions (e.g. through lower energy consumption or the development of cleaner products), and by incentivising improvements in firms' environmental behaviour (e.g. through their supply chain or internal policies). In Europe a majority of private sector green bond issuances finance projects that should lead to lower emissions, including renewable energy projects, energy efficiency improvements, clean transportation and green construction (RA.4).

#### RA.4

#### EEA corporate green bonds by purpose Limited details available on green projects



Note: Share of EEA-30 corporate green bond amount outstanding by purpose. 'Eligible green projects' include bonds for which the specific purpose is not available or financing several projects (incl. e.g. energy or transportation). Sources: CBI, Refinitiv EIKON, ESMA.

However, CO<sub>2</sub> emissions are usually reported at firm level (rather than project level), and therefore establishing a clear causality link is not straightforward. First, green bonds usually account for a limited share of issuers' total borrowing and may only impact a small part of their overall business, which would not be visible in firms' total emissions. Second, projects may reduce economy-wide GHG emissions without impacting a firm's own emissions. For example, companies building wind turbines help reduce a country's emissions for a given amount of electricity consumption by feeding clean energy into the power grid, but increase their own carbon footprint. Third, the impact of clean energy products such as electric vehicles only materialise in Scope 3 emissions<sup>200</sup>, but these are notably inconsistent (Busch et al., 2020) and may take years to materialise.

Reflecting this, Ehlers et al. (2020) do not find clear evidence that green bond issuance is associated with any reduction in firms' overall carbon intensity, highlighting that "issuers may be (and often are) heavily engaged in carbon-intensive activities elsewhere." This is the case in particular for the high-emitting utilities sector

<sup>199</sup> For example, the Greenhouse Gas Protocol Initiative has developed accounting standards for GHG emissions, and the Partnership for Carbon Accounting Financials helps financial institutions assess and disclose GHG emissions of loans and investments.

<sup>200</sup> According to the Greenhouse Gas Protocol, Scope 1 includes all direct GHG emissions; Scope 2 includes

indirect GHG emissions from electricity consumption; and Scope 3 includes all other indirect emissions (including e.g. "transport-related activities in vehicles not owned or controlled by the reporting entity").

where “green bond issuers have, on average, achieved smaller reductions in carbon intensity”.

In contrast, Fatica and Panzica (2021) find that, compared to conventional bond issuers with similar financial characteristics and environmental ratings, firms borrowing in the green segment witness a larger decrease in the carbon intensity of their assets, up to 2 years after the bond issuance. This reduction is larger for green bonds that have an external review, suggesting that green bonds may serve to signal firms’ climate-related engagement.

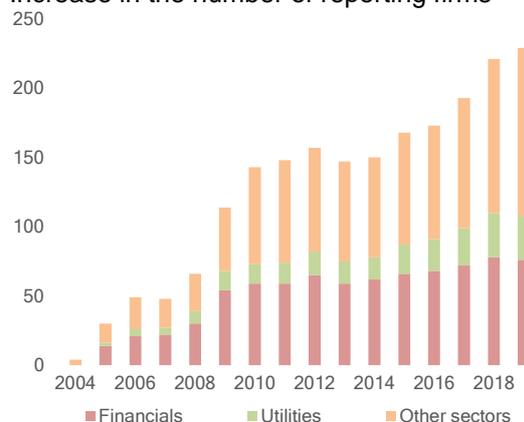
### Green bond issuers and GHG emissions

Building on the literature, our analysis in this section follows two different approaches. Firstly, we look at the evolution of carbon emissions over time for EEA issuers of green bonds and compare them with those of other firms within the same sectors. A better environmental performance from green bond issuers would support the view that green bonds are used as a signal by virtuous firms. Next, we investigate whether a firm’s ‘maiden’ green bond issuance of a firm is followed by a more pronounced reduction in its carbon intensity over time – which would potentially point to a more direct causal link between green bond issuance and GHG emissions.<sup>201</sup>

