EUROPEAN CENTRAL BANK

EUROSYSTEM

Financial Stability Review

May 2020

Contents

Foreword

Since February 2020, the coronavirus (COVID-19) pandemic has disrupted social and economic life across the euro area and the globe, to an extent unseen in most of our lifetimes and unexpected six months ago. It has caused one of the largest and sharpest economic contractions in recent history. As news unfolded of the spread of the virus, global financial markets responded with sell-offs, volatility and a sharp increase in borrowing costs, which rivalled – and at times exceeded – those seen during the 2008 global financial crisis.

Economic and financial policymakers – fiscal, monetary, micro- and macroprudential – have responded with action on an unparalleled scale to dampen the impact on near-term economic activity where they can, minimise longer-term damage and help our economy to recover quickly as the threat from the virus recedes. A central part of this policy response has been to ensure that the financial system – its intermediaries, markets and infrastructures – withstands the shock and provides the credit and financial services that will help households and businesses through these times, supporting the economic recovery.

Against this backdrop, the May 2020 Financial Stability Review assesses how the financial system has operated so far during the pandemic. It considers the financial stability implications of the potential economic after-effects of the pandemic, taking account of the financial vulnerabilities identified before the pandemic, including those related to financial market functioning, debt sustainability, bank profitability and the non-bank financial sector. It also sets out policy considerations for both the near term and the medium term. It does so to promote awareness of systemic risks among policymakers, the financial industry and the public at large, with the ultimate goal of promoting financial stability. By providing a financial system-wide assessment of risks and vulnerabilities, the Review also provides key input to the ECB's macroprudential policy stance.

The Review has been prepared with the involvement of the ESCB Financial Stability Committee, which assists the decision-making bodies of the ECB in the fulfilment of their tasks.

Luis de Guindos
Vice-President of the European Central Bank

Overview

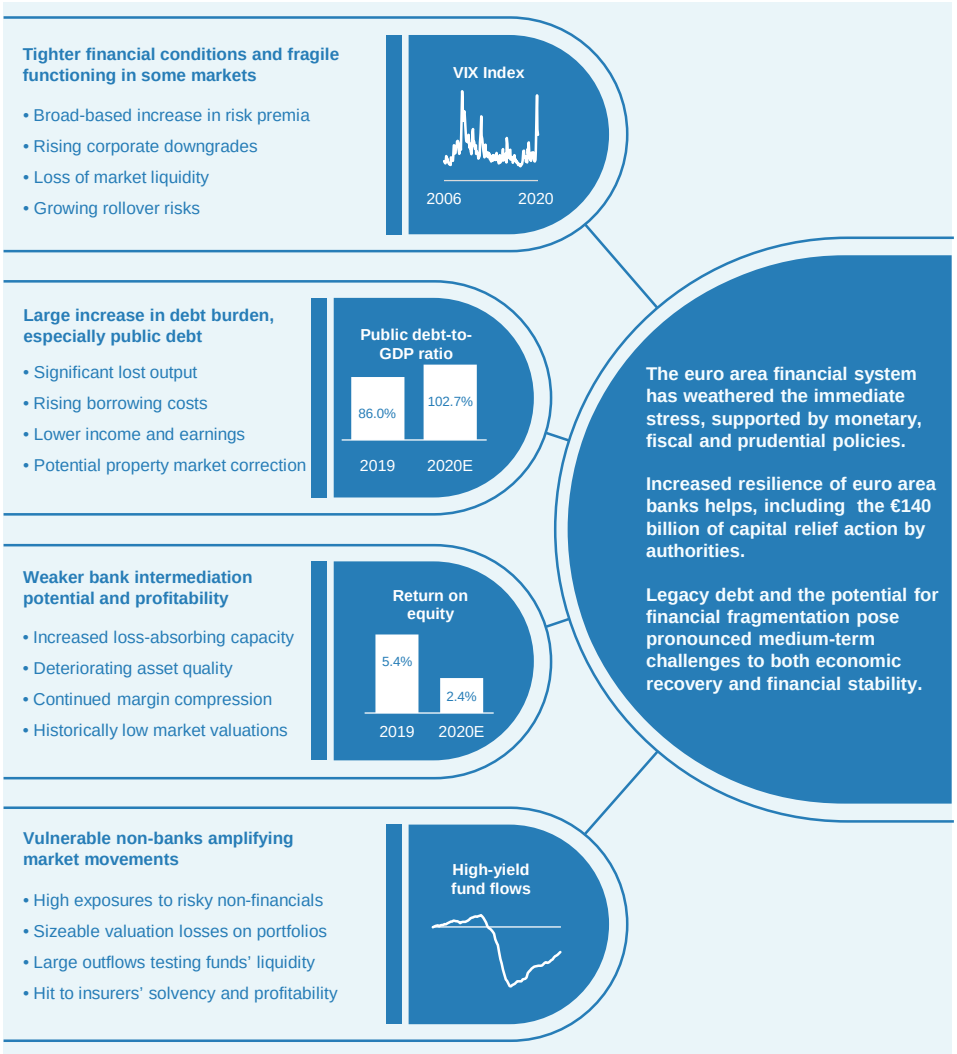
Medium-term risks to financial stability have increased markedly

The financial system has faced an economic shock of enormous scale, speed and global breadth in the wake of the coronavirus pandemic.

Wide-ranging policy measures, including monetary, fiscal and prudential policies, helped prevent a seizing-up of the financial system and support the recovery. But medium-term vulnerabilities have risen and pose challenges to the recovery.

Existing vulnerabilities of some sovereigns, highly leveraged corporates and the non-bank financial sector amplified the response in financial markets and increase the risks ahead.

Euro area banks are supported by better capital and liquidity positions than in the past, but are still likely to face significant losses and further pressure on profitability. These developments underscore the need for consolidation and structural change in the sector.

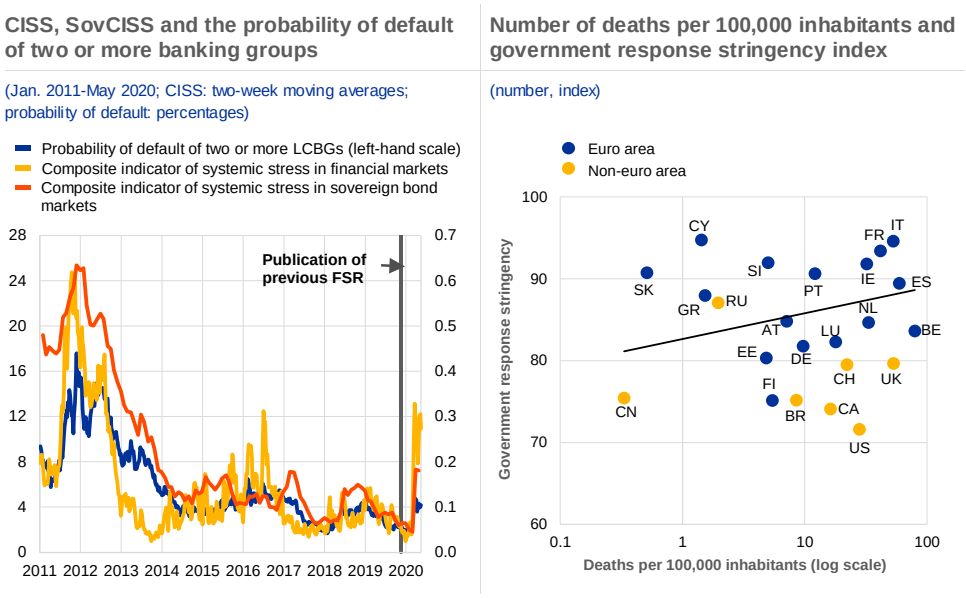


The coronavirus pandemic prompted extreme financial market sell-offs and stress

The spread of the coronavirus (COVID-19) triggered abrupt shifts in asset prices and led to an increase in financial system stress (see **Chart 1**, left panel). The reaction of financial markets reflected both the rapid spread of the virus across borders as well as the economic and financial implications of far-reaching social distancing and lockdown measures (see **Chart 1**, right panel). Financial stress was compounded by a shock to oil prices as global demand collapsed, the inability of major oil producers to agree upon a production cut, as well as turbulence on US futures markets linked to storage capacity. After several years of low volatility with only short-lived spikes, financial market volatility quickly surged to levels last seen at the time of the global financial crisis. At the same time, financial conditions tightened sharply as economic uncertainty increased and market participants priced in the possibility of a sharp slowdown in global growth.

Chart 1

Euro area systemic stress indicators rose sharply as a result of the spread of the coronavirus and the enforcement of public containment measures



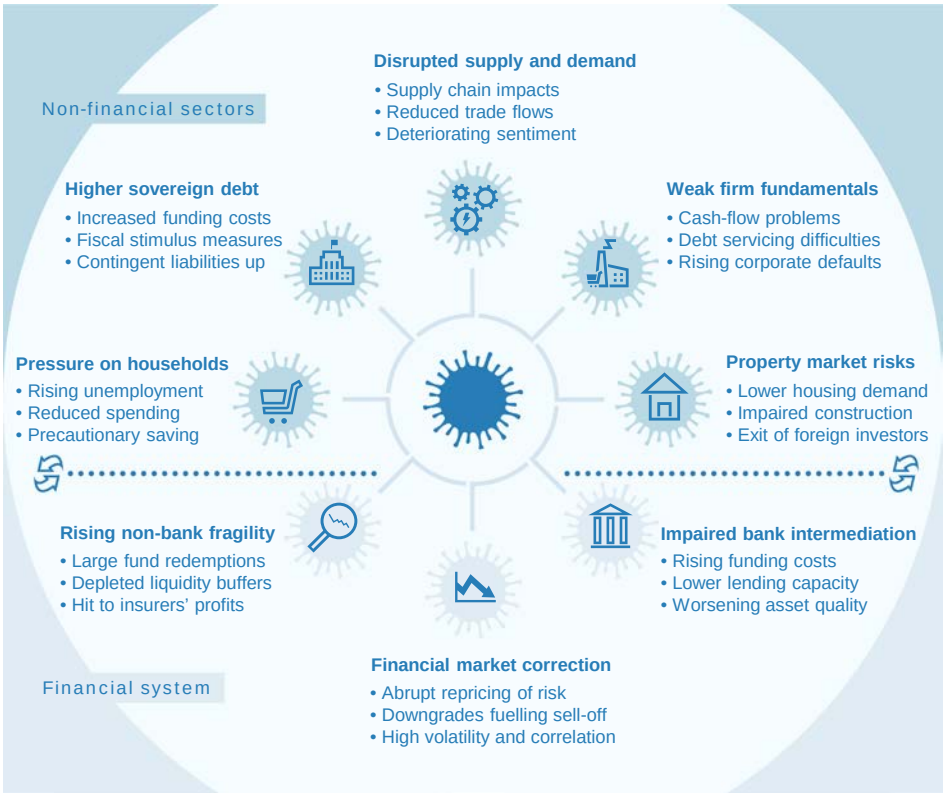
Sources: ECB, Hale et al. (2020), Johns Hopkins University and ECB calculations.
Notes: Left panel: "Probability of default of two or more LCBGs" refers to the probability of simultaneous defaults in the sample of 15 large and complex banking groups (LCBGs) over a one-year horizon. Right panel: the chart shows the maximum value of the government response stringency index. The index is based on 17 indicators, ranging from information on containment and closure policies (e.g. school closures, restrictions on movement) to economic (e.g. income support to citizens) and health system policies (e.g. coronavirus testing regime or emergency investments in health care). For further details, see Hale, T., Petherick, A., Phillips, T. and Webster, S., "Variation in government responses to COVID-19", BSG Working Paper Series, April 2020.

The coronavirus pandemic has affected virtually all aspects of economic activity, at times interacting with pre-existing financial vulnerabilities (see **Figure 1**). As set out in previous issues of this Review, those vulnerabilities included: overvalued asset prices; low bank profitability; high sovereign indebtedness; and increased liquidity and credit risks in the non-bank sector. While the presence of these vulnerabilities amplified some of the response to the coronavirus shock, the financial system nonetheless proved broadly resilient, partly reflecting the regulatory reforms of

the past decade. Nevertheless, looking ahead, further stress cannot be excluded. Some asset prices could be susceptible to corrections, if GDP and earnings growth outturns are worse than markets appear to expect. Further ahead, some already indebted sovereigns and corporates could make it more challenging to sustain the additional large increase in debt, while structurally weak bank profitability could slow the recovery of bank lending capacity.

Figure 1

The coronavirus pandemic affected the real economy and the financial system, with sector-specific vulnerabilities being reinforced by strong interlinkages



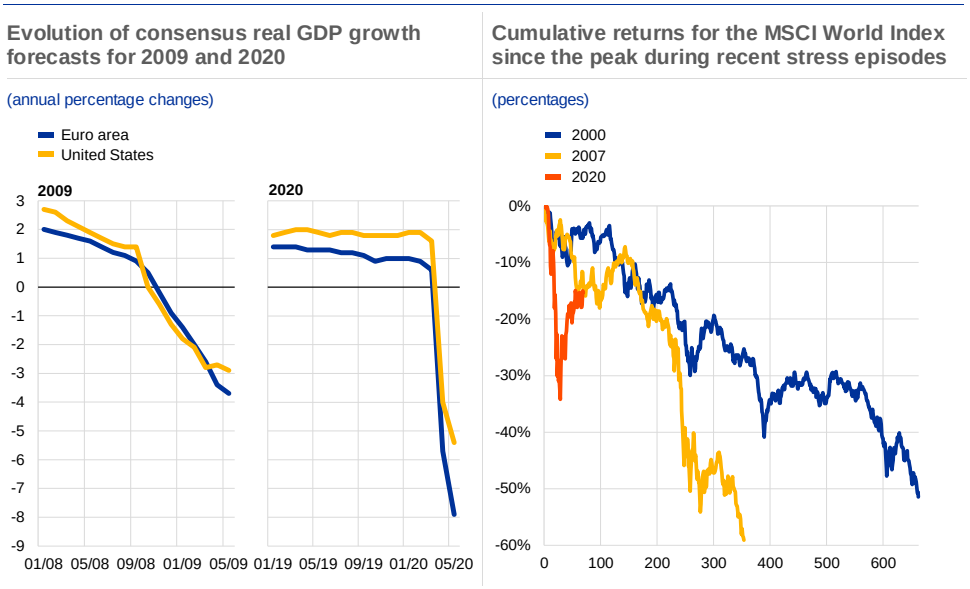
Source: ECB.

Even if temporary, there will be a significant contraction in euro area economic activity this year. Large parts of the global and euro area economies came to a near standstill in early 2020. Economic indicators suggest an abrupt contraction in economic growth in the first half of 2020 with full-year figures likely to be weaker than in the year following the 2008 global financial crisis, according to private sector estimates (see **Chart 2**, left panel). Since the extent to which containment measures continue to be required and measures are eased remains unknown, uncertainty surrounding the overall economic impact is likely to persist for some time. The timing and strength of the recovery are uncertain too, with a risk of both "false starts" in exiting from containment measures and persistent economic effects. This new and substantial source of downside risk adds to previously identified geopolitical risks such as rising protectionism and vulnerabilities in emerging markets, notably commodity exporters exposed to lower oil prices.

The initial tightening of market conditions was sudden, broad-based and, at times, disorderly. The scale of the early correction in global equity markets (see **Chart 2**, right panel) may, in part, have reflected high market valuations and compressed risk premia in some regions and asset classes prior to the outbreak of the pandemic. Sectors more affected by the pandemic, such as travel services, automobiles, and energy – which faced additional pressure from the sharp fall in oil prices – saw significant declines. Similarly, lower-rated sovereigns saw sharp rises in the cost of credit protection, while expectations of a rise in corporate defaults also led to a sharp sell-off in high-yield corporate debt markets (see **Chart 3**, left panel). Since the end of March, there has been a notable recovery in equity prices and key bond spreads, although conditions remain significantly tighter than before the pandemic.

Chart 2

The deterioration of global economic growth prospects triggered a spike in volatility and an abrupt correction in global stock markets



Sources: Consensus Economics, Bloomberg Finance L.P. and ECB calculations.
Note: Right panel: the horizontal axis denotes the number of working days from peak to trough of the index during recent stress episodes.

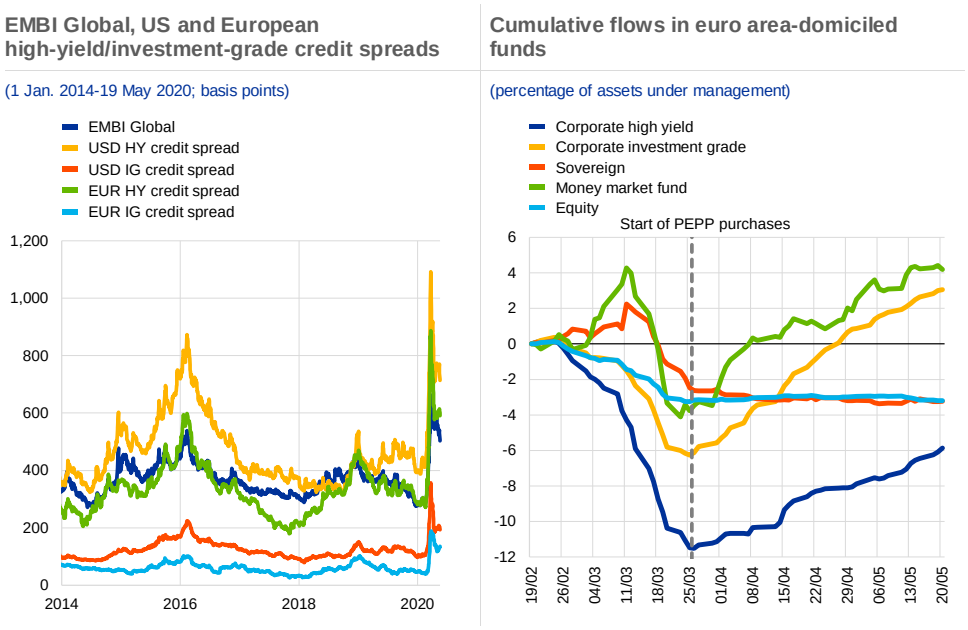
Market liquidity came under pressure, with investment funds experiencing outflows and amplifying market dynamics. Liquidity fell sharply not only for riskier assets, but briefly also in high-quality markets, such as the US Treasury and money markets, as both financial and non-financial sectors demanded cash. As the market sell-off intensified, investment funds experienced outflows resembling those seen during the global financial crisis. The extent of outflows from funds investing in less liquid asset classes, such as high-yield bonds, likely amplified market dynamics as funds were forced to sell assets to raise cash at short notice. Having benefited from flight to liquidity in the early phase of the turmoil, even money market funds and funds investing in sovereign bonds saw large outflows in mid-March as demand for cash rose (see **Chart 3**, right panel). Flows into and out of euro area funds stabilised, as central bank stimulus began to support markets.

Liquidity stress among investment funds may reappear, given their low level of liquid assets prior to the turmoil and the currently low levels of market liquidity.

During the recent stress, overall market liquidity improved following central bank policy interventions. But further declines in the market value of assets or a sharp increase in market volatility could prompt renewed outflows from funds, which remain exposed due to the search for yield and liquidity risk-taking over recent years. As a result, large outflows may prompt funds to sell assets or suspend redemptions.

Chart 3

In addition to stress in riskier bond market segments, liquidity pressures triggered large-scale investment fund outflows from safer assets as well



Sources: Bloomberg Finance L.P., Dealogic, EPFR Global and ECB calculations.
Note: Right panel: flows are measured relative to daily initial assets under management and chained together in a similar way to how cumulative fund returns are calculated.

Markets eventually calmed and liquidity pressures eased, following forceful responses by monetary authorities across the globe. These measures range from standard monetary policy action to non-standard measures, including asset purchases, lending facilities, liquidity support and currency swap lines. In March and April, the ECB's Governing Council announced a set of monetary policy measures to ensure an appropriate monetary stance and underpin the transmission of monetary policy to the real economy. These included targeted longer-term refinancing operations at very favourable terms to support bank lending, the launch of a temporary pandemic emergency purchase programme (PEPP) with an envelope of €750 billion, a new series of non-targeted pandemic emergency longer-term refinancing operations (PELTROs) to support liquidity conditions in the euro area financial system and an easing of the collateral framework.

The main euro area central clearing counterparties (CCPs) were able to avoid operational disruption during the turmoil. Despite high volatility in financial markets prompting large variation margin calls in both cleared and non-cleared derivatives markets (see **Special Feature B**), calls were in general met by market participants. Initial margins increased for some euro area CCPs, although anti-procyclicality measures in the European Market Infrastructure Regulation, such

as margin buffers or floors, were able to slow down the increase. The robustness of central clearing, a key area of financial sector reform after 2008, also helped avoid wider dysfunction in derivatives markets. However, the reformed financial system (including central clearing) has not yet been tested for a widespread deterioration in creditworthiness.

Euro area insurers and pension funds face pressures from both the fall in asset prices and the prevailing low interest rate environment. Increases in risk premia and equity price declines during the turmoil are expected to have a significant adverse impact on solvency ratios. These effects could be exacerbated if risk-free rates remain lower for longer. Some insurers could also face weakened cash inflows as a result of stalled new business during lockdowns, and possible disruptions to premium payments and investment income. Cash outflows may also rise as a result of higher claims in some business lines, policyholders' withdrawals from unit-linked products and larger derivative margin calls in a higher volatility environment. That said, in general, the impact on claims is expected to be less significant, as epidemics are usually excluded from (non-life) insurance cover.

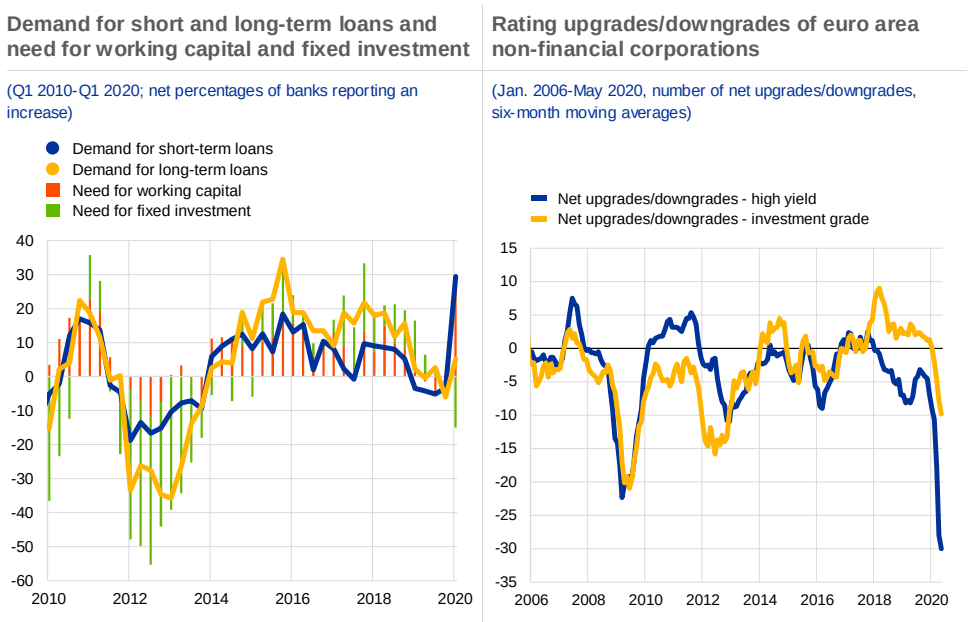
Corporates and households face lower income and rising debt burdens

Corporate fundamentals are set to weaken in line with deteriorating economic conditions. Non-financial firms, many already highly indebted and facing profitability challenges prior to the pandemic, now face cash-flow strains and higher financing costs. This weakens corporate debt sustainability over the medium term. For some firms, the sudden collapse in cash flows could translate quickly into liquidity risks and lead to sharply increasing default rates, especially in the high-yield segment. The increased drawing on credit lines indicates that temporary shutdowns are putting pressure on euro area firms' liquidity (see **Chart 4**, left panel). To overcome liquidity pressures affecting viable companies, governments stepped in with loan guarantee schemes and direct transfers.

In particular, riskier firms, which have levered up in recent years amid low funding costs, are likely to face downgrade risk (see **Chart 4**, right panel). This could imply higher funding costs and possible rollover risks going forward, primarily for the very large lower-rated investment-grade segment. Downgrades of BBB-rated issuers, in particular, could have non-linear effects on bond prices, as the markets for high-yield and (lower) investment-grade bonds are highly segregated (see **Section 2.2**). Given the higher use of leverage, developments in leveraged loan and private equity markets also warrant close monitoring (see **Box 1**).

Chart 4

Corporate liquidity pressures are increasingly evident, while higher downgrade risk may challenge non-financial firms



Sources: ECB (April 2020 bank lending survey), Fitch Ratings, Moody's, Standard & Poor's and ECB calculations.

The pandemic and subsequent containment measures are affecting euro area households, primarily through higher unemployment and weaker income. At the same time, private consumption has declined as consumer confidence has fallen and households have deferred non-essential purchases. Higher unemployment and income risks are compounded by the already high level of household indebtedness in several euro area economies. Households in countries with high pre-pandemic unemployment rates, a limited capacity to resort to existing savings and impaired debt servicing capabilities (as indicated by relatively high household non-performing loan (NPL) ratios) might be particularly affected by the repercussions of the recent shock (see **Chart 5**, left panel). But policy action, including loan moratoria and income support measures in a number of countries, could mitigate the related risks.

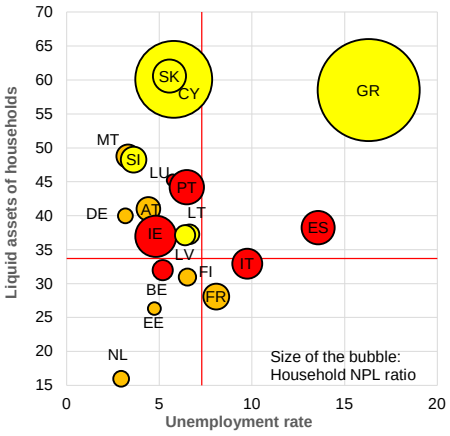
The risk of corrections in euro area residential and commercial real estate markets has increased in the wake of the pandemic. Risks in residential real estate markets continued to build in 2019, amid more visible signs of house price overvaluation for the euro area as a whole. Survey evidence also indicates an easing of lending standards for households since 2017 (see **Special Feature A**). As housing demand is set to slow along with the drop in economic activity and employment, the risk of house price corrections has increased (see **Chart 5**, right panel). Models assessing downward risks to house prices indicate that on average there is a 5% probability that house prices will decline by 15% or more over the next four quarters. A correction of stretched valuations in commercial real estate markets is also increasingly probable, given pressures on corporates and weaker investor sentiment. The prominent role of foreign investors and open-ended real estate investment funds might make commercial real estate markets more exposed to a disorderly adjustment.

Chart 5

Households challenged in countries with high pre-pandemic unemployment and low liquidity buffers amid growing risks of real estate market corrections

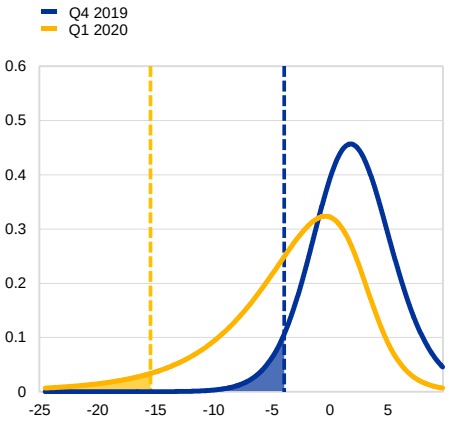
Unemployment rates, and households' liquid assets and NPL ratios across the euro area

(Feb. 2020, Q4 2019, percentages)



Probability density of one-year-ahead annual real house price growth for the euro area

(probability density)



Sources: ECB, Johns Hopkins University and ECB calculations.
Notes: Left panel: liquid assets are calculated as the sum of households' currency and deposits, short-term debt securities and money market fund holdings over total financial assets. The red vertical and horizontal lines represent the euro area averages. The colours of the bubbles reflect the number of confirmed coronavirus cases in the country as a share of total population. Red: upper tercile; orange: middle tercile; and yellow: lower tercile. Right panel: results from house price-at-risk model based on a panel quantile regression on a sample of 19 euro area countries over the period from the first quarter of 1999 to the first quarter of 2020. Explanatory variables: lag of house price growth, overvaluation (average of deviation of house price-to-income ratio from long-term average and econometric model), systemic risk indicator, consumer confidence indicator, financial market conditions indicator capturing stock price growth and volatility, government bond spread, slope of yield curve, euro area non-financial corporate bond spread, and an interaction of overvaluation and a financial conditions index. Euro area aggregate computed using nominal GDP as weights. The vertical dashed lines indicate the fifth quantile of the respective probability densities.

Fiscal measures provide essential support, but add to public debt burdens

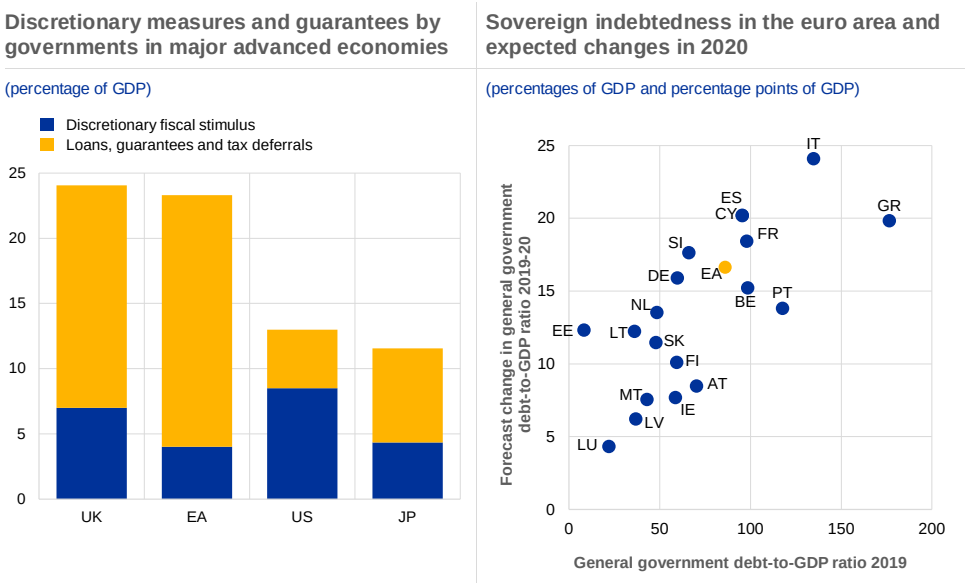
Euro area governments took action to mitigate the impact of the pandemic. All euro area countries have announced fiscal measures to cushion the economic impact of the pandemic. These measures aim to support health services, to replace lost incomes, and to protect the corporate sector. The measures include tax breaks, public investments and fiscal backstops, such as public guarantees or credit lines (see **Chart 6**, left panel). The size of these combined support schemes varies widely across the euro area, but is substantial in many countries (see **Section 1.2** and **Box 4**), with additional support being provided at the EU level.

The pandemic represents a medium-term challenge to the sustainability of public finances. Euro area governments continue to benefit from benign financing conditions against the backdrop of the ECB's ongoing asset purchase programmes, but the pandemic is set to weaken fiscal positions as automatic stabilisers and discretionary support measures translate into higher deficits. The fiscal measures help mitigate the economic fallout, and to the extent that they help economic growth to recover more quickly, they can be supportive of medium-term debt sustainability. But

the associated increase in public debt levels (see **Chart 6**, right panel) could also trigger a reassessment of sovereign risk by market participants and reignite pressures on more vulnerable sovereigns going forward. A more severe and prolonged economic contraction than envisaged, if coupled with higher sovereign funding costs for some euro area countries and the materialisation of contingent liabilities, would risk putting the public debt-to-GDP ratio on an unsustainable path in already highly indebted countries.

Chart 6

Fiscal relief measures reduce the near-term impact of the pandemic, but may reinforce medium-term public debt sustainability concerns



Sources: ECB staff assessment based on information from the national Ministries of Finance and central banks, European Commission (AMECO database), ECB and ECB calculations.
Notes: Left panel: discretionary measures and other liquidity support for the euro area are based on information collected from the 2020 stability programmes. Given the heterogeneity in the reporting of the data, the aggregate figure for discretionary measures could be distorted by the impact of automatic stabilisers. Figures are expressed as a percentage of 2019 GDP.

Euro area banks are supported by capital and liquidity buffers, but face even weaker profitability

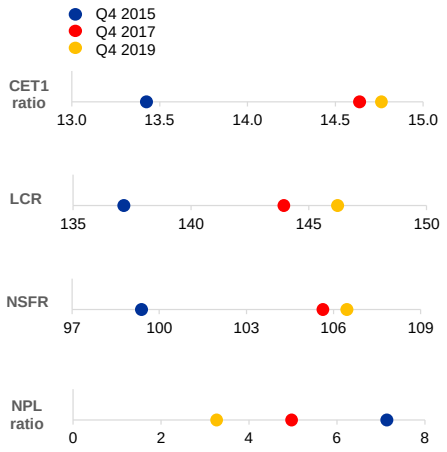
Bank valuations fell to record lows and bank funding costs increased, despite the enhanced resilience since the global financial crisis. Importantly, euro area banks entered this stress episode with stronger capital levels, better liquidity positions and more stable funding structures than they had at the time of the global financial crisis a decade ago (see **Chart 7**, left panel). Even though banks were not at the epicentre of the pandemic, their price-to-book valuations fell to record lows of around 0.3 (see **Chart 7**, right panel), reflecting both the deteriorated economic outlook and considerably higher uncertainty about the prospects for euro area banks' profits and asset quality. Market funding costs for banks also rose (see **Chapter 3**).

Chart 7

Despite increased resilience since the global financial crisis, bank valuations plunged

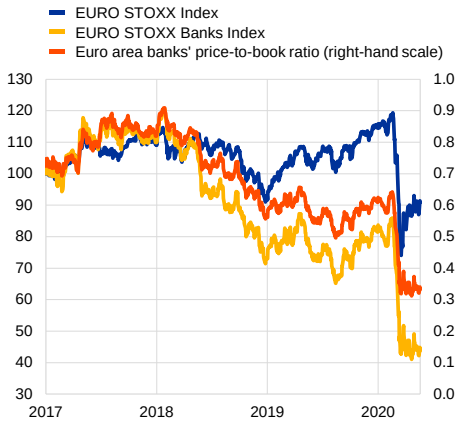
Euro area banks' Common Equity Tier 1, liquidity coverage, net stable funding and non-performing loan ratios

(percentages)



EURO STOXX and EURO STOXX Banks Indices, as well as euro area banks' price-to-book ratio

(2 Jan. 2017-19 May 2020; index: 2 Jan. 2017 = 100; multiples)



Sources: ECB supervisory statistics, Bloomberg Finance L.P. and ECB calculations.
Note: Left panel: for the liquidity coverage ratio (LCR), the figure for Q4 2015 reflects the earliest available value for Q3 2016.

An expected increase in credit risk in the wake of the pandemic weakens the outlook for bank profitability, although in the near-term government schemes may offset some losses. Banks' profitability prospects have weakened from already low levels. Mirroring changes in corporate earnings expectations, bank analysts have also revised down their 2020 return on equity (ROE) forecasts for euro area banks (see **Chart 8**, left panel). Income generation on new business is likely to be impaired, and credit losses are set to increase, as banks are increasingly confronted with missed payments and a growing number of corporate defaults. Banks with already squeezed pre-pandemic margins and high exposures to coronavirus-sensitive sectors appear particularly vulnerable in this environment (see **Chart 8**, right panel).

Euro area banks' prospects are further hindered by continuing structural problems. Low cost-efficiency, limited revenue diversification and overcapacity continue to weigh on many banks' profitability prospects. The pandemic could help accelerate change in the sector, for example by fostering digitalisation, although uncertainty and lower profit expectations might delay transformation plans. Furthermore, banks continue to face the challenges of operating in business continuity mode, including the associated increase in cyber risk. Banks also need to continue managing the implications of the transition to a greener economy (see **Box 3**).

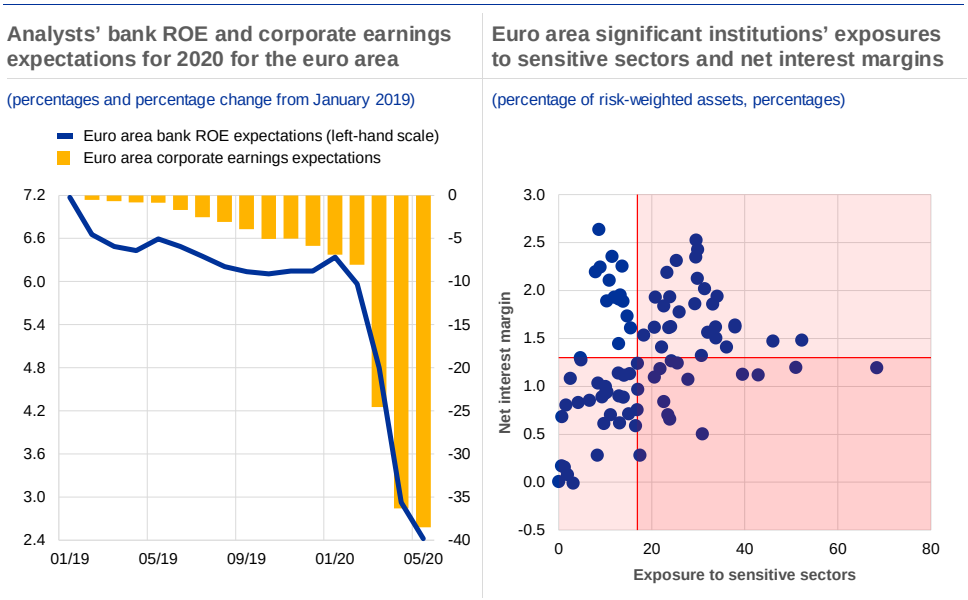
Prudential authorities across the euro area acted to maintain the flow of credit to the economy, complementing monetary and fiscal measures. ECB Banking Supervision allowed banks to operate temporarily below certain liquidity and capital buffer requirements,[1] and granted them more operational flexibility to avoid, as much

[1] See "ECB Banking Supervision provides temporary capital and operational relief in reaction to coronavirus", ECB Banking Supervision, press release, 12 March 2020.

as possible, unintended procyclical consequences for the financial sector. This was complemented by macroprudential action, in the first test of the post-crisis framework. Several national authorities promptly decided to release the countercyclical capital buffer and other macroprudential buffers, or revoke earlier macroprudential decisions (see **Chapter 5**). These actions, which amount to around €140 billion of capital and complement fiscal and monetary policy measures by supporting loss absorption and reducing incentives to deleverage, were supported by the ECB. In addition, ECB Banking Supervision recommended that banks limit capital distribution by refraining from paying dividends or buying back shares (see **Box 5**). These capital measures are expected to remain in place until the economic recovery is well established.

Chart 8

Euro area banks' profitability outlook has deteriorated further amid gloomy corporate earnings prospects, low interest rates and looming asset quality problems



Sources: Bloomberg Finance L.P., ECB supervisory statistics and ECB calculations.
Notes: Left panel: values for May 2020 are as at 19 May 2020. Right panel: sensitive sectors comprise mining, manufacturing, retail and wholesale trade, transport, accommodation and food services as well as arts and entertainment. The red horizontal and vertical lines represent the median values for euro area significant institutions.

Policy measures alleviate near-term risks to financial stability, but medium-term vulnerabilities have risen

The euro area financial system has weathered much of the recent stress with the help of policy measures, but the lost economic output and higher debt burdens increase the medium-term risks to euro area financial stability. Looking ahead, four key vulnerabilities for euro area financial stability have increased: (i) tighter financial conditions and fragile functioning in some markets; (ii) a significant increase in debt burdens, especially public debt; (iii) weaker bank intermediation capacity and profitability; and (iv) amplification of market dynamics by the non-bank financial sector. The potential of these vulnerabilities to materialise simultaneously further increases the risks to financial stability.

1 Macro-financial and credit environment

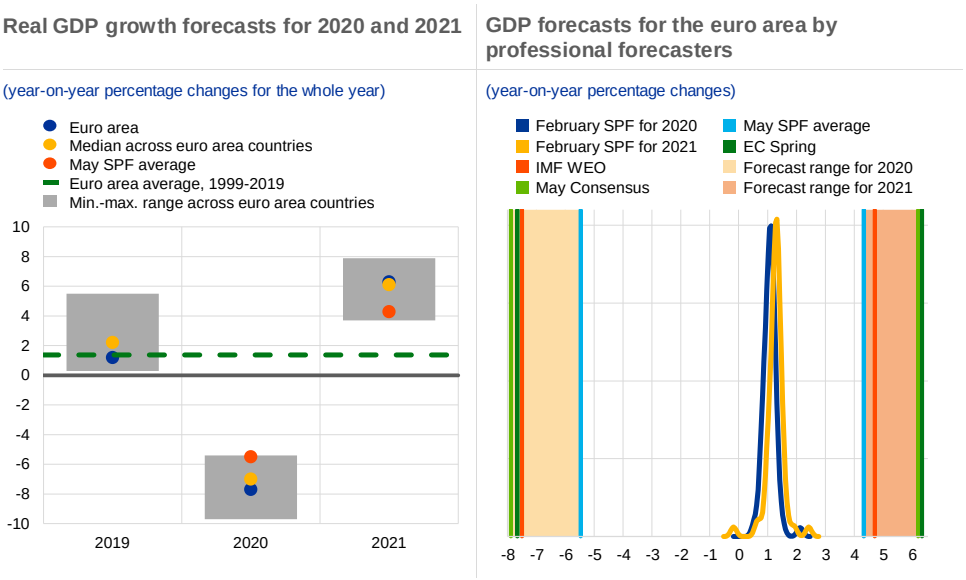
1.1 Sharp deterioration of near-term economic outlook

The global and euro area economies have faced one of the largest and fastest contractions on record, with an uncertain recovery ahead. In the first quarter of the year, euro area real GDP declined by 3.8% quarter on quarter according to preliminary flash estimates. Economic projections for all euro area countries for 2020, which are surrounded by a high degree of uncertainty, suggest substantial declines in output, with annual rates of decline ranging between -6% and -9.2% (see **Chart 1.1**, left panel). Preliminary scenario analysis by ECB staff suggests a decrease in euro

area GDP of between 5% and 12% this year. This contraction reflects the impact of the public health measures to contain the spread of the coronavirus, which curtailed demand and production, in turn weighing on cash flows of firms and incomes of households. This decline in activity is expected to be even sharper in the second quarter of the year because lockdown measures were in full force in April. The pace of recovery will depend on the ability of governments to ease containment measures and the effectiveness of the implemented fiscal and monetary policy measures. Euro area growth projections by professional forecasters suggest a strong rebound in 2021 of between 4 and 6 percentage points, but are very uncertain given the exceptional nature of the shock. The recent growth forecasts for both this and next year lie well beyond what could have been foreseen in February (see **Chart 1.1**, right panel).

Chart 1.1

Expected contraction in 2020 well beyond what could have been foreseen in February



Sources: Consensus Economics, ECB (Survey of Professional Forecasters – SPF), European Commission, April 2020 IMF World Economic Outlook and ECB calculations.
Notes: Left panel: the blue and yellow dots refer to the outcome of the European Commission Spring 2020 Economic Forecast. The average growth rate is the compounded average annual growth rate of GDP for the period 1999-2019. Right panel: normal Kernel density estimates across 66 and 69 point forecasts of professional forecasters.

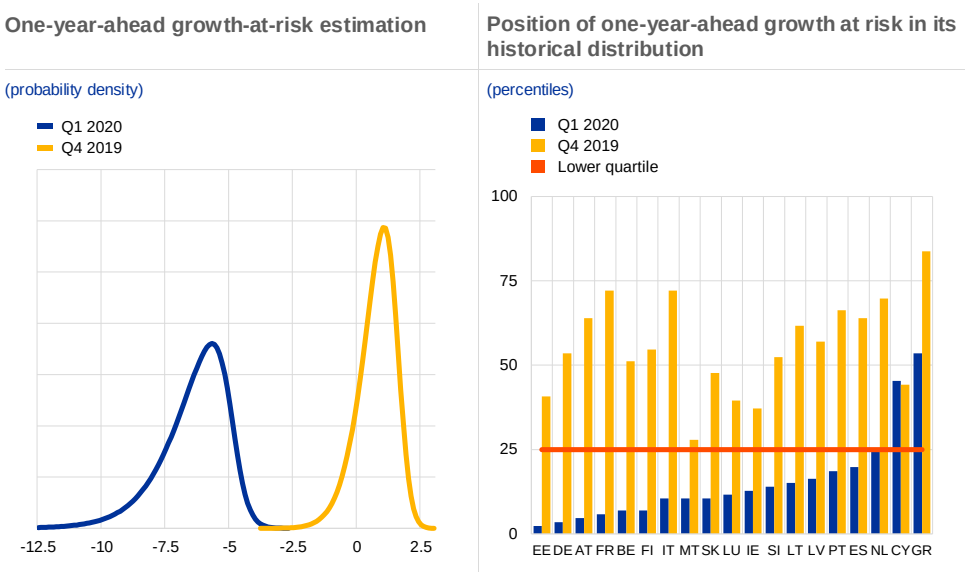
Governments have launched a range of fiscal relief measures to support companies and employment, in addition to automatic fiscal stabilisers. Beyond supporting health systems, national governments and the European Commission have also sought to mitigate the economic impact on households and companies. The European Commission launched a support scheme for short-time working, a pan-European guarantee fund to support small and medium-sized enterprises (SMEs) via the European Investment Bank, and pandemic crisis support for Member States via the European Stability Mechanism. In addition, a European recovery fund to increase the EU budget temporarily by €500 billion was proposed by the French and German Heads of State. Such a fund would make it possible for the European Commission to borrow funds over the long term allowing a substantial amount of direct support to be provided to the countries most affected by the pandemic. In addition, sovereign bond spreads could narrow as a higher share of aggregate sovereign debt would benefit from higher ratings (see **Chapter 2**). National governments have

implemented or expanded schemes to support continued employment, such as wage subsidies or special temporary unemployment schemes. In addition, non-financial corporations (NFCs) have received short-term liquidity support via direct subsidies and tax relief, and loans backed by loan guarantee schemes (see **Box 4**). Discretionary fiscal measures communicated so far amount to 4% of euro area GDP, while nearly 20% of euro area GDP has already been committed to loan guarantee schemes that reduce banks' credit risk.

In parallel, ECB monetary policy measures have supported liquidity in the euro area financial system and economy. These include the pandemic emergency purchase programme (PEPP), which – together with the existing asset purchase programme – will purchase more than €1 trillion of private and public bonds by the end of 2020. In addition, a large expansion of targeted longer-term refinancing operations (the TLTRO III programme) offers liquidity to banks at a rate that, depending on banks' lending performance, can be as low as -1.0%. These instruments are accompanied by eased collateral requirements to facilitate an increase in bank funding against loans to corporates, in particular small businesses, self-employed individuals and households. In April, the ECB introduced an additional liquidity backstop – pandemic emergency longer-term refinancing operations (PELTROs) – allowing banks to borrow at a rate of up to 25 basis points below the main refinancing rate. Other major central banks have taken similar steps to support the macroeconomy. Micro- and macroprudential authorities have also acted to support continued bank lending with capital measures amounting to around €140 billion (see **Chapter 5**).

Chart 1.2

Near-term growth at risk has deteriorated substantially



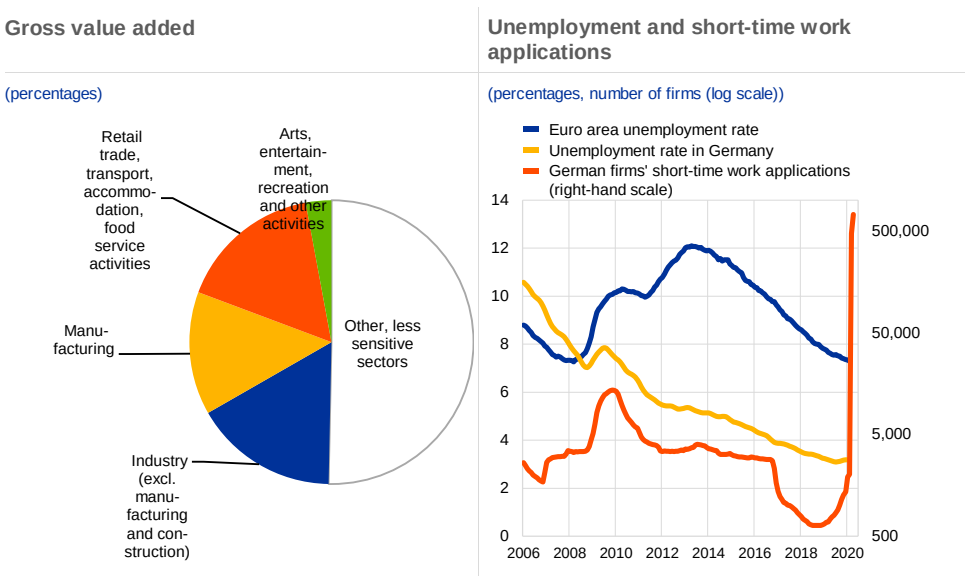
Sources: ECB and ECB calculations.
Notes: Left panel: probability density centred around the ECB central scenario. Right panel: based on a country panel growth-at-risk estimation. Growth at risk is defined as the observation corresponding to the 5th quantile of the one-year-ahead annual GDP growth density given information in the fourth quarter of 2019 and the first quarter of 2020, respectively. The chart shows where the 5th quantile is positioned in the historical distribution of the 5th quantile estimates.

While the central expectation is for the pandemic's economic fallout to be temporary, there are downside risks to the recovery despite the large-scale

policy support. Based on growth-at-risk predictions, the 5th quantile of GDP growth one year ahead has dropped from -1% to around -11% (see **Chart 1.2**, left panel). Across euro area countries, dispersion is very wide, reflecting that countries have been impacted differently by the virus and the associated containment measures (see **Chart 1.2**, right panel). Several forces are behind the downside risks: first, not only countries but also economic sectors have been affected to different extents by the lockdown measures. Initial estimates suggest that the most affected sectors – those which faced significant closure of their business – are industry (except construction), manufacturing, non-food retail and wholesale trade, transport, hotels and restaurants, as well as arts and entertainment. These sectors account for about half of total gross value added in the euro area (see **Chart 1.3**, left panel). Second, some sectors, such as travel and tourism, may be affected for a longer period of time due to continued restrictions. Third, despite schemes to keep employees in the labour market, there is a risk that a significant number of workers could still lose their jobs if firms ultimately need to scale down their business in response to changes in demand. In some countries which have established schemes to subsidise short-time work, such as Germany, applications for such subsidies have increased sharply (see **Chart 1.3**, right panel). Fourth, consumption may remain subdued for some time not only because of lower incomes but also due to a general scarring effect impacting consumer behaviour. Finally, it is possible that infection numbers rise again, leading to a return of local or regional containment measures.

Chart 1.3

Sensitive sectors account for almost half of total gross value added and unemployment may rise substantially



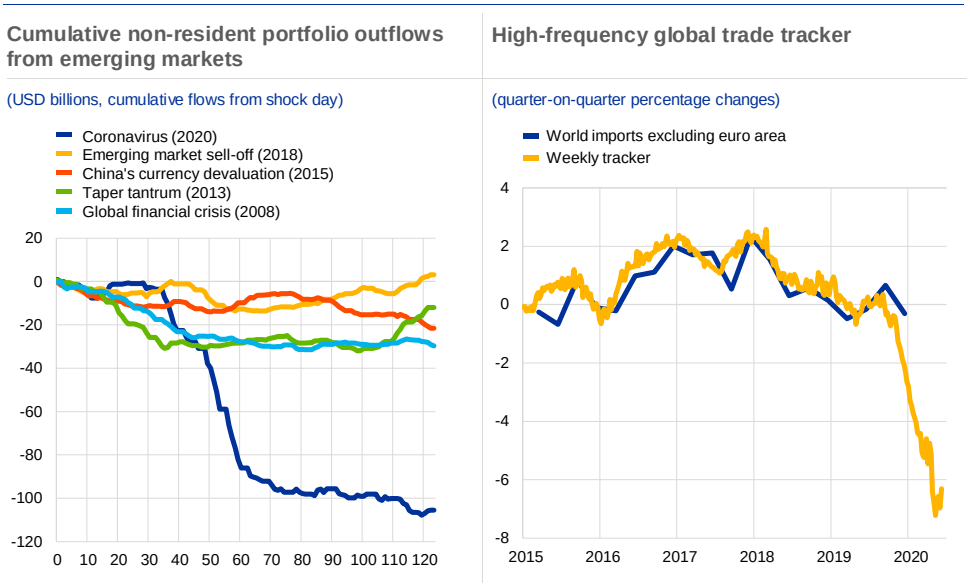
Sources: Eurostat, German Federal Employment Agency and ECB calculations.
Notes: Left panel: "other, less sensitive sectors" comprises agriculture, construction, information and communication, financial and insurance activities, real estate activities, professional, scientific, administrative and technical activities and public administration. Right panel: number of firms that have issued applications for short-time work.

Weak global growth and protracted disruption of supply chains may also delay the recovery in the euro area. Emerging market economies (EMEs) have experienced sharp capital outflows since end-January (see **Chart 1.4**, left panel).

Capital outflows and the depreciation of EME currencies against the US dollar are likely to depress economic activity in EMEs, and raise concerns about debt sustainability in a number of countries. As a first reaction, the leaders of the G20 agreed on debt moratoria for 77 low-income countries to last until end-2020 with the possibility of being extended. In addition, driven by supply chain disruptions and the massive demand shock, world trade is estimated to have fallen sharply in the first half of 2020 (see **Chart 1.4**, right panel). The International Monetary Fund (IMF) projects global activity (excluding the euro area) to contract by 2.3% in 2020. Assuming that containment measures are unwound gradually in the second half of this year, the global economy is projected to grow by 5.8% in 2021.

Chart 1.4

The global recovery is also uncertain, as EMEs experienced sharp capital outflows and world trade is expected to shrink



Sources: ECB, Haver Analytics, Institute for International Finance and ECB calculations.
Notes: Left panel: capital flows are cumulated daily. Reference shock dates are 20 January 2020 (coronavirus), 1 May 2018 (emerging market sell-off), 11 August 2015 (China's currency devaluation), 22 May 2013 ("taper tantrum") and 15 September 2008 (global financial crisis). Latest observation: 22 May 2020. Right panel: the tracker is based on a regression of world imports on a principal component of a small panel of weekly indicators of trade (including lags), a constant, some monthly indicators and lags of the dependent variable. The indicators featuring in the regression have been chosen on the basis of their correlation with world trade, their availability and timeliness. Latest observation: the fourth quarter of 2019 for world imports excluding the euro area and 9 May 2020 for the global trade tracker.

1.2 Substantial fiscal response to pandemic implies a large increase in sovereign debt

The fiscal policy response to the economic fallout of the coronavirus has softened the impact, and is expected to support economic recovery.

