



EUROPEAN CENTRAL BANK

EUROSYSTEM

# Financial Stability Review

November 2017



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## Foreword



The Financial Stability Review (FSR) assesses developments relevant for financial stability, including identifying and prioritising the main sources of systemic risk and vulnerabilities for the euro area financial system – comprising intermediaries, markets and market infrastructures. It does so to promote awareness of these systemic risks among policymakers, the financial industry and the public at large, with the ultimate goal of promoting financial stability. Systemic risk can best be described as the risk that the provision of necessary financial products and services by the financial system will be impaired to a point where economic growth and welfare may be materially affected. Systemic risk can derive from three sources: an endogenous build-up of financial imbalances, possibly associated with a booming financial cycle; large aggregate shocks hitting the economy or the financial system; or contagion effects across markets, intermediaries or infrastructures. Financial stability is a state whereby the build-up of systemic risk is prevented.

The FSR also plays an important role in relation to the ECB's microprudential and macroprudential competences, including the power to top up national macroprudential measures. By providing a financial system-wide assessment of risks and vulnerabilities, the Review provides key input to the ECB's macroprudential policy analysis. Such a euro area system-wide dimension is an important complement to microprudential banking supervision, which is more focused on the soundness of individual institutions. While the ECB's roles in the macroprudential and microprudential realms rely primarily on banking sector instruments, the FSR focuses on the risks and vulnerabilities of the financial system at large, including – in addition to banks – shadow banking activities involving non-bank financial intermediaries, financial markets and market infrastructures.

In addition to its usual overview of current developments relevant for euro area financial stability, this Review includes seven boxes and four special features aimed at deepening the ECB's financial stability analysis and broadening the basis for macroprudential policymaking. The first special feature examines the possible use of an NPL transaction platform. The second provides an overview of euro area cross-border banking over the past decade. The third discusses recent developments in euro area repo markets and looks at the possible effects of regulatory reforms on these markets. And finally, the fourth assesses the low volatility in financial markets.

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.

Vítor Constâncio  
Vice-President of the European Central Bank

# Overview

**The financial stability situation in the euro area has continued to evolve positively over the past six months.** Improved economic conditions underpin the assessment that there is no generalised overvaluation in euro area financial markets. Nevertheless, global risks in particular may trigger financial asset market corrections with negative repercussions on financial stability.

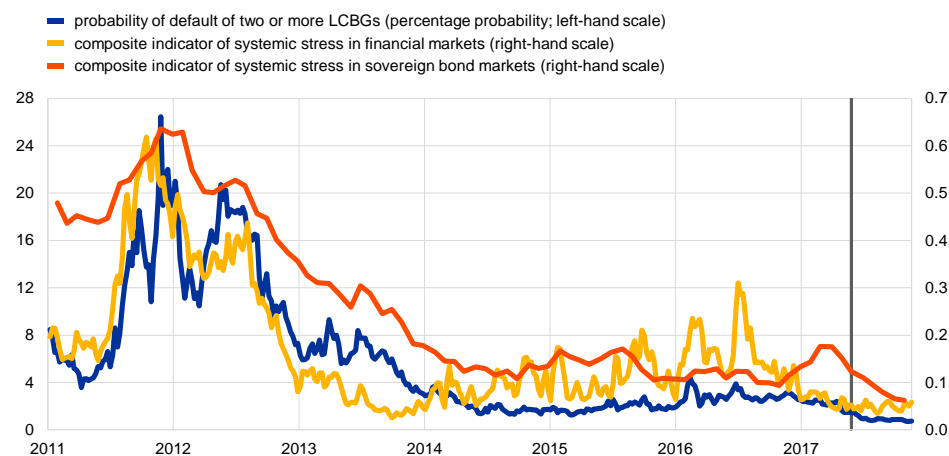
**Euro area systemic stress indicators have remained low over the past six months (see Chart 1).** Improved economic growth prospects in the euro area supported asset prices and contributed to suppressing volatility across most asset classes. Waning economic policy uncertainty was also reflected in lower financial market-based systemic stress indicators for the euro area. The election outcomes in the Netherlands and France earlier this year eased political uncertainty, which then remained fairly subdued in the second half of 2017. This easing was partly offset by higher geopolitical uncertainty at the global level, partly reflecting mounting tensions on the Korean peninsula. Euro area bank stress indicators remained low as investors perceived that a combination of improved growth prospects and higher interest rates would support bank profitability via higher loan volumes and increased lending margins.

## Chart 1

### Measures of broad financial market and bank stress remained low in 2017

#### Composite indicators of systemic stress in financial markets and sovereign bond markets and the probability of default of two or more banking groups

(Jan. 2011 – Nov. 2017; the vertical line represents the publication of the previous FSR on 24 May 2017)



Sources: Bloomberg and ECB calculations.

Note: "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.

**This issue of the FSR identifies four main risks to euro area financial stability over the next two years (see Table 1).** The first risk refers to an abrupt and sizeable repricing of risk premia in global financial markets. The second risk concerns the continued weak profitability prospects for the banking sector. A potential re-emergence of public and private sector debt sustainability concerns

constitutes the third risk. The fourth risk is associated with liquidity risks in the non-bank financial sector. The first three are assessed as being “medium-level systemic risks”, while the fourth is considered to be a “potential systemic risk”. Improved growth prospects in the euro area and other advanced economies mitigate the likelihood of these risks materialising and reduce the probable systemic impact should any of them materialise. On the other hand, continued risk premia compression and signs of increased risk-taking behaviour in financial markets are sources of concern as they may sow the seeds for large asset price corrections in the future. On balance, the offsetting influences of these two developments explain why the financial stability risk assessment is largely unchanged since the May 2017 FSR. It is important to be aware that all four of these risks are intertwined and if any one of them were to materialise it could potentially trigger the materialisation of others.

**Table 1**  
Key risks to euro area financial stability

	Current level (colour) and recent change (arrow)*
<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #800000; margin-right: 5px;"></div> <span>pronounced systemic risk</span> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #FF4500; margin-right: 5px;"></div> <span>medium-level systemic risk</span> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #FFD700; margin-right: 5px;"></div> <span>potential systemic risk</span> </div>	
1. Abrupt and sizeable repricing of risk premia in global financial markets – triggered e.g. by a policy expectation shock – leading to a tightening of financial conditions	
2. Adverse feedback loop between weak bank profitability and low nominal growth, amid structural challenges in the euro area banking sector	
3. Public and private sector debt sustainability concerns amid a potential repricing of risk premia and increased political fragmentation	
4. Liquidity risks in the non-bank financial sector with potential spillovers to the broader financial system	

\* The colour indicates the cumulated level of risk, which is a combination of the probability of materialisation and an estimate of the likely systemic impact of the identified risk over the next 24 months, based on the judgement of the ECB's staff. The arrows indicate whether the risk has increased since the previous FSR.

### Risk 1: Abrupt and sizeable repricing of risk premia in global financial markets – triggered e.g. by a policy expectation shock – leading to a tightening of financial conditions

**A cyclical rebound in growth, coupled with still accommodative monetary policies in advanced economies, has supported market sentiment.** The reflationary expectations that contributed to higher US and global bond yields around the turn of the year have abated somewhat in recent months amid some concerns that US fiscal policies would be less supportive of growth than previously anticipated. That said, in the second half of 2017 growth prospects continued to improve and this improvement became more broad-based around the globe. At the same time, monetary policies remained accommodative and supported asset price valuations. Financial markets reacted positively to the firming macro outlook and the sentiment in markets remained fairly sanguine, with asset price volatility hovering at low levels

across asset classes and economies. Overall, the improved macro picture contributed to containing financial stability risks stemming from financial markets as better growth prospects increase households' as well as other non-financial and financial sectors' buffers to absorb rapid asset price corrections.

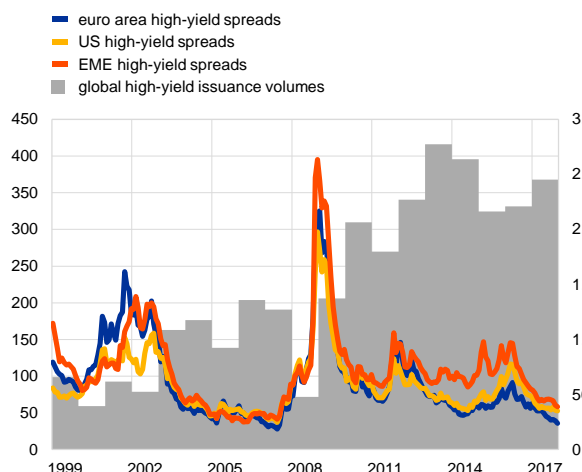
**Signs of increased risk-taking in financial markets are becoming more universal.** Notwithstanding the improved macro conditions, there are some indications that financial markets may not be fully alert to the possibility that the current favourable market sentiment can change quickly. Looking back, as central banks in advanced economies communicated the implementation of various unconventional measures which eased monetary policy, investors quickly reduced the premia required on a variety of riskier assets. These premia have, however, remained low throughout 2017 even though a number of central banks in advanced economies have begun preparing markets for an eventual recalibration of their policies, should the improvements in growth prospects continue. Across asset classes this is particularly noticeable in bond markets where there are increased signs of “pricing for perfection”. In particular, spreads for the most risky issuers have continued to hover at very low levels, indicating a market perception that conditions will continue to improve and that there is a low probability of weaknesses emerging. Some evidence on volumes mirrors the optimism evident in asset prices. In fact, global issuance of high-yield bonds has remained high in recent years and this trend has continued in 2017 (see [Chart 2](#)).

### Chart 2

Global asset prices and issuance volumes signal a high global risk appetite...

#### Global high-yield corporate bond issuance and high-yield corporate bond spreads

(for issuance: 1999-2017, annual data, USD billions; for bond spreads: Jan. 1999 – Oct. 2017, monthly data, basis points)



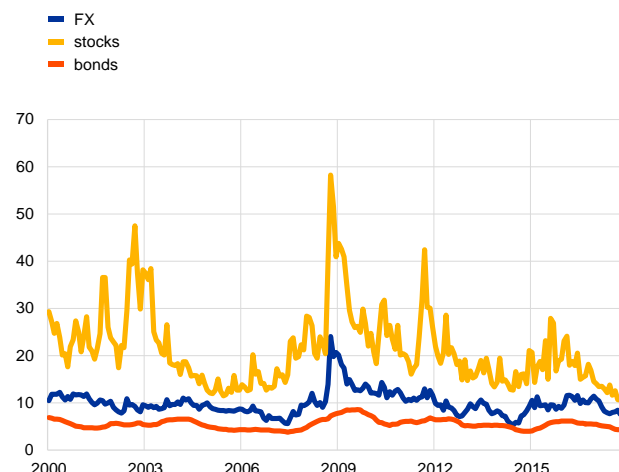
Sources: Bank of America, Bloomberg and Dealogic.  
Notes: Government option-adjusted spreads (OAS) are employed. For issuance, data up to November 2017.

### Chart 3

...amid low volatility across asset classes

#### Global asset price volatility

(Jan. 2000 – Oct. 2017, monthly data, annualised volatility in percentages)



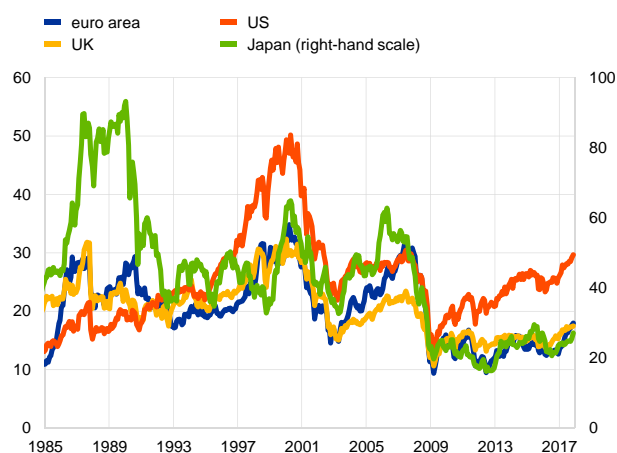
Sources: Bloomberg, Thomson Reuters Datastream and ECB calculations.  
Notes: FX volatility: implied volatility for EUR/USD, GBP/USD and JPY/USD. Stock markets: implied volatility for the S&P 500 index and EURO STOXX 50 index. Bond markets: realised volatility for US, German and UK ten-year sovereign bonds. Equal weights are applied.

**Asset price volatility has been low across market segments and economies in the recent past (see Chart 3).** The willingness and ability to take on higher risk could partly be related to the low gyrations in financial markets. In fact, low financial market volatility can encourage the build-up of leverage and can also reduce metrics of expected losses (based on value-at-risk methodologies), thereby boosting financial institutions' appetite to take on more risk.

**Chart 4**  
Mixed valuations of global stock prices

**Cyclically adjusted price/earnings (CAPE) ratio**

(Jan. 1985 – Nov. 2017, percentages)



Sources: Thomson Financial Datastream and ECB calculations. US CAPE ratio from Robert Shiller's homepage.

**Standard valuation indicators do not signal general misalignments across asset classes in the euro area, but some segments require close monitoring.**

First, as regards tangible assets, residential real estate prices are broadly in line with the average valuations recorded over the last decades. That said, in some large cities, real estate prices have increased at a faster pace than household incomes.<sup>1</sup> Similarly, the hunt-for-yield environment has contributed to continued strong price increases for prime commercial properties in 2017 and available metrics for this sector suggest stretched valuations vis-à-vis fundamentals. Second, euro area corporate bond spreads for some of the lower-rated issuers are looking increasingly tight when compared with fundamentals. Valuations of euro area stocks (and of stocks in some other major markets), however, do not appear to be exceptionally elevated by historical standards (see **Chart 4**).

**Valuations in the US corporate bond and stock markets are high.** Corporate bond spreads in the United States have continued to compress despite increases in non-financial firms' leverage. In addition, as reported in previous issues of this Review, the stock prices of US firms are high compared with their earnings track record. The current situation of very low volatility coupled with elevated valuations has, in the past, been a harbinger of price corrections (see **Chart 5**). In fact, the current valuation and volatility environment looks exceptional, even compared with the conditions that preceded sharp corrections in US stock markets in the past. A sudden increase in US bond or stock market premia has the potential to spill over to other major markets, including those in the euro area.

<sup>1</sup> See also Box 3 entitled "Residential real estate prices in capital cities: a review of trends", *Financial Stability Review*, ECB, May 2017.

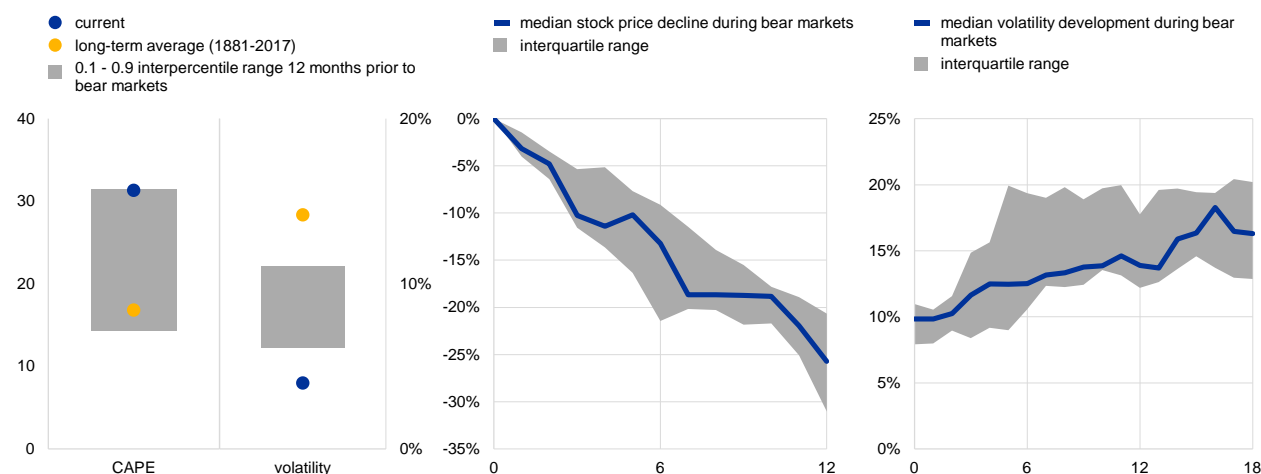


## Chart 5

Periods of low stock market volatility may incentivise higher risk-taking, possibly leading to stock market corrections and elevated volatility

Stock market valuations and volatility levels in the year preceding 13 US bear markets since 1881 (left panel); stock price developments and volatility movements during the 13 bear markets (middle and right panels)

(left panel: US CAPE ratio levels and annualised stock market volatility; middle panel: 12-month cumulative US stock price developments in percentages; right panel: 18-month development in US stock market volatility, annualised volatility)



Sources: R. Shiller's homepage and ECB calculations.

Notes: The 13 bear markets identified by Shiller are: 1892, 1895, 1902, 1906, 1916, 1929, 1934, 1937, 1946, 1961, 1987, 2000 and 2007 (for details, see R. Shiller's 22 September 2017 column). The dataset only allows for monthly computations. Thus, the volatilities shown in the left and right panels are computed based on the (annualised) standard deviation of monthly returns over a one-year period. This is the reason why the right panel has been extended to 18 months compared with 12 months for the middle panel.

**An abrupt increase in risk premia (and volatility) may be triggered by a number of factors.** First, lower than expected economic growth may lead to higher global risk premia. Second, several central banks in advanced economies have begun preparing to withdraw policy accommodation. Potential changes in monetary policy expectations could generate greater market uncertainty. For example, market participants currently expect a slower normalisation path for US policy rates (as reflected in Fed futures rates) compared with the views expressed by Federal Open Market Committee (FOMC) members. A convergence of market expectations towards FOMC member projections would exert upward pressure on US interest rates. Third, geopolitical uncertainty may increase further with possible adverse repercussions on global risk premia. As discussed in **Special Feature D**, should any of these (or other) possible triggers materialise, volatility and risk premia may overshoot on account of high valuations or a rapid unwinding of market positioning.

**A sudden repricing in fixed income markets could lead to substantial capital losses for investors with large bond holdings.** In the euro area, the impact would be felt by the non-bank financial sector, investment funds in particular. For insurers and pension funds, bonds account for almost 40% of their portfolios. For banks, this share is only around 15%. In addition, bond portfolio valuations have become more sensitive to changes in interest rates in recent years as the average duration of these portfolios has continued to increase.

**The strong asset price increases observed in euro area markets in recent years have not been accompanied by excessive credit growth.** Should material risks to financial stability arise stemming from credit-fuelled asset price booms,

macroprudential policies would be best placed to tackle such challenges, not least given their capacity to be tailored to country and sector-specific characteristics. Indeed, in late 2016 the European Systemic Risk Board (ESRB) issued a set of country-specific warnings on medium-term vulnerabilities in the EU residential real estate sector, while the Governing Council of the ECB issued a statement calling for countries to implement legislative frameworks for borrower-based measures in all euro area countries.<sup>2</sup>

## Risk 2: Adverse feedback loop between weak bank profitability and low nominal growth, amid structural challenges in the euro area banking sector

**Euro area banks' profitability recovered somewhat in the first half of 2017, mainly driven by an increase in non-interest income, while banks' solvency continued to improve.** Looking at the key sources of bank revenue, net interest income remained broadly stable compared with the first half of 2016, following a decline last year, with higher fee and trading income providing the most support to revenue growth. At the same time, loan impairment costs continued to diverge across banks. While the majority of banks reported declines in impairment costs amid a continued economic recovery, some banks recorded significant increases, linked to efforts to accelerate the clean-up of their balance sheets. As discussed below, although some of the cyclical challenges have abated, a number of structural challenges are still material and they continue to dampen banks' profitability prospects.

**Euro area banks' valuations and profitability prospects are still subdued compared with those of their international peers.** Euro area banks' stock prices have increased significantly since the trough in July 2016. As a result, valuations have improved from overly depressed levels, while analysts have revised up their earnings expectations slightly (see [Chart 6](#)). That said, there is still a wide gap between the valuations (and profitability prospects) of euro area banks and those of their global peers. In particular, more than half of euro area countries' bank stock indices have price-to-book ratios below one, which points to doubts on the part of analysts about the ability of these banks to earn a return on equity corresponding to their cost of equity.

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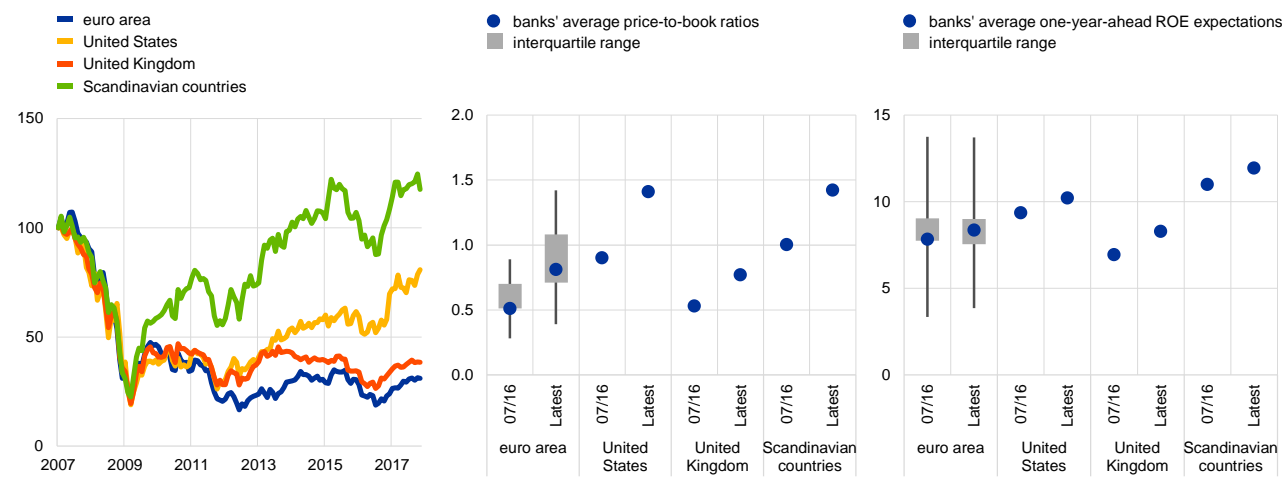
<sup>2</sup> See the [ESRB press release](#) and the [ECB press release](#).

## Chart 6

### Large differences in banks' stock price developments, valuations and profitability prospects across major markets

#### Stock price developments for banks (left panel), banks' price-to-book ratios (middle panel) and banks' one-year-ahead return on equity (ROE) expectations (right panel)

(left panel: Jan. 2007 – Nov. 2017, series indexed to 100 in Jan. 2007; middle panel: min., max. and interquartile ranges (for euro area countries); right panel: annual percentages, min., max. and interquartile ranges (for euro area countries))



Sources: Thomson Financial Datastream and ECB calculations.

Note: The latest observations in the middle and right panels refer to November 2017.

#### A range of market-based risk indicators suggest that euro area banks are, on average, also considered riskier than their global peers.

Market-based risk indicators for euro area banks are higher than those for the Nordic countries and the United States (see [Chart 7](#)). However, the euro area aggregate picture masks substantial heterogeneity at the individual bank level. Some banks in countries that were more affected by the crisis display a higher perceived riskiness, which has remained elevated over the past years, although the overall level of perceived riskiness of euro area banks has declined (see [Chart 3.1](#)). Overall, the low valuations and higher perceived risk probably reflect a number of structural challenges that cloud euro area banks' profitability outlook and the slow progress made in tackling high NPL ratios in certain jurisdictions.

#### Notwithstanding the perceived high level of riskiness of euro area banks displayed by market indicators, quantitative evidence on banks' actual risk-taking activities does not indicate any broad-based excesses.

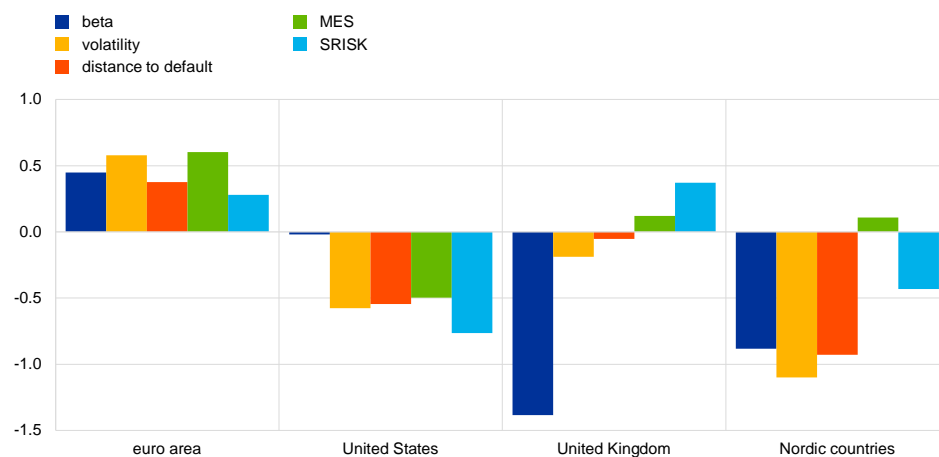
Banks' own reported measures of loan riskiness (accounting for both expected and unexpected credit losses) have declined across most significant institutions' portfolios in recent quarters and a more detailed breakdown suggests that banks have reduced their exposures to borrowers with high credit risk. That said, some of the improvements in banks' credit risk metrics may mask some vulnerabilities. Banks' exposures towards loans secured by residential real estate (which carry relatively low risk weights) have increased, while higher residential real estate prices have contributed to lowering loan-to-value ratios. Banks' increased exposure towards real estate-related assets reinforces the link between the banking system and the real estate cycle on aggregate.

## Chart 7

Euro area bank risk, on aggregate, still appears higher than in most other jurisdictions

### Market-based measures of bank risk across different regions

(Q3 2017, z-score)



Sources: Bloomberg, Thomson Reuters Datastream, SNL Financial and ECB calculations.

Notes: The five market-based risk measures are computed for a sample of 59 listed global banks. Each risk measure is expressed in terms of the z-score, with higher values indicating higher bank risk. Beta refers to the beta coefficient from a regression of bank stock price returns on broad stock index returns. Volatility is the historical bank stock price volatility over one month. The distance to default measures the number of standard deviations by which the log of the value of the bank assets-to-debt ratio needs to deviate from its mean in order for default to occur. For more details on the computation of the distance to default, see Gropp, R., Vesala, J. and Vulpes, G., "Equity and bond market signals as leading indicators of bank fragility", *Working Paper Series*, No 150, ECB, 2002. MES is the one-day loss expected if market returns are less than -2% and SRISK is the capital shortfall of a bank if the stock market falls by 40% over the next six months. For further details on the computation of MES and SRISK, see Brownlees, C. and Engle, R., "SRISK: A Conditional Capital Shortfall Measure of Systemic Risk", *Review of Financial Studies*, Vol. 30, 2017, pp. 48-79.

### The faster reduction of NPLs has also contributed to the de-risking of bank balance sheets, but progress remains uneven across banks.

Euro area banks have made notable progress in reducing the stock of NPLs since mid-2016. Asset quality has continued to improve in all sectors, with NPL reductions in the non-financial corporate (NFC) sector accounting for nearly three-quarters of the decline (see [Chart 8](#)). Despite the recent notable improvements, progress in reducing NPL levels remains uneven across banks and countries. For some banks, the still high NPL ratios continue to put pressure on their profitability, partly because provisions offset a considerable part of operating profits and also because NPLs consume balance sheet capacity.

### A number of further structural challenges continue to dampen profitability prospects for euro area banks.

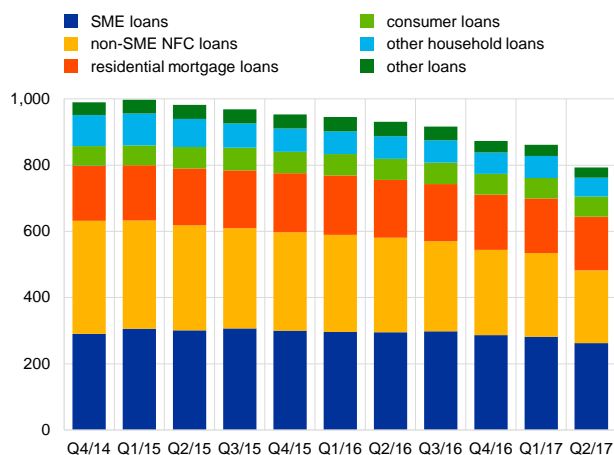
Although structural challenges differ depending on banks' business models and the country they operate in, there are some common characteristics that have been hampering the profitability of a large set of banks across euro area jurisdictions. In particular, the operating costs of euro area banks are high compared with those of many of their global peers, while the degree of revenue diversification is low for many of these banks.

**Chart 8**

Improved asset quality, but still elevated NPL levels

**Non-performing loans by sector and loan type**

(Q4 2014 – Q2 2017, quarterly data, € billions)



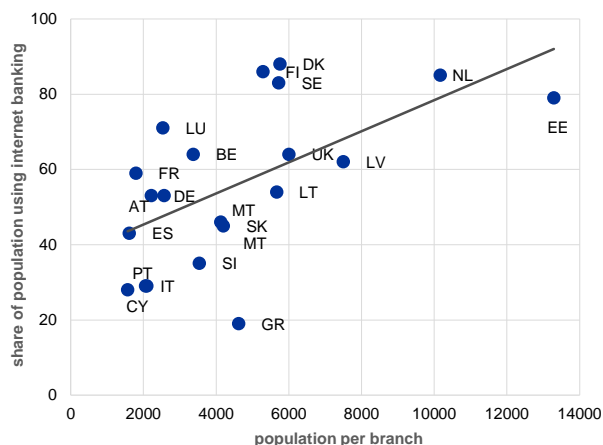
Source: ECB supervisory data.  
 Note: Based on significant institutions.

**Chart 9**

A leaner branch structure has, in some countries, been facilitated by internet banking

**Population per branch and internet banking penetration**

(2016; x-axis: population per branch; y-axis: share of the population using internet banking)



Sources: ECB structural financial indicators and Eurostat.  
 Notes: The share of the population using internet banking is measured as a percentage of individuals aged 16 to 74. Data on bank branches for the UK refer to 2014.

**Operating costs are in general high across euro area banks and various cost-efficiency metrics have deteriorated somewhat in recent years.** Further banking sector consolidation could be a way to help reap economies of scale and improve banks' cost-efficiency. The most direct way of achieving further consolidation would be through mergers and acquisitions, as well as a further reduction in bank branches and the number of employees. These potential benefits of consolidation should be considered alongside possible costs: for example, there could be renewed too-big-to-fail problems or a greater risk of cross-border contagion. However, the new Single Supervisory and Single Resolution Mechanisms, as well as the post-crisis regulatory framework, are designed to address financial stability concerns related to large cross-border institutions.

**A greater focus on digitalisation could bring about permanent improvements in banks' cost-efficiency, although this requires some upfront investment.** Empirical evidence suggests that a higher digitalisation of banking can help to reduce fixed costs (see **Chart 9**). Potential efficiency gains in this area could be further enhanced by governments stepping up their efforts to improve the IT infrastructure and the general level of IT literacy among the general public.

**Many euro area banks need to enhance their revenue-generating capacity.** In particular, banks' revenue sources can be better diversified by seeking strategies to increase the share of non-interest income. Similarly, another avenue for banks to address revenue-side challenges could be to increase the geographical diversification of their activities (see also **Special Feature B**). Finally, the adoption of financial innovation (including "fintech") could also provide new opportunities for banks to adapt their business models and create new revenue sources (e.g. via

improved digital financial service offerings or via an expanded range of capital market-related activities).

**Despite the low-yield environment, the profitability of large euro area insurers has increased slightly in 2017 and their solvency positions remain robust.**

Supported by improved economic growth prospects, insurers achieved solid underwriting results in the first half of 2017. At the same time, investment income continued to be weak, which is a particular concern for traditional life insurers, especially those that guarantee high and fixed returns to policyholders. To boost profitability, insurers have been taking on more risk, for instance through larger investments in equity and mixed funds. While this may improve insurers' profitability prospects, it also makes insurers vulnerable to the risk of an abrupt and sizeable repricing of risk premia. Turning to reinsurers, their 2017 earnings are expected to suffer, owing to a number of devastating Atlantic hurricanes and two earthquakes in Mexico.

**From a policy perspective, the most pressing issue for euro area financial institutions remains the high level of NPLs, which needs to be addressed.**

The resolution of systemic NPL problems will take time and requires a comprehensive strategy, involving coordination of all relevant stakeholders. Last July, the Economic and Financial Affairs Council announced a plan to tackle NPLs in the European Union, which envisages the introduction of new supervisory tools, as well as measures to support the sale of NPLs. In the euro area, the ECB has complemented its NPL guidance with an addendum, which is subject to public consultation and provides quantitative prudential provisioning guidance applicable to newly classified NPLs as of January 2018. **Special Feature A** discusses three sources of market failure which have prevented the development of liquid secondary markets for NPLs: information asymmetry, oligopsonistic market structure, and imperfect excludability. An NPL transaction platform, providing an exchange where banks and investors could trade NPLs based on standardised data templates, can help address these market failures and reduce the wide bid-ask spreads on NPLs, thus contributing to a faster clean-up of bank balance sheets.

### **Risk 3: Public and private sector debt sustainability concerns amid a potential repricing of risk premia and increased political fragmentation**

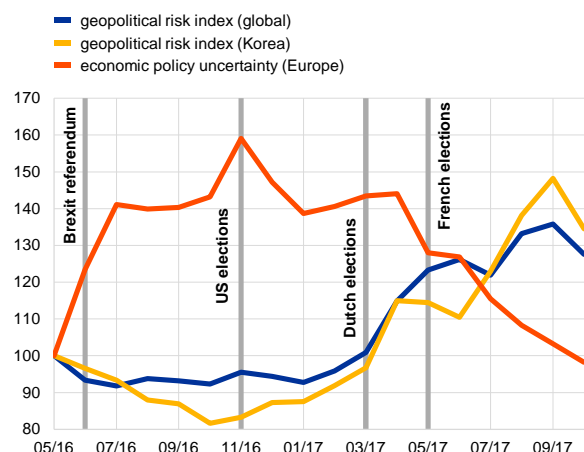
**Stress in the sovereign debt markets has abated over the past six months.** The ECB's market-based measure of stress in euro area sovereign bond markets has declined over the past six months, returning to levels comparable to those observed before the financial crisis (see **Chart 1**) amid a markedly narrowing cross-country dispersion. A decomposition of the stress indicator shows that improved liquidity conditions and low bond market volatility were the main drivers of the drop in the aggregate measure. In addition to the improved economic growth prospects, these favourable developments were likely underpinned by reduced economic policy uncertainty in Europe following national elections in major euro area countries (see **Chart 10**) and a continuation of the ECB's supportive monetary policy measures.

**Chart 10**

**Divergence of economic policy uncertainty and geopolitical risks**

**Geopolitical risk index and European economic policy uncertainty**

(May 2016 – Oct. 2017, six-month moving averages)



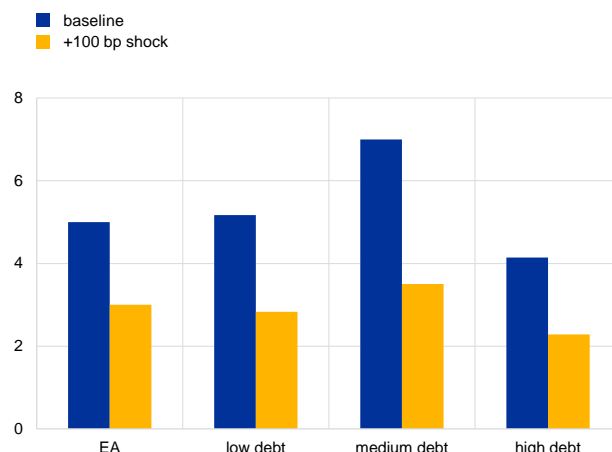
Sources: policyuncertainty.com and Caldara and Iacoviello (2017).  
 Notes: Measures of economic policy uncertainty are taken from Baker, S., Bloom, N. and Davis, S., "Measuring Economic Policy Uncertainty", Chicago Booth Research Paper No 13/02, January 2013. The geopolitical risk index of Caldara and Iacoviello is used. For more details, see Caldara, D. and Iacoviello, M., "Measuring Geopolitical Risk", working paper, Board of Governors of the Federal Reserve Board, November 2017.

**Chart 11**

**An interest rate shock would lead to a rise in average funding costs in highly indebted countries sooner**

**Time until the average cost of government funding begins to increase**

(years)



Source: ECB calculations.  
 Notes: Under the baseline scenario, countries with fiscal positions below their medium-term objective (MTO) are assumed to take additional consolidation measures (the minimum to avoid sanctions under the Stability and Growth Pact) as of 2018 to reach the country-specific MTOs (which only partly account for the additional ageing burden). Countries with a structural fiscal position above the MTO are assumed to revert to the MTO. Under the alternative scenario, a +100 basis point shock is applied to the marginal market interest rate as of 2017. To separate the effect of the interest payment shock, no additional consolidation to account for the higher interest expenditure (normally required under the SGP) is considered. For more details on the derivation of the baseline scenario, see Bouabdallah et al., "Debt sustainability analysis for euro area sovereigns: a methodological framework", Occasional Paper Series, No 185, ECB, 2017. The "low debt" category covers euro area countries with public debt levels below 60% of GDP (i.e. Estonia, Latvia, Lithuania, Luxembourg, Malta and Slovakia) as at year-end 2016. Countries with public debt levels of between 60% and 90% of GDP (i.e. Austria, Finland, Germany, Ireland, the Netherlands and Slovenia) are labelled "medium debt" countries, while countries with debt levels of over 90% (i.e. Belgium, Cyprus, France, Greece, Italy, Portugal and Spain) are referred to as "high debt" countries.

**Higher interest rates may trigger concerns about sovereigns' debt servicing capacity.** The main trigger for renewed debt sustainability concerns relates to the possibility of a sudden increase in bond yields, particularly if it takes place without a commensurate improvement in growth prospects. Highly indebted euro area sovereigns are more susceptible to an earlier rise in financing costs than countries with lower debt levels (see **Chart 11**). Most countries have, however, taken advantage of the favourable interest rate environment to increase the duration of their debt, which will make the impact of an eventual rise of funding costs more gradual. Furthermore, while the most imminent market concerns regarding political risks have abated as the electoral calendar proceeds, the distrust in mainstream political parties continues to rise, leading to fragmentation of the political landscape away from the established consensus, in the form of a multitude of parties spanning a very wide political spectrum. A growing fragmentation may lead to difficulties in governance and a further slowdown of fiscal and structural reform efforts. At the same time, uncertainty outside the euro area appears to have grown in recent months, particularly regarding geopolitical risks (see **Chart 10**). Should these tensions intensify further, risk premia on global assets may rise. Given the high

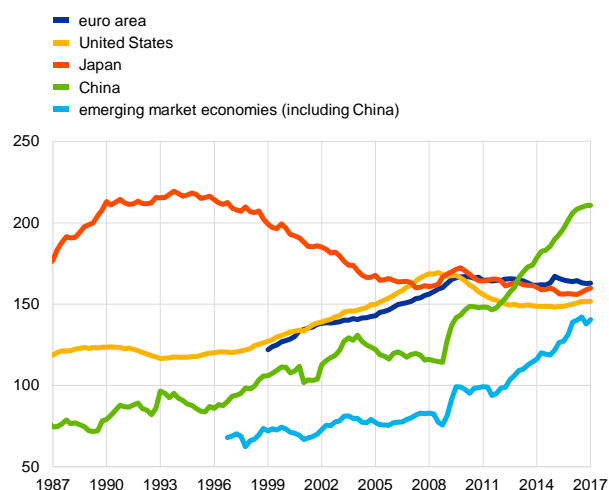
degree of financial interlinkages across sectors and countries, risk premia on euro area assets may not be shielded from further increases in global uncertainty.

**Chart 12**

**Euro area non-financial private sector indebtedness is high by historical and international standards**

**Indebtedness of the non-financial private sector in selected advanced and emerging market economies**

(Q1 1987 – Q1 2017, percentage of GDP)



Source: OECD.

Note: Non-financial private sector indebtedness is measured as the sum of household and non-financial corporate debt.

**Potential debt sustainability concerns also represent a risk for the non-financial private sector.**

Private sector indebtedness in the euro area remains high by both historical and international standards (see **Chart 12**). Corporate deleveraging has been slow despite historically low financing costs. This makes firms, in general, vulnerable to a sharp increase in interest rates. An unearthing of corporate sector vulnerabilities has the potential to spill over to the banking system, predominantly via deteriorating asset quality. As discussed in **Box 1**, the sensitivity of firms' debt servicing capacity to an interest rate shock appears to be higher in countries that were more affected by the sovereign debt crisis. The indebtedness of euro area households appears to be less of a concern at the aggregate euro area level, but the situation remains highly heterogeneous across euro area countries. Countries with stretched house price valuations and elevated levels of household debt look more vulnerable.

**Challenges to debt sustainability are in many ways best addressed by sound macroeconomic policies.**

Placing debt on a sustainable path would also create space for more effective countercyclical stabilisation policies, while structural reforms would support the growth potential of the economy. Furthermore, regulatory reforms have been introduced that have reduced the likelihood that sovereign debt sustainability would be affected by issues originating in the banking sector. In particular, the Bank Recovery and Resolution Directive that has been put in place limits the fiscal implications of resolving bank failures. On the private sector side, borrower-based macroprudential measures such as limits on loan-to-value or debt service-to-income ratios can help address debt sustainability concerns, in particular for households.

**Risk 4: Liquidity risks in the non-bank financial sector with potential spillovers to the broader financial system**

**Investment funds are increasingly engaging in higher-risk activities.** Euro area asset managers have been rebalancing their asset allocations towards lower-rated and higher-yielding assets in recent years (see **Chart 13**). In addition, the average residual maturities of investment funds' debt securities holdings have increased by more than one year since December 2013, while increases can also be identified for other sectors, such as insurance companies and pension funds (see **Chart 2.14**). The continued increase in risk-taking, coupled with limited buffers, implies that fund redemptions could adversely affect market conditions following a potential repricing



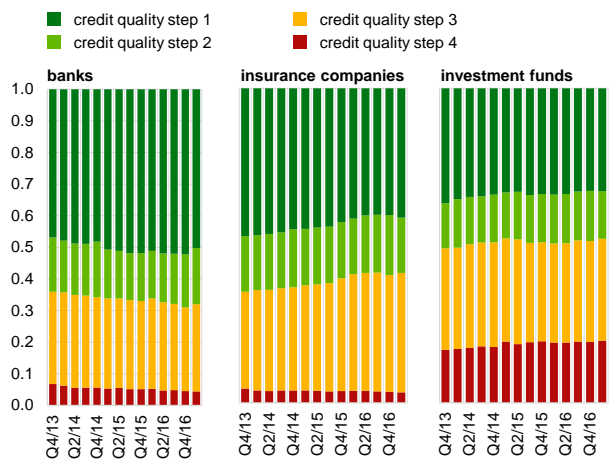
of global risk premia. Redemption patterns tend to be procyclical, with flows into funds increasing when returns are higher and vice versa (see [Box 6](#)). Such procyclicality has, in the past, intensified during periods of market stress and can amplify adverse market dynamics.

### Chart 13

#### Investment funds increased their holdings of lower-rated debt securities

##### Euro area financial institutions' holdings of debt securities, broken down by rating and sector

(Q4 2013 – Q1 2017, percentage points of total assets)



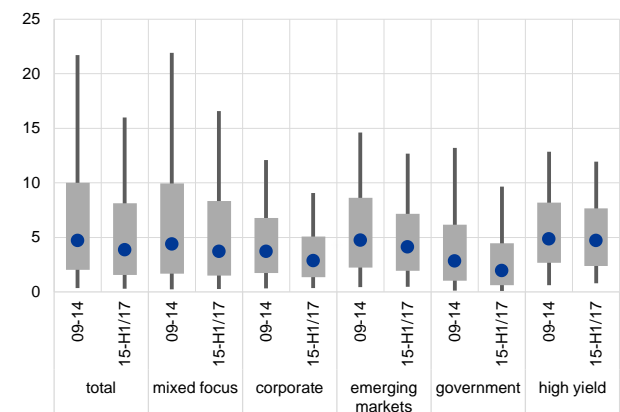
Source: ECB Securities Holdings Statistics by Sector and ECB calculations.  
Notes: The legend denotes credit quality steps defined in accordance with the Eurosystem credit assessment framework (ECAAF). The first category includes securities rated from AAA to AA-, the second from A+ to A- and the third from BBB+ to BBB-. A fourth category is added which includes all rated securities with a rating below credit quality step 3. The analysis is based on the nominal amounts of euro- and foreign currency-denominated securities, including "alive" and "non-alive" securities. The investment fund sector does not include money market funds.

### Chart 14

#### Bond funds' liquidity buffers shrank across all types of funds

##### Liquidity buffers of bond funds domiciled in the euro area

(percentage points of total assets)



Sources: Lipper and ECB calculations.  
Notes: The sample of the first period (2009-14) consists of end-of-year fund-level holdings from December 2009 to December 2014. The second period (2015-H1 2017) contains the fund-level holdings for December 2015, December 2016 and June 2017. The boxplots show the 10th, 25th, 50th, 75th and 90th percentiles of the distributions. The liquidity buffers include cash holdings, debt securities issued by euro area governments and short-term instruments.

**Sector-wide indicators also point to a decrease in the most liquid positions of bond funds.** Along with signs of increased risk-taking activities, bond funds' liquidity buffers (including cash holdings, debt securities issued by euro area governments and short-term instruments) have gradually been shrinking across all types of funds since 2009 (see [Chart 14](#)). This notwithstanding, higher buffers are still held by funds which invest in less liquid markets. However, also for these funds, liquidity and maturity transformation has grown, while their ability to buffer large outflows has diminished.

**Passive investment strategies are gaining in importance.** A discernible global trend in recent years has been the growth in passive investment strategies. In the euro area, passive strategies have been attracting continued inflows into the equity fund market since the start of the global financial crisis, while active strategies have experienced cumulated outflows of about the same magnitude. These shifts can partly be attributed to the low costs charged by funds engaged in passive strategies (such as exchange-traded funds). As the relative weight in markets of passive strategies rises, there is however a risk that diversity of opinion among investors is suppressed. This, in turn, may lead to inadequate price discrimination in markets.

**While the investment fund sector is subject to prudential regulation, most existing rules lack a systemic perspective and may not be well suited to prevent the build-up of sector-wide risks.** Enhanced information on liquidity in stressed circumstances and on leverage (both traditional and synthetic) would be needed to adequately monitor risks as this sector grows further and becomes more interconnected.

## Policy considerations

**The ECB continued to provide substantial contributions to various regulatory initiatives at both the international and EU levels, with the aim of creating a sound and robust regulatory framework for financial institutions, markets and infrastructures.** As regards the banking sector, key initiatives at the European level included the legislative proposals on the revision of the Capital Requirements Regulation and Directive, as well as the Bank Recovery and Resolution Directive and the Single Resolution Mechanism Regulation. The European Commission's proposed reform package will bring the post-crisis regulatory reforms in the European Union close to completion, strengthening the regulatory architecture, reducing risks in the banking sector and, thereby, increasing the stability and resilience of the financial system. The detailed views of the ECB on the Commission's proposal are outlined in the ECB Opinion on amendments to the Union framework for capital requirements of credit institutions and investment firms (CON/2017/46) and in the ECB Opinion on revisions to the Union crisis management framework (CON/2017/47).<sup>3</sup>

**The European Commission's package includes a number of proposals that are of particular relevance for the design and operation of the macroprudential framework.** More specifically, the proposed reform package clarifies the institution-specific nature of the Pillar 2 framework (i.e. the Supervisory Review and Evaluation Process or SREP), which should not be used to address macroprudential risks. At the same time, the removal of Pillar 2 from the macroprudential toolkit should be accompanied by targeted revisions to the macroprudential framework, and macroprudential authorities should be provided with a sufficient set of instruments to effectively address systemic risks. Key elements of the targeted review could include: (i) revising elements of the capital buffer framework to enhance consistency and avoid overlaps; (ii) streamlining the notification, coordination and reciprocity requirements of macroprudential measures; and (iii) increasing the flexibility of the existing toolkit, while ensuring the coherence and effectiveness of the EU-wide macroprudential framework. Such revisions are essential in order to enable macroprudential authorities to prevent and address systemic risks in a timely and effective manner.

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<sup>3</sup> [Opinion of the European Central Bank of 8 November 2017 on amendments to the Union framework for capital requirements of credit institutions and investment firms \(CON/2017/46\)](#) and [Opinion of the European Central Bank of 8 November 2017 on revisions to the Union crisis management framework \(CON/2017/47\)](#).

**The European Commission has recently published a package of proposals to strengthen the European System of Financial Supervision (ESFS).** The proposals amend the regulations establishing the three ESAs and the ESRB Regulation, and make modifications to other pieces of EU law as well.<sup>4</sup> The set of reforms is aimed at ensuring an intensified supervisory convergence across the European Union, enhancing the governance and funding structure of the ESAs, as well as reinforcing macroprudential coordination at the EU level. With regard to the European Banking Authority (EBA), the ECB will not be granted a voting membership of the Board of Supervisors of the EBA. Furthermore, it is foreseen that the ECB will not be a member of or an observer in the new EBA Executive Board. With regard to the ESRB, several targeted amendments aim to enhance its efficiency. The proposal includes the formalisation of ECB Banking Supervision participation in the ESRB General Board and the respective committees. However, it does not include any reference to the ECB's role in risk assessment with respect to the euro area banking sector. Therefore, in order to avoid a possible duplication of work by the ECB and the ESRB in this area, further clarification of the respective tasks would be welcome.

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<sup>4</sup> For more information on the review of the ESFS, see the European Commission's [website](#).

# 1 Macro-financial and credit environment

**Macro-financial conditions** have improved further in the euro area, with the economic expansion becoming more robust alongside continued favourable financing conditions, upbeat economic and financial market sentiment, as well as low macroeconomic and declining political uncertainty. Shaping developments in the euro area, global growth is being supported by both advanced and emerging economies amid increasingly synchronised growth patterns. That said, uncertainties regarding the timing and pace of withdrawal of monetary accommodation in major advanced economies, coupled with elevated geopolitical tensions, have the potential to spark an increase in global risk aversion and a disorderly unwinding of global search-for-yield flows, thereby weighing on the underlying global and euro area growth momentum.

**Sovereign stress** conditions have improved in the euro area in recent months as political uncertainties surrounding national elections in individual euro area countries have subsided. Cyclical tailwinds coupled with benign financing conditions underpin an improved fiscal outlook, but also mask underlying fiscal vulnerabilities in some euro area sovereigns. Above all, sovereign debt sustainability concerns remain given a slowdown in fiscal and structural reform efforts against the backdrop of increasing political fragmentation, and the risk of a reversal of bond risk premia.

The euro area **non-financial private sector** continued to recover in line with the ongoing cyclical upturn of the euro area economy, but legacy balance sheet concerns continue to linger in several countries. Improving income and earnings prospects for households and non-financial firms, coupled with continued benign financing conditions, should help support the ongoing process of deleveraging and mitigate debt servicing concerns in countries with elevated levels of household and/or non-financial corporate debt. That said, an abrupt rise in long-term interest rates, triggered primarily by a global risk repricing, may have the potential to spark renewed debt sustainability concerns.

The upturn in euro area residential and commercial **property markets** has remained intact. While this upturn is gradually becoming more broad-based, heterogeneity across countries, regions and property types remains. Overall, residential property price valuations appear to be broadly in line with fundamentals for the euro area as a whole, while prime commercial property valuations have departed further away from long-term averages. Favourable financing conditions coupled with an improved economic outlook should underpin the sustainability of the recovery, but buoyant developments in some countries and asset classes may warrant closer monitoring in the current low-yield environment.

## 1.1 Euro area economic expansion is becoming increasingly resilient, with risks to the outlook broadly balanced

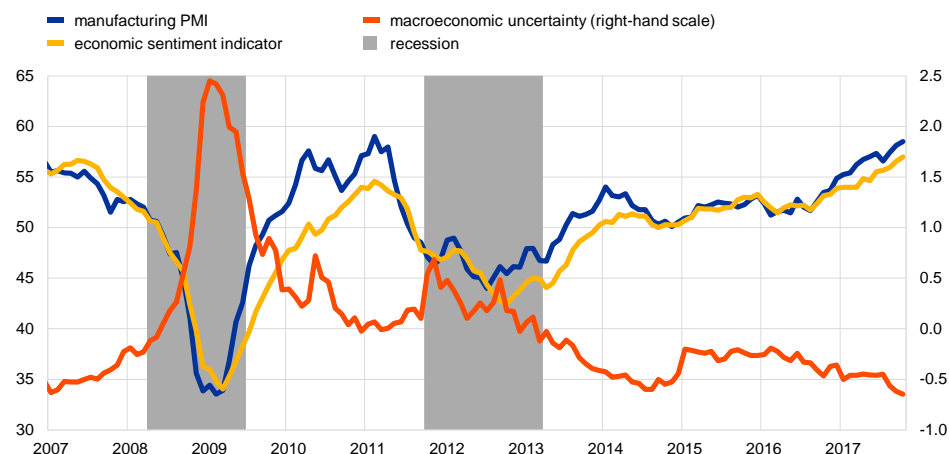
**Economic activity has gathered momentum in the euro area.** In the first half of 2017, domestic demand continued to be the main engine of economic growth, along with a small positive contribution from net exports. Favourable financing conditions, reinforced by the ECB's very accommodative monetary policy stance, the ongoing recovery in labour and housing markets, as well as improved income and earnings prospects for euro area households and non-financial corporations, continue to lend support to private consumption and the recovery in business and residential investment. At the same time, the strengthening of global economic activity underpins euro area foreign demand. The cyclical upturn in the euro area is bolstered by upbeat business and consumer sentiment, as well as record low macroeconomic uncertainty (see [Chart 1.1](#)). In particular, the lingering political uncertainties surrounding a number of national elections in major euro area countries in the earlier part of 2017 have gradually receded, even if being partly offset by increased geopolitical concerns across the globe (see Chart 10 in the Overview).

### Chart 1.1

Economic sentiment has improved considerably in the euro area amid low macroeconomic uncertainty

#### Composite index of macroeconomic uncertainty, economic sentiment indicator and manufacturing Purchasing Managers' Index in the euro area

(Jan. 2007 – Oct. 2017, standard deviations from mean, index points, diffusion index: 50+ = expansion)



Sources: Markit, European Commission (DG ECFIN) and ECB calculations.

Notes: Macroeconomic uncertainty is captured by examining a number of measures of uncertainty compiled from various sources, including: (i) measures of economic agents' perceived uncertainty about the future economic situation based on surveys; (ii) measures of uncertainty or of risk aversion based on financial market indicators; and (iii) measures of economic policy uncertainty. For further details of the methodology, see "The impact of uncertainty on activity in the euro area", *Economic Bulletin*, Issue 8, ECB, 2016. The grey areas reflect euro area recessions as identified by the Centre for Economic Policy Research (CEPR). For scaling purposes, the original economic sentiment indicator has been divided by two.

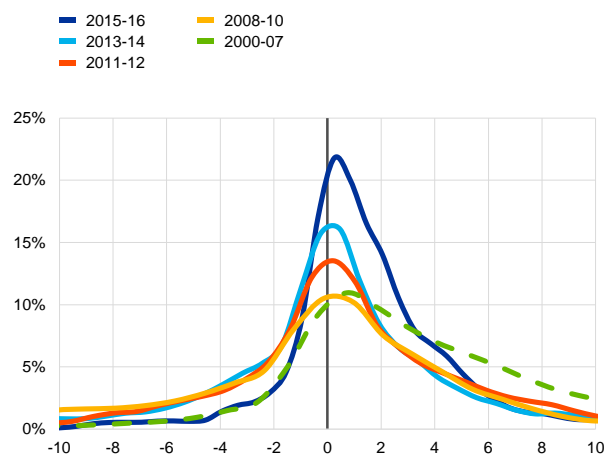
**Economic growth in the euro area is becoming increasingly resilient amid narrowing cross-country dispersion.** The distribution of growth rates across euro area countries and sectors has narrowed further compared with earlier stages of the euro area recovery. The rightward shift of the distribution reflects a broadening of the economic recovery, even though the current distribution still indicates some convergence towards lower average growth rates when compared with the pre-crisis

period (see [Chart 1.2](#)). Nonetheless, this overall decline in cross-country dispersion underpins the resilience of the economic expansion in the euro area. In line with overall economic activity, labour market conditions have continued to improve. Employment gains have been broad-based across countries and sectors, with the number of employed even surpassing the pre-crisis peak recorded in 2008. At the same time, the aggregate euro area unemployment rate has dropped to levels last seen in early 2009, but heterogeneity across countries remains elevated. Although there still seems to be considerable underutilisation in the labour market, signs of labour shortages in some sectors and countries are increasing.

**Chart 1.2**  
Economic growth has become more broad-based across countries and sectors

Distribution of real value-added growth rates across euro area countries and sectors

(unweighted kernel densities)

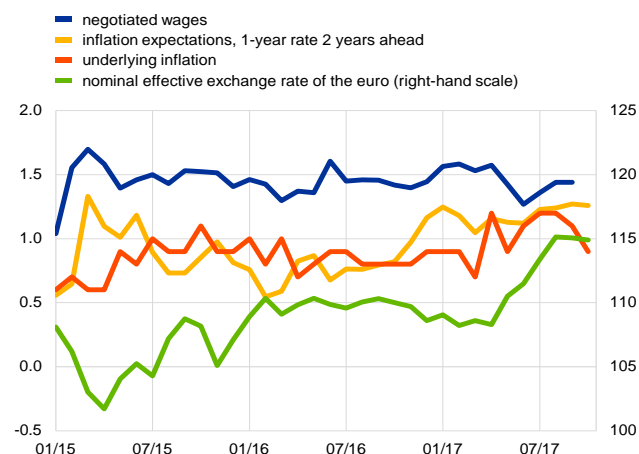


Sources: Eurostat and ECB calculations.  
Note: The distributions are calculated for each period using the year-on-year growth rates for 162 country-sector pairs (9 sectors across 18 countries).

**Chart 1.3**  
Moderate nominal developments in the euro area amid a recent appreciation of the euro exchange rate

Developments in the HICP excluding energy and food prices, market-based inflation expectations, negotiated wages and the nominal effective exchange rate of the euro

(Jan. 2015 – Oct. 2017, percentages, annual percentage changes)



Sources: Bloomberg, Eurostat, ECB and ECB calculations.  
Note: The nominal effective exchange rate of the euro is measured against the currencies of 38 of the euro area's most important trading partners.

**Euro area nominal growth prospects are also set to improve gradually.**

Following the spike at the turn of 2016-17, euro area HICP inflation has been broadly stable since the publication of the previous FSR, but is likely to temporarily decline towards the end of 2017, mainly reflecting base effects in energy prices. Having ticked up moderately in recent months, measures of underlying inflation have yet to show convincing signs of a sustained upward trend, as domestic cost pressures, including wage growth, are still subdued (see [Chart 1.3](#)). The recent appreciation of the euro exchange rate implies some moderation in price pressures, but nominal growth prospects are envisaged to improve gradually as underlying inflation picks up, supported by monetary policy measures, the continuing economic expansion and the corresponding gradual absorption of economic slack. Regarding the relationship between economic slack and underlying inflation, past regularities may prove less reliable in the post-crisis environment, as reflected by tentative signs of a flattening of the Phillips curve, in particular in the euro area, but to a lesser extent also in the United States (see [Chart 1.4](#)). This may hamper market participants' ability to use the outlook for real economic activity to extract signals regarding the timing and

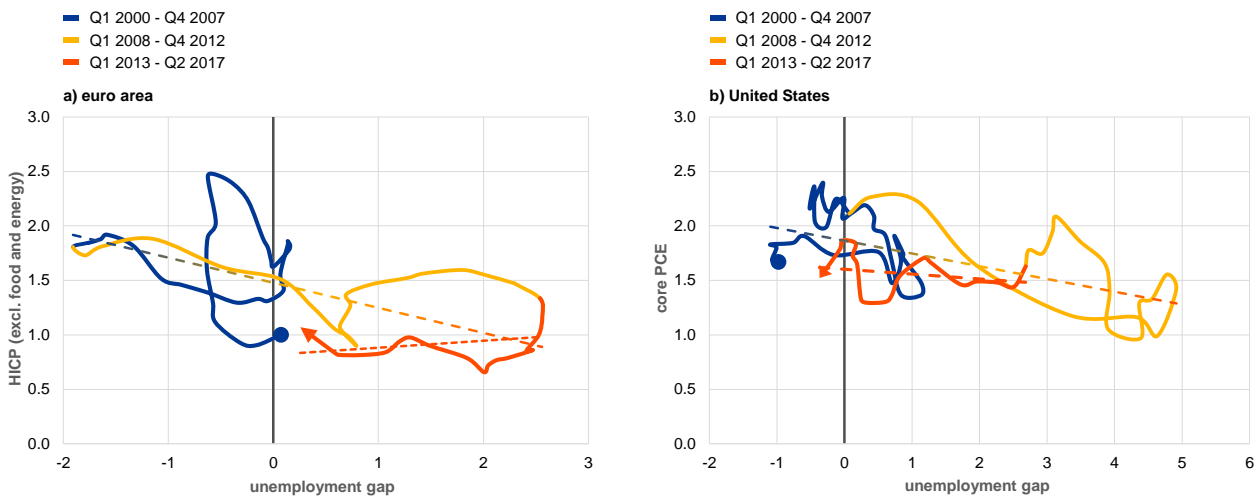
pattern of the normalisation of monetary policies. All in all, according to the September 2017 ECB staff macroeconomic projections for the euro area, headline inflation is foreseen to average 1.5% in 2017 and to decline to 1.2% in 2018, mainly driven by base effects in the energy component, before rising to 1.5% in 2019.

### Chart 1.4

Tentative signs of a flattening of the Phillips curve, mainly in the euro area, but to a lesser extent also in the United States

#### Unemployment gap and the HICP/PCE (excluding food and energy) in the euro area and the United States

(Q1 2000 – Q2 2017, percentage points, annual percentage change)



Sources: European Commission (AMECO database), ECB and ECB calculations.

Notes: The unemployment gap is calculated as the difference between the unemployment rate and the non-accelerating inflation rate of unemployment. PCE stands for personal consumption expenditure.

#### External rebalancing appears to have slowed down in the euro area more recently.

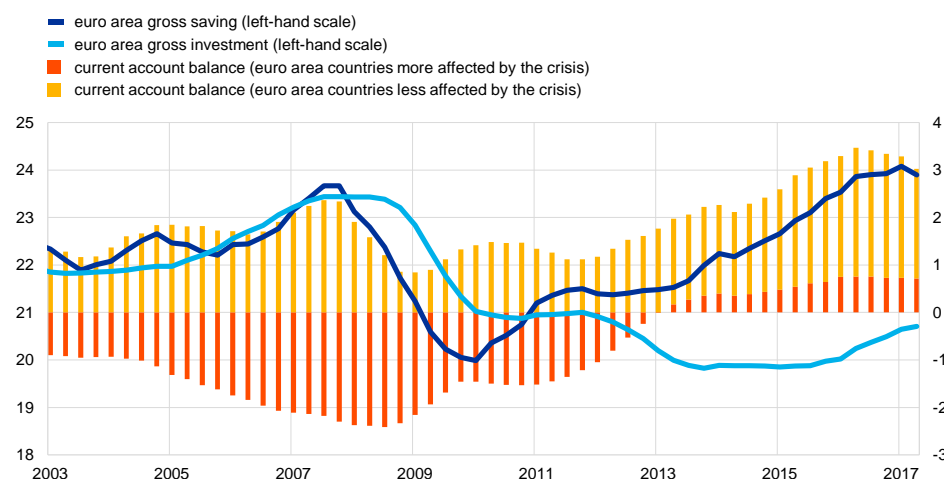
Following sharp current account reversals in euro area countries which entered the crisis with large current account deficits and a further strengthening of external positions in countries with sizeable pre-crisis surpluses (e.g. Germany), the current account surplus for the euro area as a whole appears to have stabilised at above 3% of GDP at the turn of 2016-17. This reflects a pick-up in investment which broadly offset the continued rise in gross saving, after a prolonged period when the saving-investment gap widened (see [Chart 1.5](#)). Although the net international investment position of most countries with large net foreign liabilities has stabilised thanks to the current account improvements of recent years, stock imbalances continue to be high in some euro area countries that were more affected by the crisis. Looking ahead, downward pressures on current account balances may stem from the cyclical upturn in economic activity in the euro area, the recent appreciation of the euro and higher commodity prices, potentially delaying the transition towards more balanced external positions in some euro area countries with continued rebalancing needs of a more structural nature.

### Chart 1.5

Euro area current account surpluses have stabilised at high levels with the pick-up in investment

#### Gross saving and gross fixed capital formation in the euro area

(Q1 2003 – Q2 2017, percentage of GDP, four-quarter moving sums)



Sources: ECB and ECB calculations.

Note: Euro area countries that were more affected by the crisis include Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain, while countries that were less affected by the crisis comprise all other euro area countries.

**Risks surrounding the euro area growth outlook are broadly balanced.** The very accommodative monetary policy stance, past progress in deleveraging across sectors and the continued improvement in the labour market and bank lending conditions are projected to sustain domestic demand, while a gradually firming global recovery is expected to support exports despite the recent appreciation of the euro. Following a post-crisis peak of 2.2% in 2017, the September 2017 ECB staff macroeconomic projections for the euro area envisage real GDP growth of 1.8% on average in 2018 and 2019. The risks surrounding this outlook seem to be broadly balanced. On the upside, the current positive cyclical momentum, as mirrored by favourable business and consumer sentiment, increases the chances of a stronger than expected economic upswing. At the same time, downside risks primarily relate to global factors, such as a potential disorderly tightening of global financial conditions or a further rise in (geo)political uncertainties. That said, a sluggish pace of structural reform implementation, further balance sheet adjustment needs in the public and/or non-financial private sectors, as well as elevated political and policy uncertainties (including those related to the ongoing negotiations on the future relationship between the United Kingdom and the European Union) may weigh on the cyclical momentum in individual euro area countries.

**Underpinning developments in the euro area, the global economy continued along a sustained growth path.** Underlying growth trajectories have become more synchronised across advanced and emerging economies against the backdrop of overall supportive global financial conditions, as well as a continued rise in global risk appetite (see [Chart 1.6](#)). Global economic activity is projected to accelerate moderately, but the pace of expansion will remain below pre-crisis rates, in line with lower potential growth estimates for most advanced and emerging economies. While

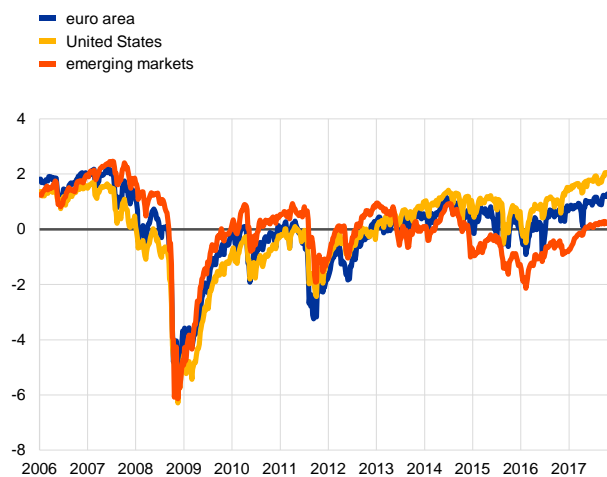


the upbeat consumer and business sentiment may underpin a stronger cyclical momentum, the risks to the outlook remain skewed to the downside and relate, in particular, to the possibility of an increase in trade protectionism, a potential disorderly tightening of global financial conditions, possible disruptions associated with China's reform and liberalisation process, as well as heightened (geo)political uncertainties.