There are 1,258 corporate issuers of green-labelled bonds, including 396 domiciled in the EEA. Data on firms’ sector and annual GHG emissions are obtained from Refinitiv EIKON. In line with the literature, for GHG emissions we rely on both absolute emissions and carbon intensity, which is calculated as the ratio of Scope 1 and 2 emissions (in metric tonnes of CO<sub>2</sub>-equivalent emissions) over the total revenues (in USD million) – i.e. CO<sub>2</sub> gram per USD. This ratio offers a better representation of a firm’s carbon efficiency, as at an equal level of activity a firm may achieve lower carbon emissions using greener technologies and resources (Ehlers et al., 2020). However, it also introduces another source of variability into the data since intensity changes based on annual sales.<sup>202</sup>

#### RA.5

#### Corporate green bond issuers: CO<sub>2</sub> data availability Increase in the number of reporting firms



Note: Number of green bond issuers reporting Scope 1 CO<sub>2</sub>-equivalent emissions, by sector and year.  
Sources: Climate Bonds Initiative, Refinitiv EIKON, ESMA.

The share of green bond issuers reporting CO<sub>2</sub> data remains low, with 23 % of EEA issuers and 16% of non-EEA issuers disclosing Scope 1 and 2 emissions in 2019. Financial sector issuers account for more than a third of firms reporting CO<sub>2</sub> data (RA.5).

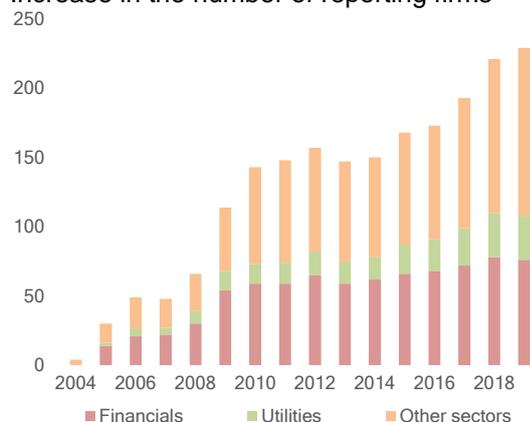
Reporting of GHG emissions remained voluntary in most countries until recently, which may introduce a self-selection bias – a problem compounded by the fact that some firms do not report every year. Finally, reporting inconsistencies across sectors due to different measurement approaches, and across firms within the same sector (e.g. from choices in reporting perimeter), create a high level of uncertainty due to limited data reliability.

Our analysis focuses on green bond issuers domiciled in the EEA that disclose emissions data. Green bonds issued by companies based in other regions can indeed have less of a focus on climate change. This is the case for example in China, one of the largest issuers of green bonds, where domestic guidelines pay closer attention to pollutant reduction, resource conservation and ecological protection (CBI, 2019).

<sup>201</sup> Due to data limitations (see below), we are not testing for causality between green bond issuance and firm-level GHG emissions. Instead, maiden green bond issuance is used as a simple benchmark, as in Ehlers et al. (2020).

<sup>202</sup> This implies a potential disconnect with GHG emissions from the production process. For example, a decline in sales compensated by stockpiling would lead to a temporary increase in emissions intensity.

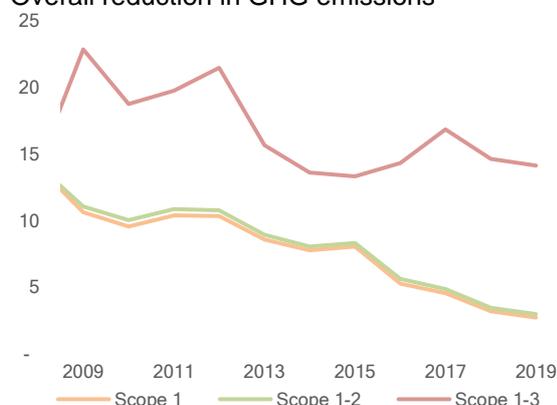
**RA.6**  
Corporate green bond issuers: CO2 data availability  
Increase in the number of reporting firms



Note: Number of green bond issuers reporting Scope 1 CO2-equivalent emissions, by sector and year.  
Sources: Climate Bonds Initiative, Refinitiv EIKON, ESMA.