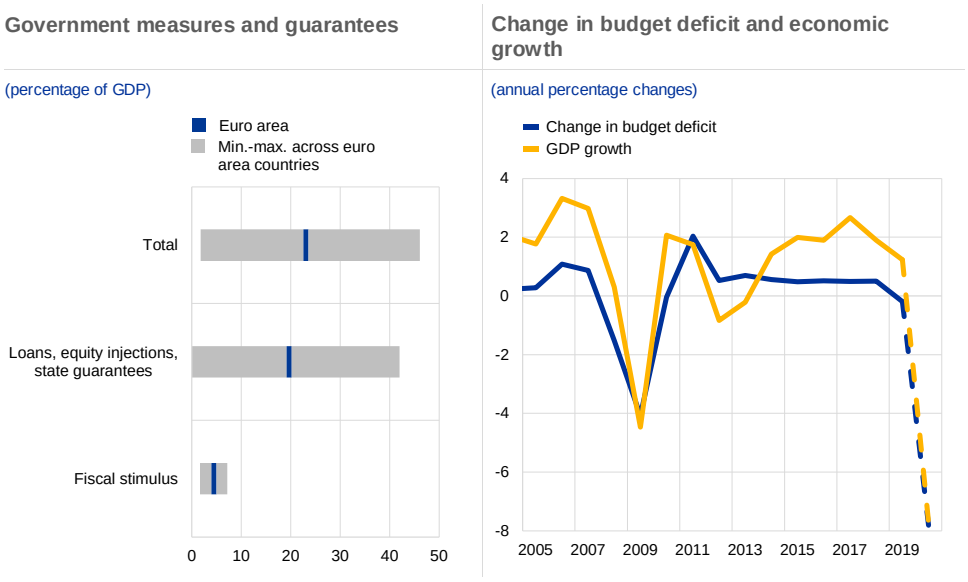
Governments across all euro area countries and the European Commission have implemented many support measures in accordance with the temporary framework for State aid measures recently adopted by the Commission. These include direct spending measures and loan guarantees for the non-financial private sector (see **Chart 1.5**, left panel). The first category includes, for example, expenditure to expand medical capacity in response to the pandemic, as well as schemes aimed at

supporting continued employment, such as wage subsidies or special temporary unemployment schemes. Furthermore, governments have directed subsidies towards SMEs to help them manage immediate liquidity shortages. Governments have also permitted deferrals of some taxes and social security contributions.

Guarantee schemes account for the largest part of governments' support to the euro area economy. These measures include guarantees for export credit and for other liquidity assistance and credit lines via national development banks (see **Box 4**). Other off-budget vehicles are being used to support companies via guarantees on firms' liabilities and capital support. Some of these measures improve the liquidity position of the private sector, but – unlike deferrals which are automatic and apply generally to the target groups – credit lines require action from the impacted companies and there remains uncertainty about the conditions under which banks can provide loans, even if the government guarantees cover the largest part of the loans.

Chart 1.5

Euro area governments have taken strong action to support the economy affecting budget deficits this year



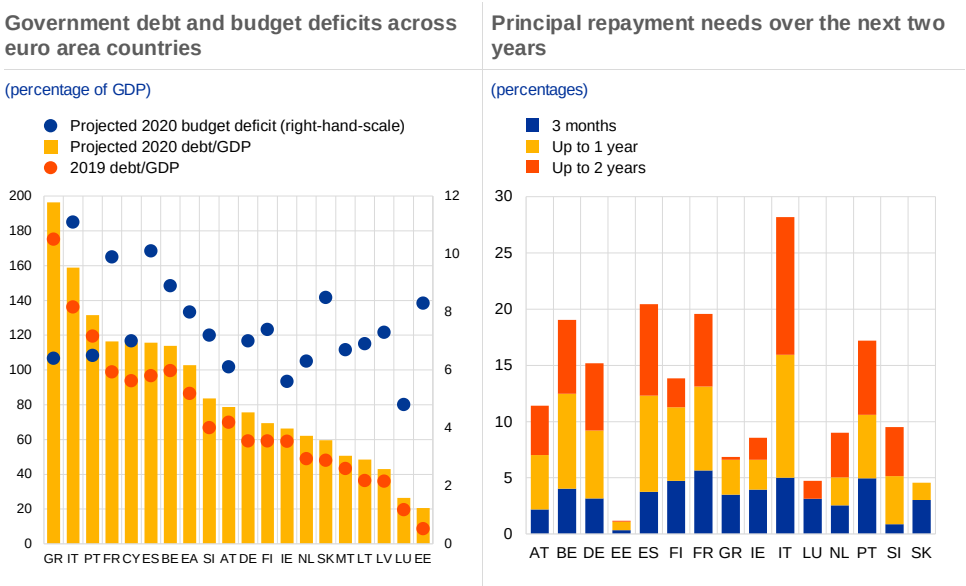
Sources: 2020 National Government Stability Programmes, European Commission Spring 2020 Economic Forecast and ECB calculations.
Notes: Given the heterogeneity in the reporting of the data, the aggregate figure on discretionary measures could be distorted by the impact of automatic stabilisers. Figures are expressed as a percentage of 2019 GDP. Right panel: the budget deficit is not cyclically adjusted.

Governments face considerable near-term gross financing needs. These higher financing needs result from both the standard functioning of automatic fiscal stabilisers and the fiscal stimulus packages. Additional revenue shortfalls resulting from tax deferral schemes and the conventional channel of lower income leading to lower tax revenues add to this. The proportion of corporate sector guarantees called will depend on the depth and length of the recession and such calls will increase government financing needs. The overall projected headline effect on the change in the budget balance is significantly larger than during the global financial crisis, but relative to the decline in GDP growth the currently projected aggregated budget deficit is comparable (see **Chart 1.5**, right panel).

As a result, budget deficits and government debt levels are expected to increase, supporting activity in the near term. Debt levels across euro area countries are projected to increase significantly by between around 7 and 22 percentage points in 2020 (see **Chart 1.6**, left panel), pushing the aggregate euro area government debt-to-GDP ratio above 100%. Moreover, a number of countries are facing substantial debt repayment needs over the next two years (see **Chart 1.6**, right panel). While the large fiscal policy response mitigates the economic cost of the downturn, thereby providing a first line of defence against fiscal debt sustainability concerns, a more severe and protracted economic downturn could give rise to debt sustainability risks in the medium term.

Chart 1.6

Sovereign debt levels will rise in 2020



Sources: ECB, European Commission Spring 2020 Economic Forecast, Eurostat and ECB calculations.
Note: Left panel: budget deficit in absolute terms relative to 2019 nominal GDP.

1.3 Income declines and rising unemployment will test resilience of household balance sheets

Consumer sentiment and unemployment expectations deteriorated sharply, with some improvement in May. Survey-based indicators point to a strong deceleration in employment across all business sectors led by the services and retail sectors (see **Chart 1.7**, left panel). These sectors were affected the most by the lockdown measures. Mirroring the bleaker employment expectations and generally elevated uncertainty, households assessed their financial situation as being much weaker and accordingly consumer confidence declined strongly.

On aggregate, euro area households entered the pandemic period with strong balance sheets. Household real disposable income had continued its expansion in 2019, underpinned by employment gains and robust wage growth (see **Chart 1.7**, right panel). Wage dynamics had remained solid, shaped by the still favourable labour

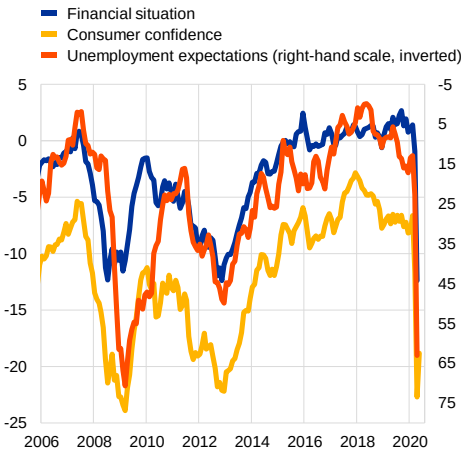
market outlook. Furthermore, before the turmoil households' balance sheets were strong. Deposit holdings on aggregate accounted for 4 ½ times their disposable income and net worth had benefited from substantial gains on financial asset and real estate holdings, following previous favourable stock and housing market developments (see **Chart 1.7**, right panel). However, the recent substantial decline in equity markets could weigh on households' financial asset holdings and housing wealth might also decline. In addition, on aggregate households will face wage decreases owing to short-time work arrangements or because they will lose their jobs.

Chart 1.7

Households expect a significant deterioration in their economic situation although past income growth and savings can provide some buffer

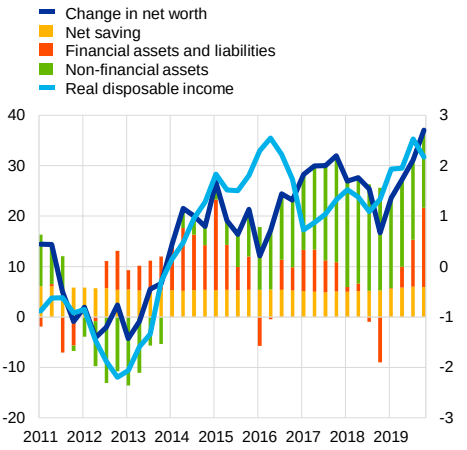
Consumer confidence, and households' expectations about the economic situation and unemployment over the next year

(Jan. 2006-Apr. 2020, percentage balances)



Gross disposable income and contributions to euro area household net worth

(Q1 2011-Q4 2019, percentage of gross disposable income, annual flows, annual percentage growth)



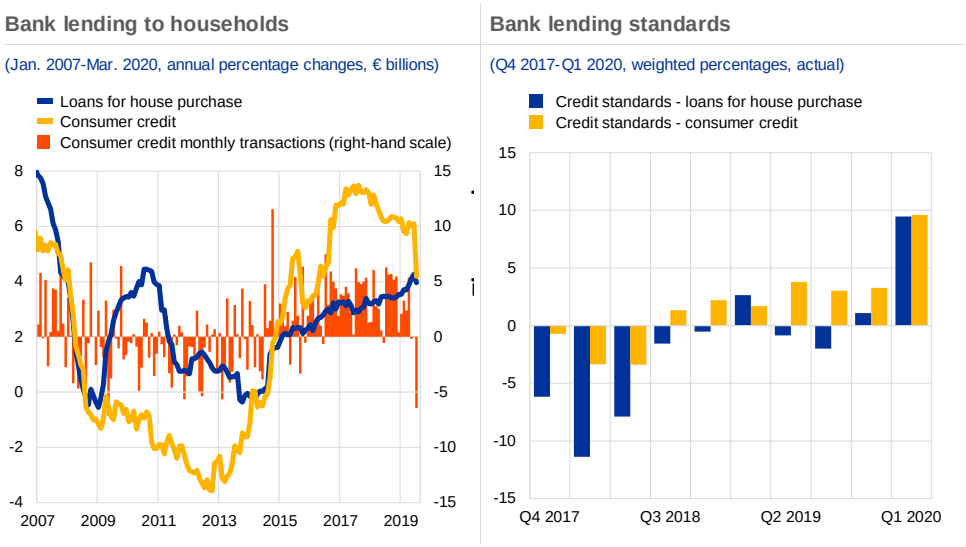
Sources: ECB, European Commission and ECB calculations.
Notes: Left panel: last observation for consumer confidence is the flash estimate published on 20.05.20, unemployment expectations are presented using an inverted scale, i.e. an increase (decrease) of the indicator corresponds to more (less) optimistic expectations. Right panel: changes in non-financial assets mainly include holding gains and losses on real estate (including land). Changes in financial assets and liabilities mainly include holding gains and losses on shares and other equity, while the change in net worth due to net saving comprises net saving, net capital transfers received and the discrepancy between the non-financial and financial accounts.

Bank lending standards for households have tightened and total lending to households declined in March. Before the coronavirus shock hit, aggregate bank loan growth had continued rising gradually, but with variation across euro area countries, reflecting different economic conditions and real estate cycles. Lending for house purchase in the euro area was supported by further improvements in labour markets, broadly resilient consumer confidence, and favourable financing conditions reflected in lower interest rates and supportive credit standards (see **Chart 1.8**, left panel). By contrast, growth of consumer credit had been gradually decelerating already, in line with slower economic growth and the associated lower spending on durable goods. In March, consumer lending declined sharply by €6.5 billion on account of the lockdown measures and elevated uncertainty, while banks considerably tightened their lending standards in the first quarter of the year (see **Chart 1.8**, right panel). The more uncertain economic situation also caused activity to stall in real estate markets, with a reduction in the amount of loans to households for house

purchase of almost 80% compared with the monthly average over the previous 12 months. This may partly reflect capacity constraints of banks which were busy providing loans to NFCs, but was also due to lower loan demand. Households facing wage declines owing to a more precarious work situation and sole proprietors facing financing strains might have drawn on credit lines.

Chart 1.8

Consumer lending declined and bank lending standards tightened

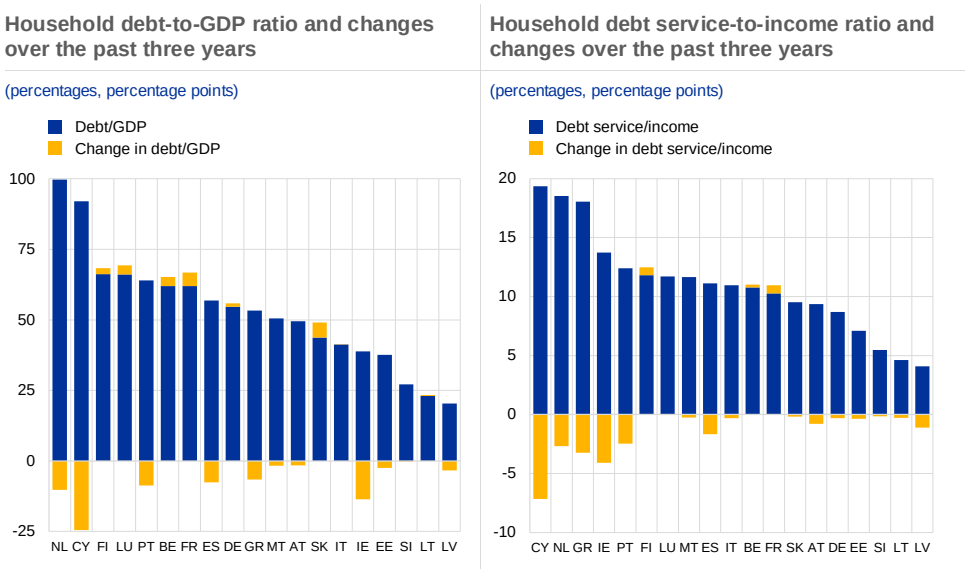


Sources: ECB and ECB calculations.

Risks to household debt sustainability could arise as a result of the economic contraction and if the recovery is slow. Prior to the pandemic, household indebtedness and debt service burdens had been declining across euro area countries, with some exceptions mostly in countries featuring buoyant housing markets (see **Chart 1.9**). A protracted economic slowdown could weigh on household incomes or lead to a sharp correction in some countries' property markets with heterogeneous effects across countries. This should also depend on the fraction of households that experience income declines, for example in the context of job losses or self-employed people who face substantial revenue losses. This could put pressure on households' debt repayment capacity. A short-term mitigating effect should come from loan repayment holidays that have been offered in a number of countries by banks and even enforced by governments in some cases. In addition, the continued favourable financing conditions should mitigate some of the vulnerability.

Chart 1.9

Debt and debt service burdens had declined in most euro area countries prior to the pandemic



Sources: ECB and ECB calculations.

1.4 Widespread cash-flow challenges put the corporate sector under stress

Vulnerabilities have increased considerably in the corporate sector due to the pandemic and related containment measures. A large share of euro area corporates had to stop production for some time during the first half of the year as a result of the economic lockdown, causing substantial revenue losses and large liquidity needs in many cases. Corporate profits on aggregate are expected to follow the large drop in economic activity (see **Chart 1.10**). A number of business models where the close contact of people is essential could be hampered for a longer period depending on the duration and extent of the containment measures. Flash PMI data for May provide first indications of some rebound in economic activity.

Chart 1.10

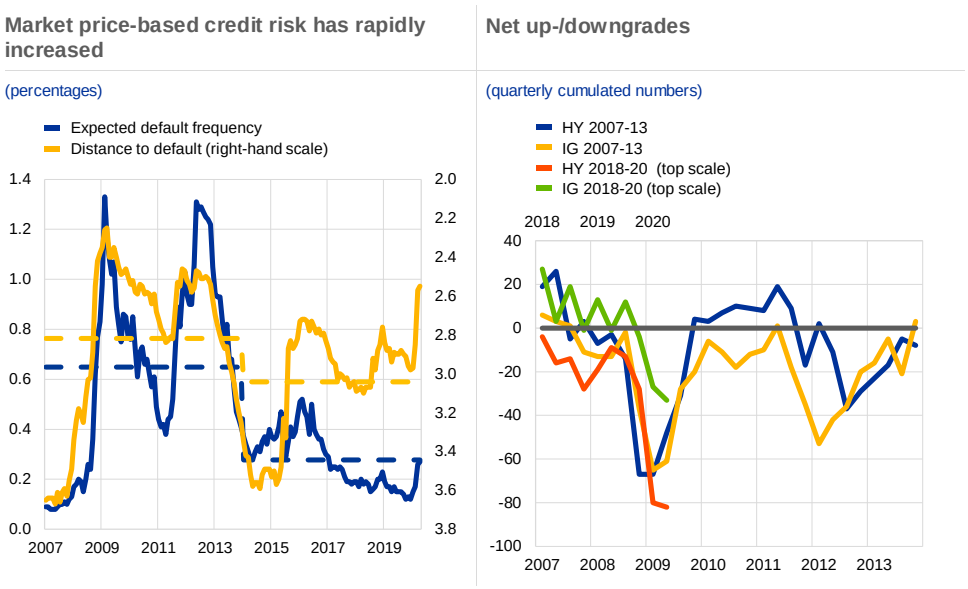
Downside risks to corporate earnings could unearth debt vulnerabilities

Sources: Bloomberg, Eurostat, Fitch Ratings, IBES via Eikon, Markit, Moody's, Standard & Poor's and ECB calculations.
Notes: In the left panel, the latest observation for gross operating surplus is the third quarter of 2019, for real GDP is the flash estimate of the first quarter of 2020, and for the Purchasing Managers' Index (PMI) is the flash estimate for May 2020. The right panel shows the change in the 12-month forward earnings per share (EPS) growth between 2 March and 18 May 2020.

The worsened outlook has been reflected in higher market-based credit risk measures and rating agency downgrades of companies. Expected default frequencies and distance-to-default measures deteriorated sharply in March and April (see **Chart 1.11**, left panel). Credit risk measures have surpassed their average values since 2014, but remained below the levels that had been observed during the financial and sovereign debt crises. In addition, rating agencies have increased the number of downgrades, notably in the high-yield segment (see **Chart 1.11**, right panel). Downgrades in the first quarter of the year exceeded those in the 2008-09 financial crisis. The corporate sector had already seen a rising number of downgrades over the past two years, reflecting the pronounced increase in leverage over that period (see **Chart 1.12**, left panel and **Box 1**). Furthermore, among investment-grade corporates, BBB-rated entities had further increased their debt issuance prior to the recent turmoil. In the first months of the year, only a small number of these firms faced downgrades to high-yield grade, but various cliff effects associated with the loss of investment-grade status expose downgraded corporates to pronounced market-based funding risks (see **Section 2.3**).

Chart 1.11

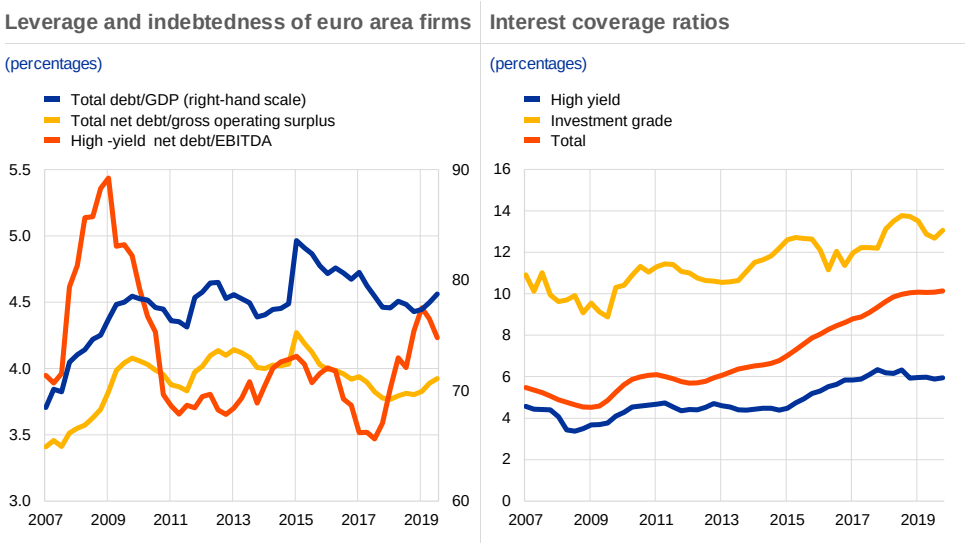
Rapid increase in credit risk and in the number of corporate rating downgrades



Sources: Fitch Ratings, Moody's, Standard & Poor's and ECB calculations.
Notes: Left panel: the dashed lines show the averages for the period from January 2007 to December 2013 and for the period from January 2014 to April 2020. The latest observations are for 30 April 2020. Right panel: the number of firms with rating upgrades minus the number of firms with rating downgrades cumulated over each quarter. HY: high yield; IG: investment grade.

Chart 1.12

The risk posed by leverage of high-yield firms materialised



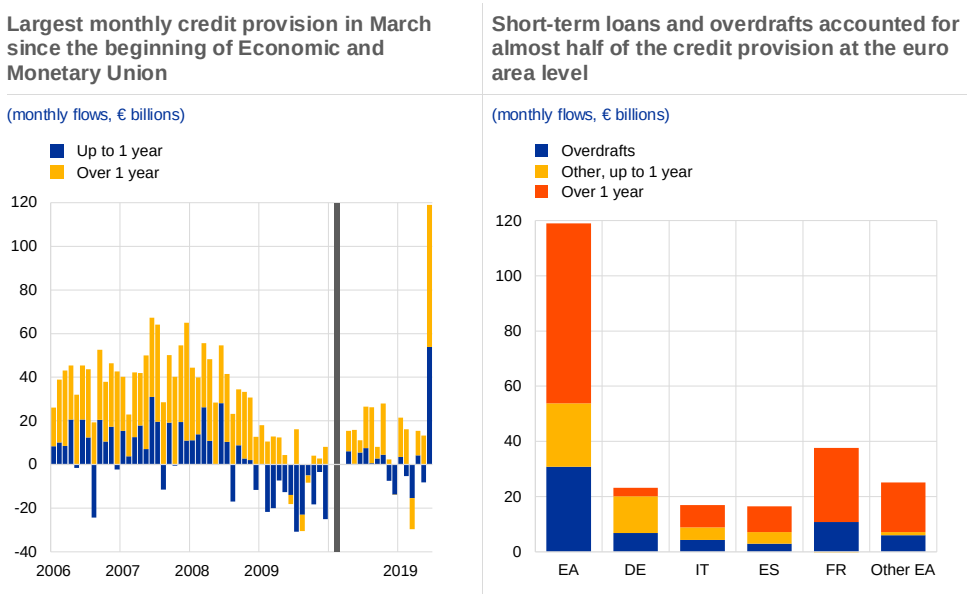
Sources: ECB, J.P. Morgan and ECB calculations.
Notes: Left panel: EBITDA: earnings before interest, tax, depreciation and amortisation. Net debt is computed as consolidated debt minus currency and deposits. Right panel: interest coverage ratio computed as gross operating surplus divided by gross interest payments before allocation of financial intermediation services indirectly measured (FISIM).

Many corporates have experienced liquidity shortages and have drawn down credit lines, increasing their leverage. Prior to the turmoil, many corporates had accumulated substantial liquidity buffers in the form of liquid assets, which – together with the low debt servicing costs and high interest coverage ratios (see **Chart 1.12**, right panel) – provided them with some resilience to withstand temporary funding

stress without resorting to abrupt deleveraging. At the same time, in relation to the size and pace of the economic shock these liquidity buffers have proven insufficient in many cases. Notably SMEs and businesses that depend heavily on current cash flows, such as travel and tourism, quickly experienced liquidity shortages and funding constraints. Firm-level data suggest that a quarter of all firms would not have sufficient cash buffers to cover two months of payment obligations linked to their liabilities (see **Chapter 3**). In response, many firms drew on credit lines (see **Chart 1.13**, left panel) and loan provision in March increased by around €120 billion to the highest monthly level on record. Loan maturities up to one year accounted for almost half of the total amount, marking a significant shift towards shorter maturities, which was broad-based across euro area countries (see **Chart 1.13**, right panel).

Chart 1.13

Credit lines and government support schemes are the first source of external finance to address liquidity needs



Sources: ECB and ECB calculations.
Notes: Left panel: monthly transactions January 2006-December 2009 and January 2019-March 2020. Right panel: monthly transactions in March 2020.

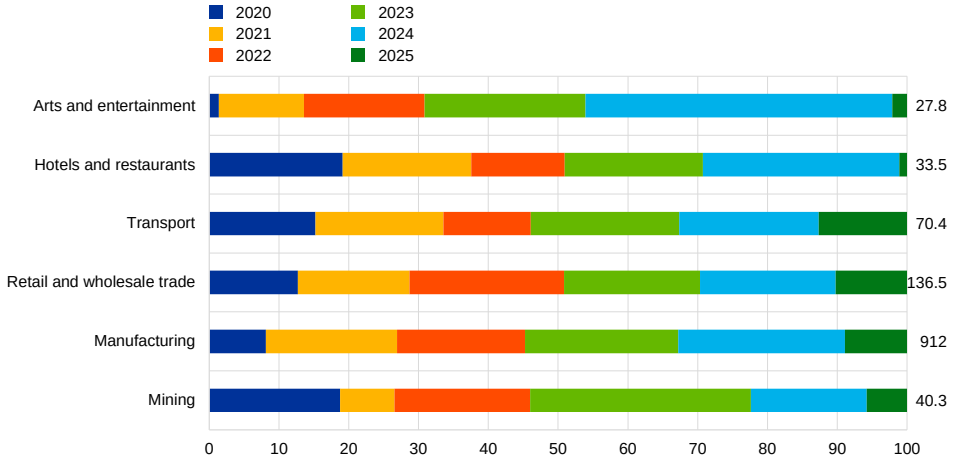
Over the next two years, corporates in sensitive sectors face significant debt refinancing needs. Gross issuance of corporate bonds was robust in early 2020, before stalling in mid-February and then resuming after 24 March, supported by the implemented policy measures and in particular by the PEPP, which along with the other measures improved risk sentiment (see **Chapter 2**). In addition to the short-term liquidity needs of corporates to finance working capital costs, corporates in sectors that are particularly sensitive to the containment measures will have to refinance a significant amount of their issued debt over the next years (see **Chart 1.14**). For some firms, challenges in refinancing debt could result in solvency problems, in particular in the event of a slow economic recovery and continued impediments to business models. While gross issuance of investment-grade bonds by NFCs in the euro area from January to April 2020 exceeded averages for the same months between 2016 and 2019, the market for high-yield issuers has remained limited since mid-February.

Chart 1.14

Sectors sensitive to the pandemic measures have substantial refinancing needs

Corporate refinancing needs in sensitive sectors over the next five years

(percentages, € billions)



Sources: Bloomberg and ECB calculations.
Note: The numbers on the right-hand scale are the cumulative refinancing needs over the next five years in € billions.

Box 1

Financial stability implications of private equity

Prepared by Margherita Giuzio, Claudiu Moldovan and Danilo Vassallo

Private equity (PE) funding, and buyout funds in particular, have grown rapidly as a form of corporate financing in recent years, as the search for yield intensified. The outstanding amount of PE managed by global funds amounted to close to USD 8 trillion in December 2019, of which buyout funds accounted for around a third. Buyout funds have grown faster than any other PE strategy over recent years, even as their managers have diversified their activities. Institutional investors' demand for access to PE buyout funds has been reflected in increasing rates of oversubscription of buyout funds in the primary market (see **Chart A**, left panel). This box provides an overview of the main developments in the PE buyout market and assesses potential financial stability risks to both investors in PE funds and the overall financial system.

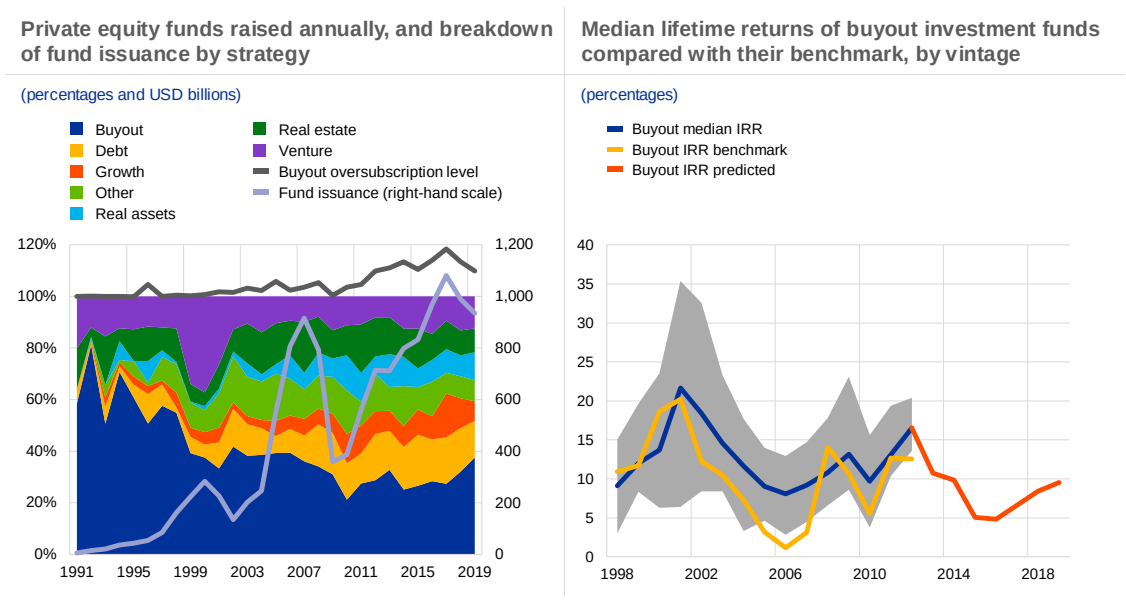
While buyout funds achieved very high absolute returns in the past, investors in more recent vintages are likely to obtain lower returns. The median buyout fund achieved high absolute returns throughout the business cycle, with a minimum of 8.1% in 2006. The median overperformance with respect to the public benchmark is 4% (see **Chart A**, right panel).[2] However, these returns are very heterogeneous and 35% of funds still underperform the benchmark, with the fund vintage (the year when the fund was launched) playing a key role. Market exuberance can drive over-optimistic investments that may lead to low returns in the medium term**:** the worst-performing vintages are those of 2005-06, prior to the onset of the global financial crisis, as they deployed most of their funds at a time when valuations were highest (see **Chart B**, left panel). Valuations of buyout funds have continued to increase every year since 2013, suggesting an increasing likelihood that recent fund vintages would achieve low and negative absolute returns. That said, the market sell-off

[2] The returns are based on publicly available data disclosed by US pension funds investing in PE funds. These investments may therefore not be representative of the overall buyout fund returns.

in February and March may create opportunities for some of the newest funds while worsening the returns of 2012-13 vintage funds which are currently in their harvesting cycle.[3]

Chart A

Buyout funds have grown rapidly in recent years, thanks to historically high returns



Sources: Bloomberg and ECB calculations.
Notes: The shaded area in the right panel shows the interquartile range. The sample consists of 85,232 private equity deals of 19,472 global private equity funds for the left panel and 2,255 global private equity buyout funds for the right panel, of which 941 had data on the internal rate of return (IRR). The benchmarks, computed for each vintage, show the realised annual total return that would have been achieved by investors if they had invested in customised equity indices of publicly traded corporates that have risk characteristics similar to the fund, i.e. HY corporates with gross debt/EBITDA leverage above 4, and the same weights as the fund in terms of sectoral and geographical exposure. The predicted returns are estimated based on the past relationship between median fund leverage and acquisition prices paid by PE managers for pre-stress vintages (see Chart B, left panel). Pandemic developments will likely increase the dispersion of returns around the median.

Market intelligence suggests that PE-controlled companies issuing leveraged loans had been driving corporate leverage higher and investor protection lower both in the US and Europe.[4] PE managers also control very large shares of high-yield (HY) corporates globally: leveraged loans issued by buyout companies are estimated to account for as much as 80% of the European leveraged loan market and half of the US market. Furthermore, PE-controlled corporates have lower ratings than the HY market, typically single B-rated, reflecting their higher leverage. PE managers have encouraged the market's shift towards lower investor protection in HY bond and leveraged loan markets in terms of fewer and weaker covenants protecting the debt-holders. These so-called covenant-lite structures increase PE managers' flexibility in terms of corporate management and cash-flow usage.

In the current stress period, PE funding can provide corporates with a diversified source of financing, but it can also increase some financial stability vulnerabilities. PE funds can support productivity by driving out inefficient management and companies, and by allocating more capital to higher growth industries. Moreover, PE managers can use excess liquidity, the so-called "dry powder" that is currently estimated to amount to around USD 1 trillion globally for buyout funds, to provide financing during downturns, which both increases the fund returns and has a countercyclical effect. But buyout activities can also have a negative impact on financial stability. First, while higher financial

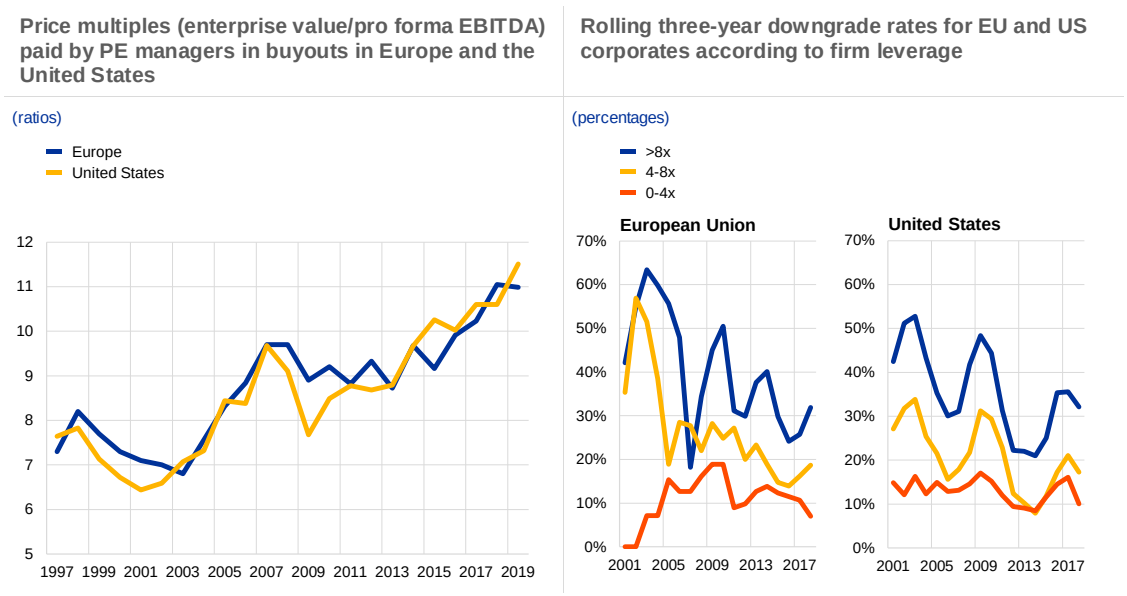
[3] Estimates are generally consistent with industry reports. See, for example, "How a COVID-19 Recession Is Likely to Affect Buyout Performance", Preqin, 31 March 2020.

[4] See "LBO credit quality is weak, bodes ill for the next downturn", Moody's, 18 October 2018.

leverage increases returns to PE investors, it also leads to decreased investments in downturns, thus amplifying recessions.[5] Second, higher leverage increases corporates' probability of default (see **Chart B**, right panel), and will likely lead to lower recovery rates.[6] The fallout from the coronavirus pandemic increases the default risk in buyout funds' portfolios further. There is a conflict of interest between PE sponsors, who seek to maximise their returns on equity, and debt-holders, who seek repayment. PE sponsors are likely to have fewer incentives than strategic investors to support companies in difficult times and are also likely to extract higher concessions from debt-holders when providing support to their companies. Finally, the high concentration of PE ownership in the hands of only a few large and global managers may exacerbate these risks.[7]

Chart B

Buyout funds have paid higher values for acquired companies and tend to leverage their targets, which increases companies' default risks



Sources: Bloomberg, Capital IQ, S&P LCD and ECB calculations.
Notes: In the right panel, the downgrade rates shown are cumulative over three years and capture downgrades that bring the rating at least one full step lower, for example from BB to B or lower. Leverage is computed as gross debt/EBITDA, with the lines showing cumulative downgrade rates for companies with a certain gross leverage range. The sample comprises public and private companies that provide financial information.

1.5 Signs of slowing in real estate markets

Residential real estate (RRE) prices were continuing to rise towards the end of 2019, but are now expected to moderate. At the euro area level, nominal house prices rose by 4.1% in annual terms in the fourth quarter of 2019, continuing the deceleration in the growth rate that had been observed after the peak in 2018 (see

5 See Kalemli-Özcan, S., Laeven, L. and Moreno, D., "Debt overhang, rollover risk, and corporate investment: evidence from the European crisis", *Working Paper Series*, No 2241, ECB, February 2019.

6 Leverage plays a central role in standard credit risk models used in academia and in the financial industry. Recently, the relationship between leverage and default risk has been investigated in Cathcart, L., Dufour, A., Rossi, L. and Varotto, S., "The differential impact of leverage on the default risk of small and large firms", *Journal of Corporate Finance*, Vol. 60, February 2020, and Traczynski, J., "Firm Default Prediction: A Bayesian Model-Averaging Approach", *Journal of Financial and Quantitative Analysis*, Vol. 52(3), June 2017, pp. 1211-1245.

7 The top 6 (16) PE buyout managers control 30% (50%) of corporate investments by value globally. See also "Largest PE firms will outperform smaller players in a downturn", Moody's, 7 May 2019.

Chart 1.15, left panel). However, valuation measures still suggest that RRE prices are higher than would be justified by fundamental data. While house prices had continued to rise in almost all euro area countries towards the end of 2019, growth rates displayed a wide dispersion across countries, reflecting the heterogeneity of euro area property markets.

A number of countries face structural vulnerabilities in their property markets. These countries feature household debt-to-income ratios at and above 100% in the presence of overvaluation (see **Chart 1.15**, right panel) and continued strong growth in mortgage loans that has often been driven by a loosening of lending standards (**see Special Feature A**). Accordingly, larger house price corrections would be more probable in countries where house prices show the strongest signs of overvaluation. In addition, high household indebtedness and debt service burdens in some countries might aggravate the adverse consumption shock.

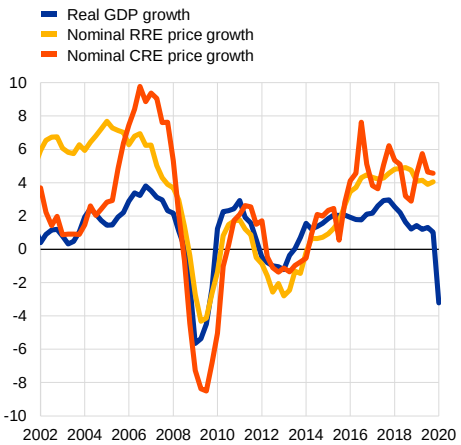
The impact of the coronavirus shock on RRE markets depends on its persistence and its effects on employment and household income. While financing conditions are likely to further support demand for real estate, the negative impact of the shock on confidence and household disposable income and the possible negative repercussions on employment could strengthen the envisaged deceleration of the euro area housing cycle both in terms of prices and quantities. However, supply shortages resulting from delays in construction due to the absence of workers and the fact that intentions to buy and renovate properties remain at fairly elevated levels could also lead to upward price pressures.

Chart 1.15

Some moderation in RRE price growth

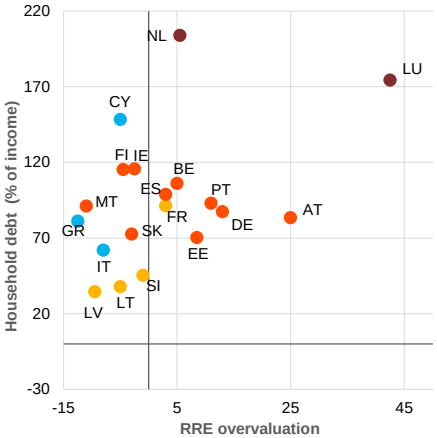
Growth in real GDP and RRE and CRE prices in the euro area

(Q1 2002-Q1 2020, annual percentage changes)



RRE valuation estimates and the household debt-to-disposable income ratio

(2019, percentages)



Sources: ECB and ECB calculations.
Notes: Right panel: the colours of the dots reflect the level of RRE risks: blue = no exposure; yellow = low exposure; red = medium exposure; brown = pronounced exposure. RRE overvaluation is the average of the price-to-income ratio and the output of an econometric model. Overall, estimates from the valuation models are subject to considerable uncertainty and should be interpreted with caution. Alternative valuation measures can point to lower/higher estimates of overvaluation.

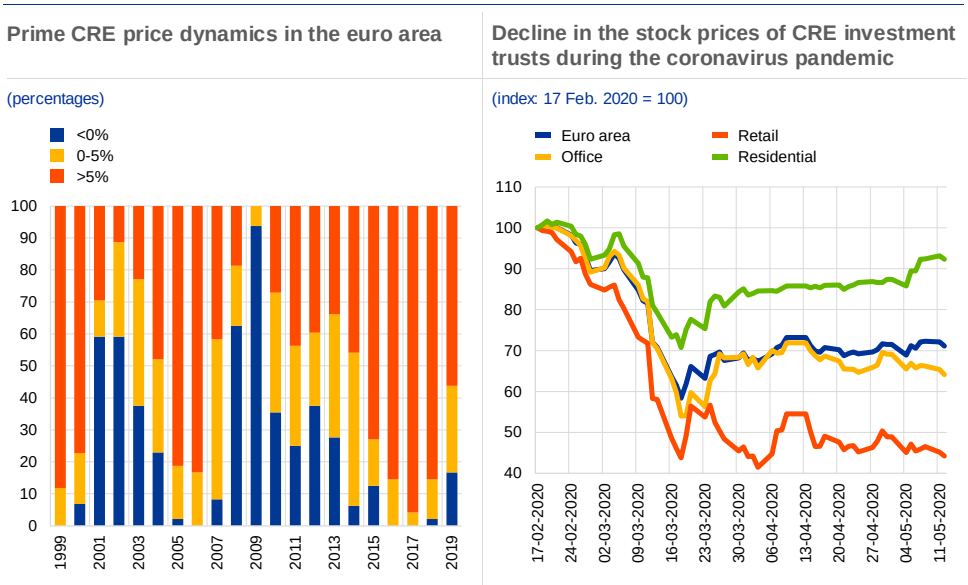
Commercial real estate (CRE) markets entered the pandemic at the peak of a cycle, with tentative signs of moderation already showing. Annual CRE price

growth picked up again in 2019 and has been fluctuating around 5% since 2016. By contrast, prime CRE price dynamics continued to moderate, and stood at 4% in annual terms in the third quarter of 2019, with an increasing number of countries observing price declines (see **Chart 1.16**, left panel). The overall developments masked diverging trends across the underlying market segments. Prices in the office segment grew at 8.8% annually, while the retail segment faced declining prices in real terms. In general, CRE prices appear to have grown faster in recent years than would be justified by fundamental data, resulting in potentially stretched current valuations, in particular in prime segments, also reflected in low CRE yields.

Transaction values increased slightly at the end of 2019 driven by price increases, as transaction numbers declined further. The fall in the number of transactions observed since end-2017 reflects the weakening macroeconomic environment. Commercial real estate tends to be sensitive to economic activity and to react strongly to a slowdown (see **Chart 1.15**, left panel), as lower profitability of NFCs likely results in a decreased demand for commercial leasable space. These effects are likely to be pronounced as a result of the pandemic, as also suggested by developments in the equity prices of CRE investment trusts in sectors where the impact has been the strongest (see **Chart 1.16**, right panel). Indeed, market intelligence points to a large drop in transactions already in March 2020. In addition, many firms have either reduced or temporarily stopped their rental payments, which could cause liquidity problems for the property owners. The negative effects of the shock are expected to be widespread as almost all sectors of the economy have been hit, but they are pronounced in the non-food retail, restaurant and hotel sectors.

Chart 1.16

Prime CRE price dynamics were moderating in line with the signs of a maturing cycle, while the stock market reaction to the pandemic in the CRE sector was strong

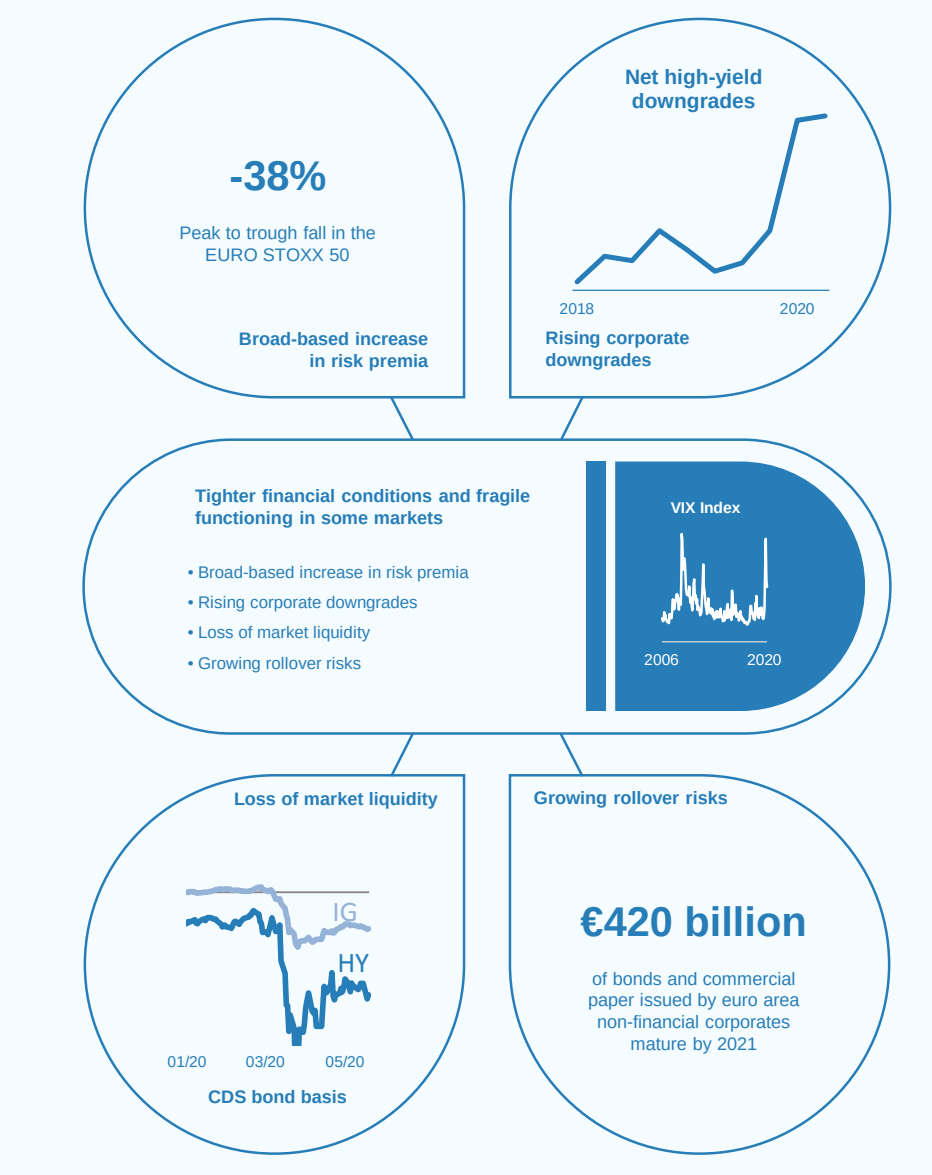


Sources: FTSE/EPRA/Nareit, Jones Lang LaSalle and ECB calculations.
Note: Right panel: CRE investment trust stock price developments are from the FTSE EPRA Nareit Global Real Estate Index Series.

Risks to financial stability stemming from real estate markets have increased. The risk of house and CRE price corrections is increasing, especially in countries

where prices are stretched. The CRE sector has been affected by the shock faster than the RRE sector and may face structural changes over the longer term. For example, lower demand for office space due to different working arrangements and lower demand for hotel rooms as business travel might be reduced owing to new working technologies and methods. Furthermore, the demand for housing might slow down, leading to a further decline in the real estate cycle as a result of the drop in economic activity and employment. Against this background, the financial sector may be exposed to the risk of house and CRE price corrections, in particular where real estate exposures are significant, debt levels are elevated and prices are overvalued.

2 Financial markets



2.1 Coronavirus spread sparks extreme market volatility

Riskier asset markets sold off rapidly in February and March as the coronavirus spread globally. Equity markets had recorded historical highs at the beginning of the year after global trade tensions had eased and global growth was widely projected to bottom out. But far-reaching public and economic lockdowns in many parts of the world to contain the spread of the virus triggered large and sudden price declines in global financial markets in February and March. Riskier asset classes, including equities and lower-rated debt, came under high selling pressure amid extreme levels of volatility (see **Chart 2.1**, first, second, third and fifth panels). The S&P 500 index

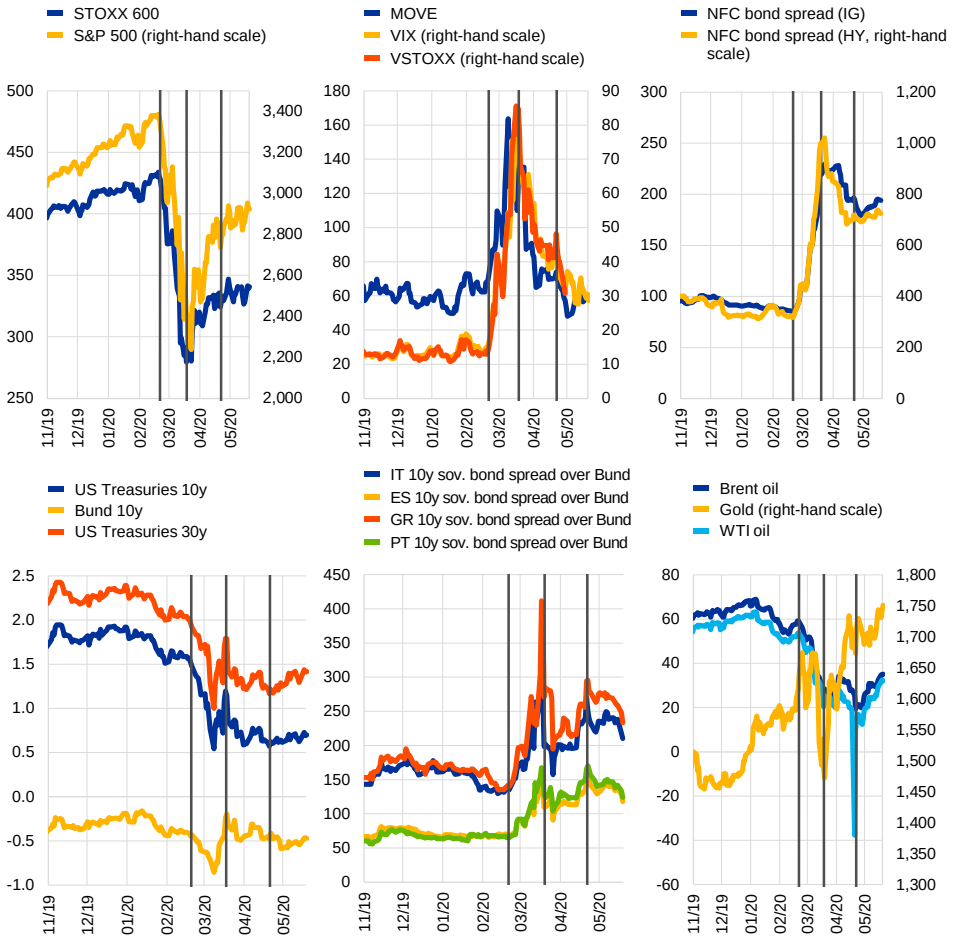
recorded its fastest 20% decline in its history (16 trading days). Equity and bonds issued by the energy sector recorded some of the largest markdowns as extreme volatility extended to commodity prices (see **Chart 2.1**, sixth panel). In its initial phase, the market sell-off extended to several high-quality asset markets, including gold and top-rated government bonds (see **Chart 2.1**, fourth panel), as investors fled into liquidity.

Chart 2.1

Global financial markets responded to expected fallout from the coronavirus pandemic

Developments in major global financial asset markets

(first panel: index; second panel: volatility index; third panel: basis points; fourth panel: percentages per annum; fifth panel: basis points; sixth panel: US dollars per barrel (left-hand scale) and US dollars per ounce (right-hand scale))



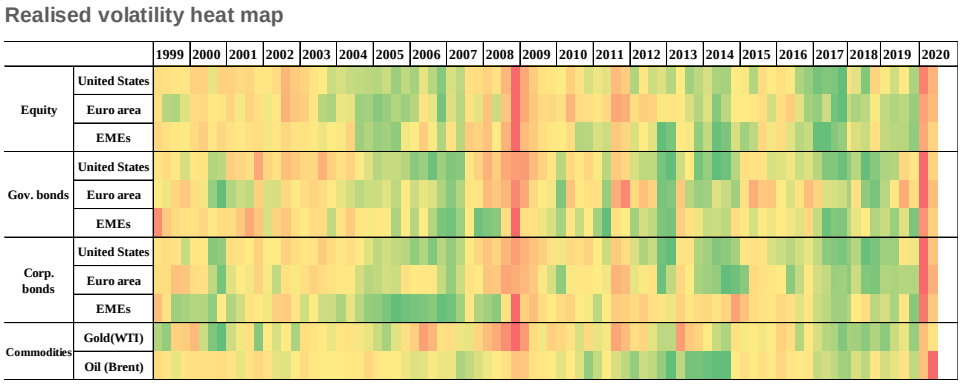
Sources: Bloomberg and ECB calculations.
Notes: The black vertical lines mark the start of the global market correction (20 February 2020), the ECB's announcement of the pandemic emergency purchase programme (PEPP) (18 March 2020), as well as the ECB's decision to continue to accept downgraded bonds in its eligible collateral pool (22 April 2020). IG: investment grade; HY: high yield; NFC: non-financial corporate; WTI: West Texas Intermediate.

The extreme levels of market stress eased in late March when central banks and fiscal authorities across the world took extraordinary measures. Central banks engaged in asset purchases in primary and secondary securities markets and expanded collateral eligibility in the face of deteriorating market liquidity, which had undermined financial markets' capacity to intermediate between the financial and non-financial sectors and, with it, the monetary policy transmission mechanism. The

announcement by the ECB of the pandemic emergency purchase programme (PEPP) in particular contributed to reversing, at least temporarily, some of the previous increase in yields of both higher and lower-rated euro area sovereign bonds (see **Chart 2.1**, fourth and fifth panels). Moreover, the Governing Council's decision to maintain collateral eligibility of bonds that had recently lost or would at some point lose investment-grade status helped to halt the widening of lower investment-grade sovereign spreads. Large fiscal stimulus measures (discussed in **Chapter 1**) also supported market sentiment and contributed to a rebound in riskier asset prices, while projected lower nominal growth and policy rates put downward pressure on benchmark bond yields on both sides of the Atlantic (see **Chart 2.1**, fourth panel).