**Chart 1.6**  
Positive risk sentiment in advanced and emerging economies underpins the recovery in global growth

**Composite financial risk indices for the euro area, emerging markets and the United States**

(Jan. 2006 – Nov. 2017, standard deviation from mean)

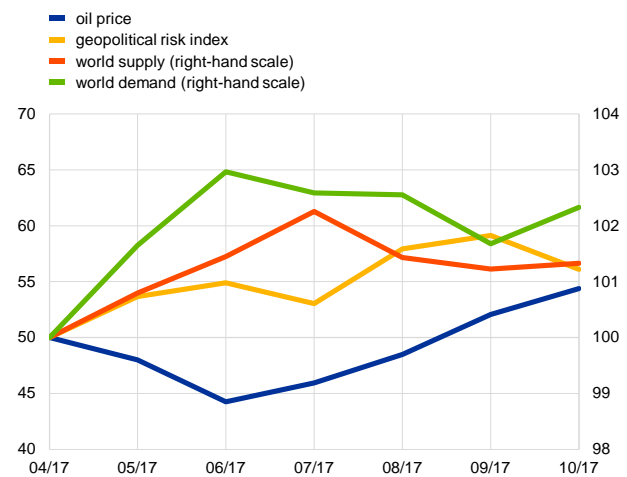


Sources: Bloomberg and ECB calculations.  
Notes: The negative of the first principal component score is used to condense the information from several market risk measures via principal component analysis whereby a higher risk index indicates an increase in risk appetite. For the euro area, three components are included: the EURO STOXX 50 volatility index, the euro area corporate BBB spread against ten-year euro area government bonds, as well as the equity-to-bond market return ratio capturing overall risk perception, hedging demand, investor sentiment and valuation concerns. Similarly, for the United States, the CBOE VIX index, the US corporate BBB spread and the ratio of the S&P 500 return to the US bond market return are used. The emerging market index captures an emerging market currency volatility index, the EMBIG spread and a modified version of the equity-to-bond market return ratio. The underlying series are weekly averages of closing prices and each component is z-standardised.

**Chart 1.7**  
Oil prices have picked up recently, driven by both increased demand and geopolitical concerns

**Oil price, world supply and demand, as well as geopolitical risk index for commodity exporters**

(Apr. 2017 – Oct. 2017; index: Apr. 2017 = 50 (left-hand scale) and 100 (right-hand scale))



Sources: Bloomberg, Haver Analytics and ECB calculations.  
Note: The geopolitical risk index for commodity exporters shows a six-month moving average. For further details, see Caldara, D. and Iacoviello, M., "Measuring geopolitical risk", working paper, Board of Governors of the Federal Reserve System, August 2017.

**Global commodity prices have edged up amid continued low volatility.** Oil prices (Brent) have trended upwards since mid-2017, hitting almost USD 65 per barrel in mid-November, the highest level since mid-2015. The recovery in oil prices helps attenuate financial stability concerns surrounding the oil industry and to ease macro-fiscal pressures on oil-exporting emerging economies. Oil market fundamentals have played a key role in shaping this development, as stronger than expected oil demand and, on the supply side, somewhat stronger compliance with the OPEC production cut agreement (see **Chart 1.7**) have both contributed to tighter market conditions. At the same time, geopolitical uncertainties appear to have risen, bearing upside risks to oil prices in the event of unexpected supply disruptions. By contrast, a larger than expected rise in US shale oil production remains the largest downside risk.

**The cyclical upswing in advanced economies is ongoing amid continued policy support.** Economic activity in advanced economies outside the euro area is supported by fairly benign macro-financial sentiment, improving labour market conditions, a steady recovery in housing markets and receding headwinds from private sector deleveraging in several countries. While remaining supportive overall, monetary policies continued to diverge across major advanced economies, as the prospect of further withdrawal of monetary support in the United States contrasts with continued monetary accommodation in Japan and the United Kingdom. The outlook for advanced economies entails a modest expansion and output gaps that gradually turn positive, underpinned by prolonged monetary and fiscal support.

**While growth prospects in advanced economies appear resilient, downside risks to the medium-term growth outlook remain.** Overall, policy uncertainties remain elevated in advanced economies and continue to relate, in particular, to the medium-term growth prospects of the UK economy following the withdrawal from the European Union, as well as the eventual fiscal and monetary policy mix in the United States and its implications for the US and global economies. At the same time, a possible further strengthening of protectionist tendencies across advanced economies could adversely impact global trade and growth, while a potential escalation of geopolitical conflicts may have a severe impact on the global economy via deteriorating sentiment and a rise in risk aversion.

**The United Kingdom's decision to withdraw from the European Union could have adverse financial stability implications for the euro area, but the risk that access to wholesale and retail financial services would be materially restricted for the euro area economy appears limited.** This notwithstanding, the impact of this decision will likely differ across euro area countries depending on the size of financial and real economy linkages with the United Kingdom. While a number of crucial financial services for the euro area economy are currently provided in the United Kingdom, euro area entities will most likely retain sufficient access to financial services in a new equilibrium following the United Kingdom's withdrawal from the European Union. Some services can continue to be provided from the United Kingdom, some will be provided by EU-domiciled entities instead and some of the entities currently providing financial services out of the United Kingdom will relocate to the EU27 to continue serving their EU27 clients.<sup>5</sup>

**The impact on financial services is likely to be reflected more in the cost of financial services and in costs for financial institutions than in a reduction in the availability of services.** Moving from a centralised wholesale banking market based in London towards a potentially more fragmented landscape, and thereby forgoing synergies reaped from the economies of scale and scope of the City of London, could indeed increase the cost of financial services and lead to higher costs for banks and other financial institutions. One-off costs for financial institutions stemming from, for example, relocating activities and reviewing and revising financial

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<sup>5</sup> See the box entitled "Preparing for Brexit to secure the smooth provision of financial services to the euro area economy", *Financial Stability Review*, ECB, May 2017.

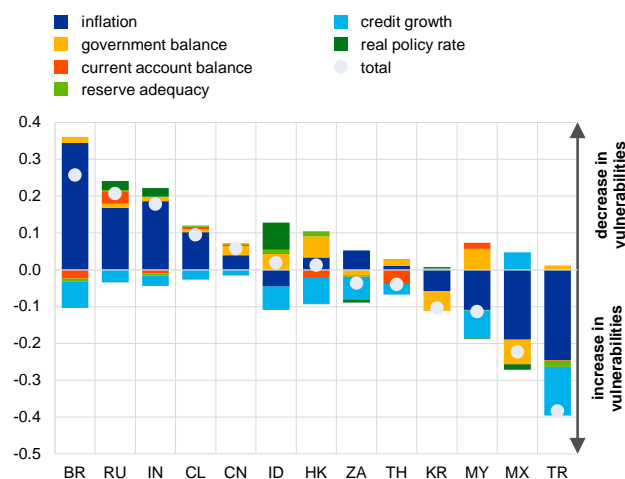
contracts could add to the profitability challenges currently facing euro area financial institutions.

**The ECB underlines the need for the affected banks and other financial institutions to undertake all necessary preparations in a timely manner, in order to avoid any remaining “cliff” effects.** A well-managed transition will be particularly important in areas such as wholesale financial services and central clearing where the City of London currently plays an important role. A relocation of capacity during the transition from the current situation to the new equilibrium could in some cases cause frictions if such a transition is not adequately managed. Therefore, in order to minimise the risk of potential cliff effects, affected entities should adequately plan for all contingencies.

**Chart 1.8**  
Emerging markets appear to be less vulnerable overall, but imbalances remain in some countries

**Annual change in the emerging market vulnerability index**

(Q2 2016 vs Q2 2017, percentage changes, percentage point contributions to change)

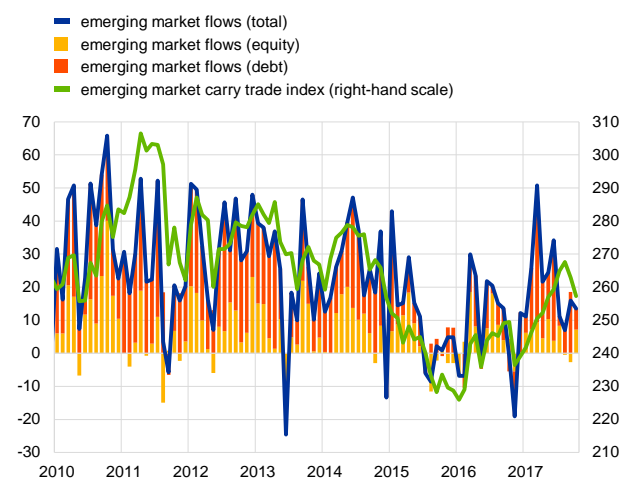


Sources: Haver Analytics and ECB calculations.  
Notes: The vulnerability index is based on an average of six standardised indicators (i.e. inflation, the budget balance, the current account balance, nominal credit growth, the real monetary policy rate and a measure of foreign reserve adequacy) of macroeconomic fragility selected from a larger set of variables based on the degree of correlation with changes in the nominal effective exchange rates of 15 major emerging market currencies during the “taper tantrum” (May-September 2013). The countries captured are Brazil (BR), Russia (RU), India (IN), Chile (CL), China (CN), Indonesia (ID), Hong Kong (HK), Thailand (TH), South Africa (ZA), South Korea (KR), Malaysia (MY), Mexico (MX) and Turkey (TR).

**Chart 1.9**  
Financial conditions have improved in emerging markets, driven by a recovery of portfolio flows

**Portfolio flows to emerging economies by asset class and emerging market carry trade index**

(Jan. 2010 – Oct. 2017, USD billions, index points)



Sources: Bloomberg, Institute of International Finance and ECB calculations.  
Notes: Bloomberg’s emerging market carry trade index captures the cumulative total return of a buy-and-hold carry trade position that is long in eight emerging market currencies (Brazilian real, Mexican peso, Indian rupee, Indonesian rupiah, South African rand, Turkish lira, Hungarian forint, Polish zloty) and that is fully funded with short positions in the US dollar. It is assumed that the investment is in three-month money market securities, with each of the eight emerging market currencies assigned an equal weight in the currency basket.

**Fundamentals have improved in emerging markets, but some countries remain vulnerable.** Economic activity in emerging markets is being supported by a rebound in growth in major commodity exporters, such as Brazil and Russia, after deep recessions, while economic growth has remained fairly resilient in China and India. Overall, macro-financial vulnerabilities have continued to recede in major emerging economies (the BRICs), which are in an increasingly robust position to withstand external financial shocks (see **Chart 1.8**). That said, vulnerabilities appear to have increased in other countries, such as Mexico, which faced marked capital outflows in the aftermath of the US presidential election, and Turkey, where corporate leverage

has risen significantly and is increasingly sourced from wholesale markets. Emerging market portfolio flows (mainly in fixed income securities) remained resilient against a backdrop of further improving global financial conditions, a low volatility environment, the depreciation of the US dollar and solid carry trade returns (see [Chart 1.9](#)).

**The economic recovery in emerging markets remains on track, but headwinds persist.** In particular, a potential disorderly tightening of global financial conditions may expose emerging markets to the risk of a broad-based sell-off, thereby posing downside risks to growth in more vulnerable emerging economies. A shift towards higher interest rates triggered by a shock to term premia or expectations of tighter monetary policies in major advanced economies could disrupt financial markets and adversely impact emerging economies with lingering domestic and external imbalances, in particular if it was accompanied by an appreciation of the US dollar, which would affect those emerging economies with notable unhedged US dollar exposures. In addition, China's reform and liberalisation process which is navigating the economy towards more market-based structures could produce financial and real shocks with negative spillovers at the global level. While China retains policy space to cushion against potential adverse shocks, continued high credit growth has increased economy-wide debt levels, including government debt, reducing buffers available to deal with future shocks.

**All in all, financial stability could be challenged, should downside risks materialise.** While the economic expansion is expected to sustain momentum at both the euro area and global levels, the cyclical upswing may be put to the test by the potential adverse ramifications of increasingly divergent monetary policies across major advanced economies, the ongoing structural rebalancing towards a more moderate growth path in some major emerging economies and further rising geopolitical risks. These factors may not only undermine the sustainability of the global and euro area recovery, they also have the potential to trigger tensions in global financial markets and prompt a disorderly unwinding of global search-for-yield flows. At the same time, a weaker than expected growth environment could itself trigger the materialisation of any of the main risks to euro area financial stability (see the Overview) and reinforce global risk repricing, further challenge bank profitability or fuel debt sustainability concerns.

## 1.2 Favourable economic and sovereign financing conditions mask underlying vulnerabilities

**Stress in euro area sovereign debt markets has subsided further on account of improving growth prospects and waning political risks.** The composite indicator of systemic stress in euro area sovereign bond markets has fallen considerably since the publication of the previous FSR, back to the levels seen before the spike in early 2017 (see [Chart 1.10](#)). In terms of the underlying contributing factors, bond market volatility has come down markedly as uncertainties surrounding possible electoral outcomes in major euro area countries (i.e. the Netherlands and France) gradually dissipated and in line with the exceptionally low global volatility environment across different asset classes. Moreover, liquidity conditions in government bond markets

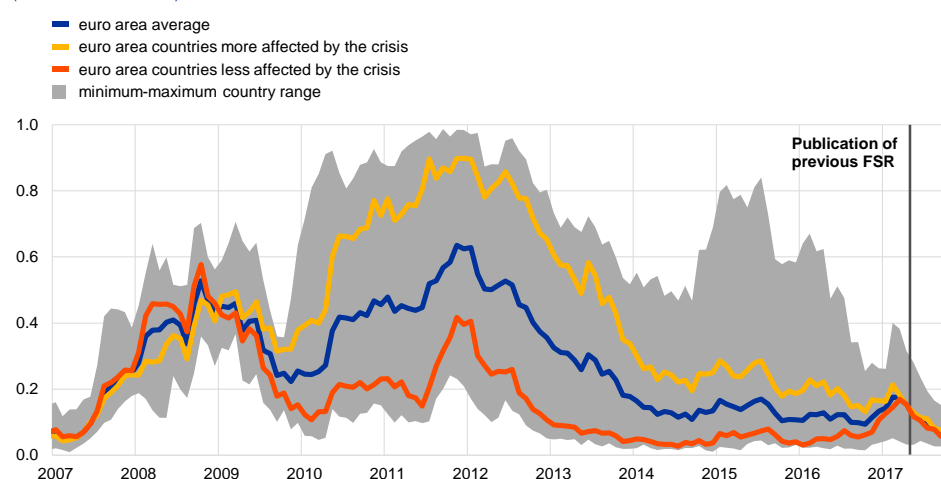
have remained benign against the backdrop of the ECB's public sector purchase programme, while specific developments at the country level, such as the conclusion of the second programme review in Greece, have contributed to lowering sovereign credit risk in some euro area countries. The recent improvement in overall euro area sovereign stress metrics went hand in hand with considerably reduced cross-country dispersion. On aggregate, stress in euro area countries that were more affected by the crisis in terms of their perceived riskiness converged towards that in countries that were less affected – a pattern last observed prior to the eruption of the global financial crisis.

### Chart 1.10

Sovereign bond market tensions have come down in the euro area amid markedly declining cross-country heterogeneity

#### Composite indicator of systemic stress in euro area sovereign bond markets

(Jan. 2007 – Oct. 2017)



Sources: ECB and ECB calculations.

Notes: The SovCISS is available for the euro area as a whole and for 11 euro area countries. Euro area countries that were more affected by the crisis comprise Greece, Ireland, Italy, Portugal and Spain, while euro area countries that were less affected by the crisis include Austria, Belgium, Germany, Finland, France and the Netherlands. The SovCISS combines data from the short end and the long end of the yield curve (two-year and ten-year bonds) for each country, i.e. two spreads between the sovereign yield and the euro swap interest rate, two realised yield volatilities and two bid-ask bond price spreads. The aggregation into country-specific and euro area aggregate SovCISS is based on time-varying cross-correlations between all homogenised individual stress indicators pertaining to each SovCISS variant following the CISS methodology developed in Hollo, 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.

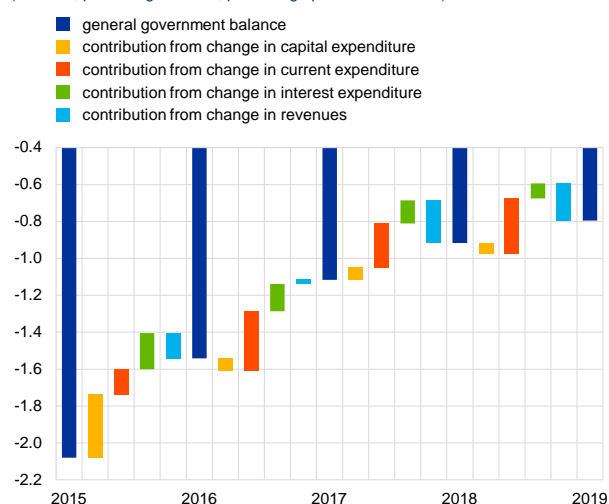
**Favourable cyclical conditions mask underlying fiscal vulnerabilities.** Following considerable improvements in recent years, the aggregate euro area headline fiscal balance is set to improve further gradually over the 2017-19 horizon. According to the European Commission, the euro area headline deficit is forecast to drop from 1.5% of GDP in 2016 to 1.1% in 2017, 0.9% in 2018 and 0.8% in 2019 (see [Chart 1.11](#)). At the country level, headline balances are expected to fall below the Maastricht Treaty deficit reference value of 3% of GDP by 2018 in all countries. Against the backdrop of the low interest rate environment, the improvement in the aggregate euro area fiscal balance over the period 2017-19 continues to be underpinned by lower interest expenditures, but also falling current expenditures, as automatic stabilisers (e.g. lower social transfers) activate amid better economic and labour market conditions. That said, improving headline balances mask underlying fiscal vulnerabilities and an overall slight loosening in the fiscal stance for the euro

area over the 2017-19 horizon. Fiscal efforts continue to fall short of commitments under the Stability and Growth Pact in several euro area countries (see [Chart 1.12](#)). The projected deterioration of structural balances in 2017-19 in a number of countries may further challenge compliance with the medium-term objectives specified in national stability programmes. In addition, structural reforms appear to have lost further momentum lately, in particular in countries that were more affected by the crisis (see [Chart 1.13](#)). Reforms are under way in several countries to rationalise public expenditures. Nevertheless, all euro area countries would benefit from further efforts towards achieving a more growth-friendly composition of public finances. Shifting expenditure to the most growth-enhancing categories or the tax burden to less distortive taxes can positively affect output growth and strengthen fiscal buffers.<sup>6</sup>

**Chart 1.11**  
Euro area headline fiscal balance is set to improve gradually...

**General government balance in the euro area**

(2015-19, percentage of GDP, percentage point contributions)

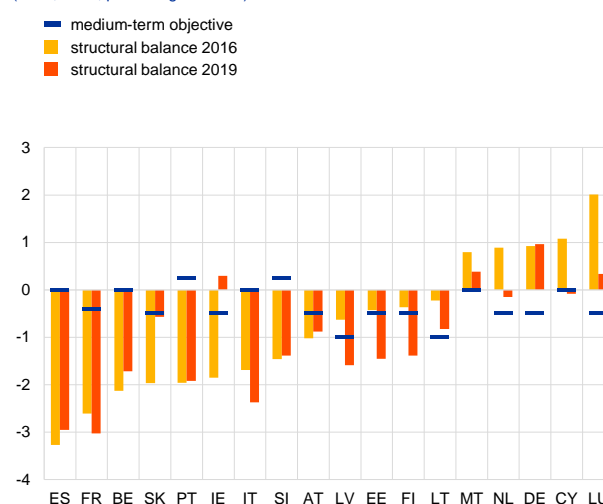


Sources: European Commission (AMECO database) and ECB calculations.

**Chart 1.12**  
...but fiscal adjustment needs are projected to increase in several euro area countries

**Structural fiscal balances and medium-term objectives in individual euro area countries**

(2016, 2019, percentage of GDP)



Sources: European Commission and national stability programmes.  
Notes: Under the preventive arm of the Stability and Growth Pact, countries are required to ensure convergence towards their respective medium-term objectives. These objectives are set by individual euro area countries in their national stability programmes and the envisaged date of compliance differs from country to country. Greece is not shown in the chart as it is subject to an economic adjustment programme and is thus outside the European Semester.

**The euro area general government debt-to-GDP ratio is expected to continue declining gradually.** Having been on a downward trajectory since the peak in 2014, the aggregate euro area government debt-to-GDP ratio is projected by the European Commission to decline further to 89.3% in 2017, 87.2% in 2018 and 85.2% in 2019. In particular, euro area countries with debt levels exceeding the 60% of GDP Maastricht Treaty threshold are projected to see a further decrease or stabilisation in their government debt ratios by 2019. At the euro area aggregate level and in most

<sup>6</sup> See the article entitled “The composition of public finances in the euro area”, *Economic Bulletin*, Issue 5, ECB, 2017.

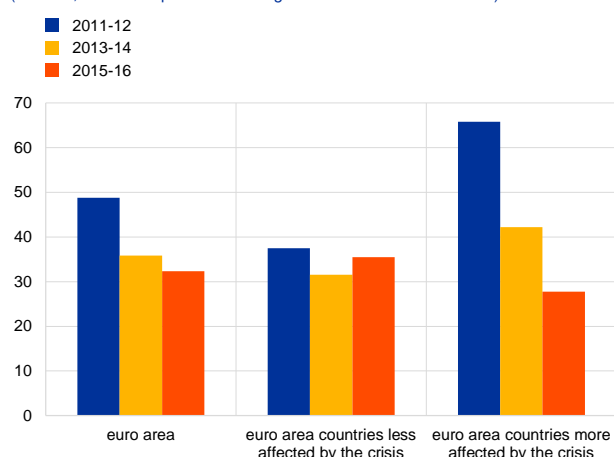
individual countries, the gradual transition towards lower debt ratios is underpinned by projected primary surpluses and a favourable “snowball effect” (i.e. a negative interest rate-growth differential).<sup>7</sup>

**Chart 1.13**

Structural reform efforts have overall continued to lose momentum in the euro area

**Responsiveness to Going for Growth recommendations**

(2011-16, share of implemented *Going for Growth* recommendations)



Sources: OECD and ECB calculations.

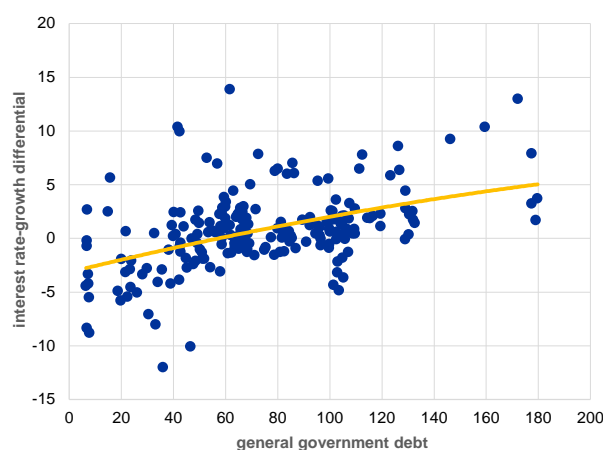
Notes: The reform responsiveness indicators measure the extent to which countries have followed up on the OECD's *Going for Growth* recommendations, but they do not aim to assess overall reform intensity per se, as they do not take into account reforms carried out in non-priority areas and do not quantify the importance of each individual measure. For methodological details, see Annex 2.A1 of *Going for Growth 2010*, OECD, March 2010. Euro area countries that were less affected by the crisis comprise Austria, Belgium, Estonia, Finland, France, Germany, Luxembourg, the Netherlands and Slovakia. Euro area countries that were more affected by the crisis include Greece, Ireland, Italy, Portugal, Slovenia and Spain. The two country groups are constructed using a simple average of the underlying country values.

**Chart 1.14**

Euro area countries with higher debt levels tend to have higher interest rate-growth differentials

**General government debt levels and interest rate-growth differentials across selected euro area countries**

(1999-2016; x-axis: percentage of GDP; y-axis: percentage points)



Sources: European Commission and ECB calculations.

Notes: The sample includes 12 euro area countries (the first to have joined EMU), namely Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, the Netherlands and Portugal. The average interest rate-growth differential for the 12 countries over the EMU period so far (1999-2016) is 0.7 percentage point, with all countries, except Ireland and Luxembourg, recording positive values on average. The sample excludes the 2015 point observations for Ireland.

**The current favourable snowball effect may reverse once interest rates normalise.**

As a corollary of the low interest rate environment and the positive underlying economic momentum, the snowball effect contributes to the projected debt reduction in almost all euro area countries. Only Italy is currently projected to record positive, albeit diminishing, snowball effects by 2019. Given that, traditionally, advanced mature economies tend to have positive interest rate-growth differentials on average over the longer run,<sup>8</sup> the currently negative and declining snowball effect may not be a structural feature. In fact, since the 1970s, the underlying trend in the interest rate-growth differential has been sharply upwards in the euro area, with the overall decline in nominal growth more than compensating for the reduction in the implicit interest rate. Over the EMU period, the increasing trend and the country

<sup>7</sup> The “snowball effect” refers to the differential between the implicit interest rate paid on the stock of government debt and the nominal growth rate of the economy, which is a key concept in assessing fiscal sustainability. If the interest rate is lower than the nominal growth rate, there is a negative interest rate-growth differential, which contributes to reducing the stock of government debt.

<sup>8</sup> See Escolano, J., “A Practical Guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates”, IMF Technical Note and Manual No 2010/02, 2010, and Escolano, J., Shabunina, A. and Woo, J., “The Puzzle of Persistently Negative Interest-Rate-Growth Differentials: Financial Repression or Income Catch-Up?”, *Fiscal Studies*, Vol. 38, 2017, pp. 179-217.

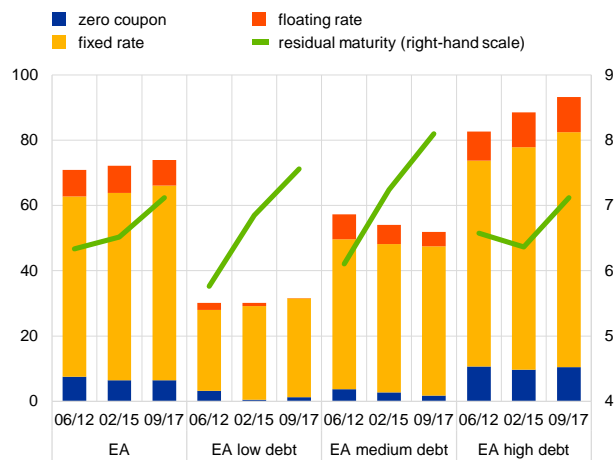
volatility moderated significantly, and started to reverse after the spike during the financial and sovereign debt crisis. At the same time, more indebted countries tend to have higher interest rate-growth differentials (see [Chart 1.14](#)), which could make putting debt ratios on a sustainable downward path challenging.

**Chart 1.15**

The shift towards long-term fixed rate debt issuance and the related maturity prolongation have continued

**Outstanding amount of government debt securities in the euro area**

(left-hand scale: percentage of GDP; right-hand scale: years)



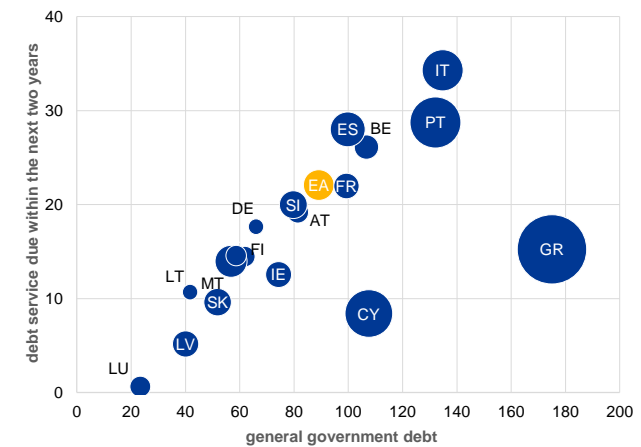
Source: ECB (Government Finance Statistics).  
 Notes: The "low debt" category covers euro area countries with public debt levels below 60% of GDP (i.e. Estonia, Latvia, Lithuania, Luxembourg, Malta and Slovakia) as at year-end 2016. Countries with public debt levels of between 60% and 90% of GDP (i.e. Austria, Finland, Germany, Ireland, the Netherlands and Slovenia) are labelled "medium debt" countries, while countries with debt levels of over 90% (i.e. Belgium, Cyprus, France, Greece, Italy, Portugal and Spain) are referred to as "high debt" countries. Figures are shown as at June 2012 (the height of the euro area sovereign debt crisis), February 2015 (the month preceding the start of the ECB's public sector purchase programme) and September 2017, i.e. the most recent observation.

**Chart 1.16**

Debt servicing needs remain substantial for several euro area countries, highlighting rollover risks

**Public debt levels and debt service due within the next two years**

(x-axis: Q2 2017; y-axis: Sep. 2017; percentage of GDP)



Source: ECB (Government Finance Statistics).  
 Notes: Data on government debt service over the next two years only reflect existing maturing securities (principal and interest). The scheduled (future) redemptions are calculated based on the maturity date for each debt security. The amounts do not include government loans or redemptions of debt securities covering future budget deficits or redemptions of debt securities that will be issued in the future. The size of the bubble reflects the 2017 year-to-date average ten-year government bond yield.

**Sovereign financing conditions have remained favourable in terms of both pricing and duration.** Pricing conditions have continued to be fairly benign for euro area governments against the backdrop of ongoing Eurosystem asset purchases and a low volatility environment (see Section 2). In terms of duration, the continued strong issuance activity targeting the long end of the yield curve has led to a further increase of the average residual maturity of outstanding euro area government debt securities (see [Chart 1.15](#)). Concerning the underlying interest rate structure, a reduction in zero-coupon and floating rate debt, in particular in euro area countries with low or medium levels of debt, and the concurrent increase in fixed rate debt allow governments to lock in long-term financing at low costs and to capitalise on historically low interest rates. The overall shift in issuance activity towards longer durations has helped to reduce the gross financing needs of euro area governments. Still, debt servicing needs remain high for several – in particular highly indebted – euro area countries (see [Chart 1.16](#)), suggesting possible rollover risks, in terms of both the availability and cost of funding, in the event of a sovereign risk repricing.

**Higher long-term interest rates and a repricing of sovereign risk may reignite government debt sustainability concerns in the absence of further reforms and**



**consolidation efforts.** Several factors may challenge the sustainability of public finances in the euro area in the short term. First, a rise in long-term interest rates (in the absence of a commensurate improvement in macroeconomic conditions) may reignite pressures on more vulnerable sovereigns, thereby triggering a sovereign risk repricing. The fact that for a number of countries the current yield on new funding is below the average cost of outstanding debt provides a buffer to absorb rate increases before they actually result in a higher overall interest bill. Nevertheless, simulation results suggest that in the event of an interest rate shock, this buffer would be significantly depleted (see Chart 11 in the Overview). This holds particularly for countries with shorter debt maturities. In addition, highly indebted euro area sovereigns are more vulnerable to rising financing costs than countries with lower debt levels. Second, while bail-in and bank resolution rules have weakened the sovereign-bank nexus since the height of the euro area sovereign debt crisis, residual risks remain, not least as individual banks in some jurisdictions remain vulnerable. Third, while the most imminent market concerns regarding political risks have abated as the electoral calendar proceeds, growing fragmentation of the political landscape (in the sense of a greater difficulty to establish political consensus) in several euro area countries and the ensuing potential difficulties in governance may lead to a further slowdown of fiscal and structural reform efforts. These short-term challenges continue to be accentuated in the medium-to-long run by vulnerabilities related to lower potential GDP growth and ageing-related costs.

**All in all, sovereign risks appear to have remained broadly unchanged since the last FSR.** While the improving economic outlook and favourable sovereign financing conditions mitigate sovereign risks, fiscal fragilities remain at the country level. Looking ahead, higher long-term interest rates, waning structural and fiscal reform efforts, as well as pockets of risks surrounding the sovereign-bank nexus in some countries may challenge public finances. The materialisation of any of these vulnerabilities – in isolation or in combination – may trigger a repricing of sovereign risk and reignite concerns regarding public debt sustainability.

## 1.3 Sustained recovery of the euro area non-financial private sector, but headwinds remain

### Households and non-financial corporations

**The income position of euro area households is strengthening gradually, in line with improving cyclical conditions.** Households' nominal income growth is primarily bolstered by improving labour market conditions and the related robust growth in labour income (see [Chart 1.17](#)). To a lesser extent, it is also being supported by positive profit and property income developments. That said, higher inflation outturns somewhat contained households' real purchasing power around the turn of 2016-17. At the same time, household net worth increased further, owing largely to continued improvements in housing markets and associated valuation gains on property holdings, as well as capital gains on direct securities and mutual

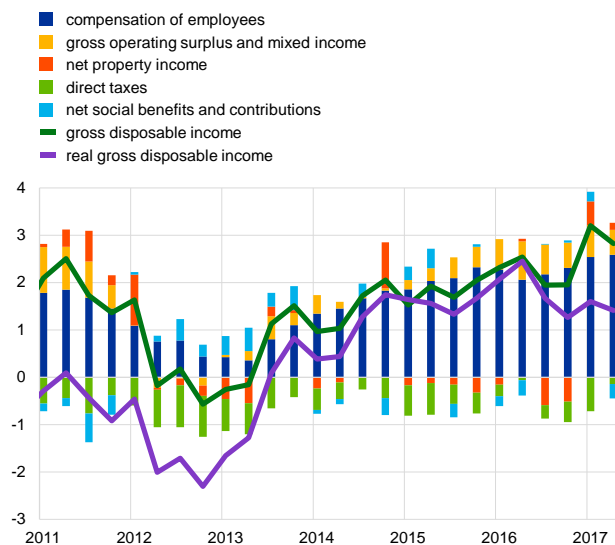
fund share holdings. Looking ahead, euro area households' income position is expected to recover further, buttressed by improving labour market conditions, even though in some countries continued labour market slack may weigh on households' income prospects.

**Non-financial corporate earnings are set to improve.** With growth becoming more broad-based across countries and sectors, the earnings-generating capacity of euro area non-financial corporations (NFCs) has improved, but corporate profitability has remained muted by historical standards. Business sentiment and confidence are ebullient, while order books and capacity utilisation are increasing (see [Chart 1.18](#)). Coupled with still moderate cost pressures from typical cyclical headwinds, such as higher wages and interest rates, these developments bode well for a recovery in corporate profitability, thereby also alleviating pressures on more vulnerable firms facing debt servicing difficulties (see [Box 1](#)).

**Chart 1.17**  
A gradually improving income position underpins households' debt servicing ability

Euro area households' real and gross disposable income

(Q1 2011 – Q2 2017, annual percentage changes, percentage point contributions)

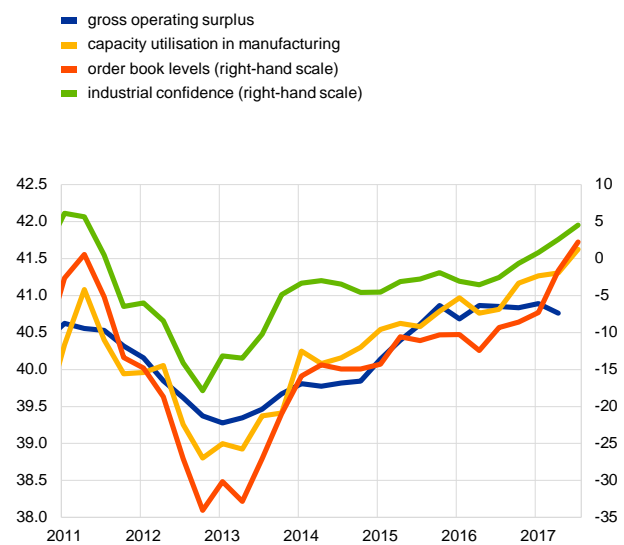


Sources: Eurostat and ECB.

**Chart 1.18**  
Improved business environment is expected to translate into higher corporate profitability

Euro area NFC gross operating surplus and order book levels, capacity utilisation and industrial confidence

(Q1 2011 – Q3 2017, percentage of gross value added, percentage of capacity utilisation, percentage balances)



Sources: European Commission (DG ECFIN) and ECB calculations.

Note: For scaling purposes, the original time series provided for capacity utilisation in manufacturing have been divided by two.

**A large stock of legacy debt continues to weigh on the euro area non-financial private sector.** On aggregate, the indebtedness of euro area households has decreased somewhat further to 58.1% of GDP as at mid-2017, a level last observed in late 2006. At the same time, the level of non-financial corporate debt stood at 106.9% of GDP on an unconsolidated basis or 82.5% of GDP on a fully consolidated basis. These figures are still high by historical standards, as balance sheet repair in the non-financial private sector has proceeded only gradually at the aggregate euro area level. In fact, while having come down since the peak in early 2015, the indebtedness of euro area non-financial firms is still above – albeit gradually

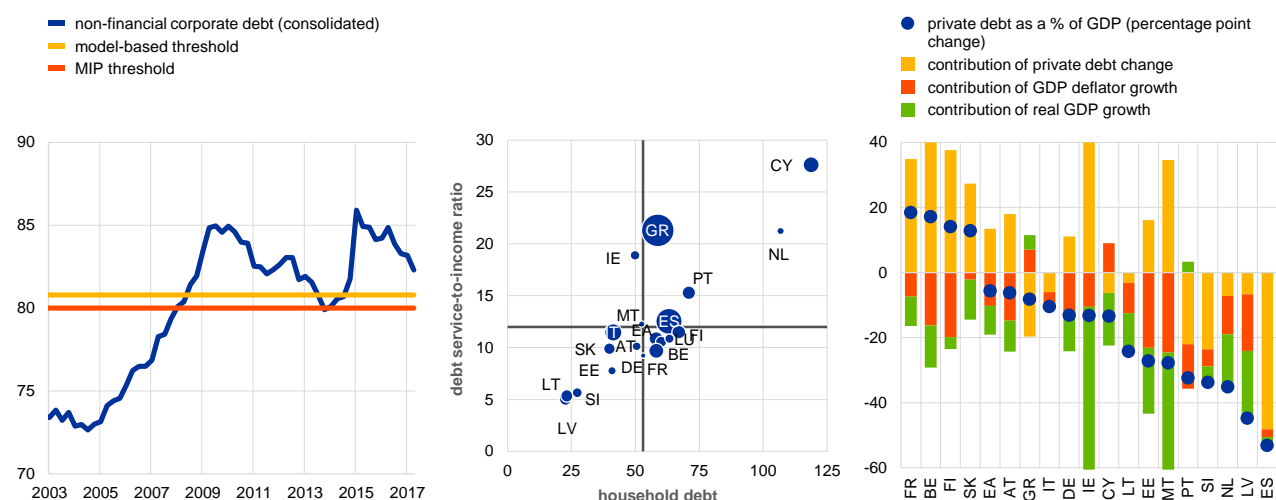
approaching – levels which can be associated with a debt overhang (see **Chart 1.19** – left panel). Similarly, continued elevated levels of household debt in some euro area countries, coupled with high debt service-to-income ratios, may render them more vulnerable than others (see **Chart 1.19** – middle panel). The pace of household debt adjustment to date has differed markedly across countries, with deleveraging being more forceful in countries (e.g. Ireland and Spain) which had accumulated large amounts of debt prior to the crisis (see **Chart 1.19** – right panel), with significant debt write-offs and renegotiations additionally helping to bring debt ratios down.

**Chart 1.19**

Continued high indebtedness of euro area non-financial firms and, in some countries, households indicates underlying vulnerabilities

Consolidated gross non-financial corporate debt in the euro area, indebtedness and debt service-to-income ratios of euro area households, and decomposition of changes in the non-financial private sector debt-to-GDP ratio from the peak until end-2016

(left panel: Q1 2003 – Q2 2017, percentage of GDP; middle panel: Q2 2017, Sep. 2017, percentage of GDP, percentages; right panel: percentage point changes and contributions)



Sources: Eurostat, ECB and ECB calculations.

Notes: Left panel: the threshold is computed with a Bayesian TVAR model with five variables, namely consolidated gross non-financial corporate debt, business investment, commodity prices, the HICP and corporate bond spreads (see Alessandri, P. and Mumtaz, H., "Financial Regimes and Uncertainty Shocks", Working Paper No 279, Queen Mary University of London, 2014). The estimation sample ranges from Jan. 1990 to Dec. 2016. Middle panel: the size of the bubble represents the unemployment rate. The vertical line represents the estimated macroeconomic imbalance procedure (MIP) benchmark of 53% of GDP for household debt. The 133% of GDP MIP limit for fully consolidated non-financial private sector debt is split between firms and households based on their average past shares in the stock of non-financial private sector debt. The debt service-to-income (DSTI) ratio is equal to the fixed debt service costs of an instalment loan, divided by income. Fixed debt service costs assume identical repayment of the principal during the average maturity of the debt and an average interest rate, and are a factor of outstanding debt. The threshold for the DSTI ratio is obtained from a univariate signalling model such that values exceeding the threshold have been associated with the onset of systemic financial crises in the following 5 to 12 quarters. The systemic financial crises are taken from "A new database for financial crises in European countries: ECB/ESRB EU crises database", *Occasional Paper Series*, No 13, European Systemic Risk Board, July 2017. Right panel: the peak in EA, EE, ES, LT, MT, NL, AT and PT was in 2009; in LV and SI in 2010; in IE, GR and IT in 2012; and in CY in 2014. The green bar is truncated for IE (-86.4 percentage points) and MT (-37.8 percentage points); the yellow bar is truncated for BE (+46.3 percentage points) and IE (+83.7 percentage points). Figures for IE are distorted by the revision of Irish GDP as of 2015 following the relocation of a limited number of multinational companies to Ireland which boosted both non-financial corporate debt and GDP.

**A favourable interest rate environment currently alleviates debt sustainability concerns.**

The gradually improving income and earnings position of euro area households and non-financial firms coupled with record low interest payment burdens buttress borrowers' debt servicing capabilities. Nonetheless, continued high household and/or non-financial corporate debt levels point to additional deleveraging needs in a number of countries. Indeed, further balance sheet repair should help offset any risks related to an eventual normalisation of interest rates and the ensuing rise in debt servicing costs. That said, a higher debt service burden for borrowers in a rising interest rate environment is likely to be counterbalanced in part by the positive impact of improved macroeconomic conditions on households' and firms'

income and earnings. In the event of an interest rate shock without a commensurate improvement in economic conditions, borrowers would face challenges primarily in countries where variable rate loans dominate. Non-financial firms are relatively more exposed in this regard than households.

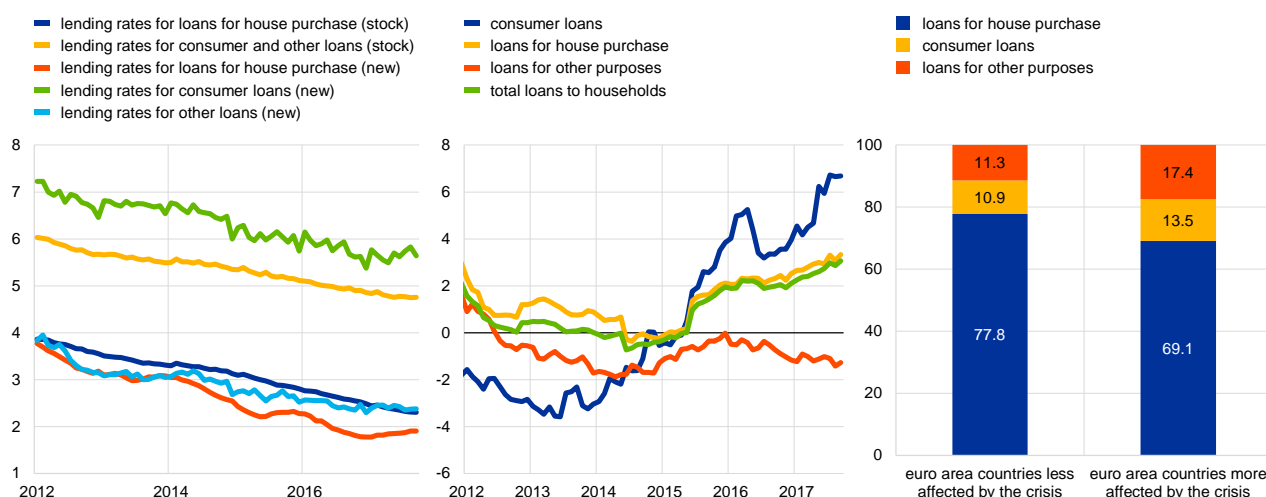
**While remaining muted, bank lending flows to the non-financial private sector have continued to recover, amid record low lending rates.** Overall, bank lending to euro area households and non-financial corporations has continued to strengthen gradually, supported by favourable demand and supply conditions. Credit standards eased for most lending categories, driven primarily by increased competitive pressures and banks' lower risk perceptions. On the demand side, the recovery in bank lending is supported by historically low bank lending rates across the maturity spectrum in almost all lending categories (see [Chart 1.20](#), left panel, and [Chart 1.21](#), right panel), as banks pass on lower funding costs to borrowers. Still, overall bank lending dynamics have remained muted, given residual deleveraging needs and the availability of ample alternative financing sources.

### Chart 1.20

Consumer lending has picked up recently given still high business margins, but the share of consumer loans in total household loans is relatively small

Household lending rates by type of lending (left panel), annual growth in lending to euro area households (middle panel) and structure of loans to euro area households (right panel)

(left panel: Jan. 2012 – Sep. 2017, percentages; middle panel: Jan. 2012 – Sep. 2017, annual growth rates based on respective indices of notional stocks; right panel: Sep. 2017, percentage share in total loans to households)



Sources: ECB and ECB calculations.

Note: Euro area countries that were more affected by the crisis include Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain, while countries that were less affected by the crisis comprise all other euro area countries.

**Bank lending dynamics continue to diverge across types of lending and countries.** While loans to non-financial firms have continued to expand at a steady pace since the turn of 2016-17, growth in lending to households further accelerated

as of the start of the year on account of consumer loans and, to a lesser extent, loans for house purchase (see [Chart 1.20](#) – middle panel). The rapid pace of expansion of consumer loans, in particular in countries that were more affected by the crisis, is not an immediate source of concern from a financial stability perspective given the relatively small share of consumer loans in total household loans on

aggregate (see [Chart 1.20](#) – right panel). Nevertheless, it may point to a niche of increased risk-taking by banks due to the higher business margins in that particular segment (as reflected by the still comparatively high lending rates), and thus warrants monitoring going forward. At the country level, credit to the non-financial private sector continued to contract in some countries that were more affected by the crisis (e.g. Cyprus, Greece, Ireland, Portugal and Spain), while in other euro area countries (e.g. Belgium, Estonia, Lithuania, Luxembourg and Slovakia) developments were more buoyant.

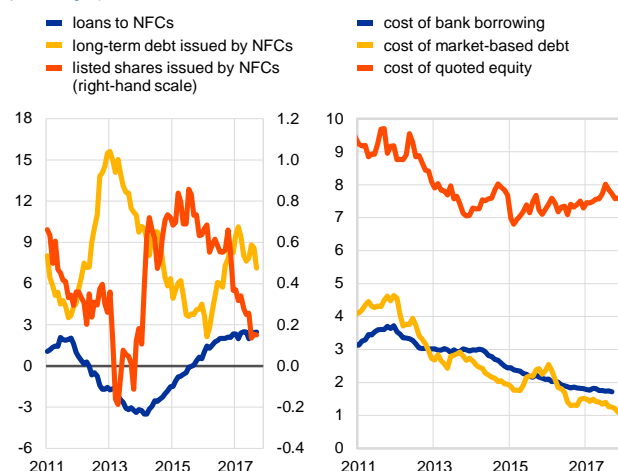
**Financing conditions for non-financial corporations have remained favourable, also in terms of non-bank sources of external financing.** Euro area non-financial firms' external financing from non-bank sources strengthened further in 2017, supported by historically low overall nominal costs of external financing. The net issuance of debt securities has remained relatively strong against the backdrop of the ECB's corporate sector purchase programme and the record low cost of market-based debt (see [Chart 1.21](#)). By contrast, the issuance of listed shares by NFCs continued to be relatively modest, given the comparatively high cost of quoted equity, while the issuance of unquoted shares remained buoyant.

**Chart 1.21**

External financing conditions remained favourable for euro area non-financial corporations

Loans to NFCs, issuance of long-term debt and listed shares by NFCs, and associated costs of financing

(Jan. 2011 – Oct. 2017; left panel: annual percentage changes; right panel: percentages)



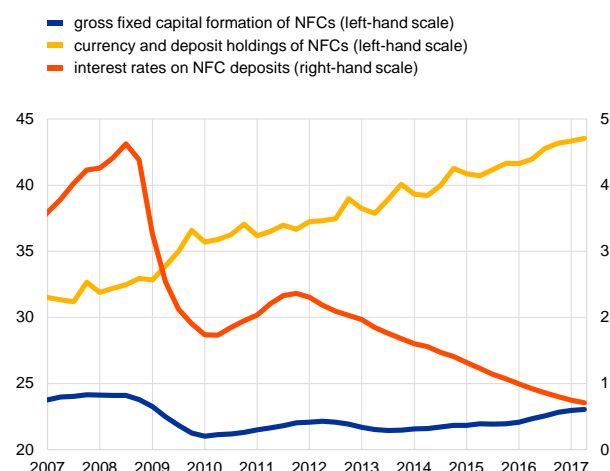
Sources: Eurostat, ECB, Dealogic and ECB calculations.  
Note: Loans to non-financial corporations are adjusted for cash pooling activities, loan sales and securitisations.

**Chart 1.22**

Corporate liquidity holdings have risen further amid falling deposit rates and muted corporate investment

Deposit interest rates, gross fixed capital formation as well as currency and deposit holdings of NFCs

(Q1 2007 – Q2 2017, percentage of gross value added, percentages per annum)



Sources: Eurostat, ECB and ECB calculations.

**Ample internal financing sources of euro area firms may underpin corporate deleveraging and investment activity.** Corporate liquidity has increased further to new record highs (see [Chart 1.22](#)), suggesting that non-financial firms can also rely on internal funds as a financing source in addition to loans and debt securities. These high liquidity buffers may reflect a lack of investment opportunities, but they also reflect precautionary motives (i.e. mitigating the risk of limited access to external financing in the future), the low opportunity cost of holding liquid assets and

continued credit supply constraints in some countries. That said, considerable savings and cash balances of euro area non-financial firms could make a significant contribution to both reducing leverage and financing the economic recovery by boosting investment.

**All in all, the euro area non-financial private sector continues to enjoy favourable financing conditions, but risks remain.** Reinforced by the ECB's very accommodative monetary policy stance, the financing conditions of euro area households and non-financial firms remain favourable and supportive of both domestic demand and debt servicing. However, rising interest rates (in the absence of a commensurate improvement in macroeconomic conditions) may spark renewed debt sustainability concerns in countries with elevated levels of household and corporate debt. Furthermore, the recent buoyancy of certain types of bank lending in some euro area countries may warrant monitoring.

## Box 1

### The prevalence of vulnerable firms in the euro area

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**The pre-crisis period was characterised by a debt-financed investment boom that ultimately proved unsustainable.** Excessive borrowing coupled with overinvestment in some euro area economies in the run-up to the global financial crisis has rendered parts of the euro area non-financial corporate sector vulnerable to shocks. As the financial crisis unfolded and macroeconomic conditions deteriorated, vulnerabilities that were looming in corporate balance sheets became increasingly apparent, with many firms no longer able to service their financial obligations.

**The health of non-financial firms is vital from a financial stability perspective, not least as debt servicing problems of firms may weigh on bank balance sheets via deteriorating asset quality.** These banking sector problems, if unresolved, can incentivise banks to “evergreen” loans in order to avoid the realisation of losses.<sup>9</sup> If interest rates were to increase without an improvement in economic conditions, the interest subsidies required to keep troubled firms afloat would become more costly, which, in turn, would have an adverse impact on banks' profitability or even, in an extreme scenario, on their solvency.

**Against this backdrop, this box examines the prevalence of vulnerable firms in the euro area and their ability to cope with stress, as reflected in an interest rate shock.** In general, vulnerable firms are defined as those having persistent difficulties in meeting their interest payments.<sup>10</sup> More specifically, firms that have had an interest coverage ratio (ICR)<sup>11</sup> of below two

<sup>9</sup> “Evergreening” here refers to the provision of additional credit to weak borrowers to enable them to make interest payments on outstanding credit and thus avoid or delay bankruptcy. This mechanism was first documented in the context of Japan's experience during the 1990s by Peek, J. and Rosengren, E., “Unnatural Selection: Perverse Incentives and the Misallocation of Credit in Japan”, *American Economic Review*, Vol. 95(4), September 2005, pp. 1144-1166. For more recent evidence relating to Europe, see Schivardi, F., Sette, E. and Tabellini, G., “Credit Misallocation During the European Financial Crisis”, *CESifo Working Paper Series*, No 6406, April 2017. Shielding troubled firms from market pressures can impose costs on healthy firms, as the congestion created by firms kept alive by their banks reduces the profits of healthy firms, which discourages market entry and investment; see Caballero, R., Hoshi, T. and Kashyap, A., “Zombie Lending and Depressed Restructuring in Japan”, *American Economic Review*, Vol. 98(5), December 2008, pp. 1943-1977.

<sup>10</sup> See McGowan, M., Andrews, D. and Millot, V., “The Walking Dead? Zombie Firms and Productivity Performance in OECD Countries”, *OECD Economics Department Working Papers*, No 1372, January 2017.

for three consecutive years are classified as vulnerable for the purposes of this box. Firms' ability to cope with an interest rate shock is examined by studying the sensitivity of ICRs to a 100 basis point increase in the cost of debt. The shock is applied to 2016 financial statements and thus does not assume a concurrent improvement in macroeconomic conditions. The analysis is based on Worldscope data, which cover listed firms in the euro area only and hence do not capture the full universe of vulnerable firms.<sup>12</sup> Accordingly, small and medium-sized enterprises, which account for the bulk of euro area employment and may be as susceptible to vulnerabilities – if not more so – as their listed counterparts, are not covered by the analysis.

**The share of vulnerable firms increased markedly during the euro area sovereign debt crisis in those countries that were more affected by it.** Since the peak in 2013, however, the share of vulnerable firms in these countries has almost halved (see **Chart A**), reflecting improving economic conditions, the easing of financing costs as monetary policy accommodation measures fed through and elevated delisting rates. The share of vulnerable firms in countries that were less affected by the crisis, on the other hand, has been less sensitive to the cycle. As listed firms are subject to capital market pressure, vulnerable firms have shown a greater propensity to delist than firms not considered vulnerable. In countries that were more affected by the crisis, since 2009 13% of vulnerable firms have delisted on average per annum, compared with only 4% for normal firms. For this reason, the recorded decline in the share of vulnerable firms may partially mask a migration of vulnerable firms to the non-listed segment, which is, however, beyond the scope of this box.

**A 100 basis point increase in the cost of the stock of debt is significant when compared with past experience.** To put the size of the hypothetical shock into perspective, it is helpful to recall that the median cost of the stock of debt of listed non-financial corporations increased by about 80 basis points over the last tightening cycle of the ECB prior to the financial crisis, despite the much larger increase in marginal funding costs.<sup>13</sup>

**The sensitivity of ICRs to a higher cost of debt appears rather low.** In 2016 about 23% of listed firms in euro area countries that were more affected by the crisis had ICRs of less than two, compared with 17% in other euro area countries. A rise in the cost of the stock of firms' debt by 100 basis points would increase the share of firms with debt at risk by two percentage points in euro area countries that were more affected by the crisis and by one percentage point in the remainder of the euro area (see **Chart B**). Thus, ICRs of listed firms appear relatively resilient across the euro area, which is consistent with the decline in the share of vulnerable firms observed since 2013.

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<sup>11</sup> The ICR is defined as earnings before interest, taxes, depreciation and amortisation divided by interest expenses.

<sup>12</sup> The dataset comprises 32,290 firm-year observations from 2001 to 2016.

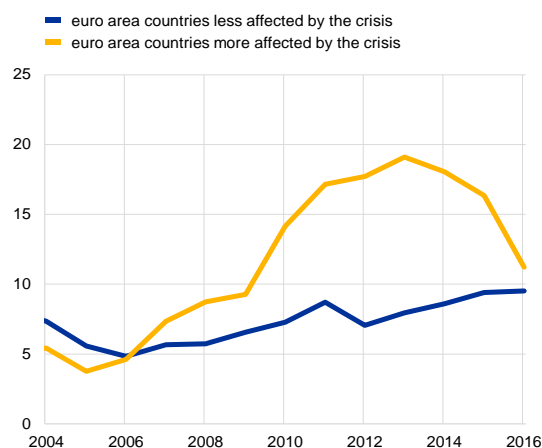
<sup>13</sup> The ECB increased the main refinancing operations rate by 225 basis points over the two-and-a-half-year period from December 2005 to July 2008.

### Chart A

The share of vulnerable firms has come down markedly since the peak in 2013

#### Share of listed firms with ICRs of less than two for three consecutive years

(2004-16, percentages)



Sources: Worldscope and ECB calculations.

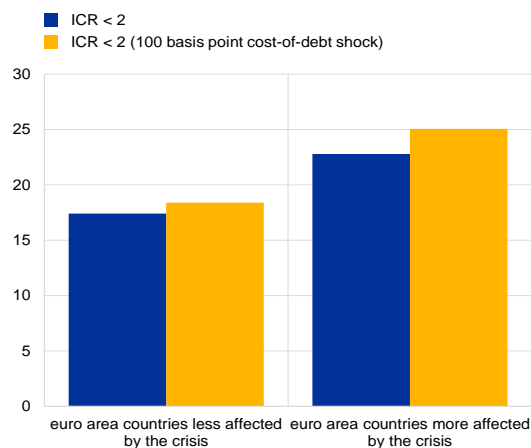
Notes: Firms with an ICR of less than two for three consecutive years are classified as vulnerable. Euro area countries that were more affected by the crisis include Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain.

### Chart B

ICRs are more sensitive to a shock in countries more affected by the crisis

#### Share of listed firms with ICRs of less than two in 2016 and after an interest rate shock

(2016, percentages)



Sources: Worldscope and ECB calculations.

Notes: A +100 basis point interest rate shock is applied to 2016 balance sheets. Euro area countries that were more affected by the crisis include Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain.

### In summary, improved macro-financial conditions are reflected in stronger corporate

**balance sheets.** The share of vulnerable firms has declined in countries that were more affected by the crisis. Overall, the sensitivity of firms' debt service capacity to an interest rate shock appears to be limited, although cross-country heterogeneity remains. Going forward, it appears that the financial health of firms depends above all on a continued improvement in economic conditions.

## Property markets

### The cyclical upturn in residential and commercial property markets has

**continued in the euro area.** In the residential segment, the house price cycle continued to firm up at the aggregate euro area level (see [Chart 1.23](#)), supported by a favourable interest rate environment and the ongoing economic recovery, with residential property prices recording the highest growth rate since the autumn of 2007. At the same time, euro area prime commercial property markets have maintained a strong underlying dynamic (see [Chart 1.24](#)). That said, in terms of property price valuations, residential property prices are estimated to be broadly in line with fundamentals, while valuation estimates for prime commercial properties



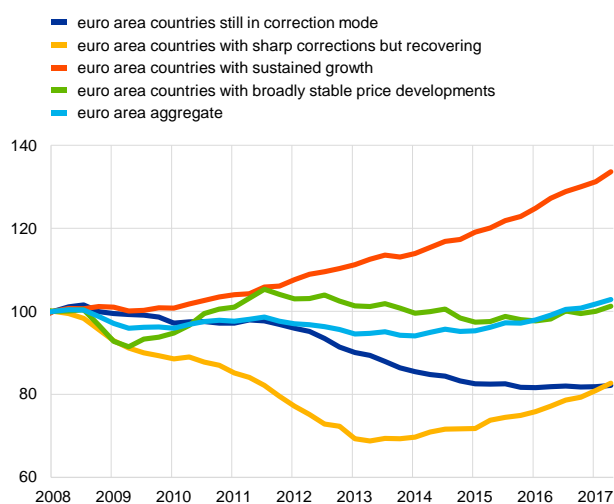
have deviated further away from their long-term average in line with recent strong price increases (see [Chart 1.25](#)).<sup>14</sup>

### Chart 1.23

Continued upturn in euro area residential property markets, but heterogeneity across countries remains

#### Residential property prices in the euro area and different country groups

(Q1 2008 – Q2 2017; index: Q1 2008 = 100)



Sources: Eurostat, ECB and ECB calculations.

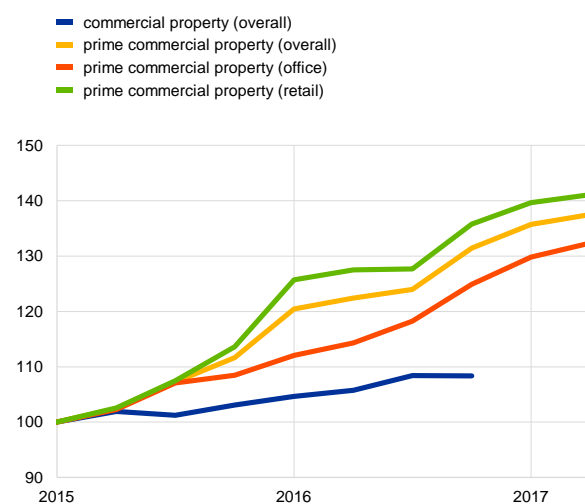
Notes: Euro area countries with sharp corrections but recovering cover Spain, the Netherlands, Estonia, Portugal, Ireland, Latvia and Lithuania. Euro area countries still in correction mode include Cyprus, Greece, Italy, Slovenia and Slovakia. Euro area countries with sustained growth comprise Germany, Belgium, Austria, Luxembourg and Malta, while euro area countries with broadly stable price developments include France and Finland.

### Chart 1.24

Buoyant developments in prime commercial property markets have continued, predominantly driven by the retail segment

#### Commercial property price indices

(Q1 2015 – Q2 2017; index: Q1 2015 = 100)



Sources: Jones Lang Lasalle and experimental ECB estimates based on MSCI and national data.

Note: Retail establishments include inter alia restaurants, shopping centres and hotels.

### Property price dynamics have become more broad-based, but heterogeneity prevails across countries, regions and property types.

For residential property markets, the majority of euro area countries have entered the upturn phase of the housing cycle, as reflected by a decreasing dispersion of growth rates across countries. Still, developments have remained somewhat heterogeneous in the euro area, with country dynamics depending on the depth and length of the correction phase in the aftermath of the crisis (see [Chart 1.23](#)). Country-level developments are additionally nuanced by diverging regional residential price dynamics, with price developments in capital and/or large cities outpacing price trends at the national level in several countries. Cross-country variation is also falling in prime commercial property markets, as the adverse repercussions of multi-year corrections gradually recede at the country level. Price developments also diverged across various commercial property types (see [Chart 1.24](#)). In particular, the prime retail segment

<sup>14</sup> Valuation estimates are surrounded by a high degree of uncertainty, as reflected by the wide range of different valuation estimates, the interpretation of which may be complicated at the country level given national specificities such as fiscal treatment or structural factors (e.g. tenure status). Likewise, commercial property valuation measures need to be interpreted with caution given only limited, mainly survey-based data coverage with a focus on prime commercial property in large cities.

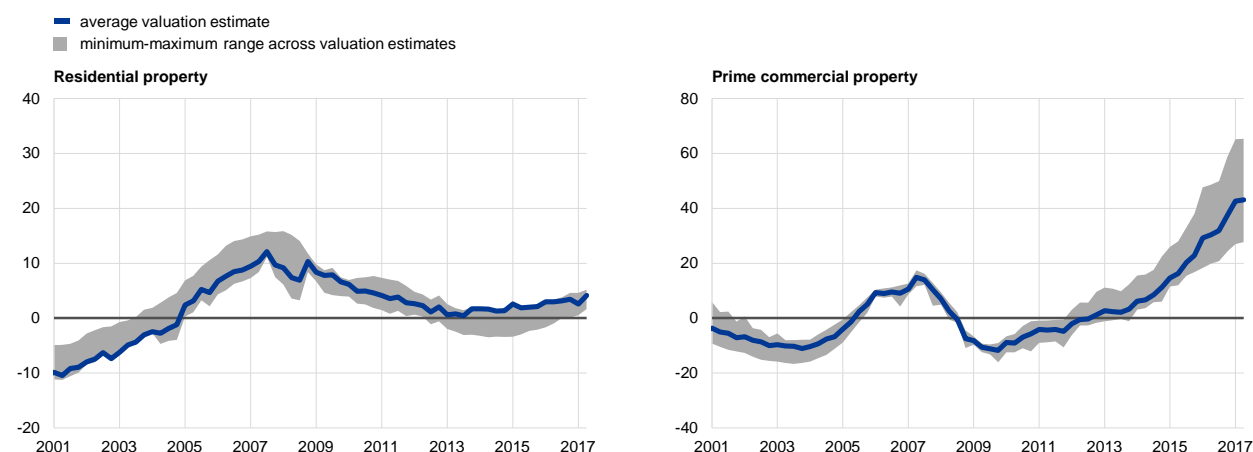
has remained buoyant in the context of the current low-yield environment and the ongoing search for yield.

### Chart 1.25

Residential property prices are broadly in line with fundamentals, while commercial property prices have moved further away from their long-term average

#### Valuation estimates of residential and prime commercial property prices at the euro area level

(Q1 2001 – Q2 2017, percentages, average valuations, minimum-maximum range across valuation estimates)



Sources: ECB and ECB calculations.

Notes: Valuation estimates for residential property prices are based on four different valuation methods: the price-to-rent ratio, the price-to-income ratio and two model-based methods, i.e. an asset pricing model and a new model-based estimate (BVAR). For residential property, the average is based on the price-to-income ratio and the new model-based method. For details of the methodology, see Box 3 in *Financial Stability Review*, ECB, June 2011, as well as Box 3 in *Financial Stability Review*, ECB, November 2015. For more details on valuation estimates for prime commercial property, see Box 6 in *Financial Stability Review*, ECB, December 2011.