Given differences in the carbon footprint of different sectors, we further restrict the sample to 67 firms belonging to three sectors of particular relevance: energy, utilities and banks.<sup>203</sup> The share of issuers in these sectors disclosing CO2 data is much higher, at 75 % in 2019.

**RA.7**  
Average GHG emissions of green bond issuers  
Overall reduction in GHG emissions



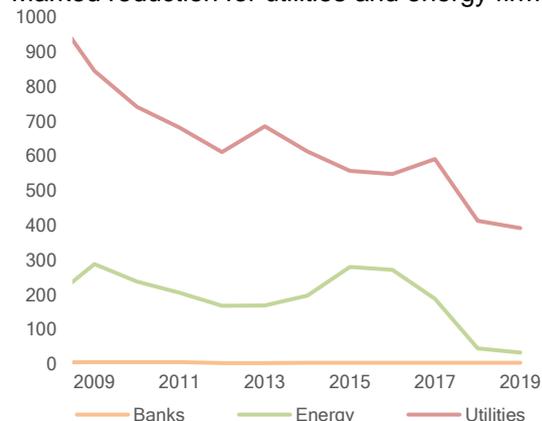
Note: Average greenhouse gas emissions of green bond issuers by emissions scope, in millions of metric tonnes of CO2-equivalent emissions. The number of firms for which data are available varies each year.  
Sources: Climate Bonds Initiative, Refinitiv EIKON, ESMA.

The average GHG emissions of EEA green bond issuers show a significant decrease between 2009 and 2019, ranging from 74 % for Scope 1 emissions to 5 % for Scope 3 emissions (RA.6).

However, Scope 3 emissions data averages are particularly sensitive to changes in sample composition due to large differences across sectors: in 2019 Scope 3 emissions were three times higher than Scope 1 emissions for utilities but 268 times larger for financials.<sup>204</sup> Overall, green bond issuers' average reduction in total GHG emissions over ten years amounted to 38 %.

A similar decline in the average carbon intensity of green bond issuers can be observed over time (- 35 %). This is true across sectors, with average reductions of 39 %, 31 % and 22 % respectively for energy firms, utilities and banks (RA.7). The overall trend is confirmed using medians, with the decrease most pronounced in the utilities sector – one of the largest GHG emitting sectors. The very low carbon intensity of banks in the next two figures reflects the absence of financed (Scope 3) emissions from this measure, due to poor availability and quality of Scope 3 data.

**RA.8**  
Median carbon intensity of green bond issuers  
Marked reduction for utilities and energy firms



Note: Median Scope 1 and Scope 2 emissions intensity by sector, calculated as metric tonnes of CO2-equivalent emissions over revenues (in USD million).  
Sources: Climate Bonds Initiative, Refinitiv EIKON, ESMA.

We then compare the carbon intensity of EEA-domiciled green bond issuers from these three sectors with other EEA firms that are from the same sectors but have never issued a green bond.<sup>205</sup> The latter group suffers from similar potential self-selection bias inconsistencies to green bond issuers and even greater data limitations. Within this group, 45 % of firms

<sup>203</sup> Energy firms and utilities have a particularly high carbon footprint, making them relevant to our analysis, while banking sector trends are important to analyse given the high share of bank loans in EEA corporate borrowing.

<sup>204</sup> Median values across the entire sample cannot be used due to financial sector overrepresentation in the sample of green bond issuers reporting CO2 data.

<sup>205</sup> The sample of firms that have never issued green bonds includes 271 firms.

disclose CO2 data , i.e. 30 percentage points lower than green bond issuers in these sectors. Green bond issuers further display a consistently lower median carbon intensity across sectors and have achieved larger reductions in carbon intensity over time than other firms (RA.8).