Chart 2.2

Market volatility peaked across asset classes and regions

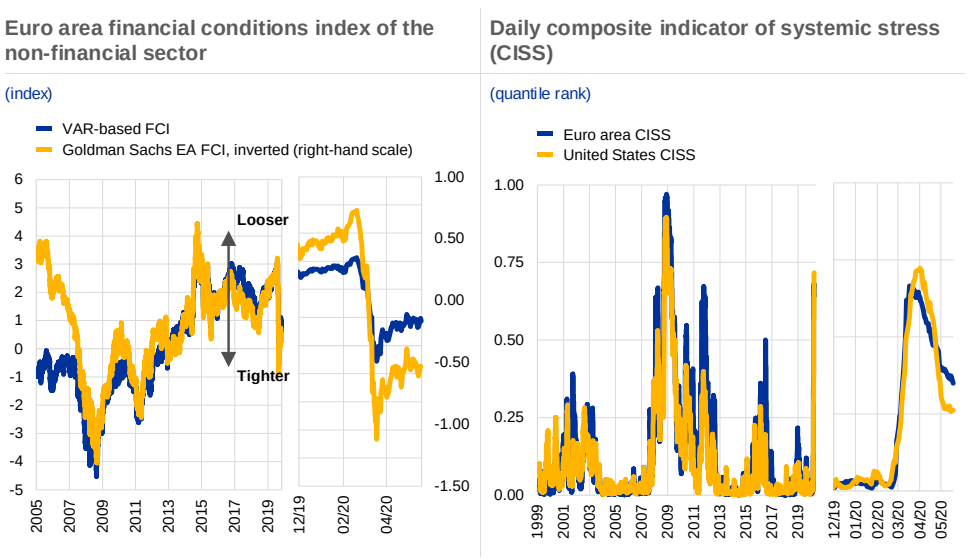


Source: Refinitiv.
Notes: Volatility estimates are derived from a non-overlapping quarterly sample of daily index returns. The colour code is based on the ranking of the estimates. Red, yellow and green indicate, respectively, high, medium and low volatility estimates compared with other periods. EMEs: emerging market economies; WTI: West Texas Intermediate.

Measures of market volatility, systemic stress and financial conditions reached historical highs. In March, the VIX index, gauging option-implied volatility in the US equity market, reached its highest level on record. Market volatility was also widespread across different regions and asset classes, resembling the pattern observed during the global financial crisis (see **Chart 2.2**). The parallel sell-off in different markets was also reflected in the sudden rise of the ECB's composite indicator of systemic stress (CISS) for the euro area and the United States, in addition to a rapid tightening of measures of financial conditions for the non-financial sector (see **Chart 2.3**). Financial conditions tightened on account of both rising credit risk, as the macroeconomic and earnings outlook deteriorated, as well as higher risk premia (see **Section 2.3**). The CISS indices also surpassed the peak levels observed during the euro area sovereign debt crisis, although they remained below the record levels observed in 2008. This may in part reflect that, unlike in 2008, the financial sector was not at the core of the market turmoil. Unsecured and secured interbank markets proved overall resilient, with fewer signs of price dislocations than twelve years ago, as banks remained solvent and willing to lend to each other and the central counterparty clearing system provided stability in the derivatives market. That said, money and bond markets showed signs of tensions prior to central bank intervention (see **Section 2.2**).

Chart 2.3

Sharp movements in indices of financial conditions and systemic stress



Sources: Bloomberg, Refinitiv, Goldman Sachs and ECB calculations.
Notes: The chart on the left shows two financial conditions indices (FCIs), one constructed by the ECB (vector autoregression-based) and one by Goldman Sachs. They are constructed as weighted averages of different financial variables. For the ECB index, these variables include the one-year overnight index swap, the ten-year overnight index swap, the nominal effective exchange rate of the euro vis-à-vis 38 trading partners, and the EURO STOXX index. For the Goldman Sachs index, a broader set of variables is considered. The weight of each financial variable in the respective indices is based on its estimated relationship with key macroeconomic aggregates. The chart on the right shows a new daily version of the CISS that differs from the standard weekly CISS as shown in Chart 1 also in some computational aspects. The CISS captures stress symptoms (e.g. rising volatility, risk and liquidity spreads) in money, bond, equity and foreign exchange markets and by taking into account time-varying correlations across its 15 components it emphasises the pervasiveness of market stress. For more details about the CISS, see Holló, D., Kremer, M. and Lo Duca, M., "CISS – a composite indicator of systemic stress in the financial system", *Working Paper Series*, No 1426, ECB, March 2012.

2.2 Central banks acted to restore liquidity in core market segments

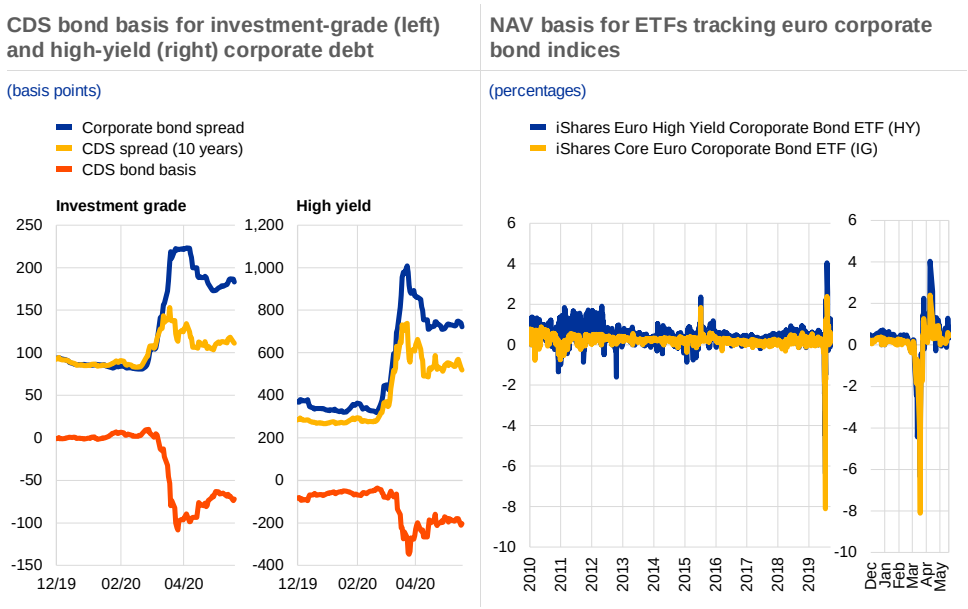
Market stress in March was amplified by scarce liquidity across several asset classes. Market analysts reported that investors were seeking to liquidate positions across numerous asset classes in the first two weeks of March, partly resulting from investment fund share redemptions (see **Chapter 4**). During the most severe stress period in March, bid-ask spreads widened in most asset markets and dealers in various financial assets were increasingly unable or unwilling to absorb the sharply increasing supply of securities, including due to balance sheet constraints. Diverging corporate sector bond and credit default swap (CDS) spreads signalled difficulties in selling bonds as dealers were unwilling to absorb the large supply of bonds arising from rapid sales. The negative bases between the two assets suggest that investment-grade and high-yield bond spreads widened beyond the rise in perceived default risk and risk premia (see **Chart 2.4**, left panel). Although the bases narrowed in the course of March and April, they still ranged above the levels prevailing at the beginning of the year. Likewise, prices for exchange-traded funds (ETFs) tracking corporate bond indices fell below their net asset value (NAV) as authorised participants found it increasingly difficult to redeem shares by selling underlying bonds at the prices recorded by the index (see **Chart 2.4**, right panel). The widening in NAV spreads, which was the largest on record for these instruments, might have indicated

that corporate bonds became even more illiquid than suggested by the CDS basis to the extent that bond prices temporarily became immeasurable. It might however also have reflected difficulties experienced by authorised participants in the ETF market in taking arbitrage opportunities (see **Chapter 4**).

Volatility-targeting and risk parity strategies might have procyclical effects on asset prices. Portfolio strategies based on volatility targets or risk parity may also have reinforced the market sell-off. Targeting a medium level of volatility, such strategies can afford a high degree of leverage during spells of low volatility. Conversely, the advent of high volatility and, in particular, the vanishing of diversification benefits have required such investors to rapidly unwind their leverage and to build up positive cash positions by selling large amounts of the bonds and equity in their portfolios, thereby likely reinforcing the initial market sell-off (see **Box 2**).

Chart 2.4

Typical market relationships broke down at the height of the market turmoil, resulting in a liquidity squeeze



Sources: Bloomberg and IHS Markit.
Notes: The CDS bond basis is defined as the difference between the ten-year senior CDS premium and the corporate bond option-adjusted spread. The NAV basis is defined as the difference between the ETF's market price and its NAV. IG: investment grade; HY: high yield.

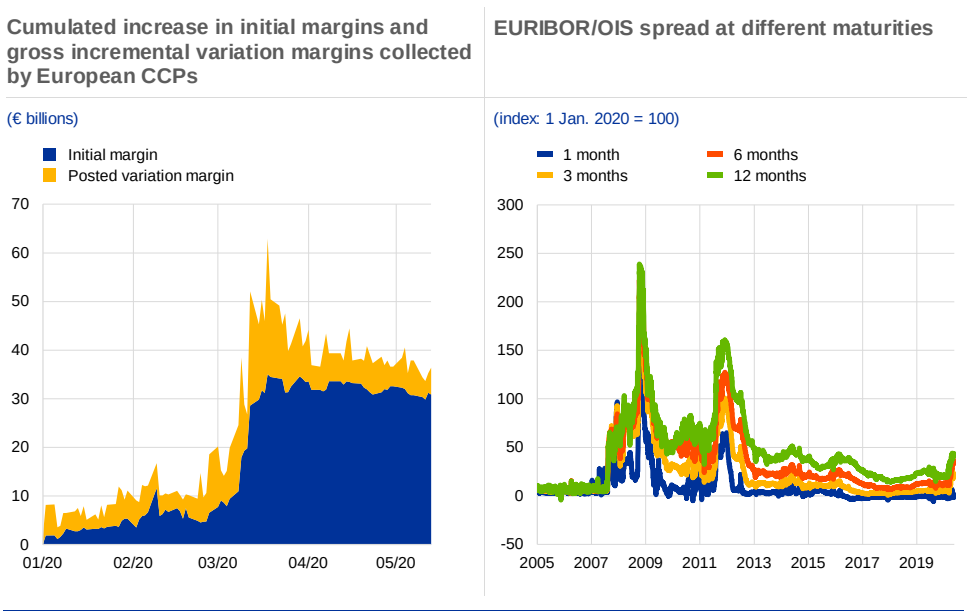
Higher margin calls for derivatives contracts added to the strong demand for cash. Central counterparties (CCPs) proved to be resilient to recent market stress. Volumes in some markets temporarily increased, as investors augmented their demand for hedging instruments in volatile markets. But rapid price movements and volatility in markets triggered considerable margin calls in March (see **Chart 2.5**, left panel, and **Special Feature B**). In order to meet such calls, investors may have liquidated some assets which could have added to the markdowns recorded in various asset markets. A lack of liquidity may have also prompted some investors to close highly leveraged positions, thereby also putting pressure on underlying asset prices. For instance, the temporary increase in long-term Treasury yields in early March was reportedly caused by arbitrageurs closing levered long positions in Treasury futures.

The increase in initial margins stemmed from the recalibration of risk models to a higher-volatility environment. However, such models calibrated with buffers or subject to floors likely provided some cushion, which dampened the increase in initial margins. Looking ahead, corporate and sovereign downgrades may trigger renewed margin calls where those bonds are used as collateral. Market participants with deteriorating creditworthiness may face stricter trading or position limits as well as requests for dedicated margin add-ons by CCPs, possibly limiting the availability of market liquidity.

Peak demand for liquidity put strains on money markets. Money market funds (MMFs) came under severe liquidation pressure as financial and non-financial investors redeemed large amounts of shares. This is turn led to a freeze in demand and issuance of commercial paper, an important source of short-term funding for financial and non-financial corporates (see **Box 7**). High demand for precautionary cash buffers and a diminishing supply of term interbank loans have also increased funding costs in unsecured money markets, predominantly at longer maturities (see **Chart 2.5**, right panel).

Chart 2.5

Derivatives and money markets remained functional despite higher margin calls



Sources: ECB (EMIR data), Bloomberg.
Note: The left chart depicts an aggregate increase in initial margin relative to levels prevailing on 1 January 2020 and in variation margin posted by euro area clearing members of four EU and UK central counterparties. OIS: overnight index swap.

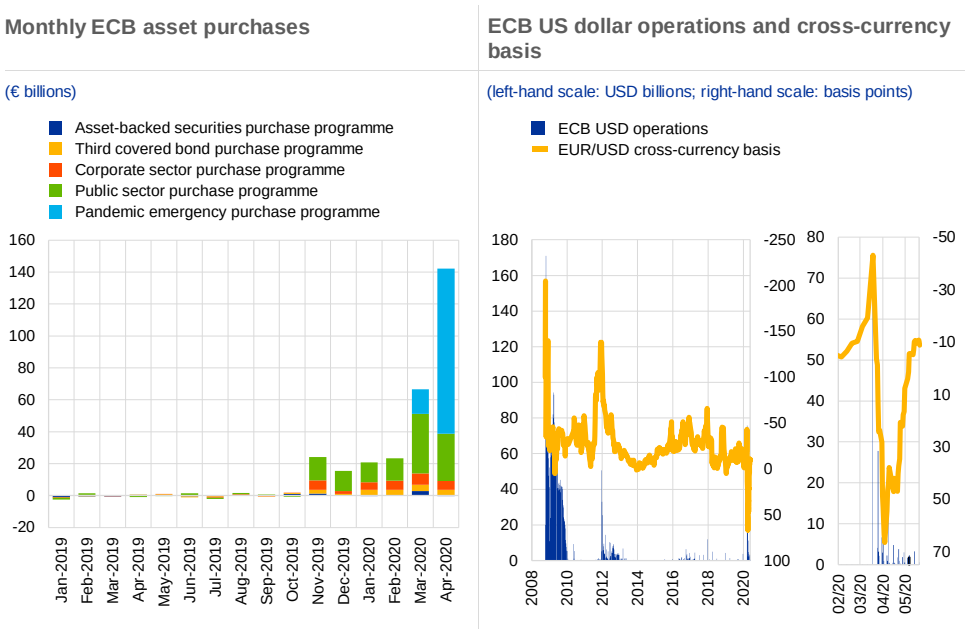
Central banks across the globe intervened swiftly to ensure liquidity in financial markets. Even securities deemed as highly liquid, such as commercial paper, were shed by MMFs to meet rising redemption pressure. In the United States, sovereign and sub-sovereign bonds as well as mortgage-backed securities (MBS) temporarily came under selling pressure, reflecting inter alia the winding-down of leveraged positions in these markets. Overall, the demand for cash was more pronounced in US markets as monetary conditions had been tighter going into the stress, and the banking system had not been as well equipped with reserves as in the euro area. The Federal Reserve, in turn, provided large amounts of liquidity by intervening in various

securities markets, such as those for Treasuries, MBS, MMF shares as well as corporate bonds, including in the form of ETFs.

The Eurosystem also provided liquidity by means of various monetary policy measures. Most prominently, the Eurosystem contributed to easing scarcity in market liquidity by significantly expanding corporate and sovereign bond purchases under the asset purchase programme (APP) and the PEPP (see **Chart 2.6**, left panel).[8] The ECB's Governing Council also extended its support to previously ineligible assets by including Greek government bonds and commercial paper in its asset purchases and collateral pool and by extending the eligibility of marketable collateral assets that are downgraded.[9] In addition, the additional flexibility with respect to sovereign issuer limits under the PEPP contributed to restoring market liquidity. The tensions in unsecured money markets eased after the announcement of the pandemic emergency longer-term refinancing operations (PELTROs), which act as a backstop to market funding needs. Finally, financial institutions' increasing demand for US dollar liquidity, reflected in higher US dollar funding costs in the cross-currency swap market, was met by more frequent US dollar tender operations at more favourable terms and extended maturities (see **Chart 2.6**, right panel) provided by the Eurosystem in coordination with other central banks participating in the swap line network.[10]

Chart 2.6

Eurosystem provided liquidity in securities and US dollar markets



Sources: Bloomberg and ECB.

8 See the blog post entitled "Our response to the coronavirus emergency" on the ECB's website.

9 See the blog posts entitled "The ECB's commercial paper purchases: A targeted response to the economic disturbances caused by COVID-19" and "Improving funding conditions for the real economy during the COVID-19 crisis: the ECB's collateral easing measures" on the ECB's website.

10 See "Coordinated central bank action to enhance the provision of global US dollar liquidity", ECB, press release, 15 March 2020, and "Coordinated central bank action to further enhance the provision of US dollar liquidity", ECB, press release, 20 March 2020.

Box 2

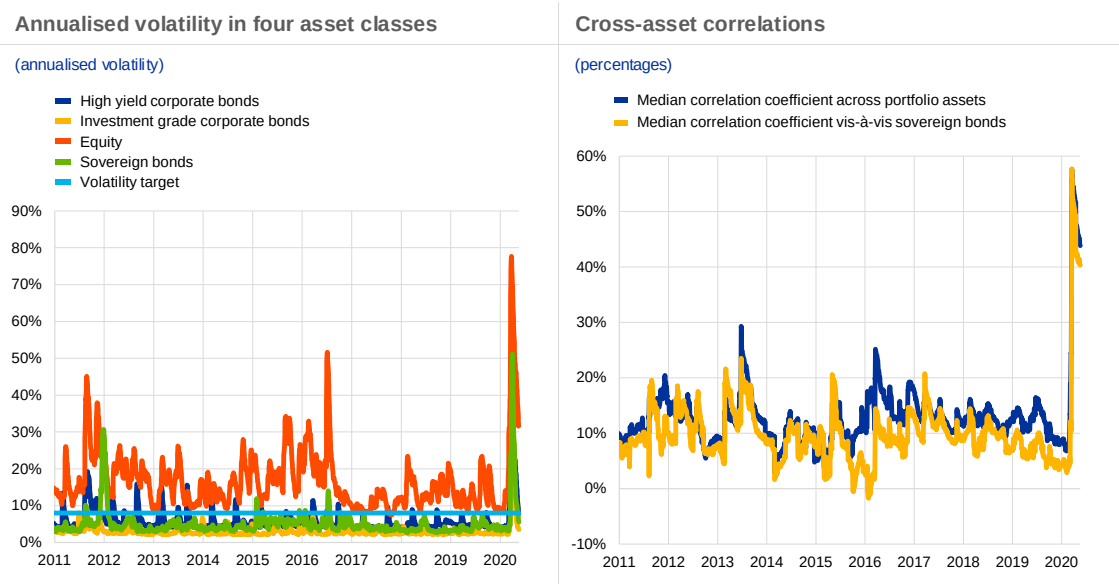
Volatility-targeting strategies and the market sell-off

Prepared by Danilo Vassallo, Lieven Hermans and Thomas Kostka

Low financial market volatility in the years prior to the coronavirus outbreak increased the popularity of investment strategies based on targeting volatility. Low volatility across major asset classes and regions had been a key feature of global asset price developments until recently.[11] Investments following strategies which are reliant on low market volatility have grown over recent years, with varying estimates. Globally, there may be funds with assets under management worth up to USD 2 trillion invested in some form of volatility strategies[12], with USD 300 billion invested in some 100 risk parity funds, a well-known hedge fund strategy for multi-asset funds.[13] Additional leverage deployed in these funds raises their market-moving capacity.

Chart A

Sharp rise in market volatility and cross-asset correlations of a stylised risk parity fund



Source: Bloomberg.
Notes: Volatilities are computed as one-month rolling averages of the ETF return series. The four asset classes are approximated by the returns of the following ETFs: iShares Core EURO STOXX 50, iShares High Yield Corporate Bond, iShares Core EUR Corporate Bond and Xtrackers II Eurozone Government Bond.

Volatility-targeting strategies can deploy leverage when market volatility is below target. Funds following volatility-targeting strategies invest in different asset classes with a specific portfolio volatility target, with the possibility to deploy leverage if market volatility and correlations are low. Risk parity strategies have the additional feature that each asset (class) in the portfolio contributes the same risk to the overall portfolio risk.[14] A common feature of these strategies is the procyclical way in

[11] This phenomenon reflected a number of factors, including stable and robust global economic growth, reduced uncertainty surrounding the outlook for growth and inflation, and accommodative monetary policies across the globe. For a detailed discussion of the financial stability risks arising from low market volatility, see Andersson, M., Hermans, L. and Kostka, T., "Higher future financial market volatility: potential triggers and amplifiers", *Financial Stability Review*, ECB, November 2017.

[12] See "End of an era for irrational complacency in markets", Financial Times, 6 September 2017.

[13] See Schrimpf, A., Shin, H. S. and Sushko, V., "Leverage and margin spirals in fixed income markets during the Covid-19 crisis", BIS Bulletin No 2, Bank for International Settlements, April 2020.

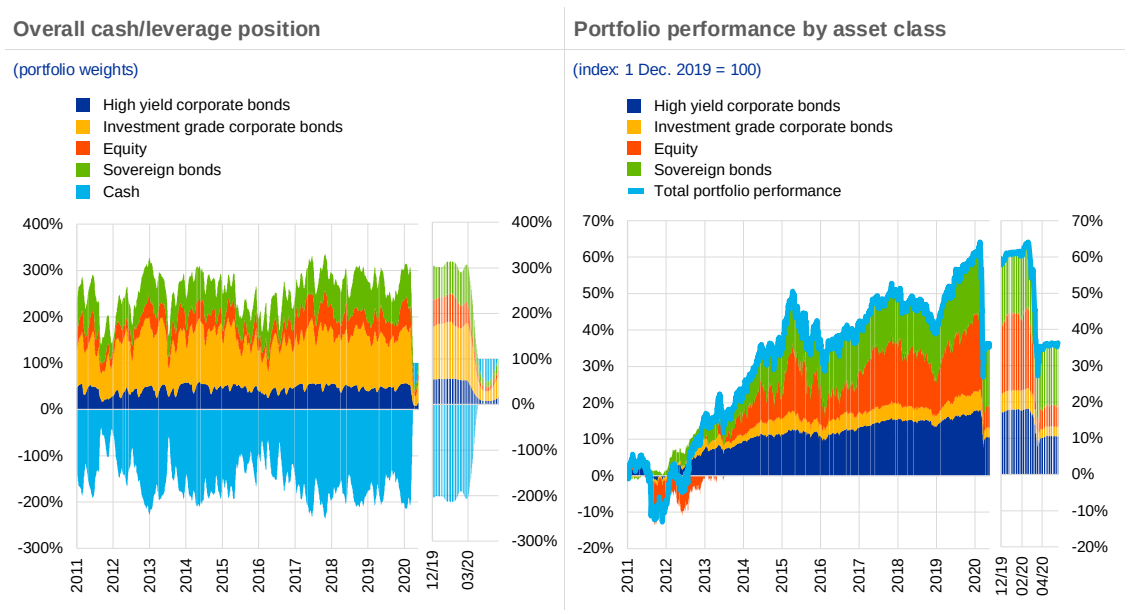
[14] In a more simple form of a low-volatility trade, speculators sell insurance against rising market volatility by taking short positions in volatility futures (e.g. VIX futures). If the implied volatility remains below the futures price, the investor earns the volatility risk premium. If volatility exceeds the futures price, such a position can incur large losses, as experienced during the VIX shock in February 2018.

which leverage and volatility are linked. Volatility targets allow for higher leverage and thus larger positions in financial assets during periods of low market volatility. Conversely, fund managers have to liquidate leveraged positions when market volatility and cross-asset correlations surge, thereby reinforcing the selling pressure in asset markets.

This box provides model-based estimates of the portfolio shifts experienced by risk parity strategies in the recent market downturn. The findings are based on a daily rebalancing risk parity investment rule applied to a four asset class portfolio with investments in equities, sovereign bonds, as well as investment-grade (IG) and high-yield (HY) corporate bonds. The performance in each of these asset classes is gauged by exchange-traded funds (ETFs) tracking benchmark euro area market indices. The portfolio volatility target is set to an annualised 8% and optimal weights in the four asset classes are determined such that each asset class contributes the same amount of variance to the overall portfolio, in line with the principle of risk parity.

Chart B

Stylised model suggests that the spike in market volatility and correlations turned highly leveraged asset allocations into large cash weights



Sources: Bloomberg and ECB calculations.
Notes: The relative portfolio weights are adjusted on a daily basis to equalise the risk contribution of the constituent assets of the portfolio considering the daily estimates of portfolio variances and co-variances presented in Chart A. The level of leverage or cash is set in a way to bring the expected portfolio volatility in line with the volatility target, whereby a portfolio volatility below the target allows for additional leverage and a portfolio volatility above the target requires the fund to hold cash.

A strict risk parity rule would have called for a large unwinding of leveraged bond and equity investments as volatility climbed and diversification benefits vanished. Until mid-March, backward-looking volatility measures in all of the asset classes except equities ranged below the target level amid low levels of cross-asset correlations (see **Chart A**). This environment allowed risk parity investors to leverage their positions in bonds and equity by up to twice the amount of assets under management (see **Chart B**, left panel). In March, however, volatility rose sharply across all asset classes. In addition, cross-asset correlations climbed to historically high levels, reflecting a parallel sell-off across all major asset classes and in particular a sharp deterioration in the diversification benefits from holding highly rated sovereign bonds. In sum, portfolio volatility climbed rapidly, requiring risk parity investors to wind down their leverage. According to the stylised model,

assets worth nearly 225% of the portfolio's capital had to be sold in order to meet the volatility target. The new portfolio would have a cash share of nearly 25% as a result. Notably, asset sales would have extended to all asset classes in the portfolio, including the supposedly safer ones. In relative terms, the selling pressure on sovereign and higher-rated corporate bonds would have been less pronounced than in riskier asset classes (notably high-yield corporate bonds) as their relative portfolio share increased. Mirroring the shifts in relative portfolio shares, the riskier asset classes, equity and high-yield bonds, have made a more negative contribution to the recent portfolio performance (see **Chart B**, right panel).

Risk parity and volatility-targeting strategies may have reinforced the downturn, but their contribution remains hard to quantify. Overall**,** the findings suggest that risk parity strategies have probably contributed to price movements observed in financial markets during March, both in absolute and relative terms. That said, precise information on the aggregate size, the initial leverage position, the asset allocations and the exact calibration of these strategies, which might include features to mitigate their inherently procyclical character, is lacking. Hence, the extent to which such strategies moved and potentially set in motion downward spirals in asset prices during the recent period of volatility remains uncertain.

2.3 Markets governed by increasing macro and credit risk

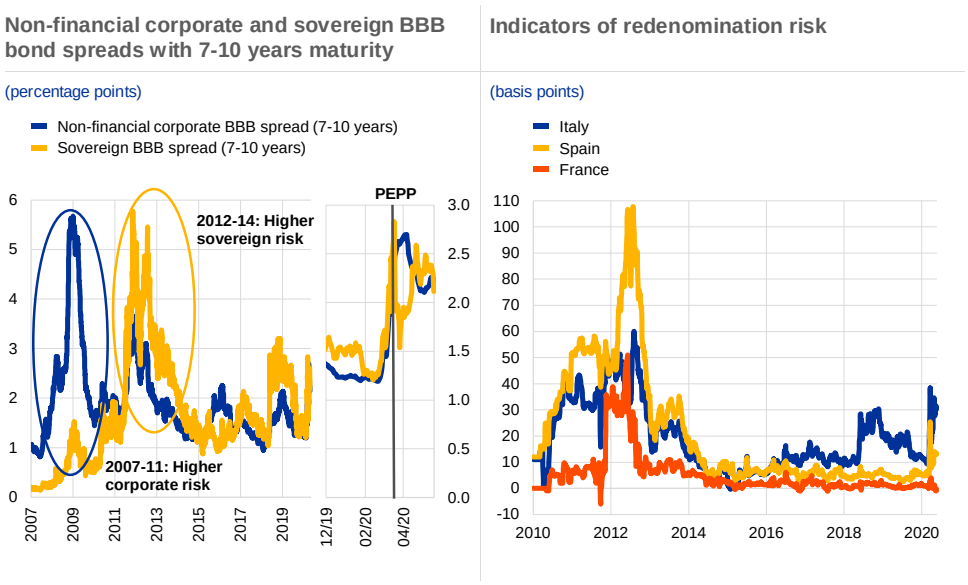
Sizeable revisions to near-term earnings expectations weighed on asset prices. Notwithstanding the various amplifying effects from scarce market liquidity, price declines in equity and credit markets first and foremost reflect lower expected earnings and elevated corporate default risk. Near-term earnings expectations for listed corporates have fallen sharply as they have drawn down on credit lines as cash flows evaporated which, in turn, raised corporate leverage ratios (see **Chapter 1**). Higher credit risk is mirrored in an acute increase in credit spreads of corporate as well as sovereign bonds with lower investment-grade and sub-investment-grade ratings. While previous systemic crises were characterised by a sharper rise in spreads in either the corporate (2008-09) or the sovereign (2011-12) sector, the current episode features a significant increase in both corporate and sovereign bond spreads (see **Chart 2.7**, left panel).

Sovereign credit spreads have been sensitive to policies at the European level. Sovereign spreads of euro area countries with lower credit ratings have risen as both the sharp decline in GDP and significant fiscal deficits may inflate debt-to-GDP ratios over the near-to-medium term. That said, the economic cost of and the adverse market impact associated with an inadequate fiscal response would likely have been more severe. The ECB's announcements of significant and swift sovereign bond purchases under the public sector purchase programme (PSPP) and the PEPP helped to reverse the widening of sovereign spreads over the short term. Over the medium term, however, sovereign spreads might increase if investors assess that public debt sustainability has deteriorated. Higher sovereign spreads might, in turn, cascade to other market segments through banks' sovereign exposures and through public guarantees on non-financial corporate debt. Yields in all jurisdictions may also rise if

official and private demand do not keep up with the rapid increase in sovereign bond issuance. Fiscal policies that increase the supply of bonds issued by highly rated European entities relative to that of individual sovereigns will arguably reduce overall sovereign funding costs and, in some jurisdictions, decrease sovereign spreads via reduced fiscal debt levels, other things being equal. Should measures taken at the national or European level be deemed insufficient to preserve debt sustainability, the market assessment of redenomination risk might rise further (see **Chart 2.7**, right panel).

Chart 2.7

Increasing corporate and credit risk



Sources: IHS Markit and Refinitiv.
Notes: Italian, Cypriot and Portuguese sovereign bonds currently have a BBB rating on average. The right panel shows the redenomination risk in Italy, Spain and France at the three-year maturity in basis points. It is measured as the difference between the "quanto" CDS for Italy, Portugal and Spain and the "quanto" CDS for Germany. The "quanto" CDS is computed as the difference between the sovereign CDS quotes in US dollars and euro. For more details, see De Santis, R., "Redenomination risk", *Journal of Money, Credit and Banking*, Vol. 51(8), pp. 2173-2206.

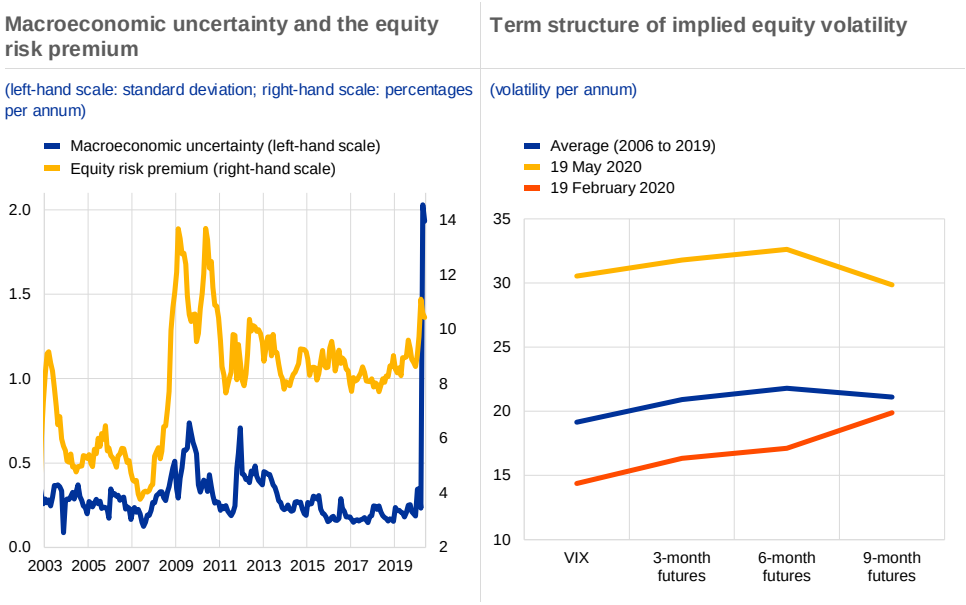
High uncertainty about future economic outcomes added to the widening of financial asset risk premia. Beyond the adverse economic shock itself, the high uncertainty surrounding the outlook for growth, corporate earnings and defaults has also weighed on asset prices. Investors are requiring higher risk premia to compensate for the increased downside risks to earnings and creditworthiness. The current extreme levels of macroeconomic uncertainty would even be consistent with a more pronounced widening of risk premia in equity markets (see **Chart 2.8**, left panel). Hence, a further sharp correction in asset prices may materialise if GDP and earnings growth outturns match the more pessimistic scenarios, which have become more probable. These extreme levels of economic uncertainty are also evident in market-implied projections of equity price volatility. While volatility is known to be mean reverting in normal times, it can become highly persistent in periods of extreme market stress.[15] This has been seen in large daily or intraday price fluctuations in the absence of major economic news as investors are very uncertain about the future path of

[15] See Andersson, M., Hermans, L. and Kostka, T., "Higher future financial market volatility: potential triggers and amplifiers", *Financial Stability Review*, ECB, November 2017.

earnings. Futures-implied forecasts of the VIX index indicate that the high-volatility regime could persist for several months (see **Chart 2.8**, right panel).

Chart 2.8

Rising macroeconomic and market uncertainty contributed to widening risk premia

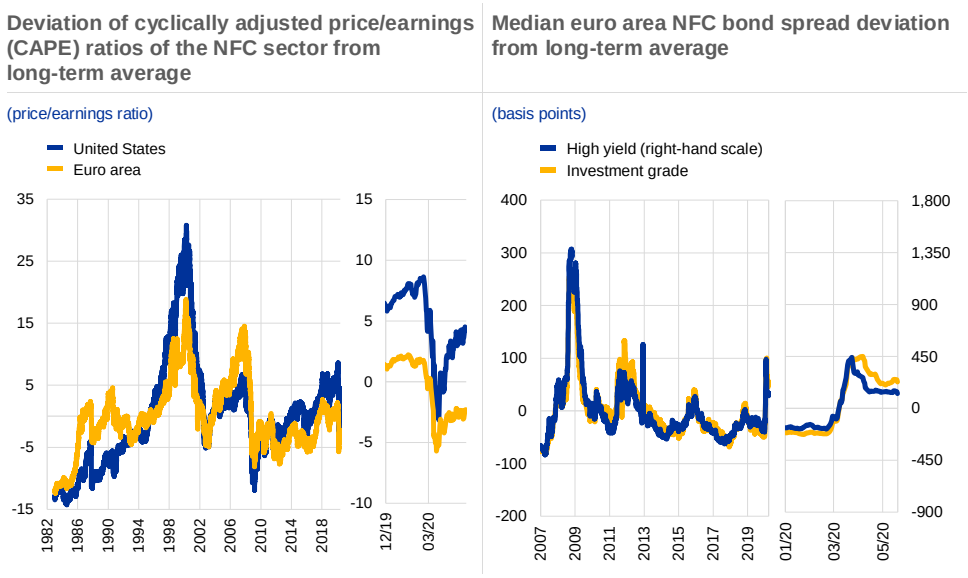


Sources: Consensus Economics, Refinitiv and ECB.
Notes: Left panel: macroeconomic uncertainty is computed as the standard deviation across forecasts for next year's euro area annual GDP growth by the participants in the Consensus Economics survey of forecasters. The equity risk premium is derived from a dividend discount model. The model includes share buybacks, discounts future cash flows with interest rates of appropriate maturity, and includes five expected dividend growth horizons. See *Economic Bulletin*, Issue 4, ECB, 2018, for more details. Right panel: the implied volatility term structure is based on the VIX index as well as futures on the VIX with three, six and nine-month maturities.

High asset valuations prior to the shock probably exacerbated the market correction and there remains a risk of further asset price declines. Financial asset price inflation prior to the shock might have intensified the sell-off. For example, non-financial corporations' equity valuations in some regions entered the episode at elevated levels in cyclically adjusted terms, implying that prices fell from a higher cliff (see **Chart 2.9**, left panel). In the United States, prices have already rebounded to levels above their long-term average, standing in contrast to the weak state of the domestic and global economies. This positive investor sentiment might evaporate rapidly should the earnings recession in 2021 turn out more severe than currently anticipated. Corporate bond markets also appeared richly valued before the market crash, with credit spreads of both investment-grade and high-yield NFC bonds ranging below their post-financial crisis averages (see **Chart 2.9**, right panel). Comparisons with previous crises suggest that the correction could extend further. In particular, bonds at the lower end of the credit spectrum are at risk of renewed markdowns, for instance in the event of significant downgrades and defaults in this segment.

Chart 2.9

Equity and corporate bond prices corrected from inflated levels

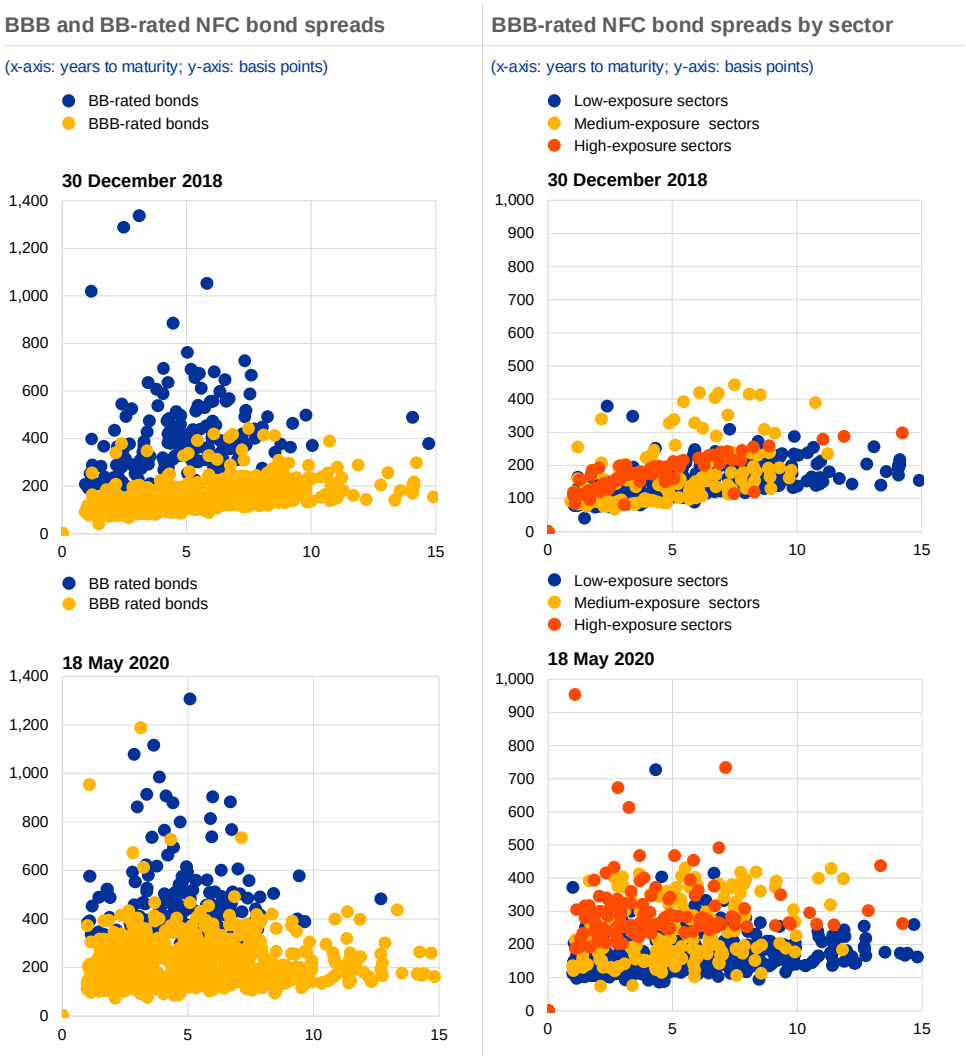


Sources: IHS Markit and Refinitiv.
Notes: The average CAPE ratio is computed from daily observations between 1982 and 2020. The right chart shows the median of deviations from the long-term average of non-financial corporate bond spreads across different rating buckets (IG: AA, A, BBB; HY: BB, B) and maturity buckets (1-3 years, 3-5 years, 5-7 years, 7-10 years, >10 years).

Corporate bond prices signal a considerable risk of imminent downgrades from investment grade to high yield, with some sectors more exposed than others. Increased levels of credit risk can translate into jumps in spreads of downgraded bonds. Previous issues of the FSR warned of the particular risk from large-scale downgrades of borrowers in the BBB segment in this context, as their downgrades are associated with a loss of investment-grade status. Downgrades into high-yield territory have a particularly large effect on corporate bond spreads as even the highest rating in this segment (BB) is mapped into a significantly higher default probability. Data on individual NFC bonds reveal that a significant fraction of the BBB market is already priced for a downgrade to BB as the cross-sections of BBB and BB-rated bond spreads exhibit a greater overlap than in previous episodes of market stress (see **Chart 2.10**, left panel). Most of these BBB-rated bonds bearing significantly higher spreads are issued by corporates in those sectors that are most affected by the lockdown measures, including consumer services, the automotive sector, and the travel and leisure industry (see **Chart 2.10**, right panel).

Chart 2.10

Differences in BBB-rated bond spreads across borrowers signal downgrade risk for sectors most exposed to the coronavirus shock



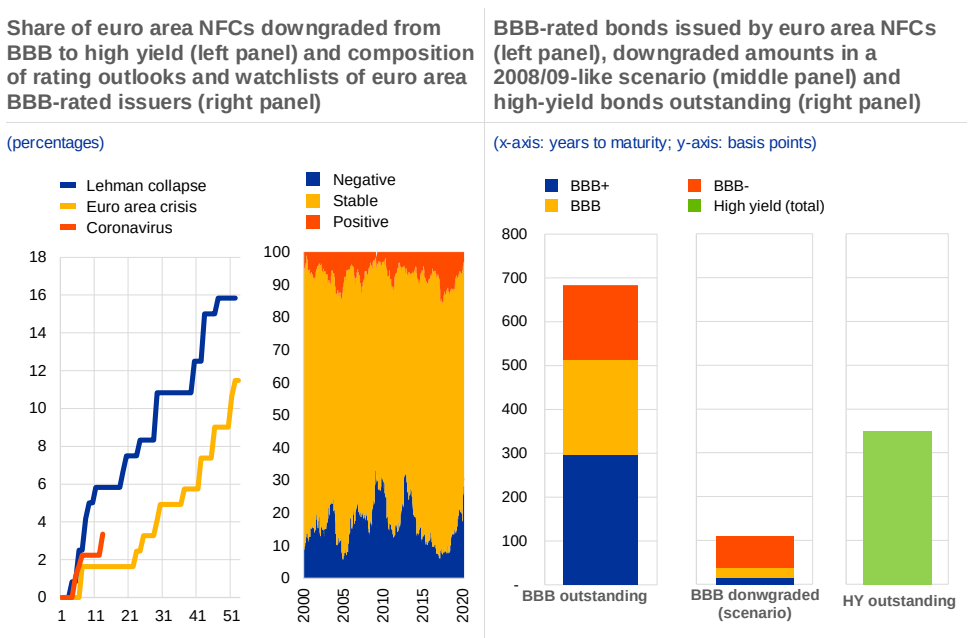
Source: IHS Markit.
Notes: The charts show option-adjusted spreads (OAS) on the y-axis. High-exposure sectors are: automobiles and parts; consumer services; travel and leisure. Medium-exposure sectors are: basic materials; basic resources; chemicals; consumer goods; energy; general industrials; industrial goods and services; media; oil and gas; retail; personal and household goods. Low-exposure sectors are: construction and materials; food and beverage; health care; technology; telecommunications; utilities.

Rating outlooks also signal a wave of prospective corporate downgrades ahead. While bond markets were fast to react to deteriorating corporate fundamentals, actual rating downgrades may occur more gradually as rating agencies assess companies' ability to withstand a severe recession. One year after the collapse of Lehman Brothers, the largest credit rating agency had downgraded one in six NFCs that were rated BBB prior to the pandemic to high-yield status. Rating actions thus far indicate that agencies may take a gradual approach to downgrades of euro area corporates, similar to the evolution observed during past crises (see **Chart 2.11**, left panel). But an increasing share of corporates in the BBB bucket put on negative rating outlooks and watchlists signals a likely rise in downgrades over the coming quarters (see **Chart 2.11**, middle panel).

Downgrades might significantly increase the supply of high-yield corporate bonds, with likely price effects. During the global financial crisis, downgrades were concentrated in the BBB- bucket. About half of such issuers lost investment-grade status one year into the financial crisis, compared with one in eight and one in 22 in the BBB and BBB+ buckets, respectively. Applying such downgrade rates to the universe of BBB-rated bonds outstanding today, a nominal amount of €110 billion of NFC bonds would be downgraded to the high-yield segment over the next year, approximately one-third of the current size of the high-yield market (see **Chart 2.11**, right panel). As downgrades materialise, investment-grade investors such as insurance companies, pension funds, investment funds and some ETFs might sell the downgraded assets in their portfolios. These assets would have to be absorbed by the much smaller market for high-yield debt, with potentially significant price effects for both the downgraded and existing high-yield debt. Central banks contributed to mitigating such pro-cyclical effects as they announced either purchases (Federal Reserve) of bonds newly downgraded to high-yield or their continued eligibility as collateral (ECB).[16] Decisions by various index providers to delay the recomposition of investment-grade bond indices in response to downgrades might also alleviate the risk of rapid asset sales by passive investors to a limited extent.

Chart 2.11

Downgrades are expected to rise significantly, especially for BBB-rated debt



Sources: Dealogic, ECB and Standard & Poor's.
Notes: Week 1 in the left panel refers to the weeks including 15 September 2008 (Lehman Brothers collapse), 26 August 2011 (euro area sovereign debt crisis) and 20 February 2020 (coronavirus). Only downgrades from BBB to the high-yield segment are considered.

Historical comparisons have their shortcomings, however, as the nature of an economic shock can expose different sets of sectors to heightened default risk. The speed and extent of downgrades also remain hard to predict. They not only depend on future macroeconomic developments in the light of the pandemic, but also

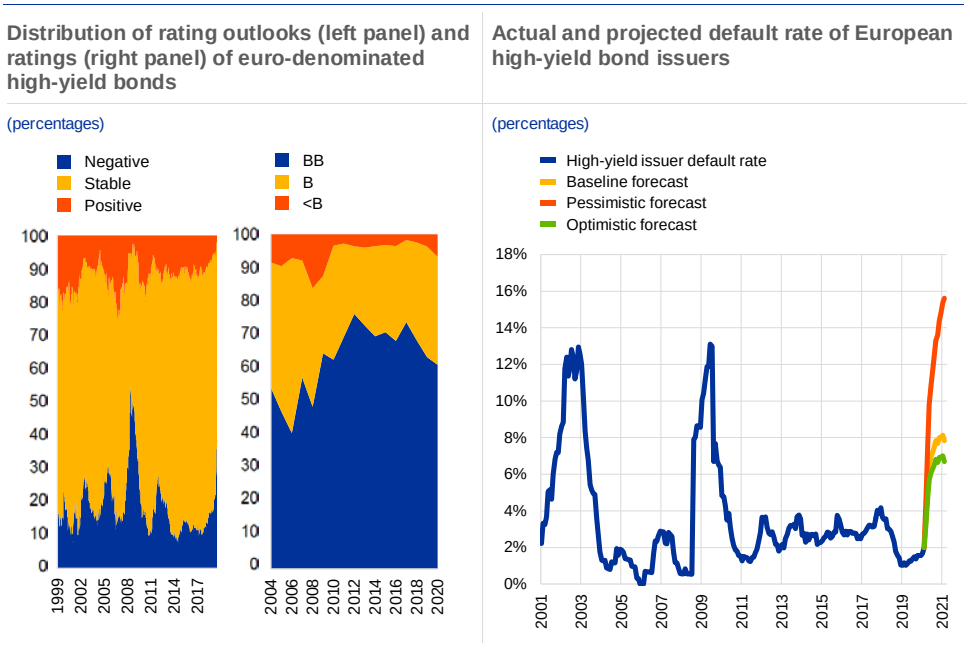
[16] The Federal Reserve's Primary and Secondary Market Corporate Credit Facilities (PMCCF and SMCCF) benefit from the support of the US Treasury via an initial equity investment of USD 75 billion.

on how effective economic policies are in restoring corporate cash flows as well as how rating agencies account for any persistent increase in corporate leverage.

Downgrades and defaults among high-yield issuers and leveraged loans are projected to increase (see **Chart 2.12,** left panel). Projected downgrades aggravate adverse longer-term trends in credit quality within the high-yield sector, with a declining share of the highest rating bucket (BB) (see **Chart 2.12,** middle panel). A significant share of these downgrades might eventually result in debt restructuring as rating agencies have augmented their default rate projections for high-yield borrowers to levels last seen during the global financial crisis (see **Chart 2.12,** right panel). The secondary market for leveraged loans has also come under greater selling and downgrade pressure, as evidenced by declining market indices on both sides of the Atlantic. This may lead structured credit instruments securitising such loans (collateralised loan obligations or CLOs) to suffer from a higher default correlation in their asset pools as the shock hits many borrowers simultaneously. While higher default concentrations are already reflected in increasing shares of junior tranches bearing ratings close to default (CCC), they may eventually even inflict capital losses on the higher-rated senior tranches.

Chart 2.12

Deteriorating credit quality in high-yield bond market



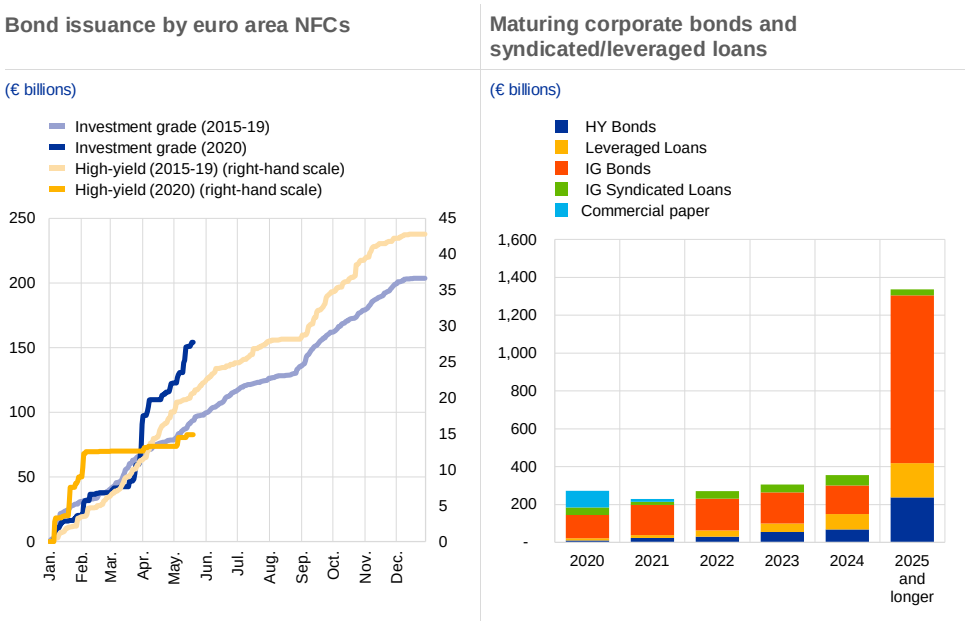
Sources: ECB and Moody's.
Note: Right panel: the chart plots one-year rolling default rates of European companies bearing a high-yield rating calculated by Moody's.

High corporate bond spreads and downgrades may hamper corporates' ability to roll over their maturing bonds. Bond issuance by euro area corporate borrowers froze in March, arguably reflecting higher spreads and overall funding costs in corporate bond markets alongside elevated uncertainty (see **Chart 2.13**, left panel). While investment-grade bond issuance resumed at a record pace in late March shortly after the ECB's announcement of private and public asset purchases under the PEPP, issuers with high-yield ratings have not yet returned to the primary market. As investor

uncertainty, reflected in at times prohibitively high financing costs, persists, current and prospective high-yield borrowers face pressing rollover risks. These are only partly mitigated by a long-term trend towards longer maturities of outstanding bonds. A nominal value of nearly €500 billion of outstanding NFC bonds, including leveraged and syndicated loans as well as short-term commercial paper, will mature by the end of 2021 (see **Chart 2.13**, right panel).

Chart 2.13

Rollover risk is higher in adverse financial conditions, but mitigated by a favourable maturity structure



Source: Dealogic.
Notes: The dashed blue and yellow lines in the left panel show average cumulated bond issuance between January and December between 2015 and 2019. The solid blue and yellow lines show cumulated bond issuance between 1.January and 15 May 2020. IG: investment grade; HY: high yield.

3 Euro area banking sector

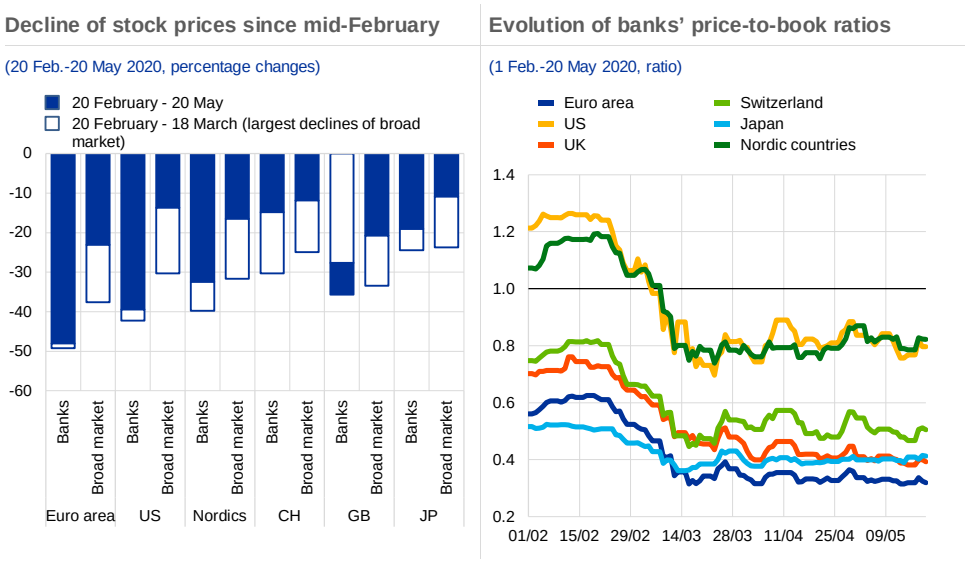
3.1 Lower valuations and tighter market funding conditions

Euro area bank valuations saw outsized declines as global equity market prices fell in March. In many countries, bank equity indices saw larger corrections than the broad market, in anticipation of the economic fallout from the coronavirus pandemic on banks' balance sheets. As the euro area became the epicentre of the pandemic in March, the broad euro area equity indices and bank indices saw the largest declines with falls of 36% and 46%, respectively (see **Chart 3.1**, left panel). Since mid-March, banks have recuperated some of the losses but less than the broader market –

suggesting lingering concerns specific to the outlook for banks. The stock price declines translated into lower market valuations of banks (see **Chart 3.1**, right panel). In particular, euro area banks' price-to-book ratios, which were already low due to profitability challenges in a low interest rate environment, fell to just over 0.3 on aggregate, the lowest on record.