#### The positive property market momentum is set to bolster the real economy.

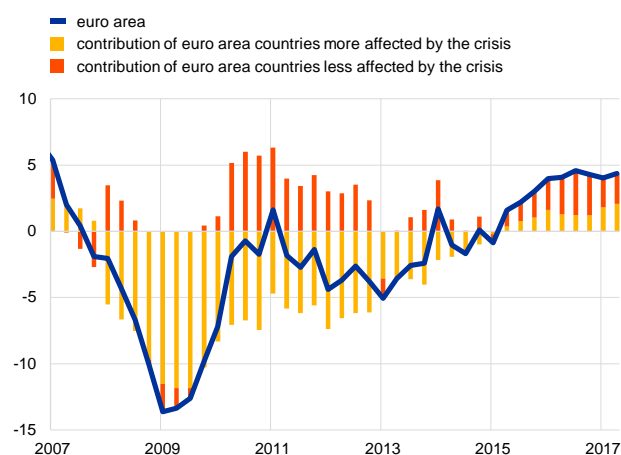
Mirroring the ongoing upswing in residential property markets, residential investment as well as construction value added and employment have started to pick up more recently, even if still being considerably below pre-crisis levels. That said, residential investment is gradually picking up in euro area countries that were more affected by the crisis, with these countries providing a roughly equal contribution to overall growth in residential investment in the euro area to that of the other euro area countries (see [Chart 1.26](#)). Looking ahead, the ongoing economic upturn and favourable labour market trends appear to be supportive not only to continued growth in residential investment, but also to private consumption via wealth and collateral effects. Supply-side conditions are set to improve further, as indicated by rising confidence in the construction sector and the increasing number of building permits granted. At the same time, investment activity in euro area commercial property markets appears to have remained robust amid continued yield compression (see [Chart 1.27](#)) and relatively high (albeit decreasing) vacancy rates, raising concerns about the potential implications of a rise in long-term interest rates.

**Chart 1.26**

Residential investment has remained strong, with increasing contributions from countries that were more affected by the crisis

**Residential investment in the euro area**

(Q1 2007 – Q2 2017, annual percentage changes, percentage point contributions)



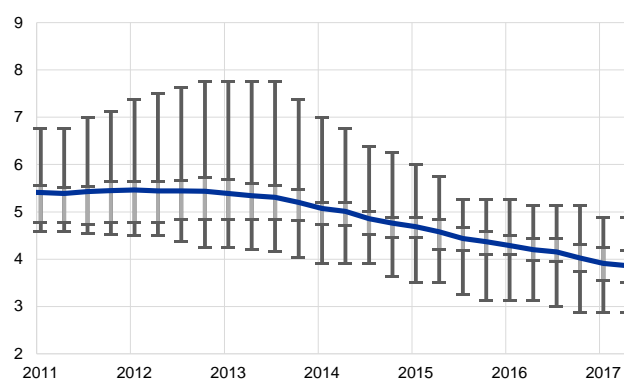
Sources: Eurostat and ECB calculations.  
Note: Euro area countries that were more affected by the crisis comprise Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain, while countries that were less affected by the crisis include all other euro area countries.

**Chart 1.27**

Returns on prime commercial property have dropped to record lows amid continued signs of a search for yield

**Yields on prime commercial property in the euro area**

(Q1 2011 – Q2 2017, percentages; minimum, maximum, interquartile distribution and average)



Source: Jones Lang Lasalle.  
Note: The euro area countries covered are Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.

**Benign financing conditions underpin the upturn in the housing cycle.**

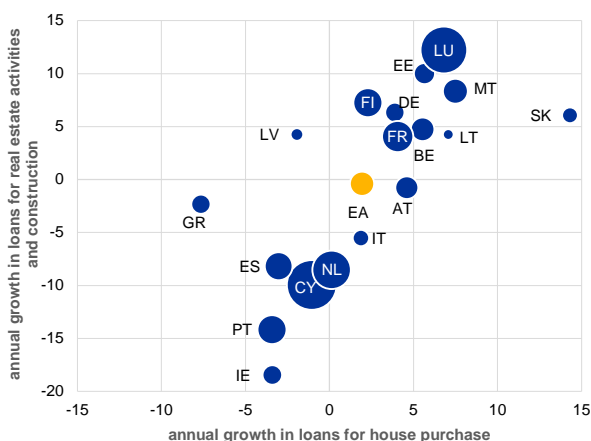
Alongside improving labour market conditions and the related easing of affordability constraints, housing market developments are also supported by favourable credit conditions. Easing credit standards, coupled with higher loan demand amid record low interest rates on loans for house purchase and households' improving income situation, are contributing to the pick-up in new loans for house purchase. That said, the ongoing upturn in residential property markets has not translated into broad-based rapid housing loan growth at the aggregate euro area level so far. However, trends in property prices and credit may warrant closer monitoring in some countries, in particular countries with high property-related exposures in the banking sector (see [Chart 1.28](#)). Regarding commercial property, price increases in some of the countries with more buoyant developments appear to be primarily driven by direct investment by institutional investors and funds and less so by bank financing. In fact, real estate investment funds and real estate investment trusts seem to be gaining importance as vehicles through which US asset managers and foreign investors in search of yield in a low interest rate environment are channelling their investments into the sector. In principle, this should reduce the potential for direct adverse spillovers to the banking system stemming from a potential abrupt adjustment in commercial property valuations.

**Chart 1.28**

The expansion of property-related lending may warrant monitoring in some countries

**Annual growth in loans for house purchase and in loans for real estate activities and construction**

(Q2 2017, annual percentage changes, four-quarter averages)



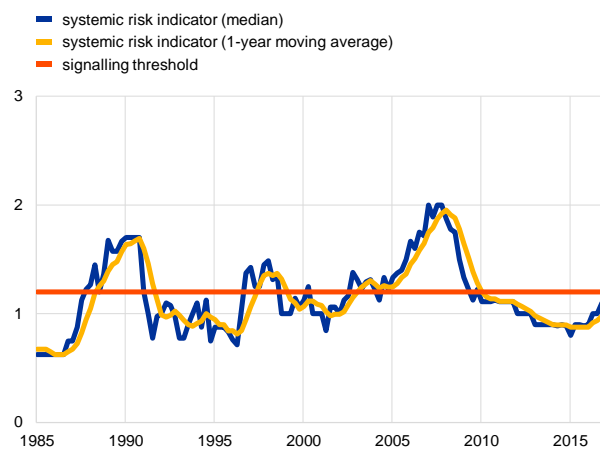
Sources: ECB and ECB calculations.  
Notes: The size of the bubble represents the property-related lending exposures of MFIs as a percentage of GDP. Property-related exposures comprise MFI lending to households for house purchase and to non-financial corporations for real estate activities and construction. Data for loans for house purchase are adjusted for loan sales and securitisation.

**Chart 1.29**

Systemic risk in residential property markets has picked up somewhat since early 2015, but remains below the early warning threshold in the euro area

**Systemic risk indicator for residential property markets**

(Q1 1985 – Q2 2017, average risk rating)



Sources: ECB and ECB calculations.  
Notes: For each euro area country, a composite residential property risk measure is computed based on a set of indicators comprising price and lending indicators as well as information on household balance sheets. The original data are transformed into discrete ratings on the basis of early warning thresholds such that a value of 0 (3) reflects no (high) risk. Based on this, a systemic risk indicator is calculated as the average across euro area countries.

**All in all, there are no evident signs of widespread imbalances in residential property markets in the euro area.** The composite indicator of systemic risk for residential property markets is below the threshold that would signal vulnerabilities (see [Chart 1.29](#)), even if potential pockets of risk may warrant closer monitoring.<sup>15</sup> That said, an adverse economic or financial shock may challenge the sustainability of the ongoing upturn in property markets. In particular, deteriorating economic growth prospects, tightening financing conditions or rising long-term interest rates could worsen the debt servicing capacity of households and commercial property investors, and may represent a risk for banks in countries with high property-related exposures. However, macroprudential policies can help to mitigate possible risks to financial stability at the country level. Given the underlying momentum in national (primarily residential) property markets, a number of countries have already introduced macroprudential measures to avoid a build-up of vulnerabilities. Given its macroprudential mandate, the ECB is monitoring property market developments closely too and, in accordance with the SSM Regulation, may top up national measures if needed.

<sup>15</sup> For further details, see the box entitled “Monitoring euro area residential real estate markets from a macroprudential perspective”, *Financial Stability Review*, ECB, November 2016.

## 2 Financial markets

*The strong reflationary expectations that contributed to higher US and global bond yields around the turn of the year abated during 2017. This notwithstanding, since May global financial market sentiment has remained fairly favourable on the back of higher and more synchronised growth prospects, solid corporate profitability and still accommodative monetary policy conditions. As a result, risk premia embedded in most global asset prices remained depressed and asset price gyrations were contained. Some short-lived bouts of volatility were observed related to increased tensions on the Korean peninsula and growing uncertainty regarding the expected timing and speed of the normalisation of the accommodative monetary policy conditions in advanced economies.*

*Apart from being influenced by external factors, euro area market sentiment was further boosted by the improved outlook for domestic growth prospects. Sovereign bond spreads across euro area countries remained fairly stable at low levels, indicating a benign market assessment regarding countries' debt sustainability prospects. Risk premia on lower-rated euro-denominated debt securities remained fairly low by historical standards. In contrast to the limited movements in the prices of most euro area financial assets, the euro exchange rate appreciated strongly, reflecting the better domestic growth prospects, expectations of an associated eventual normalisation of the ECB's monetary policy stance and a shift in investor appetite in favour of euro-denominated assets.*

*As for the euro area risk outlook, yields and spreads for lower-rated debt securities are low and susceptible to repricing. At the same time, improved domestic growth prospects are dampening the likelihood of an abrupt repricing of risk premia in bond markets. That said, euro area financial markets may be adversely affected by external factors. A number of central banks in advanced economies have begun preparing to withdraw policy accommodation. Potential changes in monetary policy conditions could generate greater market uncertainty and push asset price premia higher. In addition, geopolitical uncertainty may increase further, which could accentuate market gyrations. Finally, stock market valuations in the United States look stretched by a number of standard metrics, and a potential correction could spill over to other major markets, including the euro area.*

### Favourable global financial market sentiment owing to improved economic growth prospects

**Financial market sentiment has been supported by improving global growth prospects.** As a result, several central banks in advanced economies have begun preparing financial markets for the possibility that monetary policy may become less accommodative, should the recovery gain further momentum. Better growth prospects and a gradual adjustment in monetary conditions would also improve the financial stability outlook. Such developments would reduce incentives to take on

excessive risk, support a gradual adjustment in asset price premia, enhance the capacity of governments and private sector entities to service their debt, and have a positive net impact on bank profitability.

**Despite the improved macro outlook, risk premia in financial markets are susceptible to an abrupt reversal.** Some segments of global bond markets seem to be highly vulnerable to repricing amid low levels of risk premia and subdued volatility. In the first part of this section, developments in key global financial market segments over the past six months are discussed. The section then describes relevant issues in the euro area money market and ends by examining the main triggers and vulnerabilities that could expose financial market risks over the FSR risk horizon of 24 months.

## Chart 2.1

### Overall stable global bond yields and equity price movements in a low-volatility environment

Developments in global bond yields and EUR/USD exchange rate (left panel), stock prices (middle panel) and implied bond/stock volatility (right panel)

(left panel: Jan. 2017 – Nov. 2017, daily data, percentages per annum (left-hand scale) and exchange rate (right-hand scale); middle panel: Jan. 2017 – Nov. 2017, daily data, stock prices indexed to 100 on 1 Jan. 2017; right panel: Jan. 2015 – Nov. 2017, daily data, implied volatility for US and euro area stock markets and US and German ten-year bond markets, annualised volatility in percentage points)



Sources: Bloomberg and ECB calculations.

Notes: Implied volatility for the S&P 500 index, the EURO STOXX 50 index, and US and German ten-year bond futures. The vertical lines in the left and middle panels refer to the publication date of the May 2017 FSR (24 May).

**US bond yields have remained broadly stable since May (see Chart 2.1).** In the earlier part of the period, bond yields edged down. The downward movement reflected mixed data releases and growing reservations in the markets about the US administration's ability to push through growth-friendly reforms in the near term. In addition, higher geopolitical risks (mainly stemming from concerns about North Korea's foreign policy) occasionally contributed to portfolio shifts towards highly rated US debt instruments. Market-based inflation expectations in the United States have been revised downwards somewhat, partly as a response to low actual inflation outcomes. Furthermore, these reductions may also reflect an assessment in markets that inflation has become less responsive to changes in economic slack in the recent past (see also Section 1.1). Bond market sentiment was partly reversed in the latter

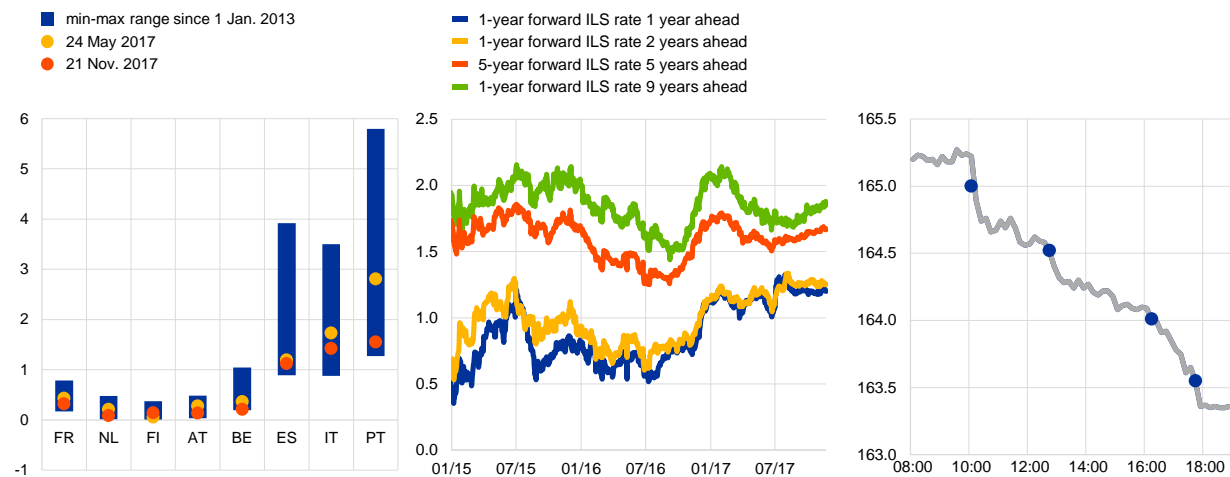
part of the review period and US bond yields rose, partly on account of better than expected macroeconomic news.

## Chart 2.2

Broadly stable euro area sovereign spreads, a reduced gap between long and short-term inflation expectations and a sharp but short bond market sell-off at the end of June

Sovereign bond spreads (left panel), euro area inflation-linked swaps (ILS) (middle panel) and intraday prices of German long-term bond futures on 27 June (right panel)

(left panel: 1 Jan. 2013 – 21 Nov. 2017, daily data, percentage points; middle panel: Jan. 2015 – Nov. 2017, daily data, percentages per annum; right panel: intraday prices, blue dots represent option strike prices)



Sources: Bloomberg and ECB calculations.

Note: The left panel shows spreads between ten-year sovereign bond yields of selected euro area countries and ten-year German bond yields.

**In the euro area, bond yields remained broadly stable overall across jurisdictions.** As a result, bond spread movements were also muted and hovered at low levels, indicating that market participants currently factor in little likelihood of future debt sustainability concerns arising across euro area countries (see [Chart 2.2](#)). Longer-term inflation expectations embedded in bond yields remained broadly stable over the review period. However, short-term expectations increased somewhat on the back of the improved cyclical outlook. At the same time, some intra-period volatility in euro area bond markets could be observed. In late June, the prices of longer-dated bonds fell sharply. Technical factors may have exacerbated the sell-off in the bond markets. As an illustration, [Chart 2.2](#) (right panel) shows the sharp intraday drop in prices of German ten-year futures on 27 June. Options are traded on this futures contract. As shown in the chart, the price declines (i.e. higher bond yields) intensified when futures prices crossed the strike prices at which the option contracts are available. Market intelligence suggests that technical factors may have been the main explanation for this behaviour.<sup>16</sup> It is difficult to quantify exactly how much of the total sell-off can be attributed to such activities, but this illustration serves as a reminder that such factors have the potential to amplify volatility and exacerbate market movements.

<sup>16</sup> When pursuing so-called “dynamic hedging” strategies, the seller of a put option must sell the underlying asset when the asset price falls, and must buy the asset when the price goes up. In other words, these strategies can amplify price changes in the underlying asset. This may create gaps in the otherwise near-continuous asset price process.

### Chart 2.3

The strong appreciation of the euro in 2017 has also been reflected in bond and stock markets

#### EUR/USD exchange rate and interest rate differentials (left panel), stock price performance conditional on company revenues generated abroad and the euro nominal effective exchange rate (right panel)

(left panel: Jan. 2017 – Nov. 2017, percentage points for US/euro area interest rate differential (based on ten-year sovereign bond yields) and exchange rate; right panel: Jan. 2017 – Nov. 2017, cumulative percentages per annum for stock price performance (indexed to zero on 1 January 2017) and index values for the NEER-38)



Sources: Bloomberg and ECB calculations.

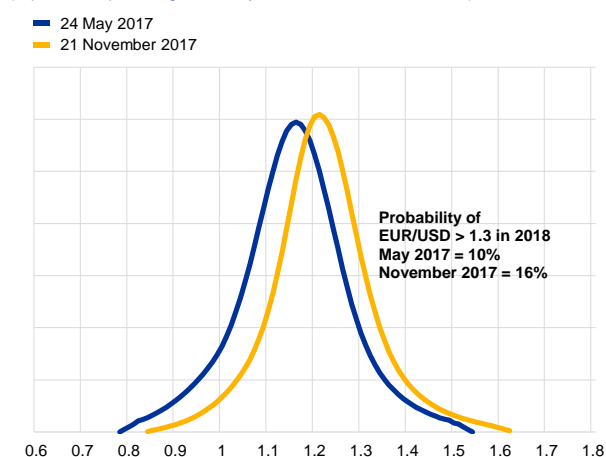
Notes: In the right-hand panel, the stock price performance is the performance of EURO STOXX companies with more than 60% of revenues generated outside the euro area relative to those with 60% of revenues generated inside the euro area. NEER-38 is the nominal effective exchange rate (NEER) of the euro against the currencies of 38 of the euro area's main trading partners.

### Chart 2.4

Option markets indicate a reasonably high likelihood of a further strengthening of the euro

#### EUR/USD exchange rate expectations for 2018 derived from option markets

(expectations prevailing on 24 May 2017 and 21 November 2017)



Sources: Bloomberg and ECB calculations.

#### The euro exchange rate has strengthened materially over the past six months.

A further possible significant strengthening of the euro exchange rate could pose financial stability risks via macro channels (i.e. lower than expected nominal growth) and asset price channels (possibly triggering higher volatility in asset price premia on euro-denominated assets). Overall, the strengthening of the euro has been broadly based (as reflected in the 3% appreciation of the euro area nominal effective exchange rate since May). The euro's strengthening against the US dollar was partly related to relative movements in US and euro area bond markets (see [Chart 2.3](#)). More generally, the euro's strength against the US dollar is likely to reflect expectations of relatively stronger euro area growth and an associated eventual normalisation of the ECB's monetary policy stance, as well as a shift in investor appetite in favour of euro-denominated assets. In euro area stock markets, as the euro strengthening gained momentum, firms with limited revenues from abroad

outperformed export-dependent firms. Looking ahead, investors see a possibility that the euro could remain strong for the foreseeable future (see [Chart 2.4](#)).



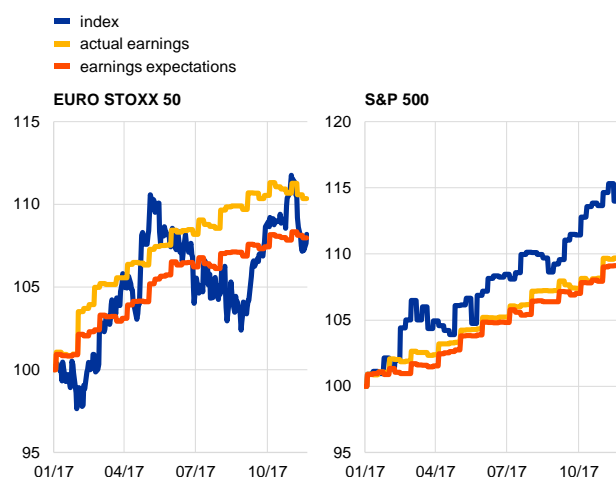
**Actual and expected earnings supported stock prices in 2017.** Overall brighter macro outlooks provided support for firms' actual and expected earnings in the euro area and in the United States (see [Chart 2.5](#)). Despite this support, the upward trend in euro area stock prices came to a halt in the early part of the review period. This may be related to the above-mentioned strengthening of the euro, coupled with a perception by market participants that the discount factor used to price stocks may increase in the future as the economy improves. In the United States, the continued increase in stock prices relative to earnings has contributed to a further stretching of valuations from already elevated levels (see also [Chart 2.17](#)).

### Chart 2.5

Overall improved earnings outlook supported global stock prices in 2017

#### EURO STOXX 50 index, S&P 500 index, and actual and expected earnings

(Jan. 2017 – Nov. 2017, all series indexed to 100 in Jan. 2017)



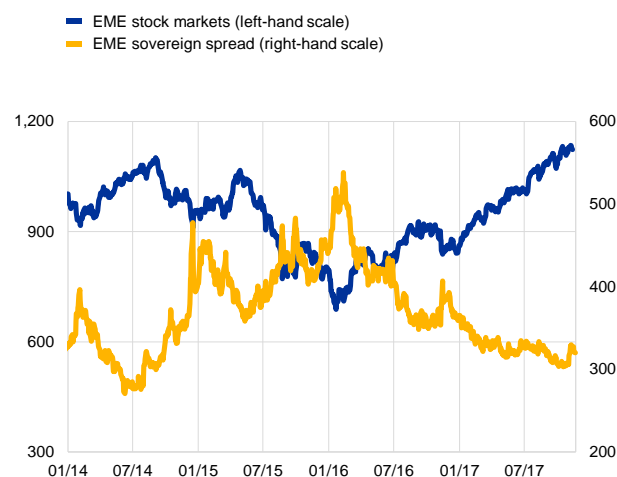
Sources: Thomson Reuters Datastream and ECB calculations.  
Note: Earnings expectations are 12 months ahead.

### Chart 2.6

EME stock prices higher and bond spreads lower

#### EME stock markets and sovereign bond spreads

(Jan. 2014 – Nov. 2017; left-hand scale: index values; right-hand scale: basis points)



Source: Bloomberg.  
Notes: "EME stock markets" refers to the MSCI Emerging Markets Index. "EME sovereign spread" refers to the JP Morgan Global Spread Index.

**Asset prices and portfolio flows to emerging market economies (EMEs) have continued to recover from their troughs in 2015 and early 2016.** Positive investor sentiment towards EME assets was reflected in robust inflows and appreciating asset prices. EME equity prices have, on aggregate, returned to levels last seen in spring 2015 and the spreads between EME and US sovereign bonds have narrowed by roughly 200 basis points over the past two and a half years (see [Chart 2.6](#)). These positive market developments reflect both domestic factors in EMEs and external ones. On the domestic side, growth has picked up recently and measures of macro-financial vulnerabilities have continued to improve for the majority of EMEs. On the external side, the recovery in oil prices and the bright global demand environment have boosted the outlook for exporters among EMEs. Moreover, the very benign global financial conditions, manifested in historically low levels of equity market volatility and yields in advanced economies, have further supported the appetite for EME financial assets by encouraging a search for yield and bolstering risk tolerance.

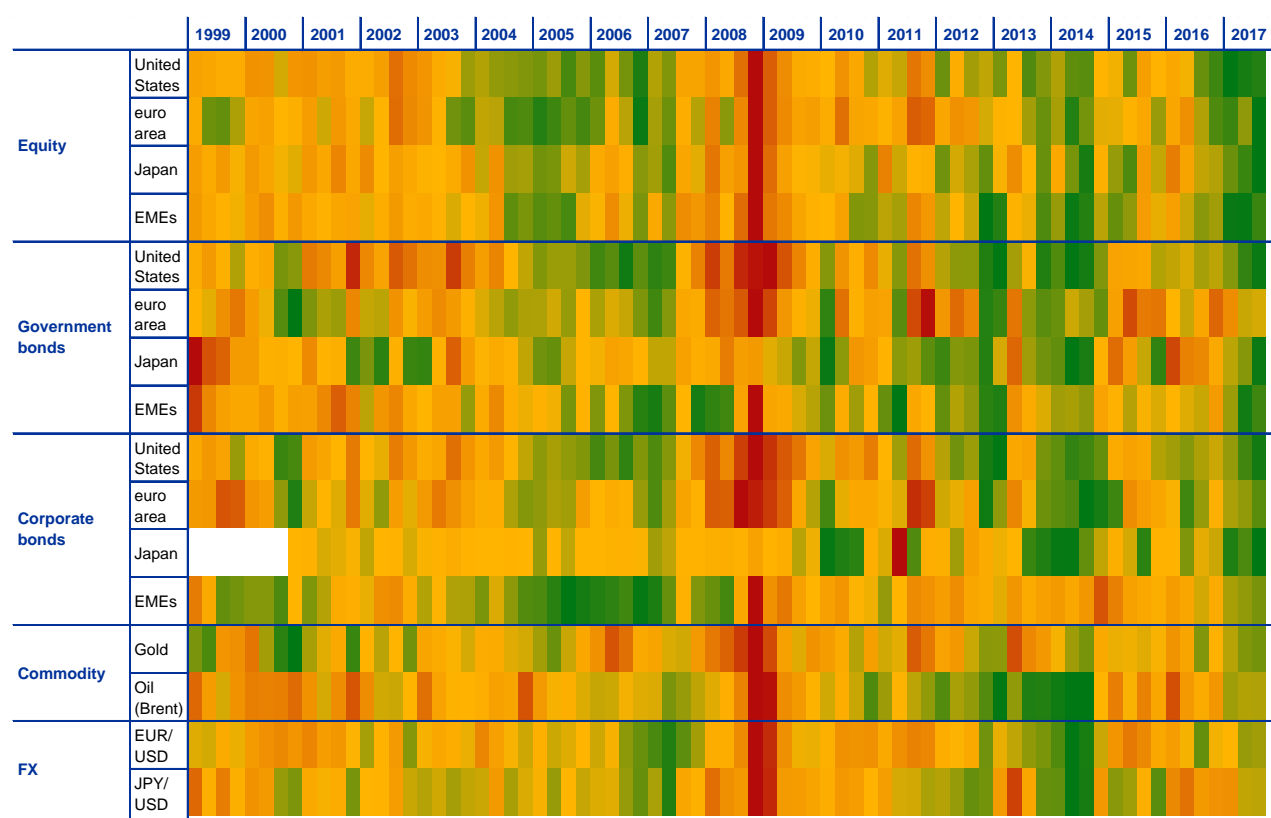
**The overall favourable market developments across global economies and asset classes over the past six months have been accompanied by low volatility.** A closer look at realised volatility in equity, bond, commodity and foreign exchange (FX) markets for the United States, the euro area, Japan and EMEs suggests that, since the peaks observed in 2008-09 and in 2011 (for the euro area), global asset price volatility has hovered at low levels (see **Chart 2.7**). Only euro area government bond markets have recorded a medium volatility level over the last few quarters. As discussed in **Special Feature D**, a sudden increase in volatility could trigger a demand for higher premia on riskier assets and thereby lead to mark-to-market losses, prompt outflows from riskier asset classes and regions, and potentially pose risks to financial stability.

### Chart 2.7

#### Low volatility across economies and asset classes

**Volatility heat map for global equity, bond, commodity and FX markets and evolution of implied volatilities across different markets**

(Q1 1999 – Q3 2017)



Sources: Bloomberg and ECB calculations.

Notes: Volatility estimates are derived from a non-overlapping quarterly sample of daily price data. The colour codes are based on the ranking of the estimates. Red, yellow and green indicate, respectively, high, medium and low volatility estimates compared with other periods. For further details, see the box entitled "Financial market volatility and banking sector leverage", *Financial Stability Review*, ECB, November 2014.

## Rates on repos collateralised by euro area sovereign bonds show signs of normalisation on balance sheet reporting dates

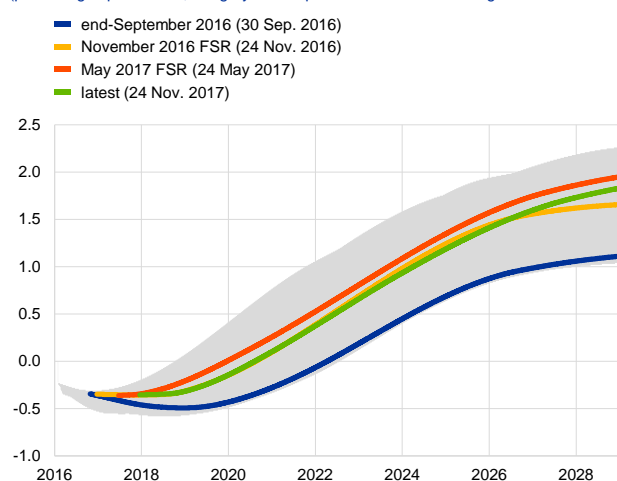
By the end of the review period, market participants expected the initiation of policy rate hikes to take place slightly later compared with their assessment in May. These revisions led to a slight downward shift in the euro overnight index average (EONIA) forward swap rates over the past six months (see [Chart 2.8](#)). The debate about an eventual exit from the asset purchase programme and the sequencing of monetary policy measures added some intra-period volatility to market expectations. The revisions since May have, however, been small compared with the significant changes that have taken place since the autumn of 2016, when the front end of the EONIA forward curve was still inverted. Over the past year, better economic data have led to higher market expectations concerning the magnitude of ECB policy rate increases and have also brought forward the expected start of the tightening cycle.

**Chart 2.8**

Market expectations of increases in ECB policy rates have been pushed slightly into the future since May

### EONIA forward curve

(percentages per annum, the grey area represents the min-max range since Jan. 2016)



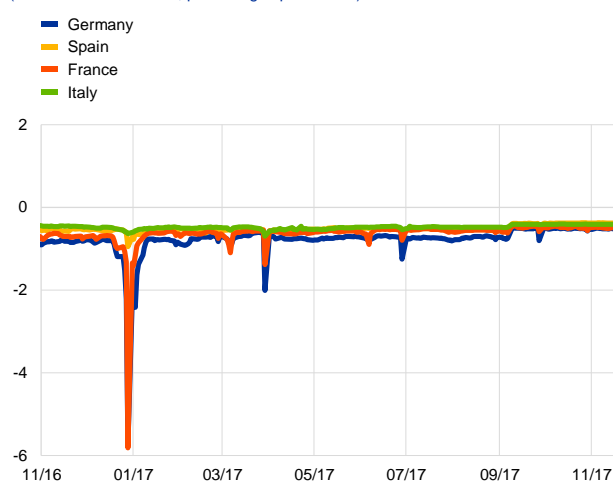
Sources: Thomson Reuters Datastream and ECB calculations.  
Note: The forward curve is estimated using EONIA overnight index swap (OIS) spot rates.

**Chart 2.9**

Milder declines in euro area government bond repo rates around reporting dates

### Repo funding rate for collateral issued by Germany, France, Spain and Italy

(Nov. 2016 – Nov. 2017, percentages per annum)



Sources: BrokerTec and MTS.

## Developments in the secured money market segment have stabilised in 2017.

Fluctuations in the daily reported volumes were relatively muted, while the declines in repo rates and volumes on balance sheet reporting dates have become milder in 2017 compared with the end of 2016 (see [Chart 2.9](#)). Several factors have reportedly contributed to this normalisation: First, dealer banks have continued their efforts to become more efficient in the management of high-quality liquid assets (HQLAs) by (i) re-designing collateral desks in an effort to concentrate and manage the HQLA portfolio in one place; (ii) investing in technology in order to facilitate the internal transfer pricing of HQLA consumption; (iii) increasing collateral fungibility by gaining access to more trading venues; and (iv) investing in human capital in order to

acquire skills related to the efficient handling of collateral. Second, anecdotal evidence suggests that over time banks have gained experience in preparing for the critical balance sheet reporting dates. For instance, some banks actively advise clients with regard to the balance sheet capacity that can be made available to them on an ongoing basis. This helps to steer client flows in a way that reduces their underlying volatility and their ultimate impact on the balance sheet. Third, subsiding political risk in Europe, in particular following the outcome of the French elections, helped to relieve the demand pressure for high-rated issuers. Fourth, the recent changes and flexibility in the Eurosystem's securities lending of holdings under the expanded asset purchase programme (APP) have also contributed to reducing money market tensions. That said, some tensions may still persist at the end of the year as a consequence of costs and levies that are directly linked to the size of banks' year-end balance sheets. As discussed in **Special Feature C**, the volatility around reporting dates calls for further analysis of whether some regulatory and other metrics could be calculated on the basis of average balance sheet size over a reporting period, rather than the size on the last day of the period. This could help reduce the volatility observed and contribute to a smoother functioning of markets around these dates.

**On the regulatory side, money market interest rate benchmarks are undergoing in-depth reforms.** Sound benchmarks are needed for the functioning of the financial system, since they play an anchoring role for contracts in financial markets (e.g. for derivatives or mortgages). In addition, benchmark rates play a pivotal role in the operationalisation and monitoring of the transmission of the ECB's monetary policy. **Box 2** provides an update on the state of current reforms in the euro area.

## Box 2

### Update on reference rate reforms in the euro area

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#### **Sound benchmarks are necessary for the efficient functioning of the financial system.**

Benchmark rates are important because of their anchoring role for contracts in financial markets. In addition, benchmark rates play a pivotal role in the operationalisation and monitoring of the transmission of the ECB's monetary policy.<sup>17</sup> Benchmark rates have been undergoing in-depth reforms over the last few years. These reforms have been largely guided by a set of principles<sup>18</sup> issued by the International Organization of Securities Commissions (IOSCO) in 2013 as a response to the scandals related to the manipulation of LIBOR. As a result of those reforms, market practices and contracts might need to be adapted to a new environment in the years to come.

**In the euro area, the euro interbank offered rate (EURIBOR), which is the interbank unsecured benchmark in euro published for maturities ranging from 1 week to 12 months, has been gradually reformed in order to anchor its methodology in transactions rather than in quotes.** The feasibility of a fully transaction-based methodology was tested by the EURIBOR

<sup>17</sup> For example, in August 2016 the European Commission estimated the total value of contracts indexed on EURIBOR at around €180 trillion for derivatives markets and around €1 trillion for mortgages. The figure for EONIA, as reported by the European Commission in June 2017, is in excess of €5 trillion, the majority of which is in the overnight index swap market.

<sup>18</sup> "Principles for Financial Benchmarks", IOSCO, July 2013.

administrator, the European Money Markets Institute (EMMI). However, the conclusion of this test, published in May 2017, was that the volume of unsecured money market transactions was insufficient to build a robust benchmark fully based on the current flow of daily market transactions. Consequently, EMMI is working with market participants on a possible hybrid methodology for EURIBOR which would combine transaction data with expert judgement. In the meantime, the current quote-based methodology will continue to be used to calculate EURIBOR. EMMI has indicated that the development of the hybrid methodology and impact assessment should take until the first half of 2018 and will be followed by a stakeholder consultation.

**EMMI, which is also the administrator of the euro overnight index average (EONIA – an overnight benchmark based on actual interbank transactions), is leading a reform process for EONIA with the aim of making it compliant with the Benchmarks Regulation.**<sup>19</sup> This Regulation will apply fully from 1 January 2018. EMMI has already defined a new governance framework compliant with the new regulatory requirements, which should come into effect in 2018. EMMI has now undertaken the second phase of the EONIA review, which relates to the analysis of the market underpinning EONIA, to ensure that the benchmark's design is adapted to the economic reality it is intended to capture.

**The robustness of both EURIBOR and EONIA, which rely on the voluntary contributions of banks, is becoming a growing source of concern as the support of the contributing banks has been waning over time.** These banks are expected to report daily either quotes based on expert judgement (in the case of EURIBOR) or their overnight unsecured interbank lending transactions (in the case of EONIA). However, recently several banks have left one or the other panel, citing that the reform process is overburdening their procedures as the main reason for their departure, while involvement in benchmarks carries liability and reputational risks.

**On 11 August 2016 and 28 June 2017, respectively, EURIBOR and EONIA were designated as “critical benchmarks” by the European Commission under the Benchmarks Regulation in the light of their crucial importance for markets and the high number of contracts referencing them.** Special provisions of the Regulation apply to a benchmark that is designated “critical”, notably that the regulator, which in the case of EONIA and EURIBOR is the Belgian Financial Services and Markets Authority (FSMA), can require mandatory contributions to the benchmark if its representativeness is threatened, e.g. by the departure of panel banks. While this mechanism might provide a backstop solution, its application is limited to a maximum two-year period (initially only one year, which can be extended once by a further period of one year), and hence cannot be considered a long-term solution if the viability of such a benchmark is threatened.

**In the secured money market, Eurepo had served as a reference rate for the euro-denominated general collateral market until its discontinuation in January 2015 in view of its limited use and the repeated departures of panel banks contributing to the benchmark.** Since then, the launch of a new repo benchmark in euro has been examined by the private sector. EMMI and the European Repo and Collateral Council have been working on a repo benchmark based on the data captured by three of the most active automatic trading systems in Europe. An in-depth analysis of repo data since 2006 commissioned by EMMI highlighted that activity in the

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<sup>19</sup> Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds and amending Directives 2008/48/EC and 2014/17/EU and Regulation (EU) No 596/2014 (OJ L 171, 29.6.2016, p. 1).

electronically traded repo market in euro is concentrated on very short-dated transactions, thus allowing the development of a purely transaction-based benchmark for a one-day tenor only. While the project is now at an advanced stage, the timeline for implementation has not yet been communicated by EMMI.

**For the unsecured money market, on 21 September the ECB announced that it will publish an overnight unsecured rate before 2020 on the basis of data collected under the Money Market Statistical Reporting (MMSR) Regulation.**<sup>20</sup> The interest rate would complement existing benchmark rates produced by the private sector and serve as a backstop reference rate. The high-level features of the benchmark will be communicated in the course of 2018 in the form of public consultations.

**Beyond the euro area, the question of the long-term viability of the London interbank offered rate (LIBOR) has similarly gained prominence.** In July 2017 the Financial Conduct Authority (FCA), as the UK regulator in charge of LIBOR supervision, argued that the underlying market that LIBOR seeks to measure – the market for unsecured wholesale term lending to banks – was no longer sufficiently active and therefore the transition to a transaction-based methodology was no longer possible. Consequently, the FCA announced its intention to withdraw its support for LIBOR by 2021, possibly triggering a discontinuation of this widespread interest rate benchmark. Work on planning a transition to alternative reference rates based on transactions has therefore commenced in some jurisdictions, undertaken by private sector working groups on alternative risk-free reference rates. Such groups are usually supported by public sector participation and are tasked to look into available alternative rates and to put forward transition plans.

**A similar initiative has also been launched in the euro money market, and the alternative rates to EURIBOR will also be debated within a newly established working group on euro risk-free rates, which will be in charge of fall-back rates and issues related to the transition to possible euro short-term alternative rates.** The work of this group is aimed at following up on the recommendation of the Financial Stability Board's Official Sector Steering Group (OSSG) of July 2014 to identify and adopt one or more risk-free rates in each main currency area. The working group on euro risk-free rates will be composed of private sector entities and chaired by a representative of the private sector. It will be supported by public authorities and its secretariat will be provided by the ECB.

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## Risks of a repricing of risk premia in global financial markets

**A key risk in financial markets is that bond yields may increase in an abrupt manner.** The main triggers for the materialisation of this risk include an abrupt reassessment by markets of future macro conditions, markets misjudging the guidance about the future stance of monetary policy or further increases in (geo-political uncertainty (see **Chart 10** in the Overview). In addition, a sudden

<sup>20</sup> Regulation (EU) No 1333/2014 of the European Central Bank of 26 November 2014 concerning statistics on the money markets (ECB/2014/48) (OJ L 359, 16.12.2014, p. 97). Daily data collection by the ECB, conducted with the support of several national central banks, started in July 2016. Its main purpose is to provide the ECB with comprehensive, detailed and harmonised statistical information on money markets in the euro area. This is a necessary set of statistics for monetary policy purposes.

normalisation of term premia or market volatility – both of which are currently depressed by historical standards – would put upward pressure on bond yields. Overall, also taking into account the improved macro outlook over the review period, the level of financial stability risk stemming from financial markets has remained broadly unchanged since the May 2017 FSR.

**Chart 2.10**

Low term premia embedded in global long-term rates

**Decomposition of euro area and US ten-year interest rates**

(Jan. 2006 – Nov. 2017, percentages per annum)



Sources: Thomson Reuters Datastream, Federal Reserve Bank of New York and ECB calculations.

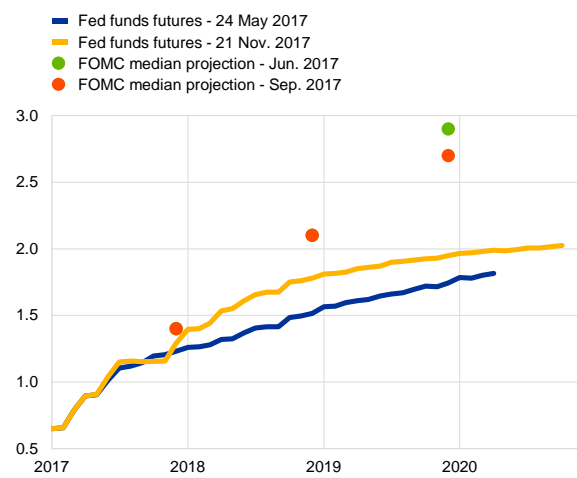
Notes: For the US decomposition, see Adrian, T., Crump, R., Mills, B. and Moench, E., "Treasury Term Premia: 1961-Present", *Liberty Street Economics*, Federal Reserve Bank of New York, May 2014, available at <http://liberystreeteconomics.newyorkfed.org>. The euro area decomposition (on ten-year OIS rates) is based on an affine term structure model following the methodology used by Joslin, S., Singleton, K.T. and Zhu, H., "A New Perspective on Gaussian Dynamic Term Structure Models", *Review of Financial Studies*, Vol. 24(3), March 2011, pp. 926-970.

**Chart 2.11**

An alignment of market expectations with those of the FOMC may trigger higher bond yields

**US federal funds rate forecasts by the FOMC and financial markets**

(FOMC median projections and Fed funds futures, percentages per annum)



Sources: Bloomberg, Federal Reserve System and ECB calculations.

**Bond yields around the globe remain at low levels amid depressed risk premia and subdued volatility.** Despite recent declines, sovereign bond yields in the United States continue to fluctuate at higher levels than those in the euro area, reflecting the more advanced stage of the business and monetary policy cycle. In both areas, however, the term premium component continues to hover at very low levels from a historical perspective and risks of a repricing in bond markets therefore remain material (see [Chart 2.10](#)). A normalisation (or even overshooting) of global term premia in the sovereign sector could be triggered by an abrupt reassessment in markets of future macro conditions, with possible repercussions on expectations about monetary policy. This possibility seems particularly relevant in the United States, given the continued divergence of views between financial markets and the Federal Reserve System. Markets are pricing in a slower path of policy rate increases compared with the views expressed by Federal Open Market Committee (FOMC) members (see [Chart 2.11](#)). As long-term rates can be viewed as an average of current and expected short-term interest rates, a rapid upward adjustment of the expected tightening path by the markets can result in higher yields and volatility for longer-dated securities. Higher interest rates in the United States

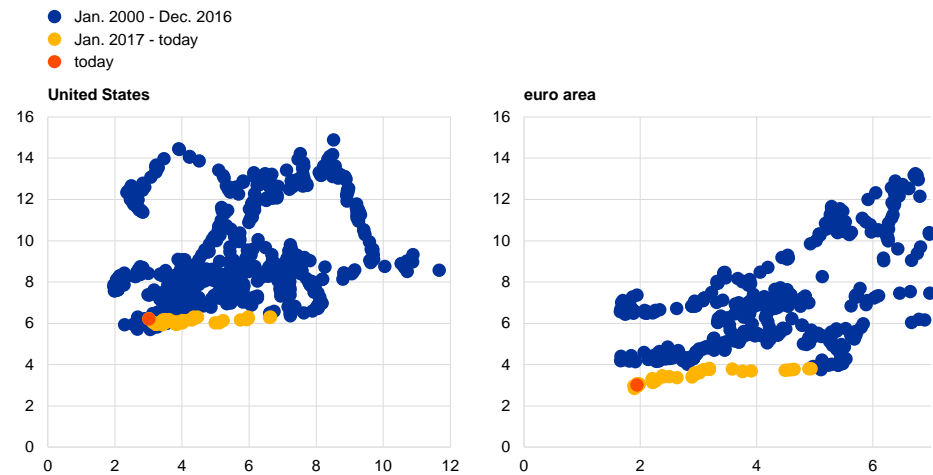
have the potential to also spill over to the euro area. While the euro area itself is considerably less advanced than the United States along the path towards monetary policy normalisation, a market misjudgement about the pace at which this will occur could also trigger an abrupt increase in term premia.

### Chart 2.12

#### Higher interest rates would have an uneven impact across sectors

##### Corporate bond yields and volatility for US and euro area high-yield segments

(Jan. 2000 – Nov. 2017; y-axis: percentages per annum; x-axis: annualised price volatility)



Sources: Thomson Reuters Datastream and ECB calculations.

#### Risk premia on corporate bonds are low compared with underlying

##### fundamentals.

Global corporate bond yields have continued to drift lower in 2017. The favourable market sentiment, a continued search for yield and subdued asset price volatility have supported corporate bond prices. In some of the lower-rated segments, yields remain exceptionally low by historical standards (see [Chart 2.12](#)). In the United States, corporate bond spreads have continued to compress despite increases in firm leverage.<sup>21</sup> Such a “disconnect” between fundamentals and market valuations can quickly unwind should the macro environment deteriorate or market sentiment reverse. Similarly, there are also some indications that the degree of price discrimination across US corporate issuers has deteriorated. In fact, the gap between firms with high and low interest coverage (which measures the number of times a company could make the interest payments on its debt with its earnings) has been reduced significantly in 2017 (see [Chart 2.13](#)). In the euro area, corporate bond spreads have continued to narrow across the credit spectrum. High corporate indebtedness is also a concern in the euro area, but this vulnerability has been reduced in recent quarters owing to continued deleveraging (see Section 1.3 and Box 1). Further evidence that risks are tilted towards an increase in corporate bond spreads comes from valuation metrics which suggest that the excess bond premium (EBP) in the euro area is negative (the EBP is the deviation of corporate credit

<sup>21</sup> This was also discussed in Section 2 of the May 2017 FSR (see [Chart 2.13](#)).



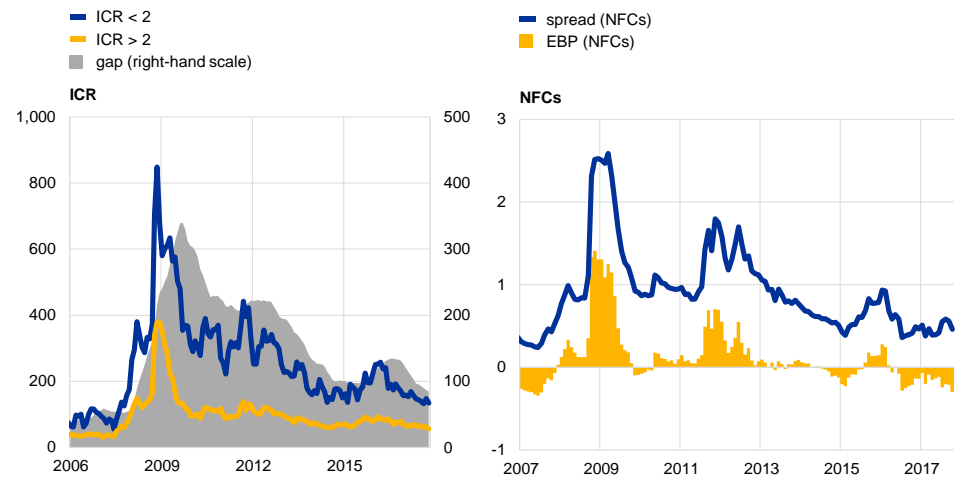
spreads from the measured default risk of the issuer and the duration risk of the bond).<sup>22</sup>

### Chart 2.13

Reduced price discrimination in the US corporate bond markets, while bond spreads in the euro area are compressed

US bond spreads for firms with high/low interest coverage ratios (ICRs) (left panel); spreads and excess bond premia (EBP) for euro area non-financial corporations (NFCs) (right panel)

(left panel: Jan. 2006 – Oct. 2017, basis points; right panel: Jan. 2007 – Oct. 2017, percentage points)



Sources: Bank of America Merrill Lynch, Bloomberg and ECB calculations.

Notes: Left panel: sample of 278 firms, containing both investment-grade and non-investment-grade firms. Right panel: the EBP is the deviation of corporate credit spreads from the measured default risk of the issuer. For more details, see De Santis, R., "Credit spreads, economic activity and fragmentation", *Working Paper Series*, No 1930, ECB, July 2016.

### A potential repricing in global bond markets may unearth vulnerabilities for both the non-financial and the financial sectors.

Relative to the size of their balance sheets, insurance corporations and pension funds (ICPFs) and investment funds are the two sectors most exposed to a sudden increase in interest rates (see [Chart 2.14](#)). In terms of dynamics, these sectors have increased their debt securities holdings in recent years and the residual maturity of their holdings is long.

Vulnerabilities related to higher interest rates are particularly relevant for the investment fund sector, as inflows/outflows can be highly sensitive to changes in market sentiment. Insurance corporations and pension funds, on the other hand, tend to engage in "buy and hold" strategies and are thus less likely to be an originator of negative feedback loops in markets.<sup>23</sup> A mechanical calculation of the immediate impact of a hypothetical 100 basis point interest rate increase on these sectors' debt securities holdings reveals losses of 3% for the ICPF sector and 2.5% for the investment fund sector (both measured as a percentage of total assets).

Banks' direct exposure (as a percentage of total assets) and the imputed capital losses are lower than for the above-mentioned sectors.

<sup>22</sup> The excess bond premium is obtained by estimating the asset swap spreads of the individual bonds on the basis of the individual duration, the coupon, the outstanding amount, credit ratings and sectoral expected default frequency, using panel fixed-effect methodology. See De Santis, R., "Credit spreads, economic activity and fragmentation", *Working Paper Series*, No 1930, ECB, July 2016.

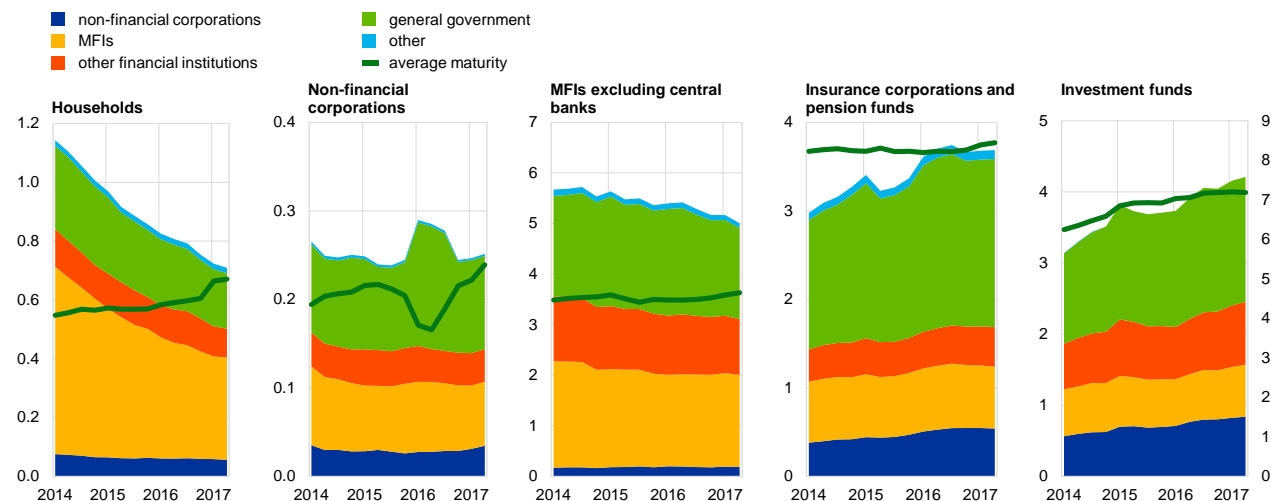
<sup>23</sup> See also Box 5, which discusses recent studies that challenge this view.

## Chart 2.14

### Rising debt securities exposure across a number of sectors

#### Debt securities holdings across sectors and average residual maturity

(Q1 2014 – Q2 2017; left-hand scale: holdings in € trillions (market values); right-hand scale: maturity in years)



Sources: ECB Securities Holdings Statistics, euro area financial accounts and ECB calculations.

Notes: Total debt as a percentage of total assets (Q1 2017): households: 3%; non-financial corporations: 1%; MFIs: 15%; insurance corporations and pension funds: 38%; investment funds: 39%.

**Households' and non-financial corporations' vulnerabilities to an increase in interest rates seem manageable (see Chart 2.15).** That said, the household sector has shifted some of its direct holdings of debt securities into investment funds. Given the observed increase in investment funds' risk-taking (see Section 3.1.3), these portfolio shifts may imply a net increase (albeit from low levels) in household vulnerabilities to an abrupt increase in bond risk premia (see Chart 2.16).

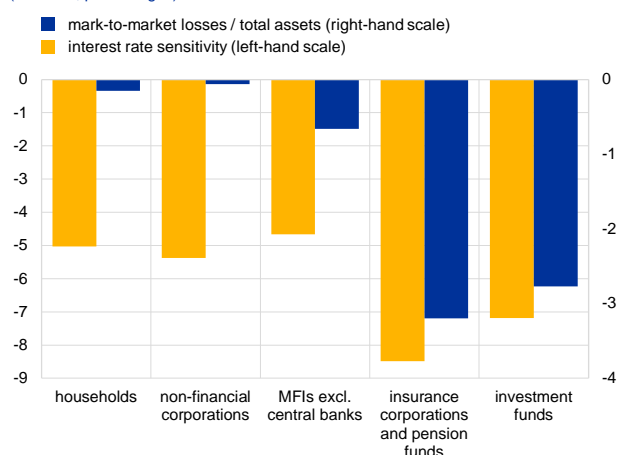
**Valuation losses in stressed bond market conditions could be further amplified by a deterioration in market liquidity.** Box 3 explains various approaches available to construct market liquidity indicators. Conditions during the period of the ECB's public sector purchase programme (PSPP) and developments in France are used as examples.

### Chart 2.15

A rise in interest rates would have an uneven impact across sectors

Mark-to-market capital losses over (i) total debt securities holdings and (ii) total assets stemming from a 100 basis point increase in interest rates

(Q2 2017, percentages)



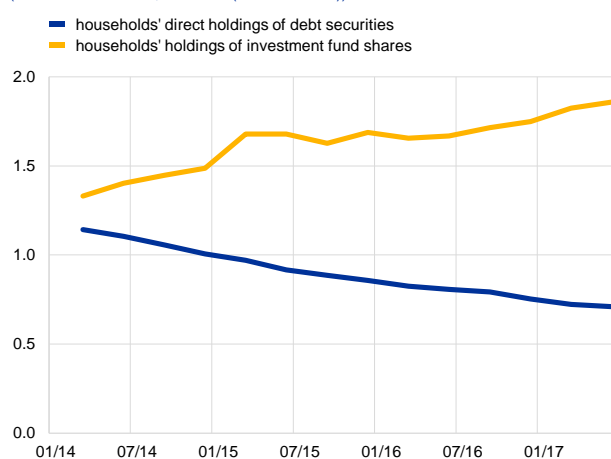
Sources: ECB Securities Holdings Statistics and ECB calculations.  
Notes: The computations are static and do not reflect a complete impact from higher interest rates. For instance, the potential offsetting impact stemming from hedging is ignored. Furthermore, for insurance corporations and pension funds, higher interest rates will reduce the value of longer-dated liabilities, and for banks, higher interest rates will probably support banks' margins. For further details, see Sections 3.1.1 and 3.1.3.

### Chart 2.16

Increased preference for investment funds over direct holdings in the euro area household sector

Euro area households' direct holdings of debt securities and holdings of investment funds

(Q2 2014 – Q1 2017, € trillions (market values))



Sources: ECB Securities Holdings Statistics and ECB calculations.

### Box 3

Bond market liquidity indicators – an overview

**An accurate assessment of bond market liquidity conditions is a crucial input for financial stability risk analysis.** As commonly defined, “liquidity” measures how much trading volume a financial market can absorb for a given change in price or what the price impact of a given trade volume will be. More elusively, liquidity may indicate how well market prices revert to their fundamental values. Lower bond market liquidity could amplify market price swings, impair the conversion into cash, and thus create financial stability risks.

**This box briefly explains the approach taken in constructing liquidity indicators at the ECB and some conclusions that can be drawn from the data.** Conditions over the lifetime of the public sector purchase programme (PSPP) to date and developments in France are used as examples.

**The concept of liquidity implies a comparison of factual and counterfactual information, namely market pricing with and without a trade being executed.** Actual market prices, as opposed to mere quotes or indications, are generally only measurable by actual trading. The executable price for a given trade at a given time also depends not only on the trade details, but also on the particular customer and trading venue. In most bond markets, it is generally also impossible to observe every trade that is being conducted. Commercial data providers and trading platforms offer trading datasets that cover certain sub-segments of the total trade universe, with varying degrees of coverage and sample bias.

**The design choices for liquidity indicators reflect trade-offs between various fundamental limitations.** ECB staff utilise multiple data sources to produce a range of internal liquidity indicators, and comparisons across indicators provide insights into market developments. The asset purchase programme (APP) in particular provides some post-trade information that would not normally be available to a central bank. By executing market purchases on a daily basis, the ECB can collect information on quoting behaviour that is not visible from screen indications, such as the dispersion of firm offers, time to quote, probability of no quote responses, etc.

**Market liquidity indicators can be grouped into three categories according to the type of trade information on which they rely (pre-trade, post-trade and indirect).** Pre-trade indicators rely on information that is observable before a trade takes place. This could be indicative price quotes posted by traders, or the order book structures of public exchanges. These indicators are comparatively easy to produce but are reliable only to the extent that indications correlate with executable prices, and that order books reflect true trade interest. Post-trade indicators are based on actual transaction prices and volumes. While the price information is informative, observed volumes are usually incomplete. In addition, the observed trading activity may be – and to the extent that traders seek out pockets of liquidity will be – a biased sample of total market activity. Sample bias is most likely to be significant at higher observation frequencies because higher frequencies imply, *ceteris paribus*, a smaller trade sample. Indirect indicators rely on secondary features of liquid markets, such as the absence of near-arbitrage opportunities. Such indicators sidestep the observational problems of the other two categories, but the definition and quantification of suitable secondary features is non-trivial.

**Market liquidity has both microscopic and macroscopic aspects.** At a given time, dealers may quote very tight bid-offer spreads and the market may be able to absorb single trades with a very low price impact, implying high liquidity at the microscopic, single-trade level. However, correlated trades in related instruments may degrade pricing at a more macroscopic level in the sense that the overall market levels move away from fundamentals. Partly as a result of this, trading volumes can be poorly correlated with other liquidity indicators.

**This idea can be illustrated with developments in the French government bond market during the period between November 2016 and May 2017.** At the time, political risk factors were being cited by a number of market participants ahead of the two rounds of the French presidential election that took place in April and May 2017. **Chart A**, based on ECB data shows that, at a microscopic level, average indicative bid-offer spreads had widened in November but then corrected around the year-end, before widening again in the spring. The price dispersion seen in PSPP execution was elevated sometimes, but not in a way that is correlated with the overall bid-offer measure, possibly indicating sample bias due to the bond selection strategy of ECB portfolio managers. At a macroscopic level, the evolution of an indicator based on spline spreads would be consistent with illiquid conditions, even over the year-end. All three indicators show an improvement in market liquidity after the election.<sup>24</sup>

**Taking a longer-term perspective, Chart B shows how bid-offer measures in the government bond market have evolved since the early days of the PSPP.** What stands out is that for the two

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<sup>24</sup> Spline spreads are produced by first fitting a smooth discount curve to observed yields and then calculating the difference between the market price and the present value of each bond according to this curve (z-spreads). These spreads are therefore indicators of relative value between similar bonds after correcting for coupon effects.

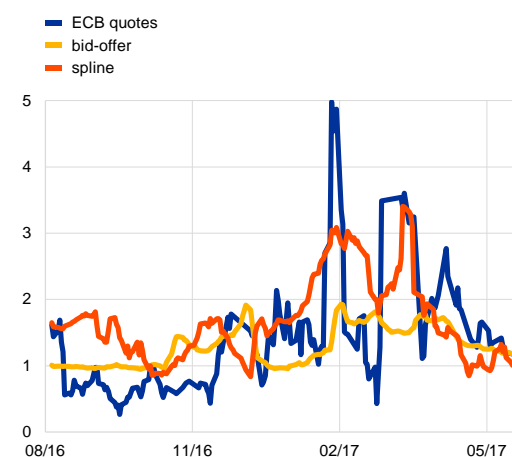
markets shown, liquidity diverged significantly over certain periods. Although there is no general trend for either market towards better or worse liquidity, investors' responses to market movements (e.g. the sharp yield rise in 2015 and the movements at the time of the French presidential elections this year) can have noticeable and diverging effects across different markets.

### Chart A

Bid-offer, spline spread and price dispersion measures of liquidity for the French market

#### Three indicators of liquidity for French government bonds of 4 to 7-year maturity

(1 Nov. 2016 = 1; five-business-day moving averages; higher values indicate lower liquidity)



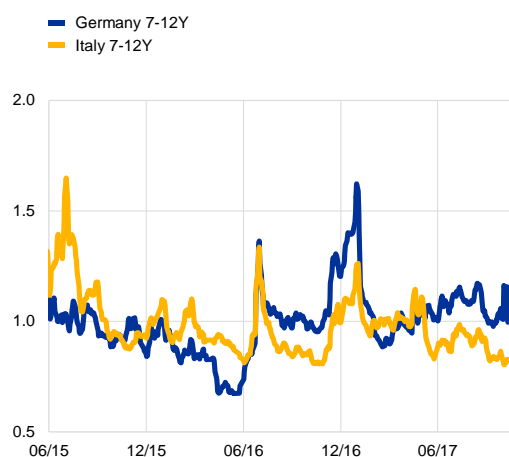
Sources: Bloomberg LP, ECB, MTS and ECB calculations.  
Notes: All indicators are indexed to 1 November 2016. "Bid-offer" refers to an average bid-offer spread (pre-trade indicator), while "spline" measures the sum of absolute spline spread values (indirect indicator). "ECB quotes" is an indicator based on the dispersion of price quotes received in PSPP execution (post-trade indicator).

### Chart B

Evolution of bid-offer measures over the last two years in Germany and Italy

#### Bid-offer-based liquidity indicator for the German and Italian government bonds of 7 to 12-year maturity

(average normalised to 1; five-business-day moving averages; higher values indicate lower liquidity)



Sources: Bloomberg LP and ECB calculations.  
Note: Bid-offer spreads are averaged across relevant bonds (pre-trade indicator).

**In conclusion, the joint analysis of multiple imperfect liquidity indicators provides a useful insight into how market conditions evolve.** Instead of focusing only on a single measure, a portfolio of quantitative indicators which can be monitored daily should be used.

**Vulnerabilities may also arise in stock markets amid elevated valuations in some areas.** In line with the improved outlook for economic activity, euro area cyclical stocks have outperformed defensive equities. Furthermore, the level of stock prices in the euro area is not deviating significantly from what would be consistent with fundamentals (see [Chart 2.17](#)). Stock prices in the United States have continued to increase in recent quarters, partly driven by the information technology sector. Among individual stocks, the "FAANG" stocks (Facebook, Apple, Amazon, Netflix and Alphabet's Google) currently make up around 11% of the total market capitalisation of the S&P 500 index. The strong increases in this sector may partly reflect some over-optimism on the part of investors, but the situation cannot be compared with that around the turn of the century when price/earnings ratios reached close to 80. Nevertheless, as highlighted in the past issues of the FSR, the overall level of valuations in the United States continues to appear stretched by historical standards. A potential trigger for a stock market correction could be the

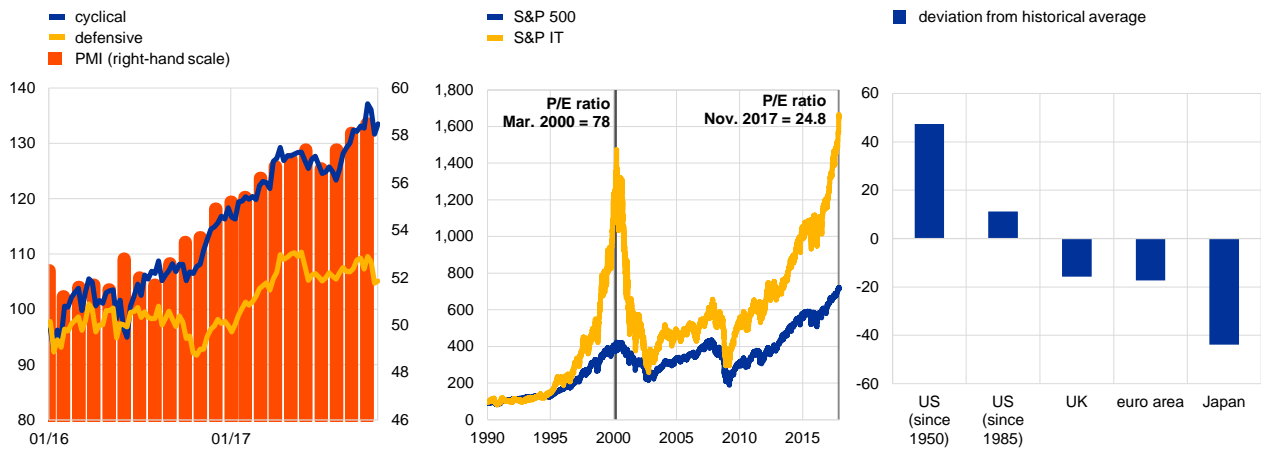
above-mentioned risk of a further repricing of bond yields, particularly if interest rate increases take place without concomitant upward revisions in firms' expected earnings growth. A potential correction could spill over to other major markets, including the euro area.

### Chart 2.17

#### Mixed valuations in global markets

**Euro area cyclical/defensive stock performance and euro area Purchasing Managers' Index (PMI) (left panel), US S&P 500 index and the S&P 500 information technology (IT) index (middle panel) and global cyclically adjusted price/earnings ratios (CAPE) (right panel)**

(left panel: Jan. 2016 – Nov. 2017, stock prices indexed to 100 in Jan. 2016, PMI index values; middle panel: Jan. 1990 – Nov. 2017, monthly data, stock prices indexed to 100 in Jan. 1990; right panel: deviation from historical averages, percentages)



Sources: Robert Shiller, Bloomberg and ECB calculations.

Notes: Left panel: the cyclical index consists of basic materials, industrials, auto & parts, technology, retail & travel and leisure stocks; the defensive index consists of food & beverage, healthcare, telecom and utilities stocks. Right panel: the CAPE ratio for the United States is taken from [Robert Shiller's homepage](#); the CAPE index series for the United Kingdom, the euro area and Japan start in 1985.