RA.9

Carbon intensity of green issuers vs. other firms  
Lower carbon intensity for green bond issuers

	Green bond issuers			Other firms		
	2009	2019	% change	2009	2019	% change
<b>Banks</b>	6.1	4.0	-36%	9.4	7.6	-20%
<b>Energy</b>	289	33	-88%	352	255	-27%
<b>Utilities</b>	846	392	-54%	1,308	640	-51%

Note: Median carbon intensity of corporate green bond issuers vs. other firms by sector, and % change in median carbon intensity between 2009 and 2019. Sources: CBI, Refinitiv EIKON, ESMA.

Despite caveats due to data limitations, the higher emissions data disclosure rate of green bond issuers, their lower carbon intensity and the greater reductions they have achieved over time confirm the view that green bond issuers use green bonds to signal their climate-related commitment.

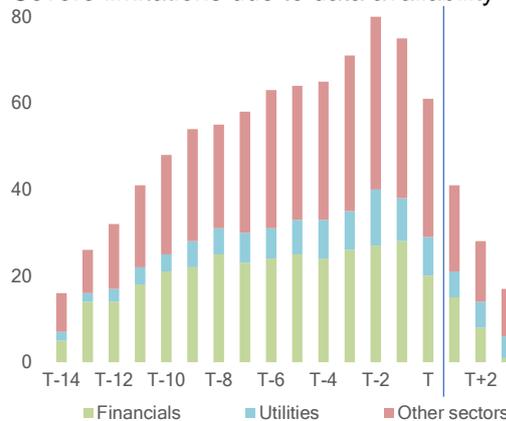
The final part of our analysis focuses on whether firms' maiden green bond issuance leads to a material reduction in carbon intensity. There is nothing in practice that prevents firms from reducing GHG emissions, even in the absence of green bonds. The question is whether *debut* green bond issuances are associated with other changes within a company that would lead it to increase its efforts to reduce its carbon intensity.

One crucial point is that in the context of very strong corporate green bond market growth, almost two thirds of global green bond issuers had their debut issuance in either 2019 or 2020. With the last CO2 data point in 2019, this imposes even more severe limitations on our ability to assess changes post-issuance. Indeed, the number of firms reporting CO2 data two years after their maiden green bond issuance is 28, or just 2 % of all green bond issuers (RA.9).

RA.10

Number of firms with data around time of maiden issuance

Severe limitations due to data availability

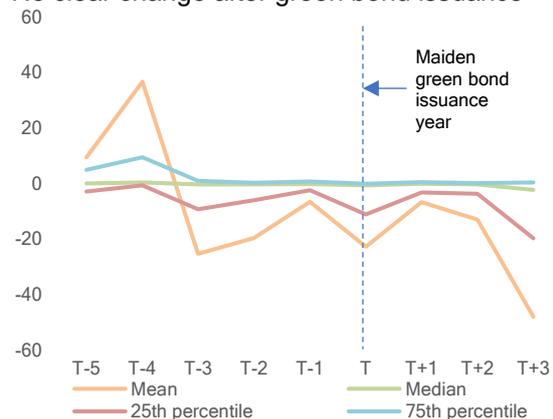


Note: Number of firms reporting emissions data before and after their maiden green bond issuance. T=maiden issuance year. Sources: Climate Bonds Initiative, Refinitiv EIKON, ESMA.

Focusing on EEA firms again, we see no clear evidence to suggest that firms intensify their emissions reduction efforts after issuing a green bond, with more than half of the distribution displaying no or very small reductions (RA.10). However, the robustness of the analysis is impaired by the decreasing sample size after issuance reflecting the on-going expansion of the green bond market.

RA.11

Changes in carbon intensity around maiden issuance  
No clear change after green bond issuance



Note: Mean and median carbon intensity of corporate green bond issuers domiciled in the EEA before and after maiden green bond issuance. The sample size changes over time. Sources: CBI, Refinitiv EIKON, ESMA.:

## Corporate green bond liquidity

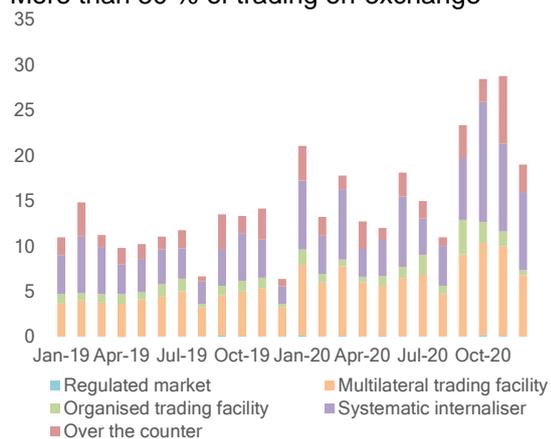
A well-known feature of corporate bonds is their illiquidity, which worsened in recent years in Europe when broader market conditions

deteriorated (i.e. when volatility increased).<sup>206</sup> With corporate bonds becoming the largest part of the green bond market, and green bonds covering an increasingly larger share of the European bond market, a question that naturally arises is whether investors experience higher liquidity when investing in corporate green bonds.

There are several features to green bonds that are relevant in this context: large oversubscriptions in primary markets and relatively low turnover in secondary markets – at least until recently – indicate a tendency by investors to hold these instruments until maturity (Fender et al., 2018). This suggests lower secondary market depth with access to green bonds possibly impaired, even as high demand should make it relatively easy for green bond holders to liquidate their positions.

#### RA.12

Green bond trading volumes by market type  
More than 50 % of trading on-exchange



Moreover, the data on trading volumes reported to ESMA under MiFID II shows that the share of corporate green bonds traded on exchange is high compared with conventional bonds, and continues to increase (RA.11). Trading of green bonds over the counter and through systematic internalisers amounted to around 50 % of overall trading volumes in 2019 and 2020, compared with 75 % for conventional bonds.<sup>207</sup> Green bond segments have been launched by 22 trading venues (12 in Europe), reflecting intensifying

competition for a market with high growth potential.<sup>208</sup> Higher trading on exchange is usually considered positive for market liquidity.

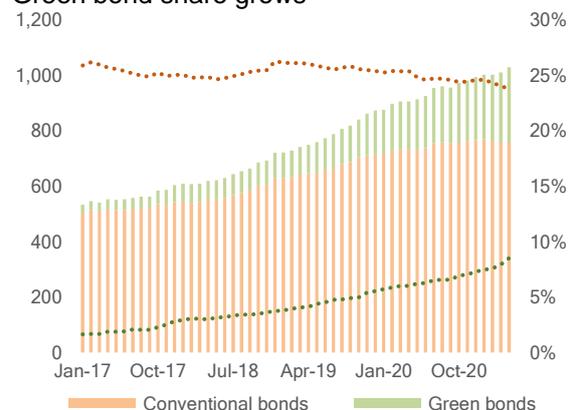
#### Measuring liquidity

Liquidity is generally measured along five main dimensions: tightness, immediacy, depth, breadth and resilience. Some of these dimensions require order-level data, but proxies based on trade-level data can be used to measure tightness (the possibility of executing transactions at a low cost), depth of the order book (for which volumes can be used as proxy), and breadth (the ability to transact large volumes with minimum impact on prices).<sup>209</sup>

The liquidity indicators presented below are based on data for EUR-denominated investment grade corporate bonds that are part of the Markit iBoxx Overall EUR index.<sup>210</sup> We identify green bonds by matching these instruments with the list of green-labelled bond ISINs from the Climate Bonds Initiative.

#### RA.13

Markit iBoxx EUR index composition  
Green bond share grows



Our approach is to systematically benchmark green bonds against conventional bonds issued by green bond issuers (henceforth 'conventional bonds'), thus providing a natural control group. The share of green bonds included in the index has quadrupled in three years (to 272 green bonds in 2021, or almost 9 % of all corporate

<sup>206</sup> De Renzis et al. (2018).

<sup>207</sup> In 2019 off-exchange trading in EU sovereign and corporate bonds amounted to 73 % and 86 %, respectively. See ESMA (2020).

<sup>208</sup> For the list of venues, see [Green Bond Segments on Stock Exchanges](#).