Chart 3.1

Euro area bank stock prices and valuations fell more than the broader equity market as the coronavirus spread



Sources: Bloomberg Finance L.P., Refinitiv and ECB calculations.
Notes: Left panel: based on national/regional stock price indices. The values for the Nordic countries are computed as a median of stock price index changes for Denmark, Sweden and Norway. When the blue bar appears below the white bar, the respective stock prices declined since 18 March, otherwise they increased. Right panel: based on a sample of 59 listed banks.

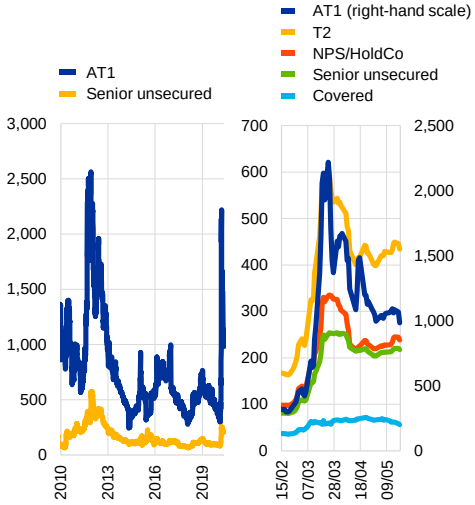
Bond funding costs for euro area banks rose, particularly for riskier instruments. Spreads on all wholesale market debt widened, but the impact was more pronounced for riskier instruments (see **Chart 3.2**, left panel). For the euro area on aggregate, from mid-February to mid-March, the spreads of the most risky instruments (i.e. additional Tier 1 (AT1) bonds) widened by around 1,700 basis points (6 times the initial level), while spreads of covered bonds increased by 20 basis points (1.6 times the initial level). There was also pronounced heterogeneity at the country and seniority levels, with spreads of AT1 bonds in Germany increasing more than in other countries due to bank-specific factors and those of Italian bank bonds increasing more for Tier 2 (T2) and senior unsecured bonds (see **Chart 3.2**, right panel). Part of the marked increase in AT1 bond spreads was related to one issuer not making use of an early repayment clause (i.e. the right to call the bond and pay back the principal amount on specified dates), which was interpreted by market participants as a sign of bank-specific weakness. Since mid-March, bond spreads have declined by around 1,000 basis points for AT1 bonds and 20 basis points for senior unsecured bonds, while spreads of covered bonds remained unchanged.

Chart 3.2

Banks' wholesale debt funding costs increased substantially, in particular for riskier instruments

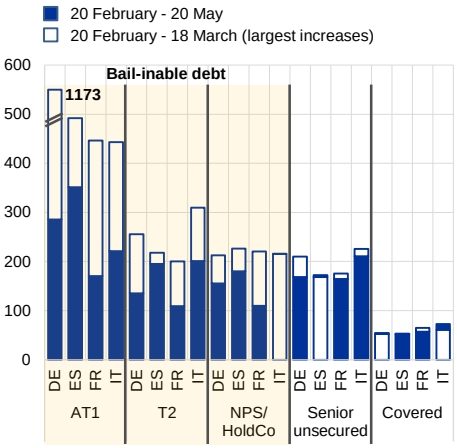
Longer-term and recent developments in bond spreads of euro area banks

(left panel: 1 Jan. 2010-20 May 2020, basis points; right panel: 15 Feb.-20 May 2020, z-spreads in basis points)



Increase in bank bond spreads since end-February across seniorities and largest euro area countries

(20 Feb.-20 May 2020, percentage changes)



Sources: Dealogic, IHS Markit and ECB calculations.
Notes: Z-spreads are defined as the difference (in basis points) between the yield to maturity of a bank's bond and the yield of a maturity-matched euro swap. Spreads are weighted by the outstanding volume of the respective bonds. NPS/HoldCo: non-preferred senior and holding company debt. Right panel: when the blue bar appears on top of the white bar, the respective bond spreads increased since 18 March, otherwise they declined.

Short-term funding remained ample in euro area banks, which entered the stress episode with larger buffers than during the 2008 crisis. Since 2014, banks have built up substantial buffers of high-quality liquid assets (HQLA), which are mainly in the form of central bank reserves and government bond holdings (see **Chart 3.3**, left panel). The amount of HQLA for euro area banks on aggregate increased from €1.9 trillion at the end of 2014 to €3.2 trillion in the first quarter of 2020, largely reflecting an increase in central bank reserves. There are notable differences across countries. While the average liquidity coverage ratio (LCR) is moderately higher in countries more affected by past crises[17] than in countries less affected by past crises, the former are relying more on government bonds to form their HQLA (see **Chart 3.3**, right panel). The LCR of banks relying to a larger extent on government bonds for their HQLA may be more vulnerable to valuation losses on those bonds, for example if public debt sustainability concerns were to resurface, but the ECB's asset purchase programme helps to reduce the volatility of government bond prices. The Single Supervisory Mechanism (SSM) has allowed banks to operate temporarily below the LCR requirement, with the aim of banks using liquidity buffers to support the real economy.

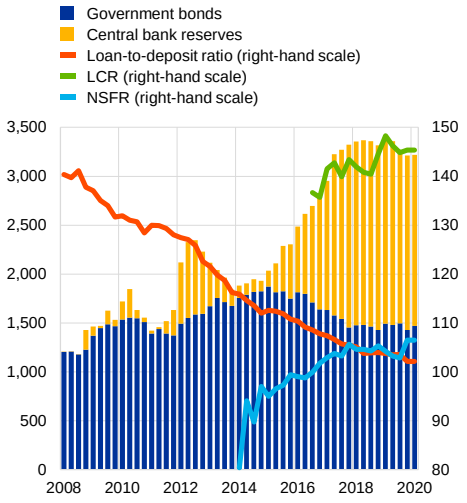
[17] This chapter includes references to countries more or less affected by the global financial crisis and/or the euro area sovereign debt crisis. Countries more affected by those crises comprise Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain.

Chart 3.3

Euro area banks have built substantial liquidity buffers over the past decade, but some banks are more reliant on sovereign debt

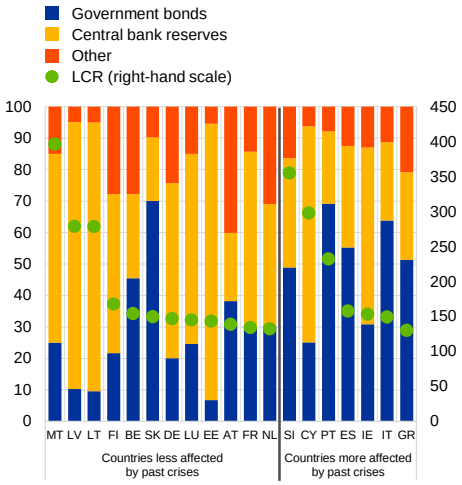
High-quality liquid assets and liquidity ratios of euro area banks since 2008

(Q1 2008-Q1 2020, € billions, percentages)



LCR and main components of high-quality liquid assets across euro area countries

(Q4 2019, percentage share of high-quality liquid assets, percentages)



Sources: ECB, ECB supervisory statistics and ECB calculations.
Notes: Right panel: based on a sample of 116 significant institutions. The category "other" includes assets of regional governments, local authorities, international organisations, public sector entities as well as banknotes and coins. NSFR: net stable funding ratio.

Household and corporate deposits also continue to provide euro area banks with a stable source of funding at low costs. Deposits account for the majority of the funding of euro area banks on aggregate, with households being the largest providers of funds, and corporates accounting for one-sixth of the total. However, there is pronounced heterogeneity across countries, with significant institutions (SIs) in Germany and France having a somewhat higher relative reliance on wholesale funding compared with banks in Italy and Spain. If market funding conditions remain tight, a heavier reliance on wholesale funding might cause bank profitability to face stronger headwinds in the future. Banks continue to benefit from low deposit funding costs (see **Chart 3.4**, left panel), even if negative rates have seen limited pass-through. The recent substantial increase in corporate deposits suggests that non-financial corporations (NFCs) increased their short-term borrowing to prevent liquidity shortages, particularly in France (see **Chart 3.4**, right panel). If social restrictions continue for longer than expected, and without additional support measures, there are risks of NFC deposit outflows as firms need to pay expenses.

Chart 3.4

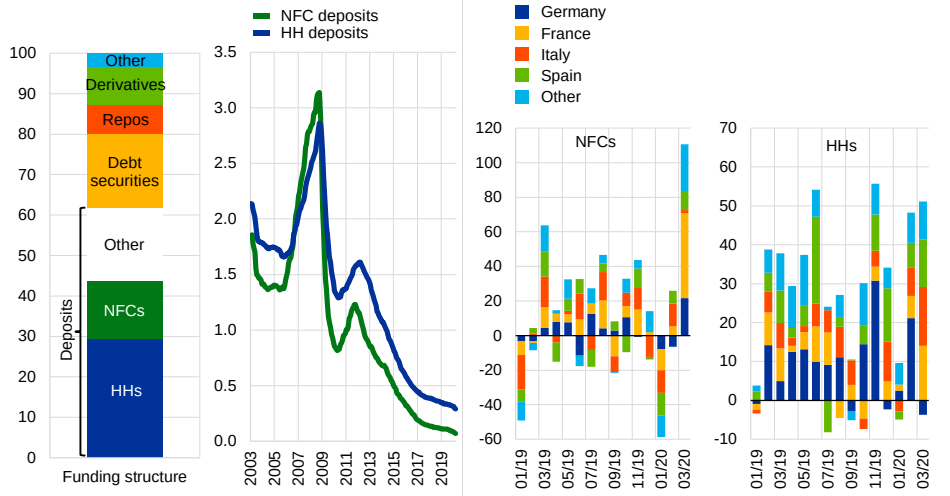
Euro area banks continue to benefit from stable low-cost deposit funding, with an increase in corporate deposits in March resulting from firms' short-term borrowing

Aggregate funding structure and deposit funding costs of euro area banks

(left panel: Q4 2019, percentage share of total bank funding; right panel: Jan. 2003-Mar. 2020, percentages)

Split of euro area NFC and household deposit flows by country of residence

(Jan. 2019-Mar. 2020, € billions)



Sources: ECB, ECB supervisory statistics and ECB calculations.
Notes: HHs: households, NFCs: non-financial corporations. Right panel: the chart shows monthly flows of overnight deposits.

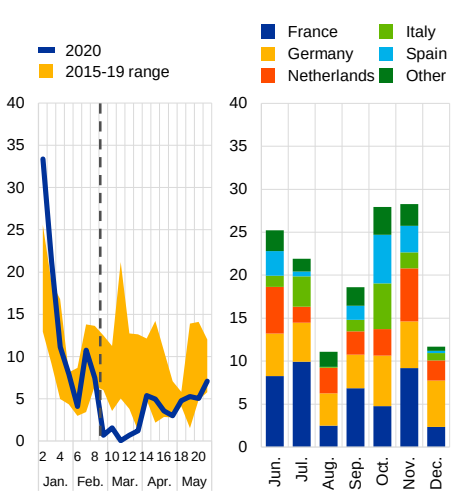
Reflecting the tightening in market conditions, the gross issuance of bank bonds dropped close to zero at the end of February. Since the end of March some banks, mainly in countries less affected by the global financial and/or euro area sovereign debt crisis and in particular in France, started issuing again, but at lower volumes and mostly covered and senior unsecured bonds. Looking ahead, a cumulative volume of €145 billion of bank bonds will mature by the end of 2020 and require refinancing (see **Chart 3.5**, left panel). However, even if banks refinance the total volume of maturing bonds at currently observed secondary market yields, they would still not see an increase in average bond funding costs in the near future. This is because the bonds maturing in the near future were issued a few years ago when funding costs were even higher than those currently observed. However, if funding conditions were to remain tight, the difference between average bond funding costs of banks in countries more and less affected by past crises would widen (see **Chart 3.5**, right panel). This might have implications for banks' profitability going forward and potentially also for how quickly banks are able to reach their targets for the minimum requirement for own funds and eligible liabilities (MREL), especially for smaller banks with more limited access to capital markets. To provide funding and thereby alleviate potential liquidity strains of banks, the ECB conducted additional Eurosystem operations of around €480 billion since mid-March. Longer-term refinancing operations (LTROs) accounted for the bulk of these operations which provide bridge financing until the new targeted longer-term refinancing operations (TLTROs) are conducted in June.

Chart 3.5

Tightening market funding conditions increase refinancing costs for banks' bond funding compared with those seen at the beginning of 2020

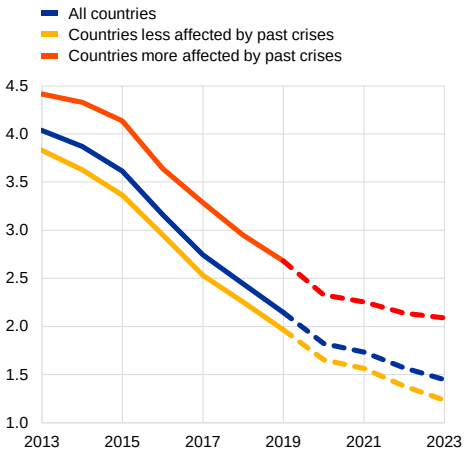
Weekly gross bond issuance and forthcoming monthly redemption volumes

(left panel: 6 Jan.-20 May 2020, € billions; right panel: June-Dec. 2020, € billions)



Average bond funding costs under a scenario of refinancing with current bond yields

(2013-23, yield per annum)



Sources: Dealogic, IHS Markit and ECB calculations.
Notes: Left panel: the left chart shows weekly gross bond issuance volumes, with week numbers shown on the x-axis, while the right chart shows monthly bond redemption volumes. Right panel: the funding cost scenario (indicated by the dashed lines) assumes that maturing bonds are refinanced at a yield to maturity observed in the secondary market in May (noting low issuance volumes in the primary market). All funding costs are volume-weighted (covered, senior unsecured, NPS/HoldCo and Tier 2 bonds are included, being the main seniorities maturing in 2020).

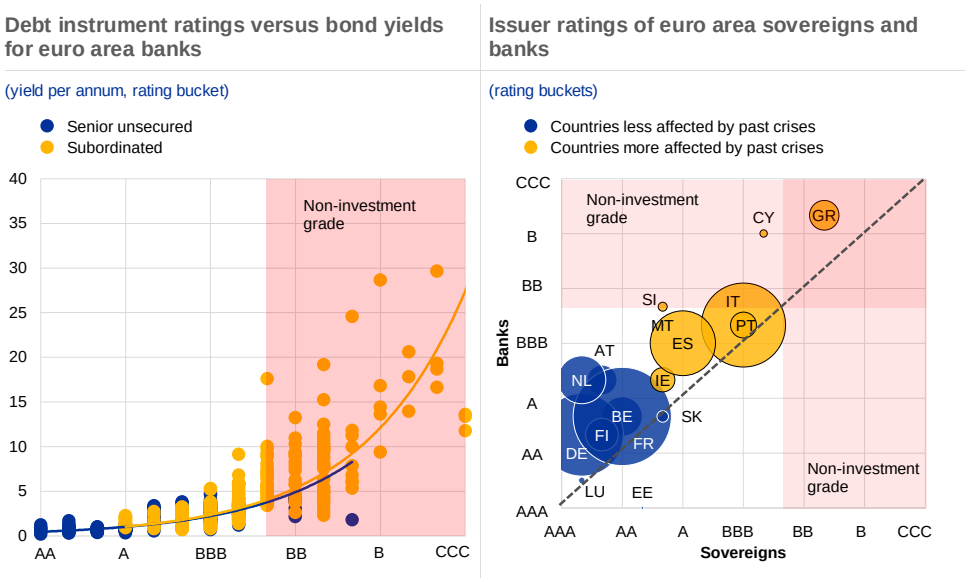
Credit rating downgrades of banks might increase their market funding costs, limit their ability to achieve MREL targets and weigh on future profitability. Amid concerns about future earnings and asset quality, rating agencies have placed several banking sectors on negative outlook. Taking each private bank's lowest rating of those provided by the four main credit rating agencies, 36% of Italian banks are one rating notch away from non-investment-grade territory and an additional 29% two notches away. Compared with 6% and 11% for the euro area, this highlights the risk of a cliff effect for Italian banks due to the proximity to the non-investment-grade space. A downgrade of banks to non-investment grade can have a variety of potentially negative consequences. The non-linear relationship between a bank's rating and its funding costs might lead to substantially higher funding costs and lower issuance volumes (see **Chart 3.6**, left panel).

Sizeable sovereign-bank links in some euro area countries create risks of negative feedback loops arising from sovereign or bank rating downgrades. While policy measures may cushion the adverse economic effects on firms and households resulting from coronavirus containment measures, there remains a risk that credit rating agencies could downgrade sovereigns and/or banks on the back of rising credit risks. Such a development could reactivate the negative feedback loops of the sovereign-bank nexus, especially for Italy and Portugal, as well as for Spain, where bank ratings are closest to non-investment grade (see **Chart 3.6**, right panel). The reforms to bank resolution and bail-in should reduce the strength of the nexus

compared with past crises. However, the benefits of these reforms could be weaker if banks are unable to reach their targets in terms of issuing bail-inable debt.

Chart 3.6

The potential for rating downgrades could generate feedback loops between sovereigns and banks in some countries



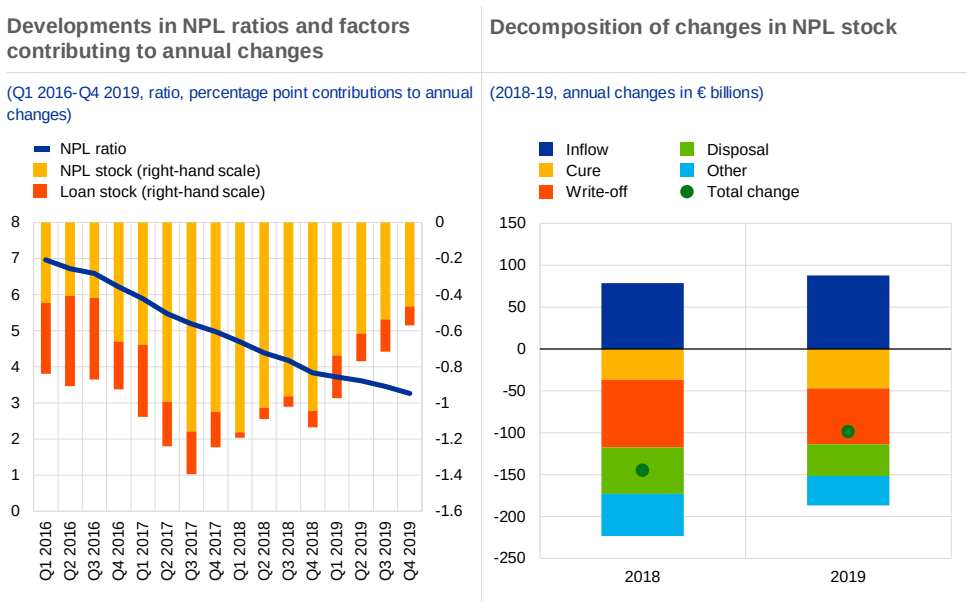
Sources: DBRS, Fitch Ratings, Moody's, Standard & Poor's, IHS Markit and ECB calculations.
Notes: Left panel: the rating shown is lowest long-term instrument rating for each bond assigned by Standard & Poor's, Moody's, Fitch Ratings and DBRS. Right panel: the rating shown represents the median of the long-term issuer ratings assigned by Standard & Poor's, Moody's, Fitch Ratings and DBRS. The bubble size indicates the combined debt of sovereigns and banks (debt securities issued) in a country as a share of the euro area total.

3.2 Asset quality set to decline in the wake of the pandemic, but capital buffers have increased during the past decade

The improvement in euro area banks' asset quality continued in 2019, but at a slower pace than previously. The aggregate non-performing loan (NPL) ratio of euro area banks declined to 3.3% in the fourth quarter of 2019, with risk reductions taking place in both high and low-NPL countries. Since end-2018, the reduction in NPL ratios has halved on the back of weaker cyclical conditions that have led to smaller declines in the NPL stock, while total loans have increased moderately (see **Chart 3.7**, left panel). With regard to the driving factors, lower sales and write-offs of NPL portfolios explain most of the slowdown in 2019 compared with the previous year, while new NPL inflows increased slightly (see **Chart 3.7**, right panel).

Chart 3.7

NPL ratios declined further, but reductions slowed on the back of lower sales and write-offs, while new NPL inflows increased only slightly up to end-2019



Sources: ECB supervisory statistics and ECB calculations.
Note: Based on a sample of 116 SIs.

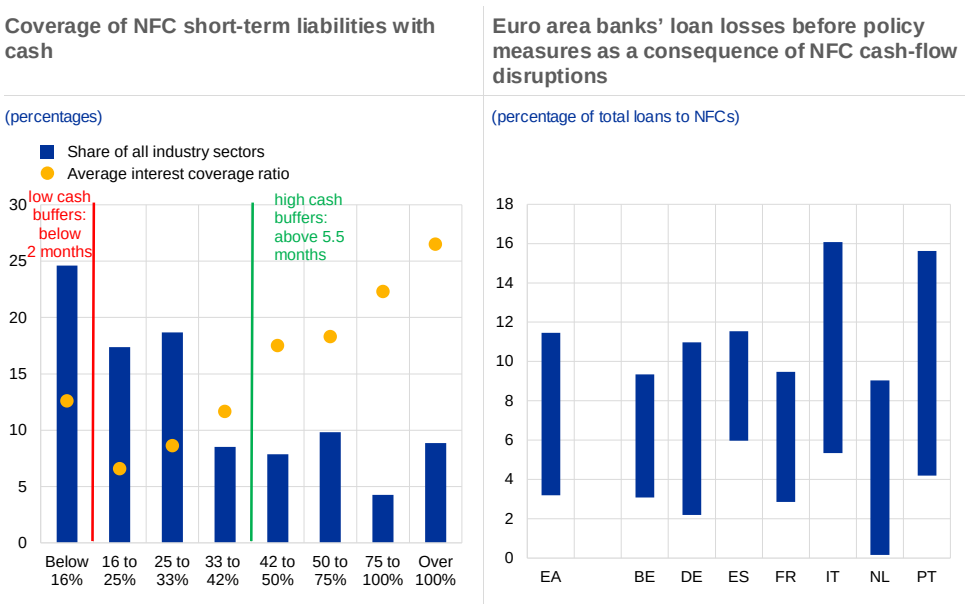
Banks' asset quality is expected to deteriorate as a consequence of the pandemic, although government measures should provide a significant offset. While a decline in corporate fundamentals, as proxied by NFC profit margins, takes up to three years to translate into higher bank NPLs in a typical recession,[18] the disruption to global supply and demand this time has led rapidly to cash-flow shortages for NFCs. This is, in turn, expected to lead to missed payments, eventually resulting in an increase in non-performing loans. Furthermore, a large share of industries in euro area countries are operating with low liquidity buffers, which lower their debt servicing capacity (see **Chart 3.8**, left panel). Although there is considerable uncertainty about the asset quality of corporate loans going forward, a sensitivity analysis, using a scenario in which corporate cash flows would drop by 50% for a period of three months and companies which exhaust their cash buffers default, suggests that loan losses – before the effect of any mitigation from policy measures – could amount to just over 3% of total loans to NFCs, adding up to about €160 billion and forming the lower bound of the range of estimates (see **Chart 3.8**, right panel). The larger estimated impact on Italian and Spanish banks reflects a relatively high weight of corporate exposures and weaker corporate liquidity buffers. In an illustrative extreme scenario, in which corporate cash flows would be depleted completely for three months, loan losses of banks would be substantially higher. Simulations suggest

[18] For further details, see the box entitled "Do corporate fundamentals explain differences in sectoral NPLs?", *Financial Stability Review*, ECB, May 2019.

a larger impact on corporate loans in Italy, the Netherlands and Portugal.[19] The size of the losses in the euro area as a whole and in individual countries will ultimately depend on the length of the lockdowns and differences in corporate resilience. As discussed below (see **Box 4**), it will also depend on the impact of government support measures, which could imply a sizeable reduction in the losses borne by banks directly, and an efficient channelling of these funds to corporates.

Chart 3.8

Liquidity shortages of NFCs are likely to lead to higher loan losses for banks, although government schemes will reduce some of the impact



Sources: ECB supervisory statistics, Bureau van Dijk and ECB calculations.
Notes: Left panel: based on 18 sectors of the economy in 19 euro area countries. The x-axis shows the share of short-term liabilities which are covered by cash. The coloured vertical lines illustrate what proportion of firm liabilities suffer from drawdown of cash buffers for the given timeframes. The average interest coverage ratio is expressed in terms of earnings before interest, taxes, depreciation, and amortization (EBITDA) as a multiple of interest payments. Right panel: range of estimates based on four scenarios, two of which assume a reduction of each NFC's cash flows by 50% and 100%, respectively, for a period of three months, and two of which assume that euro area GDP declines in 2020 by about 8% and 12%. The estimated losses do not account for mitigating measures adopted by governments, such as moratoria, grants and guarantees to firms. The selection of countries is determined by data availability constraints.

More structurally, banks' asset quality will also be affected by the need to continue managing the implications of the transition to a greener economy. The average emission intensity of euro area banks' exposures towards large corporates has improved in recent years.[20] But despite the commitment of some NFCs to adjust their business models to comply with the Paris Agreement, there is still a wide dispersion of emission intensities both within and across economic sectors, suggesting more adjustment may yet take place (see **Chart 3.9** and **Box 3**).

19 These simulations are carried out under the assumption that companies which are unable to pay their expenses as a result of the drop in cash flows would default. Losses refer to lifetime credit losses in the sense of IFRS 9. The required provision coverage on their loans is assumed to be equal to that observed on the end-2019 stock of non-performing loans in the same country and industry. This is a conservative assumption as some of the defaulting companies may be viable and able to increase their borrowing to relax the liquidity constraints. The simulations do not account for the relief that moratoria on debt repayments may provide to liquidity-constrained borrowers.

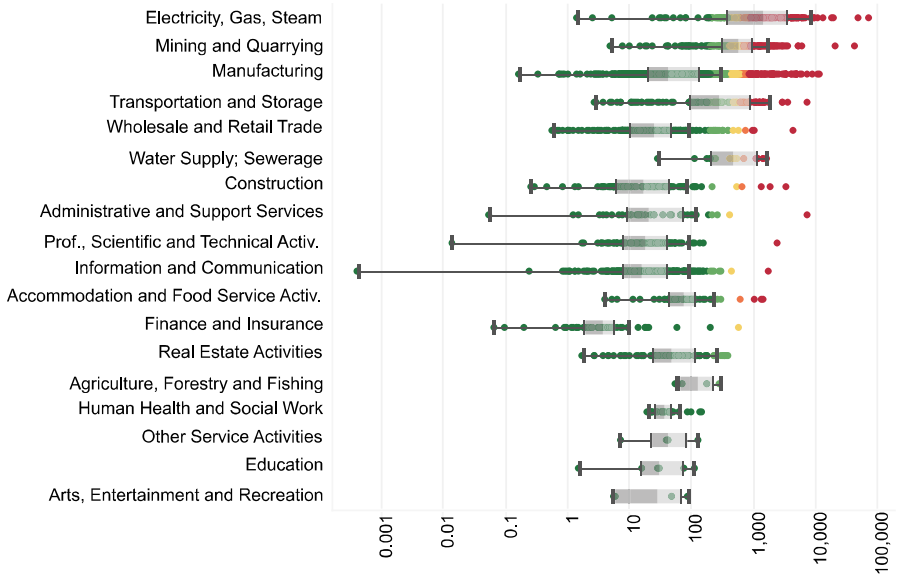
20 See *Financial Stability Review*, ECB, November 2019, Section 3.1.

Chart 3.9

Despite the commitment of some corporates to adjust their business models to comply with the Paris Agreement, there is still a wide dispersion of emission intensities

Dispersion of emission intensities both within and across economic sectors

(tons of CO2 equivalent emissions per million euro of sales)



Sources: Refinitiv and ECB calculations.
Notes: Emission intensity is measured in tons of CO2 equivalent emissions produced per million euro of sales. Sectors are based on the NACE one-digit classification. The boxplots show the 25th, 50th and 75th percentiles of the distributions. The whiskers correspond to the 1.5 interquartile range between the 25th and the 75th quartile. The colour range corresponds to the degree of emission intensity: green – low emission intensity; red – high emission intensity.

Box 3

Euro area banks' sensitivity to corporate decarbonisation

Prepared by Marco Belloni, Luca Mingarelli, Rafel Moyà Porcel and Petya Radulova

As awareness of the environmental, social and economic risks from disorderly climate change has grown, so has awareness of the need for businesses to accelerate their decarbonisation. Banks need to be prepared for changes in loan performance should financial losses result from abrupt shifts in policies, technologies or consumer sentiment in response to the risks posed by climate change. While credit ratings could in principle capture such risks, in practice rating agencies have only just begun incorporating risks arising from an abrupt transition to a low-carbon economy.

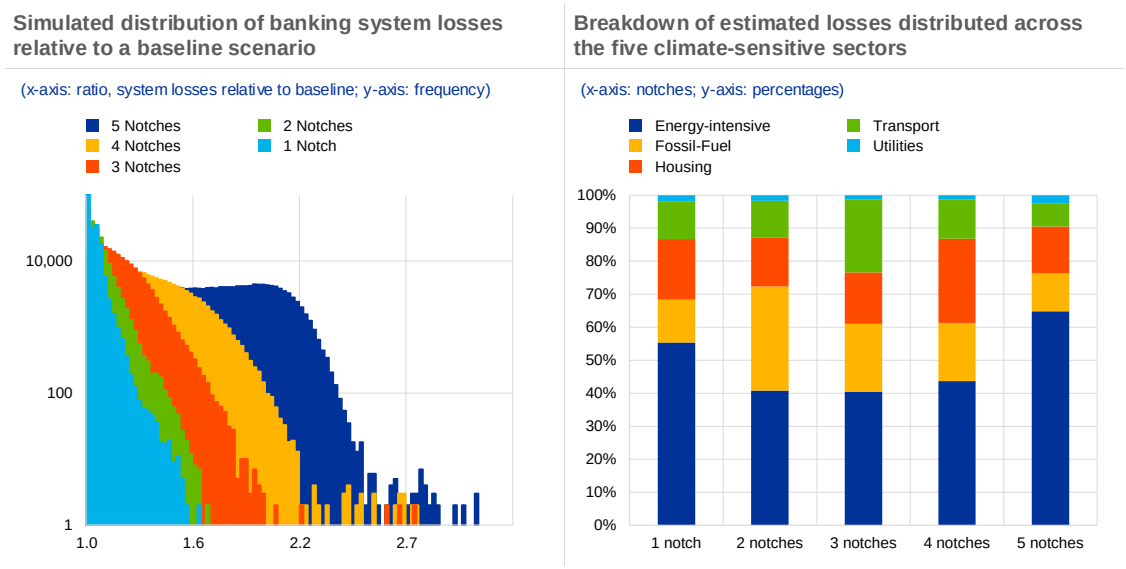
This box assesses how sensitive the euro area banking system is to higher probabilities of default for corporates stemming from an abrupt carbon adjustment.[21] A first scenario examines the impact of corporate rating downgrades applied indiscriminately to climate-sensitive economic

[21] The approach is based on granular loan and securities holdings data matched to individual business information to consider the impact of both first-round direct losses incurred by individual banks and some second-round effects propagating through interbank loan networks. See Covi, G., Montagna, M. and Torri, G., "Economic shocks and contagion in the euro area banking sector: a new micro-structural approach", *Financial Stability Review*, ECB, May 2019.

sectors.[22] A second scenario exploits firm-level data to examine the potential for downgrades *within* sectors, where all companies reporting high carbon emissions are reassessed by rating agencies. Both analyses are based on ECB supervisory statistics (large exposures dataset)[23] and ECB securities holdings statistics.

Chart A

Euro area banking system losses in the event of an abrupt climate transition for carbon-intensive sectors



Sources: Moody's and ECB calculations.
Notes: The left panel presents the factor of increase in losses relative to a baseline non-stressed scenario. In the right panel, the breakdown of losses by sector at risk accounts only for losses above the baseline, i.e. arising only from the transition risk shock. Loss estimates take into account direct contagion, including second-round effects, as well as indirect contagion arising from overlapping holdings of depreciating assets. Baseline losses are the estimated losses in a scenario where probabilities of default are not stressed.

In the first scenario, losses from a one-notch downgrade triggered by climate risk could be severe for the affected sectors, but losses only lead to systemic stress if downgrades are multi-notch. For a one-to-two notch downgrade, banking system losses are estimated to increase by up to 60%. However, should a disorderly transition lead to a several-notch downgrade, losses within the euro area banking system are estimated to double, leading to a potential for financial instability (see **Chart A**, left panel). The energy-intensive sector[22] – including e.g. mining of metals, goods manufacturing, etc. – alone contributes about half of the additional losses arising from transition risk, which is significantly more than any other sector (see **Chart A**, right panel).

In the second scenario, while diversified exposures should shield the banking sector from large losses for the highest-emitting firms within sectors, losses could still be meaningful. Company-level data[23] indicate a wide degree of dispersion of carbon transition risk within the non-financial sectors (see **Chart B**, left panel). Applying shocks proportional to each firm's emissions rather than for a sector as a whole, losses in the banking system are estimated to increase by up to 10% for shocks corresponding to one-notch downgrades. In the individual firm-level exercise,

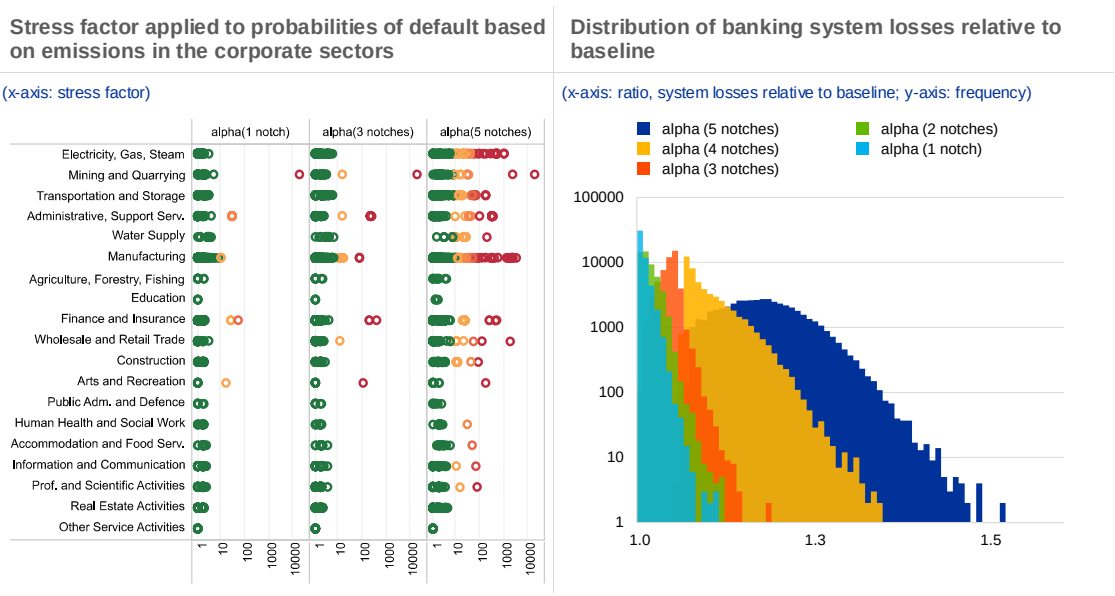
[22] The identification of climate-sensitive sectors is based on Battiston, S., Mandel, A., Schuetze, F. and Visentin, G., "A Climate Stress-Test of the Financial System", *Nature Climate Change*, Vol. 7, March 2017. The authors remap all four-digit NACE Rev. 2 sectors to new climate policy-sensitive sectors, combining criteria such as carbon emissions, the role of the sectors in the supply chain and the existence of traditional policy institutions for the sector.

[23] See *Financial Stability Review*, ECB, November 2019, Section 3.1.

system-wide losses amount to system distress only for downgrades of four notches or more (see **Chart B**, right panel). In the firm-level exercise, even for the highest levels of shock considered, losses within the banking system are therefore much more contained compared with the sector-based analysis. Clearly, banks with concentrated lending portfolios in particular sectors would face higher losses.

Chart B

Restricting rating downgrades based on firms' level of emissions suggests lower banking sector losses



Sources: Moody's and ECB calculations.
Notes: Stresses to probabilities of default at firm level are obtained as a function of each corporation's emissions and a sensitivity parameter α. The connection with the sectoral analysis is made based on the resulting mean stressed probabilities of default, so that for a given average probability one can find a corresponding value of α. Then, $\alpha(n\ notch)$ refers to the level of α giving the equivalent average probability across the sample as in the case of n-notch downgrades in the sectoral analysis. Left panel: one-digit NACE sector classification. Sectors are placed in order based on their average emissions. The x-axis shows the factor by which probabilities of default are increased given the emissions-based downgrade. Right panel: losses relative to baseline for levels of α comparable to one-to-five notch downgrades in the sectoral analysis.

This analysis provides a rationale for using firm-level information to assess the sensitivity of the banking system to downgrades related to decarbonisation. The differences in findings between the sectoral and firm-level approach to considering the carbon sensitivity of non-financial firms also indicate that the potential losses for the banking system could be reduced by implementing a targeted management of exposures to specific firms, rather than restructuring whole sectoral portfolios.

Substantially higher regulatory capital ratios since the global financial crisis increase banks' capacity to absorb potential losses. The Tier 1 capital ratio[24] of euro area banks on aggregate has almost doubled over the last decade, from 8.8% at the end of 2008 to 15.5% in the third quarter of 2019, which puts banks in a much better position to absorb potential losses resulting from the economic fallout of the

[24] The ECB's consolidated banking data have been used for long-term developments in euro area banks' capital ratios. As a new framework for consolidated banking data has been in place since the implementation of the European Banking Authority's implementing technical standards on supervisory reporting at the end of 2014, the Tier 1 capital ratio has been chosen for consistency.

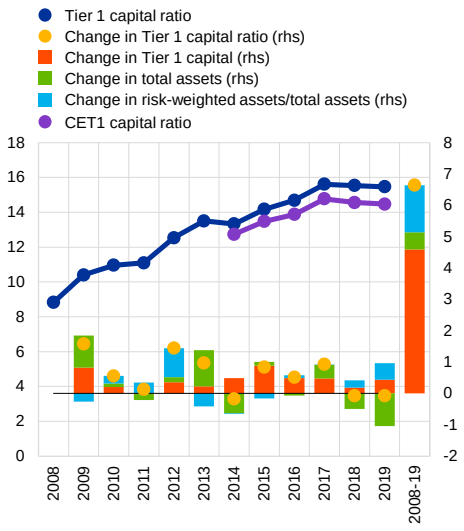
coronavirus. The main drivers behind the increase in the aggregate Tier 1 ratio are capital increases of around €450 billion, followed by a reduction in risk weights of 4.5 percentage points and reductions in total assets of €2 trillion over the same period (see **Chart 3.10**, left panel). The Common Equity Tier 1 (CET1) capital ratio, which was introduced in the context of Basel III, increased from 12.7% in 2014 to 14.5% in the third quarter of 2019. There is some heterogeneity at the country level, with capital increases and asset reductions being the main drivers in countries less affected by past crises, whereas risk-weight reductions played a more important role in countries more affected by past crises. During 2019, euro area significant institutions' CET1 ratios strengthened further to 14.8% in the fourth quarter of 2019, mainly on the back of retained earnings. Overall, at the end of 2019, management buffers above current minimum capital requirements appear to provide banks with a good starting point for absorbing potential future losses related to the repercussions from the coronavirus (see **Chart 3.10**, right panel).

Chart 3.10

Banks have increased their solvency positions substantially since the global financial crisis and are hence now much better positioned to absorb potential losses

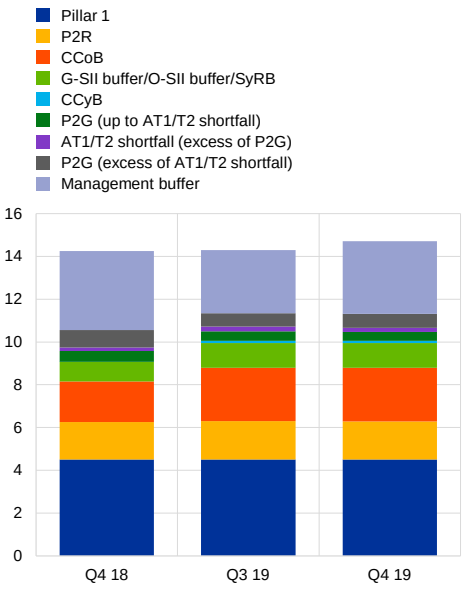
Long-term developments in euro area banks' Tier 1 capital ratios with contributing factors and CET1 capital ratios

(2008-Q3 2019, percentages, percentage changes and percentage point contributions)



Capital requirements and management buffers of euro area significant institutions

(Q4 2018, Q3 2019, Q4 2019, percentage of RWAs)



Sources: ECB consolidated banking data and ECB calculations.
Notes: Left panel: the figures for 2019 from the consolidated banking data refer to the third quarter of 2019. The decomposition follows Cohen, B. and Scatigna, M., "Banks and capital requirements: channels of adjustment", BIS Working Paper No 443, March 2014. Right panel: based on a balanced sample of 104 SIs. AT1: additional Tier 1; CCoB: capital conservation buffer; CCyB: countercyclical capital buffer; CET1: Common Equity Tier 1; G-SII: global systemically important institution; O-SII: other systemically important institution; P2G: Pillar 2 guidance; P2R: Pillar 2 requirement; RWAs: risk-weighted assets; SyRB: systemic risk buffer; T2: Tier 2.

On aggregate at the start of 2020, banks had capital to withstand a significant increase in loss rates on corporate loans. In a mechanical simulation, available capital buffers can be compared with hypothetical losses on exposures to economic

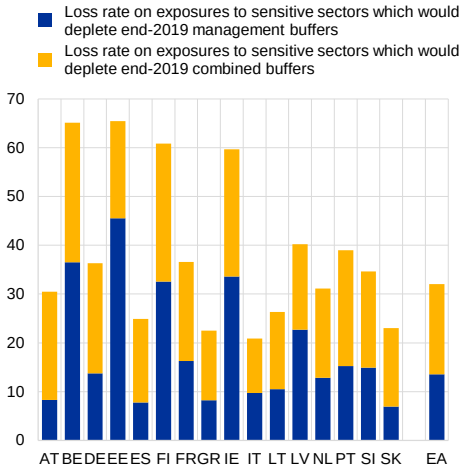
sectors that appear most sensitive to the consequences of the coronavirus outbreak.[25] The average euro area significant institution would deplete its management buffer when such losses reach over 13% of the total bank loan exposures to these sectors. At current provision coverage levels, such losses imply that, on average, about 23% of exposures to the sensitive sectors become non-performing. Compared with a historical benchmark, this would be slightly lower than peak levels of corporate NPLs in Italian, Irish and Portuguese banks after the sovereign debt crisis. Further loss-absorption capacity is available, as banks may operate below the capital level implied by Pillar 2 guidance and may use combined buffer requirements. Overall, that would allow the average SI to absorb losses of up to 30% of the exposure to the most sensitive sectors (see **Chart 3.11**, left panel). That said, the dispersion of individual banks' resilience is also wide, with a significant number of SIs likely to deplete management capital buffers with loss rates well below 30%, although they would still have access to other capital buffers (see **Chart 3.11**, right panel).

Chart 3.11

Capital buffers are sufficient to absorb a sizeable increase in loan losses on average, but dispersion of individual banks' resilience is wide

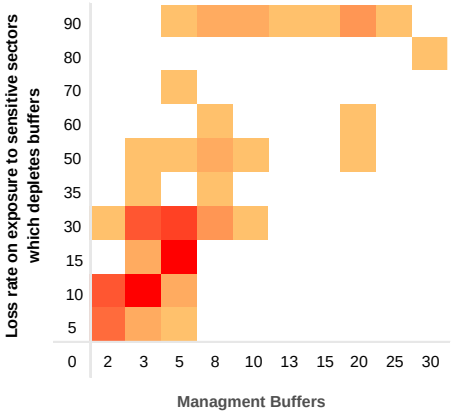
Capacity to absorb losses on exposures to sectors most sensitive to coronavirus disruptions

(percentages)



Heat map indicating estimated maximum loss rates on exposures to sensitive sectors relative to banks' management buffers

(x-axis: management buffers as a percentage of total RWAs; y-axis: maximum loss rate that can be absorbed by banks' management capital buffers; colours: number of banks)



Sources: ECB and ECB calculations.
Notes: Left panel: current loss rates refer to losses observed over the period from the fourth quarter of 2018 to the third quarter of 2019. Data for Cyprus and Malta are not available due to limited availability of data on credit losses and expected corporate default frequencies. As its exposure to the sensitive sectors is very low in relation to buffers, data are not shown for Luxembourg. Management buffers are as at end-2019 and do not account for the possibility to operate below Pillar 2 guidance and to use combined buffer requirements, or for the reduced macroprudential requirements. Combined buffers include all capital in excess of Pillar 1 and Pillar 2 requirements. The loss rate that would deplete buffers is calculated only with respect to losses on exposures to sensitive sectors and abstracts from the likely increase in losses on other exposures. The sensitive sectors include mining, manufacturing, retail and wholesale trade, transportation, hotels and restaurants as well as arts and entertainment.

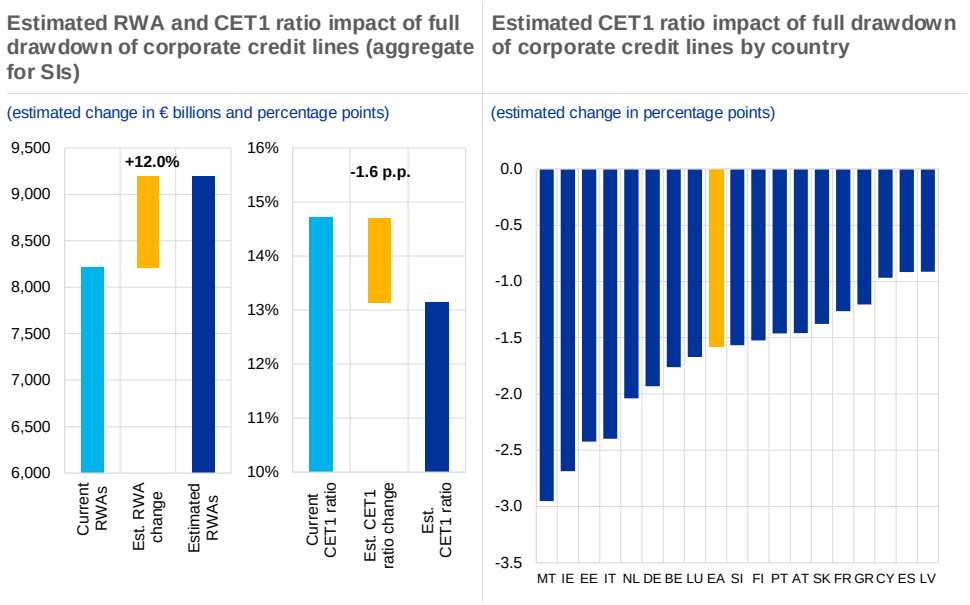
While the overall impact on euro area bank solvency remains uncertain, an assessment exercise is under way. The European Banking Authority has decided to postpone the EU-wide stress-test exercise to 2021 so that banks can focus on their

[25] The sectors include mining, manufacturing, retail and wholesale trade, transportation, hotels and restaurants as well as arts and entertainment.

core operations. However, the SSM is currently conducting a "desktop" vulnerability analysis of the euro area banking sector.[26]

Chart 3.12

A large-scale drawdown of corporate credit lines could result in a material increase in banks' RWAs and lead to some erosion of their capital ratios



Sources: ECB supervisory data and ECB calculations.
Notes: The estimates are based on a sample of 111 SIs which reported non-zero values for off-balance-sheet exposures to corporates in COREP in the fourth quarter of 2019. The estimated RWA increase is the difference between the hypothetical RWAs under a 100% drawdown of credit lines and the existing RWAs of credit lines. The former are calculated as the pre-CCF off-balance-sheet exposures times the average risk weight of post-CCF off-balance-sheet exposures.

A large drawdown of credit lines by corporates might erode banks' capital ratios, although prudential measures enhance banks' lending capacity. Given increased liquidity pressures, a number of NFCs have drawn down credit lines from their banks (see **Chapter 1**). A large-scale drawdown of credit lines would imply a move of such off-balance-sheet exposures to banks' balance sheets, resulting in an increase in risk-weighted assets (RWAs) and a decline in capital ratios. To the extent that bridge loans are backed by state guarantees, these loans would have lower RWAs. At end-2019, euro area significant institutions had over €3 trillion of off-balance-sheet credit risk exposures to corporates, equivalent to 13.5% of their total leverage ratio exposure. These off-balance-sheet exposures, mainly consisting of committed credit facilities, have an average credit conversion factor (CCF) of 41%. Under the (extreme) scenario of full corporate credit line drawdowns, euro area SIs' total RWAs are estimated to increase by 12%, corresponding to a 1.6 percentage point decline in their aggregate CET1 ratio (see **Chart 3.12**, left panel). At country level, the estimated CET1 ratio impacts fall in the range of 0.9-3.0 percentage points (see **Chart 3.12**, right panel). These estimates are a very conservative upper bound impact as – given the lack of granular data in the COREP (common reporting) framework – all off-balance-sheet exposures to NFCs are assumed to be credit lines. Furthermore, the potential impact should be assessed in the context of banks' increased lending

[26] See Enria, A., "Public hearing at the European Parliament's Economic and Monetary Affairs Committee", 5 May 2020.

capacity due to the capital relief measures taken by the SSM and national macroprudential authorities (see below for details).[27]

Government subsidy and loan guarantee schemes are expected to cushion some of the impact on banks. As discussed in **Chapter 1**, nearly all euro area governments have stepped in to provide financial assistance to households and companies facing cash-flow difficulties in the wake of the pandemic. This has included direct support and support via guarantees to banks on loans. Internal estimates suggest that State guarantees for corporate loans could help to reduce losses significantly, and transfer some of the remaining risk to governments. Under a scenario in which corporates see a 50% reduction in cash flows for three months, a full take-up of guaranteed loans could reduce loan losses by 40% for the euro area on aggregate, as firms would avoid default due to extra borrowing, while 10% of the losses would be transferred to governments via the provided guarantees (see **Box 4**). The impact varies by country depending on the design of the scheme, and benefits for the banks only materialise if the guaranteed loans are efficiently channelled to the borrowers in a short time span. Where the guarantees result in governments taking on the risk of losses, this could also tighten the nexus between banks and the non-financial corporate sector on one side and their sovereigns on the other.

Box 4

Potential impact of government loan guarantee schemes on bank losses

Prepared by Ugo Albertazzi, Martin Bijsterbosch, Maciej Grodzicki, Julian Metzler and Aurea Ponte Marques

Many euro area countries have made loan guarantee schemes a central element of their support packages in response to the coronavirus shock (see Chapter 1). In the face of acute revenue and income losses, these temporary schemes can support the flow of credit to the real economy and thereby help stabilise the banking system. This box sets out an illustrative assessment of how the announced schemes are intended to operate, and how they might affect the scale of losses that banks may face in the quarters ahead.

As the schemes are determined at national level, their features, including their size and eligibility criteria, vary across countries. The key parameters of the schemes are the overall size of the guarantee scheme, the pricing of the guarantees, the share of the loan that is guaranteed, the maximum amount per borrower and the eligibility criteria for companies to qualify (see **Table A**). The European Commission's temporary framework for coronavirus support measures sets out standards for State guarantees that would remain compatible with the Internal Market.[28] Schemes are aimed at supporting small and medium-sized enterprises (SMEs) and the self-employed, with larger companies also eligible for new lending that can be used as a business lifeline to continue paying suppliers and employees. Loan guarantees are generally short-term (one year), but can rise to up to six years. Pricing generally starts at 25 basis points (bps) for one-year SME guarantees and 50 bps for one-year corporate guarantees. This rises to 100 bps and 200 bps respectively for four and six-year maturity. Loss absorption is generally limited to a maximum of 90% of the loan principal, although in a few countries a limited amount of credit is available with a 100% guarantee.

[27] Assuming a full drawdown of corporate credit lines, for the median SI the implied RWA increase would consume 27% of management buffers adjusted for these capital relief measures.

[28] See the European Commission's Temporary Framework to support the economy in the context of the coronavirus outbreak, first announced on 19 March.

Table A

Parameters of loan schemes vary significantly across countries

		DE	FR	IT	ES	NL
Size of guarantee	€ billions	822	300	450	100	25
	% of 2019 GDP	23.9	12.4	25.2	8.0	3.0
	% of bank assets	9.9	3.2	12.1	3.7	1.0
	% of NFC loans (stock)	86.0	28.4	71.3	23.0	8.3
Pricing of guarantee		In line with EC framework	In line with EC framework	Partly free, partly with cost to firm	20-120 bps paid by banks	One-off of 1.5% to a maximum annual interest rate of 4%
Share of loan guaranteed		80%/90%, limited amounts up to 100%	90%/80%/70% depending on firm turnover	From 70% to 90% for new loans, limited amounts up to 100%	80% for SMEs & self-employed. 60-70% for large NFCs	67.5% to 100%
Max. amount per borrower		25% of 2019 turnover	25% of 2019 turnover	Up to 25% of 2019 turnover or 2x annual wage bill	Up to 2x last annual wage bill or 25% of 2019 turnover	€150 mn
Eligibility criteria		Different for different schemes; in line with EC framework	In line with EC framework (company not in insolvency proceeding as of 31 December 2019)	Different for different schemes; in line with EC framework	In line with EC framework	Different for each scheme. For large and medium-sized companies, in line with EC framework

Sources: ECB staff and national authorities.
Notes: Given the large number of support schemes and the variety in their specific conditions as well as different institutional environments across countries, not all features of guarantee schemes are directly comparable. Bank assets comprise both domestic and foreign assets. The NFC loan stock refers to domestic loans. For DE, the overall size of the guarantees is indicative (unlimited pledge). Pricing in line with the EU framework is staggered according to maturity.