### 3 Euro area financial institutions

*The risk outlook for the euro area banking sector remains broadly unchanged compared with that in May 2017. Banks' profitability recovered somewhat in the first half of 2017 and earnings prospects improved. While profitability headwinds stemming from cyclical factors are expected to abate, the progress in tackling structural challenges remains incomplete. Notable progress has been made in resolving the large stock of non-performing loans (NPLs) since mid-2016, but the pace of NPL reduction remains rather uneven across banks. European authorities have launched several initiatives to address the high NPL stock, which should support the process of balance sheet repair in the banking sector. Turning to other structural challenges, banks are at varying stages of adapting their business models to the new operating environment. In particular, progress remains limited in diversifying sources of income and improving cost-efficiency, while some banks still rely on relatively high leverage to generate returns. At the same time, the strengthening of euro area banks' solvency position continued in the first half of 2017. The materialisation of the stylised adverse scenarios capturing the four risks set out in the Overview would result in solvency difficulties for only a few small banks.*

*Despite the low-yield environment, the profitability of large euro area insurers increased slightly in the first half of 2017 and their solvency positions remain robust. Insurers achieved solid underwriting results, particularly in the non-life segment, but investment income continued to be weak, posing a particular challenge for life insurers. To boost yields from investments, insurers have been gradually shifting their portfolios towards higher-yielding but riskier assets, for instance through larger investments in equity and mixed fund shares.*

*The euro area non-bank financial sector expanded further in the first half of 2017, following a year of near-stagnation. In the investment fund sector, euro area asset managers have been gradually extending their portfolio allocation further across the credit risk and maturity spectrum, while bond funds' liquidity buffers and the share of portfolios held in liquid assets declined further. Concerns remain that selling pressures from investors in fixed income markets may be amplified by large outflows from bond funds, with the so-called "flow-performance nexus" potentially acting as an amplifying mechanism.*

*On the policy front, the European Commission's proposed reform package will bring the post-crisis regulatory reforms in the European Union close to completion. Among other aspects, the proposed reform package clarifies the institution-specific nature of the Pillar 2 framework, which should not be used to address macroprudential risks. This will require targeted revisions to the macroprudential framework which are essential to enable macroprudential authorities to prevent and address systemic risks in a timely and effective manner.*

## 3.1 Banks' profitability prospects modestly improved, but structural headwinds remain

### 3.1.1 Banks' resilience continued to improve, but further progress is needed in addressing structural challenges<sup>25</sup>

#### **Euro area banks' financial performance improved moderately in the first half of 2017 and banks' balance sheets strengthened further.**

The uptick in overall profitability levels was mainly driven by higher non-interest income and, for some banks, by lower loan impairments. This notwithstanding, banks' operating performance continues to be challenged by subdued revenue growth and/or remaining cost-inefficiencies. In addition, the profitability of banks with high NPL stocks remains weak due to still elevated impairments, even if cyclical improvements helped reduce new NPL inflows and associated provisioning needs. At the same time, banks have made headway in addressing the large stock of NPLs, although the pace of progress remains rather uneven across banks. European authorities have launched several initiatives to address the high NPL stock, which should support the process of balance sheet repair going forward. The strengthening of euro area banks' solvency positions also continued in the first half of 2017, mainly driven by increases in capital (both from internal and external sources) and, to a lesser extent, by declines in risk-weighted assets.

#### **Euro area banks' riskiness as reflected in market measures appears still elevated compared with pre-crisis levels, but there are signs of improvement since mid-2016.**

Whereas the level of bank riskiness in the euro area on aggregate as reflected in market measures is still above that observed prior to the financial crisis, there have been clear improvements since mid-2016 amid the ongoing macroeconomic recovery and favourable financing conditions (see [Chart 3.1](#)). The different market-based measures exhibited a broadly similar pattern over time, indicating more elevated risk levels at the end of 2011 and in mid-2016. The euro area aggregate picture masks substantial heterogeneity at the bank level, however. Some banks in countries that were more affected by the crisis appear to still display a higher riskiness and have remained at those levels over the past years. There is, however, a sizeable number of banks that appear to have reduced their risk levels very significantly, thereby reducing the gap with their peers in the Nordic countries.

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<sup>25</sup> The analysis of profitability, asset quality and solvency trends in this section is based on supervisory data reported by SSM significant institutions (unless otherwise stated).

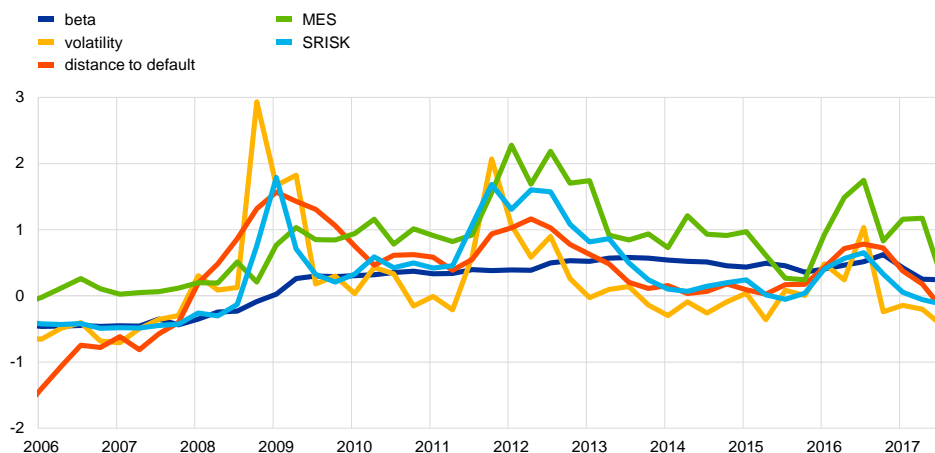


### Chart 3.1

Bank risk in the euro area is still elevated relative to pre-crisis levels, but has declined recently

#### Evolution of market-based measures of bank risk in the euro area

(Q1 2006 – Q3 2017, z-score)



Sources: Bloomberg, Thomson Reuters Datastream, SNL Financial and ECB calculations.

Notes: The chart shows five market-based risk measures. The information of individual banks is aggregated to a euro area measure by using the median. Beta refers to the beta coefficient from a regression of bank stock price returns on broad stock index returns. Volatility is the historical bank stock price volatility over one month. Distance to default measures the number of standard deviations by which the log of the value of the bank assets-to-debt ratio needs to deviate from its mean in order for default to occur. For more details on the computation of the distance to default, see Gropp, R., Vesala, J. and Vulpes, G., "Equity and bond market signals as leading indicators of bank fragility", *Working Paper Series*, No 150, ECB, 2002. MES is the one-day loss expected if market returns are smaller than -2% and SRISK is the capital shortfall of a bank if the stock market falls by 40% over the next six months. For further details on the computation of MES and SRISK, see Brownlees, C. and Engle, R., "SRISK: A Conditional Capital Shortfall Measure of Systemic Risk", *Review of Financial Studies*, Vol. 30, 2017, pp. 48-79.

Bank profitability improved moderately but revenue growth remains subdued, while banks made limited progress in improving cost structures

**Euro area banks' profitability recovered somewhat in the first half of 2017, mainly due to an increase in non-interest income** (see [Chart 3.2](#)). Looking at the key sources of bank revenue, on aggregate, net interest income slightly increased compared with the first half of 2016, following an annual decline in 2016. That said, net interest income trends diverged across banks, with roughly an equal number of banks recording increases and declines (see [Chart 3.3](#)). At the same time, a broad-based increase could be observed in banks' fee income, supported by higher fee income from asset management amid continued robust growth of the investment fund sector (see Section 3.1.3). Valuation gains on financial assets<sup>26</sup> and foreign exchange results also increased, in part due to a low base effect as in the first half of 2016 this income component was negatively affected by the repeated bouts of financial market volatility.

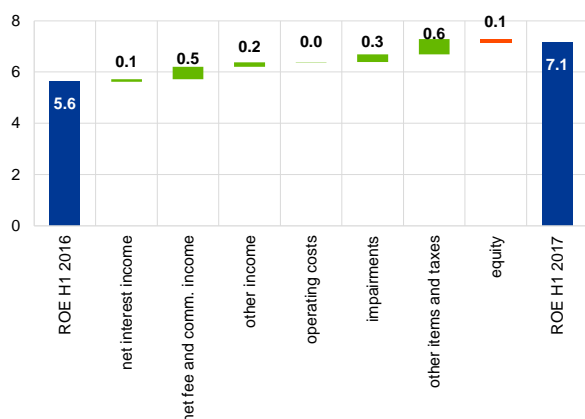
<sup>26</sup> Including net trading income and net gains on other financial assets measured at fair value.

### Chart 3.2

Banks' profitability improved in the first half of 2017, mainly driven by higher non-interest income on aggregate...

#### Decomposition of the change in euro area significant banks' aggregate return on equity (ROE)

(H1 2016 – H1 2017, percentage points, percentage point contributions)



Sources: ECB supervisory data and ECB calculations.

Notes: Based on a balanced sample of 114 significant institutions. The green and red bars denote positive and negative contributions respectively.

### Chart 3.3

...but with heterogeneous impacts of key profitability drivers across banks

#### Distribution of key profitability drivers' contributions to the change in banks' ROE

(H1 2016 – H1 2017, percentage points, median, interquartile range and 10th-90th percentile range)



Sources: ECB supervisory data and ECB calculations.

Note: Operating costs and impairment costs are shown with opposite signs (i.e. cost declines indicate positive contributions).

#### Lower impairment costs also contributed to the overall improvement in profitability, while operating costs remained stable on aggregate.

However, the decline in banks' aggregate impairment costs masked diverging patterns across banks (see [Chart 3.3](#)). The majority of banks reported declines in impairments in the first half of 2017, reflecting a slowdown in new NPL inflows amid the continued economic recovery. Nevertheless, around one-third of significant institutions reported increases in impairment costs. In some cases, increased impairments were linked to the (planned) disposal of NPLs. Operating costs remained broadly stable which, together with the resumption of revenue growth, led to a modest improvement in the average cost-to-income ratio.

#### Looking ahead, analysts' forecasts suggest that the gradual improvement in bank profitability is likely to continue over the next two years.

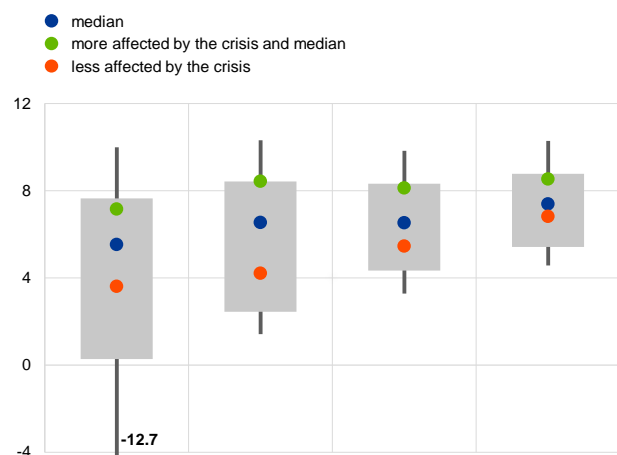
The latest median ROE estimates for 2018 and 2019 (for a sample of 42 listed significant institutions) stand at around 6% and 7%, respectively, with the dispersion across banks expected to narrow (see [Chart 3.4](#)). According to analysts' forecasts, bank profitability in euro area countries that were more affected by the crisis is expected to converge towards levels similar to those in euro area countries that were less affected by the crisis. At the same time, market sentiment towards the banking sector remained broadly unchanged over the last six months. Banks' equity valuations hovered around the levels reached by May 2017, with the median price-to-book ratio of euro area banks stabilising at around 0.9, compared with the low of 0.5 in the summer of 2016 (see [Chart 3.5](#)). The dispersion of banks' price-to-book ratios remains wide, however, partly reflecting still significant (albeit somewhat narrowing) differences in profitability prospects.

### Chart 3.4

Analysts' forecasts suggest a continued, albeit only gradual improvement in bank profitability over the next few years

#### Actual ROE for 2016 and mean ROE estimates for 2017-19 for euro area banks

(2016-19, percentages; median (blue dot), interquartile range and 10th-90th percentile range)



Sources: SNL Financial and S&P Capital IQ.

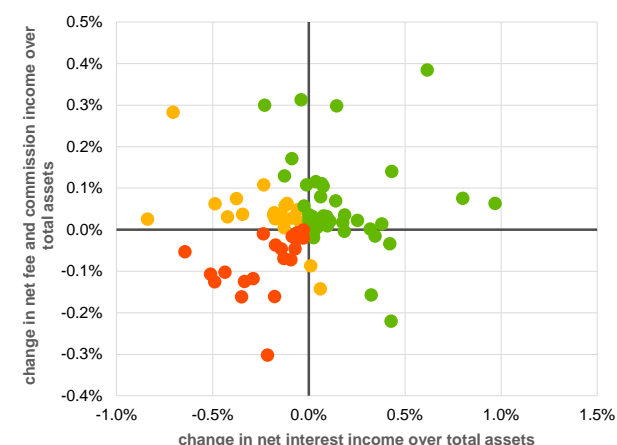
Notes: Based on a sample of 42 listed banks. The red (green) dots show the median values for banks in euro area countries that were more (less) affected by the crisis.

### Chart 3.6

The relationship between fee and commission income and net interest income suggests only limited income source substitution

#### Changes in net interest income and net fee and commission income for significant institutions

(2014 – H1 2017, percentage points)



Source: ECB.

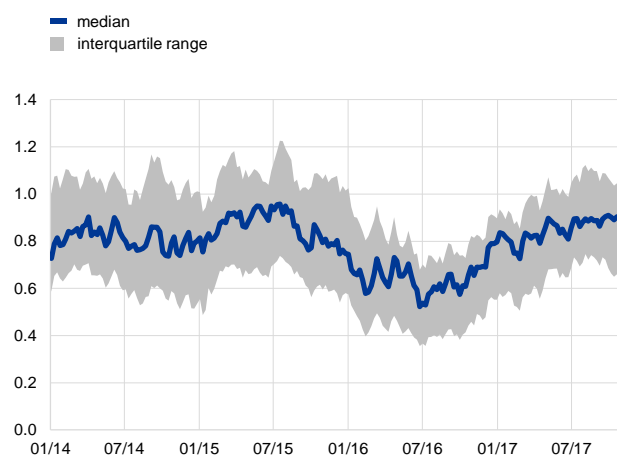
Notes: The colours indicate the relationship between changes in net interest income over total assets (NII/TA) and net fee and commission income over total assets (NFCI/TA). Green indicates increases in both NII/TA and NFCI/TA or an increase in one income component that more than offsets a decline in the other. Yellow indicates an increase in one income component that does not offset a decline in the other. Red indicates declines in both NII/TA and NFCI/TA. The figures for the first half of 2017 are calculated on a four-quarter trailing basis.

### Chart 3.5

Banks' equity valuations have remained well above the lows reached in the summer of 2016

#### Euro area banks' price-to-book ratios

(Jan. 2014 – Nov. 2017, multiples, median and interquartile range)



Source: Bloomberg.

Note: Based on a sample of 25 listed significant institutions included in the EURO STOXX Banks index.

### Despite these recent improvements, banks continue to face profitability challenges on three fronts.

The continued economic recovery should provide support to bank profits mainly through a combination of business volume growth and a further decline in loan impairment costs; for some banks, profits will probably only stabilise at a low level. These cyclical tailwinds are countered, however, by limited overall progress in improving cost-efficiency and remaining earnings risks for high-NPL banks due to the lingering uncertainty about their future provisioning needs (over and above the expected increase due to IFRS 9 rules).

### On the income side, the growth of core revenues remains subdued.

Banks' core revenues, defined as the sum of net interest income and fee income, grew moderately in the first half of 2017 (by 2%) but, on a rolling four-quarter basis, were still only back to 2015 levels. In the current low interest rate environment, one way for banks to compensate for compressed net interest margins could be to adapt their business models, by moving towards more fee and commission-generating activities. In the period from 2014 to the first half of 2017, net interest income and fee and

commission income growth patterns varied across banks (see [Chart 3.6](#)). Around half of the significant institutions managed to increase core revenues (as a percentage of total assets), as they either recorded increases in both net interest income and fee income or could more than offset declines in one of these income sources by increases in the other. For the rest of the banks, increases in one income source (typically fee income) could not compensate for declines in the other or declines were recorded for both income components.

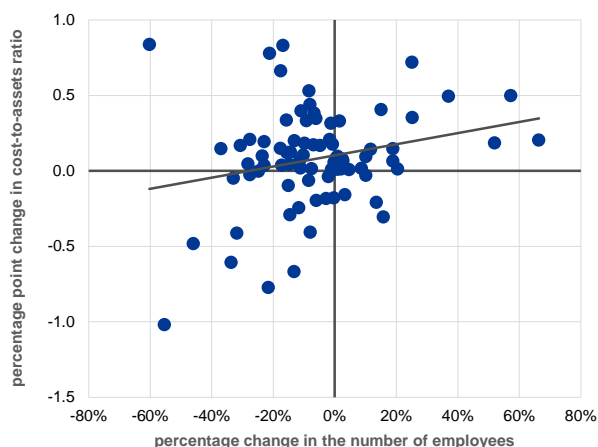
**Amid ongoing pressure on revenue growth, banks may need to make further improvements in operational efficiency, as progress remains limited to date.** In the period between 2012 and 2016, many banks achieved material headcount reductions. However, this appears to have brought only limited improvements in cost-efficiency so far (see [Chart 3.7](#)). Looking ahead, a number of banks have embarked on cost-cutting plans, which typically include (further) branch network and staff reductions, together with more IT investment. While some banks target absolute cost reductions in the medium term, the short-term impact of these measures is unclear as lower staff/branch costs could be offset by restructuring costs (e.g. severance payments) and increased IT costs.

**Chart 3.7**

Headcount reductions have brought efficiency gains only at a limited number of banks in the last few years

Change in the number of employees versus the change in the cost-to-assets ratio for euro area banks

(2012-16)



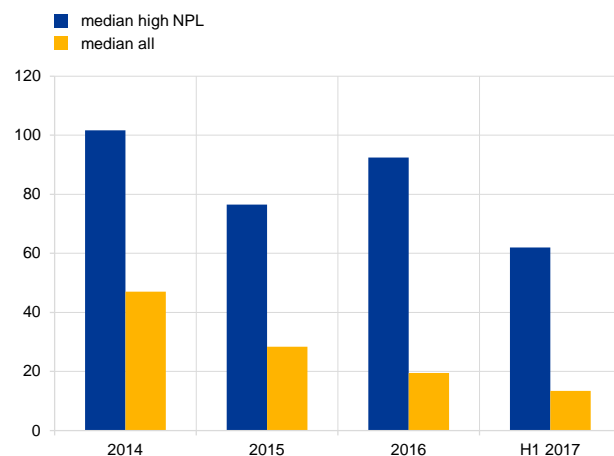
Source: SNL Financial.  
Note: Based on a sample of 80 significant institutions.

**Chart 3.8**

Loan impairments offset much of the operating profits at high-NPL banks

Median ratio of impairments to pre-impairment operating profits for high-NPL banks and all SSM banks

(2014 – H1 2017, percentages)



Source: ECB.  
Notes: High-NPL banks are defined as those in the highest NPL ratio quartile, based on 2014-H1 2017 averages. Excludes observations where pre-impairment operating profits are negative.

**For some banks, high NPLs continue to negatively affect profitability.** First, elevated loan impairment costs remain an important driver of low profitability in high-NPL countries as they offset a significant, albeit somewhat declining, part of operating profits (see [Chart 3.8](#)). Second, profitability is also adversely affected by the lower returns provided by NPLs as well as by the additional costs of managing NPLs. Looking ahead, while continued economic recovery should help the majority of banks in reducing provisions or keeping them at low levels, some high-NPL banks

may need to raise provisioning coverage to achieve their targeted NPL reductions. In addition, the introduction of IFRS 9 rules will influence provisioning levels as of January 2018. This notwithstanding, the new rules will have no upfront effect on profit and loss accounts and their impact on capital is estimated to be manageable for European banks. On average, the introduction of IFRS 9 is estimated to result in a 13% increase in provisions, corresponding to an estimated 45 basis point decrease in common equity Tier 1 (CET1) ratios for the sample of banks subject to the European Banking Authority (EBA) exercise.<sup>27</sup>

## Banks' asset quality continued to improve, but further progress is needed in reducing the large stock of legacy non-performing assets

**Euro area banks have made notable progress in reducing the stock of NPLs since mid-2016.**<sup>28</sup> In absolute terms, significant banks' NPLs fell below €800 billion in June 2017, bringing the decline over the last twelve months to around €140 billion.<sup>29</sup> Around half of the reduction can be attributed to Italian banks, with an additional 20% observed in the other high-NPL countries (see [Chart 3.9](#)). While much of this decline in the NPL stock of euro area significant institutions was due to the combination of a large-scale transaction by one bank and the liquidation of two banks, progress in NPL reduction has also become more broad-based, with the number of banks achieving at least a 2 percentage point year-on-year NPL ratio reduction rising to 19 in the second quarter of 2017, from 12 a year earlier. From a sectoral perspective, non-financial corporate (NFC) loans accounted for over 70% of the decline, with roughly a 2/3-1/3 breakdown between non-SME and SME loans, respectively. From a loan type perspective, the largest NPL ratio declines since mid-2016 were observed for small and medium-sized enterprise (SME) and commercial real estate (CRE) loans (see [Chart 3.10](#)). Moreover, improvements were also observed for other problem loans in this period, including a decline in forbore performing loan ratios in the majority of euro area countries, although banks in some high-NPL countries recorded increases in this category.

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<sup>27</sup> See *EBA report on results from the second EBA impact assessment of IFRS 9*, EBA, July 2017. The sample for the EBA exercise consisted of approximately 50 institutions across the European Economic Area. See also *SSM thematic review on IFRS 9: assessment of institutions' preparedness for the implementation of IFRS 9*, ECB Banking Supervision, November 2017.

<sup>28</sup> It should be noted that this reduction already includes the transfer of NPLs of around €26 billion by one bank to assets held for disposal, but their sale (and subsequent deconsolidation from the balance sheet) is yet to be completed.

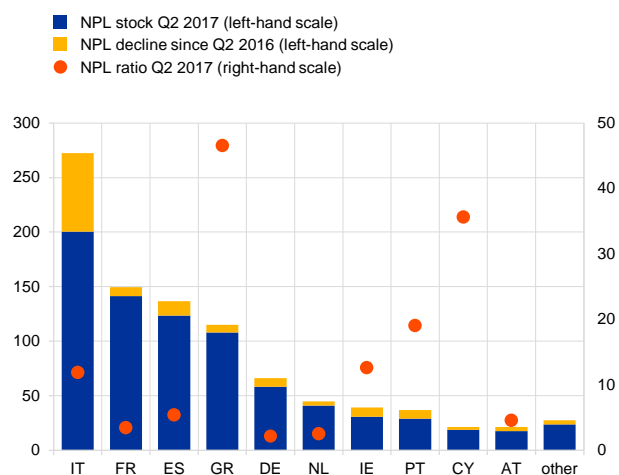
<sup>29</sup> In this sub-section, high-NPL countries include Cyprus, Greece, Ireland, Italy, Portugal and Slovenia.

**Chart 3.9**

Significant progress in reducing NPL stocks since mid-2016, led by NPL declines in Italy

**Change in NPL stocks since Q2 2016 and NPL ratio in Q2 2017 by country**

(changes between Q2 2016 and Q2 2017, € billions; NPL ratio in Q2 2017, percentages)



Source: ECB supervisory data.

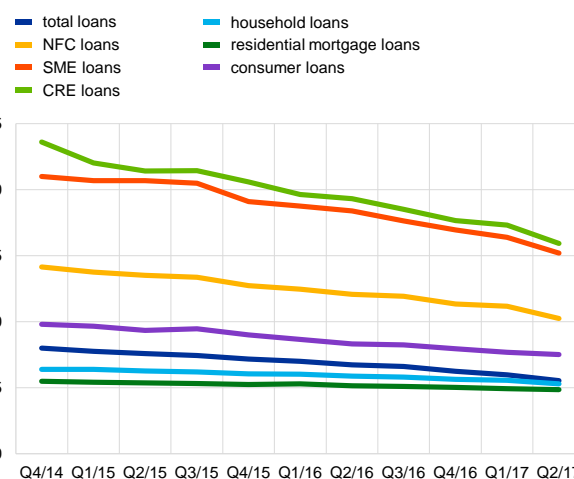
Notes: Country aggregates refer to significant institutions only. For Italy, the overall reduction already includes the transfer of NPLs of around €26 billion by one bank to assets held for disposal, but their sale (and subsequent deconsolidation) is yet to be completed.

**Chart 3.10**

Asset quality improved in both the household and NFC segments, with the most marked drop in NPL ratios for CRE and SME loans

**NPL ratios of significant institutions in the euro area by sector and loan type**

(Q4 2014 – Q2 2017, percentages)



Source: ECB supervisory data.

Note: Based on aggregates for significant institutions.

**The reduction in NPL stocks was supported by a pick-up in disposals in secondary NPL markets.** According to data collected by KPMG, loan sales<sup>30</sup> in euro area countries picked up significantly in the second half of 2016, bringing the overall amount of completed deals to €94 billion in 2016, representing a nearly 60% increase over 2015. Activity remained strong in the first half of 2017, with the combined amount of completed and ongoing deals reaching €53 billion. From a geographical perspective, loan sales since the beginning of 2016 have been dominated by deals in Italy. In the same period, unsecured and consumer loans together accounted for nearly 30% of the number of completed deals, while (commercial and residential) real estate loans represented almost 30%, with mixed and other (corporate, SME, retail) deals accounting for the rest.

**On aggregate, the coverage of NPLs by loan loss reserves remained broadly stable in the first half of 2017, but this concealed diverging patterns across banks.** In fact, the median coverage ratio showed a decline, accompanied by a widening dispersion across banks (see [Chart 3.11](#)). At the country level, NPL coverage improved in the majority of high-NPL countries. Coverage ratios also differ markedly across countries, with the variation partly linked to the share of collateralised NPLs (see [Chart 3.12](#)).

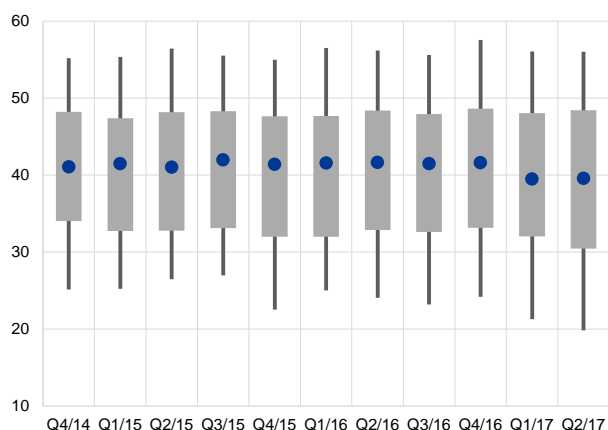
<sup>30</sup> Data on loan sales include both NPLs and performing loans, but the vast majority of deals include NPLs.

**Chart 3.11**

The median coverage ratio slightly declined in the first half of 2017, with a widening dispersion across banks

**Dispersion of significant institutions' coverage ratios**

(Q4 2014 – Q2 2017, percentages, median, interquartile range and 10th-90th percentile range)



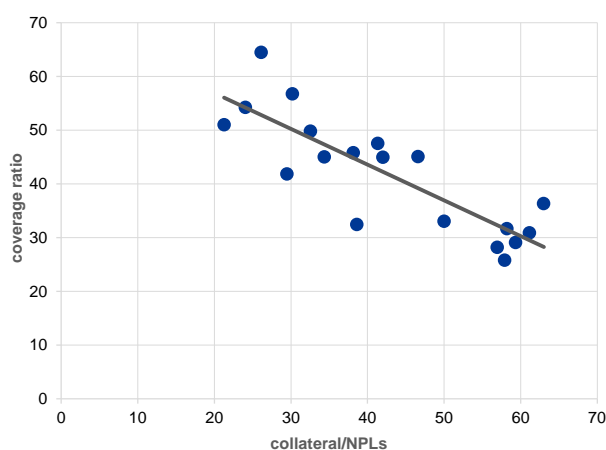
Source: ECB supervisory data.  
Note: The coverage ratio is defined as the ratio of accumulated impairments on NPLs to total NPLs.

**Chart 3.12**

Coverage ratios appear to be inversely related to the share of collateralised NPLs

**The ratio of collateral to NPLs and the coverage ratio by country**

(Q2 2017, percentages)



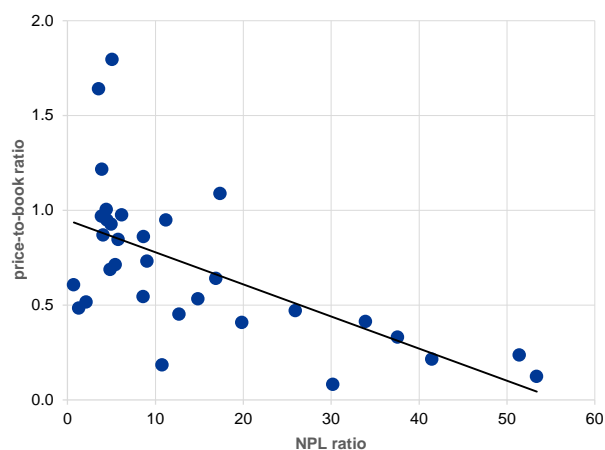
Source: ECB supervisory data.

**Chart 3.13**

High NPL ratios weigh on market perceptions

**NPL ratios and price-to-book ratios for selected euro area banks**

(x-axis: Q2 2017, percentages; y-axis: Nov. 2017, multiples)



Sources: ECB and SNL Financial.

**Despite the recent notable improvements, progress in reducing NPL levels remains uneven across banks and countries.**

In the twelve months up to June 2017, NPL ratios declined by 4-6% in four of the six high-NPL countries, compared with only a modest reduction in the remaining two countries. In addition, some banks maintain a significant amount of foreclosed assets on their balance sheets. At end-June 2017, the combined ratio of net NPLs and foreclosed assets to capital remained high (in excess of 100%) for around 15% of significant institutions. The still high NPL ratios continue to put pressure on bank profitability, partly because provisions offset a considerable part of operating profits. Against this background, the market perception of banks burdened with high NPLs remains adverse, as suggested by the negative relationship between NPL ratios and price-to-book ratios (see [Chart 3.13](#)).

**Further progress in NPL resolution should be**

**supported by ongoing policy initiatives.** In July 2017 the EU Council adopted an action plan to tackle non-performing loans in Europe, proposing a variety of measures ranging from new supervisory tools to developing a blueprint for the potential set-up of national asset management companies (AMCs) for NPLs. At the same time, the European Commission has launched a public consultation on the development of secondary markets for NPLs, aiming to inform its work on possible

legislative measures to remove impediments to these markets (see also Special Feature A, which discusses the sources of market failure that have prevented the development of liquid secondary markets for NPLs and argues that an NPL transaction platform can help address these market failures). Furthermore, in October 2017, the ECB published draft guidance outlining supervisory expectations on prudential provisioning of NPLs, applicable to newly classified NPLs as of January 2018.<sup>31</sup>

## Few signs of a broad-based increase in bank credit risk-taking

**Risk measures reported by banks continue to point to a decline in credit risk in the loan books in the first half of 2017.** In the current weak bank profitability and low-yield environment, banks may attempt to increase profits by reallocating their portfolios towards riskier assets. As regards credit risk, however, there is no broad-based evidence of such behaviour. In fact, the risk content of banks' loan books, based on the global charge indicator<sup>32</sup>, declined in most portfolios between 2014 and 2017 (see **Chart 3.14**). The consistency observed between developments in internal-rating-based (IRB) and standardised portfolios provides comfort that the de-risking is genuine, as the latter offer less scope for banks to optimise their capital charges. De-risking has been most rapid in SME exposures of banks in euro area countries that were more affected by the crisis, but credit riskiness remains the highest in this portfolio. The reported downward trend in the riskiness of this portfolio is consistent with independent measures of credit risk for non-listed SMEs (Moody's expected default frequencies, see **Chart 3.15**).

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<sup>31</sup> See "[Addendum to the ECB Guidance to banks on non-performing loans: Prudential provisioning backstop for non-performing exposures](#)", ECB Banking Supervision, October 2017.

<sup>32</sup> The global charge indicator is a measure of risk relative to the size of exposures that allows standardised and IRB portfolios to be jointly taken into account in a meaningful way. It accounts for regulatory charges related to both expected and unexpected losses (from the standardised and IRB approaches) and the expected losses calculated from the regulatory parameters estimated under the IRB approach. It is calculated as:  $(\text{risk-weighted assets} + 12.5 \times \text{expected losses}) / \text{exposure at default}$ . This indicator, often used by the EBA in its risk-weighted asset reviews, overcomes several shortcomings of the risk weight density indicator. Therefore, in using this indicator, any comparison between standardised and IRB portfolios becomes more meaningful.

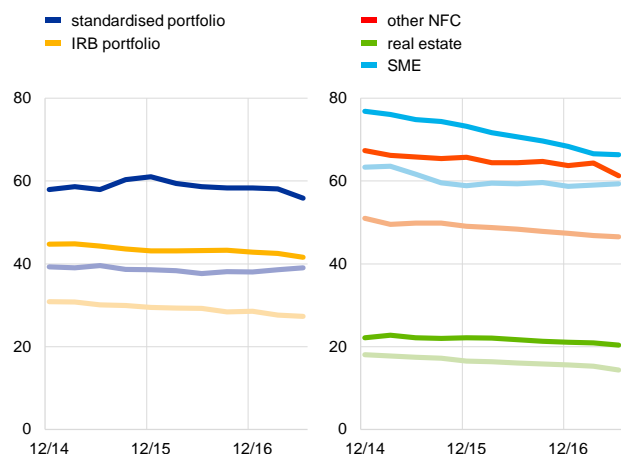


**Chart 3.14**

Credit risk in banks' portfolios has trended downwards for several large portfolios in all euro area countries

**Global charge for non-defaulted standardised and IRB credit risk exposures (left-hand panel) and selected IRB portfolios (right-hand panel)**

(Q4 2014 – Q2 2017, percentages)



Sources: ECB supervisory data and ECB calculations.

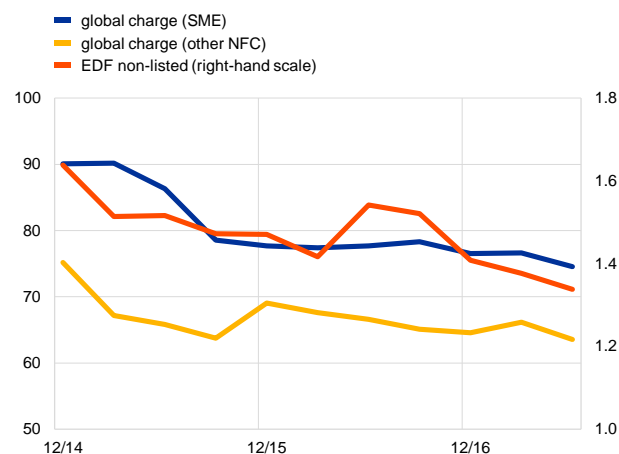
Notes: Excludes exposures in default; based on weighted averages for a sample of 101 significant institutions. Solid lines refer to banks in Cyprus, Greece, Italy, Portugal, Slovenia and Spain; lighter coloured lines refer to banks in the remaining euro area countries.

**Chart 3.15**

Regulatory charges and expected default frequencies have been moving in the same direction for non-financial corporations

**Global charge on banks' IRB corporate exposures and expected default frequencies (EDFs) of non-listed firms**

(Q4 2014 – Q2 2017, percentages)



Sources: ECB supervisory data, Moody's and ECB calculations.

Notes: Excludes exposures in default. Based on weighted averages for a sample of 101 significant institutions.

**A more granular look at banks' exposures confirms the shift towards safer portfolios at the individual bank level.**

In the past two years, significant institutions have increased exposures to borrowers with lower probabilities of default (PDs) – of less than 1% – and decreased their exposures to borrowers with greater PDs, higher than 25% (see [Chart 3.16](#)). This development in bank portfolios can reflect an active targeting of more creditworthy borrowers and the application of tighter standards to the approval of loans. It could also result, however, from borrowers' creditworthiness improving passively in line with the economic cycle. Nevertheless, a shift towards exposures with lower PDs, risk weights and regulatory charges has taken place.

**At the sectoral level, however, the shift towards safer assets has been**

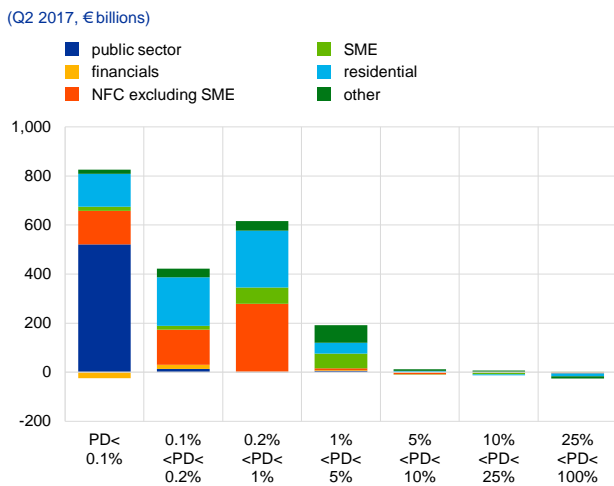
**accompanied by increased exposures towards residential real estate.** Over the last two years, significant institutions have increased their loans to households backed by real estate mortgages by focusing on borrowers with lower PDs and on mortgages with lower loan-to-value (LTV) ratios (see [Chart 3.16](#)). Between the fourth quarter of 2016 and the second quarter of 2017, significant institutions have, on average, increased their share of mortgages with an LTV ratio lower than 60%. At the same time, they have reduced their exposures with LTV ratios higher than 90%. However, this shift in the composition of loan books towards lower-LTV exposures has, in part, been driven by stronger residential real estate price growth and higher renegotiation rates (see [Chart 3.17](#)), as the renegotiation of a given loan in a market with rising prices leads to a lower LTV ratio. Overall, the increase in exposures backed by real estate assets tightens the link between the banking system and the real estate cycle on aggregate, and leads to a less diversified banking system. The

shift towards public sector exposures reported in the IRB portfolio reflects both increases in holdings of central bank liquidity (a reflection of the asset purchase programme – APP) and of sovereign assets. As investments in the latter have nevertheless decelerated in recent quarters, increased public sector exposures overall do not necessarily reflect a strengthened bank-sovereign nexus. Lastly, while consumer credit has been growing quite briskly (see also Section 1.3), it continues to be of marginal relevance for euro area banks.

**Chart 3.16**

Banks reduced their holdings of exposures with higher probabilities of default

Breakdown of exposures by PD and obligor grade categories for IRB reporting institutions; change in exposures between Q2 2015 and Q2 2017

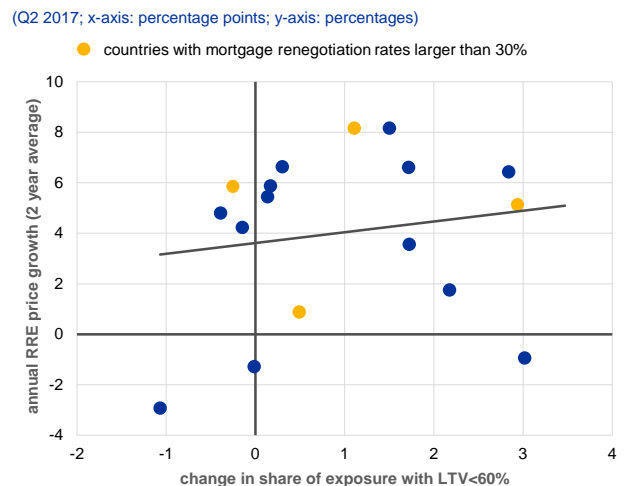


Sources: ECB supervisory data and ECB calculations.  
Notes: Excludes exposures in default; based on a balanced panel of 58 institutions. "Other" includes all retail exposures excluding those to households secured by immovable property (i.e. qualifying revolving and consumer lending).

**Chart 3.17**

The increased exposure to loans with lower LTV ratios masks a correlation with loan renegotiations and RRE price growth

Two-year average residential real estate (RRE) price growth and change in the share of residential real estate exposures with an LTV ratio lower than 60% between Q4 2016 and Q2 2017



Sources: ECB MFI interest rate statistics, ECB supervisory data and ECB calculations.  
Note: Excludes exposures in default; based on a balanced panel of 86 institutions.

**Turning to bank lending conditions, the results of the euro area bank lending survey suggest continued signs of easing credit standards, although with some differences across loan types** (see Chart 3.18). Over the last four quarters, credit standards have been easing for loans to large corporates and for household loans. Credit standards have remained broadly unchanged for SME loans over this period as a whole, although a slight easing could be observed in recent quarters. Looking at recent developments in the largest euro area economies, the easing of credit standards for non-financial corporations could only be observed in Germany in the third quarter of 2017, while standards either remained unchanged or even tightened in other large countries. Credit standards for housing loans eased in most large countries in the third quarter, with banks in the Netherlands reporting the most broad-based easing mostly driven by competitive pressure and lower risk perceptions. Overall, survey results on bank lending standards do not point to excessive risk-taking in the euro area as a whole, but they do signal an increased willingness to take on credit risks in certain segments/countries.

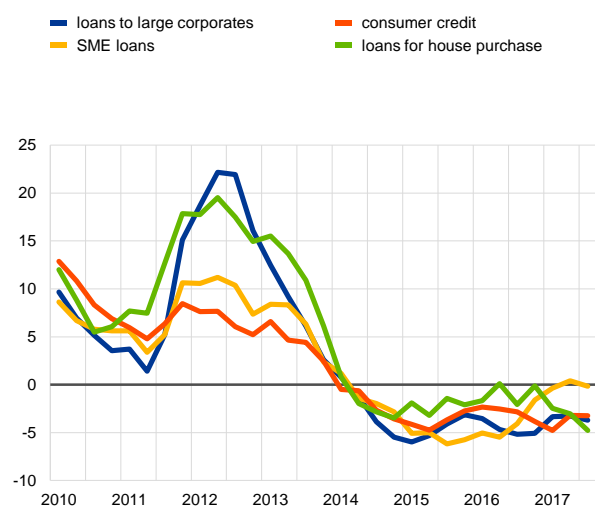
Regarding the geographical breakdown of loans, banks moderately increased their exposures to borrowers outside the euro area in the first half of 2017. This was mainly driven by an increase in lending to advanced economy regions, in particular North America, following a decline in 2016 (see [Chart 3.19](#)). Recent trends in lending activity in emerging market economies (EMEs) show some signs of increased risk aversion as EME lending exposures rose slightly in the first six months of 2017, following a deceleration in loan growth in 2016. At the same time, significant institutions' lending activity within the euro area picked up more significantly in the first half of 2017, accounting for over three-quarters of the overall increase.

**Chart 3.18**

Lending survey results suggest some signs of easing credit standards in recent quarters

**Credit standards for loans to the non-financial private sector**

(Q1 2010 – Q3 2017, weighted net percentages, four-quarter moving averages)



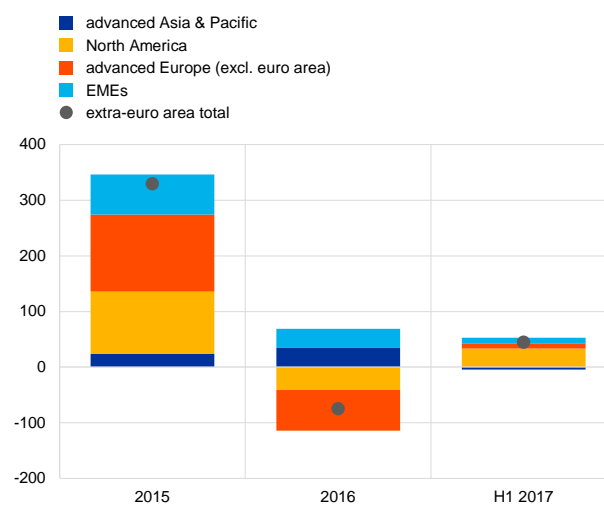
Source: ECB.

**Chart 3.19**

Banks increased their lending exposures outside the euro area in the first half of 2017

**Changes in euro area banks' extra-euro area exposures by borrower region**

(2015 – H1 2017, € billions)



Source: ECB supervisory data.  
Note: Excluding claims on central banks and interbank loans.

**Interest rate risk in the banking book appears limited at the aggregate euro area level**

**On aggregate, risks in the banking book associated with potentially rising interest rates are currently limited for euro area significant institutions.** As interest rates have declined and the yield curve has flattened over the past few years, margin compression has put pressure on bank profitability. At the same time, borrowers (in particular households in the case of loans for house purchase) took advantage of the unprecedented low rates by renegotiating existing loans, extending maturities and increasing the share of fixed rate loans (see [Chart 3.20](#)). Depending on the prevailing interest rate regime in the respective country, banks are either affected immediately (floating rate loans) or the impact materialises more gradually as the loan book gets repriced (fixed rate loans). As a consequence, the extent to

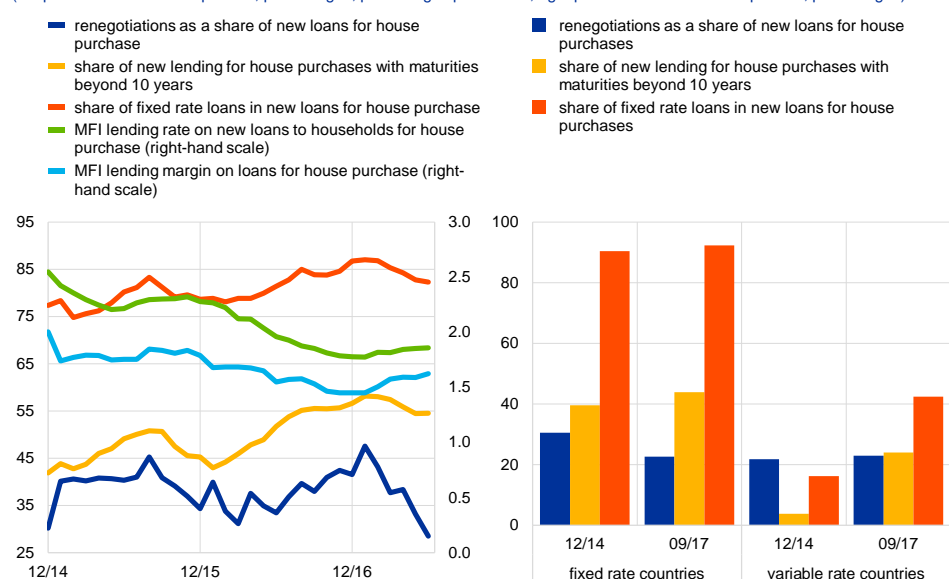
which banks' net interest income will be impacted by a prospective normalisation of interest rates is likely to depend on several factors, in particular on the respective interest rate scheme.<sup>33</sup> Supervisory data suggest that on aggregate interest rate risk in the banking book for euro area significant institutions is limited at the current juncture (see **Chart 3.21**).<sup>34</sup> This is mirrored by the results of a sensitivity analysis of interest rate risk in the banking book conducted by ECB Banking Supervision.<sup>35</sup>

### Chart 3.20

#### Declining interest rates and more favourable lending terms for borrowers put pressure on banks' margins

##### Evolution of interest rates, lending terms and lending margins for the euro area and for countries with fixed and variable interest rates

(left panel: Dec. 2014 – Sep. 2017, percentages, percentages per annum; right panel: Dec. 2014 and Sep. 2017, percentages)



Sources: ECB and ECB calculations.

Notes: All indicators refer to (new) lending to households for house purchase. Fixed rate countries include Belgium, Germany, France, the Netherlands and Slovakia, while in all other countries variable rates are considered to prevail.

#### There is, however, pronounced heterogeneity at the individual bank level, with rising interest rate risks for significant institutions operating in countries with fixed rates.

While significant institutions operating in countries with predominantly fixed interest rates appear to be adversely affected on aggregate under the scenario of rising interest rates (change in economic value amounts to -5.7% of own funds), banks in floating rate countries seem to benefit on aggregate from rate increases

<sup>33</sup> On the one hand, rising interest rates and a steeper yield curve should increase the scope for maturity transformation and should hence positively affect banks' interest margins. On the other hand, for banks operating under a fixed rate regime, the interest rate normalisation will only affect new lending while the outstanding amount of loans is still based on low rates, hence putting downward pressure on margins.

<sup>34</sup> For a comprehensive analysis of the allocation of interest rate risk in euro area economies, see Hoffmann, P., Langfield, S., Pierobon, F. and Vuillemeys, G., "Who bears interest rate risk?", *Working Paper Series*, ECB, forthcoming (currently available at SSRN).

<sup>35</sup> See the [ECB Banking Supervision press release of 9 October 2017](#).

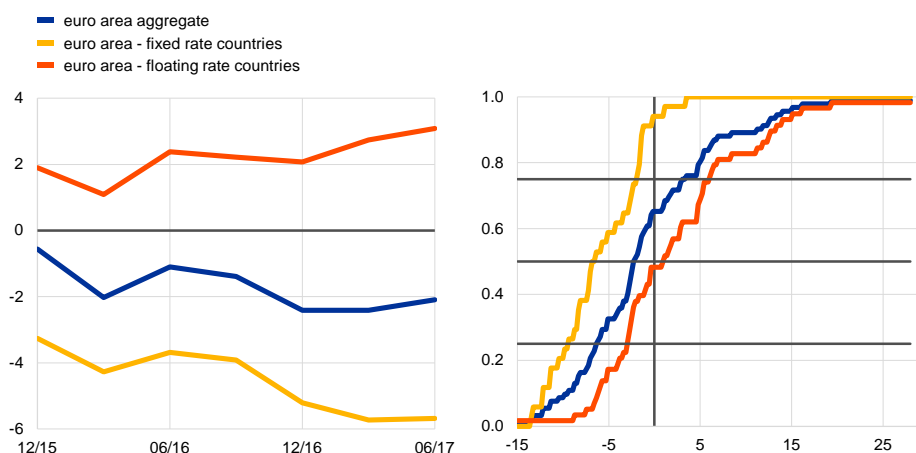
(economic value change equals +3.1% of own funds).<sup>36</sup> At the individual bank level, 20% of the significant institutions operating in fixed rate countries (representing €7.8 trillion in total assets) report a present value loss of more than 10% of own funds. Nevertheless, despite the positive results for banks belonging to the floating rate country group, interest rate risk in these countries will shift to borrowers, who are less well placed to mitigate this risk, e.g. through hedging. As a result, also for these countries bank profitability may be affected by second-round effects via asset quality and credit costs. In addition, the divergence of the impact on banks in the different interest rate regimes has increased over time which is a reflection of the gradual repricing of the loan book in fixed rate countries at increasingly lower rates. The aggregate results for fixed rate countries appear to be driven in particular by those countries in which borrowers have stronger incentives for mortgage renegotiations as early repayments are relatively less costly (e.g. Belgium and France). As interest rate risks are considered to be considerably lower for larger banks, the results for significant institutions can be seen as a lower bound of the actual interest rate risk of the entire euro area banking sector.<sup>37</sup>

### Chart 3.21

Interest rate risk of significant institutions appears limited on aggregate, but is increasing for banks in countries with fixed rate loans

**Change of the economic value of the banking book under a parallel interest rate shift of 200 basis points**

(left panel: Q4 2015 – Q2 2017, percentages; right panel: Q2 2017; x-axis: percentages; y-axis: percentiles)



Sources: ECB supervisory data and ECB calculations.

Notes: The chart shows the evolution over time of the impact of a rise in interest rates (left panel) and the empirical cumulative distribution of this impact for the most recent reporting period across individual banks (right panel). The impact of a rise in interest rates is measured by the change in economic value of the banking book as a share of regulatory own funds. The analysis is based on a sample of significant institutions which is split into fixed and floating rate countries based on the share of floating rate loans in total loans for house purchase. Fixed rate countries include Belgium, Germany, France, the Netherlands and Slovakia, while in all other countries floating rates are considered to prevail. The black horizontal lines in the right panel represent the 25th, 50th and 75th percentiles of the distribution across individual banks.

<sup>36</sup> The change in forecasted net interest income is an alternative metric to assess the impact of rising interest rates over a period of 12 months. According to this measure, banks in variable rate countries will benefit most from a rise in interest rates, while interest margins are likely to remain compressed for banks operating in fixed rate countries.

<sup>37</sup> Less significant institutions in Germany, in particular savings banks and credit cooperatives, exhibit substantially higher interest rate risk compared with large banks; see *Financial Stability Review*, Deutsche Bundesbank, November 2016.

## Banks' exposures to market risk have declined since mid-2016

**Banks' exposures to market risk have declined somewhat since the second quarter of 2016.** After a temporary increase in the second quarter of 2016, the aggregate adjusted value at risk (VaR) of banks reporting under the internal model approach has declined, and in the second quarter of 2017 it was 20% below its level a year earlier. The aggregate size of these banks' trading books dropped only slightly over the same period, suggesting that some of the decline in banks' VaR can be attributed to falling realised volatility (see Section 2).

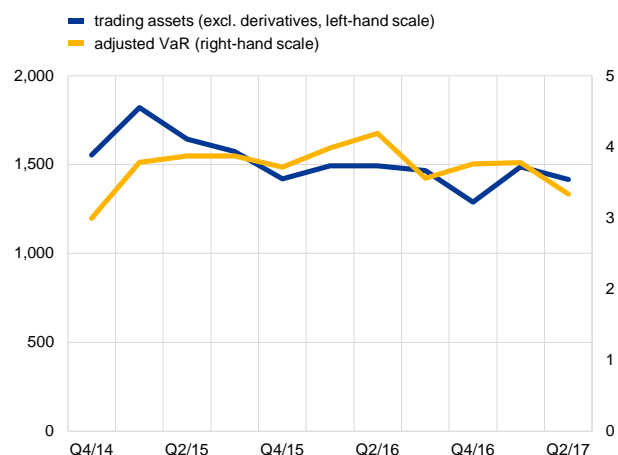
**Banks also continued to reduce their portfolio of hard-to-value (Level 3) assets, but some banks still have significant exposures.** Overall, the trend of declining Level 3 assets continued in the first half of 2017, with these assets dropping to 14% of CET1 capital from 20% a year earlier. By asset type, this was mainly driven by a decrease in Level 3 derivatives, with declines observed also across other assets (equity, debt securities and loans). Dispersion across institutions remains wide, however, with a few banks still having exposures above 50% of CET1 capital.

**Chart 3.22**

Banks' exposures to market risk have declined somewhat since the second quarter of 2016, but the reduction in VaR partly reflects lower (realised) volatility

Aggregate trading book and adjusted VaR of banks reporting under the internal model approach

(Q4 2014 – Q2 2017, €billions)



Source: ECB supervisory data.

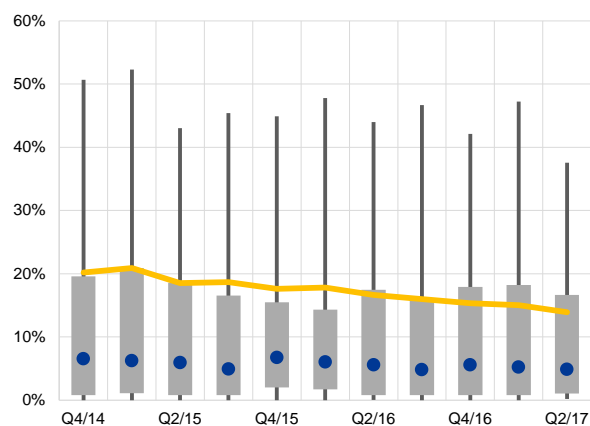
Notes: Based on a sample of 27 significant institutions reporting under the internal model approach. In the second quarter of 2017, these banks accounted for around two-thirds of significant institutions' total market risk exposures on an RWA basis. Adjusted VaR refers to the average VaR of the previous 60 working days multiplied by a factor of between 3 and 4.

**Chart 3.23**

Banks further reduced their Level 3 assets, but some institutions maintain significant exposures

Euro area banks' Level 3 assets as a percentage of CET1 capital

(Q4 2014 – Q2 2017, percentages, weighted average (yellow line), median, interquartile range and 10th-90th percentile range)



Source: ECB supervisory data.

## Bank solvency positions improved further, mainly due to increases in capital

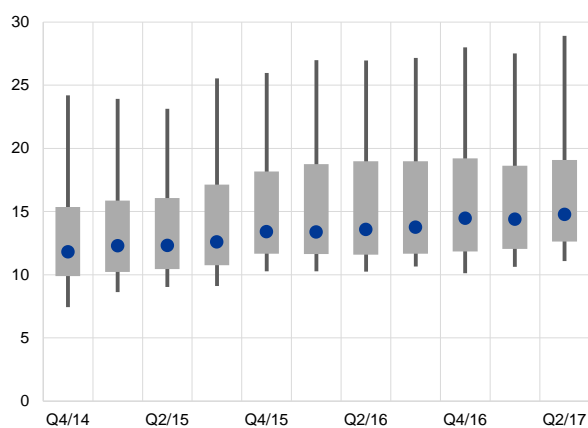
**The strengthening of euro area banks' solvency positions continued in the first half of 2017.** Euro area significant institutions' CET1 ratios edged up further, with the median fully loaded CET1 ratios reaching 14.8% in the second quarter of the year, representing a 3 percentage point improvement since end-2014 (see [Chart 3.24](#)). A decomposition of changes in banks' aggregate fully loaded CET1 ratio shows that the improvement of bank solvency positions in the first half of 2017 was mainly driven by increases in CET1 capital, although risk-weighted asset (RWA) declines also contributed to some extent (see [Chart 3.25](#)). The aggregate increase in CET1 capital was driven by retained earnings, the contribution of which more than doubled compared with the first half of 2016.

**Chart 3.24**

Solvency ratios continued to increase in the first half of 2017

**Distribution of euro area significant institutions' fully loaded CET1 ratios**

(Q4 2014 – Q2 2017, percentages, median, interquartile range and 10th-90th percentile range)



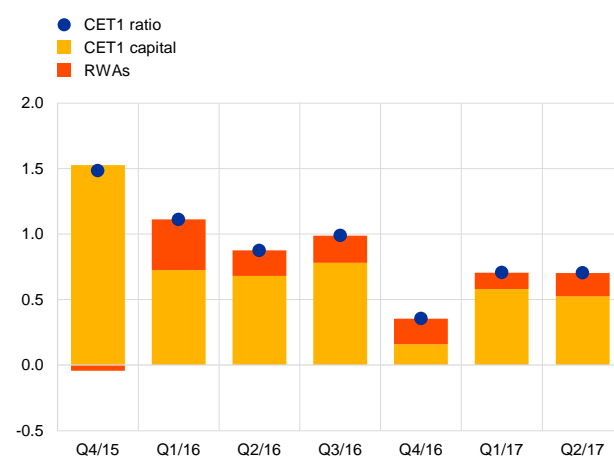
Source: ECB supervisory data.

**Chart 3.25**

The improvement in banks' aggregate fully loaded CET1 ratio in the second half of 2016 was mainly driven by increases in capital

**Contribution of changes in CET1 capital and risk-weighted assets to year-on-year changes in the euro area significant institutions' aggregate fully loaded CET1 ratio**

(Q4 2015 – Q2 2017, percentage points)



Sources: ECB supervisory data and ECB calculations.

Note: Changes in risk-weighted assets are shown with the opposite sign as their decline (increase) indicates a positive (negative) contribution to the capital ratios.

## The gradual improvement in euro area banks' leverage ratios also continued in the first half of 2017, though dispersion across banks remains significant.

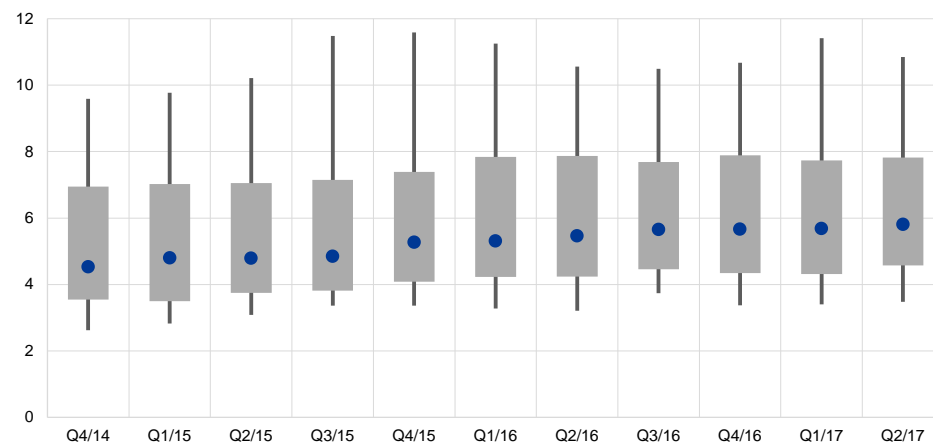
The median fully loaded leverage ratio for significant institutions rose to 5.8% in the second quarter, a 30 basis point increase from a year earlier (see [Chart 3.26](#)). Banks in the lowest leverage ratio quartile also made progress, but could not narrow the gap relative to their peers. Differences between the largest and other banks persisted, with euro area global systemically important banks (G-SIBs) remaining significantly more leveraged than other significant banks. The median leverage ratio for euro area G-SIBs stood at 4.5% at end-June 2017.

### Chart 3.26

#### Leverage ratios edged up further, but dispersion remains wide

##### Distribution of euro area significant institutions' fully loaded Basel III leverage ratios

(Q4 2014 – Q2 2017, percentages, median, interquartile range and 10th-90th percentile range)



Source: ECB supervisory data.

**Looking ahead, the finalisation of Basel III reforms may still have an impact on banks' capital requirements.** A final agreement on the Basel reform package has still to be reached. A key element of the package which is still under discussion is the calibration of the output floor. The completion of the Basel III review will reduce regulatory uncertainty.

#### Bank funding conditions remain favourable, while banks are increasingly focusing on the issuance of bail-inable debt

##### Market conditions for bank debt instruments have remained favourable.

Spreads on senior unsecured debt and covered bonds have remained at tight levels since mid-2017 (see [Chart 3.27](#)). Amid strong investor demand, spreads on subordinated debt and additional Tier 1 instruments have tightened further in recent months and, overall, recent bank resolution and liquidation events had a very limited impact on these markets (see [Chart 3.28](#)), although the instruments issued by some specific banks perceived by markets to be vulnerable did register a fall in price, which was only partly reversed afterwards.

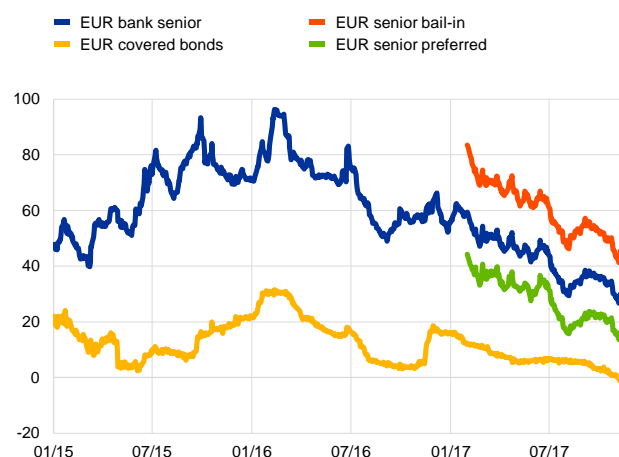


**Chart 3.27**

Market conditions for bank senior debt and covered bonds have remained favourable

**Spreads on euro-denominated senior debt and covered bonds**

(Jan. 2015 – Nov. 2017, asset swap spreads in basis points)



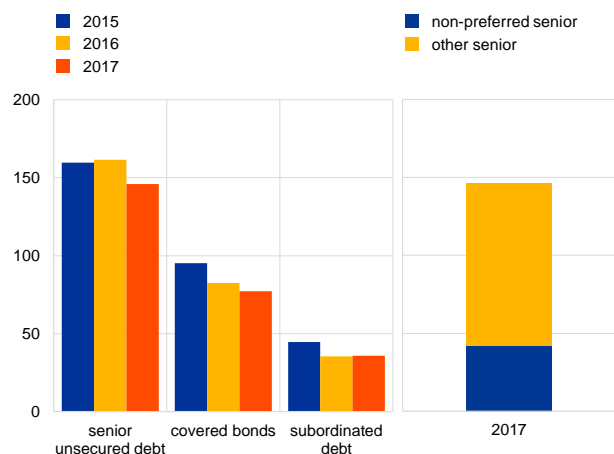
Sources: ECB and Markit.  
Note: Based on the respective iBoxx indices.

**Chart 3.29**

Bank debt issuance dropped in the first nine months of 2017, driven by lower senior unsecured and covered bond supply

**Year-to-date issuance of senior unsecured debt, covered bonds and subordinated debt by euro area banks**

(2015-17, year-to-date issuance in the period Jan.-Nov., € billions)



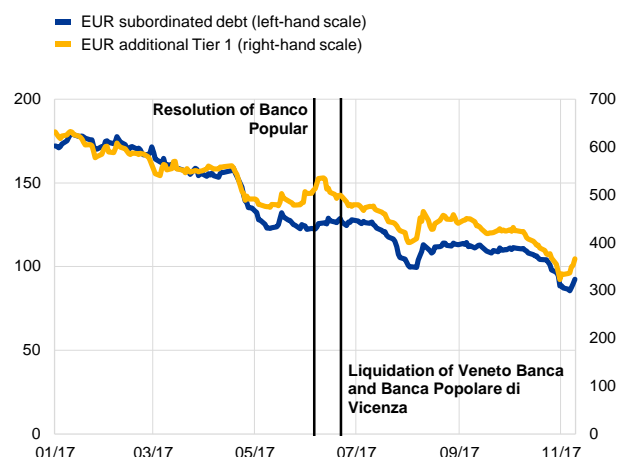
Sources: Dealogic and ECB calculations.  
Notes: Year-to-date data as at 14 November. In the right-hand panel, other senior debt includes some parts of bail-inable senior debt (e.g. German senior debt subject to statutory subordination, holding company senior debt) and preferred senior debt.

**Chart 3.28**

Spreads on additional Tier 1 instruments have tightened in recent months, following the episodes of high volatility in 2016

**Spreads on euro-denominated subordinated debt and additional Tier 1 instruments**

(Jan. 2017 – Nov. 2017, asset swap spreads in basis points)



Sources: ECB and Markit.  
Note: Based on the respective iBoxx indices.

**In primary markets, banks are increasingly focusing on the issuance of loss-absorbing instruments (see Chart 3.29).** In particular, in the senior segment, the issuance of non-preferred senior debt accounted for nearly 30% of year-to-date senior debt issuance by euro area banks.

In addition to France, legislation facilitating the creation of a new asset class of non-preferred senior debt instruments has now also been passed in Spain and Belgium, which has helped to broaden the issuer base in this market.