<sup>209</sup> For a comprehensive overview of liquidity measures see Sarr and Lybeck (2002).

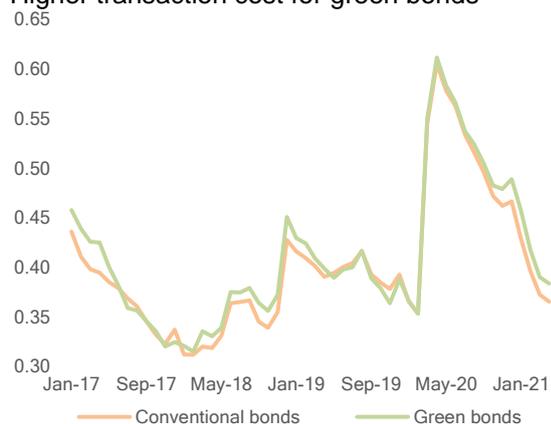
<sup>210</sup> As at April 2021 there were 2,156 bonds in the index.

bonds in the index) as green bond issuers allocated a growing share of their total borrowing to green bonds (RA.12).

We start by measuring liquidity tightness using bid-ask spreads, i.e. the difference between the bid price (the maximum price a buyer is willing to pay for a security) and the asking price (the minimum price at which a seller is willing to trade a security).

#### RA.14

Bid-ask spreads of green and conventional bonds  
Higher transaction cost for green bonds



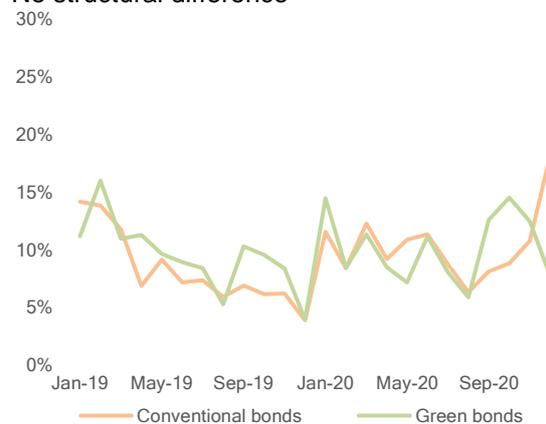
Note: Bid-ask spread for green bonds and conventional bonds issued by green bond issuers included in the Markit iBOXX EUR Overall index, in EUR.  
Sources: Markit iBoxx, ESMA

Bid-ask spreads have been on average wider for green bonds since 2017 by about EUR 0.01, indicating higher transaction costs and signalling tighter liquidity. Corporate bond bid-ask spreads deteriorated significantly in March 2020 due to COVID-19 related turmoil, but the differential between green and conventional bonds remained constant, suggesting no particular vulnerability for green bonds during selloffs (RA.13). Trading volumes of corporate green bonds have increased in line with market growth, from EUR 18 bn per month in 1H19 to EUR 22.5 bn in 2H20 (RA.11).

On the other hand, turnover ratios (measured as trading volumes over outstanding issued amount) do not reveal a clear structural difference between green and conventional bonds (RA.14).

#### RA.15

Turnover ratio of green and conventional bonds  
No structural difference

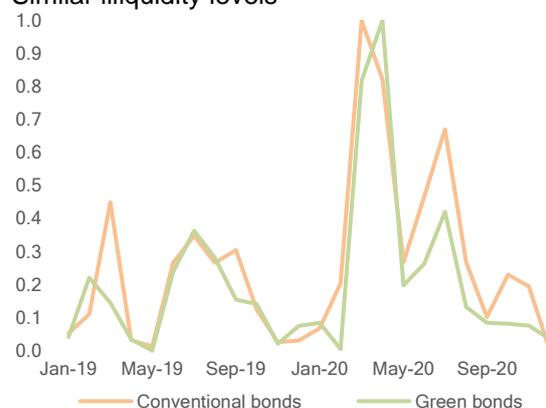


Note: Turnover ratio of green and conventional bonds issued by green bond issuers, measured as monthly trading volumes over total issued amount, in %.  
Sources: FITRS, Refinitiv EIKON, ESMA.