In principle, the schemes can reduce losses incurred by banks on corporate loans and transfer some of the remaining credit risk to governments. Eligible companies can use the guarantees to obtain bridge financing that increases their cash buffers and extends the horizon over which these firms will continue servicing their liabilities, even with limited operating cash flows. Information on the size and eligibility criteria of national schemes can be combined with firm-level data on euro area corporate cash buffers and short-term liabilities to estimate how much of the corporate loan stock can be covered by the guarantees and how additional corporate borrowing under the schemes might reduce the firm's probability of default . Based on the eligibility criteria outlined in the European Commission's framework, this sensitivity analysis assumes full deployment of the schemes along the lines of the maximum loan amount per borrower, restricted by the country-specific schemes in Table A. Illustrative estimates considering four scenarios for economic growth and corporate cash flows indicate that full deployment of loan schemes might reduce loan losses by between 15% and 20% for the euro area on aggregate compared with losses without the schemes. About one-third of the losses that would still arise could be transferred to governments via the activation of guarantees (see **Chart A**).[29]

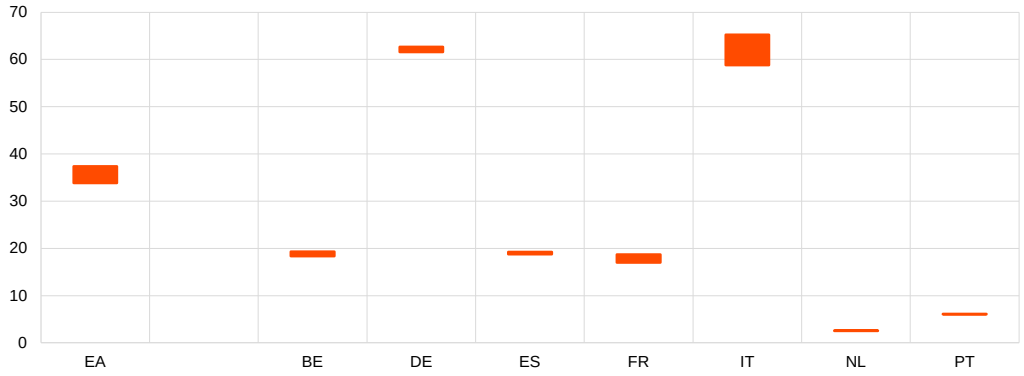
[29] The figures presented only capture effects from loan guarantee schemes and do not take into account other government-sponsored support programmes.

Chart A

Illustrative analysis suggests schemes could transfer a significant share of losses to governments

Estimated share of bank loan losses covered by government guarantee schemes under alternative macroeconomic and cash-flow scenarios, assuming full take-up

(range, percentage of total estimated losses)



Sources: ECB, national authorities, Bureau van Dijk and ECB calculations.
Notes: The ranges are constructed based on four stylised scenarios. Two of these assume a reduction of each NFC's cash flows by either 50% or 100% for a period of three months. The other two assume that euro area GDP declines in 2020 by either 8% or 12%. The impact does not take into account the possible benefits from using lower risk weights on guaranteed loans. Full deployment of the available schemes to eligible firms is assumed. The potential utilisation of guarantee schemes is estimated using corporate balance sheet micro data, taking into account the eligibility criteria of the national schemes.

A combination of the starting position of the corporate sector and the design of the scheme will determine the impact in different countries. The larger the overall size of the scheme relative to the economy, the greater the benefit in general in terms of avoiding loan losses. Beyond the overall size of the scheme, the initial cash position and solvency of the corporate sector determines the potential extent to which the additional credit supply may avoid losses arising on corporate debt by bridging liquidity shortages. The corresponding extent to which remaining losses are transferred to the State will depend on the share of firms failing to meet eligibility requirements, for example because they faced pre-existing solvency concerns (see **Chart A**).[30] In addition, banks would also benefit from a reduction in risk weights as guaranteed loans move to lower sovereign risk weights.[31]

But in reality, the effectiveness of the guarantee schemes hinges on their take-up and the ability of borrowers to access loans quickly. The demand for guarantees is likely to be particularly high in those countries facing larger economic contractions, where SMEs play a more prominent role, where companies rely more on short-term bank financing and where the corporate sector is more indebted. However, actual take-up could be significantly lower than the announced envelopes, as many firms may feel they can manage their cash-flow needs without resorting to guarantees, while other firms may not be eligible, as guarantees are conceived to be provided to companies that were not in financial difficulty before the pandemic. Operational challenges for banks may arise from the need to assess the creditworthiness of a potentially large number of applications in a challenging economic environment, and where applications may also coincide with numerous applications for debt moratoria. For example, if only firms in the most adversely affected sectors[32] take up loans,

30 The results should be interpreted as indicative, as the impact varies by country depending on the assumptions about the design of the scheme and also the estimated shape of the corporate sectors. The vulnerability of the corporate sector is estimated through a representative sample of firm-level data, which is aggregated up to match country-level corporate loan amounts.

31 In the case of an exposure being secured by unfunded credit protection, such as a guarantee, the secured part is assigned to the exposure class of the protection provider.

32 See the box entitled "Alternative scenarios for the impact of the COVID-19 pandemic on economic activity in the euro area", *Economic Bulletin*, Issue 3, ECB, 2020.

rather than all eligible firms, the uptake might be about 60% of its maximum potential amount. That said, the share of losses averted and covered by the governments might remain relatively high, as the loans would go to the firms which benefit most from extra bridge financing. Although the take-up of guaranteed loans has so far been limited in some countries, uptake is expected to increase over time.

In addition, a range of measures make it easier for euro area banks to use capital buffers to absorb losses and avoid deleveraging. The combination of microprudential and macroprudential measures implemented by authorities is expected to provide euro area banks with capital relief of around €140 billion (see **Chapter 5**). As an additional measure to support capital being used effectively, banks were asked by ECB Banking Supervision and national authorities within the SSM to postpone dividend payments and share buybacks until October 2020 (see **Box 5**).

Banks have also faced the additional challenge of operational risk stemming from more prominent cyber vulnerabilities. Higher digitalisation may offer significant cost-saving – and therefore profit-improving – opportunities for banks, at least in the medium-to-long term. At the same time, the increased adoption of digital technologies in banking services, together with the higher interconnectedness and complexity of the financial system, makes banks more vulnerable to cyber threats, which are becoming ever more sophisticated. Cyber security weakness concerns have become more prominent as banks are making greater use of remote working facilities due to the spread of the coronavirus pandemic. More generally, the digitalisation of banking warrants monitoring going forward since the competitive landscape might be altered by the pandemic as banks are challenged by weaker asset quality and lower profitability, while large technology firms might have relatively stronger balance sheet capacities to increase their activities as financial intermediaries.

Box 5

Dividend payouts and share buybacks of global banks

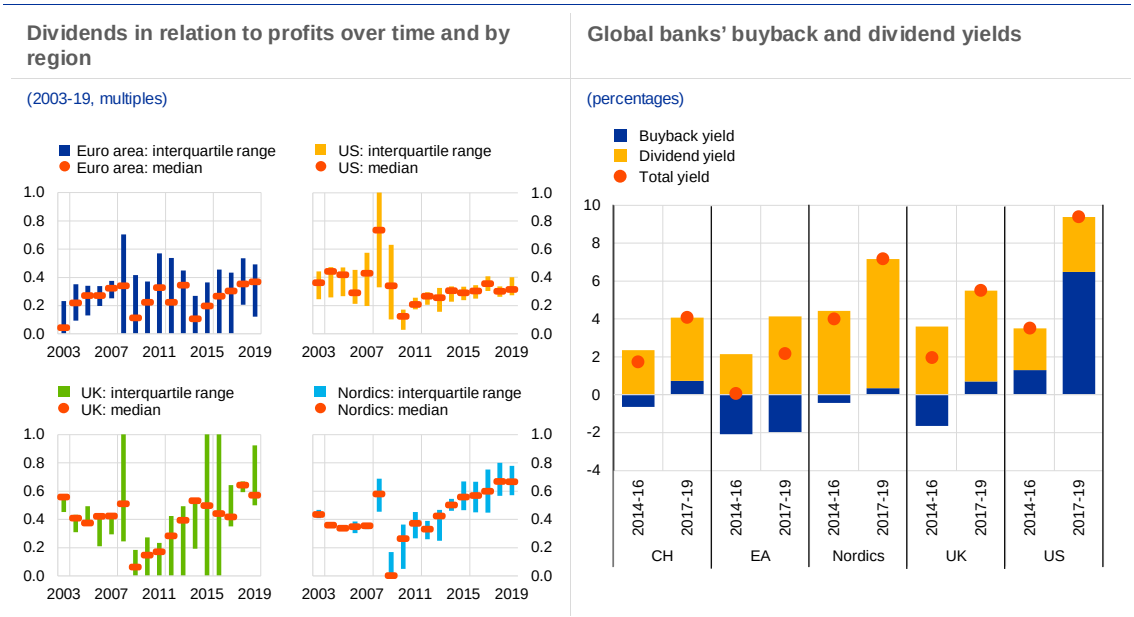
Prepared by Sándor Gardó, Maciej Grodzicki and Jonas Wendelborn

On 27 March, ECB Banking Supervision recommended that banks refrain from paying out dividends and buying back shares until 1 October 2020, following earlier announcements of temporary capital and operational relief measures.[33] All national authorities in the euro area had made similar requests to banks under their direct supervision. In recent years, euro area banks have increased dividend payouts and share buybacks. Had this continued under the current circumstances, it may have weakened the ability of banks to use retained earnings to absorb losses and support lending to the real economy. This box reviews patterns in global banks' payouts to shareholders and the contribution that lower payouts may make towards improving bank resilience.

[33] For further details, see "ECB asks banks not to pay dividends until at least October 2020", ECB Banking Supervision, press release, 27 March 2020, and "ECB Banking Supervision provides further flexibility to banks in reaction to coronavirus", ECB Banking Supervision, press release, 20 March 2020.

Chart A

Bank dividends and share buybacks have picked up in recent years in a number of jurisdictions



Sources: SNL Financial and ECB calculations.
Notes: The sample consists of a total of 43 banks, including 18 euro area, 12 US, six Nordic, five UK and two Swiss banks. Left panel: dividend payout ratio calculated as total dividends paid divided by net income. Dividend payouts for 2019 based on company announcements made before the coronavirus outbreak. Right panel: buyback (dividend) yields calculated as the sum of total net buybacks (total dividends paid) divided by the sum of market capitalisations.

Having collapsed during the global financial crisis, banks' dividend payouts have gradually returned towards pre-crisis levels (see **Chart A**, left panel)**.** In many advanced economies, dividend yields on bank stocks have recovered from the very low levels that accompanied the rebuilding of bank capital levels after the crisis to a range between roughly 2% for US banks and about 6% for Nordic banks. Euro area banks increased their shareholders' yield via dividends and also tended to raise capital by issuing new shares. Meanwhile, the recovery in yields for US banks has been more modest, as US banks have instead returned cash to shareholders through share buybacks (see **Chart A**, right panel). Overall, US and Nordic banks have been the most generous in terms of shareholder remuneration in recent years, ahead of their UK, Swiss and euro area peers.

More profitable banks tend to make higher payouts, while the relationship between capitalisation and payouts is more ambiguous. More profitable banks are indeed better placed, other things equal, to distribute excess cash to shareholders (see **Chart B**, left panel). This is reassuring insofar as weaker banks behaved more cautiously with respect to payouts. The relationship between capital levels and payouts is also positive, but weaker, and disappears in the Nordic countries where banks operate with high capital buffers over the minimum requirements.

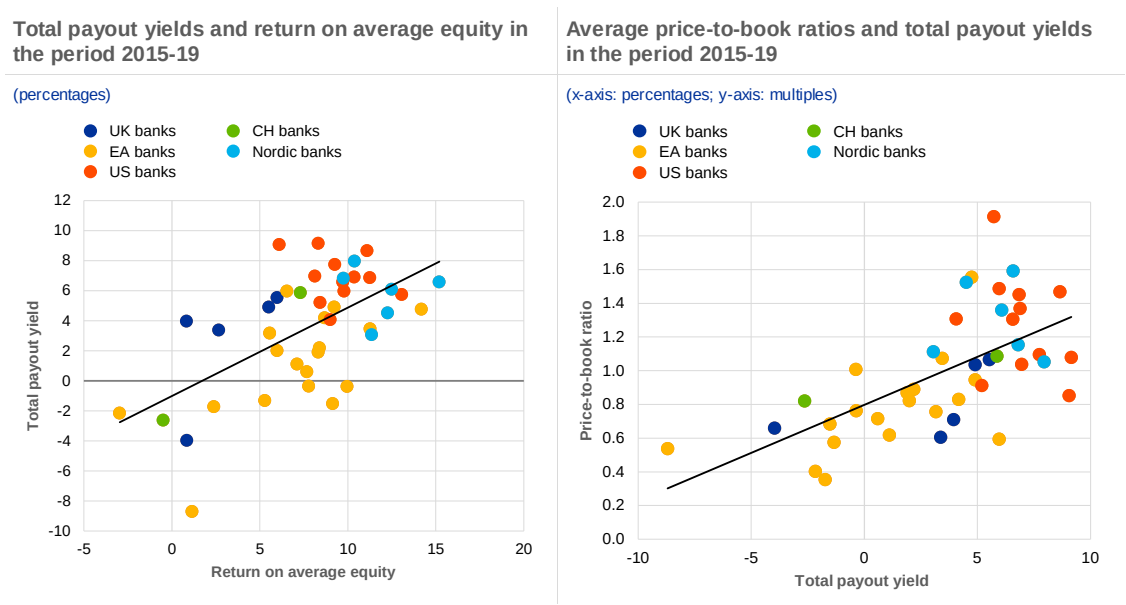
Banks which reward their shareholders more generously tend to be valued more highly on the equity market. While there is a relatively strong positive correlation between total payout yields to shareholders and the price-to-book ratio of global banks (see **Chart B**, right panel), that pattern might differ across regions.[34] At the regional level, euro area banks seem to have been paying structurally lower and more volatile dividends than their peers in other regions over the past two

[34] The sample of banks used for this box is too small to provide a statistically sound assessment of regional differences in this relationship.

decades, and were planning to retain about 40% of their 2019 net earnings (see **Chart A**, left panel). This may have further contributed to their persistent low market valuations.

Chart B

Higher payouts are also reflected in higher bank stock valuations



Sources: SNL Financial and ECB calculations.
Notes: Total payout yields calculated as the sum of total net buybacks and total dividends paid divided by the sum of market capitalisations. Dividend payouts for 2019 based on company announcements made before the coronavirus outbreak. Subsequent adjustments are not taken into account. Nordea is included among the Nordic banks, notwithstanding its relocation to Finland in 2018.

Most global banks have announced their intention to comply with supervisory expectations. Although market valuations falling below book value made share buybacks advantageous, major US banks have postponed plans in the light of moral suasion by regulators. Many euro area banks announced the suspension of dividend payments even before regulators asked them to, and almost all intend to comply with the ECB's recommendations. On the other hand, most US and Swiss banks have indicated during the first-quarter reporting season that they would adhere to their dividend payout plans. By refraining from dividend payments, banks under ECB supervision kept around €27.5 billion in retained earnings, equivalent to about 1.8% of shareholders' equity and 35% of total profits.[35] These retained earnings could absorb an additional non-performing loan (NPL) increase of around €60 billion, if provisions on new NPLs are similar to those on existing NPLs. Retaining profits makes an important addition to the regulatory capital easing worth over €140 billion. The recommendation by regulators allows banks to implement these measures without the stigma usually attached to scrapping already announced dividends. However, the increased cost of equity driven by prospects of receiving no dividends may hamper banks' chances of raising private capital.

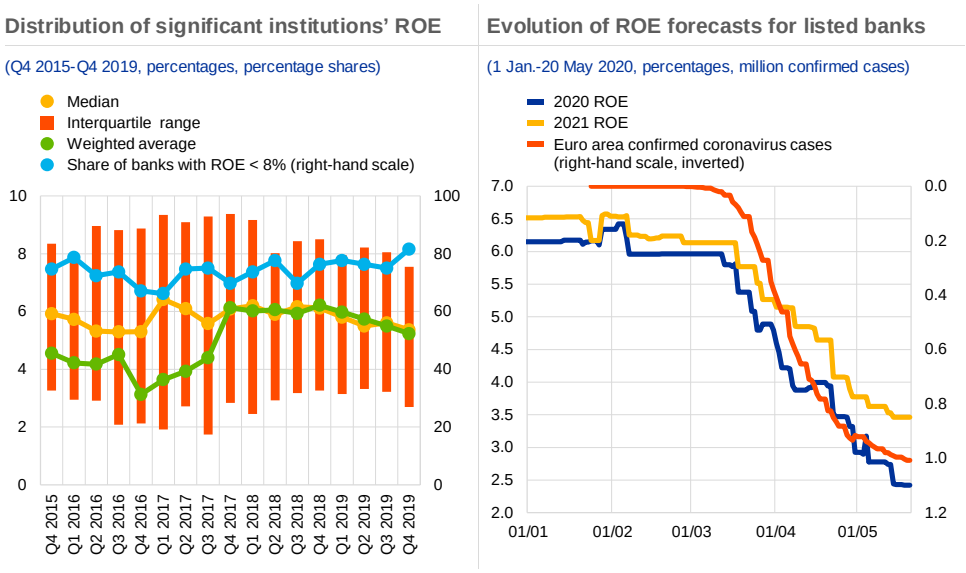
[35] Significant institutions originally proposed to pay €35.6 billion in dividends for the 2019 financial year. Of this amount, almost €6.2 billion had already been paid out when the ECB recommendation was published and just under €2 billion was paid out after the recommendation.

3.3 Banks' ability to support the recovery might be hampered by weak profitability

The profitability of euro area banks weakened in 2019 and market analysts have further revised down their 2020 and 2021 return on equity (ROE) projections. The aggregate ROE of euro area significant institutions declined in 2019 to less than 5.5% and the weakness in bank profitability intensified, with more than 80% of SIs reporting an ROE below 8%, compared with 75% in the third quarter (see **Chart 3.13**, left panel). As the pandemic shifted economic expectations, market analysts also reduced their forecasts for ROE of listed euro area banks to 2.4% in 2020 and 3.5% in 2021 (see **Chart 3.13**, right panel). While the euro area banking sector appears better positioned for the coronavirus-related risks with respect to solvency and liquidity compared with a decade ago, the weak profitability, especially in comparison with international peers, might limit banks' intermediation capacity going forward as banks are less capable of dealing with loan losses.

Chart 3.13

The outlook for bank profitability, which was already weak and declining, has deteriorated substantially



Sources: Bloomberg Finance L.P., ECB supervisory statistics, Johns Hopkins University and ECB calculations.
Note: Right panel: the ROE forecasts are computed as a median based on a sample of 40 listed euro area banks.

While lower profitability in 2019 mainly reflected one-off factors and increased capital, higher impairments are the main expected drag on profits in 2020. While banks saw a moderate improvement in operating profits in 2019, this was not sufficient to offset the negative contribution from one-off factors in other profit and loss items and higher equity capital (see **Chart 3.14**, left panel). Despite increasing core revenues during 2019, weak non-interest income was still weighing on revenues. For 2020, impairment charges are expected to increase substantially to account for the deterioration in asset quality arising from the pandemic. Estimates from market analysts suggest that while increased loan loss provisions account for the bulk of the downward revisions in banks' ROE, the degree of expected loan loss provisions might

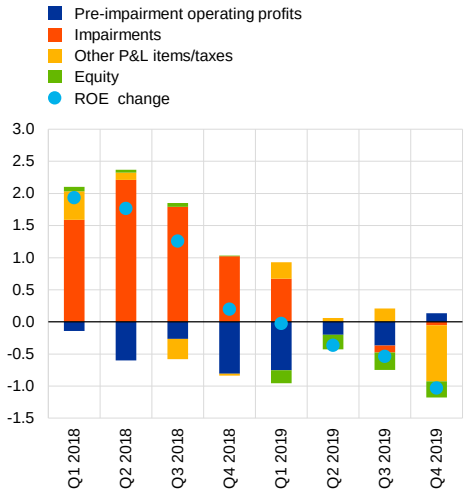
still be too low relative to the predicted GDP decline for 2020, with the implication of potential negative surprises ahead (see **Chart 3.14**, right panel). The first earnings releases by euro area banks for the first quarter of 2020 show that higher provisioning has contributed substantially to lower bank profitability.

Chart 3.14

While one-off factors accounted for most of the ROE decline in 2019, rising impairments represent substantial headwinds for profitability going forward

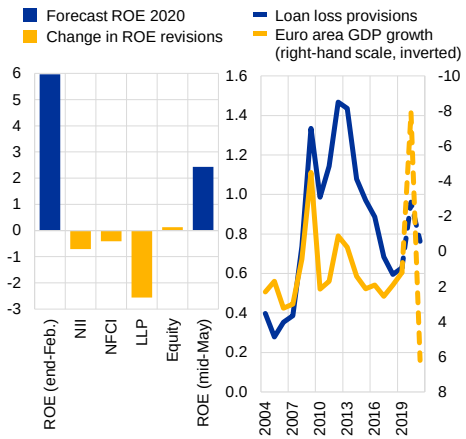
Factors contributing to changes in significant institutions' aggregate ROE

(Q1 2018-Q4 2019, percentage points)



Change in ROE forecasts and contributing factors as well as loan loss provisions of euro area banks vis-à-vis GDP growth

(left panel: 21 Feb.-20 May 2020, percentages; right panel: 2004-21, percentage of total loans, percentages)



Sources: ECB supervisory statistics, Bloomberg Finance L.P., Consensus Economics, ECB and ECB calculations.
Notes: Left panel: figures are on a trailing four-quarter basis. Based on a balanced sample of 94 SIs. Right panel: forecast values for 2020-21 are indicated by the dashed lines. Data on loan loss provisions are based on a sample of 21 listed euro area banks. NII: net interest income; NFCI: net fee and commission income; LLP: loan loss provisions.

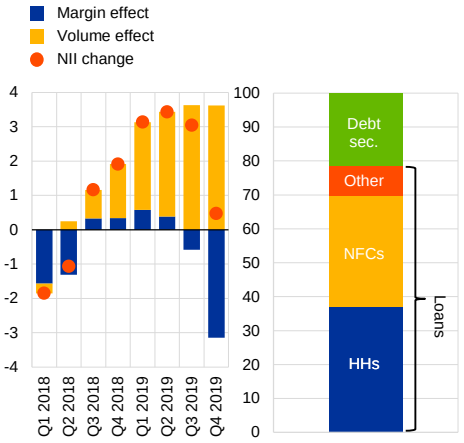
Higher loan growth supported banks' core revenues in 2019, but the adverse impact of the coronavirus looks set to reduce lending. The rise in euro area banks' net interest income (NII) since the second half of 2018 was mainly driven by a pick-up in loan volumes, in particular for lending to households for house purchase. In the third and especially in the fourth quarter of 2019, lower lending margins started to put pressure on core banking revenues so that for the full year the positive volume effect was hardly able to offset the margin decline (see **Chart 3.15**, left panel). While central bank interventions and fiscal stimulus from governments are providing strong support to banks and the real economy, it is likely that loan growth may be somewhat weaker in the period ahead, given the recent drop in confidence indicators, which typically lead lending growth, in particular for lending to NFCs (see **Chart 3.15**, right panel), with negative implications for bank profitability. That said, the drawdowns of NFC credit lines and the granting of new loans with public guarantees did lead to higher NFC loan growth in March, but the margins of State-guaranteed loans might be low.

Chart 3.15

Core revenues were recently supported by higher lending volumes in particular for mortgage loans, but coronavirus uncertainty may reduce loan demand

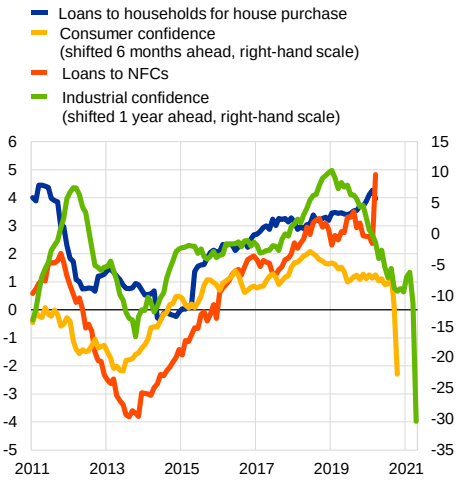
Decomposition of NII growth and factors contributing to interest earning asset growth

(left panel: Q1 2018-Q4 2019, percentage changes and percentage point contributions to NII growth; right panel: Q4 2018-Q4 2019, percentage shares)



Growth of lending to households and NFCs versus confidence indicators

(Jan. 2011-Mar. 2020, percentages, index)

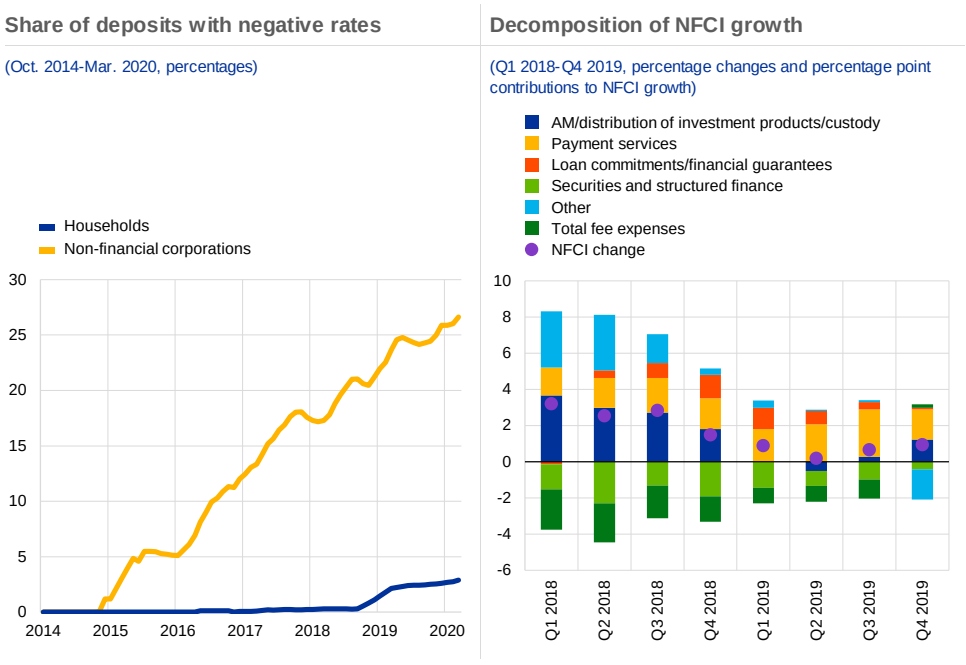


Sources: ECB supervisory data, European Commission and ECB calculations.
Notes: Left panel: figures are on a trailing four-quarter basis. Based on a balanced sample of 94 SIs.

As interest margins have compressed, euro area banks have increasingly passed negative rates on to depositors and tried to diversify their revenue sources. Banks have been able to accomplish the pass-through of negative rates mainly for deposits of non-financial corporations and, to a much smaller extent, for household deposits as the share of deposits with negative rates amounted to 26% for NFCs in January 2020 but only to 3% for households (see **Chart 3.16**, left panel). If lending volumes are unable to support net interest income in 2020, the pressure on banks to pass negative rates on to their depositors will remain. While net interest income remains 60% of total operating income (the core revenue of euro area banks), the importance of net fee and commission income (NFCI) has increased over the last years. After NFCI growth declined temporarily from 2018, it rebounded in the second half of 2019 mainly on the back of stronger asset management activities, while fees related to payment services continued to contribute as robustly as in previous years (see **Chart 3.16**, right panel). Substitution towards asset management activity by banks with low NII could increase interconnectedness between asset management and banking sectors (see **Box 6**).

Chart 3.16

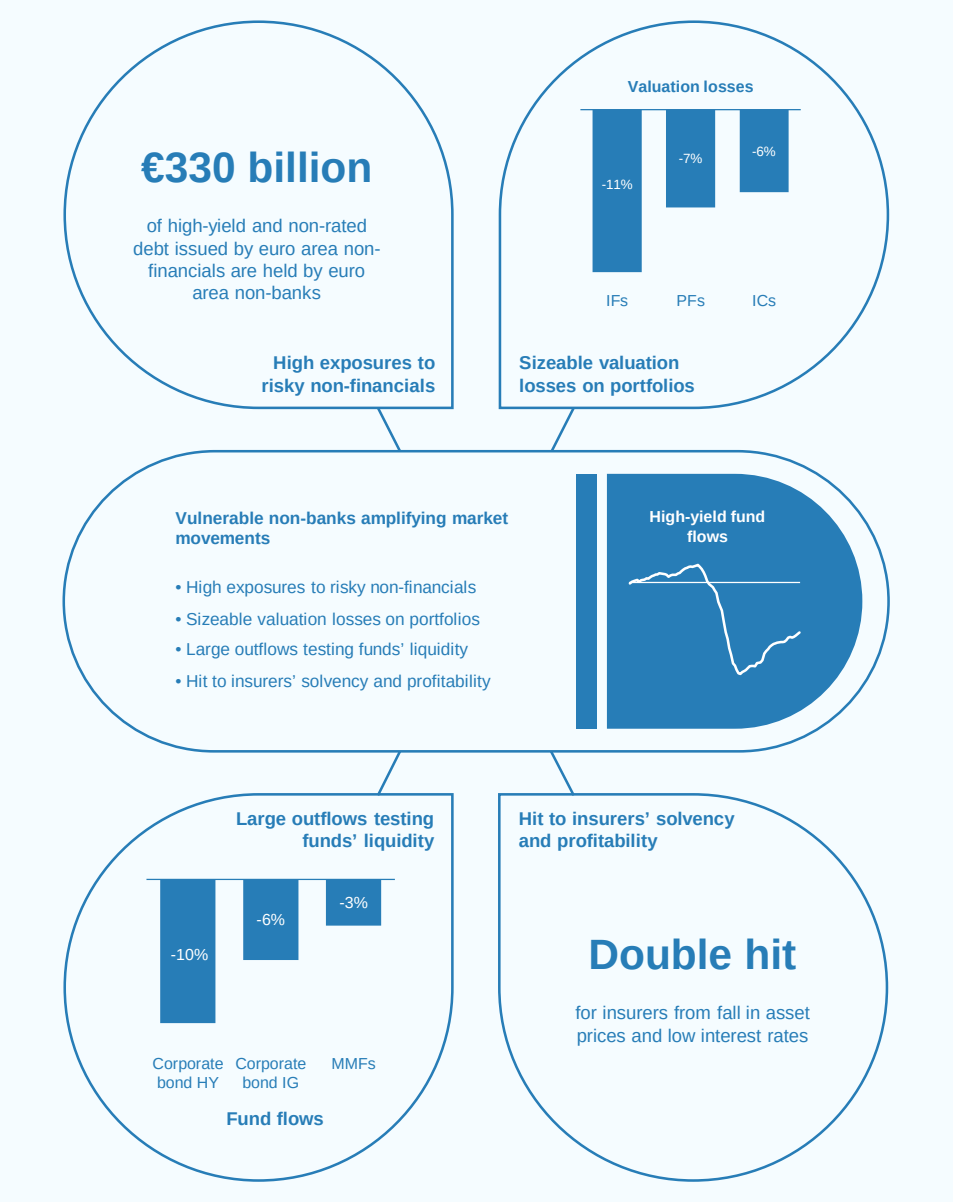
To counter the compression of net interest margins, banks have increasingly passed negative rates on to depositors and tried to diversify their revenue sources



Sources: ECB MFI interest rate statistics, ECB supervisory statistics and ECB calculations.
Notes: Figures are on a trailing four-quarter basis. Based on a balanced sample of 94 SIs. AM: asset management.

Overall, while euro area banks started 2020 with increased resilience, the pandemic is now set to weigh on banks' balance sheets and future profitability. Core revenues have benefited from higher loan volume recently, but increased uncertainty about the economic outlook and declining consumer and business confidence could reduce lending volumes. Policy measures to ease regulatory requirements and discourage banks from deleveraging should prevent even worse feedback loops arising from a credit crunch. But the pressure on banks to pass negative rates on to their depositors could remain high, and the economic fallout from the coronavirus may also limit the potential for growth in fee and commission income. While the euro area banking sector appears better positioned than a decade ago to withstand the near-term impact of the coronavirus-related risk with respect to solvency and liquidity, there is a risk that the even weaker outlook for banks' profitability limits their capacity to support the economic recovery.

4 Non-bank financial sector



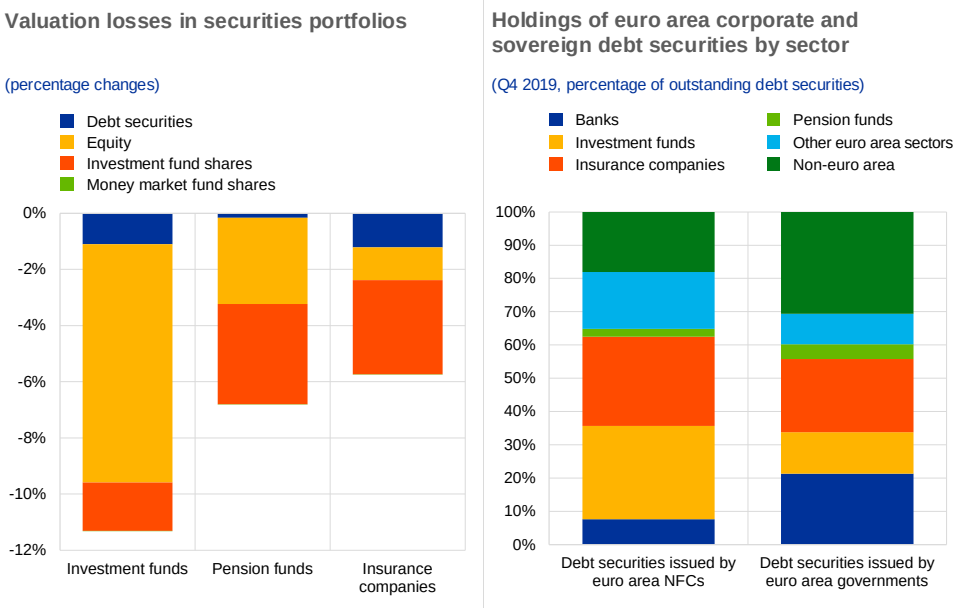
4.1 Forced asset sales by non-banks amplified market dynamics

The sharp decrease in risky asset prices globally led to significant valuation losses for non-banks, especially investment funds. The valuation losses in the securities portfolios of euro area non-bank financial sectors between February and March are estimated to range from about 6% for insurance companies to over 11% for investment funds (see **Chart 4.1**, left panel). Investment funds experienced the largest losses due to their higher exposure to risky assets and those assets most sensitive to

the coronavirus shock, including equities whose prices declined the most on average. In part, this is due to increased holdings of risky securities by this sector over recent years.

Chart 4.1

Non-banks suffered large asset valuation losses from the market response to the coronavirus pandemic



Sources: ECB (securities holdings statistics, Centralised Securities Database) and ECB calculations.
Notes: Left panel: losses are calculated as the percentage change in the value of securities portfolios held by the sectors at the end of 2019 (the most recent data point for holdings) using declines in the monthly average of prices of individual securities between February and March 2020. Right panel: the outstanding amount of debt securities issued by euro area non-financial corporations and governments is €1.22 trillion and €6.14 trillion, respectively, and excludes the volumes of securities purchased by the Eurosystem under the corporate sector purchase programme (CSPP) and the public sector purchase programme (PSPP) until the end of 2019.

To cushion the losses and reduce liquidity risk, some non-banks rebalanced their portfolios towards cash and safe assets, which amplified market tensions. The uncertainty surrounding the macroeconomic impact of and the policy responses to the coronavirus outbreak led to a flight to cash in March by dealers and investors, which contributed to the increase in market volatility. Liquidity strains were evident across non-banks as funds investing in illiquid assets experienced outflows in excess of liquidity buffers (see **Section 4.2**), with redemptions also from institutional investors. Comprehensive holdings data for this period are not yet available, but market intelligence and past evidence suggest that asset managers rebalanced their portfolios significantly following the outflows.[36] As the flight to cash intensified, outflows from money market funds (MMFs) also put strains on the short-term funding of banks and non-financial corporations (NFCs) (see **Box 7**). Selling pressures were further aggravated by cash needs related to derivative exposures, as financial institutions needed to cover margin calls (see **Special Feature B)**.

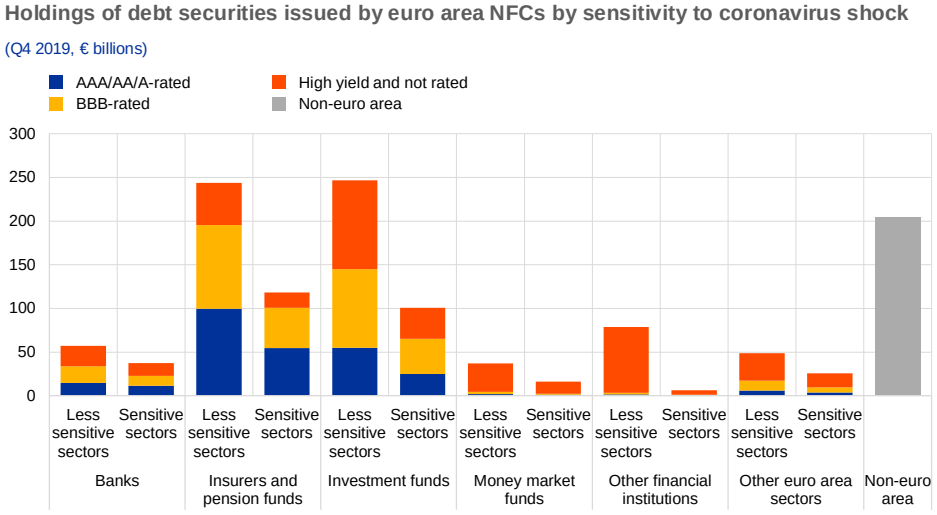
Recent events could trigger corporate rating downgrades going forward, which could worsen valuation losses for non-banks. Non-banks are heavily exposed to

[36] Investment funds tend to react procyclically to changes in bond prices and large outflows, partly as their mandates may require the selling of assets if market losses become too large (see Box 8 in *Financial Stability Review*, ECB, May 2019, and Box 7 in *Financial Stability Review*, ECB, November 2019).

corporate bonds, including those with BBB ratings and those issued by sectors most sensitive to the coronavirus shock. At the end of 2019, euro area non-bank financial institutions (including MMFs) held around €330 billion of high-yield and non-rated and around €280 billion of BBB-rated debt securities issued by euro area NFCs, compared with around €40 billion and €30 billion held by euro area banks (see **Chart 4.2**). Euro area non-banks also held around €240 billion of debt issued by NFCs belonging to sectors particularly badly hit by the coronavirus-related restrictions ("sensitive sectors" in **Chart 4.2**). Investment mandates, internal rating targets and higher capital charges could prompt non-banks to sell these assets following any downgrade to high-yield status. However, the monetary policy measures adopted by the Governing Council of the ECB to mitigate the effect of rating downgrades on collateral availability (see **Chapter 2**) aim to reduce the pro-cyclical effects of such downgrades.

Chart 4.2

Flighty investors such as investment funds hold large shares of NFC debt



Sources: ECB (securities holdings statistics, Centralised Securities Database) and ECB calculations.
Notes: Sensitive sectors expected to be especially affected by the coronavirus-related restrictions in euro area countries include mining, manufacturing, retail and wholesale trade, transport, accommodation and food services, and arts and entertainment. The outstanding amount of debt securities issued by euro area NFCs is €1.22 trillion and excludes the volumes of securities purchased by the Eurosystem under the CSPP and PSPP until the end of 2019.

Further rebalancing of non-bank portfolios towards safer assets could increase the cost of financing for risky borrowers and impair their access to capital market financing. At end-2019, insurers and investment funds jointly held 55% and 34% of the outstanding amounts of euro area NFC and sovereign debt securities (see **Chart 4.1**, right panel). If liquidity concerns, market malfunctioning and changes in risk perception were to prompt non-banks to sell assets, a wider restriction of credit in capital markets could ensue. As a result, the issuance of high-yield corporate bonds could keep decreasing (see **Section 2.3**). Stress in funds could also affect short-term funding markets, if funds need to raise cash to meet outflows or margin calls.

Vulnerabilities in the bank and non-bank financial sectors can contribute to contagion across the financial system due to the high degree of interconnectedness. The different parts of the non-bank financial sector are closely connected to each other and with the banking sector through direct exposures,

overlapping portfolios and ownership links (see **Box 6**). Recent issues in MMFs have brought some of these interlinkages into sharp focus (see **Box 7**).

Box 6

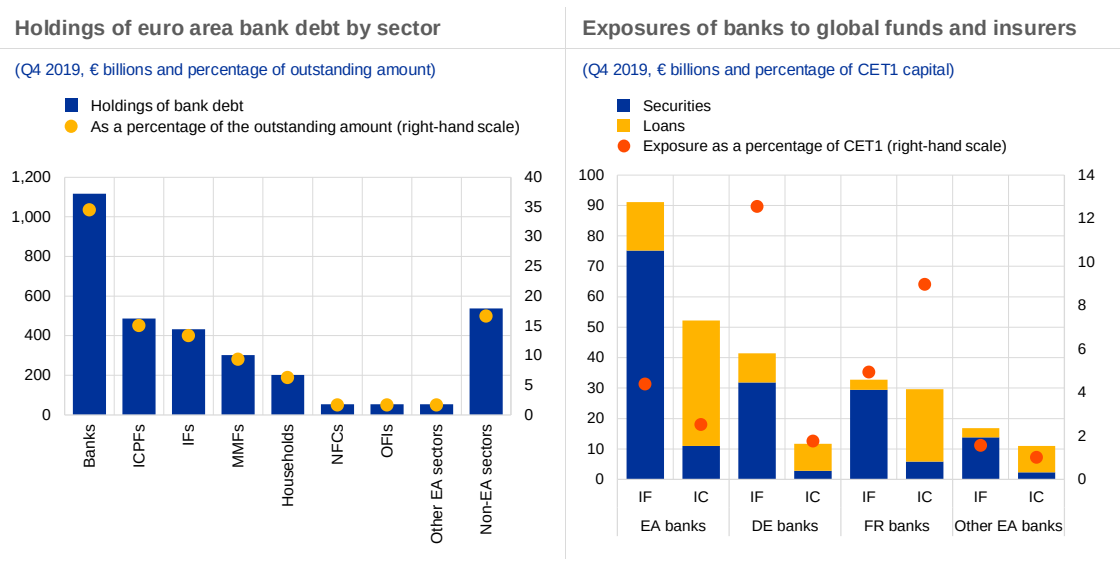
The role of bank and non-bank interconnections in amplifying recent financial contagion

Prepared by Katharina Cera, Margherita Giuzio, Régis Gourdel, Alberto Grassi, Simon Kördel and Julian Metzler[37]

Recent events have shown that stress in non-banks can affect other parts of the financial system, for example through forced asset sales and reduced short-term funding. This box examines the interconnections between banks and non-banks through direct exposures, overlapping portfolios and ownership links, and considers how these can increase the risk of systemic contagion.

Chart A

Significant financing links between banks and non-banks



Sources: ECB (large exposure data and securities holdings statistics) and ECB calculations.
Notes: The right panel shows the aggregate exposures of the largest euro area banks towards global investment funds and insurance corporations. Securities include debt securities, investment fund shares and equity. Loans are reported if the exposure is above the threshold of 10% of Common Equity Tier 1 capital. The horizontal axis shows the domicile of the bank.

Non-banks and banks are important funding sources for each other, leading to sizeable direct exposures. Euro area insurance corporations and pension funds (ICPFs) hold around 15% of euro area bank bonds, while investment funds (IFs), money market funds (MMFs) and other financial institutions (OFIs) together hold around 24% of the market (see **Chart A,** left panel). Within this, MMFs play a particularly important role in short-term funding (see **Box 7**). Banks also provide credit to insurers and investment funds through direct lending and investment in their securities. For example, the main euro area banking groups held over €11 billion in debt and equity securities issued by insurers and €75 billion in global fund shares at the end of 2019. They also provided insurers and funds with over €57 billion in loans (see **Chart A**, right panel). The exposures are concentrated in the largest banks, but remain low relative to bank capital in most cases.

Direct links between different types of non-banks are also sizeable. Insurance corporations hold over 25% of their assets in investment fund shares and rely heavily on MMFs for their liquidity

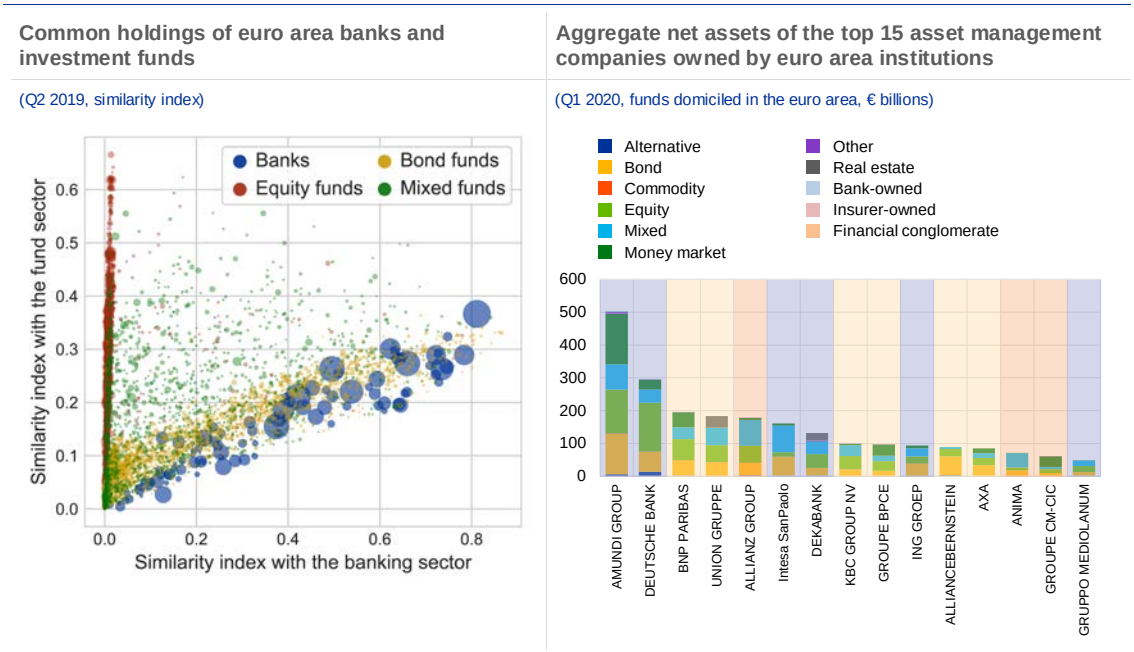
[37] Michiel Kaijser, Dominika Kryczka and Luca Mingarelli provided data support.

management. This meant that pressure on investment funds in March negatively affected insurers' profitability. For unit-linked insurance policies, insurers also invest in funds whose liquidity profile might not match the daily redemptions often offered to policyholders.[38] This could expose them to liquidity risk, as seen for example in January, when two Irish commercial real estate unit-linked funds had to introduce redemption gates following a substantial rise in outflows, in line with the contractual provisions designed to deal with such an eventuality.

Large asset sales by financial institutions in illiquid markets can propagate stress across the financial system via mark-to-market losses on common exposures. For example, the portfolios of euro area banks and bond funds have significant common exposures, although the latter tend to be more diversified geographically (see **Chart B**, left panel). Large banks, which are at the core of the interbank network, are particularly exposed to the fund sector. Large common exposures between banks, funds and insurers increase the risk of amplifying market stress if they have to liquidate a large or illiquid part of their portfolios simultaneously.[39] Investors holding the same assets may then suffer mark-to-market losses in their balance sheet, potentially leading to fire sales that increase the cost of market financing for non-financial corporations (NFCs). Market intelligence suggests that large outflows from funds in the US caused forced asset selling in March, particularly into illiquid markets such as those for high-yield and municipal bonds and mortgage-backed securities.

Chart B

Euro area banks and non-banks are interconnected through common exposures and ownership links



Sources: ECB securities holdings statistics, Refinitiv and ECB calculations.
Notes: The left panel is based on the cosine similarity index, which measures the level of commonality between pairs of portfolios (see Getmansky Sherman, M., Girardi, G., Hanley, K. W., Nikolova, S. and Pelizzon, L., "Portfolio Similarity and Asset Liquidation in the Insurance Industry", working paper, 2019). The index equals zero if the portfolio allocations are uncorrelated and equals one if they are the same. The sample includes 101 banks and 9,393 open-ended mutual funds domiciled in the euro area (4,224 equity funds, 3,060 bond funds and 2,109 mixed funds). Assets are tradable securities and redeemable fund shares. The three different fund types are aggregated to compute the similarity index with the whole fund sector shown on the y-axis. The size of each point is proportional to the portfolio size. The right panel includes assets of mutual funds and exchange-traded funds. Asset managers are classified as owned by banks/insurers when the asset manager is a subsidiary of the bank/insurer (this excludes cases where bank/insurance activities are a subordinate business of the group or where the holding company also holds banks/insurers) or has a bank/insurer as a majority shareholder. The latest observations are for March 2020.

[38] See *Financial Stability Review*, ECB, May 2019, Box 9.

[39] See *Financial Stability Review*, ECB, May 2018, Chart 3.26.

Finally, banks and insurers are often majority investors in large asset management companies and heads of financial conglomerates. Control over such companies allows banks and insurers to diversify their profitability and risks, and exploit economies of scope (see **Chart B**, right panel). Similarly, financial conglomerates (e.g. French bancassurance companies) allow the sale of insurance and investment products through the banking arm. These links can help to optimise liquidity between the parent company and affiliated institutions and provide long-term benefits in terms of revenue and risk diversification, but may also be a source of contagion in stress periods. Contagion can occur if there are credit lines and contingency arrangements between the holding company and the affiliated institutions or via step-in and reputational risks related to confidence effects or revenue losses.[40] Recent challenges faced by insurance subsidiaries may propagate to the banking parent (and vice versa) as the business models are closely interlinked (i.e. the profitability of parent banks sometimes relies on dividends and returns from insurers) and the parent may need to transfer own funds to the subsidiaries (see **Section 4.3**).

4.2 Large outflows from investment funds tested the sector's resilience

The investment fund sector experienced exceptionally large outflows between 20 February and 20 March (see Chart 3, right panel, in the Overview). This occurred amid increased short-term liquidity needs of investors, rising market expectations of a real economy shock with particular implications for the corporate sector (see **Chapter 1**) and substantial valuation losses for many funds. Among euro area funds, high-yield corporate bond funds were hit the hardest, seeing cumulative outflows of more than 10% of assets under management (AuM) over this period. The week of 12-18 March saw the largest outflows from high-yield funds since 2007 (see **Chart 4.3**, left panel). High-yield funds investing in European corporates experienced even larger outflows over this period (i.e. 12% of AuM), with institutional funds driving the trend.[41] Redemptions were accompanied by a sharp increase in margin calls, placing further pressure on fund liquidity (see **Special Feature B**) and increasing the potential for forced asset sales to amplify market dynamics.

From 12 March, euro area money market and sovereign funds also began experiencing rapid outflows, driven by rising cash demand from end-investors. As the real economy shock, margin calls and large outflows from investment funds put increasing pressure on the liquidity positions of both financial and non-financial actors, redemptions spread to asset classes typically seen as safe havens. Outflows from MMFs in the week of 12-18 March were the second highest on record, surpassed only in September 2008 (see **Chart 4.3**, right panel). Stress in MMFs could have systemic implications, reducing the financial system's and the real economy's access to liquidity during a crisis and reducing confidence in the financial system as a whole (see **Box 7**).

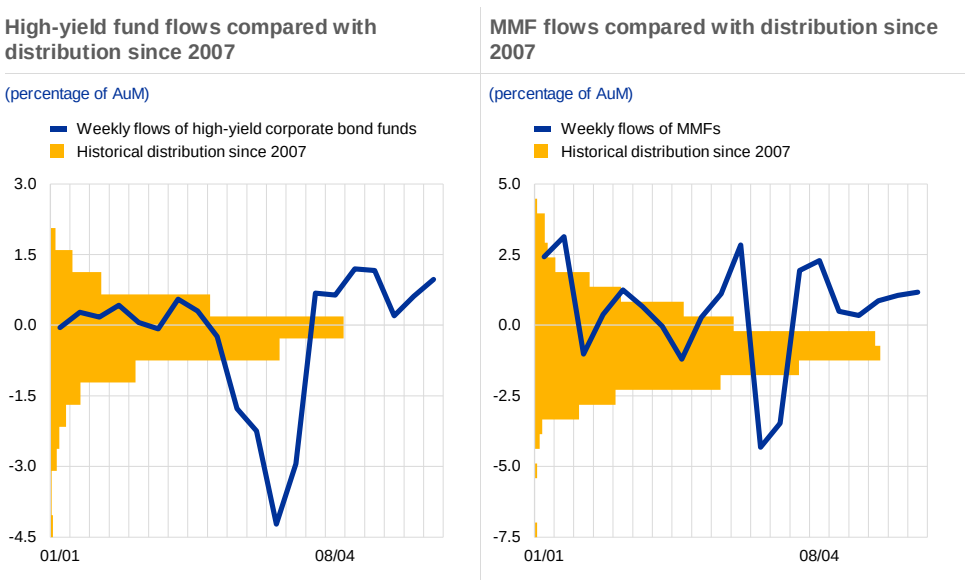
[40] Direct spillover risks within a financial conglomerate are mitigated by the supplementary supervision under the Financial Conglomerates Directive (Directive 2002/87/EC of the European Parliament and of the Council of 16 December 2002 on the supplementary supervision of credit institutions, insurance undertakings and investment firms in a financial conglomerate, OJ L 35, 11.2.2003, p. 1).

[41] This refers to euro area-domiciled funds buying high-yield western European corporate bonds.

Flows into and out of euro area funds stabilised from 20 March, as central bank stimulus began to support markets and broader conditions improved (see **Chart 3**, right panel, in the **Overview).**[42] Preliminary evidence suggests that the announcement of the PEPP – including the expansion of the CSPP to non-financial commercial paper purchases – contributed to a stabilisation in risk sentiment and market conditions (see **Chart 2**). However, future shocks to the real economy or market sentiment could initiate another period of large redemptions.

Chart 4.3

High-yield and money market funds experienced extreme outflows resembling those seen during the peak of the global financial crisis



Sources: EPFR and ECB calculations.
Notes: Data refer to euro area-domiciled funds only. Weekly flows are expressed as a percentage of AuM at the start of each week.

Low liquid asset holdings reduced the capacity of the investment fund sector to absorb these outflows, likely resulting in forced asset sales and the amplification of market dynamics. Cash holdings of bond and equity funds have declined consistently over previous years.[43] Outflows from euro area corporate bond funds between 20 February and 20 March exceeded funds' median holdings of liquid assets and cash for both high-yield and investment-grade funds (see **Chart 4.4**, left panel).[44] Although the extent of liquidity shortfalls is likely to vary substantially at the fund level, this picture suggests that at least some funds were required to sell illiquid assets at short notice to meet redemptions, thus amplifying adverse market dynamics. This is reflected in market intelligence. In some cases, funds needed to implement strategies in response to extreme liquidity pressure, including charging investors redemption fees. Funds also struggled to price assets as market liquidity dried up and, in some cases, imposed redemption gates (see **Chapter 5**).