**Looking ahead, the process of building up loss-absorbing capacity in order to attain the required amounts of MREL (minimum requirement for own funds and eligible liabilities) and TLAC (total loss-absorbing capacity) is set to continue.** Estimates by ECB staff suggest that euro area banks can have potentially large MREL shortfalls (MREL requirements less already issued eligible debt), while estimates vary significantly depending on the assumptions on thresholds and the eligibility of liabilities. An ECB study finds that, while market capacity to absorb the

issuance of MREL-eligible debt is sufficient on aggregate, banks in some countries

could face challenges in placing MREL-eligible debt due to home bias and significant bank cross-holdings in bank debt markets.<sup>38</sup> Furthermore, legislation allowing the creation of non-preferred senior debt as a new asset class is yet to be finalised in a number of countries.

#### Box 4

Market perceptions of bank risk in connection with cuts in the deposit facility rate to below zero

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**To stimulate post-crisis economies characterised by low growth and low inflation, some central banks, including the ECB, have adopted negative policy rates.** The rationale for negative rates is that they provide additional monetary stimulus, giving banks an incentive to lend to the real sector and thereby supporting growth and a return to target inflation.<sup>39</sup>

**Negative rates, by stimulating the economy, improve the operating environment for financial institutions via an increase in loan demand and improved asset quality and boost the valuation of assets in trading portfolios.** On the other hand, an environment of low nominal yields can spur a “search for yield” among institutional investors that could lead to a disproportionate demand for high-yielding risky assets. For banks in particular, negative rates may exert pressure on profitability, as net interest margins may be compressed owing to the effective zero lower bound on retail deposit interest rates.<sup>40</sup> Furthermore, negative policy rates impose a direct cost on banks’ holdings of central bank reserves. To the extent that these effects suppress bank profitability, they weaken banks’ resilience. In addition, banks may attempt to offset any reduction in their profitability by extending loans to riskier borrowers (“risk-shifting”), thereby raising their overall risk profile.<sup>41</sup>

**This box studies the impact of increasingly negative ECB policy rates on banks’ propensity to become undercapitalised in a potential future crisis, as measured by “SRISK”.** SRISK is defined as the estimated capital shortfall of a bank resulting from a 40% drop in a world equity index over a six-month horizon.<sup>42</sup> The risk measure is modelled as a function of the market valuation of a bank’s equity, its leverage ratio, the volatility of its stock price and the correlation of its stock price with the world index. To ensure a representative sample, and to include non-listed banks in the analysis, a matching procedure is applied to infer SRISK for non-listed banks.<sup>43</sup> **Chart A** reports SRISK developments between 2011 and 2015 for different bank business model groups: (A) large universal banks; (B) corporate/wholesale-focused lenders; (C) fee-focused banks/asset managers; (D) small diversified lenders; (E) domestic retail lenders; and (F) mutual/cooperative-type banks.

<sup>38</sup> See the article entitled “MREL: financial stability implications”, *Macprudential Bulletin*, Issue 4, ECB, December 2017 (forthcoming).

<sup>39</sup> See Cœuré, B., “Life below zero: Learning about negative interest rates”, presentation at the annual dinner of the ECB’s Money Market Contact Group, Frankfurt, 9 September 2014.

<sup>40</sup> See the box entitled “The ECB’s monetary policy and bank profitability”, *Financial Stability Review*, ECB, November 2016.

<sup>41</sup> See, for example, Heider, F., Saidi, F. and Schepens, G., “Life Below Zero: Bank Lending Under Negative Policy Rates”, mimeo, 2017.

<sup>42</sup> See Brownlees, C.T. and Engle, R., “SRISK: A Conditional Capital Shortfall Measure of Systemic Risk”, *Review of Financial Studies*, Vol. 30(1), January 2017, pp. 48-79.

<sup>43</sup> For details, see Nucera, F., Lucas, A., Schaumburg, J. and Schwaab, B., “Do negative interest rates make banks less safe?”, *Working Paper Series*, No 2098, ECB, September 2017.

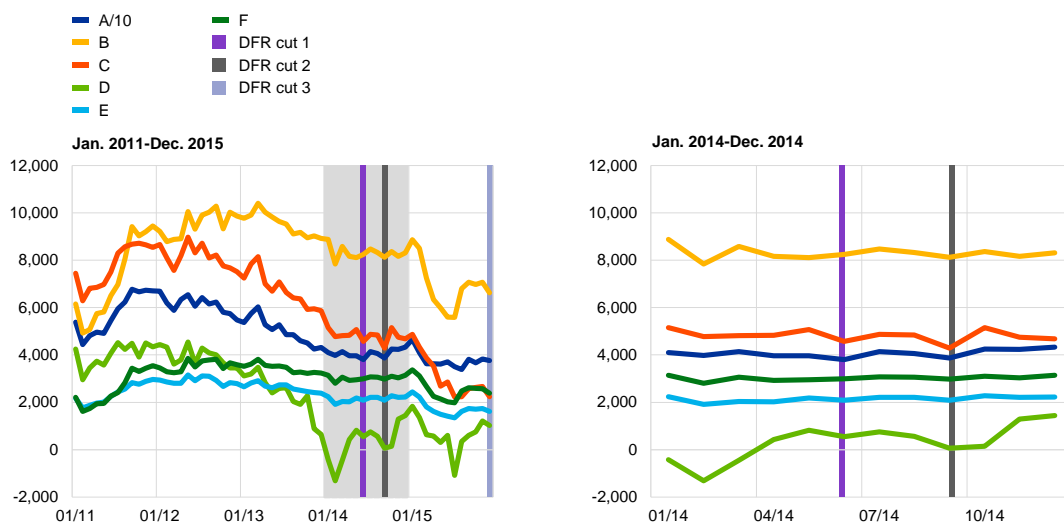
This classification is based on balance sheet items for a large number of banks over time.<sup>44</sup> In addition, three cuts in the ECB's deposit facility rate (DFR) to increasingly negative values are marked on the chart: on 5 June 2014, 4 September 2014 and 3 December 2015. A fourth cut in March 2016 is excluded from the analysis as it coincided with a key announcement concerning ECB asset purchases. The DFR was reduced by ten basis points each time.

## Chart A

Only minor SRISK responses to cuts in the ECB's deposit facility rate to negative rates

### Average SRISK for euro area banks at business model group level

(Jan. 2011 – Dec. 2015, USD thousands)



Sources: NYU Stern and ECB calculations.<sup>45</sup>

Notes: The chart shows average SRISK for different bank business model groups: (A) large universal banks; (B) corporate/wholesale-focused lenders; (C) fee-focused banks/asset managers; (D) small diversified lenders; (E) domestic retail lenders; and (F) mutual/cooperative-type banks. The average SRISK for group A is scaled by a factor of 1/10. SRISK estimates are available for 44 listed euro area banks at a monthly frequency. To ensure a representative sample, and to include more banks in the analysis, a matching procedure was applied to infer SRISK for non-listed banks. Specifically, 67 non-listed banks are matched to "nearest neighbouring" banks for which market data are available. The matching is based on accounting data which are available for all 111 banks. The business model classification and matching procedure follows Nucera et al. (2017). The vertical lines indicate the cuts in the DFR on 5 June 2014, 4 September 2014 and 3 December 2015.

**Three main observations are of interest. First, SRISK averages in the euro area fell markedly between mid-2012 and mid-2014 (see Chart A).** This development may have been sparked initially by the ECB's announcement of Outright Monetary Transactions in August 2012 and subsequently driven by the gradual recovery in economic growth and improving bank capital buffers. Compared with the pronounced variation in the level of SRISK for all banks until mid-2014, the impact of the subsequent three cuts in the DFR to negative rates on risk perceptions appears to have been relatively small.

**Second, some banks are perceived by markets as more risky following the cuts in the DFR to negative values.**<sup>46</sup> The risk impact depends on banks' business models. For example, universal banks with diversified income streams are generally perceived to be less (systemically) risky. For such banks, the benefits from negative rates cited above appear to dominate. By contrast, banks

<sup>44</sup> For further details on the business model classification methodology, see Lucas, A., Schaumburg, J. and Schwaab, B., "Bank business models at zero interest rates", *Working Paper Series*, No 2084, ECB, June 2017.

<sup>45</sup> SRISK data from NYU Stern.

<sup>46</sup> For detailed results, see Nucera et al., op. cit. Risk reductions are studied in a difference-in-differences framework relative to banks in group C ("fee-focused banks/asset managers").

that rely predominantly on deposit funding may be perceived by markets as more risky. For such banks, negative policy rates may contribute to lower net interest margins, as customer deposits are typically remunerated at rates above zero.

**Third, the three cuts in the DFR to negative rates can be compared with an earlier cut in July 2012 by 25 basis points to zero.** The cut in the DFR to zero in 2012 triggered different SRISK responses than the three cuts below zero in 2014 and 2015. For example, universal banks did not appear to benefit from the cut in July 2012. This tentatively suggests that cuts to negative rates may have different financial stability implications than more conventional cuts to non-negative rates.

**Overall, therefore, the analysis presented in this box points to a moderate impact of negative rates on market perceptions of bank riskiness.** An adverse effect is identified mainly for a subset of banks with a strong reliance on deposit funding.

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### 3.1.2 Euro area insurance sector: robust so far but profitability prospects are constrained by the low-yield environment

**Despite the headwinds from the low-yield environment, the profitability of large euro area insurers picked up slightly and their solvency positions remained robust in the first half of 2017.** Insurers achieved solid financial results in the first half of 2017, which were reflected in a continued appreciation of their equity prices over the review period. At the same time, insurers' investment income remains weak from a historical perspective. To boost yields from investment, insurers have been gradually shifting their portfolios towards higher-yielding but riskier assets. The fastest-growing asset class was investment fund shares, which grew mainly on account of life insurers' investment in equity and mixed funds.

**While not an immediate financial stability concern, insurers should continue adapting their business models to the low-yield environment.** This is particularly relevant for the traditional life insurers with large duration mismatches between assets and liabilities and high guaranteed nominal returns to policyholders. The shift towards more risky assets may improve insurers' profitability prospects, but it also makes insurers' portfolios more vulnerable to the risk of an abrupt and sizeable repricing of risk premia. Given the large share of debt securities in insurers' portfolios, such a repricing might be particularly detrimental, if coupled with public and private sector debt sustainability concerns.

**Turning to reinsurers, their 2017 earnings are expected to suffer significantly, owing to a number of devastating Atlantic hurricanes and earthquakes.** The estimated costs from these catastrophes are so high that 2017 could become one of the most costly years on record in terms of insured natural catastrophe losses. As a result, reinsurers' profits in 2017 are likely to be reduced. However, since reinsurance pricing often picks up after large catastrophe costs (see **Chart 3.35**), reinsurers' profitability may rebound soon.

## The market outlook for the insurance sector remains favourable

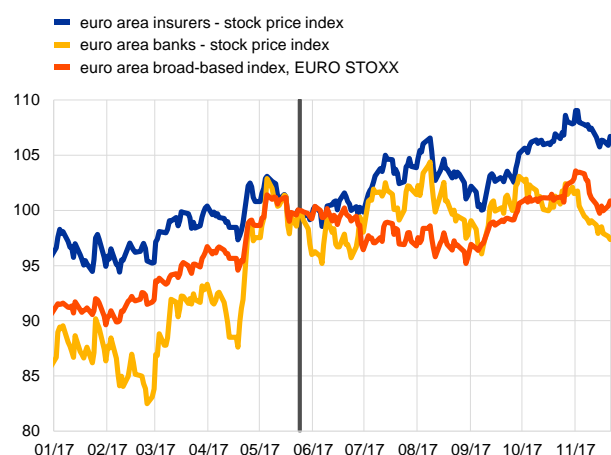
**Since May 2017 euro area insurers' equity has appreciated and outperformed the general index** (see [Chart 3.30](#)). The increase in insurers' equity prices has been supported by favourable global financial sentiment and solid financial results of euro area insurers in the first half of 2017. Life and non-life insurers' stocks rose by around 5% and 6% respectively over the review period and outperformed insurers' stocks in other jurisdictions (see [Chart 3.31](#)). Euro area reinsurers' stocks increased by around 4%, which was a larger increase than that in the stock prices of their US peers. The overall increase in reinsurers' stock prices over the review period was dampened by the stock price declines during August and early September 2017, which were – to some extent – driven by the elevated uncertainty about the impact of natural catastrophes on reinsurers in these two months. Since then, however, the stock prices have risen given the prospect of reinsurance rate rises.<sup>47</sup>

**Chart 3.30**

Stock prices of euro area insurers appreciated...

### Stock price indices

(1 Jan. 2017 – 21 Nov. 2017, daily observations, stock prices indexed to 100 on 24 May 2017)



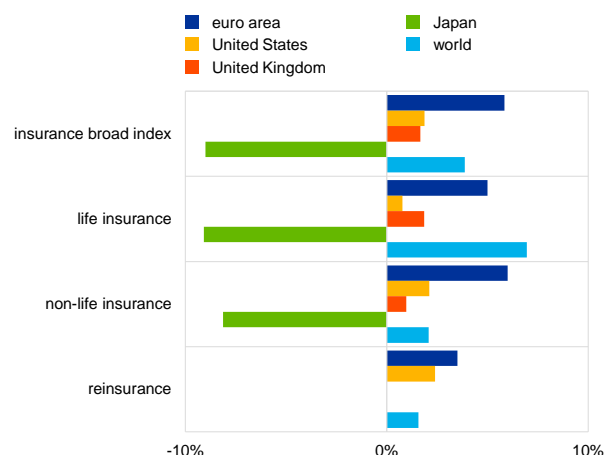
Sources: Thomson Reuters Datastream and ECB calculations.  
Note: The vertical line indicates the publication date of the May 2017 FSR (24 May).

**Chart 3.31**

...and outperformed insurers' stock prices in other jurisdictions

### Percentage change in stock prices since 1 May 2017

(percentage change between 1 May 2017 and 21 Nov. 2017)



Sources: Thomson Reuters Datastream and ECB calculations.

## The financial position of large euro area insurers slightly improved

**In the first half of 2017 the profitability of large euro area insurers slightly increased.**<sup>48</sup> The median return on equity climbed above 9% in the second quarter of 2017, which is a slight improvement compared with 2015 and 2016 (see [Chart](#)

<sup>47</sup> For more details, see the next part on the financial position of large euro area insurers.

<sup>48</sup> The analysis in this part is based on a varying sample of 27 listed insurers and reinsurers with total combined assets of about €4.9 trillion in 2016, which represent around 62% of the assets in the euro area insurance sector. Quarterly and half-yearly data were only available for a sub-sample of these insurers. While representative for large euro area insurers, the sample differs significantly from the EU-wide EIOPA sample used in Section 3.2.1 of the ECB's October 2017 *Report on financial structures*.

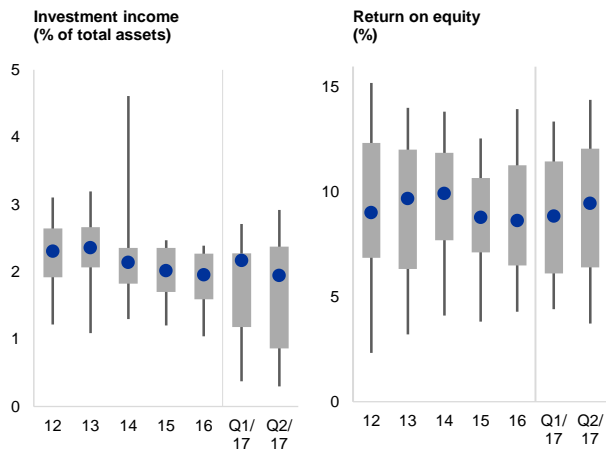
**3.32).**<sup>49</sup> This outcome was supported by improving underwriting performance, especially in the non-life business (see **Chart 3.33**), as underwriting business continued to benefit from the better euro area economic growth prospects. At the same time, investment income remained at generally low levels from a historical perspective. In the first half of 2017 median investment income hovered at around 2%, while around a quarter of the large euro area insurers earned less than 1% on their investments. Since insurers' portfolios are dominated by fixed income assets, the weak investment income results reflect insurers' difficulties in generating solid returns on their portfolios in the prolonged low-yield environment.

**Chart 3.32**

Investment income remained at low levels, while return on equity slightly increased

Investment income and return on equity for a sample of large euro area insurers

(2012 – Q2 2017, percentages, median, interquartile range and 10th-90th percentile range)



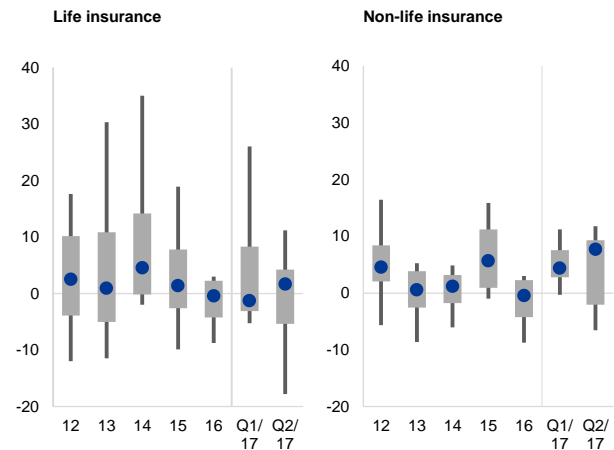
Sources: Bloomberg, individual institutions' financial reports and ECB calculations. Notes: Investment income excludes unrealised gains and losses. Quarterly data are annualised.

**Chart 3.33**

Underwriting business of some insurers picked up, supported by better economic growth prospects

Growth of gross premiums written for a sample of large euro area insurers

(2012 – Q2 2017, percentages, median, interquartile range and 10th-90th percentile range)



Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

**In an environment of historically low yields, feeble investment income remains a particular challenge for euro area life insurers.**

This is because traditional saving policies with guaranteed rates (non-unit-linked policies) continue to dominate life insurers' liabilities<sup>50</sup> and many of these long-term products were sold in the past, when interest rates were higher. As a result, it has become difficult for many life insurers to generate a margin above the average guaranteed rate on existing business. The outlook remains particularly challenging for insurers with high policyholder guaranteed returns operating in countries with limited scope to lower

<sup>49</sup> The quarterly figures should be interpreted with caution because of possible seasonal factors and sample coverage.

<sup>50</sup> Despite a recent shift towards unit-linked policies where the policyholders (rather than the insurer itself) bear the investment risk, around 80% of life insurance technical reserves are non-unit-linked policies. For more details, see Section 3 of the ECB's October 2017 *Report on financial structures*.

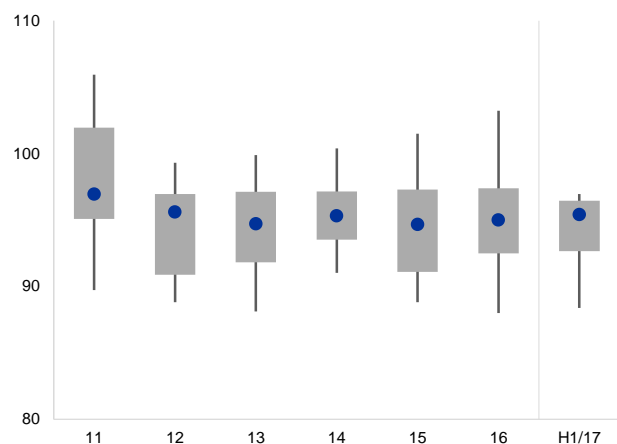
these returns, especially if they are non-diversified, small or medium-sized life insurers.<sup>51</sup>

### Chart 3.34

Premium growth and benign incurred losses in Europe preserved a positive balance in the non-life business

#### Combined ratio for a sample of large euro area insurers

(2011 – H1 2017, percentages, median, interquartile range and 10th-90th percentile range)



Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

Notes: The combined ratio expresses the sum of incurred insurance losses and expenses as a share of net premiums earned. A ratio of below 100% indicates an underwriting profit.

#### On the non-life side, solid underwriting revenues and benign insured losses in the first half of 2017 kept overall underwriting activity profitable (see Chart 3.34).

Combined ratios, which show incurred losses and expenses as a proportion of premiums earned, remained below 100% in the first half of 2017 for all large insurers in the sample. The continued focus of insurers on cost optimisation, inter alia through investment in innovation and technology, also contributed to the positive balance between underwriting revenues and costs in this period. Cost optimisation is particularly relevant for insurers that operate in highly competitive market segments with subdued prices such as motor insurance.<sup>52</sup> Even under the fierce competition, non-life insurers should however preserve an adequate pricing of risks. In this respect, insurers are also facing challenges in insuring and pricing new types of risks such as cyber risks, for which historical data are scarce.

#### Despite the limited losses in the first half of 2017, reinsurers could face one of the most costly years

**on record in terms of natural catastrophe losses.** While the catastrophe-related costs for the full year of 2017 are not yet known, they are expected to be close to or even above the historical records, owing to a number of devastating Atlantic hurricanes (Hurricanes Harvey, Irma and Maria) and two earthquakes in Mexico. According to J.P. Morgan estimates, insured natural catastrophe losses in 2017 may sum up to around USD 140 billion<sup>53</sup> and thus exceed the extraordinary losses of around USD 135 billion recorded in 2005 and 2011, when the impact of Hurricane Katarina and the Tohoku earthquake boosted the statistics (see Chart 3.35).

<sup>51</sup> See also Special Feature B by Berdin, E., Kok, C., Mikkonen, K., Pancaro, C. and Vendrell Simon, J. M., entitled "Euro area insurers and the low interest rate environment", *Financial Stability Review*, ECB, November 2015, pp. 134-146.

<sup>52</sup> According to the new ECB balance sheet data for insurance corporations, the motor sector (i.e. motor vehicle liability and other motor) represents around 20% of euro area non-life technical provisions.

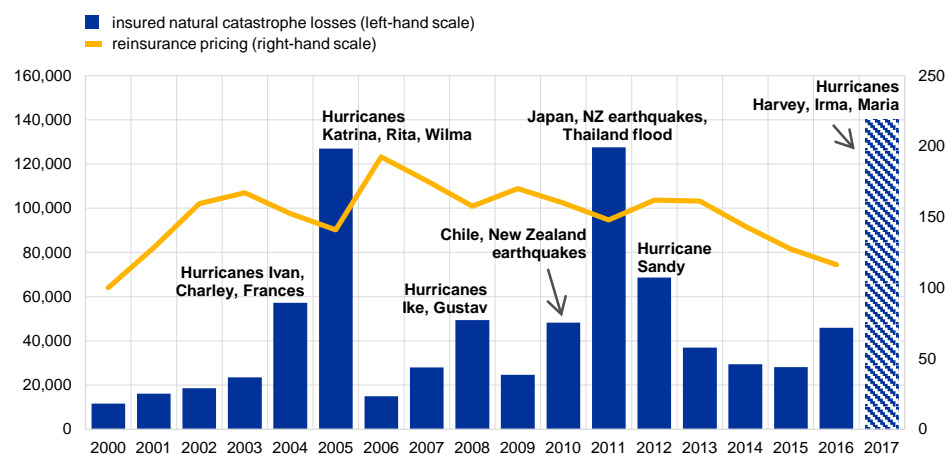
<sup>53</sup> This estimate is derived as the sum of insured natural catastrophe losses in the first half of 2017 (USD 23 billion), a typical allowance for losses in the fourth quarter of 2017 (USD 13 billion) and the following estimates for natural catastrophes in the third quarter of 2017: Hurricane Harvey (USD 25 billion), Hurricane Irma (USD 35 billion), Hurricane Maria (USD 40 billion) and the two earthquakes in Mexico (up to USD 6 billion). For more details, see "European Reinsurance", J.P. Morgan Cazenove, September 2017.

**Chart 3.35**

**Insured natural catastrophe losses in 2017 could break records**

**Insured natural catastrophe losses and reinsurance pricing**

(2000-17, insured natural catastrophe losses in USD millions, reinsurance prices indexed to 100 in 2000)



Sources: Bloomberg, Swiss Re and J.P. Morgan Cazenove.

Notes: The blue bars indicate the annual insured catastrophe losses calculated by Swiss Re. The dashed bar represents the expected insured catastrophe losses in 2017, as estimated by J.P. Morgan Cazenove on 27 September 2017.

**Capital buffers of large euro area reinsurers, however, appear to have a reasonable shock-absorption capacity to cope with such large catastrophe losses.** More specifically, the Solvency Capital Requirement (SCR) ratios of the three large euro area reinsurers were well above 200% in the first half of 2017, meaning that the three reinsurers held more than twice the capital levels that are required under Solvency II (see [Chart 3.36](#)). Moreover, although market analysts expect a large negative impact of the catastrophes on reinsurers' earnings in the second half of 2017, they do not expect earnings to turn significantly negative. Therefore, the analysts also do not foresee large drops in SCR ratios.

**Looking beyond 2017, the January 2018 renewal rounds could see an upswing in reinsurance pricing after several years of declines (see [Chart 3.35](#)).** This is because demand for reinsurance typically picks up after large catastrophe events and reinsurance rates can also rise due to automatic triggers.<sup>54</sup> At the same time, traditional reinsurance rates will also depend on price developments in markets for alternative reinsurance capital such as catastrophe bonds. While the outstanding amount of all alternative capital remains limited, representing around 15% of the global reinsurance market, it has been growing at a fast pace in recent years.<sup>55</sup> It

<sup>54</sup> In some reinsurance contracts, a (catastrophe) loss that exceeds an initial reinsurance limit can trigger a reinstatement premium, which is an additional premium to be paid by the primary insurer in order to reinstate the limit and ensure coverage for future events.

<sup>55</sup> According to Aon Securities, the amount of all alternative reinsurance capital grew to USD 88.8 billion in mid-2017, an increase of 10% from year-end 2016. Of this, catastrophe bonds accounted for USD 25.8 billion (see "[Insurance-Linked Securities, Alternative Capital Breaks New Boundaries](#)", Aon Benfield, September 2017). Catastrophe bonds are bonds that transfer specific catastrophe risk (e.g. an earthquake in Japan) from a sponsor (reinsurer, primary insurer, government funds, etc.) to institutional investors. If a catastrophe (of a specific type) occurs, the principal of a catastrophe bond is lost. Other types of alternative capital include private deals between an investor and a primary carrier (such as collateralised reinsurance) or "sidecars" (through which capital markets co-invest their capital alongside reinsurance capital).



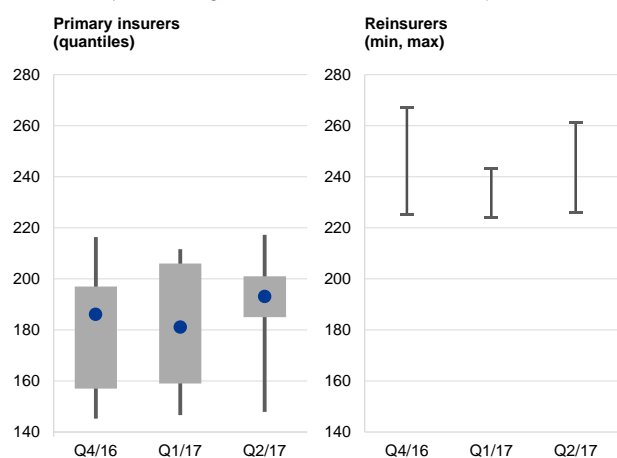
remains to be seen, however, to what extent these instruments remain attractive to investors, given that some of them were hit by losses after the recent catastrophes. In addition, as climate change appears to alter catastrophe patterns,<sup>56</sup> catastrophe risk modelling is becoming an increasingly complex task, which may limit the number of investors in the market in the long term.

**Chart 3.36**

Solvency positions of both primary insurers and reinsurers are well above the regulatory requirement

**SCR ratio**

(Q4 2016 – Q2 2017, percentage of SCR; primary insurers: median, interquartile range and 10th-90th percentile range; reinsurers: minimum and maximum)



Sources: Bloomberg, individual company reports and ECB calculations.  
Notes: The SCR ratio is also often referred to as the "Solvency II ratio" and values above 100% indicate that capital levels exceed the regulatory requirement, representing a "healthy" insurer.

**The solvency positions of primary insurers also remain well above the Solvency II requirement.** SCR ratios of most large primary insurers ranged between 140% and 220% in the first half of 2017 (see **Chart 3.36**), but the comparability of the reported SCR ratios across individual insurers is hampered by several factors. Although Solvency II introduced a harmonised regulatory regime in the EU, it includes a number of long-term guarantee (LTG) measures, which mitigate artificial volatility in insurers' balance sheets, on the one hand, but which also make the reported SCR ratios more difficult to compare, on the other.<sup>57</sup> To measure capital levels on a more consistent basis across firms and countries, market analysts estimate adjusted SCR ratios that exclude the effect of LTG measures. For selected large euro area insurers (including reinsurers), these ratios are, on average, about 35 to 55 percentage points lower than the headline SCR ratios.<sup>58</sup> As in the case of banks, another factor that limits the comparability of the ratios is the option to use (full or partial) internal models. Last but not least, the different levels of capital in excess of the regulatory requirement

reflect differences in business models. For instance, primary insurers typically target lower solvency levels than reinsurers because their incurred losses and expenses are generally less volatile.

**Insurers' portfolios continue to adjust to the low-yield environment**

**Insurers' portfolios are heavily invested in fixed income assets, which expose them to interest rate risk.** In mid-2017, holdings of debt securities accounted for around 43% of insurers' financial portfolios and thus represented by far the most important investment class (see **Chart 3.37**). The second most prominent class – with a share of around 25% – was investment fund shares, of which more than half

<sup>56</sup> For evidence of climate change effects on natural catastrophes, see e.g. Blöschl et al., "Changing climate shifts timing of European floods", *Science*, 2017, and Alfieri et al., "Global warming increases the frequency of river floods in Europe", *Hydrology and Earth System Sciences Discussions*, 2015.  
<sup>57</sup> The LTG measures that affect the calculation of the SCR ratio include the volatility and matching adjustments, extrapolation and transitional benefits. For more details, see "[Solvency II overview – Frequently asked questions](#)", European Commission, press release, 12 January 2015.  
<sup>58</sup> See "European Insurers: Solvency Matters – September 2017", Deutsche Bank AG, September 2017, and "European Insurance – Solvency II teach-in series", J.P. Morgan Cazenove, July 2017.

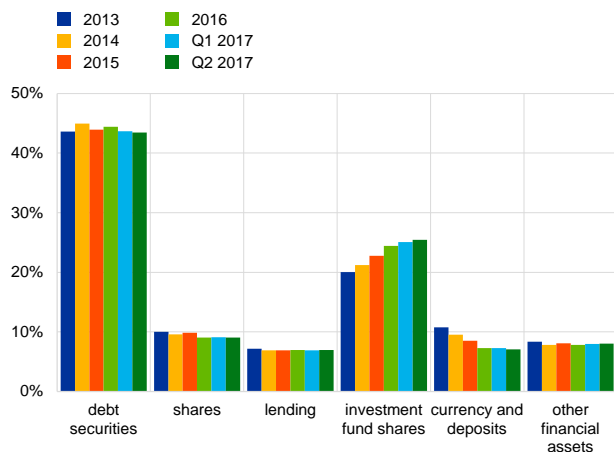
were mixed and bond fund shares, i.e. instruments that serve as an indirect channel for investment in fixed income assets (see [Chart 3.38](#)).

**Insurers' exposure to interest rate risk on the assets side, however, cannot be seen in isolation from their exposure on the liabilities side.** In fact, many insurers invest in long-term fixed income assets in order to offset their exposure to interest rate risk on the liabilities side. This notwithstanding, the duration of insurers' liabilities often exceeds that of their assets, so that the balance sheets of many euro area insurers display a negative duration gap. Due to this pattern, which is particularly pronounced for balance sheets of traditional life insurers, an increase in the long-term interest rate could be positive for insurers' financial position. This would be the case especially if such a rise were to occur gradually on the back of better economic prospects and were thus to be driven by an increase in the "risk-free" rate of interest. On the other hand, (further) declines in the risk-free rate would elevate the value of insurers' liabilities and thus exacerbate the current challenges faced by insurers (see also [Box 5](#) for more information about the underlying mechanism).

**Chart 3.37**  
The portion of investment fund shares in insurers' portfolios is growing...

**Assets held by euro area insurers broken down by type of asset class**

(Q4 2013 – Q2 2017, percentage of financial assets)

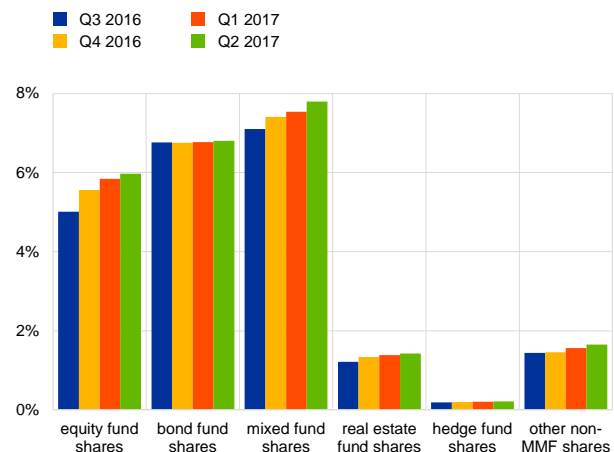


Sources: ECB (euro area accounts) and ECB calculations.

**Chart 3.38**  
...reflecting investment in equity and mixed fund shares

**Investment fund shares held by euro area insurers broken down by type of fund share**

(Q3 2016 – Q2 2017, percentage of financial assets)



Sources: ECB (insurance corporation balance sheet data) and ECB calculations.

**Insurers' increased exposure to investment fund shares may reflect efforts to boost yields in the current low-yield environment.** Over the last four to five years, the share of investment fund shares in insurers' portfolios has been steadily rising, growing from around 20% in 2013 to around 25% in mid-2017 (see [Chart 3.37](#)). The ECB's new statistics on insurers' balance sheets<sup>59</sup> reveal that inflows into equity and mixed fund shares underpinned most of this growth over the last year (see [Chart](#)

<sup>59</sup> For more details about the new statistics, see Box 1 in the ECB's October 2017 *Report on financial structures*.

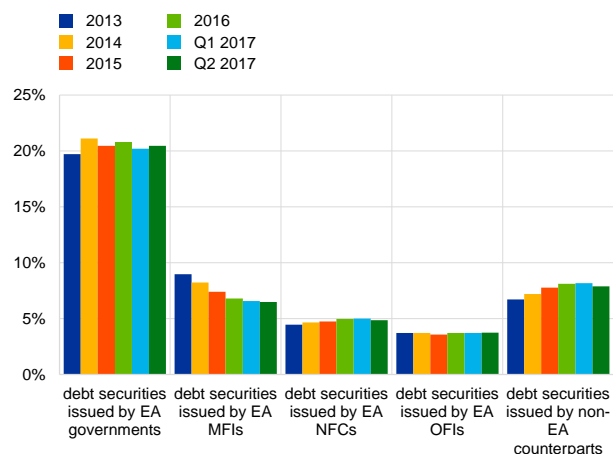
**3.38)** and that life insurers, which hold large amounts of investment fund shares in their portfolios (as compared with non-life insurers and reinsurers), were the main contributors to this trend.

**Chart 3.39**

Exposures to non-euro area sovereigns have increased

Debt securities held by euro area insurers broken down by type of issuer

(Q4 2013 – Q2 2017, percentage of financial assets)



Sources: ECB (euro area accounts) and ECB calculations.

Note: EA stands for euro area, MFIs for monetary financial institutions, NFCs for non-financial corporations and OFIs for other financial intermediaries.

**Insurers also use other asset classes to adjust their portfolios to the current low-yield and low-volatility environment.**

Since 2013 they have increased holdings of bonds issued by non-euro area counterparts (see **Chart 3.39**) and of bonds with longer maturities (see **Chart 2.14** in Section 2), thereby increasing their exposure to foreign exchange risk and possibly reducing the duration mismatch in their balance sheets. At the same time, the shift towards lower-rated bonds observed between 2013 and 2016 appears to have paused in early 2017 (see **Chart 13** in the Overview). While exposure to higher-yielding assets increased, the share of currency and deposits declined from around 11% in 2013 to around 8% in mid-2017 (see **Chart 3.37**). The decrease was mainly driven by deposits with maturities above one year, i.e. those deposits where alternative higher-yielding instruments such as debt securities are available.

**The elevated riskiness of insurers' portfolios should be closely monitored.**

This is because the value of such portfolios would fall sharply in the event of an abrupt and sizeable repricing of risk premia in global financial markets. At the same time, **Box 5** provides empirical evidence which suggests that euro area insurers would sell assets under such a scenario and that such a sell-off could be significantly amplified by public and private sector debt sustainability concerns. Given that insurers are very important investors in some asset classes, particularly in bonds with a long maturity/duration, the sales could trigger further reductions in asset prices, thus amplifying the original price shock and potentially weakening the balance sheets of other market players.

## Box 5

Investment strategies of euro area insurers and pension funds: procyclical or countercyclical?

**Traditionally, the investment behaviour of insurance corporations and pension funds (ICPFs) has been viewed as having a stabilising effect on financial markets in that they act countercyclically by buying assets, the prices of which fall.** Since ICPFs aim to match their long-term liabilities with their long-term assets, they are natural long-term investors and, as such, they typically hold assets until maturity and are less sensitive to short-term price movements. However, recent studies challenge this view by providing empirical evidence of procyclical

investment behaviour, whereby ICPFs sell assets after a drop in price, especially in periods of severe market stress.<sup>60</sup>

**This box sheds new light on the discussion by arguing that it is the underlying driver of a price change (rather than just the direction) that matters.** In particular, under a market-consistent regulatory regime, ICPF equity valuation can be expressed as the difference between the values of assets and liabilities, where liabilities are discounted only by a risk-free rate of return, while assets are discounted by the risk-free rate and risk premia.<sup>61</sup> When (bond) prices fall due to an increasing risk-free rate, the values of both assets and liabilities decline. However, the decline would typically be larger on the liabilities side as many ICPFs, particularly life insurers and pension funds, tend to have negative duration gaps. As a result, a rise in the risk-free rate would typically imply an increase in the value of ICPF equity. Conversely, a rise in risk premia would lower the value of assets and thus represents a negative shock to ICPF equity valuation.

**Through their different impacts on equity, changes in risk premia and the risk-free rate can also imply different ICPF investment behaviours in response to a price change.** In the event of a negative shock to equity, an ICPF could preserve its financial position by raising capital, reducing liabilities or selling assets. However, raising fresh capital in the market could be particularly difficult and expensive, especially in periods of financial stress. Significantly reducing liabilities is usually not a viable option either in the short term because most ICPF liabilities are of a long duration and new policies represent only a small fraction of all outstanding liabilities. Therefore, an ICPF may rather act on its asset level. In particular, an ICPF may sell bonds when their prices are falling due to an increase in risk premia (procyclical behaviour) and buy bonds when their prices are falling owing to a rise in the risk-free rate (countercyclical behaviour).<sup>62</sup>

**This box tests empirically whether this is the case.** Specifically, as a dependent variable, security-by-security ICPF holdings of government bonds in all 19 euro area countries from the ECB's Securities Holdings Statistics (SHS) are used. The sample spans from the first quarter of 2009 to the last quarter of 2016 and thus includes the euro area sovereign debt crisis. As a proxy for the risk-free rate, the risk-free interest rate term structures, published every month by the European Insurance and Occupational Pensions Authority (EIOPA), are used, since European insurers apply them to the calculation of their technical provisions, in accordance with Solvency II. After assigning to each bond in the sample the value of the risk-free yield curve corresponding to its maturity, the risk premia are computed by taking the difference between the bond's yield to maturity at time  $t$  and the risk-free rate with the same maturity at time  $t$ .

**In line with the theoretical considerations, the empirical results suggest a negative and significant effect of risk premia on euro area ICPF holdings of government bonds and a positive and significant effect of the risk-free rate on those holdings (see Table A). In**

<sup>60</sup> See, for example, Bijlsma, M. and Vermeulen, R., "Insurance companies' trading behaviour during the European sovereign debt crisis: flight home or flight to quality?", *Journal of Financial Stability*, Vol. 27, 2016, pp. 137-154, and the references therein.

<sup>61</sup> This is a very simplified approach, which aims to capture only the basic mechanism of equity valuation under a market-consistent regulatory regime such as Solvency II, while this mechanism would not be applicable to non-risk-sensitive regulatory regimes. Moreover, the regulatory regimes in place are usually more complex. For instance, Solvency II includes volatility and matching adjustments that are not considered here.

<sup>62</sup> ICPFs' investment behaviour is likely to be influenced by many other factors such as liability characteristics, regulation, accounting and general industry practices. See, for example, *Procyclicality and structural trends in investment allocation by insurance companies and pension funds*, Bank of England and Procyclicality Working Group, July 2014.

particular, when not distinguishing between the different drivers of an interest rate/price change, the estimates indicate a countercyclical behaviour, whereby ICPFs buy bonds, the yield to maturity of which rises, i.e. the price of which falls (column 1). However, when risk premia are separated from the risk-free rate, their estimated coefficients are opposite and have the expected sign (column 2). Moreover, these estimates are robust to the inclusion of a number of control variables such as very granular cross-sectional fixed effects (column 3), time fixed effects (column 4), security-specific credit quality and residual maturity, fiscal fundamentals of the issuer country and volumes of recent Eurosystem purchases of government bonds under the public sector purchase programme (PSPP) (column 5). Moreover, the results also hold over shorter time spans, such as when excluding the data collected until the third quarter of 2013, which are subject to some quality limitations (column 6), or when using sub-samples such as that of insurance corporations only (column 7).<sup>63</sup> While a wide range of robustness checks further reinforce the presented results,<sup>64</sup> one drawback of the analysis is that it is based on a rather short time span. For instance, the results in columns 6 and 7 are based on a time period when both the risk-free rate and risk premia tended to decrease.

**Table A**

Estimated effects of the risk-free rate and risk premia on government bond holdings of euro area ICPFs

(Q1 2009 – Q4 2016)

Dependent variable	Log of holdings						
	Full					From Q4 2013 onwards	
Period							
Investor type	ICPF					Insurers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Yield to maturity	0.0022***						
Risk premia		-0.011***	-0.013***	-0.011***	-0.013***	-0.018***	-0.014**
Risk-free rate		0.031***	0.030***	0.014***	0.025***	0.028***	0.018#
Security FE	Y	Y	N	N	N	N	N
Security-holder country FE	N	N	Y	Y	Y	Y	Y
Time FE	N	N	N	Y	Y	Y	Y
Observations	229,602	229,602	229,602	229,602	205,832	92,315	39,565
R-squared	0.947	0.947	0.960	0.960	0.964	0.968	0.953

Sources: ECB (SHS), Thomson Reuters Datastream, Bloomberg, OECD, EIOPA and ECB calculations.

Notes: The dependent variable is the log of the nominal amount of government bonds held by ICPFs in different euro area countries. All independent variables are lagged by one quarter to account for endogeneity (except for residual maturity). Columns 1 and 2 include the lagged value of the dependent variable and security-specific fixed effects (denoted as "Security FE"). In column 3, security-specific fixed effects are replaced by more granular fixed effects, at the security-holder country level (denoted as "Security-holder country FE"). In column 4, yearly fixed effects (denoted as "Time FE") are added. Columns 5 and 6 also include the following control variables: the log of VSTOXX (a proxy for market volatility); the log of residual maturity; a dummy, which equals one if the credit quality step of a security (defined in accordance with the Eurosystem credit assessment framework or ECAF) declines from one quarter to another (see Chart 13 in the Overview for more details on the credit quality steps used); the issuer country's debt-to-GDP ratio (as a proxy for fiscal fundamentals); and the log of the cumulative quarterly net purchases under the ECB's PSPP. \*\*\*, \*\* and # denote significance at the 1%, 5% and 15% significance levels, respectively (based on robust standard errors).

<sup>63</sup> To cover the period of severe market stress during the euro area sovereign debt crisis, the baseline regressions use the data from the Securities Holdings Experimental Statistics (SHES), which were collected on a voluntary and best-efforts basis and are thus subject to some limitations, in particular lower coverage of domestic holdings and the unavailability of the sector split between insurance corporations and pension funds in some countries.

<sup>64</sup> These include, inter alia, the use of alternative dependent variables (first difference in log holdings, a discrete buy-and-sell indicator), various proxies of the risk-free rate (OIS and German Bund yield curves) and a different type of asset (corporate bonds). The only exception found is the holdings of domestic government bonds, for which the coefficient of risk premia becomes insignificant. This exception is however not detected for domestic corporate bonds. Hence, it appears that ICPFs perceive domestic government bonds as "safe assets".

**The estimated effects are not only statistically but also economically important.** To illustrate this, Chart A describes three different macro-financial scenarios, while Chart B shows the size of the estimated effects. Using the baseline estimates in column 5, a rise in the risk-free rate by 100 basis points (bps) (Scenario 1), *ceteris paribus*, is estimated to increase euro area ICPF holdings by around 2.5% (i.e. by €48 billion). Such a scenario could, for instance, reflect a gradual rebound in long-term interest rates on the back of a broad-based economic recovery and a stable inflation outlook. On the other hand, an increase in risk premia by 100 basis points (Scenario 2), which could occur in the event of a repricing in global financial markets, is estimated to reduce ICPF holdings by around 1.3% (i.e. by €25 billion).<sup>65</sup> Moreover, if fiscal fundamentals and credit ratings were to deteriorate and, consequently, risk premia were to climb on the back of concerns about public debt sustainability, the estimated bond sell-off would be much larger (around €139 billion). The significance of the last scenario highlights the importance of close monitoring of ICPF exposures to credit risk.

### Chart A

Macro-financial scenarios: description

Scenario	Description
<b>Scenario 1: Increase in the risk-free rate</b>	Parallel shift by 100 bps of the EIOPA risk-free interest rate term structure (reflecting e.g. a broad-based economic recovery and a stable inflation outlook); no change in risk premia
<b>Scenario 2: Increase in risk premia</b>	100 bp increase in the average risk premia of government bonds (reflecting e.g. a repricing in global financial markets); no change in the risk-free rate
<b>Scenario 3: Public debt sustainability concerns</b>	100 bp increase in the average risk premia; parallel shift by -20 bps of the EIOPA risk-free interest rate term structure; credit quality step decreases for half of the issuer countries; debt-to-GDP ratio of issuer countries increases by 5 percentage points on average

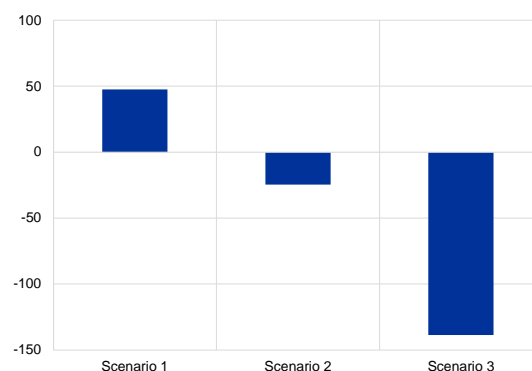
Source: ECB.

Note: For the definition of credit quality steps, see Chart 13 in the Overview.

### Chart B

Macro-financial scenarios: estimated effects on sovereign holdings of euro area ICPFs

(Q1 2009 – Q4 2016, change in holdings in € billions)



Source: ECB calculations based on the empirical results in Table A.

### **This box contributes to the current policy discussion on macroprudential measures beyond banking by providing tentative evidence of procyclical ICPF investment behaviour.**<sup>66</sup>

These initial findings will eventually need to be validated over longer samples, in particular samples with a sufficient number of observations under the Solvency II regime, which entered into force only in 2016. The theoretical framework furthermore indicates that the macroprudential measures are especially relevant for ICPFs that operate under a market-consistent regulatory regime such as Solvency II. While Solvency II already includes measures of a macroprudential nature such as volatility and matching adjustments that were designed to mitigate the impact of widening credit spreads on insurers' balance sheets, their effectiveness under adverse market and economic shocks is yet to be tested in practice.

<sup>65</sup> All the results are interpreted *ceteris paribus*, i.e. considering that all other explanatory variables do not change. However, it is not realistic to assume that this would be the case in practice. For instance, risk premia and the risk-free rate often move at the same time.

<sup>66</sup> Further work is needed to understand the systemic implications of such behaviour, e.g. whether ICPF asset allocation strategies have a systemic impact on asset prices.

### 3.1.3 Continued expansion of the euro area non-bank financial sector

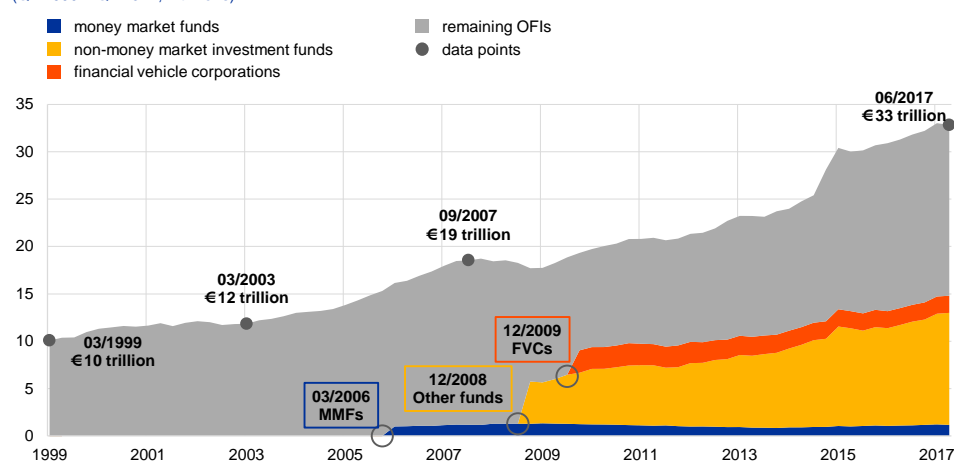
**The euro area non-bank, non-insurance (NBNI) financial sector has further expanded in 2017.** Total assets held by the NBNI financial sector (excluding insurance corporations and pension funds) started to grow again in the first half of 2017 after a year of near-stagnation (see [Chart 3.40](#)). The sector expanded by more than 2.5% in the first half of 2017. Growth in the investment fund sector, underpinning much of the expansion of the non-bank financial sector since the global financial crisis, continued on its longer-term path. Looking at the two largest sub-sectors (non-MMF investment funds and remaining other financial institutions), both have experienced positive net transactions during 2017. The expansion has, in fact, been to a large extent driven by net inflows. Decreases in bond prices and a strengthened euro exchange rate (which reduces the value in euro of assets denominated in foreign currencies) were offset by rising equity prices and positive net inflows. Growth in the non-MMF investment fund sector continued, driving the expansion of the non-bank financial sector, while the much smaller money market fund (MMF) sector experienced significant net outflows in the second quarter of 2017. The somewhat stronger loan origination and securitisation activity by euro area credit institutions over the first six months of 2017 contributed to a slight expansion of financial vehicle corporation (FVC) assets.

**Chart 3.40**

The assets of the non-bank, non-insurance financial sector continued to grow

Total assets of the euro area non-bank, non-insurance financial sector

(Q1 1999 – Q2 2017, €trillions)



Sources: ECB and ECB calculations.

Notes: A breakdown of statistical data for MMFs, other funds and FVCs is available only from the indicated dates onwards. The non-bank, non-insurance financial sector includes MMFs and all other non-monetary financial institutions apart from insurance corporations and pension funds. Further statistical breakdowns are available at the national level, including for non-securitisation special-purpose vehicles (SPVs) in Ireland and special financial institutions (SFIs) in the Netherlands.

**The share of risky activities in the euro area financial system is much lower than the overall volume of the remaining OFIs would suggest.** More than 50% of the non-bank, non-insurance financial sector's total assets are held by financial firms for which a more detailed breakdown by type of entity is not available. However, breakdowns of these remaining other financial institutions by domicile are possible. They show that approximately two-thirds of the assets of the remaining other

financial institutions are held in the Netherlands and Luxembourg.<sup>67</sup> Recent analysis by the Luxembourg authorities, based on additional data sources, reveals that the remaining other financial institutions in that jurisdiction include a large share of funding vehicles and holding companies consolidated into non-financial corporations and other entities with limited links to the banking sector.<sup>68</sup> Data collections by De Nederlandsche Bank show that so-called special financial institutions (SFIs) represent the largest category of the remaining other financial institutions in the Netherlands, accounting for about 80%. The large majority of these SFIs are so-called non-financial SFIs (approximately 90% in 2015) that are owned by foreign non-financial multinationals and channel financial flows between group companies via the Netherlands.<sup>69</sup> The share of entities in the euro area financial system engaged in credit intermediation and liquidity transformation outside the banking sector is thus much lower than the overall volume of the OFI residual would suggest. However, concerns remain that vulnerabilities may be building up in the remaining entities which engage in risky activities and are still opaque.

**Non-bank financial firms have over the past five years achieved a higher share in overall lending, but their role in this market is still eclipsed by that of banks.**

The share of non-bank lending in credit provision to the non-financial private sector in the euro area peaked at 20% in the second quarter of 2016. However, it declined again over the following three quarters. The latest decline mainly reflects an increase in lending by banks to households, rather than non-banks significantly reducing their lending activities. Among non-banks, other financial institutions (OFIs) are the largest holders of loans, mainly owing to securitisation vehicles included in this sub-sector, where FVCs account for 40% of the OFIs. Non-bank financial entities, including FVCs, are more relevant in the financing of NFCs (share of 28%; see [Chart 3.41](#)) than of households (share of 11%; see [Chart 3.42](#)). Despite the dynamism of non-bank lending in some individual euro area countries,<sup>70</sup> the lending market in the euro area overall remains dominated by the banking sector.

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<sup>67</sup> See Box 1 in “[EU Shadow Banking Monitor](#)”, No 2, European Systemic Risk Board, May 2017.

<sup>68</sup> See Duclos, C. and Mohrs, R., “Analysis on the shadow banking content of captive financial companies in Luxembourg”, working document prepared for the 2017 report of the Comité du Risque Systémique on the shadow banking system. Using granular data collected by the Banque centrale du Luxembourg and additional data extracted from financial statements, this report shows that 86% of the remaining other financial institutions (OFI residual) in Luxembourg at end-2014 refers to entities that are part of a non-financial group.

<sup>69</sup> See Van der Veer, K., Klaaijssen, E. and Roerink, R., “Shedding a clearer light on financial stability risks in the shadow banking system”, *De Nederlandsche Bank Occasional Studies*, Vol. 13-7, 2015.

<sup>70</sup> For example, in 2016 ICPFs financed 28% of new mortgages in the Netherlands. See also Box 7 entitled “The growing role of non-bank lending to households – a case study on the Netherlands”, *Financial Stability Review*, ECB, May 2017.

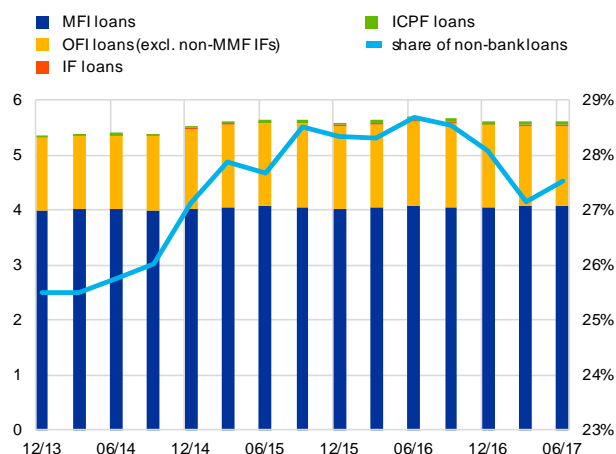


**Chart 3.41**

The share of non-banks in lending to NFCs declined due to an expansion of bank lending

**Non-bank and bank loans to NFCs**

(Dec. 2013 – Jun. 2017, € trillions (left-hand scale), percentages (right-hand scale))



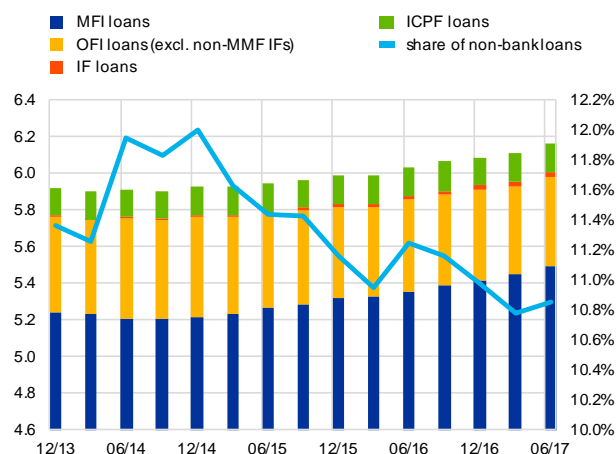
Sources: ECB (euro area accounts) and ECB calculations.  
 Note: The share of non-bank loans is calculated taking into account the non-bank financial sectors depicted in the chart. IF stands for investment funds.

**Chart 3.42**

Loans to households by non-bank financial firms increased

**Non-bank and bank loans to households and non-profit institutions serving households**

(Dec. 2013 – Jun. 2017, € trillions (left-hand scale), percentages (right-hand scale))



Sources: ECB (euro area accounts) and ECB calculations.  
 Note: The share of non-bank loans is calculated taking into account the non-bank financial sectors depicted in the chart. Securitisations are included in the figures. IF stands for investment funds.

**Expansion of the euro area investment fund sector amid overall low financial market volatility**

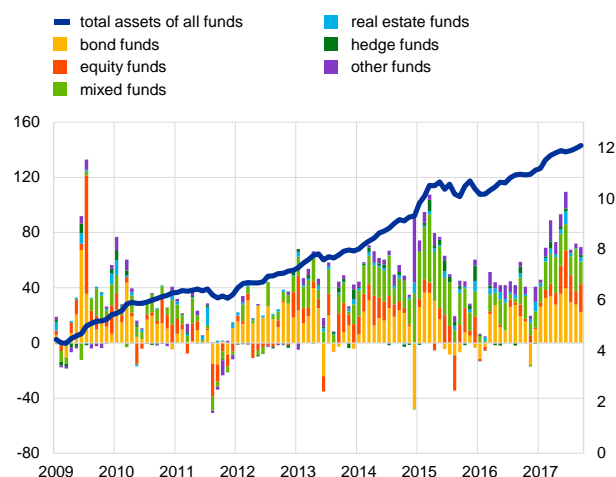
**Continued inflows into the euro area investment fund sector have been supported by improving global growth prospects and overall low financial market volatility over the past few months.** Growth in the investment fund sector, which was previously spurred by credit disintermediation and the low interest rate environment in the aftermath of the global financial crisis, has continued on its longer-term path. All types of investment fund contributed to the expansion of the euro area investment fund sector (see **Chart 3.43**). Net inflows were particularly strong for bond and mixed funds, adding a total of €276 billion and €165 billion respectively to these sectors since the beginning of 2017 until September. Net inflows into the fund sector as a whole were equally strong for both non-euro area investors and euro area investors. The expansion of the sector’s total assets was also driven by positive asset valuation effects, including those resulting from changes in global asset prices. The strengthening of the euro exchange rate versus other main currencies over the past six months dampened somewhat the overall rise in valuations of non-euro currency assets in euro terms. Net inflows into euro area investment funds have also benefited from low financial market volatility which resulted in higher risk-adjusted returns, despite generally low yields across the globe. Flows have somewhat slowed since the middle of the year, following a temporary rise in volatility of some longer-dated euro area government bonds.

**Chart 3.43**

Strong net inflows since the start of the year resulted in a further expansion of the euro area fund sector

**Monthly net flows by type of fund and total assets**

(Jan. 2009 – Sep. 2017, net flows in € billions (left-hand scale), total assets in € trillions (right-hand scale))



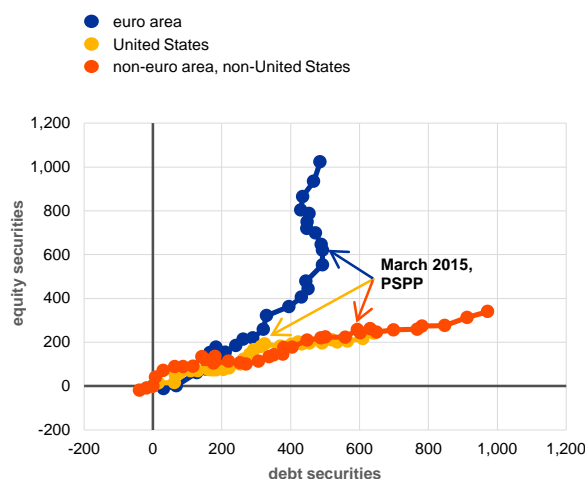
Source: ECB investment fund statistics.  
Note: The data do not cover money market funds.

**Chart 3.44**

Investment fund purchases of euro area debt securities have stalled since the start of the PSPP

**Cumulative net asset purchases (debt and equity) by euro area investment funds**

(Q1 2009 – Q3 2017, € billions)



Source: ECB investment fund statistics.  
Notes: The data do not cover money market funds. "Non-euro area, non-United States" is calculated as a residual from non-euro area securities, excluding securities issued in the United States and Japan and including securities issued in the EU (non-euro area).

**Since the start of the PSPP in March 2015, the investment fund sector's expansion has been accompanied by portfolio shifts away from euro area government debt securities.** As low and negative-yielding euro area government bonds appeared increasingly unattractive to investors, asset managers have divested these assets for the past two and a half years (see [Chart 3.44](#)). Investment funds have reduced their holdings of euro area government bonds by approximately 10%, while holdings of MFI debt securities have been reduced by 6%. Meanwhile, investment funds have increased their exposures to non-euro area bond markets including those of the rest of the European Union, the United States and the emerging markets. Net purchases of euro area debt securities became positive again in the second quarter of 2017. This increase in net purchases may be explained by the shrinking rate differential between the United States and the euro area observed in the first half of 2017, with US bond yields decreasing between March and September and euro area yields increasing somewhat in this period. It remains to be seen whether this will be a sustained development or whether the previous trend will resume. Net purchases of non-euro area, non-US securities (bonds and equities) have continued in the recent months. About 42% of euro area investment fund assets (some €4.7 trillion) are invested in non-euro area countries, with nearly equal shares for equities and debt securities, suggesting that investors are using investment funds as a vehicle to take positions in non-euro area assets.

**Euro area investment fund flows into global debt and equity markets have been positive, with more rapid growth in the emerging market segment.**

Portfolio flows into emerging market equity funds are gradually recovering from their lows in 2015 and early 2016, while flows into emerging market bond funds have

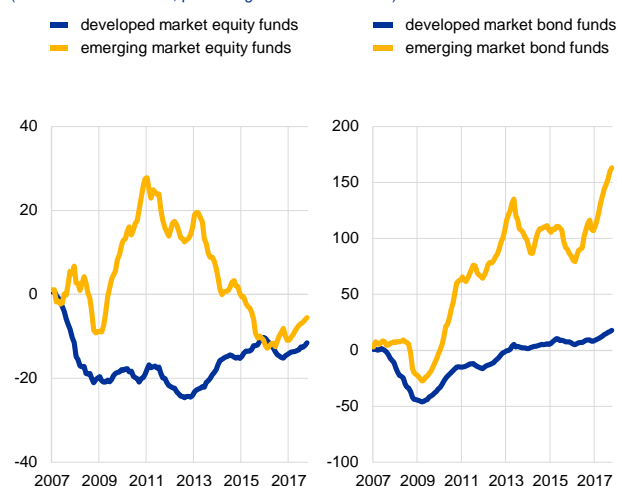
continued to be buoyant over the past six months (see [Chart 3.45](#)). Net flows into developed markets have increased since end-2016, although relative to the sector's size, growth seems less impressive than that of the emerging market segment. The slight upswing in developed market equity fund flows is likely to have been initially triggered by the anticipation of changes in US policies, which had been expected to result in higher nominal growth prospects. Subsequently, the euro area's improved economic outlook supported inflows into this segment, while expectations regarding US policies have been revised in the meantime.

**Chart 3.45**

Net flows into developed market equity and investment-grade bond funds have increased

Cumulated monthly flows since January 2007 into equity and bond funds domiciled in the euro area

(Jan. 2007 – Oct. 2017, percentage of total net assets)



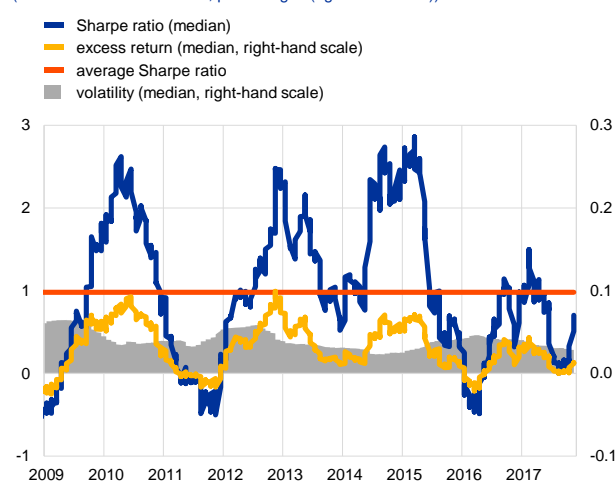
Sources: EPFR Global and ECB calculations.  
Note: Based on an aggregate sample by EPFR.

**Chart 3.46**

Bond fund returns have deteriorated in the current low-volatility environment

Median Sharpe ratios, excess returns and volatility for euro area bond funds

(Jan. 2009 – mid-Nov. 2017, percentages (right-hand scale))



Sources: Thomson Reuters Lipper and ECB calculations.  
Notes: The chart shows the median Sharpe ratio, the excess return and the volatility of a sample of euro area bond funds. Sharpe ratios are constructed as the ratio of the 52-week historical excess return over annualised volatility of the same period, using weekly data. The one-month overnight index swap rate is used for the risk-free rate.

## Continued risk-taking by euro area bond funds

**A prolonged period of low volatility may entice fund managers to take on further risk in order to improve their relative performance compared with peers.** Both median return volatility and median excess returns of bond funds have trended downwards over the past few years (see [Chart 3.46](#)). Bond fund returns have deteriorated since the beginning of the year and, more recently, increased again. Still, the secular decline in volatility has continued throughout 2017. The median Sharpe ratio for euro area bond funds has stayed below historical averages, indicating that investors might not be adequately compensated for the risks they are taking. Previously, the median return-to-volatility ratio for euro area bond funds dropped to very low levels in periods of financial market stress (e.g. the euro area sovereign debt crisis in 2011-12, the re-emergence of the Greek sovereign crisis in 2015, the banking sector distress in Italy in 2016). Median Sharpe ratios fell

significantly earlier this year, although this time financial market stress was absent. In the current low-volatility environment, common risk/return measures are dominated by the level of yields rather than price volatility. Thus, despite volatility remaining low, Sharpe ratios could deteriorate again to even lower levels if bond prices were to fall and fund returns were to deteriorate gradually, i.e. as a result of rising rates globally. Under these circumstances, fund managers might further increase their exposure to higher-yielding assets in order to compensate for a decline in valuations of their current portfolios.