To measure depth and breadth, we then use the widely used Amihud ratio defined as the average of absolute daily returns on a security to trading volumes over a given period.<sup>211</sup> The idea behind the indicator is that excess returns represent an illiquidity premium.

#### RA.16

Amihud illiquidity index  
Similar illiquidity levels



Note: Monthly Amihud illiquidity index for green and conventional bonds issued by green bond issuers, monthly averages. Normalised between 0 and 1.  
Sources: Markit iBoxx, FITRS, ESMA.

In this respect, the Amihud ratio is positively correlated with the illiquidity of a security. The monthly Amihud ratio (based on daily returns and volumes for each bond averaged over one month) does not suggest that green bonds are more illiquid than conventional ones (RA.15).

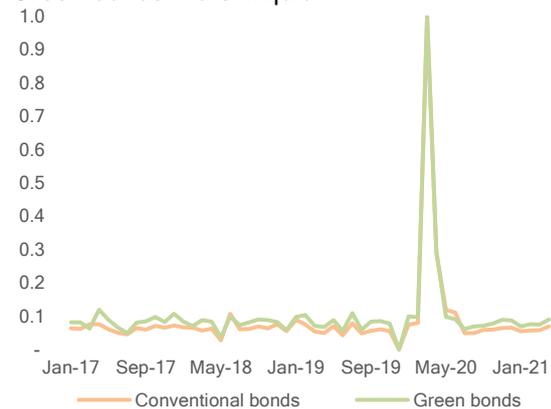
<sup>211</sup> See Amihud (2002).

Lastly, the Bao Pan Wang index (BPW) indicator is based on the autocovariance of prices.<sup>212</sup> It is based on the assumption that the transitory impact of illiquidity leads to price reversals. The BPW indicator displays slightly higher illiquidity for green bonds throughout most of the observation period (RA.16).

#### RA.17

#### Bao Pan Wang index

#### Green bonds more illiquid



Note: Illiquidity of green bonds and conventional bonds from green bond issuers, normalised between 0 and 1 over the sample period. Based on Bao et al. (2010).

Sources: Markit iBoxx, ESMA.

## Conclusion

The expansion of the green bond market over the last decade is a significant development for European bond markets. By funnelling private-sector capital into green projects, green bonds can play an important role in the transition to a low carbon economy under the European Green Deal. The growing number of firms issuing green bonds further marks a key milestone in the development of this market. However, high demand for these instruments combined with the absence of a legal framework increases the risk of corporate greenwashing.

In this context, the environmental impact of green bonds – in particular on climate change – has come into focus. Our analysis shows that only a fifth of firms issuing green bonds worldwide disclose data on GHG emissions. EEA energy firms, utilities and banks tend to disclose emissions data at a much higher rate. We further find evidence at firm level of an overall reduction in the direct and indirect carbon emissions of these firms, as well as in their carbon intensity,

between 2009 and 2019 – with the decline most pronounced in the high-emitting utilities sector. Moreover, green bond issuers have lower median carbon intensity than other firms, have achieved larger reductions over time, and are much more likely to disclose emissions data. These findings confirm that green bonds may serve to signal firms' climate-related engagements.

We then look into the carbon intensity of green bond issuers after their 'maiden' issuance. The existence of a potential causal link is not clear since green bonds finance long-term green projects that do not have a direct impact on the firm itself, while we rely on GHG emissions measured at firm level. We do not find clear evidence that issuing a green bond leads firms to intensify their carbon reduction efforts – but the robustness of these findings is severely hampered by data limitations.

Lastly, we turn to the liquidity of corporate green bonds, which we compare with that of conventional bonds from green bond issuers using proxy indicators. These suggest that green bond liquidity is tighter, without any clear difference in depth or breadth. Moreover, the differentials are small and have remained broadly constant during the COVID-19 crisis, suggesting no particular vulnerability in the green segment of the corporate bond market.