[42] For further discussion, see the blog post entitled "The ECB's commercial paper purchases: A targeted response to the economic disturbances caused by COVID-19" on the ECB's website.

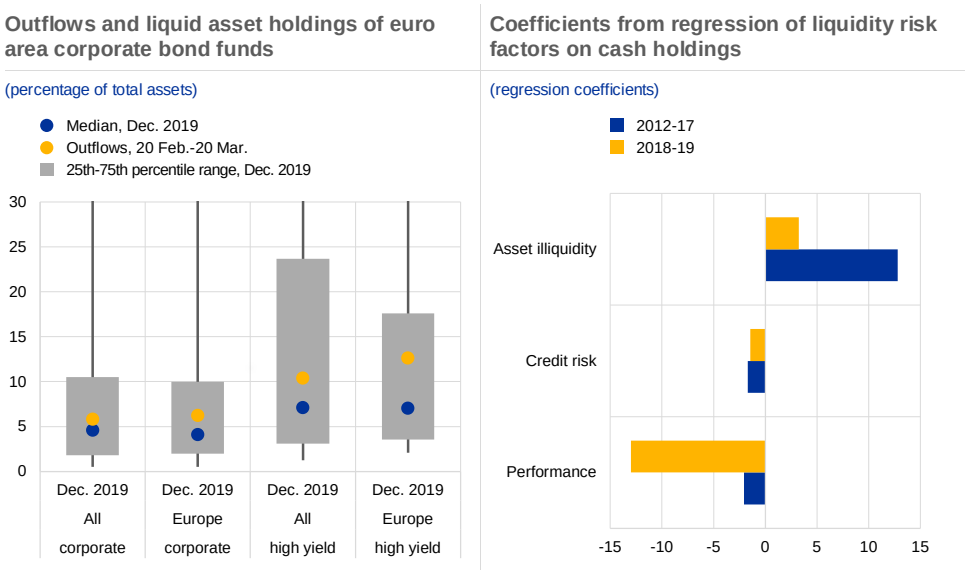
[43] See, for example, *Financial Stability Review*, ECB, November 2019.

[44] As previously flagged, liquidity stress was exacerbated by a spike in margin calls (see **Special Feature B).**

Relatively low liquid asset holdings reflect increased risk-taking by funds over recent years. Funds' liquidity needs vary across investment strategies. For example, investing in illiquid assets is a central purpose of many fund types, but such funds also need substantial precautionary cash holdings. Without these buffers, they would be unable to respond to short-notice redemptions or margin calls without engaging in forced asset sales. Funds' holdings of precautionary cash buffers are reflected in fund-level regression analysis, which finds a strong and positive relationship between asset illiquidity and cash holdings for the 2012-17 period (see **Chart 4.4**, right panel). However, this relationship is much weaker for the more recent period (2018-19), indicating that funds with illiquid assets have reduced precautionary cash holdings over time. This reduces their capacity to absorb liquidity shocks. At the same time, higher cash holdings were associated with substantially weaker performance in 2018-19 compared with previous years, potentially reflecting high costs of holding cash in a low interest rate environment.

Chart 4.4

Increased liquidity risk-taking by funds has reduced their ability to manage outflows



Sources: EPFR, Refinitiv and ECB calculations.
Notes: Left panel: liquid assets include cash and HQLA (high-quality liquid assets) bonds. Data refer to euro area-domiciled bond funds only. "Europe corporate" and "Europe high yield" refer to euro area-domiciled funds which primarily invest in European bonds. "Corporate" refers to investment-grade corporates. Right panel: regression coefficients for a panel regression of various liquidity risk factors on cash holdings of euro area bond funds (dependent variable). Data are monthly and cover between 3,507 and 3,945 funds over the 2012-19 period. Fund and time fixed effects are included and standard errors for institutional leveraged UCITS funds are clustered. "Asset illiquidity" is measured as the share of the portfolio invested in non-HQLA bonds. "Credit risk" is the average of the bonds' ratings in the portfolio weighted by the share invested in each bond. A number of other variables are included in the regression, but are not shown in the chart. These include the log of AuM, the 12-month flow volatility, the weighted average bond maturity, and a dummy equalling one if a fund had outflows below the sample's 20th percentile in the previous three months.

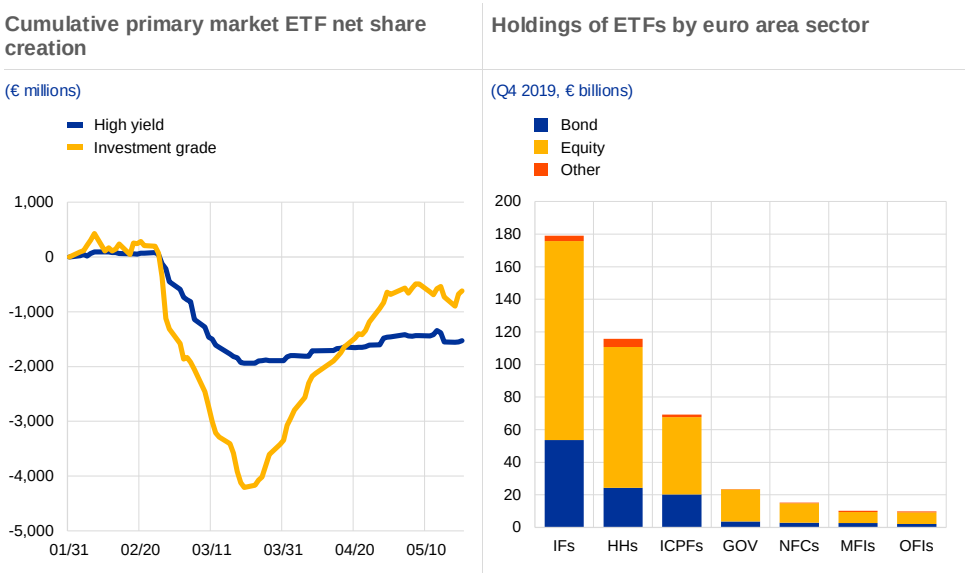
Disruption in exchange-traded fund (ETF) markets may have impaired the capacity of investors to raise cash, aggravating existing liquidity shortages. Exceptionally high spreads between prices for ETFs and prices for their underlying assets (net asset value (NAV) spreads) reflected broader market liquidity issues (see **Chapter 2)**, but may have also reflected frictions in the ETF intermediation chain.[45] In

[45] For a broader discussion of the ETF market and potential financial stability risks, see Grill, M., Lambert, C., Marquardt, P., Watfe, G. and Weistroffer, C., "Counterparty and liquidity risks in exchange-traded funds", *Financial Stability Review*, ECB, November 2018.

particular, low market liquidity for the underlying assets increases the cost of executing the arbitrage mechanism which usually closes these spreads. Spreads can also be closed via primary market redemptions and, while these did take place (see **Chart 4.5**, left panel), the response may have been too slow to eliminate spreads entirely.[46] As ETF shares are typically highly liquid under normal market conditions, many investors use ETFs for managing liquidity in a portfolio context.[47] Euro area investment funds hold €180 billion in ETF shares, households' exposure comes to almost €120 billion and insurance corporations and pension funds (ICPFs) hold €70 billion (see **Chart 4.5**, right panel). Focusing on investment-grade and high-yield corporate bond ETFs, investment funds are estimated to hold €17 billion, households €9 billion and ICPFs €7 billion. The recent reduction in liquidity for these instruments may have impaired the capacity of these sectors to raise cash, aggravating existing liquidity shortages.

Chart 4.5

ETF market frictions can have spillover effects on a range of other sectors



Sources: Bloomberg, ECB securities holdings statistics, Refinitiv and ECB calculations.
Notes: Left panel: refers to the five largest ETFs operating in euro area equity and investment-grade markets, and the three largest in the high-yield market. Right panel: IFs: investment funds; HHs: households; ICPFs: insurance corporations and pension funds; GOV: government; NFCs: non-financial corporations; MFIs: monetary financial institutions; OFIs: other financial institutions.

Looking ahead, open-ended real estate investment funds may face pressures as the commercial real estate cycle begins to turn (see Section 1.5). The role of the investment fund sector in financing real estate varies across the euro area, with a particularly large real estate fund presence in the Netherlands and Germany (see **Chart 4.6**, left panel).[48] While open-ended real estate funds have higher cash buffers now than in 2008 (see **Chart 4.6**, right panel), there are sometimes large mismatches between the liquidity of these funds' assets and liabilities. Where substantial mismatches exist, redemptions from these funds create a significant risk of forced

[46] This process may have been hampered by the introduction of redemption fees by a number of fund managers. While these may have contributed to slowing overall redemptions, they also increased the cost of primary market activity.

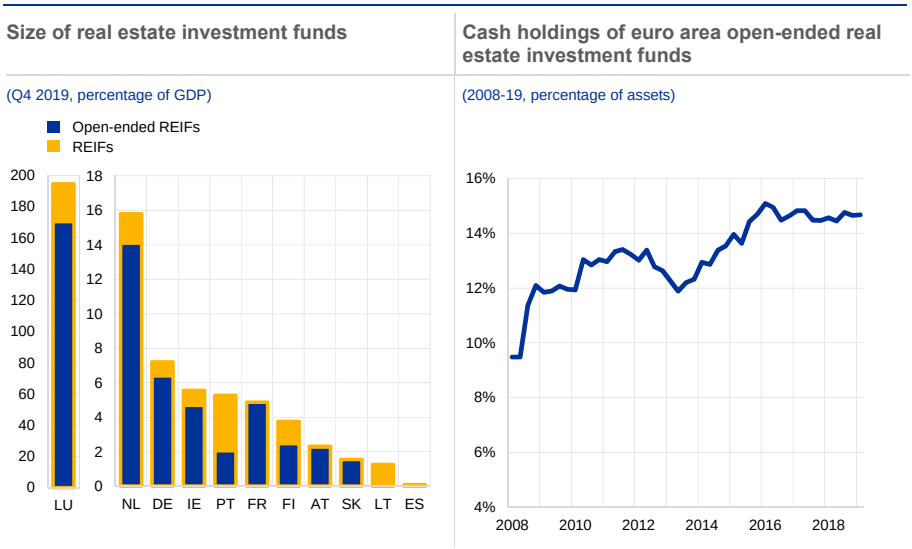
[47] See "Institutions Turn to ETFs for Bond Market Liquidity", Greenwich Associates, 18 September 2018.

[48] For Luxembourg, the high ratio of real estate fund assets to GDP reflects the presence of a large internationally oriented investment fund sector.

asset sales. When redemptions are themselves a response to a turning real estate cycle, sales may exert further downward pressure on prices and create a self-reinforcing feedback loop.[49] Funds' capacity to provide redemptions may also be hampered by the difficulty in pricing real estate assets during market volatility.

Chart 4.6

Real estate funds play a prominent role in some countries, but cash holdings are relatively high



Source: ECB investment fund statistics.
Note: Left panel: the left-hand scale relates to Luxembourg, for which the large size of real estate investment funds (REIFs) reflects the presence of a major international investment fund sector.

Box 7

Recent stress in money market funds has exposed potential risks for the wider financial system

Prepared by Miguel Boucinha, Laura Capotă, Katharina Cera, Emmanuel Faïk, Jean-Baptiste Galléty, Margherita Giuzio, Maciej Grodzicki, Isabel Kerner, Simon Kördel, Luis Molestina Vivar, Giulio Nicoletti, Ellen Ryan and Christian Weistroffer

Euro area money market funds (MMFs) provide short-term credit to banks and non-financial corporations (NFCs) through purchases of commercial paper (CP). The total assets of euro area MMFs amounted to €1.26 trillion in December 2019, of which €307 billion and €295 billion were debt securities issued by credit institutions domiciled in the euro area and in the rest of the world, respectively (see **Chart A**, left panel). Most securities are denominated in euro (51%), followed by US dollars (27%) and British pounds (21%). MMFs are particularly important for the short-term funding market, holding €251 billion and €40 billion in short-term securities issued by euro area banks and firms, respectively, including commercial paper (see **Chart A**, right panel). Although commercial paper is a minor source of bank funding, covering less than 3% of total funding needs, it provides a

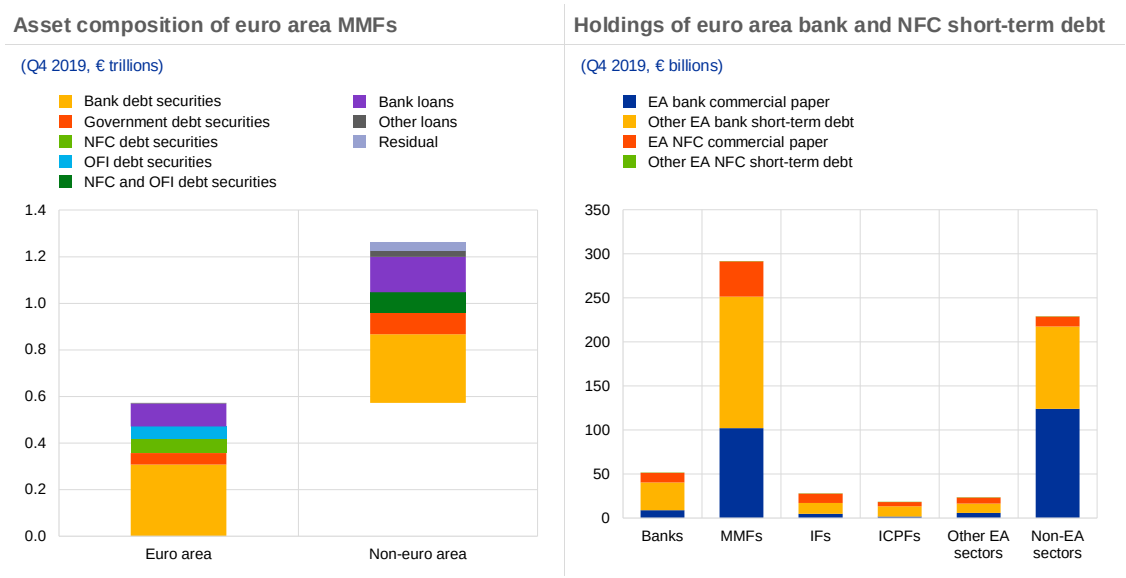
[49] The most extreme mismatch is seen in funds which offer redemptions on a daily basis, although these make up a small share of the total market. See the box entitled "The role of investment funds and investment trusts in EU CRE markets", *EU Non-bank Financial Intermediation Risk Monitor 2019*, European Systemic Risk Board, July 2019.

meaningful source of wholesale unsecured short-term funding, especially in US dollars, for internationally active banks.

MMFs also play an important role in non-banks' cash and liquidity management, given that the funds offer stable value and the possibility to redeem at short notice. Within the euro area, MMF shares are largely held by investment funds (IFs) (€169 billion), insurance corporations (€127 billion) and NFCs (€72 billion) (see **Chart B**, left panel). In particular, investment funds' and insurers' holdings of MMF shares equal 28% and 21% of their total MMF and cash holdings, respectively.

Chart A

MMFs finance most of the short-term debt of banks and NFCs



Sources: ECB (securities holdings statistics and MFI balance sheet item (BSI) statistics) and ECB calculations.
Notes: Left panel: euro area OFI debt securities are made up of OFI issuances (98%) and ICPF issuances (2%). Non-euro area debt securities can be broken down into bank and government-issued securities. It is assumed that the remaining debt securities were issued by the same sub-sectors as in the euro area. "Bank" refers to MFIs. The x-axis labels refer to the issuer domicile.

As the coronavirus outbreak deepened, euro area MMFs experienced outflows of nearly 8% of assets under management between 13 and 20 March. Increasing cash needs of MMF investors, difficulties in monetising assets and flight-to-safety considerations drove large redemptions, which were further amplified by growing liquidity needs to meet margin calls on derivative exposures (see **Special Feature B** for investment funds). Both euro and USD-denominated funds experienced substantial outflows from 12 March (see **Chart B**, right panel), which were particularly pronounced for USD-denominated low-volatility net asset value (LVNAV) funds, while constant net asset value (CNAV) funds – primarily USD-denominated – received net inflows.[50] This divergence in flows may have reflected general flight-to-safety motives, since CNAV funds can only invest in public debt, while variable net asset value (VNAV) and LVNAV funds can invest in commercial paper (see **Chapter 5**). Euro area USD LVNAV funds may also have been perceived to be riskier, given their exclusion from the Federal Reserve's Money Market Mutual Fund Liquidity Facility due to their offshore domicile.

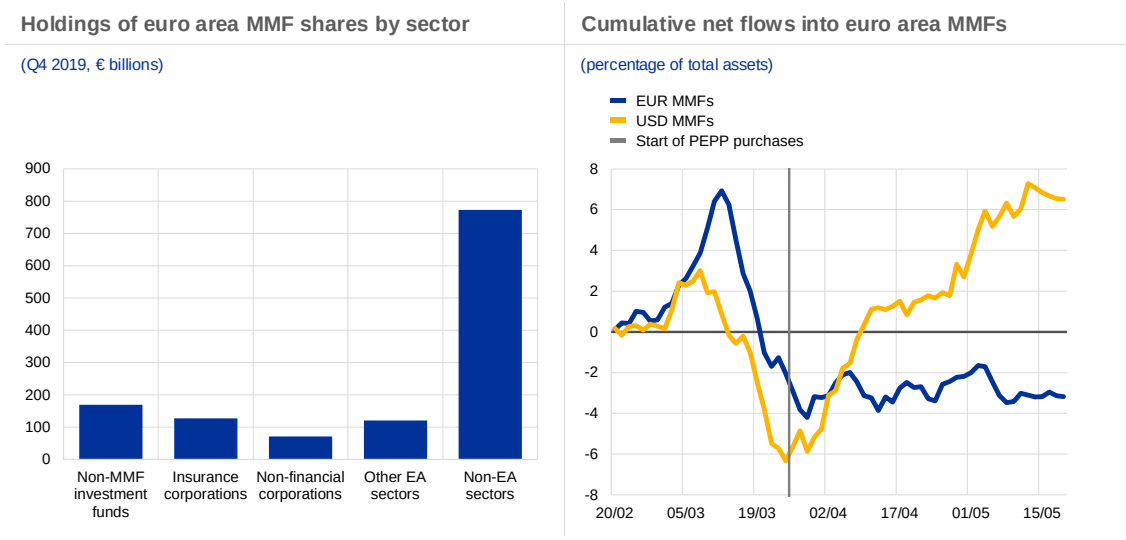
LVNAV funds also suffered particularly large outflows because investors were concerned that the funds could soon lose their cash-like properties. LVNAV funds are allowed to offer a constant share price as long as the fund's NAV at amortised cost does not deviate by more than 20 basis points

[50] According to Crane data, LVNAV funds held around 49% of total euro area MMF assets at the end of February, while VNAV and CNAV funds held 43% and 8% of total assets, respectively.

from the corresponding market value.[51] Otherwise, the fund will "break its collar" and trade at a variable price, which can result in mark-to-market losses for investors. Some LVNAV funds, mostly denominated in US dollars, were close to reaching this threshold at the end of March.[52]

Chart B

Outflows from MMFs created risks for the liquidity of non-banks and for the wider system



Sources: ECB BSI statistics, EPFR and ECB calculations.
Notes: Left panel: the holdings of MMF shares by non-euro area sectors are computed as the difference between total assets and holdings of euro area sectors.

Stress in MMFs can impair the financial system's and the real economy's access to short-term funding and liquidity during crises. In normal times, MMFs can raise sufficient cash from maturing assets. However, when outflows are sufficiently large, such as during the recent period of market volatility, funds may be forced to sell assets. As part of remedial action to preserve fund liquidity, the asset manager can, in principle, also decide to suspend redemptions. So, severe stress in the MMF sector may spill over to those sectors that are reliant on MMFs to manage their liquidity. For example, other investment funds may need to raise cash to respond to outflows, and insurers and firms may need to access liquidity to meet their obligations or cover losses. Finally, liquidity strains in USD-denominated MMFs could also spill over to the broader foreign exchange funding market.

Market and supervisory intelligence suggests that a number of MMFs had difficulties in raising sufficient cash from maturing assets and liquid positions during March, as liquidity deteriorated rapidly, also in the CP market. In the absence of alternative buyers, this led MMFs in need of liquidity to request issuing banks to buy back their CP. From the perspective of banks, this caused the loss of a liquidity source at a time of impaired access to unsecured funding and increasing demand for cash by corporate clients. Some banks accommodated the requests of MMFs, some responded with aggressive pricing in an attempt to discourage the requests for buybacks and a few simply denied the requests altogether as there is no contractual obligation to buy back. At the same time, issuance in the CP market almost completely ceased, likely reflecting a lack of buyers.

[51] In accordance with Regulation (EU) 2017/1131 of the European Parliament and of the Council of 14 June 2017 on money market funds (OJ L 169, 30.6.2017, p. 8).

[52] NAV deviations have been most prevalent in USD-denominated LVNAV funds. On 24 March, Fitch Ratings lowered its sector outlook for LVNAV funds from stable to negative, following the heightened outflows and price volatility (see the Fitch Ratings website).

Monetary policy action helped to improve financial market conditions more broadly, thereby also alleviating liquidity strains in the MMF sector. In particular, the inclusion of non-financial commercial paper in the ECB's corporate sector purchase programme and the ECB's US dollar operations provided an important backstop in this market, against a backdrop in which MMFs and other investors had tried to sell non-bank commercial paper or became increasingly reluctant to invest in it. This action also supported the overall provision of liquidity through capital markets, helping companies to manage their short-term funding needs. The Eurosystem also increased the concentration limits for bank-issued unsecured debt in its collateral framework, which incentivised banks to buy other banks' short-term debt, thereby supporting liquidity in the CP market (see **Chapter 2**). Finally, the ECB introduced the pandemic emergency longer-term refinancing operations (PELTROs), which contributed to preserving the smooth functioning of money markets by providing an effective backstop after the expiry of previous longer-term refinancing operations.[53]

Despite the strains in the MMF sector seen during March, an immediate loss in confidence was avoided. While some funds had difficulties in raising cash due to exceptionally large outflows, investors were able to access their funds at all times. Inflows into MMFs were seen during April (see **Chart B**, right panel), alongside a reduction in buybacks. Market and supervisory intelligence suggests that central bank action, the build-up of sufficient liquidity buffers by MMFs and decreasing redemptions by investors could have played a stabilising role.

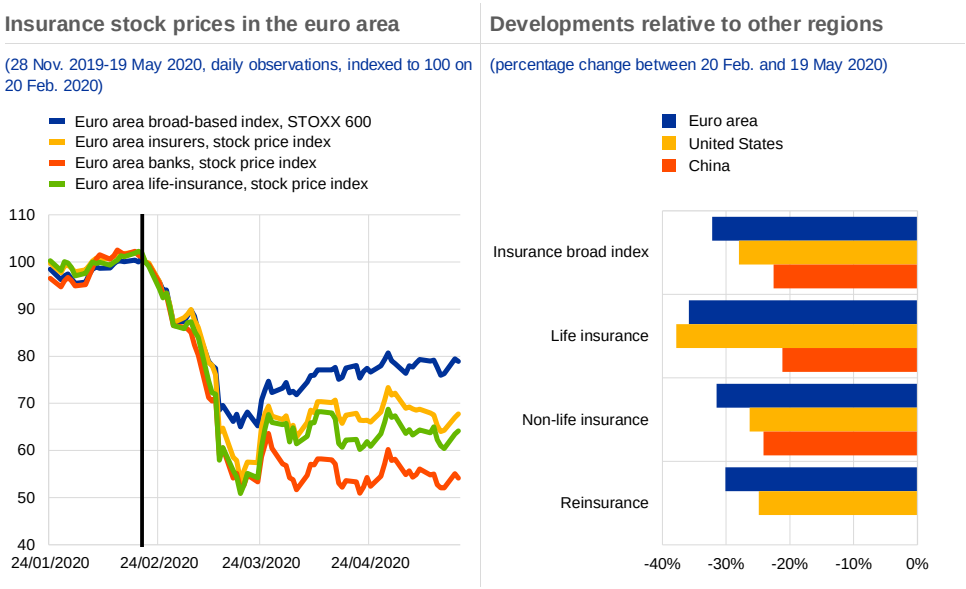
4.3 Euro area insurers face a double hit from the fall in asset prices and low interest rates amid potential liquidity risks

In the wake of the coronavirus pandemic, valuations of insurance companies in the euro area declined by up to 50% before partially recovering in April. Similar to banks, insurers were affected more severely by the coronavirus shock than the broad market indices (see **Chart 4.7**, left panel). Euro area life insurers' valuations saw the largest declines, in line with their high exposure to the asset price declines after the coronavirus shock. In the United States, life insurer valuations fell by 38% compared with 28% for the insurance broad index (see **Chart 4.7**, right panel).

[53] See also "The ECB's commercial paper purchases: A targeted response to the economic disturbances caused by COVID-19", "Improving funding conditions for the real economy during the COVID-19 crisis: the ECB's collateral easing measures" and "ECB announces new pandemic emergency longer-term refinancing operations" on the ECB's website.

Chart 4.7

Insurers' stock valuations declined by more than broad market indices



Sources: Refinitiv and ECB calculations.
Notes: Left panel: the vertical black line indicates 20 February 2020, when the financial market turmoil due to the spread of the coronavirus began. Right panel: no reinsurance index is available for China.

Insurers' solvency could be significantly weakened by a double hit from asset price declines and lower-for-longer interest rates. In general, insurers were well capitalised at the onset of the pandemic (see **Chart 4.8**, left panel). That said, increased risk-taking by some insurers over recent years had made the sector more vulnerable to the repricing of financial assets.[54] As the Solvency II regime requires insurers to mark to market the valuation of their assets, increases in risk premia and equity price declines over the course of February and March are expected to have a significant adverse impact on solvency ratios (see **Chart 4.8**). These negative effects are only partially compensated for by long-term guarantee measures, such as the volatility adjustment and the matching adjustment, which are designed to mitigate the effect of market volatility on insurers' balance sheets. Moreover, solvency ratios could deteriorate further if risk-free rates were to stabilise at lower levels. This is because lower risk-free rates typically increase the present value of insurers' liabilities more than that of their assets, especially for life insurers.[55]

If concerns about public debt sustainability arise again, solvency ratios could also be adversely affected by the high concentration of sovereign debt in insurers' portfolios. Sovereign debt spreads of some euro area countries experienced high volatility over the review period (see **Chapter 2**), which was only contained after the announcement by the ECB of the PEPP. Insurers traditionally hold significant shares of their portfolios in sovereign debt, amounting to up to 70% of their

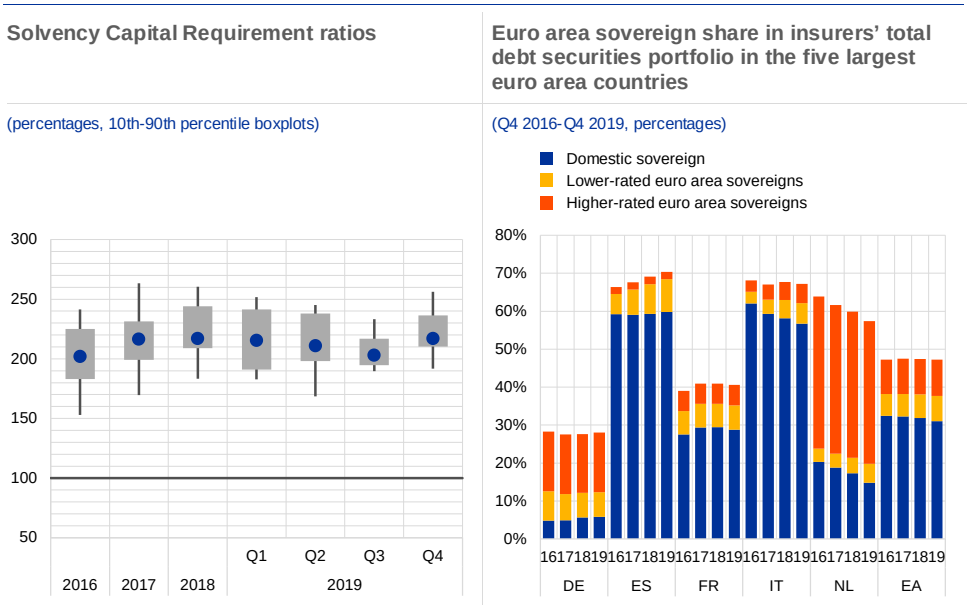
54 See *Financial Stability Review*, ECB, November 2019, Chapter 4.

55 The 2016 EIOPA stress test assessed the impact on 236 EU insurers of a double-hit scenario comprising a sudden increase in risk premia combined with a low-yield environment. The test found that the total excess of assets over liabilities in the baseline would decrease by almost 30% (close to €160 billion). As a result, 104 insurers (over 40% of the sample) would lose more than one-third of their excess of assets over liabilities. This was despite the inclusion of long-term guarantee measures.

total debt securities portfolios in some countries (see **Chart 4.8**, right panel). Their balance sheets could thus be weakened in the event of renewed stress in sovereign markets. The high level of exposure to domestic sovereign debt also indicates the ongoing presence of an "insurance-sovereign nexus".

Chart 4.8

Insurers were generally well capitalised before the pandemic, but solvency is adversely affected by asset price valuation losses and potential further drops in risk-free rates



Sources: ECB securities holdings statistics by sector, SNL and ECB calculations.
Notes: Left panel: based on a sample of up to 18 large euro area general insurers offering life and non-life products. The full sample is not covered for the fourth quarter of 2019 due to reporting lags. The horizontal line marks the regulatory minimum requirement of 100%. Right panel: lower-rated euro area sovereigns refer to countries with credit ratings below high grade (AA-) during the sample period (CY, ES, GR, IT, LT, LV, MT, PT, SK). The five countries shown in the chart cover 83% of total assets of euro area insurers in the fourth quarter of 2019. Data do not include indirect holdings via insurers' investment fund portfolios.

Declines in expected income from investments and premiums are also likely to weigh on profitability and solvency. Investment income may decline as corporates cut back on dividend distributions. Similarly, payment disruptions (e.g. in the form of moratoria) affecting residential and commercial mortgages, which are held by insurers in some countries to a material extent, would also impair revenues.[56] Such potential losses on inflows could also pose liquidity risks to the insurance sector. In addition, solvency could be affected if corporates default on debt securities held by insurers or in the event of corporate debt downgrades. The latter would result in asset valuation losses and require higher capital charges, thus decreasing solvency capital ratios.

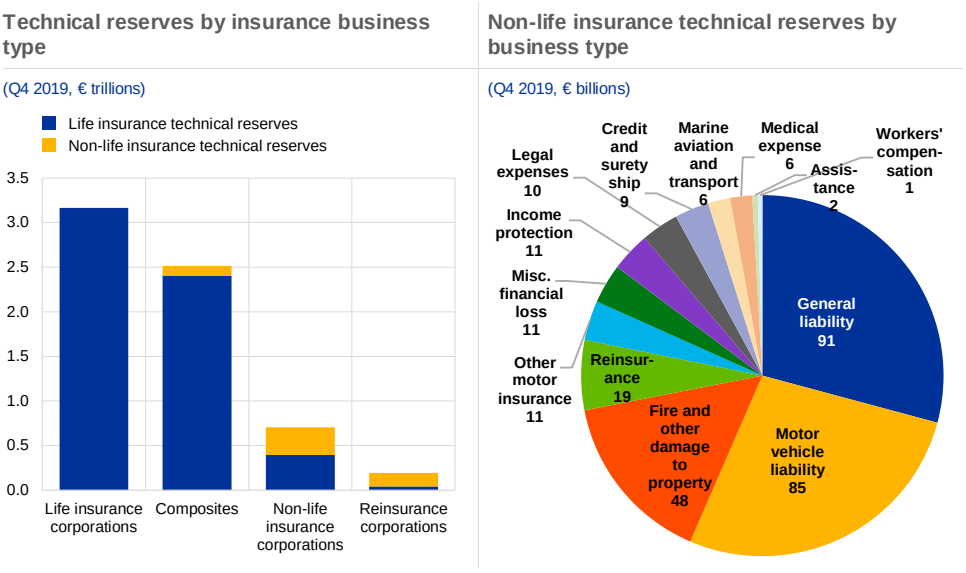
As a consequence of the pandemic, some insurers could face significant liquidity strains. Although liquidity risks for insurers are hard to quantify given the current lack of comprehensive monitoring, they may arise both from lower cash inflows as well as higher cash outflows. Inflows for all types of insurance business can be at risk as new business stalls and the renewal of policies as well as payments of

[56] Euro area insurers' exposures to real estate investments amounted to 7.7% of their total assets in the fourth quarter of 2018. See the box entitled "Insurers' investment in alternative assets", *Financial Stability Review,* ECB, May 2019.

premiums can become disrupted. Cash outflows may arise because: (i) some insurance lines are likely to be subject to higher claims; (ii) insurers may need to pay policyholders that close unit-linked policies, even before the underlying fund liquidates its assets; and (iii) larger derivative margin calls could arise in a high-volatility environment. Moreover, the recent strains in the MMF sector (see **Box 7**) point to a potential risk of contagion to insurers given the important role of MMFs in insurers' liquidity management.

Chart 4.9

The majority of insurance liabilities relate to life insurance business, which suffered heavily from asset price declines but for which a limited increase in claims is expected



Source: ECB insurance corporation balance sheet statistics.
Notes: Insurance technical reserves consist of the actuarial reserves against all outstanding potential claims by policyholders. Technical reserves constitute the largest share of insurers' liabilities (91%).

While some increase in insurance claims is expected due to the coronavirus, the expected scale of such claims varies significantly depending on the specific lines of business. The vast majority of insurance technical reserves to cover potential future claims by policyholders relate to life insurance products (see **Chart 4.9**, left panel). Life insurance companies have to hold dedicated capital reserves to cover abrupt increases in mortality risk, with the Solvency II regulation specifying that capital requirements need to be calibrated to cover an instantaneous 15% increase in mortality rates. As such, this type of business is expected to be rather resilient to additional payment claims. The non-life insurance segment is relatively small and covers several different types of insurance (see **Chart 4.9**, right panel). While large claims can be expected for some business lines, such as trade credit, other lines, such as business interruption insurance, usually have explicit exemptions for pandemics written in their contracts. However, in some countries governments have negotiated with the insurance industry so that the latter partially pays business interruption claims despite the exemptions. Moreover, some governments have reached agreements with credit insurers to guarantee compensation payments by credit insurers to cover business transactions of firms with their domestic and foreign buyers until the end of the year to protect the companies and their supply chains. Some further business

lines, like motor insurance, can even be expected to see lower claims due to reduced traffic. This could partially counteract the adverse effects of higher claims for some multiline insurers.

Higher claims in the reinsurance sector arising from the coronavirus are partially counterbalanced by below-average losses from their natural catastrophe business lines. Reinsurers' underwriting losses are expected to emerge in particular from trade credit and event cancellations, such as the postponement of the Tokyo Olympics. On the positive side, claims from natural catastrophes have been relatively modest recently. Although the frequency of weather-related catastrophes is on an upward trend globally, insured losses in 2019 are estimated to be around USD 56 billion, well below the previous ten-year average of USD 75 billion.[57] And current estimates for insured losses from the bushfires in Australia, which peaked in December and January, are in the range of single-digit USD billions. Nevertheless, climate change continues to pose a medium-term financial stability risk to the insurance sector through the impact of more frequent and severe disasters – in particular if markets are not pricing these risks correctly.[58]

Looking further ahead, an extension of the low interest rate environment in light of the economic downturn may also weigh on insurers' profitability and future solvency. Life insurers have come under pressure in recent years as the return on their assets in the low interest rate environment has fallen and the maturity of assets tends to be shorter than the duration of their contractual obligations with relatively high guaranteed rates. For the euro area insurance sector as a whole, the difference between coupon income from debt securities and average guaranteed rates was about 1% in 2019 (see **Chart 4.10**).[59] Assuming that the current interest rate environment continues to prevail, average coupon income is projected to decline from 2.8% in 2019 to 1.7% in 2030, as securities that yield higher returns mature. Guaranteed rates are also estimated to decline from about 1.8% currently to 1% in 2030, as old annuity policies expire and because new contracts feature significantly lower rates. As a result, the spread between average coupon rates and guaranteed returns would narrow further to 0.7%. These estimates capture an average trend for the euro area and therefore can mask more severe mismatches between return income and guaranteed rates in some insurance companies. Such developments may also induce some insurers to continue the rebalancing of their portfolios towards riskier assets once the immediate shock has passed, adding to those insurers' vulnerability towards credit risks and risky asset repricing.

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57 Estimations are taken from Swiss Re Institute.

58 See the special feature entitled "Climate change and financial stability", *Financial Stability Review,* ECB, May 2019.

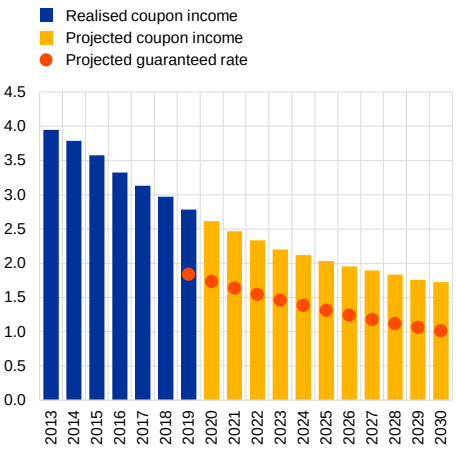
59 Coupon income from debt securities constitutes one of the main sources of income from insurers' asset holdings. In the fourth quarter of 2019, euro area insurers invested on average 41% of their total assets in debt securities and 26% in investment fund shares, which are in turn also invested in bonds to a large extent. See also *Financial Stability Review*, ECB, November 2019, Section 4.3.

Chart 4.10

The spread between investment income and guaranteed rates is expected to narrow further, but to stay positive until 2030

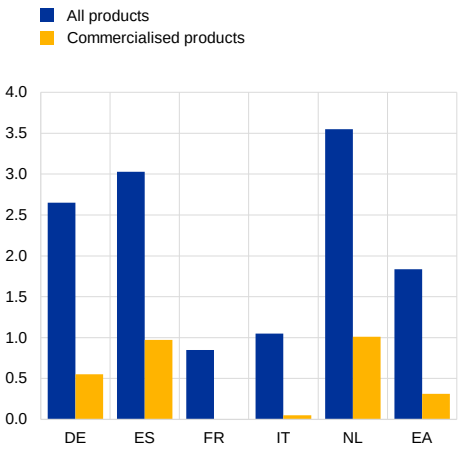
Realised and projected coupon income versus projected guaranteed rates

(percentages)



Guaranteed returns on existing and new insurance policies

(Q4 2017, percentages)



Sources: ECB (insurance corporation balance sheet statistics and securities holdings statistics by sector), European Insurance and Occupational Pensions Authority (EIOPA) and ECB calculations.
Notes: Left panel: the coupon income projections are based on the whole debt securities portfolio of euro area insurers. It is assumed that all securities currently in the portfolio are held until maturity. All maturing assets are replaced one-to-one with securities whose average return is equal to that of newly bought securities between the third quarter of 2019 and the fourth quarter of 2019. The guaranteed rate projections assume that each year 6.8% of contracts mature (equivalent to the average duration of life insurance liabilities of 14.6 years). Expiring contracts are replaced at 76% by policies with average guaranteed rates of currently advertised policies and at 24% with unit-linked policies that do not feature a guaranteed return. These shares are calculated based on flow data on new business from ECB insurance corporation balance sheet statistics.

5 Macroprudential policy issues

Fiscal and monetary policy measures provide relief to the economy, which also supports financial stability by reducing or delaying credit losses and enhancing market liquidity.

Learning from past crises, macroprudential authorities and supervisors have acted swiftly to reduce regulatory capital needs for banks and support the continued flow of bank credit.

Taken together, these actions, worth around €140 billion, make it easier for banks to use capital to absorb losses and avoid deleveraging, and are expected to be in place until the recovery is well established.

Authorities have provided further relief through delaying the introduction of some measures and using the flexibility in the bank regulatory framework to prevent excessive or procyclical loan loss provisioning.

Monetary policy helped mitigate immediate liquidity stress in the non-bank financial sector, but events highlight that an effective macroprudential framework for non-banks is lacking.

Continuing progress towards completing the banking and capital markets unions in Europe remains a priority, as integrated and resilient European markets could help the recovery.

5.1 Authorities acted to help banks draw on capital buffers and continue lending

Authorities have provided relief against the economic impact of the coronavirus outbreak, which also benefits financial stability (see Chapter 1). All euro area governments announced fiscal support packages providing combinations of sizeable direct transfers, tax relief or guarantees on bank loans to companies and households facing lost income. The ECB announced measures to lean against tightening financial conditions and provide the financial system with sufficient liquidity, including through the creation of the pandemic emergency purchase programme (PEPP), the expansion of other purchase programmes, as well as the easing of conditions for the targeted longer-term refinancing operations and for eligible collateral. The European Commission announced measures to mitigate unemployment risks, support companies affected by the coronavirus and facilitate the financing of related healthcare costs, involving the European Investment Bank, the European Investment Fund and the European Stability Mechanism.

Mindful of the lessons of earlier crises, prudential authorities also acted to facilitate the continued provision of bank credit. Prudential policy authorities recognised that the banking sector could face pressures to maintain banks' regulatory capital ratios and constrain credit at precisely the time when many households, companies and governments would need financial support the most. The impact of this would be worse if banks were to deleverage rather than draw down on the existing

regulatory capital buffers. In response, prudential authorities across the euro area announced a series of measures to make it easier for banks to use capital to absorb losses and reduce their incentives to constrain credit. These measures build on the regulatory framework that was designed in response to the 2008 global financial crisis and, for the first time, aim to support banks to exploit fully the flexibility that it provides to respond to economic and financial distress. This additional layer of policy easing is significant and complements monetary and fiscal measures by supporting the functioning of the banking system, thereby facilitating the transmission of the policies to the real economy (see **Box 8)**.

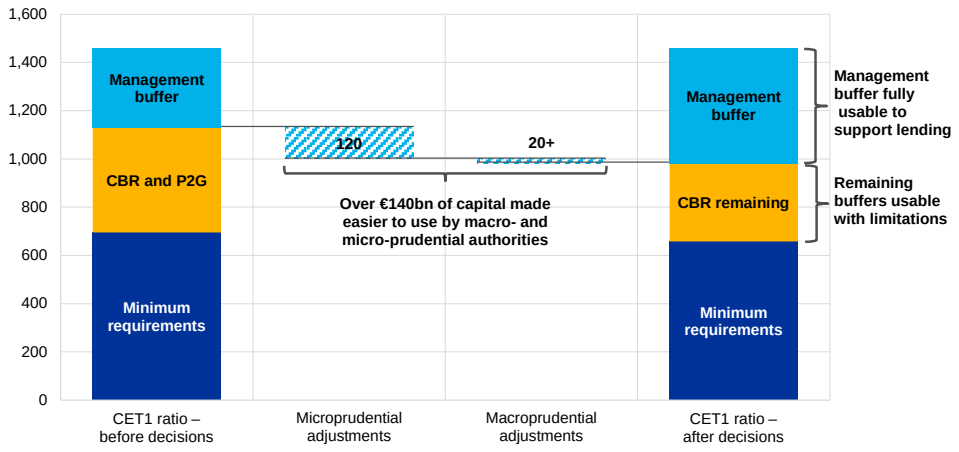
The euro area banking sector entered the pandemic with relatively solid capital and liquidity positions, in part reflecting regulatory reforms since 2008. Common Equity Tier 1 (CET1) capital ratios of euro area banks increased from 10.4% at the end of 2010 to 14.8% by the end of 2019. Some of this capital was being held by banks to meet buffer requirements, while some constituted management buffers over and above regulatory capital requirements. These buffers were accumulated so that banks could, in the event of stress, absorb losses and continue to provide credit. They can now be used to absorb some of the fallout from the pandemic.

Chart 5.1

Macro- and microprudential measures, worth over €140 billion, make it easier for banks to use capital to absorb losses and support lending

CET1 capital stack and remaining macroprudential capital buffers in the euro area

(Q4 2019, € billions)



Sources: COREP (common reporting), notifications of national designated authorities and websites of national authorities.
Notes: The sample covers significant and less significant institutions, consolidated at the euro area level. Microprudential adjustments include the decision on the regulatory adjustment of the Pillar 2 requirements (P2R) and making Pillar 2 guidance (P2G) temporarily usable. Macroprudential adjustments include the releases of the countercyclical capital buffer (CCyB), the systemic risk buffer (SyRB) and the other systemically important institution (O-SII) buffer. Data on underlying risk-weighted assets and the combined buffer requirement (CBR), including the capital conservation buffer (CCoB), the CCyB, the SyRB, the global systemically important institution (G-SII) buffer and the O-SII buffer, refer to the fourth quarter of 2019.

The release of around €140 billion of capital requirements by prudential authorities should facilitate continued credit provision to the real economy (see Chart 5.1). ECB Banking Supervision now allows banks to operate temporarily below the level of capital defined by Pillar 2 guidance (P2G) and the combined buffer requirement (CBR), without facing corrective actions from supervisors. Banks are also allowed to meet Pillar 2 requirements (P2R) with lower quality capital (additional Tier 1

– AT1) as a result of the early introduction of a CRR II amendment. The temporary release of P2G and the adjustments to P2R amount to €120 billion of bank capital. These measures will be in place until the recovery is well established. Furthermore, banks can temporarily operate below the liquidity coverage ratio and use the operational flexibility embedded in supervisory requirements, so that the use of public guarantees does not invoke non-performing loan (NPL) requirements.[60] Nevertheless, going forward, banks might still be reluctant to fully use this flexibility and may, in particular, want to avoid going below certain capital levels to safeguard market confidence. Banks might also want to avoid facing limits on distributions, including on AT1 instruments, which might apply when using residual buffers.[61]

Macroprudential authorities released or reduced more than €20 billion of capital buffer requirements, including through the release of countercyclical capital buffers (CCyBs). Among the seven euro area countries that had activated the CCyB, France, Ireland and Lithuania announced a full release, while Belgium, Germany and Slovakia revoked previously announced CCyB increases.[62] Authorities have also released or reduced buffer requirements for structural risks or delayed the implementation of new requirements. Finland and Estonia announced their intention to fully release the systemic risk buffer (SyRB), while the Netherlands announced the reduction of the SyRB for the three banks to which it applies.[63] Finally, some countries announced the delay of the entry into force of previously announced measures.[64]

To ensure that the capital relief provided by prudential authorities is used to support lending, banks were asked to limit payouts to shareholders. On 27 March, the ECB asked significant institutions (SIs) not to pay out dividends for the financial years 2019 and 2020 and to refrain from conducting share buybacks until at least 1 October 2020.[65] Numerous national authorities also extended restrictions on distributions to less significant institutions (LSIs), thus ensuring consistency between the supervisory treatment of SIs and LSIs. This action was intended to protect capital for absorbing losses and supporting lending. It should also reduce any stigma associated with restrictions on dividend distributions that might normally follow banks drawing down on their capital buffers. Given the increases in bank payout ratios in recent years, the suspension of dividends could retain capital in the region of €27.5 billion (see **Box 5)**.

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60 "ECB Banking Supervision provides temporary capital and operational relief in reaction to coronavirus", ECB Banking Supervision, press release, 12 March 2020.

61 The leverage ratio, which will become a binding requirement in the EU as of June 2021, could also constraint the full use of the combined buffer requirement.

62 Domestic CCyB releases in the euro area amount to around €6 billion of capital for euro area banks. An additional €6 billion stems from reductions in the institution-specific CCyB of euro area banks as a result of CCyB releases implemented by countries outside the euro area (to which euro area banks have credit exposures), bringing the total impact via the CCyB to €12 billion.

63 Finland and the Netherlands also announced reductions in O-SII buffers for banks that would otherwise be restricted in drawing down on the SyRB, given the interactions between the two requirements stipulated in Article 131 of the Capital Requirements Directive.

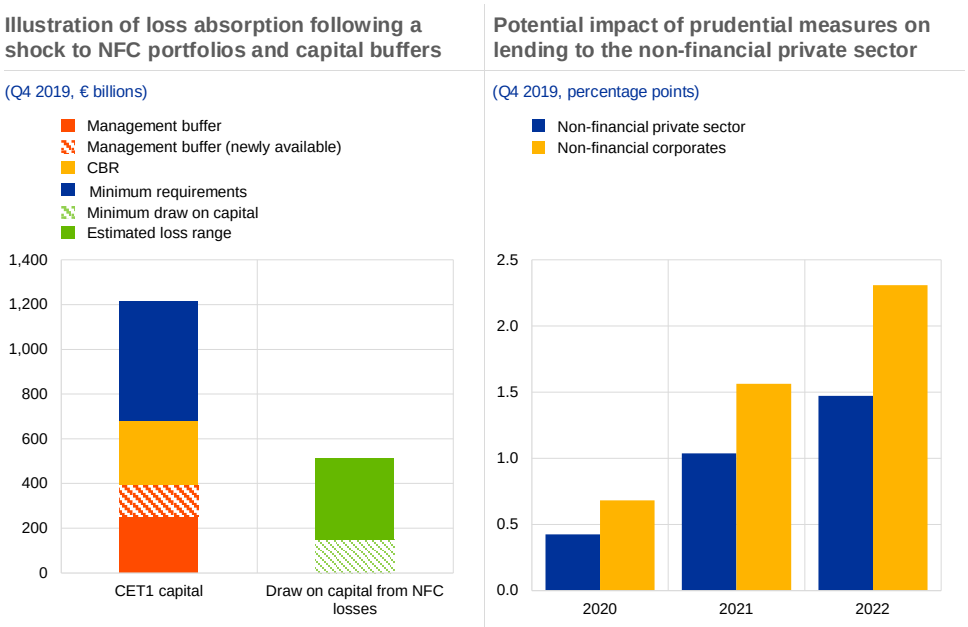
64 Portugal and Cyprus decided to delay the phasing-in of O-SII buffers by one year, while the Netherlands intends to postpone the announced measure under Article 458 of the Capital Requirements Regulation (CRR) on higher risk weights for domestic mortgage exposures of banks that follow the internal ratings-based (IRB) approach.

65 "ECB asks banks not to pay dividends until at least October 2020", ECB Banking Supervision, press release, 27 March 2020.

Taken together, these measures should help the euro area banking system to sustain lending to households and companies, while weathering losses. A simple sensitivity analysis indicates that the capital built up in recent years could absorb very sizeable losses on corporate exposures arising in a severe downturn, and could absorb even larger losses if banks draw on regulatory buffers (see **Chart 5.2**, left panel).[66] In this context, the flexibility provided by policy actions is instrumental in facilitating loss absorption and supporting credit provision. According to internal estimates, recent prudential policy measures might reduce the expected decline in bank loans to the non-financial private sector in 2022 by 1.5 percentage points (p.p.) less than the fall otherwise (see **Chart 5.2**, right panel). The policies could provide particular support to lending to non-financial corporations (NFCs), with banks providing almost 2.5 p.p. more loans to this sector in 2022.

Chart 5.2

Banks can weather a sizeable increase in losses, while the flexibility provided by prudential measures supports credit availability to households and companies



Sources: COREP (common reporting) and FINREP (financial reporting).
Notes: Left panel: the sample includes SIs and LSIs on a local operations basis. Losses are derived from scenario analysis on corporate loans as in Chart 3.11. The capital stack accounts for the microprudential decision on the regulatory adjustment of P2R and making P2G temporarily usable, as well as macroprudential adjustments such as the releases of the CCyB, the O-SII buffer and the SyRB. Right panel: the bars represent the difference between euro area lending to the non-financial private sector and to non-financial corporates with the introduction of the prudential package versus without the package. The simulation takes account of adverse economic conditions and endogenous reactions of banks to stress and policies. See Budnik et al., "Macroprudential stress test of the euro area banking system", *Occasional Paper Series*, No 226, ECB, July 2019.

Overall, current developments highlight the value of the macroprudential framework and, in particular, of releasable capital buffers. The coronavirus has been the first test for the macroprudential framework since it was set up post-2008. The enacted prudential measures will provide relief to banks as long as they are needed, and until the economic recovery is well established. The recent events also demonstrate that, beyond the overall level of bank capital, releasable buffers are

[66] Country-specific (stressed) loss rates are calculated from the 95th percentiles of historical probabilities of default and losses given default. A 1.5 multiplier is used for low-NPL countries (i.e. Austria, Belgium, Estonia, Germany, Finland, France, Latvia, Lithuania, Luxembourg, the Netherlands and Slovakia).

important to offer policy space in situations of economic distress, as we have seen this year. In the past, the ECB has highlighted the importance of creating macroprudential space in the euro area in the form of releasable CCyBs to help sustain credit in a downturn.[67] Looking ahead, as conditions normalise, authorities should consider a greater role for the CCyB to ensure that sufficient flexibility is available to respond to downturns in the form of buffers explicitly designed to be releasable.

Box 8

Macroeconomic impact of financial policy measures and synergies with other policy responses

Prepared by Matthieu Darracq Pariès, Christoffer Kok and Elena Rancoita

As authorities have sought to soften the impact of the coronavirus pandemic, a key concern has been the potential for the banking sector to ration credit and amplify the economic cost. Euro area real GDP could decrease substantially in 2020. For example, it could be 9 percentage points lower than expected before the pandemic shock, with a rebound in 2021 as confinement policies are reversed (see **Chart A**).[68]

This initial economic shock could be amplified by the procyclical nature of financial intermediation. In this box, the financial sector's amplification role is viewed through the lens of a dynamic stochastic general equilibrium model featuring a capital-constrained banking sector.[69] The model is used to assess the impact of financial policy responses aimed at mitigating procyclical effects currently, taking into account interactions with fiscal and monetary policy actions.[70]

Procyclical financial intermediation effects could amplify the impact of the pandemic on the economy. Non-financial firms and households are now expected to face lower cash and income flows as well as lower collateral values. This could increase the cost of credit and reduce loan demand. According to the model estimates, such financial accelerator effects[71] would subtract another percentage point of GDP in 2020 and increase the size of the recession by an additional 2 percentage points of GDP in 2021 (see **Chart A,** left panel). Financial accelerator effects in turn imply an increase in loan impairments and rising risk weights, reducing capital ratios and, therefore, banks' loss-absorption capacity. Within the model, the implicit bank capital ratio would decline by 4 percentage points below its baseline level over two years (see **Chart A,** right panel).[72] As banks get closer to regulatory constraints, they are anticipated to constrain lending, either by raising lending

67 *Financial Stability Review*, ECB, November 2019, Chapter 5.

68 This is within the range of alternative scenarios presented in the box entitled "Alternative scenarios for the impact of the COVID-19 pandemic on economic activity in the euro area", *Economic Bulletin*, Issue 3, ECB, 2020. In the model-based simulations, the scenario considered here is based on a combination of demand and supply shocks which in the absence of real-financial amplification effects produces a GDP path corresponding to the estimates within the range of these alternative scenarios.

69 The DKR model of Darracq et al. (2011) is employed; see Darracq Pariès, M., Kok, C. and Rodriguez Palenzuela, D., "Macroeconomic propagation under different regulatory regimes: Evidence from a DSGE model for the euro area", *International Journal of Central Banking*, Vol. 7, December 2011. See also Cozzi, G., Darracq Pariès, M., Karadi, P., Körner, J., Kok, C., Mazelis, F., Nikolov, K., Rancoita, E., Van der Ghote, A. and Weber, J., "Macroprudential policy measures: macroeconomic impact and interaction with monetary policy", *Working Paper Series*, No 2376, ECB, February 2020.