**Asset managers have been venturing further out across the credit risk spectrum and into longer maturities.** A common pattern observed during the past few years is that some institutional investors, including insurance corporations, pension funds and investment funds, have shifted their asset allocation from higher- to lower-rated debt securities (see [Chart 13](#) in the Overview). Euro area investment funds have been rebalancing their asset allocations towards higher-yielding assets for some time now and this trend continued at the beginning of 2017. The overall shifts in portfolio composition have largely been driven by an actual reduction in the holdings of higher-rated securities and an increase in lower-rated securities holdings, rather than by a decline in the rating quality of the securities held. Investment funds appear to hold a higher share of the lowest-rated securities when these are issued in non-euro currencies. In the corporate bond fund sector, exposures to the high-yield segment have, on average, increased relative to the less risky investment-grade segment, as captured by funds' increased beta relative to a high-yield bond benchmark (see [Chart 3.47](#)). In addition, a rise in residual maturities can be observed across the debt securities held by the broader investment fund sector. Since December 2013 average residual maturities have increased by more than one year for debt securities holdings, although an increase can also be identified for other sectors (see [Chart 2.14](#) in Section 2). Increased risk-taking, both in terms of credit and interest rate risk, has left investors in bond funds more exposed to any changes in global rates and risk premia.

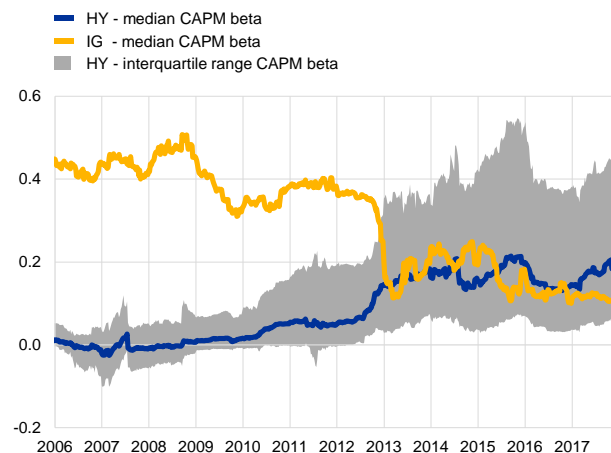
**At the same time, bond investment funds have on average reduced their liquidity buffers.** Asset managers are considering the cost of holding cash in an environment of very low nominal rates where there are management fees on top, which results in increasing pressure to maximise the return of the entire portfolio. Repos and bank deposits yield close to zero or negative returns, which provides strong incentives for fund managers to increase their share of higher-yielding assets. The low-volatility environment, where fund flows move in predictable patterns, may further reduce incentives for precautionary cash holdings. As a result, the cash buffers available in bond funds have been gradually shrinking across all market segments since 2009 (see [Chart 14](#) in the Overview). Sector-wide indicators point furthermore to a decrease in the most-liquid positions of bond funds, including cash holdings, debt securities issued by euro area governments and short-term instruments (see [Chart 3.48](#)). Liquidity and maturity transformation among bond funds has grown as a result, while less-liquid portfolios and lower cash holdings have reduced the buffers available to accommodate large outflows.

**Chart 3.47**

Corporate bond funds' market betas relative to the high-yield segment and investment-grade benchmark indices

Estimated market betas for euro area bond funds relative to high-yield and investment-grade benchmark indices

(Jan. 2006 – Nov. 2017, median coefficient estimates and interquartile range)



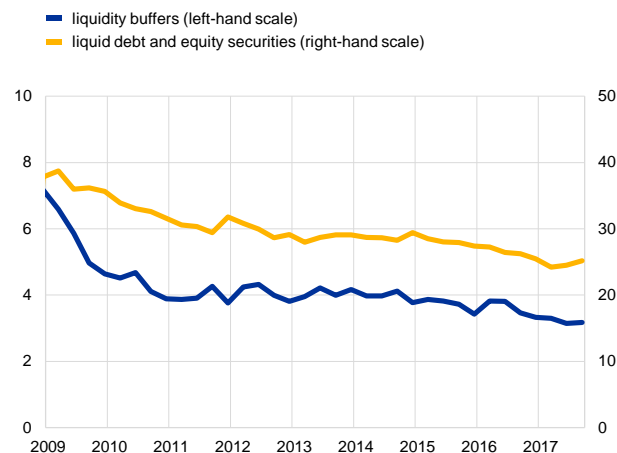
Sources: Thomson Reuters Lipper/Datastream and ECB calculations.  
Notes: Median and interquartile range of CAPM (capital asset pricing model) betas calculated from weekly fund excess returns over a rolling window of 52 weeks (see equation below). The sample includes approx. 3,000 bond funds, which are EUR-denominated, with a euro area investment focus, and are not flagged as government bond funds. The underlying market benchmarks used are Barclay's pan-European high-yield (HY) and investment-grade (IG) indices. Coefficient estimates from an augmented CAPM model:  $(r - r_f) = \alpha + \beta_{HY}(r_{HY} - r_f) + \beta_{IG}(r_{IG} - r_f) + \varepsilon$ .

**Chart 3.48**

Bond funds' liquidity buffers and the share of portfolios held in liquid assets have further declined

Bond funds' liquidity buffers and liquid assets

(Q1 2009 – Q3 2017, percentage of total assets)



Sources: ECB investment fund statistics and ECB calculations.  
Notes: Liquidity buffers include loans and deposits, where the statistical classification does not allow a distinction between loans and deposits. Liquid debt and equity securities include debt securities issued by euro area governments, debt securities issued with an original maturity under one year and equities issued in the EU, Japan and the US. According to the underlying statistical classification of bond funds, these funds can hold a minor share of equities.

## Procyclicality and herding in the investment fund sector potentially amplifying cyclical risks

**Concerns remain that selling pressures from investors in fixed income markets may be amplified by large and mounting outflows from bond funds.** If

bond yields were to suddenly rise, funds in the euro area could face significant reductions in value and subsequent outflows, potentially destabilising the bond market more broadly via adverse feedback effects. The continued increase in liquidity risk-taking by the fund sector, coupled with the limited capacity of counterparties to absorb large volumes of securities, raises the potential for fund redemptions to adversely affect market conditions following a potential repricing in global risk premia. **An important amplifying mechanism results from the positive correlations between fund flows and past returns – the so-called flow-performance nexus.** Empirical evidence documents a close correlation between fund flows and past returns, where funds with positive price performance tend to attract inflows, whereas negative price performance is likely to lead to outflows from the funds (see **Box 6**). Such a mechanism is also observable in the euro area bond fund sector, suggesting that investors position themselves in a procyclical manner in line with the signals that they receive from past returns. The positive correlation between flows and returns increases in times of stress, thus adding to the procyclicality inherent in the flow-performance nexus (see **Chart 3.49**). Recent findings for euro area investment funds suggest that the flow-performance nexus is

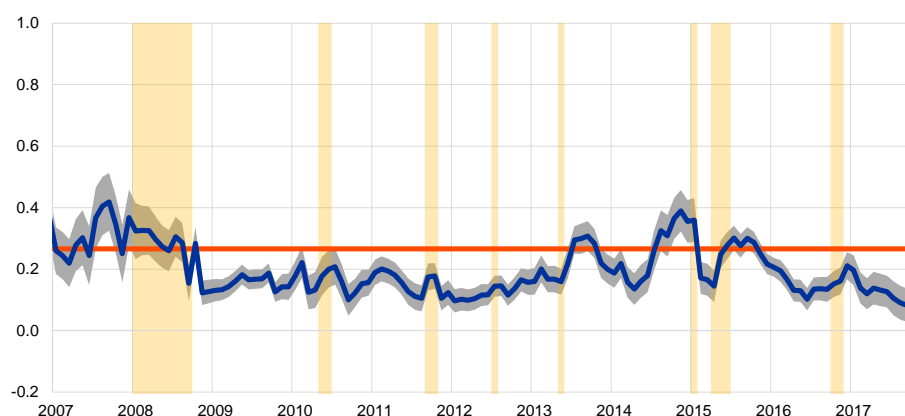
stronger among leveraged funds than unleveraged funds. While leverage tends to be low on average in UCITS (undertakings for collective investment in transferable securities) bond funds, some alternative investment funds (AIFs), including hedge funds, are known to have substantial leverage and may experience higher outflows if their returns fall.

### Chart 3.49

Flow-return correlations increase during market stress, thus adding to procyclicality

#### Estimated sensitivity of flows to past returns for euro area bond funds with confidence intervals

(Jan. 2007 – Oct. 2017; yellow shaded areas represent periods of high financial stress)



Sources: Lipper IM and ECB calculations.

Notes: Highlighted periods: acceleration of sub-prime crisis/Lehman collapses (Jan.-Sep. 2008); emergence of sovereign debt crisis/start of the Securities Markets Programme (May/June 2010); deepening of sovereign debt crisis/Italian bond yields peak (Sep.-Oct. 2011); ECB President's speech (26 July 2012); Fed talks of tapering (22 May 2013); PSPP announcement (22 Jan. 2015); German Bund sell-off (Apr.-May 2015); Greek sovereign crisis re-emerges (June 2015); reversal of yields/US presidential election (Oct./Nov. 2016). The sample includes all euro area bond funds covered by Lipper IM. The blue line depicts the beta coefficient estimates ( $\beta$ ) for a rolling-window fixed effects regression  $flows_{i,t} = \alpha_i + \beta returns_{i,t-1} + \varepsilon_{i,t}$  using a 12-month rolling window. The grey shaded area depicts the confidence intervals of the estimates at the 5% level. The red line is the beta of the same panel regression for the entire period.

**Market-wide pressures from a global risk repricing could mount due to investor herding and the higher share of passive strategies.** Although cross-asset correlations have recently weakened, the potential for spillovers within and across market segments remains high. Because relative performance has been identified as one of the key determinants of fund inflows, fund managers can be expected to have a strong aversion to underperformance. This can potentially result in concerted buying and selling of assets, i.e. herding, which would amplify stress in a market downturn.<sup>71</sup> These channels are also becoming more important with the rise of passive investment strategies. Passive strategies have been attracting continued inflows in the euro area equity fund market since the start of the global financial crisis, while active strategies in equities have experienced cumulated outflows of about the same magnitude (see [Chart 3.50](#)). With the rise in passive strategies, there is a risk that diversity of opinion among investors declines and market movements become more cyclical.

<sup>71</sup> See Feroli, M., Kashyap, A. K., Schoenholtz, K. and Shin, H. S., "Market Tantrums and Monetary Policy", paper presented at the 2014 US Monetary Policy Forum, New York, 28 February 2014.

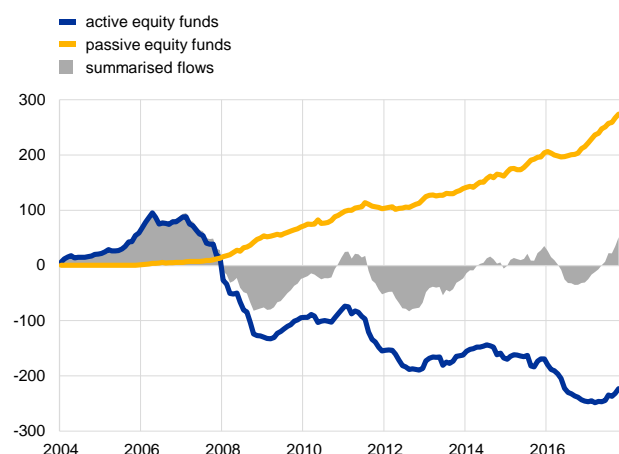
The rise in passive strategies has been accompanied, in particular, by a broader use of ETF (exchange-traded fund) products. ETFs have allowed low-cost positioning in market-wide indices through physical or synthetic index replication strategies. In the euro area, the ETF market has been developing rapidly, but it remains relatively small to date (see Chart 3.51). The implications for financial stability may, therefore, also be limited. Nevertheless, as the market continues to grow, ETF products are expected to play an increasing role in price discovery and liquidity transformation. ETFs have already become a central factor in asset pricing in some market segments, such as US equities or emerging market debt, where price signals feed back from ETFs to related products and the underlying securities.<sup>72</sup>

**Chart 3.50**

Passive strategies have attracted rising inflows into euro area equity funds

Cumulated monthly flows into/out of active and passive equity funds domiciled in the euro area

(Jan. 2004 – Oct. 2017, USD billions)



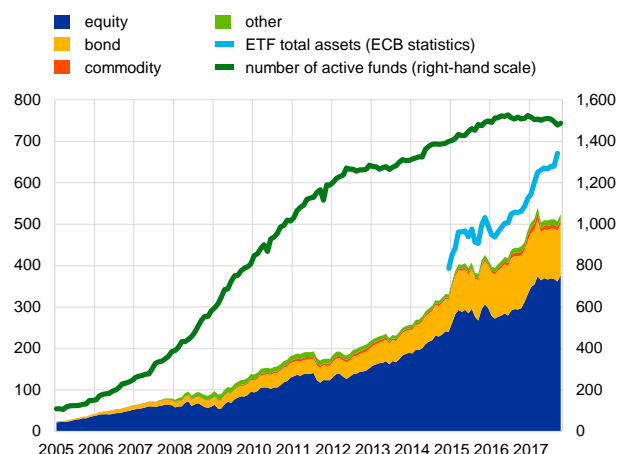
Sources: EPFR Global and ECB calculations.

**Chart 3.51**

Total assets of euro area ETFs have expanded strongly

Breakdown by asset class

(Jan. 2005 – Oct. 2017; left-hand scale: € billions; right-hand scale: number)



Sources: Thomson Reuters Lipper, ECB investment fund statistics and ECB calculations.

Notes: Monthly observations; the coloured areas represent total net assets of ETFs domiciled in the euro area according to data from Thomson Reuters Lipper. The blue line represents total assets according to the ECB investment fund statistics. Data are available from December 2014 onwards for the latter.

## Some slowdown in money market fund growth

In the second quarter of 2017 the euro area MMF sector experienced the first quarterly decline in total assets after a prolonged period of growth. The contraction in total assets was mainly due to withdrawals by domestic investors. Although net inflows were positive again in the third quarter, this brief episode of net outflows was only the second quarter of material decline since the start of the sector's recovery in 2013 (see Chart 3.52). Some intra-period volatility in money

<sup>72</sup> See Box 8 entitled "Exchange-traded funds in the euro area – recent trends and vulnerabilities", *Financial Stability Review*, ECB, May 2017, pp. 107-110.

markets could be observed as market participants revised their expectations regarding the timing of the initiation of policy rate hikes. Nevertheless, the year-on-year growth in notional assets (excluding valuation effects) in the third quarter of 2017 was still 8% for the euro area as a whole. MMFs in all major fund domiciles, including Ireland (+10%), France (+8%) and Luxembourg (+9%), have contributed to this recent expansion of the MMF sector. In the third quarter of 2017 total assets of euro area MMFs stood at €1,175 billion, still below the March 2009 peak level (€1,330 billion) but about 40% above the trough reached at the end of 2013 (€830 billion).

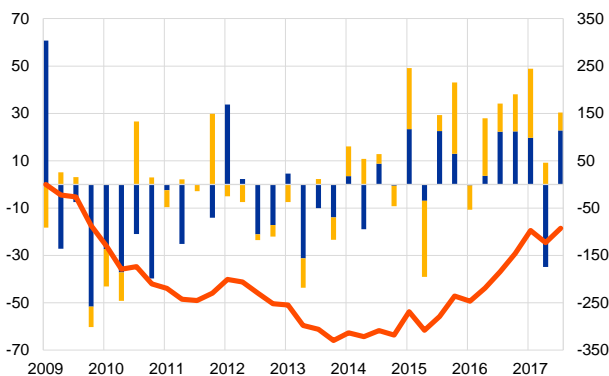
### Chart 3.52

Net outflows from euro area MMFs in the second quarter of 2017 as a result of withdrawals by domestic investors

#### Quarterly net flows into and out of MMFs

(Q1 2009 – Q3 2017, shares issued (flows) in € billions)

- quarterly flows from the euro area (left-hand scale)
- quarterly flows from non-euro area (left-hand scale)
- total cumulated flows since Q1 2009 (right-hand scale)



Sources: ECB balance sheet item statistics and ECB calculations.

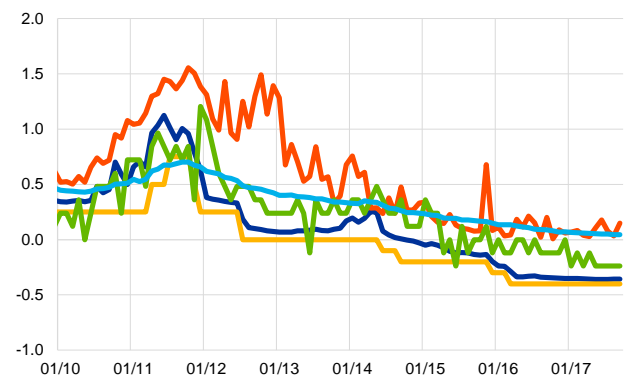
### Chart 3.53

Average rates offered by money market funds have further declined since the beginning of the year

#### Annualised returns of euro-denominated MMFs in comparison with interbank, policy and deposit rates

(Jan. 2010 – Sep. 2017, percentages)

- EONIA
- ECB deposit facility
- bank repos
- MMF returns
- bank deposits - non-financial corporations



Sources: EPFR Global, ECB and ECB calculations.

Notes: MMF returns are based on EPFR data for euro-denominated funds. Bank repo and deposit rates are based on the ECB MFI interest rate statistics using the narrowly defined effective rate.

**MMFs have adjusted their portfolios over the past two years, enabling them to offer more competitive returns.** MMFs started to attract substantial net inflows again in 2015 following a long period when the sector contracted, in an environment of declining short-term interest rates. MMF holdings of non-financial corporate debt have gradually risen since 2014, initially mainly at the expense of debt securities issued by credit institutions. While the share remains very small relative to MMF total assets (4%), it represents almost 60% of the short-term debt issued by non-financial corporates in the euro area. Since 2016 MMFs have started to expand their holdings of short-term debt issued by the euro area banking sector and now hold about 40% of MFI outstanding short-term debt securities, although this is still below the 2010 peak of around 52%. MMFs have also shown a tendency to engage more in maturity



transformation, albeit within the relevant regulatory limits on the residual maturity and residual life of securities held.<sup>73</sup>

**It remains to be seen whether the withdrawals from euro area MMFs by domestic investors in the second quarter of 2017 will remain a temporary effect.** So far, MMFs have received net inflows again in the third quarter of 2017. The broader based growth of MMFs since 2015 should be seen against a growing demand for the short-term placement of funds by financials and non-financial corporates which are sensitive to relative performance. Some corporates have reportedly shifted cash balances previously held in overnight bank accounts to money market funds. It is noteworthy that, on average, bank deposit rates seem to have levelled off, while MMF fund returns have further declined since the end of last year (see [Chart 3.53](#)). MMF returns have in fact been negative since 2015, while bank deposit rates for non-financial corporates are still slightly positive on average. These average rates, however, conceal the heterogeneity of bank deposit rates offered to different depositor types, with some banks passing on negative policy rates to large corporate and institutional clients.

**There have been no significant shifts within the MMF sector so far in anticipation of tighter EU regulation.** The new regulation will enter into force from 2018 onwards and will impose stricter prudential requirements on MMFs.<sup>74</sup> Given that the final regulation text was only agreed upon recently, investors might only react to the regulatory changes when they enter fully into force, i.e. in the course of 2018.<sup>75</sup>

## Box 6

How would a repricing in bond markets impact euro area investment funds?

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**An abrupt repricing of risk premia in bond markets has the potential to expose vulnerabilities in the rapidly growing investment fund sector.** A shock to bond prices would give rise to first-round mark-to-market losses for open-end investment funds, particularly those with large exposures to debt securities. From a systemic risk perspective, these losses could propagate through the financial system if negative returns trigger investor outflows, eventually resulting in forced sales of fund portfolios. Such sales have the potential to amplify the original shock to bond prices, with wider financial stability implications in the form of impaired market liquidity and possible spillovers to the real economy, via negative wealth and confidence effects. This box sheds some light on this channel, dubbed the “flow-performance nexus”, by quantifying the impact of an interest rate shock on the net asset values of euro area-domiciled investment funds (everything else held

<sup>73</sup> MMFs are governed by the UCITS Regulation and the CESR (Committee of European Securities Regulators) Guidelines on a common definition of European money market funds until the new EU regulation on MMFs becomes effective. CESR’s Guidelines establish a classification creating two types of MMFs: “short-term money market funds” (ST-MMFs) and “money market funds” (MMFs). Both types of funds are subject to specific standards in terms of portfolio quality and maturity, risk management and disclosure. Short-term MMFs have to ensure their portfolio has a weighted average maturity (WAM) of no more than 60 days and a weighted average life (WAL) of no more than 120 days. Other MMFs must ensure a WAM of no more than 6 months and a WAL of no more than 12 months.

<sup>74</sup> [Proposal for a regulation of the European Parliament and of the Council on Money Market Funds](#), Council of the European Union, Brussels, 30 November 2016.

<sup>75</sup> See Section 3.1.3 of *Financial Stability Review*, ECB, May 2017, pp. 111-113.

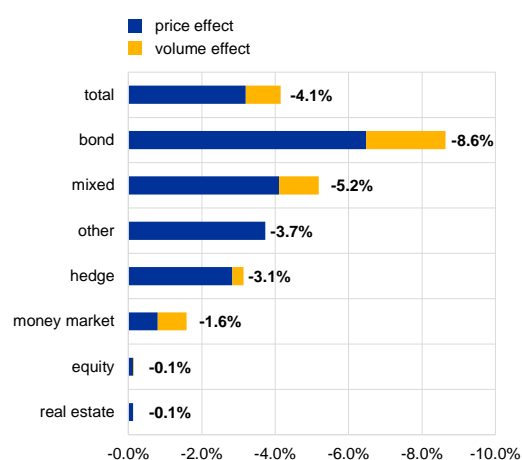
equal).<sup>76</sup> More specifically, the first part of the analysis examines the impact of an increase in yields on the net asset value of the main euro area investment fund categories (equity, bond, mixed, real estate, money market, hedge and other funds), while the second part particularly focuses on euro area bond funds.

### Chart A

A 100 basis point bond yield shock implies overall limited price and volume effects

#### Change in net asset value after an initial shock of 100 bps to the yield curve

(Q4 2016; x-axis: percentage points)



Sources: ECB, Thomson Reuters Lipper and ECB calculations.

Note: The underlying scenario assumes a "ceteris paribus" parallel upward shift of the yield curve up to 7-8 years affecting rates across bond markets.

**For both exercises, bond yields are assumed to increase, ceteris paribus, by 100 basis points all along the maturity spectrum and for all types of bond holdings.**

The first part of the analysis consists of a first step, where "direct" valuation losses resulting from a rise in bond rates are computed by assuming that the duration of funds' bond holdings matches that of the respective sector indices. Given this assumption, the sectors' fund holdings suffer a valuation loss equal to the product of the yield change and the assumed duration. Then, investor outflows are simulated using the estimated coefficients obtained from regressions of fund-level flows on lagged fund returns, controlling for lagged flows and total net assets. An important feature of this assessment is that it allows the quantification of both first-round valuation effects and of possible outflows.

#### The results for the euro area investment fund sector as a whole suggest that the

**contraction of net asset values (NAVs) would be relatively small (Chart A). In particular, the total contraction would be 4.1% and can be decomposed** into a "price effect" (a reduction in funds' NAVs resulting from the lower valuation of their portfolios), followed by a "volume effect" (a reduction in funds' NAVs resulting from investor outflows). The price effect represents 77% of the total, while the remaining 23% is the volume effect. The results displayed in Chart A reflect differences in investment policies and, more precisely, in the portfolio weights assigned to bond holdings. As expected, bond funds would experience the largest decline in net asset value (-8.6%), followed by mixed funds (-5.2%), as these fund types are the main holders of bonds among euro area investment funds. The expected declines in NAV for other types of investment funds, including hedge funds, equity funds, money market funds and real estate funds, are lower.

#### Further analysis for the bond fund sector suggests that sensitivities to an interest rate shock differ across types of bond funds.

For this analysis, fund flows at an entity level are regressed on benchmark indices corresponding to each of the five bond fund categories (e.g. mixed, sovereign, corporate, high-yield and emerging market bond funds), while distinguishing between positive and negative benchmark performance. The results indicate that a negative fund performance of 1% would correspond to an outflow ranging from 0.5% in the case of mixed bond

<sup>76</sup> A more comprehensive analysis, including possible feedback effects, is outside the scope of this box (e.g. second-round effects on asset prices, falling house prices and possible externalities resulting from asset fire sales are not considered).

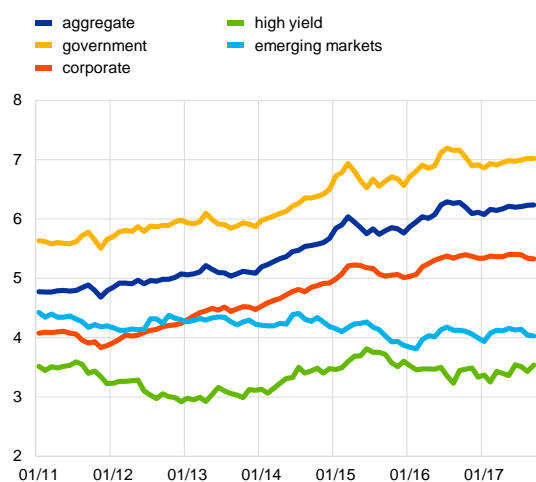
funds to 1.5% in the case of emerging market funds. These numbers seem rather modest and may reflect some degree of stickiness in the strategic asset allocations set out by some investors (for instance, participants in defined-contribution pension schemes investing in investment funds tend to rebalance their portfolios relatively infrequently).

### Chart B

Average duration in bond markets has increased over the past years

#### Duration for key benchmark performance indices

(Jan. 2011 – Sep. 2017, monthly data)



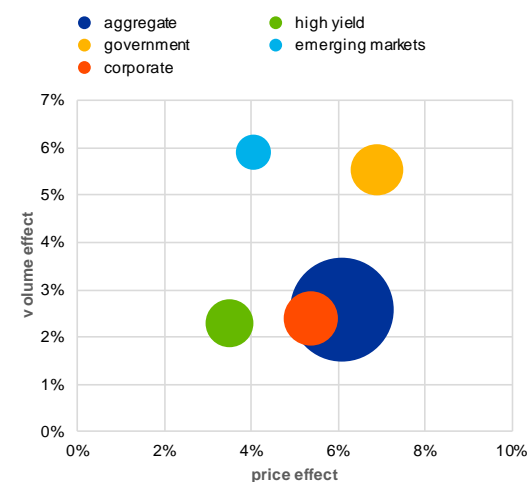
Sources: Bloomberg and Merrill Lynch indices.

### Chart C

Government and emerging market bond funds comparably sensitive to a yield shock

#### Decrease in net asset value after an initial shock of 100 bps to the yield curve

x-axis: price effect (decline as a % of total net assets)  
y-axis: volume effect (decline as a % of total net assets)



Sources: Thomson Reuters Lipper, Bloomberg and ECB calculations.  
Notes: The size of the bubbles represents total net assets. The fund flow variable is derived at entity level from Thomson Reuters Lipper, whereas performance measures are based on the indices shown in Chart B corresponding to the funds' investment focus.

**The extent to which the assumed increase in yields translates into a “price effect” depends on the benchmark durations which vary significantly across indices and have generally increased over the past years, except for emerging market and high-yield bonds (Chart B).**

Combining the price and volume effects, funds investing mainly in government and emerging market bonds would be the most affected by a hypothetical 100 basis point increase in bond yields (Chart C). The three largest bond fund categories would be responsible for almost 80% of the total reduction in net asset values (mixed, government and corporate bond funds). The decline would correspond to a contraction of 8.7%, 12.4% and 7.8% of total net assets, respectively. The results suggest that those funds with the largest reductions in asset values from the “price effect” (i.e. government bond funds) would also endure the largest outflows. Emerging market funds seem particularly vulnerable to outflows in spite of their limited duration. Mixed and corporate bond funds have comparably high duration and would thus suffer comparably large valuation losses, but seem to be less vulnerable to outflows.

**The magnitude of the expected outflows (between 2% and 6% one month following a bond yield hike of 100 basis points) suggests that the role of investment funds as bond price shock amplifiers may be limited.** There are some important considerations to keep in mind, however, when interpreting these results. First, they are based on average effects over the entire sample period and should be considered as a lower bound for the outflow amounts that the sector

could experience under adverse conditions, as sensitivities tend to increase during stress periods. Second, the rather sizeable dispersion of sensitivities across funds implies that some funds may experience substantially larger outflows than others – also because investors tend to be more sensitive to relative performance against, for example, a benchmark rather than absolute performance. Third, this is a “ceteris paribus” sensitivity analysis and not a complete crisis scenario (like the EBA stress tests or indeed the scenario simulations in Section 3.2 below). Finally, the analysis considers only first-round price effects and does not include feedback loops, leverage targeting by managers or externalities resulting from forced asset sales.

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## 3.2 Evaluating the resilience of euro area financial institutions through scenario analysis

**This section provides a quantitative assessment of the resilience of euro area financial institutions to a materialisation of the four main systemic risks identified in this Review.** The assessment of the impact of macro-financial shocks on euro area banks and insurers is based on a macroprudential simulation exercise involving top-down stress-testing tools.<sup>77</sup> The four main risks presented in the Overview of this Review are mapped into four independent adverse scenarios to assess the resilience of the euro area banking sector (see **Table 3.1**), with some additional specific risks identified for the purpose of assessing the resilience of euro area insurers. Owing to methodological, scenario and sample differences, the results presented in this section should not be compared with the results of the supervisory stress-test exercises, such as those coordinated by the European Banking Authority (EBA) or the European Insurance and Occupational Pensions Authority (EIOPA). Moreover, the analysis conducted in this section is not comparable with the ECB’s recent supervisory exercise on interest rate risk in the banking book (IRRBB)<sup>78</sup>, which is a sensitivity analysis of hypothetical changes in interest rates and is not based on a macro-financial scenario. Due to the limited availability of disaggregated data on assets, liabilities, capital and profitability of financial institutions other than banks and insurers, this section does not assess the resilience of these parts of the financial sector.

### Main features of the adverse macro-financial scenarios

**The assessment of the resilience of the euro area banking sector is based on a baseline and four adverse scenarios.** The baseline scenario is taken from the European Commission’s winter 2017 economic forecasts. The adverse scenarios

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<sup>77</sup> The tools employed are: (i) a forward-looking solvency analysis, similar to a top-down stress test, for euro area banks; and (ii) a forward-looking analysis of the assets and liabilities sides of the euro area insurance sector. For a more detailed description of the tools, see Dees, S., Henry, J. and Martin, R. (eds.), “STAMP€: Stress-Test Analytics for Macprudential Purposes in the euro area”, ECB, February 2017.

<sup>78</sup> See the ECB Banking Supervision [press release](#) dated 9 October 2017.

have been designed on the basis of the stress-testing toolkit available at the ECB and the main exogenous shocks assumed to trigger these scenarios are summarised in **Table 3.1**.<sup>79</sup>

**Table 3.1**

Mapping the main systemic risks into adverse macro-financial scenarios

Risk	Scenario names	Key exogenous shocks driving the impact on GDP and on solvency of financial institutions	Calibration of exogenous shocks
Abrupt and sizeable repricing of risk premia in global financial markets – triggered e.g. by a policy expectation shock – leading to a tightening of financial conditions	Global repricing	Shock to risk-free bond yields in advanced economies Shock to equity prices in advanced economies Foreign demand shock in advanced economies	1-year government bonds: DE (68 bps), US (22 bps) 10-year government bonds: DE (89 bps), US (162 bps) Euro area average (-30%), US (-23%) Euro area average (-7%)
Adverse feedback loop between weak bank profitability and low nominal growth, amid structural challenges in the euro area banking sector	Distressed banking sector	Shock to private investment in EU countries Shock to private consumption in EU countries Funding shock for banks reflecting higher counterparty risk	Euro area average (-11%) Euro area average (-4%) Euro area average (78 bps)
Public and private sector debt sustainability concerns amid a potential repricing of risk premia and increased political fragmentation	European repricing	Shock to sovereign bond spreads against the Bund Shock to corporate bond spreads Shock to residential real estate prices	Euro area average (75 bps) Euro area average (80 bps) Euro area average (-12%)
Liquidity risks in the non-bank financial sector with potential spillovers to the broader financial system	Non-bank financial sector spillover	Shock to EDFs of largest insurance corporations and investment funds in the euro area Shock to household net wealth	Euro area average (0.4%) Euro area average (-4%)

Source: ECB.

Notes: All of the financial shocks have been calibrated using simulations based on a multivariate copula model applied to a sample of daily data starting in 2007 and assuming a probability of realisation of 5%. Financial shocks are shown at their peak level (at the end of the first year of the scenario), while shocks to macroeconomic variables are expressed in terms of the deviation from the baseline at the end of the scenario horizon.

**The global repricing scenario reflects the risk of an abrupt reversal in risk premia, leading to reductions in asset prices after a protracted period of low volatility and high valuations.** The scenario is triggered by a shock to bond yields and equity prices in the euro area and the United States. Globally higher interest rates would adversely affect major emerging market economies, thereby contributing to reduced external demand for euro area exports.

**The distressed banking sector scenario captures the risk of weaker than anticipated domestic economic activity, combined with structural banking sector challenges (such as high NPL ratios and overcapacity).** The scenario is triggered by confidence shocks, leading to a sharp decline in private consumption and investment. Moreover, it assumes a concomitant increase in banks' wholesale funding costs, reflecting a worsening of market perceptions about the profitability of euro area banks, both due to the weakening of the economy (increasing counterparty credit risk) and prevailing structural challenges. Banks would respond to the tighter funding conditions by increasing their lending spreads, thus raising the cost of capital for the private sector.

**The European repricing scenario envisages renewed concerns about the vulnerabilities associated with high public and private sector indebtedness.** The scenario would be triggered by an increase in sovereign and corporate bond

<sup>79</sup> For a more detailed description of the scenario design toolkit, see Dees et al. (op. cit.) and Henry, J. and Kok, C. (eds.), "A macro stress testing framework for assessing systemic risks in the banking sector", *Occasional Paper Series*, No 152, ECB, October 2013.

spreads in the European Union, reflecting heightened concerns about debt sustainability. This would also trigger a demand shock in the residential real estate markets, leading to a decline in residential real estate prices.

**The non-bank financial sector spillover scenario covers the risk of transmission of stress from the non-bank financial sector to the euro area banking sector.** The scenario would be triggered by unexpected increases in redemptions by investment fund investors which would result in forced asset sales, leading to downward pressure on euro area asset prices.<sup>80</sup> As a result of the liquidity shortfalls triggered by higher redemptions, investment funds would start withdrawing funding provided to the banking sector, leading to an increase in its cost of funding. Stress in the non-bank financial sector would generate feedback to the real economy via wealth effects on private households.

The four risks may act as triggers to each other, so that the scenarios may materialise jointly, reinforcing the already severe macro-financial conditions prevailing under each of the individual scenarios.

**The four scenarios result in different overall impacts on the real economy.** The distressed banking sector scenario would have the strongest impact on euro area economic activity, as reflected in real GDP growth being 3.5% below the baseline level at the end of 2018 (see **Table 3.2**). A somewhat milder though non-negligible real GDP impact is entailed in the global repricing scenario (-2.1% compared with the baseline level) and the European repricing scenario (-1.0% below the baseline level), whereas the real economic impact is only slightly negative under the non-bank financial sector spillover scenario.

**Table 3.2**

Overall impact on euro area GDP growth under the adverse macro-financial scenarios

	2016	2017	2018	Percentage deviation from the baseline level in Q4 2018
Baseline (annual percentage growth rates)	1.7	1.6	1.8	
Global repricing scenario (percentage deviation from baseline growth)		-0.9	-1.2	-2.1%
Distressed banking sector scenario (percentage deviation from baseline growth)		-1.6	-2.0	-3.5%
European repricing scenario (percentage deviation from baseline growth)		-0.4	-0.6	-1.0%
Non-bank financial sector spillover scenario (percentage deviation from baseline growth)		0.1	-0.2	-0.1%

Sources: European Commission and ECB.

**In addition to the real economic impact, the scenarios also differ in terms of their effects on financial markets.** The global repricing scenario is characterised by the strongest shocks to equity prices (-30%) and the strongest average shock to the euro area ten-year government bond yields (124 bps); see **Table 3.3**. Moreover, this scenario also presents the strongest steepening of the yield curve (almost 60 bps) with limited cross-country variation. By contrast, the degree of steepening of the

<sup>80</sup> As data on the composition of balance sheets of these institutions are scarce, statistical simulations are employed to calibrate this scenario. These simulations are based on historically observed relationships between key financial market indicators reflecting the resilience of these institutions (i.e. expected default frequencies – EDFs) and other financial variables, such as stock prices, interest rates and banks' credit default swap (CDS) spreads.

yield curve under the European repricing scenario exhibits the largest cross-country dispersion. While in this scenario the average projected yield curve steepening and the size of the yield curve shocks are more subdued than in the global repricing scenario, in euro area countries with more pronounced debt sustainability concerns the yield curve steepening is much stronger than under the global repricing scenario. While the global repricing and the non-bank financial sector spillover scenarios entail strong declines in stock prices (-30% and -20%, respectively), under the distressed banking sector and the European repricing scenarios stock prices are projected to decline by about 10%. Furthermore, under the European repricing scenario residential real estate prices decline by on average 12%. Finally, bank funding costs (measured in terms of bank CDS spreads) are projected to increase by 78 basis points under the distressed banking sector scenario, while in the European repricing and non-bank financial sector spillover scenarios, they would increase by some 40-45 basis points.

**Table 3.3**

Overall impact of the adverse macro-financial scenarios on interest rates and asset prices

	Global repricing	Distressed banking sector	European repricing	Non-bank financial sector spillover
Average euro area increase in short-term interest rates (basis points, peak deviation from baseline)	0	0	0	33
Average euro area increase in 1-year government bond yields (basis points, peak deviation from baseline)	68	14	31	10
Average euro area increase in 10-year government bond yields (basis points, peak deviation from baseline)	124	29	75	21
Change in euro area real estate prices (percentage deviation from baseline, 2018)	-2	-1	-12	-1
Average euro area increase in banks' CDS spreads (basis points, peak deviation from baseline)	19	78	44	42
Change in euro area equity prices (percentage deviation from baseline)	-30	-11	-10	-20

Source: ECB.

Notes: The table reports the euro area weighted average of the shocks (measured as the deviation from the baseline levels) in the peak quarter. Some of the shocks reported in the table coincide with exogenous shocks which trigger the scenario (e.g. the shocks to euro area equity prices in the global repricing scenario). The other shocks correspond to endogenous responses of these variables to the triggers of the scenario.

## Solvency results for euro area banking groups

**The impact of the baseline and the four adverse scenarios on bank solvency is analysed in terms of the impact on the CET1 capital ratio of individual banks and its main drivers.** The main variables that determine banks' solvency, such as the credit risk parameters, profits and risk-weighted assets, are projected under the assumption of a static balance sheet. The scenario analysis covers about 100 large and medium-sized banking groups directly supervised by the ECB. The starting point for the analysis is end-June 2017. The calculations follow to a large extent the EBA methodology for the 2016 EU-wide stress test, although some assumptions have been relaxed. Notably, in comparison to previous issues of this Review, the conservative caps and floors on the interest rate pass-through have been relaxed with the aim of deriving a more plausible impact on net interest income.

**Under the baseline scenario, the solvency position of the sample of euro area significant institutions is projected to improve somewhat in line with the moderate economic recovery.** The aggregate CET1 capital ratio is projected to increase by about 0.7 percentage point, to 14.4% by the end of 2018 (see Chart 3.54). This improvement would be driven by net interest income and net fee and commission income which would positively contribute by 5.1 and 2.6 percentage points, respectively, to the overall increase of the CET1 capital ratio. These positive effects would however be partially offset by operating expenses (-5.7 percentage points). The overall positive contribution of operating profits would still outweigh the negative one of credit losses by about 0.7 percentage point. Other effects on capital play a marginal role at this setting.

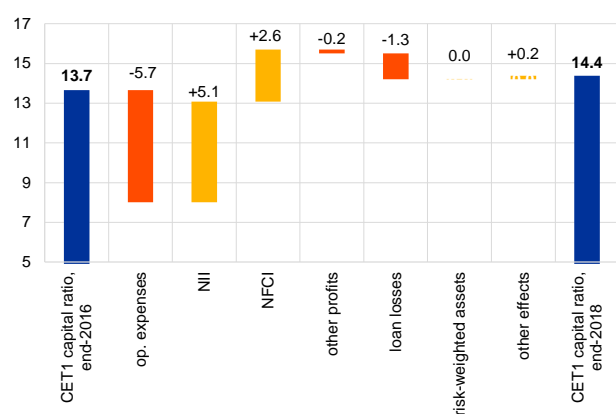
**The global repricing and distressed banking sector scenarios would lead to the most severe outcomes in terms of bank solvency.** The global repricing and distressed banking sector scenarios would lead to a CET1 capital depletion corresponding to 1.8 and 1.7 percentage points respectively compared with the baseline (see Chart 3.55), while the European repricing scenario would also lead to severe outcomes in terms of the CET1 capital ratio (-1.7 percentage points). As it is overall characterised by weaker interest rate and macroeconomic shocks, the non-bank financial sector spillover scenario would have the weakest effects in terms of banks' solvency, with a capital depletion of 1.4 percentage points compared with the baseline.

**Chart 3.54**

Under the baseline scenario, the euro area bank solvency position would continue to improve

Average contribution of changes in profits, loan losses and risk-weighted assets to the CET1 capital ratios of euro area banking groups under the baseline scenario

(percentage of CET1 capital ratio and percentage point contributions)



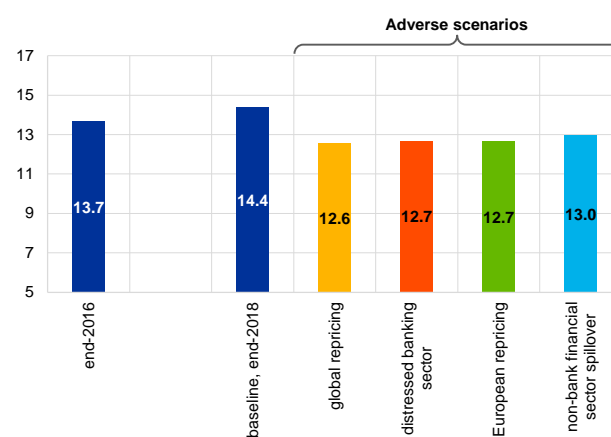
Sources: Individual institutions' financial reports, EBA, ECB and ECB calculations.  
Notes: The contribution of operating expenses is scenario-independent and is calculated in accordance with the EBA 2016 stress-test methodology and thus reflects the average of the previous five years. NII stands for net interest income and NFCI for net fee and commission income.

**Chart 3.55**

The adverse scenarios would reduce the aggregate capital ratio by between 1.4 and 1.8 percentage points

Average CET1 capital ratios of euro area banking groups under the baseline and adverse scenarios at the end of 2018

(percentages, average of euro area banking groups)



Sources: Individual institutions' financial reports, EBA, ECB and ECB calculations.  
Note: The contribution of operating expenses is scenario-independent and is calculated in accordance with the EBA 2016 stress-test methodology and thus reflects the average of the worst three years of the previous five years.

**The cost of credit risk would increase in all adverse scenarios with respect to the baseline.** Higher impairment provisions on loans is one of the largest



contributing factors to the reduction in the aggregate CET1 capital ratio (see [Chart 3.56](#)), reducing it by between 0.5 and 0.7 percentage point compared with the baseline result. These provisions would be the highest in the distressed banking sector scenario and particularly low in the non-bank financial sector spillover scenario, reflecting the relative size of the shocks to the real economy.

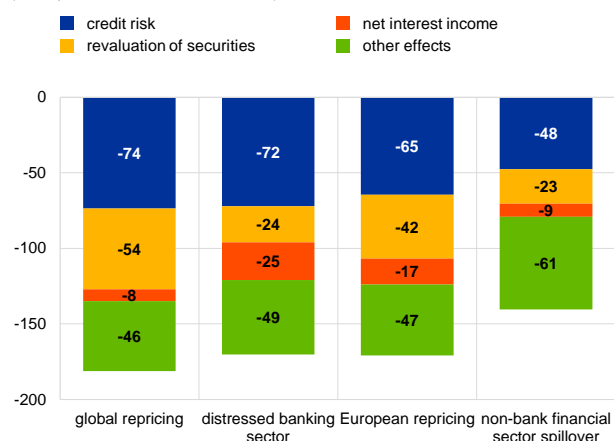
**Net interest income would contract under all adverse scenarios.** The most pronounced impact would be observed under the distressed banking sector scenario (-0.3 percentage point compared with the baseline), reflecting high banking sector funding cost shocks, some forgone interest due to higher credit default rates and the lower degree of yield curve steepening with respect to the other scenarios. The weakest effects on net interest income are observed under the global repricing and non-bank financial sector spillover scenarios, where the net interest income falls by about -0.1 percentage point compared with the baseline. In the former case, the main driver is the strong steepening of the yield curve (the yield curve would steepen on average by about 60 bps in the euro area), which tends to positively influence net interest income, but the effect is offset by the forgone interest due to material credit losses and by the mild increase in banks' wholesale funding costs. In the latter case, the main driver is the less severe impact on forgone interest income as default rates are less pronounced in this scenario (in view of the less adverse macroeconomic developments). The negative impact on net interest income under the European repricing scenario falls in-between the impact observed for the other three scenarios.

**Chart 3.56**

Credit risk and revaluation of securities contribute most to the deviation in capital ratios

Average contribution of risk factors to the change in the CET1 capital ratio under the adverse scenarios

(basis points, deviation from baseline)



Source: ECB calculations.

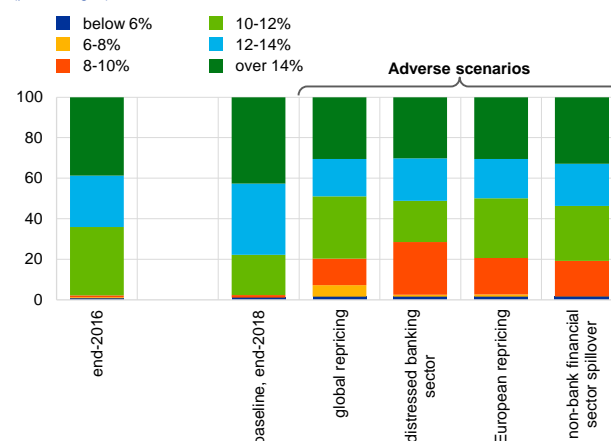
Notes: Credit risk includes additional loan impairments and the increase in risk exposure amounts. Revaluation of securities includes sovereign debt and other securities held as available for sale and designated at fair value through profit and loss. These effects are gross of tax and prudential filters. Other effects mainly include trading income, fee and commission income, operational risk, taxes and dividends.

**Chart 3.57**

The vast majority of banks would remain well capitalised under the four adverse scenarios

Distribution of banks' assets by CET1 capital ratio

(percentages)



Sources: Individual institutions' financial reports, EBA, ECB and ECB calculations.

**Losses on securities would be an important factor under the global repricing and the European repricing scenarios.** The impact of losses on securities would

be strongest under the global repricing scenario (0.5 percentage point) due to the contemporaneous revaluation of sovereign bonds and equity holdings. Also under the European repricing scenario, losses on securities would be high (0.4 percentage point), mainly reflecting the effects of the increase in sovereign bond yields. Under the distressed banking sector scenario, the revaluation of securities would have much milder effects owing to the weaker shocks to sovereign bond yields and equity prices. The non-bank financial sector spillover scenario is characterised by a 20% decline in equity prices; however, the losses on securities would only amount to a 0.2 percentage point reduction in the CET1 ratio as equities are a small component of the available-for-sale portfolio. Most of the losses would be reflected in net trading income, which is included in the broader category of “other effects” and would therefore contribute to a decline in the CET1 ratio more than in the other scenarios.

**While a number of banks would see a material worsening of their solvency position, by and large the euro area banking sector is assessed to be resilient to the materialisation of the four systemic risks.** Almost all banks would maintain their CET1 capital ratio above the average Pillar 2 capital requirements of 10%, although banks representing almost 30% of total assets would fall below this CET1 capital ratio level in the distressed banking sector scenario.<sup>81</sup> The share of banks with a CET1 ratio above 12% would decline from 80% of the total assets of the sector to around 50% in all scenarios (see [Chart 3.57](#)). Only a few small banks would face solvency difficulties under the adverse scenarios, with their CET1 ratio falling below 6%.

## Assessing the resilience of euro area insurers

**The impact of the main euro area financial stability risks on large euro area insurers is assessed using publicly available data for 11 major euro area insurance groups.** The assessment relies on a market-consistent approach to the quantification of risks, and is applied to both assets and liabilities of insurance corporations. Shocks to the insurers in the sample are assumed to be instantaneous. In the absence of sufficiently granular data, this impact assessment focuses on the main risks in economic terms rather than trying to gauge the impact in terms of prudential solvency ratios. In this way, it is conceptually and methodologically different from the bottom-up EU-wide stress-testing exercises carried out regularly by EIOPA, which also cover a much broader range of European insurers.<sup>82</sup>

The following market, credit and underwriting risks are assessed: (i) a change in interest rates; (ii) a fall in equity and real estate prices; (iii) a deterioration of the creditworthiness of borrowers through a widening of credit spreads for marketable instruments; (iv) an increase in lapse rates;<sup>83</sup> (v) an increase in loss rates on loan portfolios; and (vi) an increase in claims. The channels of transmission of these risks

<sup>81</sup> It is important to note, however, that individual banks' Pillar 2 capital requirements may deviate from the sample average.

<sup>82</sup> For a description of the methodology and results of the EIOPA exercises, see “2016 EIOPA Insurance Stress Test Report”, 15 December 2016.

<sup>83</sup> The lapse rate is defined as the fraction of contracts terminated prematurely by policyholders.

are detailed in **Table 3.4**, together with the necessary simplifying assumptions made for this exercise.<sup>84</sup>

**Table 3.4**

Technical assumptions regarding the individual risk drivers of insurers' balance sheets

Risk drivers	Channels of transmission	Technical assumptions
<b>Credit risk</b>	Changes in the credit quality of loan portfolios	Credit risk assessment carried out using: (i) breakdowns by rating or region, depending on data availability; and (ii) loss rate starting levels, which are stressed using the same methodology as that applied for assessing the resilience of euro area banks.
<b>Interest rate risk transmission</b>	Valuation effects on financial securities and liabilities	Sensitivities to interest rate changes computed for each interest rate-sensitive asset and liability exposure. Relevant yield curves used to project asset and liability cash-flow streams, to calculate internal rates of return, and to discount the cash flows using yield curve shocks.
<b>Market valuations of securities</b>	Valuation effects on financial securities and liabilities	Haircuts for debt securities derived from changes in the value of representative securities implied by the increase in interest rates under each shock and uniformly applied across the sample of large euro area insurers. Valuation haircuts applied to government bond portfolios estimated on the basis of representative euro area sovereign bonds across maturities. Haircuts for corporate bonds derived from a widening of credit spreads. Stock prices estimated using a representative euro area benchmark.
<b>Lapse risk</b>	Sales of assets due to unforeseen redemptions resulting from increased lapse rates	Lapse risk quantified by projecting insurers' cash flows over a two-year horizon, assuming a static composition of contracts and the reinvestment of maturing assets without a change in the asset allocation. Lapse rates linked to macroeconomic variables <sup>85</sup> . Unexpected component of lapses <sup>86</sup> leads to surrender payments <sup>87</sup> . In the case of negative cash flows from surrender payments, the insurer is obliged to use cash reserves or sell assets to meet obligations. Lapse risk equals the cash or other assets needed to cover surrender payments.
<b>Catastrophe risk</b>	Variations in the projected claims	Catastrophe risk estimated by fitting a log-normal distribution to historical loss payments and then drawn via Monte-Carlo simulations to estimate the annual loss distribution. The percentile is given by the scenario.
<b>Other assumptions specific to the sensitivity of investment income</b>		Investment income earned from reinvested assets shocked on the basis of investment income earned at the beginning of the simulation horizon. All other assets assumed to earn the initial investment income throughout the simulation horizon. Maturing fixed income assets reinvested retaining the initial asset composition. Underwriting business component of operating profit assumed to remain constant throughout the simulation horizon. No distribution of dividends assumed.

Source: ECB.

## Main features of the adverse scenarios for the insurance sector

**This assessment uses three scenarios specifically designed to target potential weaknesses of the insurance sector: a flight-to-safety scenario, a twin shock scenario and a natural catastrophe scenario.** The departure from the scenarios used for the banking sector is due to specific features of insurers' business models, which imply that the insurance sector features vulnerabilities that are not necessarily aligned with the ones identified for the banking sector. Notably, one of the main structural divergences is the sensitivity to interest rate changes. The insurance sector scenarios are therefore tailored to target insurer-specific vulnerabilities, while

<sup>84</sup> For a comprehensive explanation of the underlying assumptions, please refer to Section 3.2 of the May 2015 FSR.

<sup>85</sup> Sensitivities of lapse rates to GDP and unemployment were derived by taking the mean of a number of elasticity values, collected from the literature (e.g. Honegger, R. and Mathis, C., "Duration of life insurance liabilities and asset liability management", *Working Paper*, Actuarial Approach for Financial Risks (AFIR), 1993; Kim, C., "Report to the policyholder behaviour in the tail subgroups project", *Technical Report*, Society of Actuaries, 2005; and Smith, S., "Stopping short? Evidence on contributions to long-term savings from aggregate and micro data", *Discussion Paper*, Financial Markets Group, London School of Economics, 2004) or calculated by the ECB.

<sup>86</sup> The unexpected component of lapses is defined as the difference between the projected lapse rate and the average lapse rate reported by large European insurers.

<sup>87</sup> It is assumed that 50% of the total amount represented by the extra lapse rates has to be paid due to the existence of penalties in the contracts, which lower the insurers' risk.

also incorporating elements from the four main systemic risks (see [Table 3.5](#) for further details on the magnitude of the shocks applied).

**The twin shock scenario affects both sides of the balance sheet negatively.** It features an increase in long-term bond yields, supplemented by a fall in other asset prices, as in the global repricing scenario considered above. At the same time, real estate prices are assumed to drop by 10%, combined with an increase in corporate failures and a conservative assumption about the occurrence of natural catastrophes (corresponding to the worst year out of five years).

**The flight-to-safety scenario is characterised by stock market turmoil triggering an increase in demand for safe assets.** Short-term interest rates remain unchanged, but high-quality long-term sovereign bond yields decrease significantly, causing a flattening of the yield curve. Increasing risk premia lead to a widening of corporate and bank credit spreads, while natural catastrophes impact the non-life activities (worst year in five).

**The natural catastrophe scenario assumes a strong increase in the frequency and severity of such events (worst year out of 25 years).** This is combined with a deterioration of economic conditions due to non-bank financial investors retrenching, as envisaged in the context of the systemic risk related to liquidity risks in the non-bank financial sector. In terms of the financial shock, the scenario is also aligned with the non-bank financial sector spillover scenario, which has been found to be the most adverse for the insurance sector among the four scenarios identified for and applied to the banking sector.

**Table 3.5**  
Details of the main shocks within the insurance-specific adverse scenarios

Scenario names	Key exogenous shocks driving the impact on GDP and on the solvency of insurance companies	Magnitude of exogenous shocks
<b>Twin shock</b>	Shock to sovereign bond yields	10-year government bond yields - euro area average (+87 bps)
	Shock to equity prices	Euro area average (-11%)
	Shock to real estate prices	Euro area average (-10%)
	Natural catastrophe	80th percentile
<b>Flight-to-safety</b>	Shock to equity prices	Euro area average (-24%)
	Shock to sovereign bond risk premia	10-year government bond yields - DE (-41 bps), GR (+49 bps)
	Natural catastrophe	80th percentile
<b>Natural catastrophe</b>	Natural catastrophe events	96th percentile
	Shock to household net wealth	Euro area average (-4%)

## Results for euro area insurance groups

**The flight-to-safety scenario results in the strongest negative impact on euro area insurers.** Under the flight-to-safety scenario, euro area insurers exhibit average total declines in their net asset values amounting to 3.0% of their total assets (see [Chart 3.5](#)). The twin shock scenario is projected to have the least significant impact on the insurance companies, triggering a negative effect on net asset values of just

0.1%. The natural catastrophe scenario would rank second in terms of severity, resulting in a drop of 1.7% in net asset values.

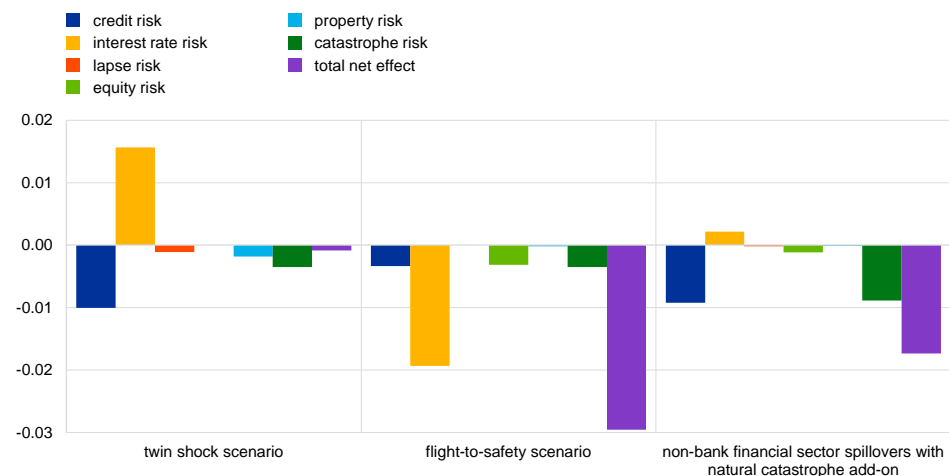
**Credit risk is an important negative driver of net asset value in all three scenarios, while interest rate risk is the most diverse risk driver across the three scenarios.** The twin shock scenario triggers a materialisation of credit risk amounting to -1% of net asset value (expressed as a percentage of total assets), while in the natural catastrophe scenario it amounts to -0.9%. Insurers' credit risk is the least affected under the flight-to-safety scenario, with a negative effect of 0.3% in net asset value. The variability of the credit risk impact across scenarios is mainly driven by credit rating migrations affecting (especially corporate) bond holdings.

**The shape of the yield curve is an important determinant of interest rate risk, along with the magnitude of the maturity mismatch between assets and liabilities.** The reason why the twin shock scenario triggers a positive effect in interest rate risk terms (+1.6% of net asset value) is associated with the steepening of the yield curve.<sup>88</sup> This would imply a rise in the insurers' net asset value that almost fully compensates for the adverse impact of the other risks in this scenario. Similar in nature but of a different magnitude, interest rate risk under the natural catastrophe scenario also contributes positively with 0.2% of insurers' net asset value. By triggering the opposite phenomenon, i.e. a flattening of the yield curve, the flight-to-safety scenario carries a material risk associated with the exposure of insurers to interest rate evolution. The impact is significantly negative, at -1.9% of the net asset value.

### Chart 3.58

Change in the net asset values of large euro area insurers under different scenarios

(Q4 2016, percentage of total assets)



Sources: Individual institutions' financial reports and ECB calculations.

<sup>88</sup> As the average duration of insurance companies' assets tends to be shorter than that of their liabilities, a steepening of the yield curve leads to the value of insurers' liabilities decreasing faster than the value of their assets.

**A more frequent occurrence of natural catastrophes could result in a substantial negative impact on insurers' net asset value.**

The natural catastrophe scenario would trigger a negative impact on the net asset value of almost 1%. Catastrophe risk would be more moderate, though non-negligible, in the twin shock and flight-to-safety scenarios, representing a decrease in net asset value of 0.3% in both cases.

**The three other risks – lapse, property and equity risks – are found to be secondary in terms of impact.**

The lapse risk is muted, standing at only -0.1% under the twin shock scenario, reflecting the more adverse developments in GDP growth and the unemployment rate under this scenario. The twin shock scenario also encompasses a property shock which results in a slightly negative property risk effect of 0.1% of net asset value, while the negative impact from equity risk is strongest in the flight-to-safety scenario.

**Overall, this assessment highlights the centrality of the evolution of interest rates for the resilience of insurance corporations.**

While this analysis only relies on high-level aggregate data from market sources and does not provide a direct assessment of prudential solvency ratios, it clearly highlights how the shape of the yield curve can materially influence insurance companies' balance sheets. It also shows that credit and catastrophe risks can exert a meaningful influence on insurers' outlook.

## 3.3 Regulatory framework

This section provides an overview of a number of regulatory initiatives in the areas of banking, insurance, financial markets and financial infrastructures that are of particular importance for enhancing financial stability in the EU. The initiatives aim to both reduce systemic risk and strengthen the resilience of the financial system as a whole.

### 3.3.1 Regulatory initiatives for the banking sector

#### 1. Prudential rules for banks

##### CRR/CRD review

**The European Commission published on 23 November 2016 a comprehensive package of banking regulation reforms.**

The package will implement in European legislation important elements of the global regulatory reform agenda, such as new global standards on bank capital adequacy and liquidity and other outstanding elements. The proposed reform package will bring the post-crisis regulatory reforms

in the EU close to completion,<sup>89</sup> strengthen the regulatory architecture, reduce risks in the banking sector and thereby increase the stability and resilience of the financial system. Such progress on risk reduction will pave the way for concurrent and commensurate progress on risk-sharing in the European banking sector, which is needed to complete the banking union. Certain elements of the package have already been agreed upon during recent trialogue discussions, such as the proposals on bank creditor hierarchy, the implementation of IFRS 9, as well as transitional arrangements for the large exposure framework. The detailed views of the ECB on the Commission's proposal are outlined in the ECB Opinion on amendments to the Union framework for capital requirements of credit institutions and investment firms.<sup>90</sup>

**The European Commission's package includes a number of proposals that are of particular relevance for the design and operation of the macroprudential framework.** More specifically, the proposed reform package foresees refinements to the Pillar 2 framework, distinguishing between Pillar 2 requirements (P2R) and Pillar 2 guidance (P2G). It also clarifies the institution-specific nature of the Pillar 2 framework, notably that P2R should be implemented by microprudential authorities and should not be used to address macroprudential risks. The Commission's proposal contributes to better clarifying the roles of macro- and microprudential authorities by explicitly assigning responsibilities and powers with regard to Pillar 2 requirements. However, such a clarification is also necessary with respect to P2G. In concrete terms, the interaction of P2G with the combined buffer requirements, which are set by macroprudential authorities, should be clarified and potential conflicts with the policy objective of the countercyclical capital buffer should be avoided.

**The removal of Pillar 2 from the macroprudential toolkit should be accompanied by targeted revisions to the macroprudential framework.** In particular, macroprudential authorities should be provided with a sufficient set of instruments to effectively address systemic risks. In this regard, the ECB put forward a number of proposals in its Opinion on the CRR/CRD review, as well as in its contribution to the European Commission's consultation on the review of the EU macroprudential policy framework.<sup>91</sup> On this basis, key elements of the targeted review could include certain revisions to the framework, such as: (i) eliminating the overlaps between the capital buffers for systemically important institutions (SIIs) and the systemic risk buffers (SRBs) and making them cumulative when they address distinct risks; (ii) increasing the current ceiling on the O-SII buffer rate to a level that is commensurate with the systemic risks, while keeping an increased cap for subsidiaries in order to avoid ring-fencing of capital in host countries; (iii) adopting mandatory transposition of the SRB into national legislation; and (iv) streamlining notification, coordination and mandatory reciprocity requirements of macroprudential

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<sup>89</sup> Some changes to the Basel III framework, most notably those relating to credit and operational risk, have not yet been finalised by the Basel Committee on Banking Supervision and are not included in the proposed reform package.

<sup>90</sup> [Opinion of the European Central Bank of 8 November 2017 on amendments to the Union framework for capital requirements of credit institutions and investment firms \(CON/2017/46\)](#).

<sup>91</sup> See [ECB contribution to the European Commission's consultation on the review of the EU macroprudential policy framework](#).

measures. In addition, in order to increase flexibility while ensuring the coherence and effectiveness of the EU-wide macroprudential framework, the mandatory sequencing (so-called pecking order) of macroprudential measures should be removed from the legislation (Article 458 of the CRR and Article 133 of the CRD). Finally, it is also important that designated authorities have at their disposal instruments to address systemic risks at the sectoral level, in particular to counter risks in the real estate market. Such sectoral instruments should be added to the macroprudential toolkit.

### ESFS review

**The European Commission has recently published a package of proposals to strengthen the European System of Financial Supervision (ESFS).** These proposals amend the regulations establishing the three European Supervisory Authorities (ESAs) and the ESRB Regulation, and introduce modifications to the Directive on Insurance and Reinsurance (Solvency II) and the European Market Infrastructure Regulation (EMIR) as well. The set of reforms is aimed at ensuring intensified supervisory convergence across the EU and enhancing the governance and funding structure of the ESAs. Moreover, it is proposed to extend direct supervision by the European Securities and Markets Authority to selected capital market sectors, also in order to reduce cross-border barriers and promote further market integration. Several targeted amendments also aim to strengthen the efficiency of the ESRB and to reinforce macroprudential coordination.

**With regard to the ESAs, one of the key objectives of the review is to enhance the European dimension of the operation and decision-making of these authorities.** The ECB will not be granted voting membership status in the Board of Supervisors of the European Banking Authority (EBA), nor is it foreseen that the ECB will be part of the new EBA Executive Board as either a member or an observer.

**As regards the European Systemic Risk Board, the proposal includes the formalisation of ECB Banking Supervision participation in the ESRB General Board, Steering Committee and Advisory Technical Committee.** However, the ECB would support further efforts to avoid overlaps between the ESRB and the ECB by reaping the synergies of the ECB's role in risk assessment with respect to the euro area banking sector.

### Completing the banking union

**On 11 October 2017 the European Commission published a Communication on completing the banking union.** The Communication sets out a path for completing the banking union in terms of further risk reduction and risk-sharing. In particular, it: (i) urges the adoption of the risk-reduction package proposed in November 2016; (ii) suggests a new approach to moving towards a European deposit insurance scheme (EDIS); (iii) calls for the completion of a backstop to the banking union; (iv) recalls the actions under preparation to address non-performing loans; and



(v) considers a proposal to facilitate the diversification of sovereign portfolios via sovereign bond-backed securities (SBBSs). On supervision, the Communication mentions the need to continue ensuring high-quality supervision, to be addressed in proposals on the prudential treatment of investment firms. In a separate Commission report, the establishment of the SSM is assessed as having been successful overall.

## 2. Crisis management and resolution of banks

### BRRD/MREL review

**The European Commission's proposal on banking regulation reforms included, inter alia, important amendments to the crisis management and resolution framework.**<sup>92</sup> The key issues addressed are:

1. Amendments to the minimum requirement for own funds and eligible liabilities (MREL), which – for example – implement the total loss-absorbing capacity (TLAC) standard for global systemically important banks (G-SIBs).
2. Some harmonisation in the creditor hierarchy by introducing a new “non-preferred” senior debt class, ranking below existing senior unsecured liabilities but above subordinated liabilities, so as to enhance the implementation of the bail-in tool and to facilitate meeting the TLAC requirement.
3. A new pre-resolution moratorium power, i.e. the establishment of new harmonised powers in the EU for the competent authorities to suspend payment and delivery obligations.