Overall, our findings support the further development of the green bond market. The future EU Green Bond Standard should strengthen the potential environmental benefits of these instruments and their credibility. Improving the availability and consistency of climate-related disclosures, and in particular Scope 3 emissions for the financial sector, would support future assessments of the impact of green bonds on firms' carbon emissions. Meanwhile, lower green bond liquidity does not appear to expose corporate investors to materially greater liquidity risk as a result of their green bond holdings.

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<sup>212</sup> Bao et al. (2010).

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# Annexes

# TRV statistical annex

In addition to the statistics presented in the risk-monitoring and risk analysis sections above we provide extensive and up-to-date charts and tables with key data on the markets under ESMA's remit in the TRV Statistical Annex, which is published jointly with the TRV and can be accessed at <https://www.esma.europa.eu/market-analysis/financial-stability>.

# List of abbreviations

€STR	Euro short-term rate
1H(Q)21	First half (quarter) of 2021
AI	Artificial intelligence
AIF	Alternative Investment Fund
AIFM	Alternative Investment Fund Manager
AIFMD	Directive on Alternative Investment Fund Managers
AMF	Autorité des Marchés Financiers
AS	Active share
AuM	Assets under management
BTC	Bitcoin
bps	Basis points
CA	Cryptoasset
CAPM	Capital asset pricing model
CBDC	Central bank digital currency
CBOE	Chicago Board Options Exchange
CCP	Central counterparty
CDS	Credit default swap
CDO	Collateralised Debt Obligation
CFD	Contract for differences
CII	Closet index indicator
CLO	Collateralised Loan Obligation
CNAV	Constant net asset value
Consob	Commissione Nazionale per le Società e la Borsa
CRA	Credit rating agency
CPMI-IOSCO	Committee on Payments and Market Infrastructures-International Organization of Securities Commissions
CSD	Central securities depository
CSP	Cloud service provider
DLT	Distributed ledger technology
EA	Euro area
EBA	European Banking Authority
ECB	European Central Bank
EEA	European Economic Area
EIOPA	European Insurance and Occupational Pensions Authority
EM	Emerging Market
EONIA	Euro Overnight Index Average
EPS	Earning per share
ESA	European Supervisory Authority
ESG	Environmental, Social and Governance
ESMA	European Securities and Markets Authority
ESTER	Euro short-term rate
ETF	Exchange-traded fund
ETH	Ether
ETS	Emissions-trading system
EU	European Union
Euribor	Euro Interbank Offered Rate
FCA	Financial Conduct Authority
FinTech	Financial technology
FSB	Financial Stability Board
FVC	Financial vehicle corporation
GDP	Gross domestic product
GM	Growth market

GSCs	Global stablecoins
HY	High yield
ICE	Intercontinental Exchange
ICMA	International Capital Market Association
ICO	Initial coin offering
ICT	Information and communication technology
IG	Investment grade
IMF	International Monetary Fund
IPO	Initial Public Offering
IRD	Interest-rate derivative
ISIN	International Securities Identification Number
KIID	Key Investor Information Document
LMT	Liquidity Management Tool
LVNAV	Low-volatility net asset value
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
MTF	Multilateral trading facility
NAV	Net asset value
NCA	National Competent Authority
NFC	Non-financial corporates
OECD	Organisation for Economic Co-operation and Development
OFI	Other financial institution
OTC	Over the counter
ppt	Percentage point
PRIIP	Packaged Retail and Insurance-based Investment Product
RegTech	Regulatory technology
SEC	Securities and Exchange Commission
ROA	Return on assets
SEF	Swap execution facility
SI	Systematic internaliser
SIB	Social impact bond
SMEs	Small and medium-sized enterprises
SSA	Style shifting activity
SSM	Single Supervisory Mechanism
STRESI	Stress simulation
STS	Simple, transparent and standardised
SupTech	Supervisory technology
TE	Tracking error
TER	Total expenses ratio
TRV	Report on trends, risks and vulnerabilities
UCITS	Undertakings for Collective Investment in Transferable Securities
VAR	Variance autoregression
VNAV	Variable net asset value

*Currencies and countries abbreviated in accordance with ISO standards*