70 The analysis presented in this box does not account for the macroeconomic costs of unwinding the fiscal, monetary and prudential policy measures later.

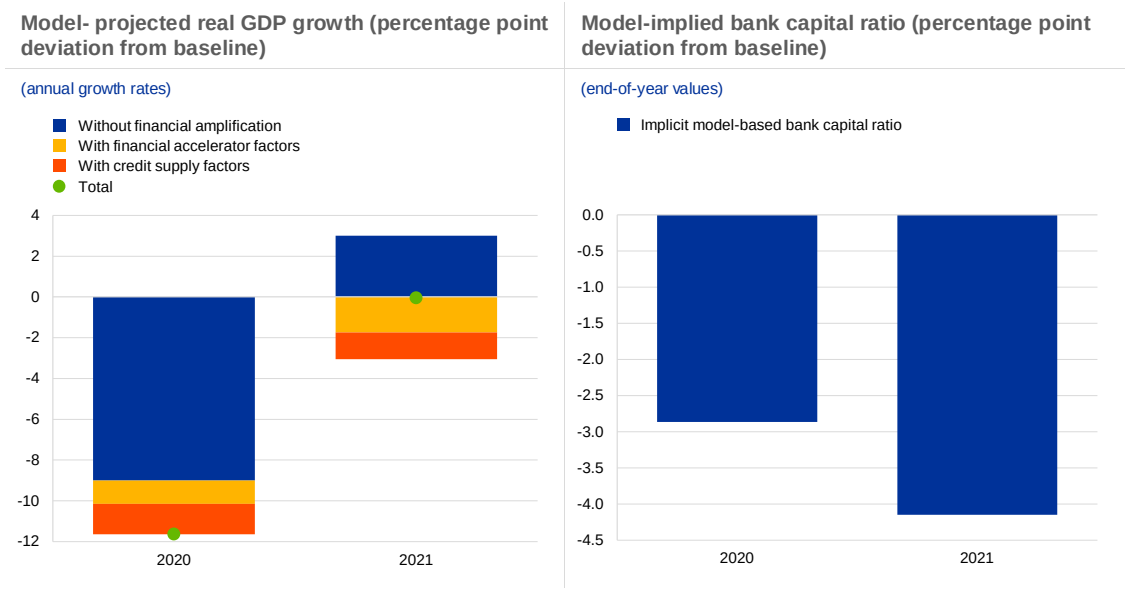
71 See Bernanke, B., Gertler, M. and Gilchrist, S., "The financial accelerator in a quantitative business cycle framework", *Handbook of Macroeconomics*, 1999.

72 The model-implied capital gap should not be confused with bank-level stress-test calculations, but is in line with credit losses and net interest income projections using ECB top-down stress-test models.

margins or through outright quantity constraints (see **Chart A,** left panel).[73] Overall, credit supply effects reduce GDP growth by more than 1 percentage point in 2020-21 on average over two years.

Chart A

Without policy interventions, the financial sector is likely to induce procyclical effects of the coronavirus pandemic shock



Sources: DKR model, ECB and ECB calculations.
Notes: The simulations are conducted assuming unchanged monetary, fiscal and prudential policies. The impact on the bank capital ratio displayed in the right panel is consistent with the magnitude of the financial accelerator effects shown in the left panel.

This impact would be even greater without the large increase in bank capital levels following the 2008 financial crisis which has boosted euro area banks' loss-absorption capacity. Overall, euro area significant institutions' Common Equity Tier 1 (CET1) ratio stood at 14.7% on average at the end of 2019. This corresponded to a distance to the minimum capital requirements (i.e. Pillar 1 and Pillar 2 requirements) of around 8% of risk-weighted assets (RWAs) and close to 5% of the combined buffer requirement (CBR; including the capital conservation buffer).

Capital built up over recent years has allowed authorities to now be able to relax constraints and provide room for banks to avoid undue procyclicality. A combination of supervisory capital relief measures and credit risk treatment measures, including the announced releases or reductions of macroprudential buffers and restrictions on dividends, amount to around €170 billion (or almost 2.0% of RWAs).[74] Furthermore, making it easier for banks to consume the remaining CBR could overall amount up to around €330 billion (about 3.5% of RWAs).[75] In addition, supervisors have recommended the use of more flexibility in the application of the IFRS 9 accounting rules with the aim of avoiding procyclical effects on banks' regulatory capital, which under the macroeconomic scenario

[73] Within the confines of the model, impairments of bank assets and bank funding constraints generate substantial capital shortfalls, to which banks react by tightening lending conditions.

[74] See "ECB Banking Supervision provides further flexibility to banks in reaction to coronavirus", ECB Banking Supervision, press release, 20 March 2020.

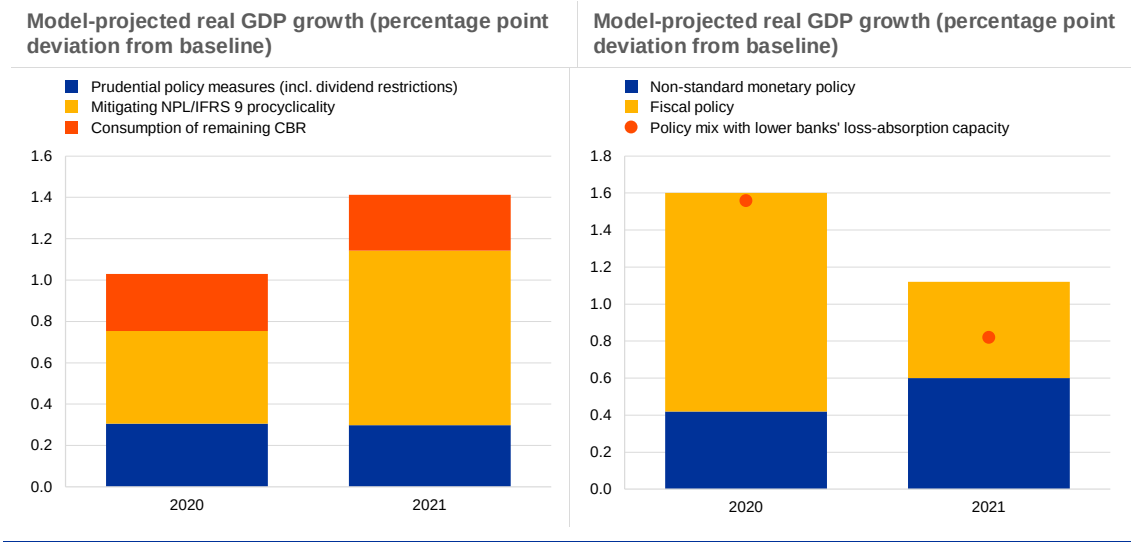
[75] This figure does not take into account the leverage ratio which comes into force in the EU in June 2021.

shown in **Chart A** could reduce the CET1 ratio depletion by about 1.5 percentage points in 2020 and 1.8 percentage points in 2021.[76]

The financial policy relief measures would help attenuate the economic impact of the pandemic by reducing procyclicality. Combining the effects of the announced prudential capital relief measures, the measures to retain capital through dividend restrictions and the relaxation of IFRS 9 accounting rules, model-based simulations suggest that the offsetting prudential actions, reducing the likelihood and magnitude of a credit crunch, could restore 1.9 percentage points to real GDP over the two-year horizon, and up to 2.4 percentage points if banks were allowed to draw down the remaining CBR (see **Chart B**, left panel). An important caveat, however, is that in order to safeguard their credit ratings and funding costs banks may be reluctant to consume their remaining buffers. If so, this would tend to lower the macroeconomic impact of the measures.

Chart B

Prudential measures relaxing bank capital requirements should help mitigate procyclicality, but monetary policy and in particular fiscal measures are needed to tackle the cyclical downturn



Sources: DKR model, ECB and ECB calculations.
Notes: The simulations are conducted assuming the path of the monetary policy interest rate remains at the baseline. The illustrative macroeconomic simulation of ECB non-standard monetary policy measures in the right panel corresponds to central bank asset purchases of €870 billion; this reflects the additional temporary envelope of €120 billion for 2020 assigned to the asset purchase programme (decided on 12 March) and a purchase envelope of €750 billion assigned to the pandemic emergency purchase programme (decided on 18 March). Other non-standard measures enacted prior or in response to the pandemic emergency are not taken into account. The illustrative fiscal policy response in the right panel abstracts from the effect of automatic stabilisers and off-budget items such as State guarantees on loans. The policy mix simulation with lower bank loss-absorption capacity in the right panel evaluates the same fiscal and non-standard monetary policy measures, but assumes tighter bank capital constraints so that banks would resist any temporary decline in net interest income through less accommodative lending policies.

Fiscal and monetary policy measures are the first line of defence against the economic fallout from the coronavirus outbreak. Timely fiscal easing supports households' and firms' incomes, while central bank asset purchase and liquidity operations ease financing conditions for all economic agents. For example, the impact of a debt-financed fiscal impulse of 3 percentage points[77] and

[76] These numbers include: (i) the additional provisions under IFRS 9 with respect to IAS 39 in stress with respect to normal times; and (ii) the estimated impact on provisions of including flexibility in the classification of the exposures potentially falling under debt restructuring (e.g. public moratoria schemes). It is assumed that the implemented policies would be able to absorb the full procyclical impact of IFRS 9. IFRS 9 adds back to the CET1 ratio, but would not increase the loss-absorption capacity. Thus, the increase in the loss-absorption capacity would be less than the reduction in capital depletion.

[77] The fiscal measures are illustrative of part of the government responses to the pandemic emergency; see the "Report on the comprehensive economic policy response to the COVID-19 pandemic", Eurogroup, 9 April 2020. In the model, it is assumed that the fiscal measures consist of government consumption and transfers to liquidity-constrained households and firms, and are sustained over two years.

central bank asset purchases amounting to €870 billion, taking the total purchases to over €1 trillion,[78] could, according to this model, support real GDP by 2.7 percentage points over the two-year horizon (see **Chart B,** right panel). Note that this fiscal policy response neither includes the effects of automatic stabilisers, nor off-budget measures, such as the various State guarantee schemes and equity injections.

Prudential policy can in parallel reinforce the transmission of fiscal and monetary actions. Without the relief measures described above, banks' ability or willingness to absorb losses without constraining credit would be significantly lower. With tighter bank capital constraints, the same fiscal and non-standard monetary measures would yield a smaller expansionary effect, notably in 2021 as banks would react to the downward pressures on their net interest income stemming from the central bank asset purchases (see **Chart B**, right panel).

5.2 Using flexibility in the bank regulatory framework

To complement capital easing measures, regulators and international standard-setters also provided guidance on the flexible implementation of other rules. This included, among other things, revising the implementation dates of new standards and providing guidance on loan loss provisioning, taking account of national measures on loan moratoria.

Implementation of the Basel III standards, including those for market risk and Pillar 3 disclosures, has been deferred by one year to 1 January 2023. Transitional arrangements for the output floor have also been extended by one year to 1 January 2028. On 27 March, the Group of Central Bank Governors and Heads of Supervision endorsed these changes to provide additional operational capacity for banks and supervisors, while reiterating its commitment to the full implementation of all Basel III standards. Although the revised timeline does not affect banks' current capital positions, it may mitigate potential procyclical increases in capital requirements in a stress situation. Looking ahead, full and consistent implementation of all Basel III standards based on the revised timeline remains necessary.

The Basel Committee on Banking Supervision (BCBS) and supervisory authorities also acted to mitigate unintended consequences of the accounting framework for banks' capital position. The expected credit loss (ECL) approach, introduced by International Financial Reporting Standard 9 (IFRS 9), addresses shortcomings of the previous "incurred loss" approach that exacerbated procyclicality during the 2008-09 financial crisis, requiring banks to record expected loss provisions over time as credit risk rises. Notably, where banks judge there to be a "significant increase in credit risk" they must now account for lifetime expected losses. If many loans face such a significant increase in credit risk simultaneously, this could prompt a

[78] This package is indicative of part of the ECB's response to the pandemic emergency, namely the asset purchases announced by the ECB since the 12 March 2020 Governing Council meeting (other interventions related to liquidity operations or collateral easing measures are not considered in the simulation). To simulate the impact of non-standard measures, the DKR model has been augmented with relevant frictions as in Darracq Pariès, M., Körner, J. and Papadopoulou, N., "Empowering central bank asset purchases: The role of financial policies", *Working Paper Series*, No 2237, ECB, February 2019.

large increase in loan loss provisions and weigh on capital. Notwithstanding the mitigating effect of policy measures and given the current uncertainty about the extent and duration of the economic contraction, the BCBS decided to adjust, on a temporary basis, how additional provisions would flow through to capital, allowing their add-back to CET1 capital for two years.[79] Consistently with this, the ECB provided an additional recommendation to banks to make full use of the IFRS 9 transitional provisions and avoid excessively severe assumptions in provisioning models. Also consistently with the BCBS decision, the European Commission proposed to extend and adapt the IFRS 9 transitional arrangements to address the effects related to the coronavirus.

Policies such as payment moratoria and State guarantees can help mitigate the increase in credit risk and defaults. Debt payment moratoria temporarily suspend the counting of days past due, thereby avoiding automatically triggering defaults. Exposures on which there are no other concerns about credit quality and payments are resumed before or at the end of the moratorium would therefore not migrate to the "underperforming" or "defaulted/impaired" categories. In addition, public guarantees can also decrease banks' expected losses. While important, these policies may not fully offset the effect of the sudden and sizeable shock on credit risk and defaults.

Supervisors and standard-setters have supported the full use of the flexibility of the IFRS 9 framework and the prudential framework. This flexibility is currently foreseen to be applied on a case-by-case basis under the scrutiny of the supervisors' expert judgement. Beyond the ECB, other European authorities, such as the European Banking Authority and the European Securities and Markets Authority, and international bodies, such as the International Accounting Standards Board and the International Organization of Securities Commissions, have also issued clarifications and guidance on the use of flexibility within the accounting and prudential frameworks.

The post-2008 crisis establishment of a macroprudential policy framework in the euro area has helped the banking sector respond to the shock. Furthermore, institutions have made use of some of the available flexibility. Nevertheless, there will also be lessons from the pandemic as to how tools worked in practice in mitigating procyclicality and delivering a resilient banking system that was able to support lending to the real economy.

More broadly, while the euro area has made good progress in tackling legacy NPLs, the pandemic may lead to a deterioration of bank asset quality. Large stocks of NPLs divert capital, funding and operational resources away from the core lending function of banks. As demonstrated in the sovereign debt crisis, banks relieved of troubled assets are better placed to contribute to the economic recovery. There are different solutions which could be considered and tailored to the magnitude of the problems arising. For example, well-designed asset separation measures, such as centralised asset management companies (AMCs), may help achieve efficient workouts. International best practice suggests that sound governance and objectives, a clear focus and robust pricing of NPLs upon transfer are instrumental in making such

[79] These add-backs would then be drawn down on a straight line basis for the subsequent three years. However, the BCBS has indicated that jurisdictions that have already implemented the transitional arrangements may decide to add back less than 100%, or adopt measures to prevent the add-back from including ECL provisions established before the outbreak of the coronavirus.

centralised AMCs successful and protecting taxpayers' money. Further options include stepping up NPL transaction platforms and facilitating NPL sales (e.g. with securitisations).[80]

Finally, removing the remaining barriers to the banking union continues to be a priority and is key to facilitating a more complete European financial market. Against the risk of a re-emergence of fragmentation, the progress achieved with the establishment of the banking union should not be reversed, and further progress must be achieved. To ensure a uniform level of depositor protection and depositor confidence within the banking union regardless of banks' location, the banking union now needs to be completed with its third pillar, a European deposit insurance scheme.

5.3 Mitigating risks from the non-bank financial sector

A number of investment funds faced severe liquidity issues, with some funds taking exceptional measures to cope with large outflows. Investment funds, particularly high-yield corporate bond funds, experienced exceptionally large outflows between 20 February and 20 March (see **Chapter 4**). Quantity-based measures, such as the suspension of redemptions and redemption gates, were activated by a small number of funds in response to the large outflows. Other funds used price-based measures, such as swing pricing[81] and redemption fees, to ensure trading costs were borne by redeeming investors. While these tools were generally effective in addressing imminent stress at the fund level, the suspension of redemptions in some open-ended funds has impaired the ability of investors to raise liquidity and exposed them to market risk when prices were falling.

Monetary policy action, including the PEPP, helped improve financial market conditions, thereby also alleviating liquidity strains in the money market fund (MMF) sector. A number of MMFs had difficulties raising sufficient cash from maturing assets, as liquidity deteriorated rapidly also in the commercial paper market (see **Box 7**). In the euro area, the expansion of asset purchases to non-financial commercial paper, in particular, provided an important backstop in this market against a backdrop in which private sector investors – including MMFs – became reluctant to invest in commercial paper or tried to sell it in a search for cash.[82] Following the announcement of these measures, liquidity conditions in financial markets improved, and outflows from MMFs and other investment funds abated (see **Chart 5.3**).

The European Securities and Markets Authority (ESMA) and national competent authorities (NCAs) continue to monitor flows of investment funds and the impact of the pandemic on financial markets. In this regard, ESMA addressed a

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80 See Fell, J., Grodzicki, M., Martin, R. and O'Brien, E., "Addressing market failures in the resolution of non-performing loans in the euro area", *Financial Stability Review*, ECB, November 2016, for a detailed presentation of such options, and "AMC Blueprint", Staff Working Document 72, European Commission, March 2018, for guidance on setting up centralised AMCs.

81 Swing pricing occurs when a fund provider adjusts the net asset value of a fund in order to pass on the costs of trading to those that are buying and selling within their accounts.

82 See the blog post entitled "The ECB's commercial paper purchases: A targeted response to the economic disturbances caused by COVID-19" on the ECB's website.

number of recommendations to financial market participants.[83] These aim to enhance business continuity planning, reporting and disclosure of coronavirus-related risks, and risk management. But securities markets supervisors have few legal instruments at their disposal to tackle systemic risks.

Notwithstanding liquidity management measures used by individual institutions, recent events highlight weaknesses in the policy framework for non-banks. The events in the investment fund sector highlighted that the current policy framework relies to a large extent on ex post liquidity management tools, in the hands of asset managers. But available tools at the fund level, such as the suspension of redemptions, are of limited use to prevent stress at the system level. If applied in a stress scenario, they could limit the ability of firms and other financial institutions to raise liquidity and undermine market confidence more broadly. The current prudential framework includes provisions to ensure that asset liquidity is consistent with a fund's redemption policy.[84] However, a number of investment funds entered the recent stress episode with significant liquidity mismatches and experienced difficulties in accommodating outflows, adding to the stress in the sector.

Authorities should have a range of policy tools available to effectively mitigate the build-up of risks in funds during periods of exuberance. Authorities should ensure that existing tools to mitigate liquidity risk are applied consistently. Furthermore, authorities require additional policy tools to mitigate system-wide liquidity risks. In particular, authorities should have policy tools to limit liquidity risk during periods of exuberance, when market liquidity appears to be abundant. These could include, for instance, limits on investment positions in potentially illiquid markets or restrictions on redemption frequency and minimum notice periods. Such tools should furthermore ensure the alignment between asset liquidity and funds' redemption risk in stress periods. Minimum liquidity buffers should also be considered, to manage increased liquidity needs from outflows or margin calls in a stress period.

Additional powers are needed to ensure a timely and consistent use of liquidity management tools by asset managers in periods of distress. In principle, NCAs can direct fund managers to suspend redemptions if it is in the interest of the shareholders or the public. While suspending redemptions may stop outflows, it may undermine wider market confidence and impair the ability of investors to raise cash when they need it most. It is thus important that a wide range of liquidity management tools is available and used in a timely manner, especially by funds that invest in less liquid assets and have short redemption periods. Authorities should have the powers to oversee that these tools are applied in a timely and consistent manner. In line with

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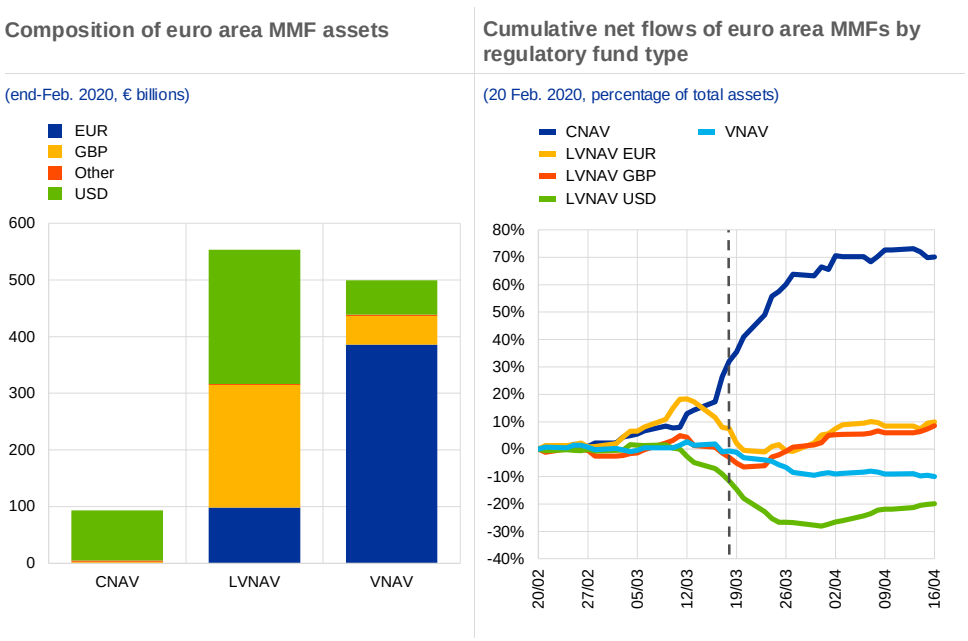
83 See "ESMA recommends action by financial market participants for COVID-19 impact", European Securities and Markets Authority, 11 March 2020.

84 For UCITS funds, the liquidity profile of the investments needs to be appropriate to the redemption policy (Article 40(4) of Commission Directive 2010/43/EU of 1 July 2010 implementing Directive 2009/65/EC of the European Parliament and of the Council as regards organisational requirements, conflicts of interest, conduct of business, risk management and content of the agreement between a depositary and a management company (OJ L 176, 10.7.2010, p. 42). For alternative investment funds, the asset manager shall ensure that the liquidity profile and the redemption policy of the funds are consistent (Article 16(2) of Directive 2011/61/EU of the European Parliament and of the Council of 8 June 2011 on Alternative Investment Fund Managers, OJ L 174, 1.7.2011, p. 1).

European Systemic Risk Board (ESRB) recommendations, ESMA's role in facilitating and coordinating the use of liquidity management tools should be strengthened.[85]

Chart 5.3

Outflows from MMFs were mostly concentrated in LVNAV funds



Sources: Crane Data, Refinitiv Lipper IM and ECB calculations.
Notes:
Left panel: total assets by regulatory fund type and currency for euro area-domiciled money market funds in February 2020, covering around 90% of euro area MMF assets.
Right panel: cumulative daily net flows as at 20 February, by MMF regulatory fund type. The sample covers around 70% of total euro area assets, while not covering all VNAV funds. The vertical dashed line shows the ECB's announcement of the PEPP. CNAV: constant net asset value; LVNAV: low-volatility net asset value; VNAV: variable net asset value.

Lessons from the recent stress in the MMF sector should be drawn, including for regulation. While a number of MMFs saw large outflows and were forced to sell illiquid assets, stress was particularly concentrated in low-volatility net asset value (LVNAV) funds (see **Chart 5.3**, right panel), which represent almost half of the euro area MMF sector in terms of total assets (see **Chart 5.3,** left panel). These funds are allowed to offer a constant share price as long as the fund's NAV at amortised cost does not deviate from the corresponding market value. Otherwise, the fund will trade at a variable price, which can result in mark-to-market losses for investors.[86] A number of funds were close to breaching the regulatory limits on NAV and on weekly maturing assets during the recent period of volatility. This may have provided unintended incentives for investors to redeem during the recent stress episode and contributed to additional outflows and liquidity shortages in these funds (see **Box 7**).

The market response to the pandemic underlines the need to strengthen the Solvency II framework for insurance companies. The communication of the

[85] See also Recommendation of the European Systemic Risk Board of 7 December 2017 on liquidity and leverage risks in investment funds (ESRB/2017/6), OJ C 151, 30.4.2018, p. 1.

[86] This applies to LVNAV funds under the EU MMF Regulation. Under this Regulation, the fund's board could decide to apply liquidity fees or redemption gates, or to suspend the fund if the level of weekly maturing assets falls below 30% of the fund's total assets, and net redemptions on one day are greater than 10% of the fund's total assets (Article 34(1) of Regulation (EU) 2017/1131 of the European Parliament and of the Council of 14 June 2017 on money market funds, OJ L 169, 30.6.2017, p. 8).

European Insurance and Occupational Pensions Authority (EIOPA) regarding mitigating action and the temporary suspension of dividend distributions and share buybacks helped to dampen the impact of the shock on the sector.[87] Since liquidity risk has come into the spotlight (see **Chapter 4**), the monitoring and enhanced management of such risk should be key elements of the 2020 review of Solvency II as also highlighted by EIOPA's recent draft advice.[88] The Solvency II review should also pay due attention to other macroprudential aspects, including by drawing on the proposals put forward in a recent ESRB report.[89] For instance, while the volatility adjustment provides capital relief, the report highlights that it lacks the symmetry for building buffers during times of exuberance and provides a suggestion on a simple but effective way to make it symmetrical. It also suggests the strengthening of liquidity risk frameworks, including through supervisory stress testing and new Pillar 2 provisions in relation to liquidity buffer requirements for insurers with a vulnerable liquidity profile.

Accelerating progress towards a fully fledged capital markets union (CMU) in Europe remains a priority, as integrated and resilient European markets could help the recovery. Deep and integrated capital markets can complement bank lending and help ensure that a wide range of businesses have access to funding, thereby contributing to a swift recovery of economic activity after the shock abates. While the need to address challenges posed by Brexit[90] and climate change continues to be an important driver for advancing CMU, the pandemic has highlighted that the CMU agenda also needs to include increasing the resilience of the financial sector to large exogenous shocks such as the coronavirus pandemic. The risks that have materialised during this period underscore the importance of moving towards a stronger role for Europe-wide supervision of capital markets, which would enhance cross-border risk monitoring and coordinated actions across Europe.[91]

87 See "EIOPA statement on actions to mitigate the impact of Coronavirus/COVID-19 on the EU insurance sector", EIOPA, 17 March 2020, and "EIOPA statement on dividends distribution and variable remuneration policies in the context of COVID-19", EIOPA, 2 April 2020.

88 See "Consultation Paper on the Opinion on the 2020 review of Solvency II", EIOPA, 15 October 2019.

89 See "Enhancing the macroprudential dimension of Solvency II", ESRB, February 2020.

90 See Bergbauer et al., "Implications of Brexit for the EU financial landscape", *Financial Integration and Structure in the Euro Area*, ECB, March 2020.

91 See "ECB contribution to the European Commission's consultation on Capital Markets Union mid-term review 2017", ECB, May 2017.

Special features

A Trends in residential real estate lending standards and implications for financial stability

Prepared by Jan Hannes Lang, Mara Pirovano, Marek Rusnák and Claudia Schwarz

It is often maintained that the recent real estate booms in many euro area countries have been accompanied by a loosening in lending standards. However, data for a thorough cross-country assessment of lending standards have been missing. This special feature uses a novel euro area dataset from a dedicated data collection covering significant institutions supervised by ECB Banking Supervision to analyse trends in real estate lending standards and derive implications for financial stability. First, lending standards for residential real estate loans in the euro area, in particular loan-to-income ratios, eased between 2016 and 2018. Given the significant deterioration in the euro area economic outlook since the coronavirus outbreak, this vulnerability seems of particular relevance. Second, lending standards appear to be looser in countries that saw stronger real estate expansions, suggesting that real estate vulnerabilities may have been growing in some euro area countries. Third, lending standards deteriorated less in countries with borrower-based macroprudential policies in place, highlighting the importance of early macroprudential policy action to help prevent the build-up of real estate vulnerabilities.

Introduction

The 2008-09 global financial crisis demonstrated that real estate booms can unwind abruptly and lead to financial crises with large economic costs. Based on data for 17 countries over the past 140 years, Jordá et al. (2015) show that credit-fuelled house price bubbles are a particularly dangerous phenomenon: they increase the likelihood of financial crises and are associated with deeper recessions and slower recoveries when they collapse.[92]

Credit-fuelled real estate booms often go hand in hand with a loosening of lending standards. For example, Kelly et al. (2019) document significantly higher loan-to-value (LTV) and loan-to-income (LTI) ratios and increasing loan maturities in euro area countries that experienced property price boom/bust cycles during the 2000s.[93] Moreover, as shown in Gaudêncio et al. (2019) for euro area countries, higher LTV ratios, higher LTI ratios and longer loan maturities increase the probability

[92] Jordà, O., Schularick, M. and Taylor, A. M., "Leveraged Bubbles", *Journal of Monetary Economics*, Vol. 76(S), 2015, pp. 1-20.

[93] Kelly, J., Le Blanc, J. and Lydon, R., "Pockets of risk in European housing markets: then and now", *Working Paper Series*, No 2277, ECB, May 2019.

of default of borrowers.[94] Hence, lending standards are central to monitoring financial stability risks related to real estate booms.

While real estate cycles differ across euro area countries, a number of them have experienced real estate booms during the past years. In 2019, the European Systemic Risk Board (ESRB) carried out an assessment of residential real estate (RRE) risks and issued five warnings and six recommendations to selected countries.[95] While a loosening of lending standards is often highlighted as one of the key vulnerabilities during the recent expansion phase of the RRE cycle, detailed cross-country evidence on loosening lending standards has been missing due to a lack of data.

This special feature analyses trends in RRE lending standards and implications for financial stability in euro area countries based on a unique ECB dataset. The data were collected in 2019 by ECB Banking Supervision from significant institutions under its direct supervision, and contain information on lending standards for new loans for the years 2016-18.

The key finding of the analysis is that RRE lending standards of significant institutions have loosened in recent years, in particular in countries that have experienced real estate booms. First, lending standards for RRE loans, and in particular LTI ratios, eased in the euro area between 2016 and 2018. Given the recent deterioration in the euro area economic outlook, this vulnerability seems of particular relevance. Second, lending standards are looser in countries that have seen pronounced real estate booms, as represented by robust real estate price and mortgage loan growth. Third, lending standards have deteriorated less in countries with borrower-based macroprudential policies in place. The findings suggest that real estate vulnerabilities may have been growing in some euro area countries in recent years and that early macroprudential policy action can help contain the build-up of such vulnerabilities.

The remainder of this special feature is structured as follows. Section 2 provides an overview of the dataset and recent trends in RRE lending standards. Section 3 links these trends to overall macro-financial developments. Section 4 explores the impact of borrower-based macroprudential policies on lending standards. Section 5 concludes.

Recent trends in residential real estate lending standards

The analysis is based on data collected by ECB Banking Supervision about lending standards for new loans granted by large euro area banks between 2016 and 2018. The dataset comprises 145 country-specific mortgage loan portfolios

94 Gaudêncio, J., Mazany, A. and Schwarz, C., "The impact of lending standards on default rates of residential real estate loans", *Occasional Paper Series*, No 220, ECB, March 2019.

95 The Czech Republic, Germany, France, Iceland and Norway received warnings, while Belgium, Denmark, Luxembourg, the Netherlands, Finland and Sweden received recommendations.

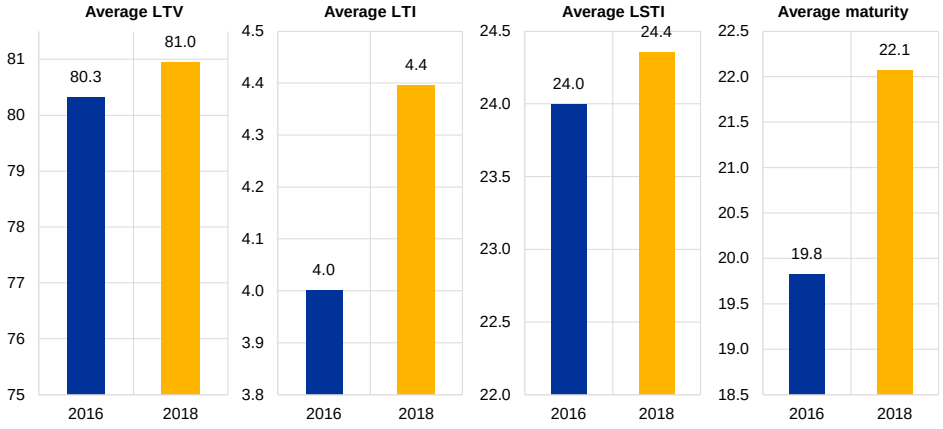
representing roughly 75% of the entire RRE loan market in the euro area.[96] While data coverage varies across countries, in most cases the dataset represents between 60% and 100% of the domestic RRE loan market. The dataset provides a comprehensive overview of loan characteristics (e.g. maturity), key risk indicators (e.g. LTV, LTI and loan service-to-income (LSTI) ratios), risk parameters (e.g. expected loss) and loan pricing spreads for new loans.[97] New loan volumes include drawn and undrawn amounts, as well as renegotiations with active customer involvement, and exclude non-performing or forborne exposures.

The novel dataset reveals that lending standards for RRE loans of significant institutions eased on aggregate in the euro area between 2016 and 2018. The average LTV, LTI and LSTI ratios all increased between 2016 and 2018 (see **Chart A.1**), indicating an easing of lending standards. While the average LTV and LSTI ratios increased slightly from 80.3% to 81.0% and 24.0% to 24.4% respectively, the average LTI ratio rose considerably from 4.0 to 4.4. These numbers imply that in 2018 euro area households taking out loans to buy a house or an apartment borrowed on average 81% of the purchase price, which represented 4.4 times their annual disposable income, and they spent 24.4% of their income to service the loan.

Chart A.1

Average LTV, LTI and LSTI ratios in the euro area all increased between 2016 and 2018

(ratios as a percentage or multiple, years)



Source: SSM credit underwriting data collection exercise in 2019.
Note: Aggregates based on bank micro data weighted by the respective shares in the total euro area new business volume of RRE loans.

[96] As the domestic market share of significant institutions differs across countries, the data may not always be representative of each national mortgage market. In the case of Germany, for example, the data cover only around one-third of the domestic RRE market (based on a national survey by the Bundesanstalt für Finanzdienstleistungsaufsicht and the Deutsche Bundesbank of small and medium-sized banks on real estate financing and the ECB credit underwriting data collection for the year 2018). For further information on the dataset, see *Trends and risks in credit underwriting standards of significant institutions in the Single Supervisory Mechanism*, ECB Banking Supervision, forthcoming.

[97] Data availability and the extent to which some of the indicators adhered to the common indicator definitions of the ESRB Recommendations 2019/3 and 2016/14 on closing real estate data gaps varied across institutions, especially for income-based indicators. This should be kept in mind when comparing lending standards across countries. For some countries and indicators data availability was insufficient to show country aggregates. Country scatter plots in this special feature therefore feature less than 19 euro area countries.

The substantial increase in the average LTI ratio was accompanied by a lengthening of maturities and a reduction in interest rates. The average loan maturity increased from 19.8 to 22.1 years between 2016 and 2018 (see **Chart A.1**). Over the same period, the average mortgage loan interest rate in the dataset decreased from 2% to 1.8%. Hence, the considerable easing in the average LTI ratio only translated into a slight easing in the average LSTI ratio.[98] But longer maturities also come with risks: (i) they reduce annual loan repayments and can thus increase the loss given default (LGD); and (ii) they can lead to higher interest rate risk for borrowers if coupled with short interest rate fixation periods.

Lending standards differ widely across euro area countries, with tighter standards in countries more affected by the euro area sovereign debt crisis. For example, the average LTV ratio and average LTI ratio over the period 2016-2018 varied between 53% and 87% and 3.1 and 6.7 respectively across euro area countries (see **Chart A.2**, left panel). One can distinguish three broad country groups: (i) countries with high average LTV and LTI ratios (AT, BE, DE, LU, SI, SK); (ii) countries with a high average LTV ratio, but a low average LTI ratio (EE, FR, IE, LT, NL, PT); and (iii) countries with low average LTV and LTI ratios (CY, ES, GR, IT).[99] Interestingly, the lowest average LTV and LTI ratios are observed in those countries that had higher non-performing loan (NPL) ratios in recent years.

The average LTI ratio has risen in the vast majority of euro area countries, while the average LTV ratio has risen in more than half of the countries. Increases in the average LTI ratio between 2016 and 2018 were mostly in the range of 0.1 to 0.9 (see **Chart A.2**, right panel). This means that households borrowed on average an additional 10% to 90% of their annual income when buying a house or an apartment. In total, nine euro area countries saw both the average LTV and the average LTI ratio increase between 2016 and 2018 (AT, BE, DE, ES, FR, IE, IT, PT, SK), with increases in the average LTV ratio in a range from 0.5 percentage points (p.p.) to 4 p.p. However, average lending standards can mask important pockets of risk. From a financial stability perspective, a focus on lending with elevated LTV or LTI ratios is therefore of particular importance, as these are usually more risky, other things being equal.[100]

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98 This is because longer maturities and lower interest rates reduce the LSTI ratio for a given LTI ratio. For an annuity loan, the relationship between LSTI, LTI, maturity (m) and interest rate (i) is: $LSTI = \frac{i}{(1-(1+i)^{-m})} \cdot LTI$

99 Even though common indicator definitions were provided for the data collection, some institutions provided data based on slightly different definitions. This should be kept in mind when comparing lending standards across countries. See also footnote 6.

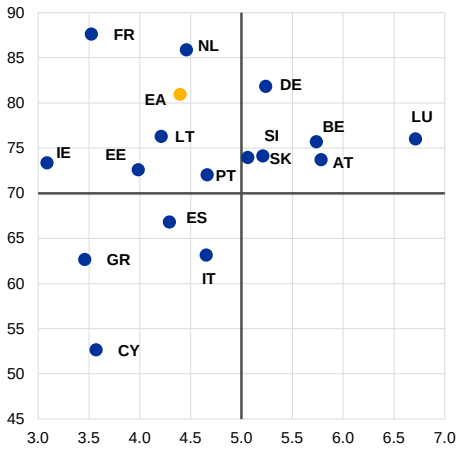
100 To fully characterise risks in RRE lending, combinations of various indicators (such as a high LTV in combination with a high LTI) need to be analysed; however, the scope of the data collection did not extend to gathering such combinations of indicators.

Chart A.2

Lending standards and their dynamics differ widely across euro area countries

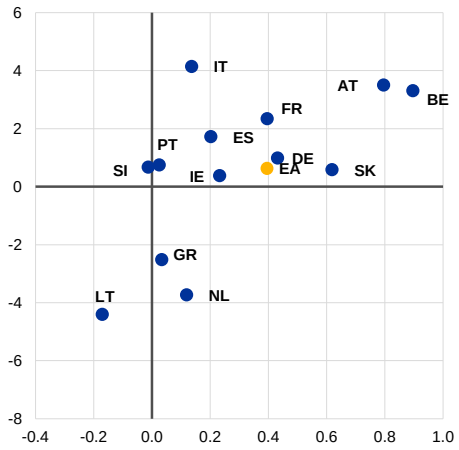
Average LTV and LTI ratios across countries over the period 2016-2018

(y-axis: average LTV ratio in %; x-axis: average LTI ratio as a multiple)



Changes in average LTV and LTI ratios in the 2016-18 period

(y-axis: p.p. change in LTV ratio; x-axis: p.p. change in LTI ratio)



Source: SSM credit underwriting data collection exercise in 2019.

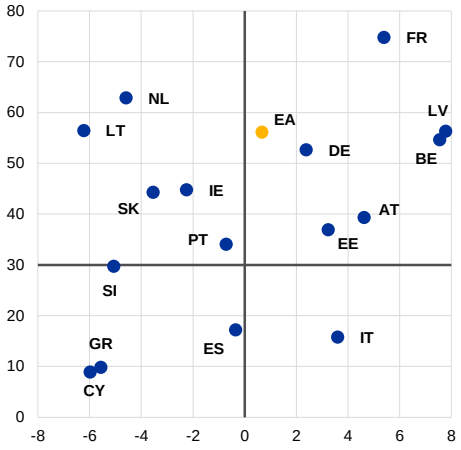
The share of new lending with an LTV ratio above 80% or an LTI ratio greater than 5 has been increasing for the euro area as a whole and it is substantial in a number of countries. For more than half of all RRE lending in 2018, households borrowed more than 80% of the purchase price of the house or apartment (see **Chart A.3**, left panel). In addition, for more than one-third of all RRE lending in 2018, households borrowed more than five times their annual disposable income (see **Chart A.3**, right panel).

Chart A.3

The share of loans with elevated LTV or LTI ratios has been increasing in the euro area

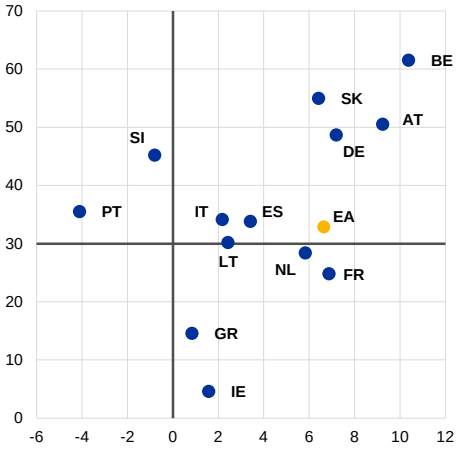
Share of new loans with an LTV ratio > 80%

(y-axis: 2018 share in %; x-axis: p.p. change in share in 2016-18)



Share of new loans with an LTI ratio > 5

(y-axis: 2018 share in %; x-axis: p.p. change in share in 2016-18)

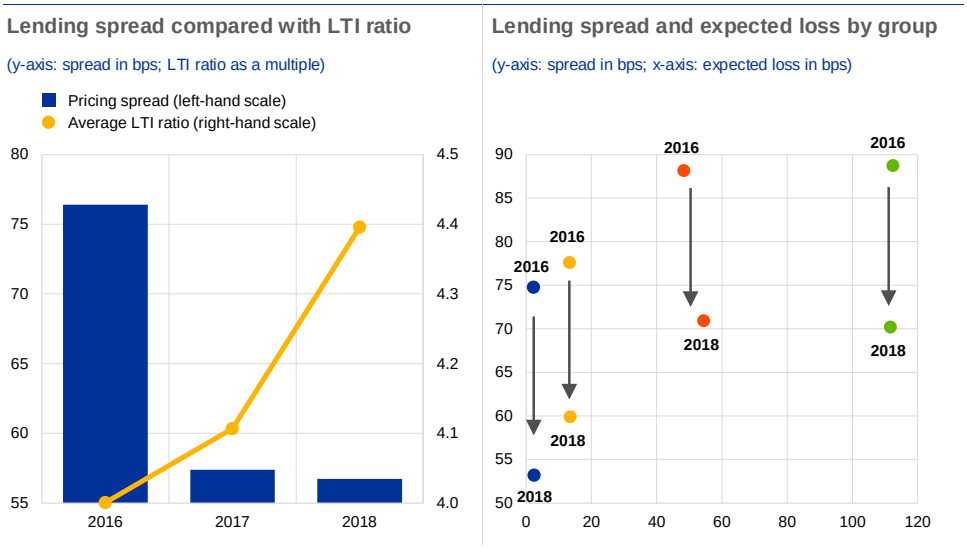


Source: SSM credit underwriting data collection exercise in 2019.

The loosening of euro area RRE lending standards was accompanied by decreases in bank lending spreads over the same period. The average spread relative to funding costs (i.e. the financing cost to obtain the liquidity used to originate the loan, including the reference rate) for real estate loans in the euro area decreased by 20 basis points (bps) between 2016 and 2018, from 76 to 56 bps (see **Chart A.4**, left panel). A decrease in average spreads relative to funding costs is visible across all classes of borrower riskiness, as represented by banks' own estimates of expected loss (see **Chart A.4**, right panel). Risk-adjusted compensation (i.e. the difference between the spread and expected loss) is lower for high-risk mortgage loans. Simulations based on aggregate banking sector data suggest that bank interest margins on the stock of residential mortgages could further decline in the coming years (see **Box A**).

Chart A.4

As lending standards have loosened, bank lending spreads have also decreased



Source: SSM credit underwriting data collection exercise in 2019.

Links between lending standards and macro-financial developments

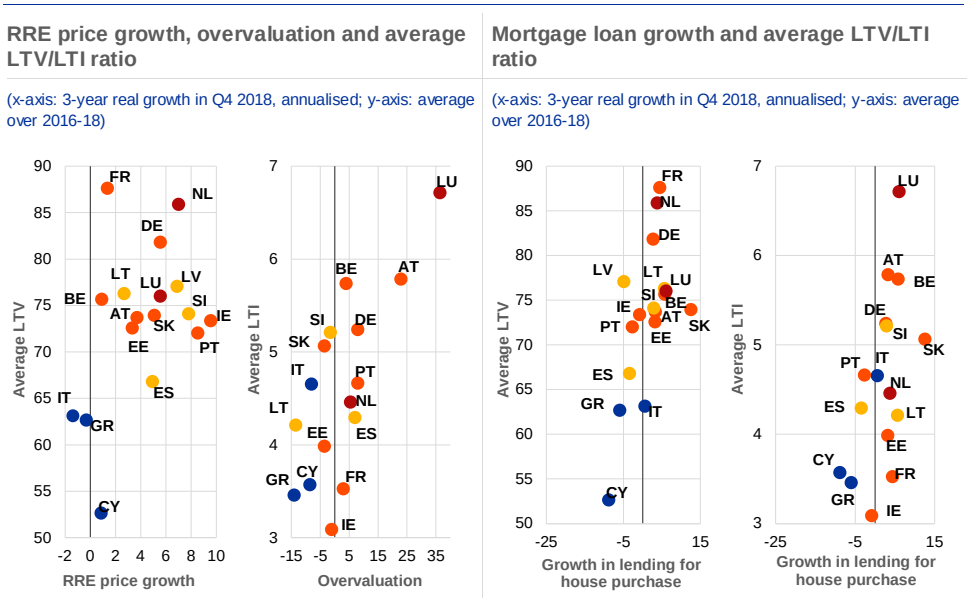
Developments in macro-financial indicators such as RRE price growth, price overvaluation or loan growth are important for assessing systemic risks from RRE lending standards. For example, even moderate LTV ratios might be problematic if house prices are overvalued. Similarly, moderate LSTI ratios might pose risks in the future, if interest rate fixation periods are short and interest rates increase suddenly. Finally, house price booms are more prone to end in busts when associated with deteriorating lending standards that feed a credit and house price spiral. This section uses country-level scatter plots and bank-level panel regressions to assess developments in lending standards against developments in these macro-financial variables.

Lending standards tended to be looser in countries which experienced stronger house price and mortgage loan growth and lower banking sector profitability.

New loans originated in countries with higher mortgage loan growth and, to some extent, also higher RRE price growth had on average higher LTV and LTI ratios over the 2016-18 period (see **Chart A.5**). In addition, in countries where prices appeared to be more overvalued households tended to take out larger loans in relation to their income (AT, DE, LU). Results from the panel regressions corroborate these findings and further reveal that banking sectors with lower bank profitability tended to originate loans with looser lending standards (see **Table A.1**). Moreover, the regressions confirm the finding from the previous section that LTV ratios tended to be more conservative in countries that were more affected by the sovereign debt crisis (i.e. with higher NPL ratios).

Chart A.5

Countries with higher mortgage loan growth, and higher RRE price growth or price overvaluation, had on average higher LTV and LTI ratios over the 2016-18 period



Source: SSM credit underwriting data collection exercise in 2019.
Notes: The colouring of countries is based on the 2019 risk assessment by the ESRB. Dark red = pronounced risk; orange = medium risk; yellow = low risk; blue = no exposures to RRE risks. For details, see "Vulnerabilities in the residential real estate sectors of the EEA countries", ESRB, September 2019. The overvaluation estimates are based on the simple average of the deviation of the price-to-income ratio from the long-term mean and the output of an econometric model.

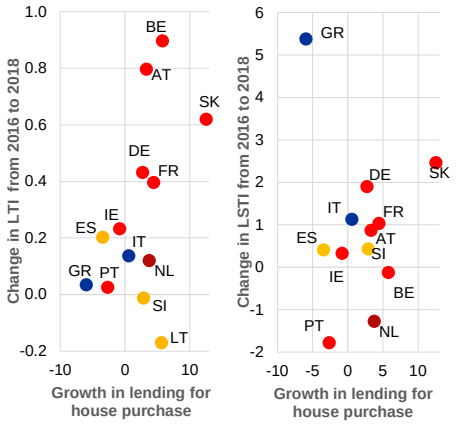
Income-based lending standards deteriorated more in countries with faster mortgage loan growth, while the average LTV ratio increased more in countries with lower interest rates. For example, countries with more dynamic mortgage loan growth saw larger increases in the average LTI and LSTI ratios (see **Chart A.6**, left panel). This is also supported by the regression results (see **Table A.1**, last two columns). In addition, it appears that in countries where mortgage interest rates were lower, the average LTV ratio tended to increase more over the 2016-18 period (see **Chart A.6**, right panel). Worryingly, especially the average LTI ratio seems to have deteriorated more in countries with more pronounced indications of price overvaluation.

Chart A.6

Lending standards deteriorated more in countries where mortgage loan growth was more dynamic and where house prices seem to be overvalued

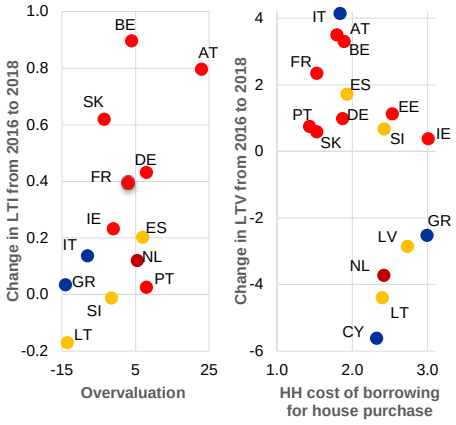
Mortgage loan growth and change in LTI and LSTI ratios

(x-axis: 3-year real growth in Q4 2018, annualised; y-axis: change from 2016 to 2018)



Mortgage interest rates, RRE price overvaluation and change in LTI and LTV ratios

(x-axis: percentages; y-axis: change from 2016 to 2018)



Source: SSM credit underwriting data collection exercise in 2019.
Notes: Changes are computed using a balanced sample of banks. Dark red = pronounced risk; orange = medium risk; yellow = low risk; blue = no exposures to RRE risks. For details, see "Vulnerabilities in the residential real estate sectors of the EEA countries", ESRB, September 2019. The overvaluation estimates are based on the simple average of the deviation of the price-to-income ratio from the long-term mean and the output of an econometric model.

Overall, lending standards are looser in countries where macro-financial indicators also signal RRE vulnerabilities, highlighting the importance of mitigating macroprudential policies. Data on lending standards complement aggregate indicators of RRE vulnerabilities such as overvaluation estimates, price and lending growth dynamics and household indebtedness and thus fill an important gap in the assessment of euro area countries' exposure to RRE risks.[101] Overall, the evidence of loose or loosening lending standards suggest that real estate vulnerabilities have been building up in some euro area countries in recent years.[102] A pre-emptive macroprudential communication stressing the importance of lending standards in RRE lending or, when deemed necessary, an early activation of borrower-based macroprudential instruments such as LTV or LSTI/LTI/DSTI/DTI limits could have contributed to limiting the build-up of such vulnerabilities, as also suggested by the recent ESRB warnings and recommendations.

101 See Lo Duca, M., Pirovano, M., Rusnák, M. and Tereanu, E., "Macroprudential analysis of residential real estate markets", *Macroprudential Bulletin*, ECB, March 2019, for details of the ECB framework for assessing financial stability risks stemming from RRE markets and for designing macroprudential policy responses.

102 See also the evidence in "Vulnerabilities in the residential real estate sectors of the EEA countries", ESRB, September 2019.

Table A.1

Estimated relationships between lending standards, macro-financial indicators and macroprudential policy action for euro area banks between 2016 and 2018

	Average			2-year change		
	LTV	LTI	LSTI	in LTV	in LTI	in LSTI
Bank average interest rate at origination	2.321	0.082	5.579**	-0.800	-0.091	1.443
Bank average maturity at origination	-0.114	0.026	-0.500**	-0.024	-0.049**	-0.219*
RRE price growth (year on year, %)	0.736***	0.066**	0.039	-0.103	0.055	0.202
RRE price-to-income ratio	0.029	0.036***	0.134*	-0.000	-0.011	-0.103**
Growth in bank lending to households for house purchase (year on year, %)	0.241	0.166***	0.518***	-0.136	0.037*	0.298**
Household cost of borrowing for house purchase (%)	0.510	0.476	-6.031**	-2.223	0.054	-0.788
NPLs (% of total loans)	-0.467***	-0.000	-0.037	0.138	-0.006	0.111*
Pre-tax return on assets (%)	-1.079	-0.525**	-0.161	4.734**	-0.161	2.055
Macroprudential policy dummy	-1.137*	-0.447***	-0.423	-1.671***	-0.162**	-1.806***
Year dummy 2017	-1.063	-0.060	0.685			
Year dummy 2018	-2.192*	-0.073	0.772			
Constant	71.418***	2.517***	36.426***	4.979	1.425***	1.967
Observations	295	270	265	97	88	84
Adjusted R-squared	0.312	0.419	0.180	0.0569	0.0517	0.322

Sources: ECB calculations based on the SSM credit underwriting data collection exercise in 2019.
Notes: The coefficients reported in the table are obtained from a bank-level panel regression of the respective lending standards variable on a number of bank-specific and country-specific factors and year fixed effects. Macroprudential policy dummy equals one for countries which implemented LTV, LTI/DTI or debt service-to-income (DSTI) limits before 2018. The asterisks indicate statistical significance based on robust standard errors: *** p<0.01, ** p<0.05, * p<0.1.

Gauging the impact of borrower-based macroprudential policies

In recent years, many euro area countries have activated borrower-based macroprudential instruments such as LTV, DSTI and maturity limits to increase the resilience of households and banks and to counter the build-up of risks. By end-2018, when the lending standards dataset ends, 11 countries had activated such measures.[103] The design and calibration of these instruments vary greatly across countries. In general, LTV limits are set between 70% and 100%, DSTI limits between 10% and 80%, and maturity limits between 30 and 40 years (see **Table A.2**).[104] In some countries, banks are allowed to grant a limited fraction of new lending above the macroprudential limits (e.g. IE, SK), while in others different limits apply to different categories of borrowers (e.g. FI, IE) or loan types (e.g. CY, EE, LV). It is important to note that the ECB does not have powers to activate borrower-based macroprudential instruments. The legal frameworks for borrower-based instruments are based on national legislation and are not harmonised across the EU.[105] While a comprehensive

[103] Countries with borrower-based macroprudential tools in place as at end-2018 were AT, CY, EE, FI, IE, LT, LV, NL, PT, SI and SK. In 2019 and 2020, borrower-based measures were enacted also in BE, FR and MT.

[104] The wide calibration window for DSTI limits results from the use of different definitions of income across countries.