The detailed views of the ECB on the Commission's proposal are outlined in the ECB Opinion on revisions to the Union crisis management framework.<sup>93</sup>

**At the international level, the Financial Stability Board (FSB) published guiding principles to assist authorities in implementing the FSB's standard on internal TLAC and the sixth report on the implementation of post-crisis resolution reforms.** Internal TLAC requires a certain amount of loss-absorbing capacity to be held within the group, allowing losses of material subsidiaries or sub-groups of a G-SIB to be “upstreamed” to its resolution entity. The principles guide authorities in implementing the different aspects of the internal TLAC requirement, such as its size and composition, the cooperation between home and host authorities, and the trigger mechanism. As regards the implementation of the post-crisis resolution reforms, the sixth report on this matter highlighted that further actions are necessary to fully implement the Key Attributes of Effective Resolution Regimes for Financial

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<sup>92</sup> The Bank Recovery and Resolution Directive (BRRD) and the Single Resolution Mechanism Regulation (SRMR).

<sup>93</sup> [Opinion of the European Central Bank of 8 November 2017 on revisions to the Union crisis management framework \(CON/2017/47\)](#).

Institutions and future work will focus on the consistent implementation and the effects of the agreed resolution reforms.

**Table 3.1**

Selected regulatory initiatives at the international level and legislative proposals for the EU banking sector

Initiative	Description	Current status
<b>CRR/CRD review</b>	The European Commission is proposing amendments to: (i) the Capital Requirements Regulation (CRR) and Directive (CRD); and (ii) the Bank Recovery and Resolution Directive (BRRD) and the Single Resolution Mechanism Regulation (SRMR).	Technical discussions are ongoing in the relevant Council working groups. No exact timeline for a legislative proposal is available.
<b>TLAC standard and MREL review</b>	In the EU, TLAC will be implemented through the ongoing MREL review, in accordance with the BRRD. The European Commission legislative proposal to implement TLAC and revise MREL was published on 23 November 2016 and the legislative process is ongoing.	The Council has begun work to adopt a general approach to the Commission's legislative proposal. The European Parliament has appointed rapporteurs to develop its report. Once these are adopted, the dialogue discussions will start.
<b>EDIS</b>	The EDIS proposal foresees the establishment of a fully fledged European deposit insurance scheme as of 2024, via an increased mutualisation in three steps (reinsurance, coinsurance, full EDIS).	The European Commission published a legislative proposal for a European deposit insurance scheme on 24 November 2015, and on 11 October 2017 published a Communication on completing banking union. EDIS is considered to be the third pillar of a fully fledged banking union, as notably outlined in the Five Presidents' Report <sup>1)</sup> . The EDIS proposal is currently being discussed in a Council ad hoc working party, which is also updating the so-called risk-reduction measures. Discussions at the European Parliament have also started. The ECB's legal opinion on the proposal was published on 20 April 2016. <sup>2)</sup>  On 11 October the Commission published a Communication suggesting a new approach for EDIS which envisages a more gradual introduction of the scheme – proportionate to progress achieved with regard to risk-reduction measures. According to the new proposal, EDIS would start with a reinsurance phase limited to liquidity coverage and would move to a coinsurance phase (where the EDIS would also cover losses of national deposit guarantee schemes). The transition to coinsurance would, however, be contingent on a set of conditions.

1) "Report on Complementing Europe's Economic and Monetary Union", published on 22 June 2015.

2) Opinion of the European Central Bank of 20 April 2016 (CON/2016/26).

### 3.3.2 Regulatory initiatives for financial markets and financial infrastructures

In addition to the initiatives in the area of banking regulation, several steps have been taken to address risks in financial markets and to strengthen the resilience of financial infrastructures.

#### 1. Market-based finance/investment funds and investment firms

**In April 2017 the Committee on the Global Financial System (CGFS) published a report on repo market functioning.** The report found that despite the overall stable repo volumes in global repo markets, there are some signs of volatility around banks' balance sheet reporting dates. Regulatory reforms and monetary policy have been identified by the report as two important potential drivers of recent developments in repo markets. Special Feature C follows up on the CGFS repo market report by providing a more in-depth analysis of the impact of regulatory reforms on repo markets.

**On 12 January 2017 the FSB published policy recommendations to address the structural vulnerabilities from asset management activities. The International Organization of Securities Commissions (IOSCO) will**

**operationalise some of the FSB recommendations.** The FSB recommendations focus on addressing vulnerabilities related to: (i) the mismatch between the liquidity of fund investments and redemption terms and conditions for fund units; (ii) leverage within investment funds; (iii) operational risk and challenges in transferring investment mandates in stressed conditions; and (iv) securities lending activities of asset managers and funds. The ECB actively supports this work, given the growing importance of this part of the financial system and the need to extend the macroprudential toolkit to mitigate risks to financial stability coming from beyond the banking sector. On 6 July IOSCO published a [consultation paper](#) on liquidity risk management recommendations for collective investment schemes, which builds on the guidance provided in IOSCO's 2013 report "Principles of Liquidity Risk Management for Collective Investment Schemes". The consultation ended on 18 September 2017.

**On 29 September 2017 the EBA published its Opinion on the design and calibration of the new prudential framework for investment firms (outside the CRR/CRD legislative framework), which is tailored to the different business models of investment firms and their inherent risk.** The Opinion sets out recommendations to develop a single and harmonised set of requirements that are reasonably simple, proportionate and relevant to the nature of investment firms authorised to provide MiFID services and activities. To recall, the EBA published a first report in December 2015, recommending the development of a new categorisation of investment firms distinguishing between: (i) systemic and "bank-like" investment firms to which the full CRR/CRD requirements should be applied; (ii) other investment firms ("non-systemic") with a more limited set of prudential requirements; and (iii) very small firms with "non-interconnected" services. The EBA published a discussion paper on 4 November 2016 that put forward a basis for the new categorisation of investment firms and a specific prudential regime for investment firms that are not systemic and bank-like and for very small, non-interconnected investment firms outside the CRR/CRD. The ECB supports the work aimed at ensuring that the prudential regime correctly captures all the risks relevant to prudential supervision, as well as any systemic risks posed by investment firms.

**On 20 September 2017 the European Commission announced that it will propose aligning the regulatory and supervisory treatment of large and complex investment firms with that of credit institutions.** On 11 October 2017 the Commission published an [update](#), where it made clear that it will propose that large investment firms carrying out bank-like activities be considered credit institutions and be subject to bank supervision by the SSM. The Commission is also conducting a broader review of the regulatory framework for investment firms, expected to be completed before the end of 2017. The ECB believes that EU financial stability would be best served by making large and complex investment firms, and particularly those with cross-border operations and those undertaking bank-like activities, subject to the same regulation and supervision as credit institutions.

## 2. Financial infrastructures

**The ECB Regulation on oversight requirements for systemically important payment systems entered into force on 12 August 2014, aiming, inter alia, to ensure the efficient management of legal, credit, liquidity, operational, general business, custody, investment and other risks of systemically important payment systems (SIPs).** An amending Regulation was adopted on 3 November 2017. It introduces, inter alia, amendments relating to liquidity risk mitigation and cyber resilience and assigns additional powers to the competent authorities (e.g. the right to conduct on-site inspections and to mandate an investigation or independent review of certain aspects of a SIPs).

**The European Commission has initiated the review of EMIR.** On 4 May 2017 a proposal for a targeted review of the Regulation was launched (“EMIR REFIT”). The proposal put forward a number of changes aimed at increasing the efficiency of requirements and reducing the burden on small financial counterparties and non-financial counterparties. These include streamlining transaction reporting requirements, limiting the scope of the clearing obligation for non-financial counterparties and small financials, and extending targeted exemptions aimed at pension funds. The ECB adopted its Opinion on the proposed regulation on 11 October 2017. On 13 June 2017 the Commission published a second proposal (“EMIR Step 2”), which seeks to strengthen the EU supervisory framework for clearing houses, in particular with regard to systemically important third-country central counterparties (CCPs). These amendments are a response to the growing importance of CCPs as systemic entities within the financial system, as well as the foreseen withdrawal of the UK from the EU (which will lead to significant volumes of transactions denominated in EU currencies being conducted offshore). They would provide ESMA (through the establishment of a new body – the CCP Executive Session) and the central banks of issue of the ESCB with a greater role in the supervisory framework for EU CCPs and systemically important third-country CCPs. The ECB adopted its Opinion on the proposed regulation on 4 October 2017.

**In response to the proposals foreseen under the EMIR review, the ECB adopted on 22 June 2017 a Recommendation to amend the Statute of the ESCB and of the ECB.** This amendment would provide the ECB with regulatory competence over CCPs, providing it with the legal basis to fulfil the strengthened central bank of issue role foreseen in the Commission’s EMIR Step 2 proposal.

**Legislative discussions on the European Commission’s proposal for the recovery and resolution of central counterparties continue to progress.** The proposal, which was released on 28 November 2016, is based on the guidance adopted by international standard-setting bodies, and seeks to ensure that risks related to the failure of central counterparties can be managed effectively, while preserving the stability of the financial system and helping to avoid that taxpayers have to bear the costs associated with the restructuring and resolution of failing CCPs. It aims to lay out rules for the preparation of recovery and resolution plans, to provide CCP supervisors with early intervention powers, to define a set of effective resolution powers, and to establish principles for cooperation between national

authorities. The ECB published its Opinion on the proposed regulation on 20 September 2017.

**Table 3.6**

Selected new legislation and legislative proposals for financial markets and financial infrastructures in the EU

Initiative	Description	Current status
<b>ECB Regulation on oversight requirements for systemically important payment systems</b>	The aim of the Regulation is to ensure the efficient management of all types of risk that SIPSs face, together with sound governance arrangements, objective and open access, as well as the efficiency and effectiveness of SIPSs.	The Regulation entered into force on 12 August 2014. An amending Regulation was adopted on 3 November 2017.
<b>EMIR review</b>	The first set of amendments (EMIR REFIT) aims to improve the proportionality of rules regarding over-the-counter (OTC) derivatives for smaller financial counterparties and non-financial counterparties.  The second set of amendments (EMIR Step 2) aims to review the supervisory framework for EU and third-country CCPs, by introducing a more pan-European supervisory approach involving a greater role for ESMA and for the central banks of issue of the ESCB.	The two sets of amendments were published on 4 May and 13 June 2017 respectively.  The respective ECB Opinions were published on 11 and 4 October.
<b>ECB Recommendation to amend Article 22 of the Statute of the ESCB and of the ECB</b>	The proposed amendment seeks to provide the ECB with the legal basis to fulfil the strengthened central bank of issue role foreseen in the Commission's EMIR Step 2 proposal.	The ECB Recommendation was adopted on 22 June 2017.
<b>CCP recovery and resolution regulation</b>	The aim of the proposed regulation is to ensure that risks related to the failure of CCPs can be managed effectively, while preserving the stability of the financial system and helping to avoid that taxpayers have to bear the costs associated with the restructuring and resolution of failing CCPs.	The European Commission's legislative proposal was published on 28 November 2016.  The ECB Opinion on the proposed regulation was published on 20 September 2017.

### 3.3.3 Regulatory initiatives for the insurance sector

**In Europe, EIOPA published an Opinion on the harmonisation of recovery and resolution frameworks for (re)insurers across the Member States.**<sup>94</sup> The Opinion is based on a previous discussion paper published by EIOPA in December 2016 and a survey on existing recovery and resolution frameworks conducted by EIOPA in the first half of 2016 among national supervisory authorities. Based on the results of the survey, EIOPA noted that the existing fragmented landscape of national recovery and resolution frameworks could cause significant barriers to the resolution of (re)insurers, particularly of cross-border groups. Therefore, the Opinion recommends a minimum harmonised and comprehensive recovery and resolution framework for (re)insurers to guarantee policyholder protection and safeguard financial stability in the European Union. The Opinion is addressed to the European Parliament, the Council of the European Union and the European Commission.

**The ESRB also published a report on recovery and resolution for the EU insurance sector, focusing on the macroprudential perspective.**<sup>95</sup> The report argues that the disorderly failure of an insurer or a group of insurers may pose financial stability risks and that the regular insolvency procedure might be unable to manage a failure in the EU insurance sector in an orderly fashion. In addition, according to the report, the current environment of low interest rates further

<sup>94</sup> [Opinion on the harmonisation of recovery and resolution frameworks for \(re\)insurers across the Member States](#), EIOPA, 5 July 2017.

<sup>95</sup> ["Recovery and resolution for the EU insurance sector: a macroprudential perspective"](#), ESRB, 17 August 2017.

underlines the need to strengthen recovery and resolution frameworks. Therefore, the report advocates the development of a harmonised effective recovery and resolution framework for insurers across the European Union and recommends that existing national frameworks be evaluated and, if appropriate, enhanced and harmonised.

**At the international level, the International Association of Insurance Supervisors (IAIS) published the Insurance Capital Standard (ICS) Version 1.0 for extended field testing.**<sup>96</sup> The ICS is a globally comparable risk-based measure of capital adequacy for internationally active insurance groups (IAIGs)<sup>97</sup> and global systemically important insurers (G-SIIs), reflecting all material risks that these may be exposed to. The main objectives of the ICS are to protect policyholders and to contribute to financial stability. One of the purposes of the ICS is to constitute a foundation for the Higher Loss Absorbency (HLA) requirements for G-SIIs<sup>98</sup> once Version 2.0 is developed by late 2019.<sup>99</sup> This extended field-testing exercise is addressed to all potential IAIGs and other interested volunteer groups and contains extended data requests on technical and policy issues that the IAIS will be seeking to resolve for ICS Version 2.0.

**Table 3.7**  
Selected new regulatory initiatives for the insurance sector

Initiative	Description	Current status
<b>EIOPA Opinion on the harmonisation of recovery and resolution frameworks for (re)insurers across the Member States</b>	EIOPA's Opinion calls for a minimum harmonised and comprehensive recovery and resolution framework for (re)insurers to deliver increased policyholder protection and financial stability in the European Union.	EIOPA's Opinion was published in July 2017.
<b>ESRB report on recovery and resolution for the EU insurance sector from a macroprudential perspective</b>	The report notes that the disorderly failure of an insurer or group of insurers may pose financial stability risks and therefore advocates the development of a harmonised effective recovery and resolution framework for insurers in the EU.	The ESRB report was published in August 2017.
<b>Insurance Capital Standard Version 1.0 for extended field testing</b>	The ICS is a globally comparable risk-based measure of capital adequacy for internationally active insurance groups and global systemically important insurers. The ICS Version 2.0 will serve as a basis for the HLA requirements for G-SIIs.	The ICS Version 1.0 was published in July 2017. The data for the current extended field testing are to be submitted in September 2017. The ICS Version 2.0 will be published at the end of 2019.
<b>Higher Loss Absorbency (HLA) requirements</b>	The HLA requirements are meant to help reduce the probability and impact on the financial system of the distress or failure of a G-SII.	The HLA requirements would be implemented beginning in 2022 and would apply to any G-SIIs identified in 2020.

<sup>96</sup> "IAIS Releases ICS Version 1.0 for extended field testing", IAIS, 21 July 2017.

<sup>97</sup> An IAIG is a large, internationally active group that includes at least one sizeable insurance entity. The IAIS provides criteria based on size and international activity for supervisors to assess whether a particular insurance group should be treated as an IAIG.

<sup>98</sup> The HLA requirements are meant to help reduce the probability of and impact on the financial system of the distress or failure of a G-SII.

<sup>99</sup> According to the IAIS, the ICS Version 1.0 represents an important step towards the development of ICS Version 2.0 by late 2019.

## Box 7

### Can commodity trading firms create systemic risk via derivatives markets?

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**Commodity traders<sup>100</sup> are relevant from a financial stability perspective as they are active players in derivatives markets.** Commodity dealers buy or sell a commodity and transform it, for example, by transporting or storing it, and may hedge the resulting commodity position with a derivative transaction. The derivative contract will hedge, for example, against commodity price risk, which is considered the largest risk for most trading firms, or against changes in foreign exchange rates.<sup>101</sup> Thus, hedging is inherent to the business of commodity dealers and derivatives are central to commodity traders' risk management frameworks. At the same time, there are concerns about the speculative use of derivative contracts. For example, in the US the Commodity Futures Trading Commission (CFTC) intends to establish **position limits** for physical commodity derivatives, with the aim to prevent excessive speculation from distorting commodity prices.

**Commodity traders have largely escaped regulatory scrutiny in the EU despite their potentially significant role in derivatives markets.** Because trading derivatives is a significant part of their business, the main regulatory framework relevant for commodity traders is the Market in Financial Instruments Directive (MiFID). Under both MiFID I and II, commodity traders can use several exemptions to avoid the regulatory requirements applicable to investment firms.<sup>102</sup> In addition, under the Capital Requirements Directive (CRD IV) framework, commodity dealers are temporarily exempt from compliance with minimum capital rules until the end of 2017.<sup>103</sup> In case they fell under the scope of MiFID II, they would have to fulfil requirements regarding, inter alia, trading, transparency, capital and margin, and they would become subject to other EU rules, such as the European Market Infrastructure Regulation (EMIR) and CRD IV.

**Against this background, the analysis in this box looks at the 11 largest European commodity trading firms and investigates their derivative trading activity in the euro area.** The 11 commodity traders in the sample have a combined amount of €783 billion in total assets globally. The analysis is based on a sub-set of the data collected under EMIR which covers 18,281 derivative trades<sup>104</sup> in the euro area by 84 distinct entities belonging to the 11 groups at the end of January 2017. The total notional amount<sup>105</sup> of derivatives traded is €211 billion. The analysis

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<sup>100</sup> For the purpose of this box, the terms "commodity trader", "commodity dealer" and "commodity trading firm" will be used interchangeably to denote firms that engage in the process of purchasing, selling and transforming physical commodities. Transformation can be in space (from the extraction/production to the consumption location, using logistics), in time (using storage) or in form (with processing).

<sup>101</sup> See Pirrong, C., "The economics of commodity trading firms", Trafigura, 2014.

<sup>102</sup> See Directive 2004/39/EC ("MiFID I") and Directive 2014/65/EU ("MiFID II"). The broadest exemption under MiFID I is Article 2(1)(k) (the "commodity dealer exemption"). This exempts commodity trading companies that are not part of a banking or financial services group, and whose main business is dealing on their own account in commodities or commodity derivatives. Under MiFID II, commodity dealers can remain exempt if they fulfil the criteria laid out in Article 2(1)(j) (the "ancillary business exemption").

<sup>103</sup> Article 498 of Regulation (EU) 575/2013 ("CRR").

<sup>104</sup> The 18,281 derivative trades are obtained after cleaning, de-duplicating and excluding trades with missing mark-to-market values. See Abad et al., "Shedding light on dark markets: first insights from the new EU-wide OTC derivatives dataset", ESRB, 2016.

<sup>105</sup> This analysis is based on notional amounts. The main messages of the analysis are broadly similar when using market values.

provides a lower bound on commodity dealers' activity as the dataset does not capture trades outside the euro area.<sup>106</sup>

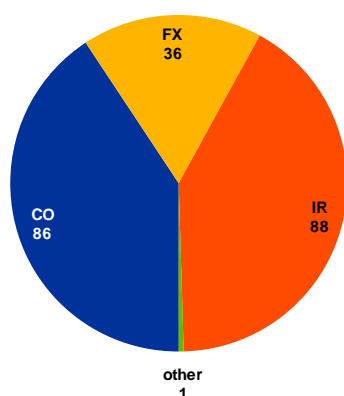
**The analysis reveals that the 11 commodity dealers cover more than 25% of the euro area market in commodity derivatives and are also active in other derivative classes (albeit to a lesser extent).** Overall, more than 95% of derivative contracts are non-centrally cleared, over-the-counter (OTC) derivatives. Compared with the size of the OTC market in commodity derivatives in the euro area,<sup>107</sup> the notional amounts of commodity derivatives traded by the 11 commodity trading firms in the euro area represent around 25% in this market. The majority of commodity derivatives cover underlying energy products. In addition to commodity derivatives, the commodity dealers in the sample also trade in interest rate and currency (foreign exchange) derivatives, predominantly FX forwards and interest rate swaps (see Chart A and Chart B).

### Chart A

Commodity dealers trade mostly in commodity, interest rate and currency derivatives...

**Commodity dealers' total trades by derivative class**

(Jan. 2017, notional amounts, € billions)



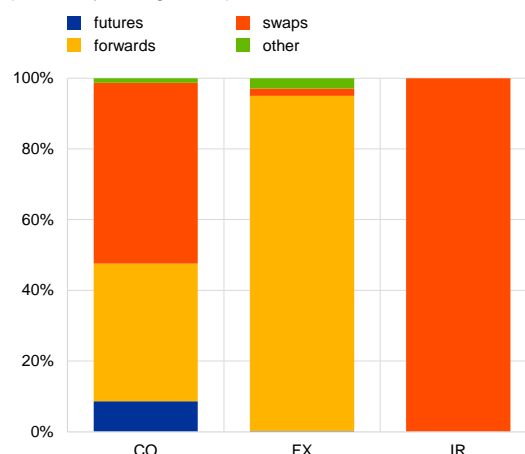
Sources: ECB calculations based on EMIR data.  
Note: FX, CO and IR denote currency, commodity and interest rate derivatives, respectively.

### Chart B

...predominantly forwards and swaps

**Total trades by derivative class and instrument**

(Jan. 2017, percentage of total)



Sources: ECB calculations based on EMIR data.  
Note: FX, CO and IR denote currency, commodity and interest rate derivatives, respectively.

**The trading activity of the 11 commodity trading firms is significant both in absolute amounts and relative to their size.** The data show that the derivative trading activity in the euro area of the largest commodity traders in the sample is comparable to the total global activity of some of the most active financial institutions in commodity derivatives in terms of notional amounts.<sup>108</sup> The total notional amounts traded in the euro area by 9 of the 11 groups represent on

<sup>106</sup> Under EMIR, counterparties resident in the EU are required to report details of derivative transactions to authorised trade repositories. This analysis is based on a sub-set of these data containing derivative contracts in which at least one counterparty resides in the euro area. For the purpose of this box, "derivative trades in the euro area" will refer to derivative contracts either held by a subsidiary of the 11 commodity dealers which is located in the euro area or in which the other counterparty is located in the euro area.

<sup>107</sup> Estimated from the BIS semi-annual survey statistics on OTC derivatives, based on national values for Germany, France, Italy, the Netherlands and Spain; values as at end-2016. However, this is only a rough estimate given that the EMIR data and the BIS semi-annual survey are not fully comparable.

<sup>108</sup> See Valiante, D. and Egenhofer, C., "Price Formation in Commodities Markets: Financialisation and Beyond", CEPS, Brussels, 2013.



average around 40% of their total assets.<sup>109</sup> For the remaining two groups, the notional amounts traded were more than 10 times their total assets globally, but these are the smallest groups, which make up for less than 1% of the total assets of the sample.

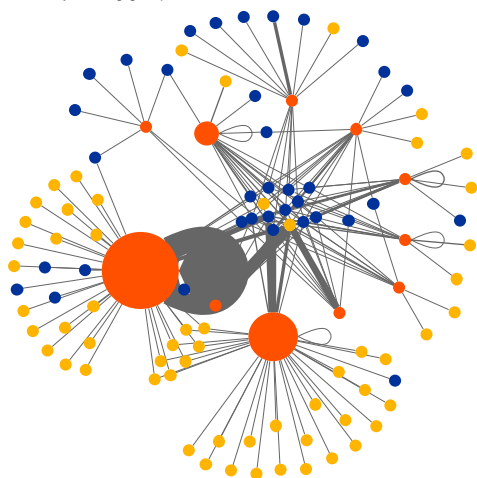
**Banks turn out to be important counterparties to commodity trading firms.** Derivative contracts with banks<sup>110</sup> amount to about €77 billion and are predominantly currency swaps and interest rate forwards (37% of total notional amounts traded by the 11 commodity trading groups in the euro area).<sup>111</sup> In addition, the 11 commodity dealers trade about €92 billion in commodity and interest rate swaps inside their own corporate group (representing around 44% of their total euro area notional amounts).<sup>112</sup> Chart C below reveals the importance of some banks and other counterparties in the network, as well as the relevance of some intra-group trades. Not surprisingly, larger groups appear more interconnected. Generally, commodity traders seem to have relatively many small exposures to different counterparties.<sup>113</sup>

### Chart C

Some banks, other counterparties and intra-group trades in the network are significant

#### Full network of commodity dealers and counterparties

- banks
- other or NA
- commodity trading groups



Sources: ECB calculations based on EMIR data.  
Notes: The edges are weighted by notional amounts; vertex sizes for commodity dealers are weighted by total assets where they are above average; the others have the standard size of the counterparties.

Commodity dealers are currently exempt from MiFID I, CRD IV, EMIR and possibly MiFID II.

#### The interconnectedness of banks and commodity trading firms through derivatives may make banks vulnerable to strains in the commodity dealer sector.

Four banks are exposed to at least three commodity traders through derivative trades above €1 billion in notional amounts. Furthermore, the three commodity traders are the largest in the sample. Consequently, financial difficulties in the commodity trading sector, for example due to a collapse in commodity prices or because of failed speculative strategies, could result in material losses for banks most exposed to this sector.<sup>114</sup> While these may not be large enough to destabilise the banking system as a whole, they could still put pressure on some banks.

**Overall, the analysis suggests that commodity dealers may contribute to vulnerabilities in derivatives markets and raises the question whether their current exemptions from a range of regulatory requirements should be reconsidered.**

<sup>109</sup> Comparing notional amounts of derivatives with the size of total assets is one way to measure the amount of potential leverage involved in the business activity of market participants.

<sup>110</sup> According to Bureau van Dijk's sector classification.

<sup>111</sup> This represents 66% of total notional amounts of the derivative contracts which are not intra-group transactions and for which the sector classification of the counterparty is available in Bureau van Dijk's Orbis Europe database.

<sup>112</sup> The estimate for the total notional amount of derivative contracts with banks may be underestimated if intra-group transactions are with a banking entity within the same corporate group.

<sup>113</sup> However, it cannot be excluded that some counterparties are part of the same corporate group (distinct from the commodity trading groups).

<sup>114</sup> Potential losses would be even higher if the same banks are also exposed to commodity traders through funding and investment activities.

However, as the analysis shows, commodity trading firms are large players in derivatives markets and stress in the commodity dealer sector could potentially affect the banking system. While they may not pose systemic risk at the current juncture, commodity traders' activities in derivatives markets may need to be better understood. As such, their current exemption from certain regulatory requirements could be reconsidered, in particular regarding disclosure and transparency, which would help better understand their links and interconnections with the financial system and their potential riskiness.

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# Special features

## A Overcoming non-performing loan market failures with transaction platforms

John Fell, Maciej Grodzicki, Dejan Krušec, Reiner Martin and Edward O'Brien <sup>115</sup>

*When banks judge that more value can be extracted by offering non-performing loans (NPLs) for sale rather than working them out themselves, potential investors cannot be sure that the credit quality of the assets is as good as the banks portray it to be. Such information asymmetries in the NPL market drive a wedge between the prices that investors are prepared to pay for NPLs and the prices that banks are prepared to sell them for. While information asymmetries can be overcome through investor due diligence, this requires specialist expertise and the costs of valuing NPL portfolios can be very high. As few investors have the resources to absorb such costs, barriers to entering the market are compounded. This appears to explain why the euro area NPL markets display the features of an oligopsony, a situation where there is a concentration of market power among a limited number of investors, which pushes traded prices even lower. At the same time, potential NPL investors can face coordination challenges when debtors have multiple loans with different banks. In such situations, investors must face the prospect of competing with other creditors for the debtor's resources. While coordination between banks for common exposures may alleviate this problem, this too can be costly, weighing further on market prices. By offering the prospect of greater transparency in NPL markets, fostering wider investor participation and addressing coordination issues, NPL transaction platforms could help in overcoming all three of these market failures. The attendant improvement in market liquidity would allow banks to achieve better prices for NPL sales, preserve their capital and mitigate financial stability risks. This special feature outlines the desirable features of NPL transaction platforms and discusses their operational implementation.*

### Introduction

**Transaction platforms are being considered as a possible solution to Europe's high stock of non-performing loans.** The total gross volume of non-performing bank loans in the European Union (EU) stood at about €1.3 trillion at end-March 2017, of which €921 billion were on euro area bank balance sheets. The corresponding NPL ratios were, respectively, 5.1% and 6.1% of total loans.<sup>116</sup> There are several impediments to the resolution of the NPL stock, arising from both

<sup>115</sup> The authors wish to posthumously acknowledge the contribution of Charlie Fell in the formation of some of the concepts and arguments outlined in this special feature.

<sup>116</sup> These data are derived from the ECB Consolidated Banking Data.

demand and supply sides of the secondary markets for NPLs.<sup>117</sup> A comprehensive policy response to this high stock of NPLs was formulated by the Economic and Financial Affairs Council (ECOFIN Council) in July 2017, drawing on the analytical work carried out by the Financial Services Committee.<sup>118</sup> The action plan announced by the EU Council covers several domains: banking supervision, macroprudential policies, secondary markets for NPLs and insolvency frameworks. As proposed by Constâncio (2017), the action plan also covers initiatives aimed at fostering the growth of secondary markets, with the EU Council inviting the European Commission, the ECB and the European Banking Authority to “strengthen the data infrastructure with uniform and standardized data for NPLs and consider the setting-up of NPL transaction platforms”.<sup>119</sup> The European Systemic Risk Board (ESRB) also proposed that a “trading platform which banks can use to reach investors when they wish to dispose of portfolios of NPLs must be specified”.<sup>120</sup>

**There are a number of reasons why banks should dispose of, and not continue to hold NPLs, once stocks reach a critical mass.** NPLs can tie up scarce bank resources, including capital, funding and human resources, diverting them from more profitable activities or opportunities, with overall negative consequences for a bank.<sup>121</sup> Large NPL stocks may also impact bank funding costs, as a result of uncertainty surrounding the future prospects of the institution; see, for example, ESRB (2017).

**A transaction platform could offer a central marketplace for NPLs, bringing together banks and investors.** Clarity about objectives is crucial in designing a platform. First, its scope could vary, from a data warehouse solution which would provide transparency around NPLs, to covering the entire transaction process. Further decision points include the choice of asset classes, the mode and perimeter of banks’ participation, and the nature of the data collected on the platform. Moreover, the platform could offer ancillary services which would support investors in conducting due diligence and closing transactions.

**The platform could play a complementary role among several strategies used to facilitate the acquisition of NPLs by private investors.** Other instruments, already discussed in past issues of the FSR, include asset management companies (AMCs) and securitisation.<sup>122</sup> The platform may offer an outlet for AMCs to sell their exposures and may also support securitisation by providing transparency around the

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<sup>117</sup> See “Resolving NPLs in Europe”, European Systemic Risk Board, July 2017.

<sup>118</sup> See “Council sets out action plan for non-performing loans”, press release, 11 July 2017, and “Report of the FSC Subgroup on non-performing loans”, July 2017.

<sup>119</sup> See Constâncio, V., “Resolving Europe’s NPL burden: challenges and benefits”, keynote speech at “Tackling Europe’s non-performing loans crisis: restructuring debt, reviving growth”, Brussels, 3 February 2017. See also Fell, J., Grodzicki, M., Martin, R. and O’Brien, E., “A Role for Systemic Asset Management Companies in Solving Europe’s Non-Performing Loan Problems,” *European Economy: Banks, Regulation and the Real Sector*, 17(1), 2017.

<sup>120</sup> ESRB (2017), op. cit.

<sup>121</sup> It should be noted that not all NPLs should be characterised as unprofitable. It may be the case, for example, that a loan is producing substantial cash flow, despite being in arrears.

<sup>122</sup> 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, pp. 134-146, and Fell, J., Moldovan, C. and O’Brien, E., “Resolving large stocks of NPLs: a role for securitisation and other financial structures?”, *Financial Stability Review*, ECB, May 2017, pp. 158-174.

NPL pools, with securitisation being one of the possible financial structures used to fund the transactions.

**Crucially, an NPL transaction platform has the potential to mitigate a number of market failures which appear to be in evidence in the secondary market.** All three textbook causes of market failure – transaction costs and information asymmetries, bargaining problems, and insufficient control – may manifest themselves in the NPL market. To that end, this special feature is structured as follows. Section 2 reviews the various market failures that plague the secondary market for NPLs in the euro area, and Section 3 discusses how a platform can contribute to overcoming these problems. An operational concept for an NPL transaction platform is presented in Section 4. Section 5 describes the roles of various stakeholders in establishing a platform. Section 6 concludes.

## Market failures in the euro area secondary NPL market

**Fell et al. (2016) described a number of indicators of market failure in the secondary market for NPLs, characterising the situation as symptomatic of a so-called “market for lemons”.**<sup>123</sup> Available transaction data confirm that the market suffers from low liquidity – despite evidence from market intelligence suggesting strong demand to meet the known supply of NPLs – and wide bid-ask spreads, i.e. the differences between the prices that investors are prepared to pay for NPLs and the prices that banks are prepared to sell them for.<sup>124, 125, 126</sup> Such bid-ask spreads are, by definition, unobservable but Chart A.1 illustrates two key determinants of the total bid-ask spread associated with an NPL sale, using the World Bank Doing Business database. The blue segments of the bars represent the reported average cost of enforcing claims through individual legal systems,<sup>127</sup> whereas the yellow segments represent the additional discount that results from using an internal rate of return (IRR) of 15%, assumed to represent the premium required by investors for the risk of acquiring NPLs. This is at the lower end of the 15-25% range of IRR assumptions which Ciavoliello et al. (2016) suggest investors

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<sup>123</sup> Ibid.

<sup>124</sup> According to Deloitte, the total volume of loan sales – including also transactions in performing assets – amounted to about €160 billion between January 2015 and June 2017, which is a small fraction of the NPL stock (over €1 trillion) or the estimated stock of non-core assets (over €2 trillion).

<sup>125</sup> Available data on European loan portfolio sales, of which NPLs are a sub-set, indicate that while the pace of transactions has picked up, the improvement remains modest. For the first half of 2017, €42 billion in deals were concluded, with a further €37 billion of deals ongoing, but yet to be closed. The comparable total for 2016 was €103 billion, while the market may be as large as €2 trillion. See, for example, *Shifting momentum: regulation driving change in European loan portfolio markets*, Deloitte, 2017.

<sup>126</sup> Anecdotal evidence also continues to suggest that NPLs that do trade in the market are frequently unsecured assets, the value of which has already been substantially written down by the originating bank. This supports the “market for lemons” hypothesis in this context.

<sup>127</sup> Under IFRS (IAS39 AG84), a part of that cost, for example related to the cost of foreclosing on collateral, should be recognised in the book value of NPLs. However, a part can be recognised as an expense on a pay-as-you-go basis.

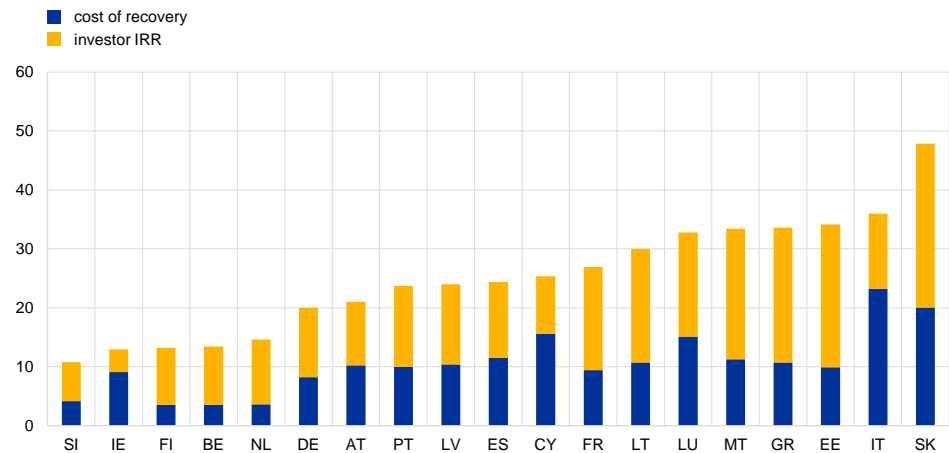
seek to acquire bad loans.<sup>128</sup> Even for a 15% IRR assumption, however, the resulting spread is likely to exceed 30% in several euro area countries.

### Chart A.1

A wide bid-ask spread arises from the intransparency around NPL values and the cost of recovery

#### Difference between the net book value and the estimated bid price of a sample of collateralised NPLs

(percentage of book value)



Sources: ECB calculations based on the World Bank's *Doing Business 2017* and ECB data.

Notes: The cost of debt recovery includes court fees and government levies; fees of insolvency administrators, auctioneers, assessors and lawyers; and all other fees and costs. It does not include operational expenses incurred by the creditor, such as wages and salaries of involved staff members, or the cost of IT infrastructure used to manage NPLs. Inclusion of these costs would reduce net present values even further.

**The potential sources of market failure are well documented in the microeconomic literature.**<sup>129</sup> Three causes are typically cited: **(1) information and transaction costs**, sometimes referred to as the nature of the exchange; **(2) bargaining problems**, which may also be considered as market structure issues; and **(3) insufficient control** – imperfect excludability and non-transferability – which may be alternatively referred to as the nature of the commodity. While typical market failures arise as a result of one of these factors being present, it may be the case that in the market for NPLs, all three of these factors play a role; furthermore, their interaction may also induce market dysfunction.

**Akerlof's "market for lemons" was invoked by Fell et al. (2016) as a possible explanation for wide bid-ask spreads and apparent market failure in the NPL market.**<sup>130</sup> This failure relates to **information and transaction costs**. It is well known that, in general, banks' NPL-related data tend to be insufficient, both in

<sup>128</sup> See Ciavoliello, L. G., Ciocchetta, F., Conti, F. M., Guida, I., Rendina, A. and Santini, G., "What is the value of NPLs?", *Notes on Financial Stability and Supervision*, Banca d'Italia, April 2016. There are sound economic reasons why investors use higher discount rates for valuing NPLs than banks. NPL investors usually have higher costs of capital than banks and different contractual positions.

<sup>129</sup> See, for example, Gravelle, H. and Rees, R., *Microeconomics*, Prentice Hall Financial Times, 2004.

<sup>130</sup> See, for example, Akerlof, G., "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism", *Quarterly Journal of Economics*, Vol. 84(3), 1970, pp. 488-500.

quantity and in quality.<sup>131</sup> A number of factors may drive banks' intransparency around NPL holdings. For example, banks may not feel that transparency is warranted in cases where loan performance may recover and underlying collateral values may increase. Rather than fully recognising the consequences of falling asset values and increased impairments, banks may hold out for recovery. Even if this were not to be the case, banks may prefer not to fully reveal their true balance sheet strength, as declining asset values in certain portfolios may spill over to other portfolios, with possible implications for capitalisation, costs of funding and the cost of equity. Asymmetric information problems may arise, as investors may have less information about a given exposure than a selling bank.<sup>132</sup> From the investor perspective, in the absence of sufficient data, accurate valuations are difficult, which may result in low bid prices. Linked to this, further uncertainty may result for investors from a lack of clarity about access to collateral, the time it may take to realise that collateral, and the potential costs incurred in the process. Uncertainty in this regard will be reflected in bid prices.

**In keeping with the “lemons” outcome, banks may therefore be incentivised to offer only their worst assets for sale, rather than selling better-quality assets at prices which would undervalue them.** The result of this market failure – a “lemons” outcome – may be a suboptimal demand-supply equilibrium, both in terms of price and quantity traded. This partly explains the wide bid-ask spreads, as well as the low level of liquidity in the market.

**Market intelligence suggests that bargaining problems also exist in the NPL market. Banks with high stocks of NPLs are observable and well known and they face various pressures to reduce these stocks.** Looking at the demand side, however, although in principle there could be many potential investors for these assets, a few large firms dominate the market in Europe, giving that market the characteristics of an **oligopsony**, where a limited number of buyers exert market power. During 2015-17, a total of 67 investors were active in the secondary NPL market in the EU. The maximum number of investors in any given country and asset class, however, never exceeded 14 (see Table **A.1**). Moreover, the top 10 investors in EU NPL markets accounted for 60% of transactions by volume, with the relative market concentration being similar across individual countries (see **Chart A.2**). Similar to other market structures with dominant participants, **barriers to entry** play a significant role in firms acquiring and maintaining their oligopsony.

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<sup>131</sup> For some examples, see “[Stocktake of national supervisory practices and legal frameworks related to NPLs](#)”, ECB, 2016.

<sup>132</sup> It may be the case that information asymmetries do not arise, as banks may be as uninformed as potential investors about a given exposure, due to poor-quality data. Investors, however, may not be able to deduce whether or not a selling bank has an informational advantage or not.

**Table A.1**

European NPL markets are fragmented, with few buyers active in individual market segments

**Number of buyers participating in secondary market transactions in loans, per country and asset class**

(2015-17)

	BG	DE	ES	GR	HR	HU	IE	IT	NL	PT	RO	SI	EU (per segment)
Asset finance	0	2	0	1	0	0	0	0	0	0	0	0	3
Consumer	1	0	5	0	0	1	0	10	0	0	1	0	16
Corporate	0	0	5	0	1	0	2	7	0	0	2	2	18
CRE	0	7	3	0	0	0	11	10	7	0	0	0	27
Mixed	1	2	4	1	0	0	0	14	1	0	2	0	22
Mortgage	0	0	2	0	0	2	4	3	5	0	1	0	17
RED	0	0	11	0	0	1	0	0	0	1	0	0	12
<b>All asset classes</b>	<b>2</b>	<b>11</b>	<b>18</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>13</b>	<b>32</b>	<b>13</b>	<b>1</b>	<b>5</b>	<b>2</b>	<b>67</b>

Sources: ECB calculations based on Deloitte data.

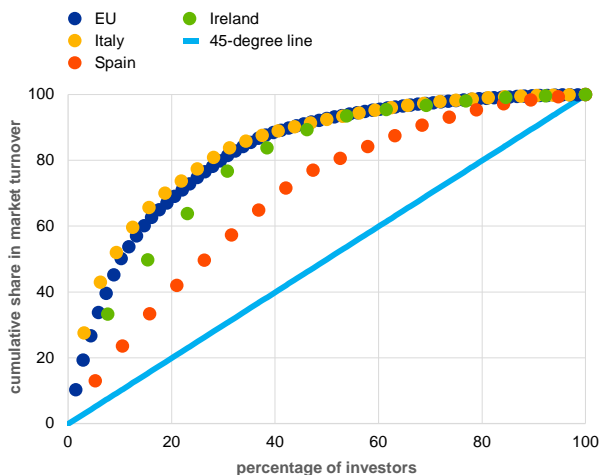
Notes: The database covers 199 secondary market transactions where the name of the buyer was reported, accounting for €153 billion in terms of the gross value of loans. CRE: commercial real estate; RED: real estate development. The darker the shading of a cell, the greater the number of investors which are active in a particular country and market segment. Transaction data for Portugal may not be representative owing to non-disclosure of the buyer for several transactions.

**Chart A.2**

Turnover in the secondary market is dominated by a few large investors

**Cumulative market share of investors in the secondary market for loans**

(2015-17)



Sources: ECB calculations based on Deloitte data.

Notes: The database covers 199 secondary market transactions where the name of the buyer was reported, accounting for €153 billion in terms of the gross value of loans. The 45-degree line denotes a theoretical situation where all investors would have an identical market share. Total number of investors: EU – 67, Italy – 32, Spain – 18, Ireland – 13.

**In the NPL context, these barriers to entry are likely to relate to an established capacity to value impaired assets and conduct the necessary due diligence.**

The due diligence process entails reviewing individual loan files, together with the accompanying legal documentation and the history of the relationship. These data, often existing in paper form only, should be put into an IT system. Then, loan valuation can be performed, often using complex models. The associated (sunk) costs and experienced resources needed to perform due diligence on the underlying loan tape tend to be large. Moreover, these costs are unrecoverable for all except the winning bidder. Even where investors are willing to pay the entry costs, the poor quality of NPL data can compromise the results of valuation methods that investors use in their due diligence, resulting in heightened uncertainty about asset values (i.e. higher discount rates applied by a new investor than by an established investor). Barriers to entry may also relate to the absence of access to local servicing platforms.<sup>133</sup> In some jurisdictions, rent-seeking behaviour on the part of many stakeholders in a sale drives up costs and, therefore, drives down bid

<sup>133</sup> Loan servicing means the administration of a loan, including the collection of principal and interest payments on behalf of the creditor. In the context of NPLs, loan servicing involves working out the loan, for example by modification of the payment terms, foreclosure or repossession of collateral. While many banks use internal servicing, availability of independent third-party servicing is often a precondition for the development of secondary markets for loans.



prices.

**In addition, established investors enjoy a market-power premium which can widen the spread even further.** Benchmarking with comparable transactions is almost impossible for external investors, leading to substantial insider advantages for established investors with market-specific expertise and a record of past transactions.

**Finally, insufficient control may further impair market functioning.** This market failure has two aspects: **imperfect excludability** and **non-transferability**. In the NPL context, imperfect excludability can arise from the fact that a bank or potential investor may only have recourse to collateral underlying a non-performing loan, even though a debtor may have other resources and other performing loans. In the context of lending to firms, it may be the case that multiple banks have extended credit to the same debtor and cross-collateralisation may occur. A potential investor in an impaired loan must face the prospect of competing with other creditors for the debtor's resources – insofar as they can be accessed – in order to recover value on the asset; the problem may be further exacerbated where debtors have lent against personal guarantees. While coordination between banks for common exposures may alleviate this problem, coordination challenges and costs will arise. Apart from the time and costs incurred in coordinating these exposures, banks with performing exposures may have no incentive to coordinate with banks holding non-performing exposures to the same client. Imperfect excludability and the challenges of coordination may also be reflected in lower bid prices than would be the case without coordination challenges.<sup>134</sup>

**Non-transferability may also impact market activity.** In some jurisdictions, restrictions are in place, for example, through licensing requirements or consumer protection codes of conduct, which may limit the acquisition of some NPLs. This may also exacerbate bargaining problems, as potential investors may be excluded from the market, or at least face barriers to entry, thereby increasing transaction costs.<sup>135</sup>

## An NPL transaction platform as a means to overcome market failures

**An NPL transaction platform could help overcome the sources of market failure and induce new investors to enter the market.** The platform – an electronic transaction system combined with a data warehouse and trade repository, easily accessible to buyers and sellers alike – could contribute to the growth in NPL trading by increasing transparency around NPLs, reducing transaction costs, and

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<sup>134</sup> The National Asset Management Agency (NAMA), an asset management company established in Ireland in 2010, overcame imperfect excludability problems by taking a “debtor approach” in acquiring assets from participating banks. For a given debtor with an exposure to the relevant asset perimeter established by the agency, all other assets, both performing and non-performing, within the bank perimeter were transferred to NAMA, so that it could exert full control over the debtor's exposure.

<sup>135</sup> Barriers to entry may arise as a result of the cost of acquiring a necessary licence, or the time it may take to become licensed. In extremis, for example, the costs of acquiring a banking licence and meeting regulatory requirements represent a significant barrier to entry.

resolving the coordination problems that arise from multiple creditors having a claim on a specific borrower and the resulting problem of imperfect excludability.<sup>136</sup> These benefits should lead to an increase in investor interest and, in particular, the NPL market being opened up to new investors. The latter point is crucial, as wider investor participation may have a number of important benefits that result in lower bid-ask spreads: price competition in the market may be increased and investors with lower risk tolerance (measured by IRR targets) may enter the market.<sup>137</sup>

**One of the main functions of an NPL transaction platform is to mitigate the information asymmetry between banks willing to sell NPLs and potential investors.**

A standard solution to the asymmetric information problem is to establish an independent data provider which would be responsible for certifying and auditing data about the quality of individual items in the marketplace. The NPL transaction platform can fulfil that role by collecting data from banks and disseminating them, at low cost, to possible investors. To perform this task efficiently, the platform could utilise standardised and thus comparable data templates and collect the relevant documentation.<sup>138</sup> It could then validate the data, possibly relying on external service providers. The platform could also provide access to independent valuation tools and provide transaction price data to users for benchmarking purposes. If the platform were to be extended to also conduct NPL transactions, it could standardise the transaction process, manage the bidding process and offer transaction services. In doing so, transaction costs may be reduced, thereby lowering barriers to entry.

**An NPL platform can substantially lower the costs of investors' due diligence by standardising loan data tapes and allowing a wide pool of interested investors to access them.**

First, it can act as a consolidator of data, e.g. by requesting that participating banks use standard data templates for NPLs. Second, it can be a single point of contact for potential investors, enabling them to package NPLs originated by multiple banks without having to approach them individually. Although improved transparency and reduced "shoe-leather" costs for investors cannot be expected to increase distressed asset prices significantly, it could help to narrow bid-ask spreads and increase sales. In particular, it would reduce the sunk cost of due diligence by allowing investors to review the assets in a cost-efficient manner through data standardisation and, possibly, offering data analytics and valuation services. Crucially, this should attract a wider investor base; if this can be achieved, price competition should increase, putting further upward pressure on prices. In addition, similar to an AMC, the platform can have a positive impact by overcoming the inaction bias which the originating bank may have, as it may be focused on protecting the relationship with a client rather than recovering overdue claims.

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<sup>136</sup> The scope of the platform may be restricted to the provision of information about NPLs. However, this would reduce the possible benefits as investors would be left to negotiate transactions with individual sellers.

<sup>137</sup> The IRR includes a risk premium, which covers all risks related to the expected cash flows from an investment. Improved transparency and data quality lower the risk premium imposed by the investor and increase the price the investor is prepared to pay for the asset.

<sup>138</sup> Work on data standardisation was referred to in the EU Council's NPL action plan and is being undertaken primarily by the European Banking Authority.

**Finally, the NPL transaction platform can help overcome the imperfect excludability and creditor coordination problems by granting investors access to all banks' exposures to a troubled debtor.**<sup>139</sup> Instead of having to search for these exposures across several lenders, and then conclude bilateral deals, an investor would be able to find and purchase the relevant exposures on the platform.<sup>140</sup> The investor could easily acquire a majority stake in the debtor's liabilities. In turn, where permitted by insolvency legislation, this investor can implement a restructuring solution for the debtor which would bind the remaining minority creditors.

**Taken together, this suggests that an NPL transaction platform could arrest and reverse the negative dynamic that may result from market failures, as alluded to in the previous section.** By bringing transparency to the marketplace and reducing transaction costs, barriers to entry can be lowered, and a wider and more diverse investor base can be brought to the market, increasing price competition and resulting in a deeper and more liquid market.

## Features of an NPL transaction platform

**In practical application, data, trading and servicing form the key features of a transaction platform.** Figure A.1 presents the main elements of a transaction platform which are necessary to fully exploit its potential advantages. The data function offers the investors transparency, and should address the level and scope of information, the degree of data harmonisation and standardisation, as well as data validation services. The trading function provides the space to execute transactions. Availability of independent servicing is yet another key condition for the success of the platform. Taken together, these elements would help tackle the three sources of market failure. Additional roles of the platform, such as intermediation with external service providers, may offer synergies with the data warehouse and trading function.

**First, the platform must collect loan-level information.** NPL portfolios, especially in corporate and commercial property business, are highly diverse. While investors may be willing to purchase and value them at the portfolio level, this usually leads to a discount in comparison to a loan-by-loan valuation approach, for example, owing to the specialisation of investors in recovering value from certain types of loans.<sup>141</sup>

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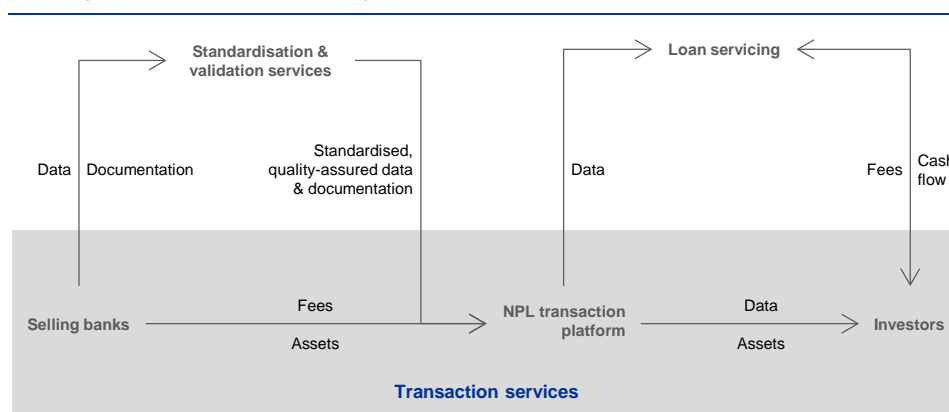
<sup>139</sup> While the concept outlined here is for a fully fledged transaction platform, less ambitious schemes could also be envisaged, and progress has already been made in this regard in some European jurisdictions.

<sup>140</sup> Bank secrecy laws and regulations may pose an obstacle to disclosure of the relevant information via the platform. This obstacle could be overcome by obtaining borrowers' consent to disclosure, which is more likely to be feasible for new loans, or by dividing the due diligence process into two stages. In the first stage, anonymised data could be made available to all interested parties. More detailed data would be distributed only in the second stage, to those investors that decide to bid for an asset based on the results of the first stage.

<sup>141</sup> Anecdotal evidence suggests that this mechanism is relevant for many banks, which due to insufficient information about their NPLs are unable to segment the NPL portfolios and, instead, sell mixed portfolios at a discount.

**Harmonised data templates for loan tapes are an essential element of the platform.** Comparability of NPL data across banks is hardly possible, and data definitions used by individual banks are often bespoke. Until 2014 there was no agreement across EU countries on what constitutes a non-performing loan and, even now, many banks use different NPL definitions for internal management purposes. The scope of the data collected and analysed by individual banks also varies. An NPL investor is therefore faced with a new data challenge every time it considers transacting with a new bank. The platform would overcome these challenges by imposing a standard scope and data definition on every bank in the system.

**Figure A.1**  
Concept of an NPL transaction platform



Source: ECB.

**The scope of NPL information must go beyond purely financial data.** Even more than in the case of performing portfolios, the valuation of NPLs depends critically on qualitative information. This may concern the legal position of the lender vis-à-vis the borrower, the (non-)cooperative attitude of the borrower, the past history of interactions with the borrower, or qualitative information on collateral. A loan's legal documentation plays a particularly important role in determining the workout approach and, ultimately, also the range of recovery options. The platform should therefore act as a repository of key documents. Where possible, it could extract critical qualitative information from these documents and present it, in a transparent and standardised format, to the prospective investors.

**Independent validation of the reported NPL data would be a key function of the transaction platform and may require sizeable upfront investment.** The platform would inspire trust if, and only if, the data it provides to potential investors are of the highest quality. It could engage independent service providers, such as auditors, to inspect the quality of the data. At the current juncture, raw loan tape data typically do not achieve the necessary quality standard. With supervisory and market pressures increasing, high-NPL banks are, however, in any case expected to improve the quality of their loan-level information. This is also in their best interest when considering a sale. Even if the actual validation would be done by the platform, the cost would need to be borne by the banks.

**To be fully realised, the concept of the transaction platform must be extended beyond the data provider function to a trading platform.** The centralised data provider may be well placed to intermediate between the sellers and the buyers of NPLs, as it enters into a business relationship with both parties. The marginal cost of intermediating between the parties and offering transaction services would be limited and this may be more efficient than the bilateral conclusion of transactions outside the platform. The buyers could choose individual portfolios or even single loans from all participating banks, allowing them to build their own, bespoke NPL portfolios. The platform may also consider operating an auction system, where the sellers could post their reservation price and buyers may either accept it or bid it down.

**The platform may combine the data and transaction services with further, ancillary services.** There may be business opportunities for the platform to partner with providers of valuation services, and offer its own valuation models directly to participating buyers and sellers, similar to the products offered by many financial market data providers. Cooperation with legal, real estate and advisory firms could also be part of the bundle of services facilitated by the platform.

**Banks should be incentivised to make use of an NPL transaction platform as a means to reduce large stocks of NPLs.** The precise nature of the incentives may depend on the jurisdiction in which the platform is established, but they could, for example, be taxed-based in nature.

## Operational implementation of an NPL transaction platform

**The operational implementation of an NPL platform would benefit from the development of a “blueprint”, which could provide some common terms of reference valid across the EU Member States.** Similar to the AMC blueprint, which is currently being developed by the European Commission in close cooperation with the ECB and other European institutions, such a blueprint could help interested parties to speed up the design and practical establishment of an NPL platform. The main practical aspects to be covered are related to the scope, participation, funding model, governance, regulation and the role for the public authorities.

**The role of the authorities in setting up an NPL platform should essentially be limited to regulation, support during the start-up phase and incentivising participation.** A key advantage of an NPL platform is that unlike a traditional, systemic AMC, state aid is not necessary to set it up and support its operations.<sup>142</sup> Moreover, the set-up costs for a platform should be relatively low. Rather, the platform may be seen as a utility, provided on commercial terms to market participants. The authorities would lay down the legal foundation for the operations of the platform, facilitate access to existing public information and encourage participation.

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<sup>142</sup> See “[Market-based solutions to bank restructuring and the role of state aid control: the case of NPLs](#)”, speech given by Gert Jan Koopman, Deputy Director-General, DG Competition, European Commission, at the ECMI Annual Conference, Brussels, 9 November 2016.

**The platform could be set up by the banks that intend to use it for placing NPLs on the secondary market**, thus following the example of the European Data Warehouse. It could also be set up and run by a third-party market provider, or by an existing market servicer of NPLs.<sup>143</sup> However, regardless of the ownership and operation models, the platform should be open to all interested banks and investors. This would require that access to the platform and the cost of using it be regulated to ensure that the platform cannot exercise monopolistic powers. It is not necessary, and for governance reasons not even preferable, that the state takes an ownership stake in the platform.

**The authorities can sponsor the creation of an NPL transaction platform, acting to deliver a public good.** In the securitisation markets, the ECB acted in the public interest to increase the transparency of the asset pools underlying European asset-backed securities by fostering the European Data Warehouse initiative.<sup>144</sup> A similar catalyst role could be played by the authorities in the NPL markets. However, the securitisation markets have not been successfully revived, owing to a combination of factors: the increased availability and reduced cost of other funding instruments to banks, uncertainty around the future shape of regulation and regulatory disadvantages of securitisations versus other instruments. This experience shows that transparency around assets may be a necessary but not a sufficient condition for establishing a well-functioning secondary market for loans.

**The authorities may, therefore, need to review and amend regulations that impact the operations of the transaction platform.** First, the role of the platform as an aggregator of various publicly available data (e.g. from property and corporate financial information registers) may require amendments to the regulations governing access to such data. Importantly, given that the platform would be processing commercially sensitive and possibly personal data, it may face obstacles arising from data protection regulations in these areas. Selling banks would also need assurances that competitors or potential investors in bank equity or debt could not access the platform's data with a view to gaining broader insights into a bank's asset quality. The role of the authorities would be to balance confidentiality requirements in these fields with the operational requirements of the platform and its clients. To overcome the challenges that relate to non-transferability, regulations concerning licensing and ownership should also be reviewed to ensure an appropriate balance is struck between stimulating markets and protecting debtors.

**The platform should be run to the highest standards of governance, in particular to avoid conflicts of interest.** Although market participants are expected to play a substantial role in the ownership structure of the platform, their individual impact on the business operations of the platform should be limited. The platform should offer a level playing field for buyers and sellers, including potential sellers of NPLs that decide not to become owners of the platform. In particular, any preferential

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<sup>143</sup> For example, a major online auction provider arranged NPL sales in China. See, for example, "China's Huarong plans \$8 billion bad loan sale, biggest in five years", Reuters, 15 December 2015.

<sup>144</sup> The European Data Warehouse (EDW) is an industry-led central data warehouse collecting, validating and disseminating loan-level data for asset-backed securities transactions. It is not a transaction platform.

access to the platform by owners would be severely damaging to its credibility.<sup>145</sup> An arm's length relationship should be established, with adequate checks and balances.

**Participation in an NPL platform should be open to all interested investors and to all holders of NPLs.** Synergies offered by an NPL platform, such as the consolidation of debt owed by a given borrower (known as the “single borrower principle” in the case of AMCs), could be best reaped when there is a broad participation of creditors. By contrast, a limited take-up of the platform's services by banks holding NPLs may be contrary to the objective of resolving the creditor coordination problem. Hence, incentives for participation by creditors or the use of moral suasion could be considered. Participation could even be open to non-bank creditors, such as bondholders, leasing companies or factoring companies. On the investor side, the platform should ideally be open to all potential buyers of NPLs.

**An NPL transaction platform could play a role in promoting securitisation as a tool in NPL resolution and could facilitate divestment by national AMCs.** Fell et al. (2017) outlined a securitisation scheme for NPLs which foresaw a role for the state in co-investing in such a structure, thereby reducing risk for investors.<sup>146</sup> While an NPL transaction platform would greatly facilitate securitisation through the provision of adequate data and the provision of ancillary services, including loan servicing, banks could be incentivised to participate in such a platform if the state were to make platform participation a prerequisite for co-investment. With respect to AMCs, such an entity could also choose to participate in the platform, which it could likely do with relative ease, to improve its outreach to potential investors. Under such an arrangement, investors would have the potential to acquire assets from banks and an AMC with reduced transaction costs.

**The costs of operating the platform should be borne by the industry.** The platform is likely to be a light operation, incurring only limited operating costs, which should be covered by access fees paid by both buyers and sellers.<sup>147</sup> Establishing the platform may, however, require a substantial upfront fixed investment. In particular, the initial cleaning and validation of data may require sizeable expenses, which should be borne by the sellers of NPLs.<sup>148</sup> It is important to make sure, however, that the fees charged by the platform do not become a barrier to entry to the NPL market.

**The NPL platform concept is potentially applicable to a broad range of asset classes and jurisdictions.** There is, however, a potential trade-off between the scope of asset classes covered by the platform and the width of the information

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<sup>145</sup> In the case of the EDW, where the owners are banks, the governance structure is such that they exert very limited power over the day-to-day operations of the EDW platform, and access is open to all interested parties. Proper governance is enhanced by external board counselling by the ECB.

<sup>146</sup> Ibid.

<sup>147</sup> For example, the EDW provides the basic access to investors free of charge, and charges up to €20,000 per annum for more sophisticated products and services. Data providers pay a one-off fee charged at the inception of the deal, followed by an annual fee per transaction serviced by the EDW. Both of these fees are set between €6,000 and €8,000. The fees are set on a cost-plus basis.

<sup>148</sup> These costs would anyway be borne by a bank disposing of NPLs, either in the form of costs to prepare data for due diligence or as losses incurred in selling assets at a discount to account for insufficient data.

requirements. On the one hand, the platform may be attractive to potential investors in non-financial corporations, as it could reduce the cost of finding acquisition targets and provide a view of the full spectrum of debt of a company. On the other hand, the platform may facilitate the disposal of granular portfolios, including even performing portfolios, if servicing of these portfolios can be arranged. The information required for various asset types would differ and the platform should cater for the information needs relevant for its particular “in scope” asset classes. A similar trade-off applies to a cross-border platform. Investors may achieve the benefits of diversification on a platform which would pool assets from several jurisdictions. However, a multi-country (possibly EU-wide) platform would also need to take into account the specific national data needs.

**Concerns about disclosing sensitive information to a broad range of investors may hold back the implementation of the platform concept.**

These concerns relate to the impact of transparency on the pricing of bank equity and debt, and to the protection of personal data. Regarding the first, banks may be reluctant to open up their NPL books to prospective investors, which are often active in equity and debt markets. From the consumer protection and bank secrecy angles, data protection rules may not allow for full transparency. Data-sharing may, moreover, require amendments to existing loan contracts. These two types of concerns could be mitigated by a two-step process, where a limited set of anonymised data would be disclosed to all participants in the platform in the first step. A full set, including where possible unanonymised data and legal documentation, would then be made available, subject to appropriate confidentiality constraints, to those who express a firm interest in a specific exposure, possibly after having been shortlisted in the bidding process.

## Concluding remarks

**The secondary market for NPLs in the euro area currently suffers from several market failures.**

This results in an oligopsonistic market with a limited number of large buyers. Transaction volumes and prices thus tend to be below what could be expected in a fully competitive market. An NPL transaction platform could alleviate these market failures by standardising and validating loan-level data, reducing due diligence costs and hence increasing the number of potential investors in the market. Further analysis is required to assess the feasibility of the platform concept, especially concerning the impact of data protection and bank secrecy rules.

**The EU Council and the ESRB have recently stated the potential usefulness of NPL platforms.**

They can form part of the comprehensive solution to the euro area NPL problem, complementing other tools such as AMCs and internal workout by banks. Unlike AMCs, they do not require significant financial aid from the state, thus avoiding possible state-aid issues. In fact, the role of the authorities may be limited to the regulatory amendments needed to facilitate the operation of such a platform. Platforms may be potentially useful for a range of asset classes and participation should be open to all interested holders of and investors in NPLs.



**To realise its full potential benefits, the platform would need to be supported by structural changes aimed at expanding the NPL investor base, such as relaxing licensing requirements and fostering the growth of independent loan servicing.** In some European jurisdictions, the investor concentration is reinforced by licensing and other compliance requirements imposed on prospective NPL investors. The entry of new investors into the NPL market is also further limited by the lack of an efficient third-party servicer market in many EU countries. For servicers, accessing a new market takes time and requires upfront investment, which may become a sunk cost if a successful deal is never concluded. This, in turn, deters smaller NPL investors without country expertise and their own servicing capacity.

## B Cross-border banking in the euro area since the crisis: what is driving the great retrenchment?

Martin Schmitz and Marcel Tirpák

*This special feature examines the potential drivers of the post-crisis retrenchment in cross-border banking in the euro area, which stands out in international comparison. Examining a wide range of possible determinants of this phenomenon, it establishes a significant link between deteriorating asset quality and the retrenchment in cross-border banking. Conversely, tighter prudential policies and the introduction of bank levies do not contribute to explaining the reduction in cross-border banking activity. Therefore, tackling the persistent asset quality problems, along with the completion of the banking union, would seem to be pivotal to reaping the potential benefits of cross-border banking within the euro area in terms of risk diversification and risk-sharing.*

### Introduction

#### **Financial integration via cross-border banking may bring important financial stability benefits in terms of risk diversification and risk-sharing.**

A geographically diversified loan book and deposit base make banks less susceptible to domestic shocks and thus reduce the volatility of their lending and income streams. Further benefits from financial integration may stem from enhanced competition and greater stability of banking systems. For instance, foreign banks entering less mature markets tend to introduce more sophisticated risk management practices, accelerate the process of privatisation of state-owned banks and contribute to faster resolution of non-performing loans (NPLs).