[105] This heterogeneity hinders cross-country comparisons, but the national legal frameworks make it possible to account for the specific characteristics of national RRE markets.

legal framework for borrower-based instruments exists in most euro area countries, in some it is not yet in place or not all instruments are available (see **Table A.2**).

Table A.2

Overview of borrower-based instruments applied to RRE loans in place in euro area countries in 2018

	LTV	DSTI	LTI/DTI	Maturity	Legal framework (instruments [1])
AT [2]	80%	30%-40%		35 years	Yes (LTV, DTI, DSTI, mat.)
BE					Yes (LTV, DTI, DSTI)
CY	70% (80% for primary residence)	80% (65% for foreign currency loans)			Yes (LTV, DTI, DSTI, mat.)
DE					Yes (LTV, amortisation requirement)
EE	85% (50% if state guaranteed)	50%		30 years	Yes (LTV, DTI, DSTI, mat.)
ES					In progress [3]
FI	85% (95% FTB) [4]				Yes (LTV)
FR					Yes (LTV, DTI, DSTI, mat.)
GR					No
IE	90% (+5%) FTB; 80% (+20%) SSB; 70% (+10%) BTL		LTI<3.5 (+20%) FTB, (+10%) SSB		Yes (LTV, DTI, DSTI, mat.)
IT					No [5]
LT	85%	40%-60%		30 years	Yes (LTV, DTI, DSTI, mat.)
LV	90% (95% if state guaranteed)				Yes (LTV, DTI, DSTI, mat.)
LU					Yes (LTV, DTI, DSTI, mat.)
MT					Yes (LTV, DTI, DSTI, mat.)
NL	100%	10%-30% [6]			Yes (LTV, DSTI)
PT [2]	90% (80% if not permanent residence)	50% (+20% up to 60%) [7]		40 years and gradual convergence of average maturity towards 30 years, until 2022	Yes (LTV, DTI, DSTI, mat.)
SI	80%	50%			Yes (LTV, DTI, DSTI, mat.)
SK	90%; 80% (+20%)	80% (+20%) [8]	DTI≤8 (+5%)	30 years (+10%)	Yes (LTV, DTI, DSTI, mat.)

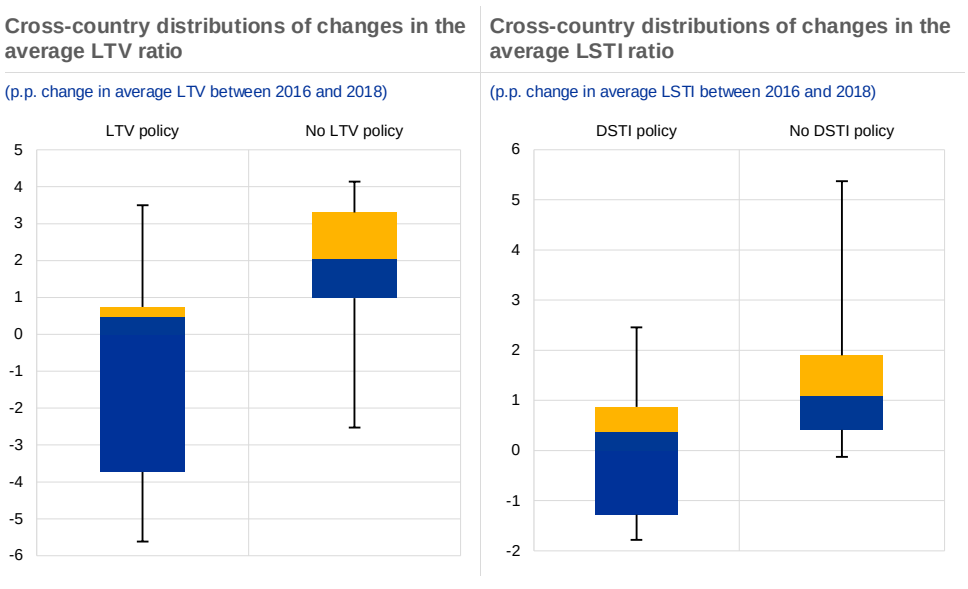
Sources: ESRB and national notifications.
Notes: FTB: first-time buyer; SSB: second and subsequent buyer; BTL: buy to let. The + sign indicates the exemption/speed limit (the percentage of new loans that can be granted above the limit of the lending standard). "Mat." denotes maturity limit. The borrower-based measures in AT, PT and SI (only the LTV limit in the case of the latter) are in the form of non-legally binding recommendations. National specific measures are not always comparable given different definitions of loans, value/collateral and/or income.
(1) Only instruments that can be introduced through a legally binding act.
(2) In AT and PT, borrower-based measures were enacted in 2018.
(3) The primary legal framework for borrower-based instruments in Spain was passed in November 2018. The preparation of secondary legislation for the operationalisation of BBM instruments by the Banco de España is currently under way.
(4) The limit in FI is on the loan-to-collateral (LTC) ratio, rather than the LTV ratio.
(5) While a legal framework specifically for borrower-based measures does not exist, Article 53(1)(b) of the Italian Banking Law stipulates that the Banca d'Italia "[…] shall issue general regulations concerning: […] b) the limitation of risk in its various forms".
(6) Depending on borrowers' income.
(7) The share of loans allowed with a DSTI ratio of up to 60% was tightened to 10% in February 2020. The calculation of the DSTI numerator considers both the impact of an interest rate rise and, in the case of a borrower aged 70 and over at the planned expiry of the agreement, a reduction in income of at least 20% of current annual income.
(8) To protect and also support a proportionate market access for low-income borrowers, disposable income is defined as net income less a minimum subsistence amount (only for the DSTI ratio).

The evidence suggests that borrower-based measures are effective in limiting a build-up of systemic risks from the deterioration of RRE lending standards, thereby reducing vulnerabilities. The cross-country distributions of changes in the average LTV and LSTI ratios lie to some extent in negative territory for countries where

borrower-based tools such as LTV and DSTI limits were in place (see **Chart A.7**). This implies that some countries with such measures in place registered improvements in lending standards between 2016 and 2018. By contrast, the cross-country distributions of changes in average LTV and LSTI ratios are tilted towards the positive side for countries where no borrower-based tools were in place. This implies that many countries without LTV or DSTI limits experienced deteriorating average LTV and LSTI ratios over the review period. These findings are corroborated by the econometric evidence: banks in countries with borrower-based instruments in place had more conservative average LTV and LTI ratios (-1.14 p.p. and -0.45 p.p. respectively), and they saw less of a deterioration in the average LTV, LTI and LSTI ratios (-1.7 p.p., -0.16 p.p. and -1.8 p.p. respectively) between 2016 and 2018 compared with banks in countries where such instruments were not yet activated (see **Table A.1**).

Chart A.7

Borrower-based measures help to contain the loosening of lending standards and thereby contribute to limiting a build-up of vulnerabilities



Source: SSM credit underwriting data collection exercise in 2019.
Notes: The yellow bar denotes the difference between the median and the 75th percentile, while the blue bar denotes the difference between the 25th percentile and the median. The lines indicate the min.-max. range.

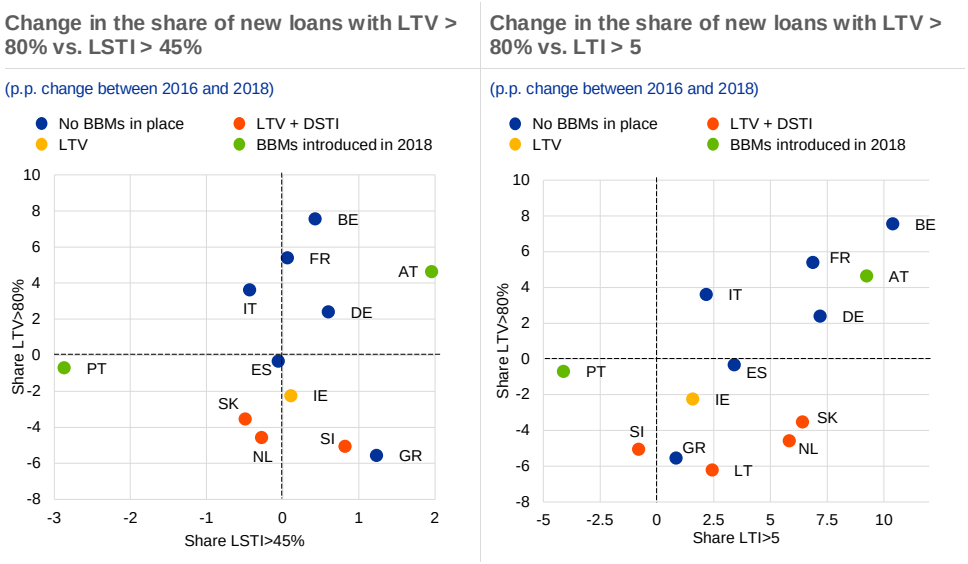
Countries that imposed borrower-based measures (either in form of legally binding limits or recommendations) often saw reductions in the share of the riskiest loan segments in terms of lending standards. For example, in countries with LTV limits in place, the share of loans with an LTV ratio greater than 80% declined by between 0.5 p.p. and 5 p.p. between 2016 and 2018 (IE, NL, PT, SI, SK) (see **Chart A.8**). In many countries without such measures in place, the share of loans with an LTV ratio above 80% increased during the same period (AT[106], BE, DE, FR, IT). In addition, in some countries with DSTI policies in place (NL, PT, SK), the share of loans with an LSTI ratio greater than 45% declined between 2016 and 2018, while it increased in some of the countries that did not have DSTI limits in place (AT, BE, DE,

[106] Austria adopted the recommendation on sustainable lending with specific limits in September 2018.

GR). Moreover, the largest increases in the share of loans with an LTI ratio above 5 were also seen in countries without DSTI limits in place (AT, BE, DE, FR).

Chart A.8

Countries where borrower-based measures are in place often saw reductions in the share of the riskiest loan segments in terms of lending standards



Source: SSM credit underwriting data collection exercise in 2019.
Notes: In AT and PT, borrower-based measures were enacted at the end of 2018. BBMs: borrower-based measures.

Conclusion

This special feature has shown that loosening lending standards may have contributed to an increase in RRE vulnerabilities in some euro area countries and that macroprudential policy can mitigate such vulnerabilities. In particular, the broad-based rise in average LTI ratios has increased the vulnerability of many households to negative income shocks. Given the significant deterioration in the euro area economic outlook since the coronavirus outbreak, this RRE vulnerability seems of particular relevance. While pre-emptive macroprudential policy action has contributed to containing vulnerabilities arising from loosening lending standards in some countries, more timely policy action would have been desirable in some euro area countries, as also reflected in the 2019 ESRB warnings and recommendations. A key lesson for macroprudential policy is that the use of borrower-based measures early on in the upswing of the RRE cycle can help contain the build-up of vulnerabilities that could otherwise arise from long periods of loose lending standards.

Box A

Quantifying the drift in banks' net interest margins on residential mortgages

Prepared by Desislava Andreeva, Marco Belloni, Benjamin Klaus, Dejan Krusec and Dilyara Salakhova

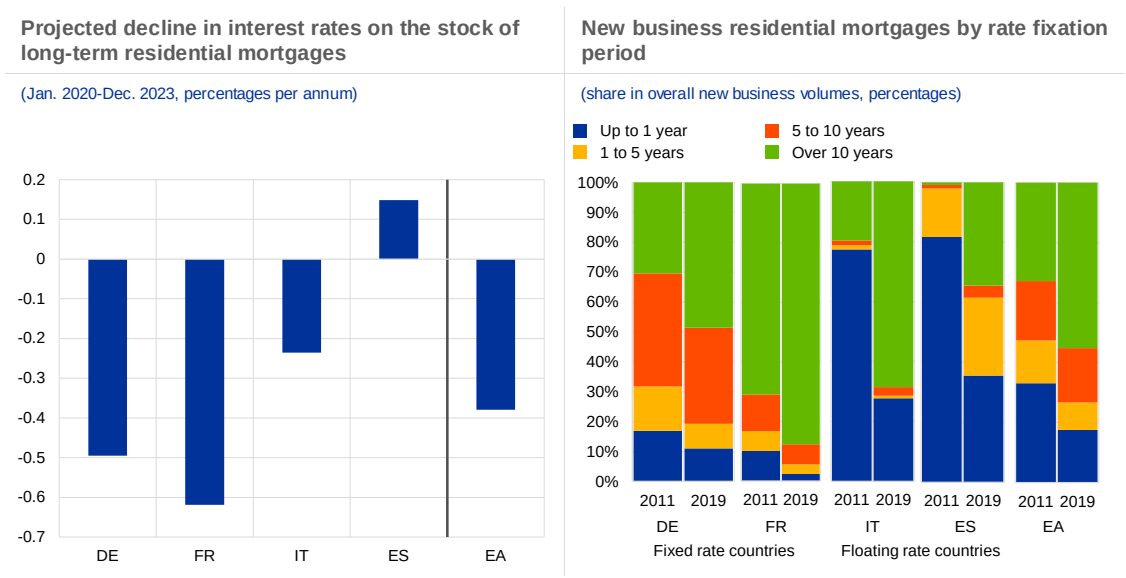
Net interest income is the dominant income source for euro area banks. Declines in interest rates result in higher intermediation volumes, supporting income. At the same time, they squeeze

margins, in particular when part of banks' funding costs are bound by zero and no longer decline in synch with market rates, while the yield on bank assets still does.

The focus here is on banks' long-term residential mortgage portfolios. Residential mortgages make up around 35% of banks' loan books, so an important determinant of margin squeeze will be the extent and pace at which effective mortgage rates adjust. At initiation the typical maturity of a mortgage is long, often 25 to 30 years, and a significant share is granted at fixed rates, with fixation periods well in excess of five years. Thus, declines in market rates affect banks' residential mortgage yield with a delay, resulting in a persistent downward drift. But compositional shifts shape the dynamics too. Strong declines in long-term interest rates also tend to be associated with a preference for fixed rate mortgages as households seek to lock in low interest rates. In parallel, banks may offer more fixed rate loans to boost unit margins as on these a term premium can be charged.

Chart A

Yields on euro area banks' mortgage books are expected to decline over the next four years if interest rates on new mortgages remain around January 2020 levels, despite compositional shifts in mortgage portfolios



Sources: ECB and ECB calculations.
Notes: Out-of-sample simulation of interest rates on the stock of banks' mortgage books assuming that new business rates will remain unchanged at their level in January 2020 over the period 2020-23. Mortgages are assumed to amortise linearly over time. The average maturity at origination is calibrated based on ECB Occasional Paper No 101. In each year, new mortgage origination equals the sum of reported net flows plus calibrated repayments of old loans. Two portfolios per country are tracked: a floating rate portfolio of mortgages with a rate fixation period of less than one year and a fixed rate portfolio of loans with a rate fixation period of more than one year. For the fixed rate portfolio, mortgages are assumed to be granted at a fixed rate equal to the weighted average new business rate for loans with a rate fixation period of more than one year. The rate fixation period is set at ten years, after which the residual balance is assumed to reprice in line with mortgage rates prevailing at that moment. The interest rate on the floating rate portfolio is assumed to be indexed to a reference rate (three-month or 12-month EURIBOR) with a fixed spread determined at the time of loan origination. The chart presents the weighted average interest rate across these two portfolios.

This box quantifies the expected downward drift in banks' net interest margins on residential mortgages using a simulation method. Banks' mortgage book structure is backed out by vintage using information on net flows and calibrated repayments.[107] The share of fixed rate loans and the applicable interest rate for each mortgage vintage are tracked too. This allows the projection of how interest rates on the stock of long-term residential mortgages would evolve if maturing loans, which carry high interest rates, were to be replaced with new loans at lower mortgage rates. Also at the end

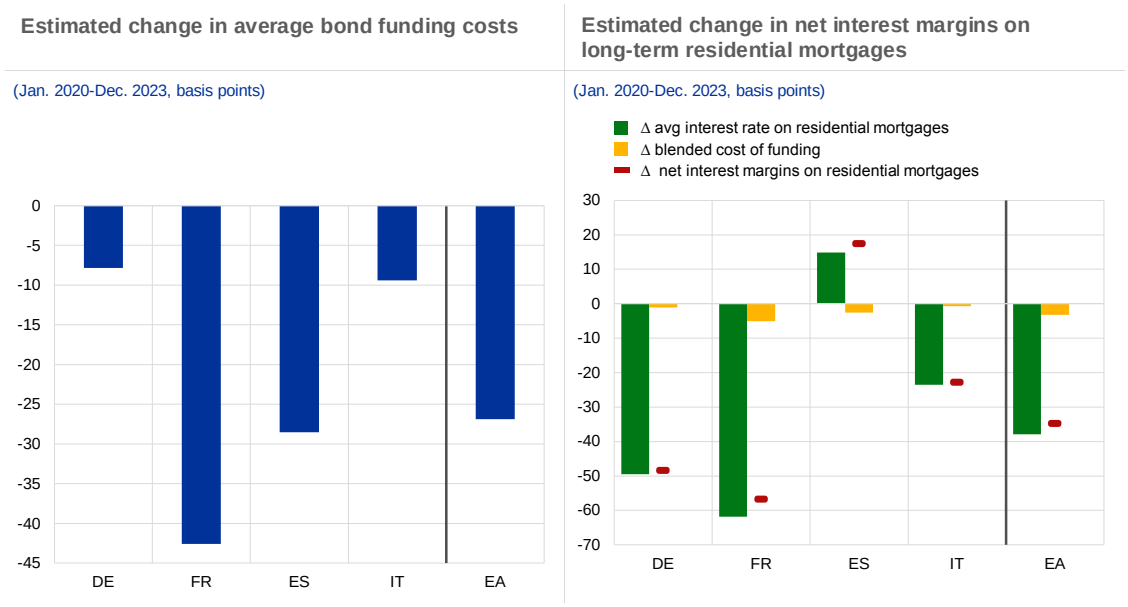
[107] Based on Adalid, R. and Falagiarda, M., "How repayments manipulate our perceptions about loan dynamics after a boom", *Working Paper Series*, No 2211, ECB, December 2018. For details on how the simulation algorithm has been adapted, see the notes to Chart A.

of the rate fixation periods, old loans are assumed to reprice at current, lower interest rates. Both effects result in a mechanic downward pressure on banks' mortgage yields. As regards funding costs, deposit rates are assumed to remain largely unchanged, while banks' bond market financing costs are projected.

The average interest rate on euro area banks' mortgage books is estimated to decline by 40 basis points over the next four years if new business rates remain at January 2020 levels. Banks in the large euro area countries which currently have a larger share of floating rate loans are likely to see a smaller downward drift (see **Chart A**, left panel), as they are able to partly counteract the downward pressure on mortgage yields by shifting towards fixed rate loans (see **Chart A**, right panel). Such fixed rate loans pay on average higher interest rates. By contrast, banks in the large euro area countries with an already high share of fixed rate mortgages are projected to see a substantial decline in the interest rates they earn on their long-term residential mortgage books.

Chart B

Lower costs of bond financing provide no noteworthy offset, resulting in a compression of net interest margins on euro area banks' long-term residential mortgage books



Sources: ECB, Dealogic, IHS Markit and ECB calculations.
Notes: Left panel: out-of-sample simulation of banks' average bond market funding costs assuming that maturing bank bond funding will be rolled over into new issuances at costs observed in early April 2020. The cost of new issuance is based on secondary market yields due to very limited issuance activity outside the covered segment. Right panel: the change in the blended cost of funding assumes that banks' bond market financing costs adjust, while the remaining components of bank funding have either already fully repriced (e.g. money market funding) or do not adjust (e.g. deposits).

The coronavirus outbreak may have material implications which are not reflected in the above quantification. The elevated uncertainty and sharp decline in macroeconomic activity will likely have profound effects on euro area households' demand for, banks' supply of and ultimately the pricing and origination volume of residential mortgages. The simulation method mechanically extrapolates recent trends, which largely occurred before the worldwide spread of the disease. Also, some banks have announced "payment holidays" on mortgage debt for households, with potentially large effects on the profitability of banks' residential mortgage books. The pandemic has also led to a material increase in banks' bond market funding costs, which is taken into account when projecting funding costs.

Bank funding costs are expected to decline marginally, providing little offset. The average bond funding costs of euro area banks are projected to decline over the next years despite the recent

spike in issuance costs as the current cost of bond issuance is still below the weighted average cost of the stock of bank bonds. The rollover of maturing funding at the rates observed in early April 2020 should lower average bond funding costs by around 25 basis points for the euro area by end-2023 (see **Chart B**, left panel).[108] Since bonds constitute only 12% of banks' total liabilities, the decline in banks' average funding costs is small (see **Chart B**, right panel), assuming that deposit rates will remain largely unchanged.[109] The combination of a significant downward drift in interest rates on the stock of loans and a marginal decline in overall funding costs results in a compression of overall net interest margins on the mortgage book of around 35 basis points (see **Chart B**, right panel). This effect will put further pressure on the already low bank profitability in a challenging environment.

[108] It should be noted that the coronavirus outbreak has led to a significant worsening of banks' wholesale bond market funding costs. If instead maturing bonds were to be rolled over at the rates observed in September last year, a significantly stronger decline of around 70 basis points would be projected over the same period.

[109] The methodology used does not capture: (i) volume effects, which could in principle mitigate the impact of compressed margins on net interest income; (ii) behavioural changes by banks, which may adjust the composition of their assets and liabilities to counteract the downward drift in banks' net interest margins; (iii) prepayments of mortgage debt; and (iv) the impact of hedging.

B Derivatives-related liquidity risk facing investment funds

Prepared by Linda Fache Rousová, Marios Gravanis, Audrius Jukonis and Elisa Letizia[110]

Stricter margining requirements for derivative positions have increased the demand for collateral by market participants in recent years. At the same time, euro area investment funds which use derivatives extensively have been reducing their liquid asset holdings. Using transaction-by-transaction derivatives data, this special feature assesses whether the current levels of funds' holdings of cash and other highly liquid assets would be adequate to meet funds' liquidity needs to cover variation margin calls on derivatives during stressed market periods, once the derivative portfolios become fully collateralised. The evidence so far indicates that euro area funds were able to meet the fivefold increase in variation margin during the height of the coronavirus-related market stress. But some of them were likely to have done so by engaging in repo transactions, selling assets and drawing on credit lines, thus amplifying the recent market dynamics.

Introduction

Out of the almost 60,000 euro area investment funds, around 35% use derivatives. For instance, two-thirds of funds with a net asset value above €500 million have a derivative exposure. At the end of March 2020, the notional value of euro area funds' derivative exposures stood at almost €13 trillion and was concentrated in a few euro area countries, namely Luxembourg (53%), Germany (20%) and Ireland (18%), all of which also have a sizeable fund sector. Interest rate, equity and foreign exchange (FX) derivatives together accounted for almost 90% of the notional value. Funds use derivatives either for hedging purposes or to increase their potential exposure to risky assets, and the composition of their derivative portfolios depends heavily on their mandates (see **Chart B.1**, left panel).

Recent regulatory reform in the derivatives market has introduced the daily exchange of margin for the vast majority of derivative exposures. The exchange of margin in the form of high-quality collateral reduces counterparty credit risk. But the requirements also increase liquidity risk as counterparties need to meet margin calls with high-quality collateral at short notice. In the prevailing low-yield environment, holdings of cash and other liquid assets have, however, become increasingly costly, which has incentivised funds to reduce such holdings.[111]

The collateralisation of funds' derivative portfolios has increased, reflecting the stricter regulatory requirements (see **Chart B.1**, right panel). Specifically, the European Market Infrastructure Regulation (EMIR)[112] requires the posting of two types of margin: initial and variation margin, which are to be exchanged on a daily or

[110] Audrius Jukonis and Elisa Letizia worked on this article while being affiliated with the ECB. Francesca Lenoci provided valuable data support.

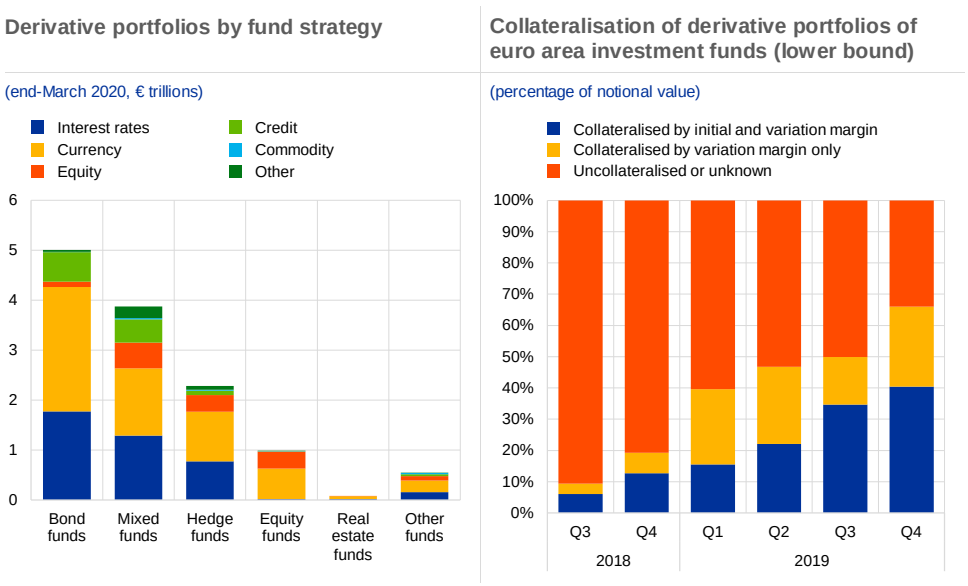
[111] See, for example, *Financial Stability Review*, ECB, November 2019.

[112] Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories (OJ L 201, 27.7.2012, p. 1).

even intraday basis. Variation margin reflects the price movement of a portfolio of derivative contracts: if the market value of a portfolio decreases, a variation margin is called. Initial margin is an additional collateral buffer that protects a counterparty against a potential future decline in the market value of a portfolio over a short period, should the other counterparty default. For centrally cleared contracts, the exchange of both initial and variation margin is required. For non-centrally cleared contracts, the requirement to exchange variation margin was phased in in two steps and applies to *all* European counterparties on contracts originated after 1 March 2017. The initial margin requirements for non-centrally cleared contracts are less widespread as they continue to be phased in until September 2022.[113] Since euro area funds have around two-thirds of their portfolios non-centrally cleared, the collateralisation of their portfolios by variation margin exceeds that by initial margin. Moreover, in times of severe market stress, variation margin tend to be more procyclical and volatile than initial margin.

Chart B.1

The size, composition and collateralisation of euro area funds' derivative portfolios



Sources: EMIR data, sector classification from Lenoci and Letizia (2020) and authors' calculations.
Notes: Left panel: data refer to 30 March 2020. Right panel: based on selected dates close to the end of the respective quarter and the field "collateralisation" in EMIR reporting. The extent of collateralisation may be under-reported in EMIR data, owing to the limited quality of the data (e.g. missing values).

Against this background, this special feature assesses funds' liquidity risk related to variation margin calls using two complementary approaches. It first considers the evidence on margin calls and fund liquidity drains during the recent market sell-offs in March. Second, it runs simulations of how funds may be affected in future periods of extreme stress, once their portfolios become fully collateralised by variation margin.

[113] For the details of risk-mitigation techniques applicable to non-centrally cleared derivatives, see Article 11 of EMIR and the related Commission Delegated Regulation (EU) 2016/2251 of 4 October 2016 supplementing Regulation (EU) No 648/2012 of the European Parliament and of the Council on OTC derivatives, central counterparties and trade repositories with regard to regulatory technical standards for risk-mitigation techniques for OTC derivative contracts not cleared by a central counterparty (OJ L 340, 15.12.2016, p. 9). On 3 April 2020, the deadlines for completing the final two implementation phases of the margin requirements were extended by one year (see this press release).

For both approaches, two concepts of liquidity risk are considered: sudden demand for cash in one day and demand for high-quality liquid collateral spread over several days. The rationale for the two concepts is that cash is the preferred asset class to meet an overnight or intraday call as it can be transferred between counterparties very quickly. Therefore, cash is considered as the means to cover a margin call triggered by an extreme one-day market move. In prolonged market turmoil, funds should, instead, have time to engage in collateral transformation (e.g. using repo markets) and thus a broader liquidity buffer seems relevant. It is chosen to be composed of cash and high-rated government bonds.[114] For the extreme one-day market move, it is also assumed that the timing when margin is posted and received can differ across portfolios of a fund and thus the payments cannot be netted. In the prolonged market turmoil, the exact timing is assumed to be less critical and the margin payments are netted.

The special feature uses transaction-by-transaction derivatives data collected under EMIR,[115] enriched by a sector classification[116] and liquid holdings of funds. The EMIR data are daily and cover both over-the-counter (OTC) and exchange-traded derivatives, all five main classes (i.e. commodity, equity, foreign exchange, credit and interest rate derivatives) and both centrally and non-centrally cleared trades. The data provide detailed information on both the counterparties and the characteristics of the contract, including information about (the stock of) margin posted and received. Given their large volumes and quality limitations, the data are extensively manipulated and carefully cleaned. The sector classification facilitates filtering of derivatives held by euro area investment funds and obtaining breakdowns by type of fund.

Margin calls on funds during the coronavirus market turmoil

During the recent coronavirus market turmoil, the daily variation margin calls on funds' derivative exposures rose fivefold. Based on the partial reporting of variation margin in EMIR data, the daily variation margin calls on euro area funds increased from around €2 billion in the first half of February 2020 to over €10 billion in the week beginning 16 March 2020 (see **Chart B.2**, left panel). The highest increase – by around 6.5 times – was reported on portfolios composed of equity derivatives, followed by interest rate (fivefold increase) and currency (fourfold increase) portfolios. The announcement of the pandemic emergency purchase programme (PEPP) on 18 March 2020 helped reduce market volatility (e.g. as measured by the VIX index for

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114 High-rated equities are not included in the broad liquidity buffer as they may quickly turn illiquid and lose value in severe market distress such as the recent coronavirus turmoil. The size of the repo market for equities is also limited and the haircuts applied in this market are high.

115 While the reporting obligation applies to all EU-located entities that enter into a derivatives contract, this special feature is based on a sub-set of the data, to which the ECB has access. In most cases, these data are reported by euro area counterparties. See Article 2 of Commission Delegated Regulation (EU) No 151/2013 of 19 December 2012 supplementing Regulation (EU) No 648/2012 of the European Parliament and of the Council on OTC derivatives, central counterparties and trade repositories, with regard to regulatory technical standards specifying the data to be published and made available by trade repositories and operational standards for aggregating, comparing and accessing the data (OJ L 52, 23.2.2013, p. 33).

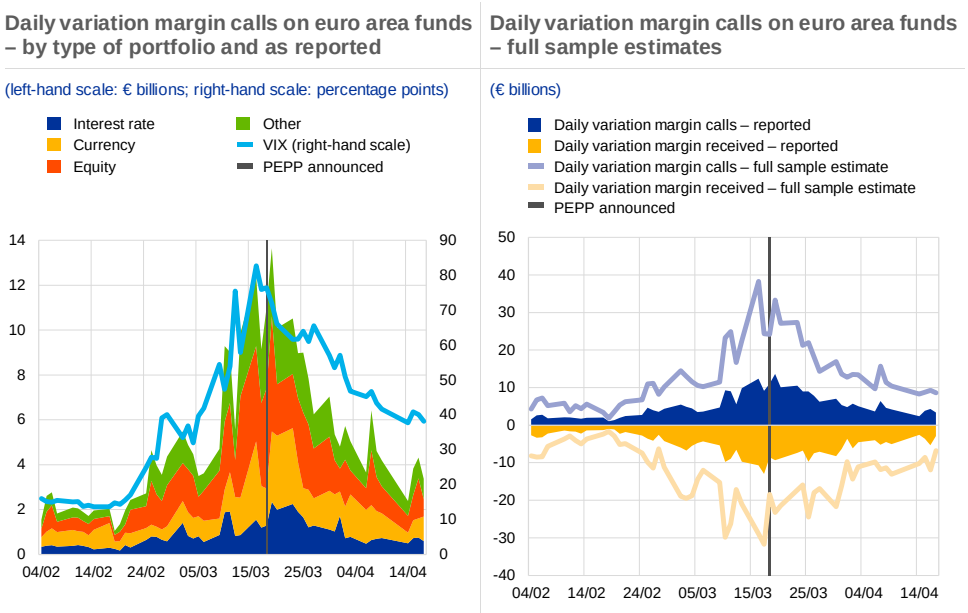
116 Lenoci, F. and Letizia, E., "Classifying the counterparty sector in EMIR data", ECB Working Paper, forthcoming.

the equity market) and thus contributed significantly to the subsequent decline in margin calls.

The actual size of daily variation margin calls on funds during the turmoil could have been in the order of magnitude of several tens of billions of euro. While the exchange of daily variation margin has become a common market practice, the information in EMIR data on the size of variation margin on funds' portfolios is often missing or not updated on a daily basis. Estimates accounting for such a gap suggest that the daily variation margin calls on euro area funds' portfolios could have reached a daily peak of almost €40 billion on 16 March 2020 (see **Chart B.2**, right panel).

Chart B.2

The size and composition of variation margin calls on funds' derivative portfolios during the coronavirus market turmoil



Sources: EMIR data, sector classification from Lenoci and Letizia (2020), Bloomberg and authors' calculations.
Notes: Left panel: calculated as the sum of all positive margin calls on euro area investment funds, where a positive margin call occurs if either variation margin posted increases or variation margin received decreases from one day to another. The classification of derivative portfolios into asset classes is based on notional amounts using an 80% threshold: if more than 80% of the notional value of contracts in the portfolio belongs to one asset class, the portfolio is classified in this asset class. Right panel: estimates are computed by rescaling the variation margin calls proportionally to the notional amount that they represent for a specific asset class, in order to take into account the fact that some trades are reported as collateralised by variation margin (in the field "collateralisation" in EMIR reporting), but the size of the margin (in the fields "variation margin posted" and "variation margin received") is either not reported at all or not updated on a daily basis.

Euro area funds also received variation margin during the turmoil, reflecting a mix of diverse investment strategies and different positioning within the sector. While some funds were required to post margin (blue area), others received them at the same time (yellow), so that the net margin call on the whole sector remained limited throughout most of February and March 2020 (see **Chart B.2**, right panel). Such netting, however, masks the individual positioning within the sector, where each fund needs to have sufficient liquidity to meet its own margin calls. Evidence from the EURIBOR futures market also suggests that the positioning of funds is relatively

polarised compared with other market participants, with many funds taking either clearly "long" or clearly "short" positions in the market.[117]

The available data indicate that a substantial share of euro area funds with derivative exposures faced a liquidity squeeze from the high margin calls. For more than a quarter of these funds, the variation margin call exceeded their pre-stress cash positions on at least one day during the turmoil (see **Table B.1**). In addition, the pre-stress buffer of cash and high-rated government bonds of 6% of these funds did not have a sufficient capacity to cover the cumulative two-week increase in variation margin during the market turmoil. These results should, however, be interpreted with caution as they are based on a fairly limited sample of around 3,200 funds, for which both reported variation margin calls and liquidity buffers are available. Moreover, in the high-volatility environment and taking into account the diverse positioning of funds, around half of these funds were likely to have received large liquidity inflows from variation margin calls shortly before the market turned against them.

Table B.1

Share of funds with variation margin calls exceeding their pre-stress liquidity position

(percentages)

	All funds	Bond funds	Equity funds	Hedge funds	Mixed funds	Other funds
Maximum daily margin call (compared with cash buffer)	28%	31%	12%	32%	34%	40%
Maximum cumulative two-week margin call (compared with broad liquidity buffer)	6%	4%	11%	9%	5%	6%
Total number of funds in the sample	**3,189**	**1,457**	**663**	**90**	**902**	**77**

Sources: EMIR data, sector classification from Lenoci and Letizia (2020), Refinitiv and authors' calculations.
Notes: The two maximum calls refer to the maximum daily variation margin call and the maximum cumulative variation margin call over a two-week period between 4 February and 17 April 2020. For daily margin calls, margin posted and received (obtained as the difference between the stock values reported in EMIR data) are not netted as the timing of payment outflows and inflows may differ. For cumulative margin calls, the exact timing is assumed to be less critical and thus the margin payments are netted. The broad liquidity buffer includes cash and holdings of high-quality government bonds, i.e. Level 1 euro-denominated bonds issued by European governments and non-euro-denominated government bonds rated at least AA.

While a substantial share of euro area funds seems to have faced liquidity strains from the high margin calls, they were generally able to meet them.[118] They could have raised cash during the turmoil by engaging in repo transactions, selling assets (e.g. money market fund shares) or drawing on credit lines. Such cash needs were beyond what might have been needed to meet other liquidity outflows during this time, for example due to redemptions (see **Chapter 4**), thus emphasising the potential role of investment fund margin calls in amplifying recent market dynamics. Equity and hedge funds with derivative exposures may have played a particularly important role in amplifying the downward price spirals since around 10%

[117] See Boneva, L., Böninghausen, B., Fache Rousová, L. and Letizia, E., "Derivatives transactions data and their use in central bank analysis", *Economic Bulletin*, Issue 6, ECB, 2019.

[118] A US client of ABN Amro Clearing bank, presumably a volatility-focused hedge fund, is one reported case of a failure to meet the margin requirements in the extreme stress situation (see this risk.net article).

of them are found to have experienced liquidity strains from margin calls over a prolonged period during the market turmoil.[119]

Stress simulations of variation margin calls

Going forward, further extreme market shocks may occur, which calls for the conduct of forward-looking simulations of margin calls under stress scenarios. Moreover, the structural trend of increasing collateralisation of funds' derivative portfolios is also expected to continue. Therefore, the simulations presented in this section consider two extreme stress scenarios for the three main derivative classes held by funds and assume full collateralisation of funds' portfolios by variation margin.

To derive potential margin calls, pricing functions are developed for the ten most prevalent types of derivatives held by funds. The contracts covered include interest rate derivatives (e.g. interest rate swaps, overnight index swaps (OIS), forward rate agreements, Bund futures, and EURIBOR and LIBOR futures), equity derivatives (e.g. call/put European/American options, futures and contracts-for-difference) and FX derivatives (e.g. EUR/USD forwards). The pricing functions exploit reported contract characteristics and external data sources, and are calibrated using EMIR data.[120]

The two stress scenarios chosen are stylised and motivated by the market moves during the 2008 financial crisis and the recent coronavirus stress (see **Table B.2**)**.** Specifically, the first scenario considers an extreme one-day movement, with a 25 basis point parallel downward shift in interest rates, a 5% decline in major stock market indices and a 2% depreciation of the US dollar vis-à-vis the euro. The second scenario reflects prolonged market turmoil, with a 75 basis point parallel downward shift in interest rates, a 15% decline in stock markets and a 5% depreciation of the US dollar. Although these extreme market moves did not occur as a combined shock on the same day or in the same period, they were seen separately in the three markets during the 2008 or 2020 stress episodes.

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[119] Recent studies by the Bank of England and the Bank for International Settlements (BIS) emphasise the role of variation margin calls on non-banks in amplifying market dynamics in the UK and US markets respectively (see Schrimpf, A., Shin, H. S. and Sushko, V., "Leverage and margin spirals in fixed income markets during the Covid-19 crisis", BIS Bulletin No 2, April 2020; and, "Interim Financial Stability Report", Bank of England, May 2020). In particular, the BIS study points out that (leveraged) hedge funds involved in relative value strategies were unable to meet variation margin calls on their US Treasury futures and their positions were unwound by dealers/exchanges, which further exacerbated the Treasury price declines.

[120] Missing contract characteristics (e.g. starting dates, frequency of payments, etc.) are set to most common market practice. Current and historical prices of underlying instruments that are necessary to price plain-vanilla contracts (e.g. yield curves in different currencies, equity indices and stock prices, exchange rates) are sourced from external data providers. Whenever possible, reported market prices (e.g. fixed interest rates, exchange rates, futures prices) are matched to the end-of-day mid-prices and inconsistent or missing values are either transformed, dropped or replaced. Volatility parameters for contracts that involve optionality are calibrated directly to the EMIR data to obtain a smooth volatility surface using a sequential resampling algorithm that exploits the large scale of the data. For more details, see Jukonis, A., "EPIC: an EMIR based derivative pricing and stress testing tool", unpublished manuscript, 2019.

Table B.2

Two stress scenarios compared with extreme market movements in 2008 and 2020

		Interest rate decline (basis points)		Stock market decline (%)		USD depreciation vis-à-vis EUR (%)
		Euro area	US	Euro area	US	
One-day movement	Maximum move in 2008	30	66	8	9	2.9
	29 September 2008	8	50	5	9	1.4
	10 October 2008	18	34	8	1	1.2
	Maximum move in 2020	4	26	11	12	1.5
	12 March 2020	-8	8	11	10	0.9
	18 March 2020	-1	15	4	5	1.3
	Scenario 1	**25**	**25**	**5**	**5**	**2.0**
Two-week movement (prolonged market turmoil)	Maximum move in 2008	74	162	23	26	8.6
	15 to 29 Sep. 2008	17	46	7	7	-1.4
	26 Sep. to 10 Oct. 2008	74	66	23	26	7.8
	Maximum move in 2020	13	118	28	23	6.2
	27 Feb. to 12 Mar. 2020	4	110	24	17	-1.9
	4 to 18 Mar. 2020	-4	71	28	23	2.5
	Scenario 2	**75**	**75**	**15**	**15**	**5.0**

Sources: Bloomberg and authors' calculations.
Notes: Interest rate declines are measured as the change in the three-month EUR-OIS and US T-bill rates for the euro area and the US respectively. Stock market declines refer to the percentage change in the EURO STOXX 600 and S&P 500 indices. Since a substantial part of euro area funds' derivative portfolios references US markets, US figures are presented in addition to the euro area ones.

According to the simulations, 33% of funds with derivative exposures may not have sufficient cash buffers to absorb variation margin calls under the one-day stress scenario. The share is even higher for bond and "other" funds, standing at 35% and 40% respectively (see **Chart B.3**, left panel). The estimated cash shortfalls amount to €4.5 billion for a sample of around 3,500 funds, for which data on both derivatives and liquidity buffers are available (see **Chart B.3**, right panel). By rescaling the cash shortfalls to the full sample of 14,000 funds for which variation margin calls can be calculated (typically funds with sizeable derivative exposures), the overall cash shortfall is estimated to reach €31 billion. Around 53% of the variation margin call originates from equity derivatives, followed by interest rate (26%) and currency (21%) derivatives.[121]

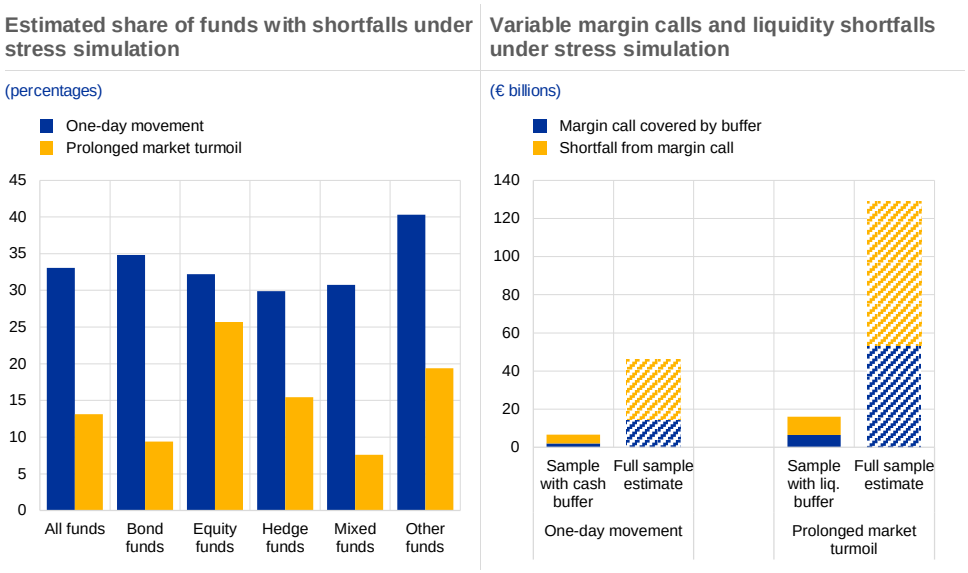
Under the prolonged turmoil scenario, 13% of funds with derivative exposures do not have sufficient liquidity buffers to fully absorb the simulated margin call. Particularly affected are equity funds, where the share of funds with an insufficient buffer reaches 25%. This result relates to the sizeable margin calls on equity derivatives simulated in this scenario (68% of the overall call) and the relatively low holdings of high-rated government bonds by equity funds. The estimated liquidity shortfall for the limited sample of around 3,500 funds is €9.4 billion, which – after

[121] This result emphasises the importance of moving beyond the analysis of only interest rate derivatives, which have been the focus of the few existing studies on this topic so far. See, for example, *Financial Stability Report*, Bank of England, 2018; Bardoscia, M., Bianconi, G. and Ferrara, G., "Multiplex network analysis of the UK OTC derivatives market", Staff Working Paper No 726, Bank of England, 2019; Bardoscia, M., Ferrara, G., Vause, N. and Yoganayagam, M., "Simulating liquidity stress in the derivatives market", Staff Working Paper No 838, Bank of England, 2019; and Glasserman, P. and Wu, Q., "Persistence and procyclicality in margin requirements", *Management Science*, Vol. 64, 2018.

rescaling to the full sample – results in an estimated broader liquidity shortfall of around €76 billion.

Chart B.3

Liquid holdings of some euro area funds are estimated to be insufficient to cover variable margin calls under two extreme stress scenarios



Sources: EMIR data, sector classification from Lenoci and Letizia (2020), Refinitiv and authors' calculations.
Notes: Based on end-2018 data. The sample with cash and liquidity buffers includes 3,523 funds, for which cash and liquidity buffers are available. The full sample includes 13,969 funds, for which EMIR data indicate a holding of a derivative portfolio and variation margin can be calculated. The rescaling to the full sample assumes that the ratio of the cash shortfall to the size of the variation margin call is the same in the two samples. It is assumed that all derivative holdings are collateralised by variation margin. The margin on funds' portfolios is netted at the fund level only under the scenario of the prolonged market turmoil.

Conclusions

This special feature assesses the liquidity risk faced by euro area investment funds from variation margin calls on their derivative exposures. According to the simulations of extreme stress scenarios and assuming the completion of the structural move to full collateralisation by variation margin, additional liquidity needs are estimated to be around €30 billion for an extreme one-day market shock and €70 billion under prolonged market turmoil. The estimates appear realistic in view of the evidence from the recent coronavirus market turmoil, when daily variation margin calls on funds likely reached tens of billions of euro. Considering the fairly large derivative exposures of euro area funds (around €13 trillion of notional value), the estimates covering three derivative classes are also sensible when compared with the same type of simulations run on interest rate swap portfolios of European insurers[122] and pension funds (see **Box A** and a study by the Danish central bank[123]).

[122] De Jong, A., Draghiciu, A., Fache Rousová, L., Fontana, A. and Letizia, E., "Impact of variation margining on EU insurers' liquidity: an analysis of interest rate swaps positions", *Financial Stability Report*, European Insurance and Occupational Pensions Authority, December 2019.

[123] See "Pension companies will have large liquidity needs if interest rates rise", Danmarks Nationalbank, November 2019.

At the same time, the simulation results rely on several assumptions and, as such, have to be interpreted with caution. For example, after a shock, funds may rebalance their portfolio, but the analysis assumes that portfolios are static.[124] In addition, the cash/liquidity buffers considered are relatively narrow as funds may have the option to use less liquid assets to cover margin calls. Moreover, the analysis assumes that the move towards full collateralisation of funds' portfolios by variation margin calls has been completed. On the other hand, investment funds' liquidity needs would be aggravated if margin calls were combined with redemption requests and/or falls in prices of assets used as collateral such as in the recent market turmoil. Recent events have also highlighted how a combination of liquidity risks in investment funds can play a key role in amplifying adverse market dynamics.

The results call for the development of macroprudential tools to address the liquidity risk in the fund sector as this risk can have wider systemic implications. Such tools should focus on containing the build-up of vulnerabilities before risks materialise. Regulatory requirements aimed at strengthening funds' ability under stress to meet potential funding needs, including variation margin calls, could be effective in this respect. Such tools would make the sector more resilient to future financial turbulence and decrease the need for ex-post interventions (see **Chapter 5**).

Box A

Liquidity stress simulations of euro area pension funds' interest rate swap portfolios

Prepared by Linda Fache Rousová, Audrius Jukonis and Eszter Tanai

Euro area pension funds are currently exempted from the central clearing obligation under EMIR, and may continue to be exempt until 18 June 2023.[125] The exemption means an important category of active derivatives users are currently left out of the scope of the central clearing obligation. The primary reason behind this exemption is that without it, pension funds could face an increase in liquidity risk as they would be required to adhere to risk management of central counterparties (CCPs), including the daily exchange of variation margin (VM) in cash, which they may not currently hold in sufficient amounts.[126] In response, pension funds could increase their cash holdings, which would, however, adversely affect their investment returns, which are already under pressure in the low-yield environment (see also **Chapter 4** on the profitability challenges of life insurers, which are similar to those faced by pension funds). Alternatively, they could rely on other solutions such as market-based collateral transformation to convert their bond holdings into cash when needed.

Against this background, this box assesses the liquidity risk faced by pension funds from transitioning to central clearing. The analysis focuses on Dutch pension funds as they provide a good proxy for the euro area pension fund sector: at the end of March 2020, they accounted for 80%

[124] In view of the elevated market volatility since March 2020, some market participants put in place temporary restrictions on the trading of certain contracts (see this FT article).

[125] See Regulation (EU) 2019/834 of the European Parliament and of the Council of 20 May 2019 amending Regulation (EU) No 648/2012 as regards the clearing obligation, the suspension of the clearing obligation, the reporting requirements, the risk-mitigation techniques for OTC derivative contracts not cleared by a central counterparty, the registration and supervision of trade repositories and the requirements for trade repositories (OJ L 141, 28.5.2019, p. 42).

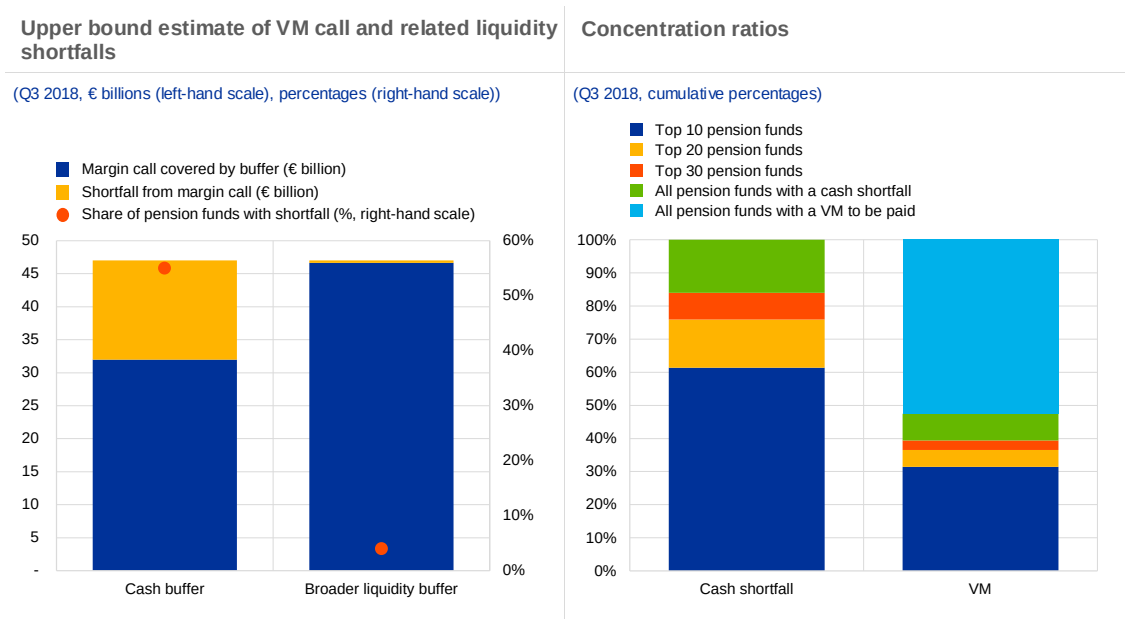
[126] Central clearing may be used as a clearing member or as a client. Should pension funds use central clearing as clients, they may be provided with collateral transformation by their intermediating clearing members, which, in turn, would reduce the need for pension funds to post VM in cash.

of the derivatives of all euro area pension funds.[127] In addition, the analysis is targeted at interest rate swaps, which are mandated for central clearing and where the share of Dutch pension funds is even higher, standing at 89%.[128]

Pension funds use interest rate swaps to hedge the interest rate risk arising from their long-dated liabilities whose duration exceeds that of their assets. Therefore, an increase in interest rates would trigger CCP VM calls on pension funds' interest rate swap portfolios. To simulate such VM calls, an extreme one-day +100 basis point parallel shift in the yield curve is assumed.[129] While the size of the shock may be extreme, it is commonly used as a baseline stress scenario by the industry.[130] To simulate the impact, the analysis uses fund-by-fund supervisory data from De Nederlandsche Bank (DNB) on liquidity buffers and derivative exposures, complemented by EMIR data. In the analysis, the liquidity buffers and the hedging profiles are assumed to be static.

Chart A

Results of a stress scenario of a +100 basis point parallel shift in the yield curve



Sources: DNB data as reported by pension funds and authors' calculations.
Notes: The sample includes 187 pension funds. Cash buffer includes freely disposable cash and reverse repos. Broader liquidity buffer includes cash buffer and AAA- and AA-rated government bonds of advanced economies. The ranking (top 10, 20 and 30) is based on the size of cash shortfalls.

Under the simulated stress scenario, VM calls on interest rate swaps held by Dutch pension funds could be between €36 billion and €47 billion, resulting in an aggregate cash shortfall of €6 billion to €15 billion. Using the upper bound estimate of the aggregate cash shortfall of €15 billion, around 55% of Dutch pension funds would not have sufficient cash to cover their VM calls (see **Chart A**, left panel). The cash shortfalls would be concentrated within a small number of pension

127 In terms of the notional amount and according to EMIR data.

128 While pension funds also heavily use FX derivatives, these contracts are currently not subject to mandated clearing. Thus, for the purpose of assessing the liquidity shortfalls, the interest rate swap portfolios are studied in isolation in view of the Eurosystem's contribution to the discussions on the impact of the central clearing obligation on pension funds.

129 While this shock is negative for the value of pension funds' interest rate swap positions and thus poses liquidity risks, it is positive for the overall financial position of pension funds.

130 For instance, the study prepared by Europe Economics and Bourse Consult for the European Commission also applies this stress scenario.

funds with relatively low VM payments (see **Chart A**, right panel). For instance, 61% of the overall cash shortfall is attributed to ten pension funds, which have a share in VM payments of 32%.

The analysis shows a potential €15 billion cash shortfall and 96% of Dutch pension funds are found to have a sufficient amount of high-rated government bonds that could be used for collateral transformation. For the remaining 4%, the lack of high-rated government bonds is very low, at below €0.35 billion. Assuming that pension funds source funding via market-based collateral transformation, the cash shortfall can be considered contained when compared with the overall size of the repo market. The results underline the importance of pension funds' individual preparedness to use market-based collateral transformation or other options to fund their stressed VM calls, when needed.

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