**However, cross-border banking may also entail financial stability costs.** The presence of foreign banks, which are associated with greater mobility of capital than domestic banks, may weigh on financial stability in the host economy, owing to spillovers from external shocks. Indeed, the post-crisis deleveraging by European banks, shedding cross-border assets initially while sheltering domestic assets, is a case in point. Nevertheless, the view that financial integration via cross-border banking is beneficial overall, except in situations where cross-border exposures are excessive, prevails in the literature.<sup>149</sup>

**The precipitous decline in cross-border bank lending within the euro area since the global financial crisis, especially between banks, partly reflects some excesses prior to the crisis.** Part of the reduction in cross-border banking positions may, therefore, be seen as a welcome development, as the elevated pre-crisis levels

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<sup>149</sup> For a discussion of the costs and benefits of cross-border banking, see, among others, Allen, F., Beck, T., Carletti, E., Lane, P.R., Schoenmaker, D. and Wagner, W., "Cross-border Banking in Europe: Implications for Financial Stability and Macroeconomic Policies", VOX, CEPR's Policy Portal, Centre for Economic Policy Research, June 2011; and Beck, R., Dedola, L., Giovannini, A. and Popov, A., "Financial integration and risk sharing in a monetary union", *Financial integration in Europe 2016*, ECB, April 2016, pp. 80-98.

may have reflected to some extent distorted incentives for banks to expand their balance sheets. This notwithstanding, cross-border banking integration in the euro area seems desirable, given the relatively limited cross-border penetration of the banking industry. As well as further enhancing risk-sharing within the euro area, cross-border integration via, for example, cross-border mergers and acquisitions (see **Box A** in this special feature) could also help tackle the “over-banking” problem in some countries.<sup>150</sup>

**This special feature examines the potential drivers of the post-crisis retrenchment of cross-border banking in the euro area.**<sup>151</sup>

First, it provides an anatomy of the cross-border bank retrenchment in the euro area observed since the outbreak of the global financial crisis. Second, it investigates a wide range of possible drivers of this phenomenon, including various measures of banking sector performance and stability, prudential policies and the use of bank levies.

## The retrenchment in euro area cross-border banking

**The global financial crisis triggered a rapid decline in international capital flows, followed by an asymmetric recovery across regions and instruments.**

The halt in international financial integration was particularly pronounced for capital flows intermediated by banks, which prior to the crisis had been increasing dynamically.<sup>152</sup> The sharp decline has highlighted the volatile nature of cross-border bank flows compared with other types of financial flows, such as foreign direct investment.<sup>153</sup> By 2016, global cross-border banking positions had contracted by around 15% compared with their peak in 2008, and this retrenchment was predominantly driven by European banks (see **Chart B.1**).<sup>154</sup> Banks located in the euro area and in the rest of the EU reduced their cross-border bank claims by around 25% over this period, while banks located elsewhere (in Canada and Japan, for instance), following an early retrenchment, had re-built their cross-border positions to surpass their pre-crisis peaks by early 2015.<sup>155</sup> At the same time, the

<sup>150</sup> See Hartmann, P., Huljak, I., Leonello, A., Marqués, D., Martin, R., Moccero, D., Palligkinis, S., Popov, A. and Schepens, G., “Cross-border bank consolidation in the euro area”, *Financial integration in Europe 2017*, ECB, May 2017, pp. 41-64; and “Is Europe Overbanked?”, *Reports of the Advisory Scientific Committee*, No 4, European Systemic Risk Board, June 2014.

<sup>151</sup> For a detailed analysis of cross-border banking retrenchment in the EU, see Emter, L., Schmitz, M. and Tirpák, M., “Cross-border banking in the EU since the crisis: what is driving the great retrenchment?”, *Working Paper Series*, ECB, forthcoming.

<sup>152</sup> See Lane, P.R., “Financial Globalisation and the Crisis”, *Open Economies Review*, Vol. 24(3), July 2013, pp. 555-580; and Milesi-Ferretti, G-M. and Tille, C., “The great retrenchment: international capital flows during the global financial crisis”, *Economic Policy*, Vol. 26(66), April 2011, pp. 289-346.

<sup>153</sup> See McQuade, P. and Schmitz, M., “The great moderation in international capital flows: A global phenomenon?”, *Journal of International Money and Finance*, Vol. 73, 2017, pp. 188-212.

<sup>154</sup> Based on the external claims of Bank for International Settlements (BIS) reporting banks on a locational basis. The original data reported by the BIS have been corrected for breaks and exchange rate variations following Cerutti, E., “Drivers of cross-border banking exposures during the crisis”, *Journal of Banking and Finance*, Vol. 55, 2015, pp. 340-357. The residence-based locational data on cross-border banking are used, as these are consistent with the other macro-financial variables used in this special feature and closely resemble private other financial flows recorded in the balance of payments statistics.

<sup>155</sup> The euro area sample among the BIS reporting countries consists of the 11 original euro area countries and Greece, while the “rest of the EU” reporting countries are Denmark, Sweden and the United Kingdom.

share of euro area-based banks in global cross-border bank claims fell from around 36% in 2008 to below 30% in 2016, while intra-euro area cross-border bank loans as a percentage of total euro area bank assets declined from around 8% to 6% over the same period.

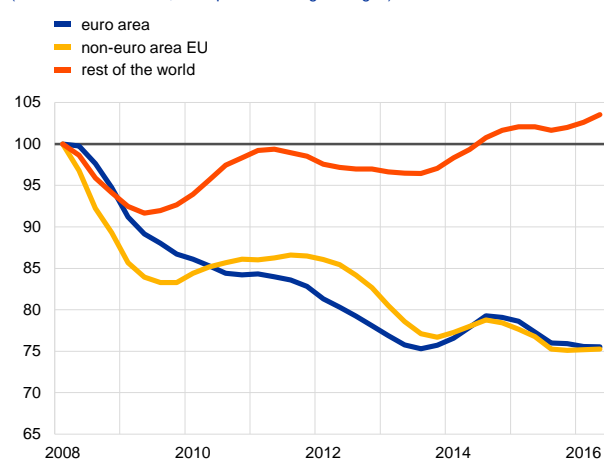
**Euro area-based banks cut their cross-border exposures most significantly vis-à-vis counterparties located in other euro area countries and the rest of the EU.** Between 2008 and 2012, euro area-based banks' cross-border exposures across different regions declined fairly uniformly by around 20%. Since then, however, intra-euro area exposures and especially exposures vis-à-vis the rest of the EU have continued to decline, whereas exposures to counterparties located outside the EU have partly recovered (see **Chart B.2**).<sup>156</sup>

**Chart B.1**

Since the crisis EU-based banks have reduced their cross-border claims substantially

Cross-border bank claims by location of reporting bank

(index: Q3 2008 = 100; four-quarter moving averages)



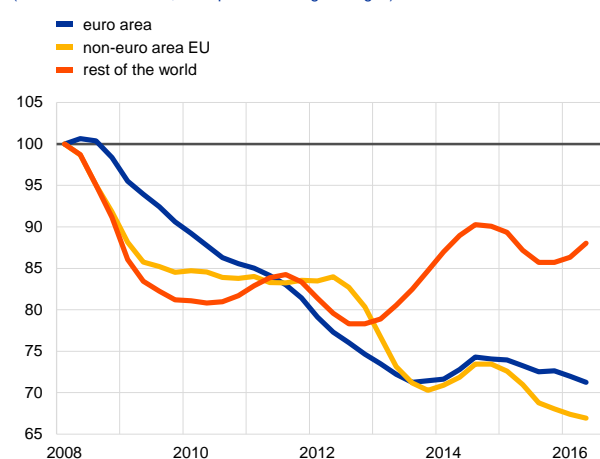
Sources: BIS locational banking statistics and ECB calculations.  
Note: Total cross-border claims of banks based in BIS reporting countries.

**Chart B.2**

Intra-euro area cross-border retrenchment of euro area-based banks has been particularly pronounced

Cross-border bank claims of euro area banks by destination country

(index: Q3 2008 = 100; four-quarter moving averages)



Sources: BIS locational banking statistics and ECB calculations.  
Note: Cross-border claims of banks based in euro area countries by counterparty country.

**Within the euro area, banks have cut their cross-border interbank loans by around 40% and have shaved almost a third off their cross-border debt securities holdings since 2008.** Cross-border lending to non-banks declined by less than 10% over the same period (see **Charts B.3** and **B.4**).<sup>157</sup> Strikingly, since the crisis, domestic loans for the euro area as a whole have remained above pre-crisis levels, suggesting an increasing home bias within the euro area. The great retrenchment of banks' cross-border exposures probably reflects the remnants of the euro area sovereign debt crisis, albeit evolving heterogeneously across counterparty

<sup>156</sup> Intra-euro area exposures of banks located in the euro area accounted for around 45% of total exposures in 2016, while exposures vis-à-vis the rest of the EU and vis-à-vis third countries accounted for around 24% and 31%, respectively.

<sup>157</sup> Loans and deposits are the most important component of intra-euro area cross-border exposures, with a share of around 55% of the total, while debt securities and other instruments (e.g. financial derivatives) account for around 31% and 14%, respectively.

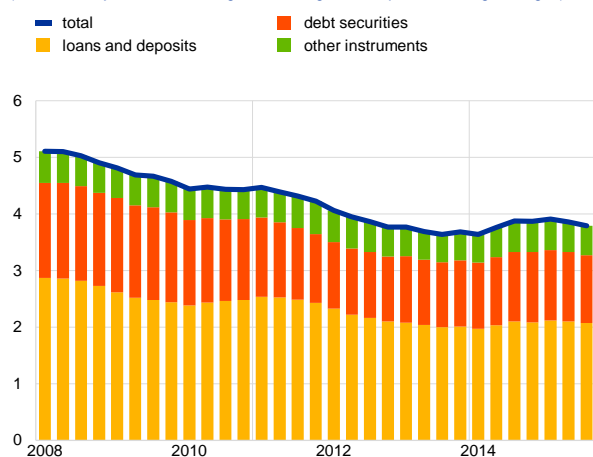
sectors. Moreover, at the country pair level within the euro area, developments in bilateral cross-border banking exposures have also been very divergent. This heterogeneity across various dimensions is exploited in the regression-based empirical analysis in this special feature in order to identify the potential drivers of the post-crisis retrenchment in euro area cross-border banking.

**Chart B.3**

Loans and deposits made the largest contribution to intra-euro area retrenchment...

**Cross-border intra-euro area bank claims**

(€trillions, adjusted for exchange rate changes, four-quarter moving averages)



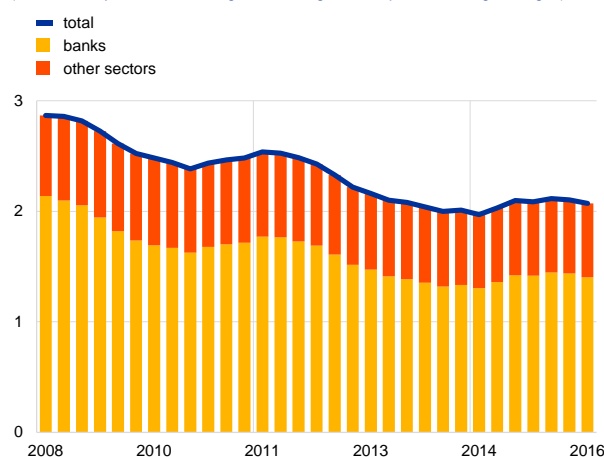
Sources: BIS locational banking statistics and ECB calculations.  
Note: Cross-border intra-euro area claims of banks based in euro area countries.

**Chart B.4**

...largely driven by a decline in cross-border interbank loans

**Cross-border intra-euro area bank claims in loans and deposits by counterparty sector**

(€trillions, adjusted for exchange rate changes, four-quarter moving averages)



Sources: BIS locational banking statistics and ECB calculations.  
Note: Cross-border intra-euro area claims in loans and deposits of banks based in euro area countries by counterparty sector.

### Identifying the drivers of cross-border banking exposures in the euro area

**In the aftermath of the global financial crisis, the global banking system was subject to a number of structural changes, including, among others, a tighter regulatory framework, more stringent supervision and higher taxation of banks.** These structural changes took place alongside the sharp cyclical downturn, which weighed on banks' balance sheets in the form of substantial credit losses. The resulting financial "deglobalisation", which manifested itself in a striking retreat from cross-border banking, has been especially pronounced in the EU.<sup>158</sup> A number of studies suggest that several factors lay behind this cross-border banking

<sup>158</sup> See Forbes, K., "Financial 'deglobalization'?: capital flows, banks and the Beatles", speech given at Queen Mary University, London, November 2014.

retrenchment, such as banking sector vulnerabilities, regulatory tightening and government interventions.<sup>159</sup>

**This special feature further investigates whether these factors have contributed to the retrenchment of cross-border banking within the euro area.**

To this end, a gravity model in a cross-country panel set-up for the period from 2008 to 2015 is estimated in which bilateral cross-border loans and deposits between two euro area countries are regressed on a set of standard gravity-type variables (e.g. distance, common language), macroeconomic controls (e.g. economic activity and interest rates) and our main variables of interest, including (i) an index of prudential policy stringency, (ii) a measure of the tax burden arising from levies on banks, and (iii) indicators of bank performance (e.g. NPL ratio, return on equity).<sup>160</sup> All variables are entered into the econometric model both for source and host countries and complemented with a comprehensive set of fixed effects to control for unobserved heterogeneity across countries and over time.<sup>161</sup> Since a large portion of the cross-border banking retrenchment relates to interbank lending, the volume of liquidity provided by the Eurosystem to each national banking system is also controlled for.

## The role of bank performance indicators

**Since 2008 banks in the euro area have experienced, on average, an increase in NPLs amid gradually declining leverage and relatively subdued profitability.**

Elevated NPL ratios can give rise to cross-border spillovers as banks, in an effort to shore up their balance sheets, cut their cross-border exposures. High NPLs can create deleveraging pressures, for instance as a result of higher risk weights. Similarly, weakened bank profitability leads to slower capital accumulation, thereby impeding banks' capacity to leverage, which – coupled with tighter regulation – may reduce banks' willingness to engage in risk-taking across borders. Indeed, there is evidence of a “pecking order” in banks' deleveraging in the EU after the global financial crisis, which focused on cutting cross-border assets, while largely sheltering domestic assets.<sup>162</sup>

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<sup>159</sup> See Giannetti, M. and Laeven, L., “Flight Home, Flight Abroad, and International Credit Cycles”, *American Economic Review*, Vol. 102(3), May 2012, pp. 219-24; Rose, A.K. and Wieladek, T., “Financial protectionism? First evidence”, *Journal of Finance*, Vol. 69(5), September 2014, pp. 2127-2149; Bremus, F. and Fratzscher, M., “Drivers of structural change in cross-border banking since the global financial crisis”, *Journal of International Money and Finance*, Vol. 52, April 2015, pp. 32-59; and Ichiue, H. and Lambert, F., “Post-crisis International Banking; An Analysis with New Regulatory Survey Data”, *IMF Working Paper*, No 16/88, April 2016.

<sup>160</sup> The gravity model was first introduced by Tinbergen (1962) to explain bilateral trade flows by the size of and distance between two countries – see Tinbergen, J., *Shaping the World Economy: Suggestions for an International Economic Policy*, Twentieth Century Fund, New York, 1962. Okawa and van Wincoop (2012) provide a formal theoretical framework to justify the use of gravity models in international finance by linking bilateral investment patterns to differences in transaction costs – see Okawa, Y. and van Wincoop, E., “Gravity in International Finance”, *Journal of International Economics*, Vol. 87(2), 2012, pp. 205-215.

<sup>161</sup> More specifically, source country, host country and year fixed effects are included in the panel regression analysis.

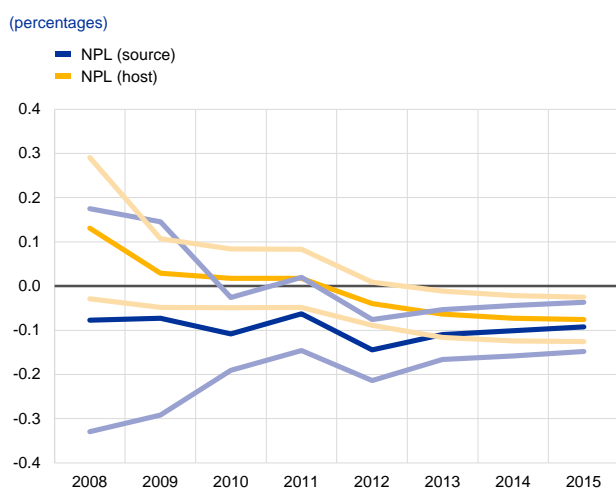
<sup>162</sup> See the special feature entitled “EU bank deleveraging – driving forces and strategies”, *Financial Stability Review*, ECB, June 2012.

**Elevated NPL ratios are significantly associated with a retrenchment in cross-border banking.** For source countries, the estimated impact of higher NPL ratios on cross-border exposures is somewhat larger for interbank lending than for lending to other sectors. This may reflect the shorter maturity of interbank lending and therefore the greater flexibility in adjusting these exposures. In addition, banks might be less keen on reducing their positions vis-à-vis the real economy, as these are often subject to higher build-up costs. Moreover, the result for host countries suggests that higher NPL ratios are associated with less cross-border funding to the domestic banking sector, which could potentially aggravate credit supply constraints. This is further amplified by reduced cross-border borrowing by non-banks in high NPL host countries.

### Chart B.5

NPLs have weighed persistently on cross-border interbank loans over the past years...

**Time-varying coefficients on NPL ratios in source and host countries for cross-border interbank loans**

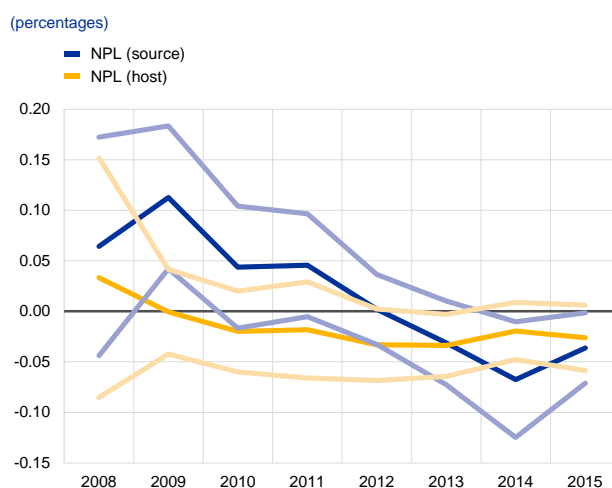


Source: ECB calculations.  
Notes: The pale lines indicate 90% confidence intervals around the estimated coefficients. Time-varying coefficients are estimated using interaction terms between year fixed effects and the NPL ratio in source and host countries, respectively.

### Chart B.6

...and more recently also on cross-border loans to other sectors

**Time-varying coefficients on NPL ratios in source and host countries for cross-border loans to other sectors**



Source: ECB calculations.  
Notes: The pale lines indicate 90% confidence intervals around the estimated coefficients. Time-varying coefficients are estimated using interaction terms between year fixed effects and the NPL ratio in source and host countries, respectively.

**Deteriorating asset quality has consistently been associated with lower interbank lending throughout the post-crisis period.** However, for lending to non-banks, such a significant relationship has only been observed more recently (see **Charts B.5** and **B.6**). Similarly, higher NPL ratios in host countries have only been associated with reduced cross-border borrowing by both banks and non-banks to a significant extent since 2012. Worsening asset quality and the need to shore up banks' balance sheets are thus found to be important impediments to cross-border banking integration within the euro area.<sup>163</sup> This is consistent with the idea that high NPLs can create deleveraging pressures, thereby impeding banks' capacity to

<sup>163</sup> See McGuire, P. and von Peter, G., "The resilience of banks' international operations", *BIS Quarterly Review*, March 2016.

provide financing to the economy.<sup>164</sup> It is also consistent with the notion that “financial deglobalisation” in Europe is a reflection of banks responding to credit losses by shedding assets abroad.<sup>165</sup>

**Compared with asset quality, other bank performance indicators – such as the leverage ratio and return on equity – are more loosely associated with developments in cross-border banking.**

Profitability is significant only for interbank lending, as more profitable banks exhibit reduced exposures across borders. This could reflect the post-crisis macroeconomic environment, in which low interest rates and central bank liquidity provision – which the model controls for – give profitable banks less incentive to engage in interbank cross-border lending. The post-crisis decline in bank leverage across the euro area, which, on average, has been rather gradual, does not appear to be significantly correlated with the decline in cross-border exposures.

## The role of prudential policies

**Prudential policies were tightened across the euro area and globally in the aftermath of the crisis.**

This applies especially to capital requirements (the Basel requirements and their transposition into EU law in the Capital Requirements Directive (CRD IV) and Capital Requirements Regulation (CRR)), but also to other prudential instruments. To track the evolution of prudential policies, an index of prudential stringency is constructed using a database compiled by Cerutti et al. (2016) and information provided by the European Systemic Risk Board (ESRB).<sup>166</sup> The prudential policy index (PPI) is the cumulative sum of prudential policy changes and captures the level of “tightness” of prudential policy across euro area countries over time (see [Chart B.7](#)).<sup>167</sup>

**The impact of prudential policies on cross-border banking is ambiguous.** Some studies highlight the role of regulatory arbitrage, which results in higher cross-border banking exposures to circumvent tighter domestic regulation, while others stress that adhering to more stringent rules is costly for banks, which therefore reduce their

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<sup>164</sup> See Constâncio, V., “Resolving Europe’s NPL burden: challenges and benefits”, keynote speech at the event entitled “Tackling Europe’s non-performing loans crisis: restructuring debt, reviving growth” organised by Bruegel, Brussels, February 2017; and *Financial integration in Europe 2017*, ECB, May 2017.

<sup>165</sup> See McCauley, R.N., Bénétrix, A.S., McGuire, P. and von Peter, G., “Financial deglobalisation in banking?”, *BIS Working Papers*, No 650, June 2017.

<sup>166</sup> An annual index of prudential stringency is constructed by summing the quarterly changes in five types of commonly implemented prudential instrument (i.e. capital requirements, sector-specific capital buffers, interbank exposure limits, concentration limits and loan-to-value ratio limits) for each instrument in any given year and subsequently for all instruments. The information is retrieved from Cerutti, M., Correa, M., Fiorentino, E. and Segalla, E., “Changes in Prudential Policy Instruments – A New Cross-Country Database”, *IMF Working Paper*, No 16/110, June 2016, and from the [ESRB’s website](#).

<sup>167</sup> A potential caveat of this approach is that changes in the instruments may have different qualitative implications in terms of intensity across countries and over time.



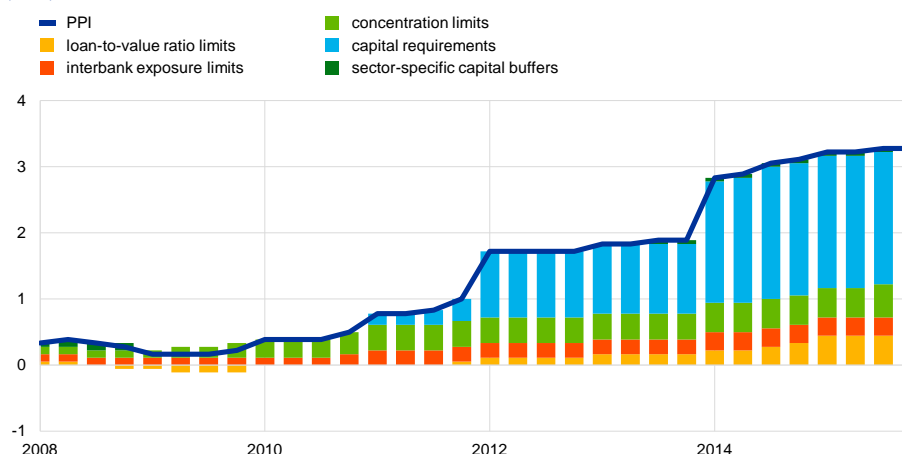
cross-border exposures.<sup>168</sup> As the international spillovers of prudential policies can vary significantly across types of instrument, prudential policies aimed at lenders (i.e. capital requirements, capital buffers, interbank exposure limits and concentration limits) and those aimed at borrowers (i.e. loan-to-value ratio limits) are controlled for separately.<sup>169</sup>

### Chart B.7

Prudential policies have tightened significantly in the euro area since the crisis

The PPI and its components for the euro area

(index)



Sources: Cerutti et al. (2016), ESRB and ECB calculations.

Notes: Cumulative index at quarterly frequency as of Q1 2000. The index equals one if in the respective quarter the respective prudential instrument became more stringent, zero if no change occurred, and minus one if the instrument became less stringent. Sector-specific capital buffer instruments include instruments regulating real estate credit, consumer credit and other credit.

**There is no evidence that prudential policies are associated with retrenchment of cross-border banking in the euro area.** When confronted with more stringent prudential policies aimed at them domestically, euro area banks increase their positions vis-à-vis banks located in the rest of the euro area. This suggests that there can be intra-euro area spillovers through leakages from tighter prudential policies aimed at banks. Changes in prudential policies that were common across euro area countries, reflecting the Basel requirements and their transposition into EU law in the CRD IV/CRR package, are absorbed econometrically by using time fixed effects. Exploiting the various dimensions of the PPI, there is evidence that the positive intra-euro area spillovers from prudential policies are driven by stricter concentration limits in source countries, which may incentivise diversification, including cross-border diversification. By contrast, stricter prudential measures aimed at borrowers show no such pattern, and the same applies to cross-border lending to non-banks for both

<sup>168</sup> See, among others, Bremus, F. and Fratzscher, M., "Drivers of structural change in cross-border banking since the global financial crisis", *Journal of International Money and Finance*, Vol. 52, April 2015, pp. 32-59; Houston, J.F., Lin, C. and Ma, Y., "Regulatory Arbitrage and International Bank Flows", *Journal of Finance*, Vol. 67(5), October 2012, pp. 1845-1895; and Ongena, S., Popov, A. and Udell, G.F., "When the cat's away the mice will play: Does regulation at home affect bank risk-taking abroad?", *Journal of Financial Economics*, Vol. 108(3), 2013, pp. 727-750.

<sup>169</sup> See Fahr, S. and Żochowski, D., "A framework for analysing and assessing cross-border spillovers from macroprudential policies", *Financial Stability Review*, ECB, May 2015; and Buch, C.M. and Goldberg, L., "Cross-Border Prudential Policy Spillovers: How Much? How Important? Evidence from the International Banking Research Network", *NBER Working Paper*, No 22874, December 2016.

groups of macroprudential policies. Finally, more stringent macroprudential policies in host countries have no significant impact on cross-border borrowing.<sup>170</sup>

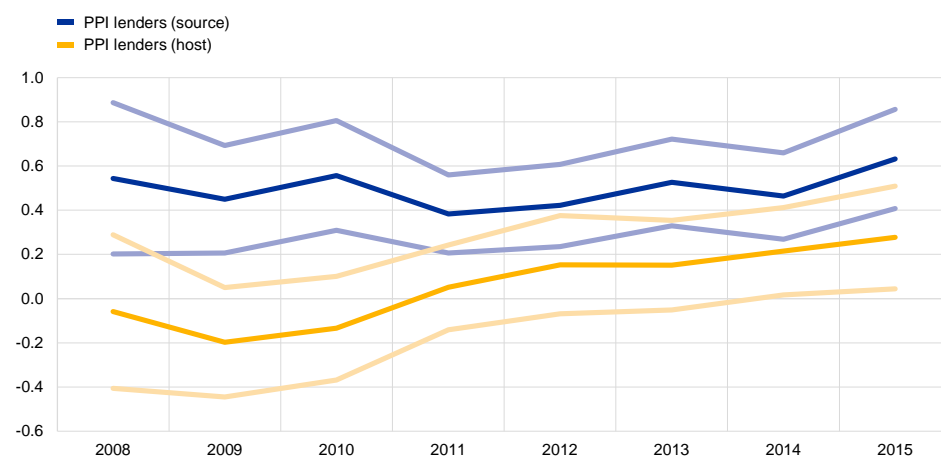
**Banks facing tightened macroprudential policies at home tend to have been more engaged in cross-border interbank lending throughout the post-crisis period.** Such behaviour may reflect intra-group lending, which, in contrast to lending to unrelated banks, has remained relatively resilient in the post-crisis period and may be associated with risk diversification benefits. **Chart B.8** suggests that a one point increase in the PPI for lenders is associated with an increase in cross-border interbank lending in the range of 0.4% to 0.6%.

### Chart B.8

Tighter prudential policies aimed at lenders are associated with increased cross-border lending to banks

Time-varying coefficients on the PPI for lenders in source and host countries

(percentages)



Source: ECB calculations.

Notes: The pale lines indicate 90% confidence intervals around the estimated coefficients. Time-varying coefficients are estimated using interaction terms between year fixed effects and the PPI for lenders in source and host countries, respectively.

## The role of bank levies

**The introduction of bank levies – special taxes on banks – in several euro area countries does not appear to be significantly connected to the cross-border banking retrenchment.** There are nine euro area countries in which governments have introduced bank levies, possibly with the objective of recouping some of the costs incurred during the crisis in order to support the domestic banking sector. These countries are Belgium, Germany, Ireland, the Netherlands, Austria, Portugal, Slovenia, Slovakia and Finland. The extent of cross-border potential spillovers from such bank levies depends on, among other factors, the underlying tax base and corresponding incentives for banks to adjust their lending activity.

<sup>170</sup> A relatively weak positive impact of tighter macroprudential policies aimed at lenders is found for cross-border borrowing by banks.

## Box A

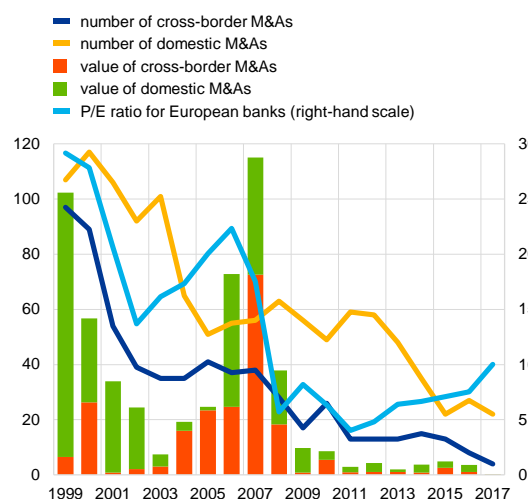
### Cross-border mergers and acquisitions in the EU banking sector: drivers and obstacles<sup>171</sup>

#### Chart A

##### Lower bank valuations tend to discourage M&As

##### Bank M&A activity and bank valuations

(left-hand scale: number per year, € billions; right-hand scale: P/E ratio in multiples of earnings)



Sources: Dealogic and ECB.

Notes: M&A data cover the EU28. Values only include transactions for which data are available. The value spike in 2007 reflects one very large deal (the acquisition of ABN Amro by a consortium comprising Royal Bank of Scotland, Fortis and Santander).

#### The number of cross-border mergers and acquisitions (M&As) in European banking has been relatively low since the global financial crisis.

Cross-border M&As are relevant for financial stability because they can help banks to achieve economies of scale and diversify risks. In a monetary union, cross-border M&As could foster the integration of credit markets, thereby contributing to cross-country risk-sharing. Looking at the evolution of cross-border bank M&A activity in the current 28 EU Member States, a gradual downward trend can be observed since the turn of the century (see Chart A). Following a peak in around 1999-2000 and a stabilisation before the global financial crisis, the number of cross-border M&A transactions has come to a virtual standstill.

Moreover, their value has been low, following a peak in the years preceding the global financial crisis. Some of the weakness may be associated with a decline in bank stock price valuations, but the recent improvement in those

valuations has not been accompanied by a pick-up in M&A activity. Cross-border M&A activity has also remained relatively weak when compared with domestic M&A activity. Against this backdrop, the following question arises: what factors drive or inhibit cross-border bank M&As and how do these contrast with those for domestic M&A activity?

#### The bank-level analysis in this box is aimed at identifying the observable characteristics associated with becoming the target of a cross-border or a domestic bank acquisition.<sup>172</sup>

Bank M&As can be undertaken for a variety of reasons, such as cutting costs, expanding into growth markets, taking advantage of funding synergies, and diversifying balance sheets. Obstacles to cross-border M&As may include business obstacles, regulatory and supervisory hurdles, and political uncertainty.<sup>173</sup> The characteristics on which the analysis in this box focuses include both bank-specific characteristics, such as the bank's operating performance, its capitalisation and size,

<sup>171</sup> Prepared by Martin Bijsterbosch and Andrea Deghi.

<sup>172</sup> The model specification is similar to, for example, Hernando, I., Nieto, M.J. and Wall, L.D., "Determinants of domestic and cross-border bank acquisitions in the European Union", *Journal of Banking and Finance*, Vol. 33(6), June 2009, pp. 1022-1032. An M&A transaction is defined as a deal that leads to an effective change in the ownership of the financial entity involved (defined here as an ownership stake of at least 20% before the transaction and at least 30% after the transaction). In the dataset there are 254 domestic and 106 cross-border transactions.

<sup>173</sup> See the special feature entitled "Cross-border bank consolidation in the euro area", *Financial integration in Europe 2017*, ECB, May 2017, which suggests that business obstacles, such as low economic growth and political uncertainty, may have created an unfavourable environment for bank M&As in recent years. Regulatory and supervisory hurdles, partly associated with a still incomplete banking union, seem to have added to these obstacles.

and characteristics relating to the jurisdiction in which the bank operates, such as prospects for growth, banking sector concentration and stock market volatility.

**Drivers of and obstacles to M&As may differ depending on whether the transaction is domestic or cross-border.** While many of the factors driving domestic and cross-border M&As are similar, Table 1 also shows some notable differences. Regarding the similarities, the probability of a bank being acquired increases with its size and its cost-to-income ratio for both domestic and cross-border M&As. The importance of a bank's size seems to reflect the existence of economies of scale or fixed costs in the M&A process, making the acquisition of a limited number of large banks more attractive than the acquisition of a larger number of smaller institutions. The significance of the cost-to-income ratio suggests that less efficient banks provide more scope for cost savings, increasing the potential benefits of an M&A deal. Moreover, in more concentrated banking systems (proxied by the Herfindahl-Hirschman Index), banks are less likely to be acquired, irrespective of whether the buyer is domestic or foreign.

**Table A**

Determinants of the probability of a bank being acquired in domestic and cross-border acquisitions

Determinant	Proxied by	Domestic	Cross-border
Size	Total assets	+++	+++
Capitalisation	Equity-to-assets ratio	-	
Liquid assets	Liquid assets-to-total assets ratio	--	-
Asset quality problems	NPL ratio	+++	
Profitability	Operating income-to-total assets ratio	--	++
Cost-efficiency	Cost-to-income ratio	+	+++
Macroeconomic conditions	Macroeconomic conditions	+	
Bank sector concentration	Herfindahl-Hirschman Index	---	--
Market volatility	Standard deviation of the country-specific MSCI stock price index		--
Expansion opportunities	Dummy variable for Member States that joined the EU in the 2000s		+++

Sources: Dealogic, SNL Financial, Fitch Connect, Thomson Reuters Datastream, Eurostat and ECB.

Notes: The results are based on multinomial logit regressions estimating the probability of a bank being acquired by a domestic or a foreign bank, using an annual panel of 6,013 banks in the EU28 for the period 1999-2016. The plus and minus signs represent the sign of the relationship between the explanatory variable and the probability of being acquired, and the number of signs (one, two or three) represents the degree of statistical significance (10%, 5% or 1%). All explanatory variables are lagged by one year. The models include time fixed effects. To control for the type of bank, the models include dummy variables for commercial banks, cooperative banks, savings banks and listed banks. The dummies for commercial and listed banks are significant, suggesting that it is primarily these types of banks that are involved in M&A transactions. Data on bank M&As from Dealogic and SNL Financial are matched with bank-specific time-series data from Fitch Connect. Data on country-level variables are from Thomson Reuters Datastream, Eurostat and the ECB.

**Cross-border bank M&A activity seems to be driven more by expansion opportunities, while domestic acquisitions tend to focus more on seeking cost synergies.** More specifically, domestic M&As are targeted at banks with weaker fundamentals, such as lower capital and liquidity buffers, weaker asset quality and lower profitability. The potential for efficiency gains seems to be more important for domestic deals, where there is more scope to streamline overlapping distribution networks or central functions. Such synergies are, however, typically less obvious for cross-border deals, where profitability and expansion opportunities tend to be more important drivers. The importance of the latter is illustrated by the strong statistical significance of the dummy variable representing whether a bank is located in a country that joined the EU during the 2000s, reflecting the fact that many cross-border acquisitions during that period were driven by the expansion opportunities in central and eastern Europe (although real GDP growth is somewhat more significant for domestic M&As than cross-border M&As). Moreover, cross-border M&As are

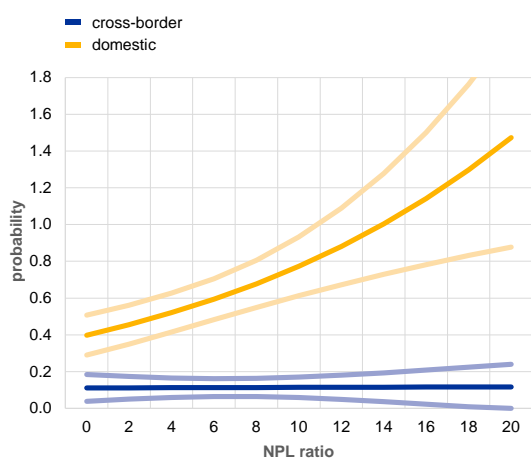
positively related to a bank's operating income, which can be seen as a proxy for a bank's profitability prospects.<sup>174</sup> Finally, the probability that a bank will be acquired by a foreign bank declines as domestic stock market volatility increases, which suggests that cross-border acquisitions tend to be more risk averse and more sensitive to market volatility.

### Chart B

Higher NPL ratios increase the probability of domestic acquisitions, but not cross-border acquisitions

**NPL ratio and probability of bank acquisition**

(percentages)



Source: ECB calculations.

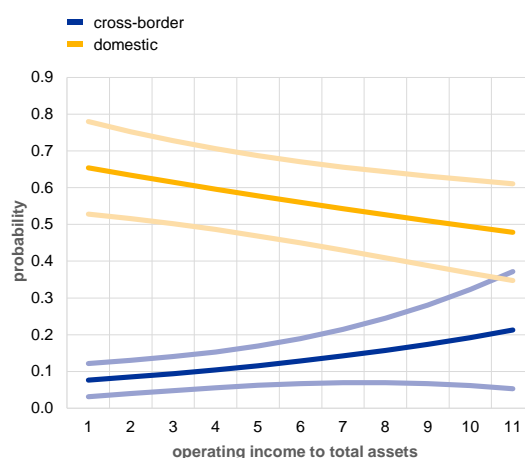
Notes: The shaded lines represent 95% confidence intervals. The probabilities are computed from a multinomial logit model of the probability of being acquired by a domestic or foreign bank.

### Chart C

As profitability falls, cross-border acquisitions become less likely, but domestic acquisitions become more likely

**Profitability and probability of bank acquisition**

(percentages)



Source: ECB calculations.

**Variations in the drivers of M&As have had a relatively strong downward impact on cross-border M&As in recent years.** Charts B and C show how the probability of an acquisition varies with the target bank's NPL ratio and its profitability, respectively, using the same model as in Table A. In both charts, the probability of a domestic acquisition is consistently higher than that of an acquisition by a foreign bank, reflecting the fact that domestic M&As are more common than cross-border deals. While the probability of a domestic takeover increases substantially as the bank's NPL ratio rises, higher NPLs do not affect the likelihood of a cross-border takeover. This is in line with the finding above that domestic M&As tend to target relatively weakly performing banks. Chart C shows how changes in a bank's profitability affect the likelihood of a cross-border or domestic M&A. While the probability of an acquisition by a domestic bank tends to increase as a target bank's profitability weakens or it becomes loss-making, the likelihood of a cross-border acquisition declines.

**To conclude, the weakness in cross-border M&A activity in recent years seems to reflect a lack of expansion opportunities and market perceptions of uncertain net benefits.** While domestic acquisitions tend to be more driven by the scope for restructuring, cross-border M&As appear to be more targeted at growth opportunities and at more profitable banks. The absence of these is likely to have depressed cross-border bank M&A activity in Europe in recent years.

<sup>174</sup> Operating income, also referred to as recurring profit, excludes some relatively volatile income components and can thus be seen as a measure of "underlying" profitability.

Moreover, cross-border M&As seem to be relatively sensitive to changes in market sentiment, which is likely to have been an additional factor suppressing cross-border deals during the financial crisis. Looking ahead, an improvement in bank performance and lower uncertainty, supported, for example, by a completion of the banking union, could help support a pick-up in cross-border bank M&A activity.

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## Conclusion

**This special feature shows a significant link between deteriorating asset quality and the great retrenchment in cross-border banking in the euro area since the crisis.** This result holds for cross-border lending to both banks and other sectors and for the countries of both the lenders and the borrowers.

**Conversely, tighter prudential policies and the introduction of bank levies do not contribute to explaining the reduction in cross-border banking activity.** Banks facing stricter prudential policies at home are actually more engaged in cross-border interbank lending. This may be driven by stricter concentration limits, which may incentivise geographical diversification and thus be associated with enhanced risk diversification. For bank levies, there is no discernible link with the reduction in cross-border bank exposures in the euro area.

**The euro area cross-border banking retrenchment was driven to a greater extent by source country factors, highlighting the spillovers from national banking sector conditions across the euro area.** This is in line with the existing literature, which stresses that, during crisis times, cross-border bank flows are mainly affected by idiosyncratic supply shocks to creditor banks.<sup>175</sup>

**The analysis suggests that tackling the persistent asset quality problems in the euro area is pivotal in order to reap the potential benefits of cross-border banking.** These benefits relate to risk diversification and risk-sharing within the euro area. Hence, the findings of this special feature make a case for completing the banking union. For instance, the rulebook for financial actors in the EU needs to be amended by adding a chapter on a harmonised approach to NPL resolution, complemented by country-specific elements in each high-NPL constituency, as stressed by Constâncio (2017).

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<sup>175</sup> See Amiti, M., McGuire, P. and Weinstein, D.E., "Supply- and Demand-Side Factors in Global Banking", *Federal Reserve Bank of New York Staff Reports*, No 818, June 2017.

## C Recent developments in euro area repo markets, regulatory reforms and their impact on repo market functioning

Michael Grill, Julija Jakovicka, Claudia Lambert, Pascal Nicoloso, Lea Steininger and Michael Wedow

*Effectively functioning repo markets are of key importance for both financial stability and monetary policy, but the excessive use of repos may also be a source of systemic risk as witnessed during the recent financial crisis. Regulatory reforms introduced since the start of the crisis have aimed to contain systemic risk related to the excessive build-up of leverage and unstable funding, but recently some concerns have been raised about their potential effects on the functioning of the repo market. This special feature presents new evidence on the drivers of banks' activity in the repo market with respect to regulatory reforms. In addition, it takes a closer look at the repo market structure and pricing dynamics, in particular around banks' balance sheet reporting dates. While the observed volatility around reporting dates suggests that the calculation methodology for some regulatory metrics should be reviewed, overall, the findings indicate that unintended consequences of regulatory reforms on the provision of repo services by euro area banks have not been material.*

### Introduction

**Repurchase agreement (repo) markets play a key role in facilitating the flow of cash and securities around the financial system and are crucial for the implementation of monetary policy.**<sup>176</sup> Repos are a means for various financial and non-financial institutions to place cash, obtain funding or source collateral. Moreover, central banks often implement monetary policy by providing banks with secured funding. Banks may then pass liquidity on to the interbank market via the repo market.

**However, the excessive use of repos in the creation of leverage and in financing long-term assets with short-term funding was one factor that contributed to the Great Financial Crisis (GFC).**<sup>177</sup> Before the GFC, repos were one of the factors contributing to the build-up of both leverage and unstable funding profiles. The reliance on repo funding increased steadily in the run-up to the GFC, before dropping sharply during the crisis, leading to negative repercussions on financial institutions' solvency and funding. The GFC further revealed that financial institutions tended to over-rely on short-term wholesale funding, including repos, to meet their funding needs. The GFC demonstrated that this type of funding can be

<sup>176</sup> See "[Repo market functioning](#)", CGFS Papers No 59, Committee on the Global Financial System, Bank for International Settlements, April 2017.

<sup>177</sup> See, for example, "[Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos](#)", Financial Stability Board, August 2013, "[The role of margin requirements and haircuts in procyclicality](#)", CGFS Papers No 36, Committee on the Global Financial System, Bank for International Settlements, March 2010, and Gorton, G. and Metrick, A., "[Securitized Banking and the Run on Repo](#)", Yale ICF Working Paper No 09-14, November 2010.

extremely volatile and can quickly disappear in times of market or idiosyncratic stress.

**Regulatory measures have been introduced in the aftermath of the GFC to address excessive leverage and the use of unstable funding structures.** This special feature focuses on analysing whether these reforms may have had a material negative impact on the functioning of repo markets. To this end, it starts by reviewing longer-term developments in repo markets and describing the relevant regulatory reforms and how they may impact these markets. It then examines volatility in repo market volumes and rates around recent balance sheet reporting dates and finds that it intensified in 2016 and peaked at the end of 2016, but has become less pronounced more recently. Among other important factors contributing to this improvement, the adaptation of market participants' behaviour as reflected in significant pre-funding activities and the entry of new players into the repo market, as well as the central bank securities lending facilities, appear to be relevant. While this suggests that markets can adapt to a changing regulatory environment and other factors, it is necessary to better understand whether the modalities of regulatory reporting need to be adapted to mitigate any unintended consequences of regulations. Further analysis thus appears warranted to assess whether the current calculation methodology for regulatory and other metrics is appropriate and whether it should potentially be based on more than a single snapshot of the balance sheet at the quarter-ends.

**The special feature also presents new evidence on the drivers of banks' activity in the euro area repo market with respect to regulatory reforms.** The analysis finds that while regulatory reforms have contributed to a decline in the share of outstanding repos and reverse repos in the overall business activity of euro area banks over the past two and a half years, the magnitude of the decline has been contained. The positive effects of regulatory reforms, such as increases in resilience in stressed periods, are not considered in the analysis.

## A longer-term view of developments in the repo market and the factors driving them

**The repo market has gained in importance, while the turnover in the unsecured market has declined strongly, making the repo market the main interbank market segment in the euro area.** The semi-annual repo survey conducted by the International Capital Market Association (ICMA) shows a steady increase in the outstanding amounts of repos in European financial markets since June 2001 (see [Chart C.1](#)). Similarly, the ECB's Euro Money Market Survey (EMMS) and money market statistical reporting (MMSR) data show that between 2003 and 2017 the share of secured transactions has increased significantly in euro area money markets, while a significant decline of total trading volumes has been recorded in the unsecured market (see [Chart C.2](#)).

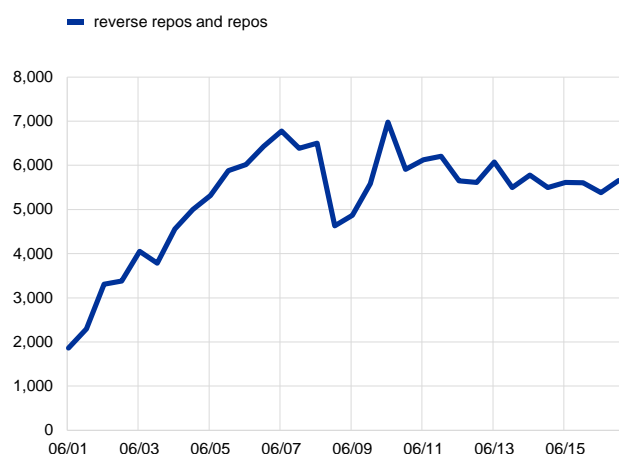


### Chart C.1

Repo markets have increased steadily since 2001, but declined significantly during the financial crisis, and have exhibited a sideward trend lately

#### Evolution of outstanding repo and reverse repo amounts in Europe

(June 2001 – Dec. 2016; outstanding repos and reverse repos in €billions)



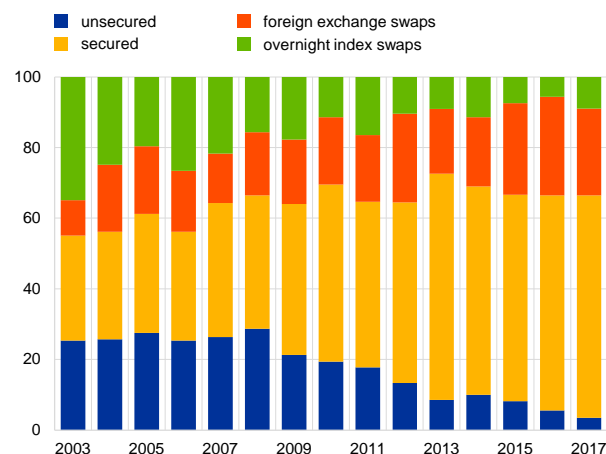
Source: ICMA December 2016 European Repo Market Survey.

### Chart C.2

The repo market has gained in importance over the years, while turnover in the unsecured market has declined significantly

#### Evolution of money market turnover in different categories in the euro area

(Q2 2003 – Q2 2017; market turnover in percentages)



Sources: EMMS, MMSR and ECB calculations.

Note: The sample includes the constant panel of 38 banks reporting in the EMMS until the second quarter of 2015 and in the MMSR from the third quarter of 2016 onwards.

**The features of repo trading have also changed since the GFC.** Despite the overall increase in market activity, trading volumes in repos used primarily for cash management purposes have declined lately, whereas collateral-driven repo trading volumes have increased. Moreover, the share of centrally cleared transactions has increased to above 60% in 2017 from around 30% in 2009. Finally, repo market activity has become increasingly concentrated in short-term transactions, with transactions up to one week making up more than 90% of total trading volume.

**A number of factors, including unconventional monetary policy and regulatory reforms, have affected repo markets in the euro area in the recent past.** Asset purchases by central banks have reduced the availability of collateral in the repo market, although central banks have made assets available through their securities lending facilities, thus aiming to mitigate the impact of the asset purchase programmes on collateral availability. The increasing amount of liquidity provided through asset purchases and long-term refinancing operations has reduced banks' demand for short-term funding and thus appears to have led to a decline in the repos used primarily for cash management and short-term funding purposes.<sup>178</sup> Besides unconventional monetary policy, regulatory reforms enacted after the GFC have affected market participants' incentives to enter into repo transactions and have also increased the demand for high-quality collateral.

**Regulatory measures have been introduced with the intention to address concerns about excessive leverage and unstable funding structures.** In

<sup>178</sup> For more details, see CGFS (2017), op. cit.

particular, the Basel Committee on Banking Supervision has developed a regulatory minimum leverage ratio (LR) to address the build-up of excessive leverage, a net stable funding ratio (NSFR) which introduces a stable funding requirement for short-dated securities financing transactions, and a liquidity coverage ratio (LCR) to ensure banks can withstand short-term liquidity dry-ups. Furthermore, the Financial Stability Board has developed a minimum haircut framework for a sub-set of securities financing transactions aimed at constraining the build-up of procyclical leverage outside the banking system.

**In the context of evaluating the impact of post-crisis regulatory reforms, concerns have been raised that some of the measures introduced have had a negative impact on the functioning of repo markets.** Market analysts and industry associations<sup>179</sup> have argued that regulatory reforms have significantly reduced the willingness of banks to provide repo services and contributed to volatility and market dislocations around the balance sheet reporting dates. These concerns have been raised on the grounds that the regulatory metrics may incentivise banks to reduce their repo assets and liabilities.

**The LR framework affects banks' incentives to enter into repo transactions in different ways.** In the LR framework, the marginal repo transaction increases the LR exposure measure as the cash received increases the assets side of the balance sheet and, at the same time, the asset used as collateral is not derecognised. For reverse repos, while the marginal transaction does not impact the exposure measure significantly as essentially cash is exchanged for a repo asset, ultimately the repo assets stemming from reverse repos enter the exposure measure and therefore impact banks' LR. Moreover, the LR framework allows for netting of repos and reverse repos with the same counterparty (subject to a few additional conditions), providing incentives to clear transactions with central counterparties and thus contributing to the increasing role of these institutions in the repo market.<sup>180</sup>

**Liquidity requirements also change the incentives for banks to enter into repo transactions.** With regard to the NSFR, there is an asymmetric treatment of short-term repo and reverse repo transactions. Short-term reverse repos require stable funding, whereas short-term repos are not recognised as stable funding. The asymmetry aims to create incentives to reduce the reliance on short-term funding transactions. Finally, the effects of the LCR depend on a number of factors, including the nature of the collateral used, the counterparty involved, as well as the haircuts applied.<sup>181</sup>

**A study group set up under the auspices of the BIS Committee on the Global Financial System (CGFS) published a report in April 2017 on repo market functioning.** The report finds that despite the relative stability in headline measures

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<sup>179</sup> See "Closed for business: a post-mortem of the European repo market break-down over the 2016 year-end", ICMA, February 2017.

<sup>180</sup> Furthermore, within the capital framework, for most banks the LR is likely to be the more constraining capital constraint than the risk-based framework for repo activity. Whereas in the risk-based framework, collateral is recognised as exposure-reducing, the LR framework does not allow this as a general principle.

<sup>181</sup> See CGFS (2017), op. cit.

of activity and pricing in the repo market, there are some signs of tensions, in particular around banks' balance sheet reporting dates, as reflected in a high volatility in prices and volumes. Regulatory reforms have been identified by the group as one important potential driver of these recent developments. This special feature follows up on the CGFS repo market report by providing a more in-depth analysis of volatility in euro area repo markets around reporting dates and how regulatory reforms have affected the provision of repo services by euro area banks.

## Volatility in repo markets around recent quarter-ends and in particular at the end of 2016

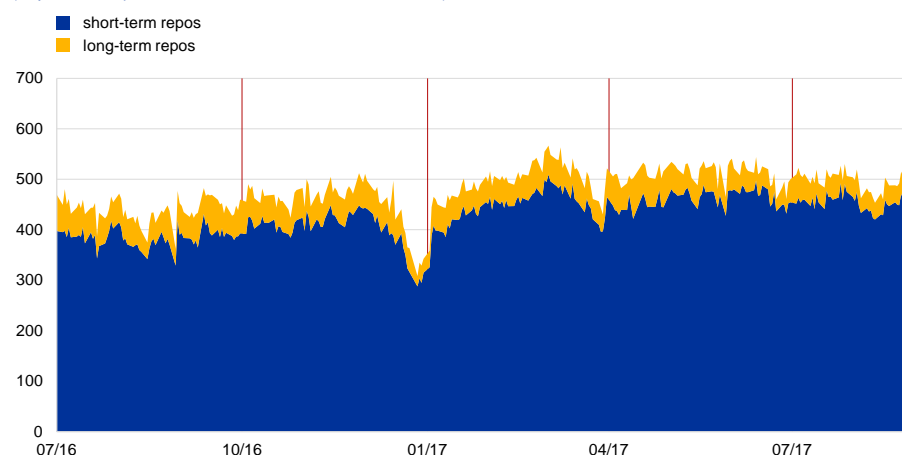
**Volatility of repo rates and trading activity at the balance sheet reporting dates has increased gradually over the past years, peaking at the end of 2016.** During 2014 and in the first part of 2015, all repo rates tended to increase at quarter-ends due to the preference for liquid assets and cash on reporting dates. However, since mid-2015, repo rates for higher credit quality collateral, such as German and French sovereign bonds, have started to fall at quarter-ends. Since the second half of 2016, Spanish and Italian repo rates have also started to exhibit a downward move at quarter-ends, indicating the market preference for holding securities, contributing to a lower supply of collateral and a higher premium paid for collateral in the repo market on those dates. Indeed, trading volume data reveal that around quarter-ends significantly lower trading activity is witnessed than in-between the quarter-ends (see [Chart C.3](#)).

### Chart C.3

Volatility of trading activity around balance sheet reporting dates peaked at the end of 2016, but has declined significantly recently

#### Evolution of money market turnover in different categories in the euro area

(July 2016 – Sep. 2017; secured market turnover in € billions)



Sources: MMSR and ECB calculations.

Notes: Repo transactions are grouped according to their maturity. Short-term repos include trades with a maturity of up to one week, while long-term repos are an aggregate of contracts with longer maturities. Forward trades are not included.

**Window-dressing of regulatory metrics, combined with a higher demand for high credit quality bonds and the lower availability of this type of asset, appear**

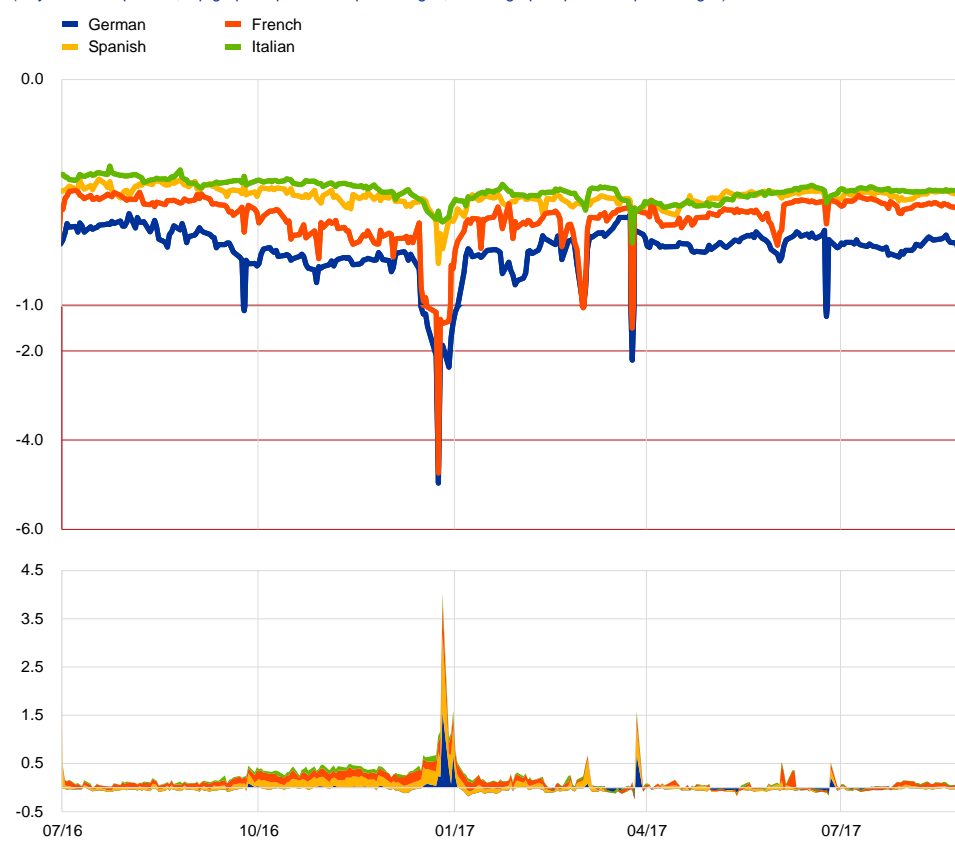
**to be behind these recent developments.** To the extent that repo activity impacts regulatory metrics as described above, its often short-term nature makes it easy to adjust around these dates. Banks are therefore incentivised to use this margin of adjustment to report “better” balance sheets at these dates. This is reflected in reduced repo market volumes traded on these specific dates. As discussed in Box B, repo trading activity between European banks and US money market funds provides complementary evidence of window-dressing activity in repo markets around reporting dates. Window-dressing effects are complemented by broader structural factors. First, there is an increasing demand for high credit quality bonds, which is driven by several factors, such as higher demand for high-quality liquid asset (HQLA) buffers for the LCR, the need to post margin for centrally cleared transactions, and increased demand for the secured investment of cash against high-quality collateral by various market players. Second, the increasing surplus of liquidity generated by non-standard monetary policy measures has contributed to a decline in the rates on repos backed by other collateral as well.

### Chart C.4

Volatility of repo rates and the spread between bilateral and centrally cleared repos can be observed around reporting dates

Evolution of repo rates and repo market premia for centrally cleared vs bilateral repo market trades

(July 2016 – Sep. 2017; top graph: repo rates in percentages; bottom graph: spreads in percentages)



Sources: MMSR and ECB calculations.

Notes: Repo rates for German, French, Italian and Spanish collateral include repos and reverse repos with spot/next maturity. The spreads between bilateral and centrally cleared repos are calculated by isolating the volume-weighted average rate for transactions with a counterparty that qualifies as a central clearer.

**The year-end of 2016 saw a very pronounced balance sheet reporting date effect, with a large decline in volumes and a high dispersion of repo rates, raising concerns that the market might be dysfunctional.** Large changes in trading volumes were observed around the end of 2016, with repo market activity declining by around 40% to a low of around €325 billion on 27 December from €500 billion on 1 December and remaining at subdued levels for the subsequent two to three weeks before returning to a normal level of market activity (see Chart C.3). The price impact, shown in Chart C.4, was also very pronounced as repo market trades were concluded at rates as low as -10% on certain German or French securities. Overall, the price distribution around the year-end was strongly skewed towards very negative repo rates.

**Repo market developments at the end of 2016 highlighted the limitations of banks' balance sheet capacity and the high premium charged for its usage as also reflected in the price differentiation between centrally cleared transactions and bilateral trades.** Regulatory measures and the preference for risk reduction during the financial crisis have contributed to a shift to centrally cleared transactions in the repo market. As a result, the share of non-centrally cleared trades has decreased, also reflecting the previously mentioned benefits of balance sheet efficiency and netting provided by central counterparties (CCPs). According to MMSR data, price differentiation can be observed between cleared and non-cleared trades, with CCP-cleared repos trading at a premium reflected in lower repo rates, especially on reporting dates. This premium reached several hundred basis points at the end of 2016 (see Chart C.4).

**At the end of 2016, a number of factors in addition to the aforementioned regulatory aspects contributed to the more pronounced effects that were witnessed.** Year-end balance sheets form the basis for the calculation of the contributions to the Single Resolution Fund (SRF), the global systemically important bank (G-SIB) designation and categorisation, as well as bank levies in a number of euro area jurisdictions. Furthermore, market participants' position-taking around the year-end and the need to fund those positions also played a role. The combined effect of these factors appears to have exerted downward pressure on repo rates, reflecting the higher compensation or return required for banks to be willing to trade, resulting in significantly larger drops in activity and repo rates than at other quarter-ends.

**The observed developments raise the question whether secured markets were dysfunctional at the year-end or rather exhibited exacerbated tensions in still-functioning markets.** MMSR data indicate that there were two-way markets and still reasonable levels of activity in December 2016, despite the significant decline in market turnover. Market tensions were essentially visible in the pricing of repo transactions, as an unusually high number of securities were sought after and traded at deeply negative rates.

**Since the end of 2016, the volatility at reporting dates in secured markets has declined significantly.** The following quarter-end dates were significantly less affected by high volatility and a decline in activity compared with the year-end. Chart C.4 shows that at the March and June 2017 quarter-ends the decline in

trading volumes and the volatility in repo rates were much less pronounced than at end-December 2016.

**Better usage of Eurosystem cash/securities lending facilities and advance preparations by market participants were two important factors behind the lower volatility at the most recent quarter-ends.** Firstly, a more targeted usage of Eurosystem cash/securities lending facilities, as well as the introduction of the cash collateral option, have helped to ease collateral tensions in repo markets in 2017. Indeed, the average balance of loan and cash collateral received in the context of public sector purchase programme (PSPP) securities lending reached €47 billion and €18 billion in March 2017, respectively, compared with €24 billion and €7 billion in December 2016.<sup>182</sup> Secondly, advance preparations by market participants have helped to secure the bonds that could be required at reporting dates already prior to the reporting period. Market feedback suggests that new entrants to the market have also contributed to the supply of collateral, attracted by high repo market premia for their securities holdings. This has helped to reduce the number of bonds trading at deeply negative levels around the reporting dates.

## Assessing the impact of regulatory reforms on repo market activity

**In the recent past, concerns have been raised that regulatory reforms have had a negative impact on the availability of repo services provided by banks.** The above analysis based on turnover data shows that banks window-dress their regulatory metrics around reporting dates. A related question in the context of evaluating the effects of regulatory reforms is, therefore, whether banks have significantly reduced their provision of repo services. Moreover, aggregate repo market developments may mask any significant impact of regulatory reforms at the individual bank level. This suggests that an analysis of the impact of regulatory reforms on repo market activity is warranted at both the aggregate and the bank level. To this end, this section presents an analysis based on quarter-end balance sheet data reported by banks to the ECB since the third quarter of 2014.

**While euro area banks have gradually adapted to the new regulatory framework, aggregate amounts of euro area banks' outstanding repo transactions have been relatively stable in recent years.** Since the third quarter of 2014, euro area banks have improved their leverage ratio by 0.91 percentage point, from 4.84 to 5.75 on average (based on data for a large set of significant euro area banks representing the vast majority of repo market activity; see [Chart C.5](#)). At the same time, the aggregate amounts of reverse repos and repos outstanding have declined only modestly, although year-end dips can be observed (see [Chart C.6](#)).

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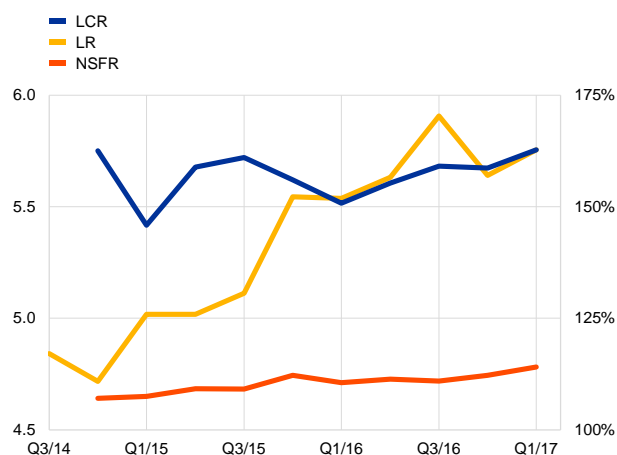
<sup>182</sup> See the [ECB's website](#).

### Chart C.5

Banks have improved their regulatory metrics over the past two and a half years

#### Evolution of banks' regulatory metrics in the euro area, based on supervisory data

(Q3 2014 – Q1 2017; left-hand scale: percentage points for the LR; right-hand scale: percentages for the LCR and NSFR)



Source: ECB.

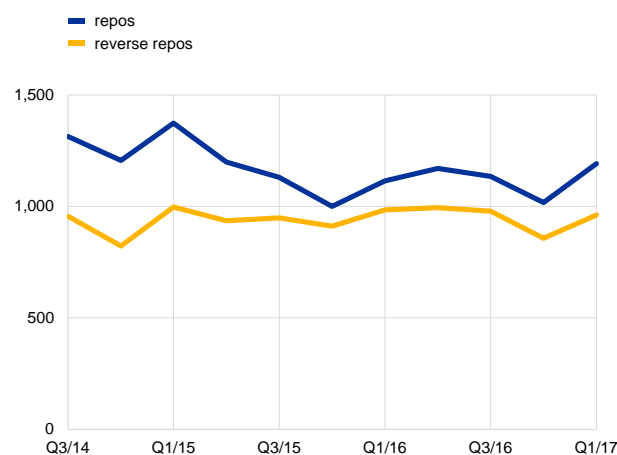
Notes: Balanced samples, based on unweighted averages of the individual metrics. The LCR is based on 52 banks, the NSFR on 48 banks and the LR on 52 banks.

### Chart C.6

On aggregate, the changes in outstanding repos and reverse repos appear to be modest, while year-end dips in volumes can be observed

#### Evolution of banks' outstanding repo and reverse repo transactions in the euro area, based on supervisory data

(Q3 2014 – Q1 2017; outstanding repo and reverse repo transaction volumes in € billions)



Source: ECB.

Note: Aggregate repo and reverse repo volumes are based on samples of 52 and 42 banks, respectively.

**To better understand whether regulatory reforms have impacted the provision of repo services, an empirical analysis at the individual bank level has been conducted.** A comprehensive dataset including information on banks' repo and reverse repo volumes, regulatory measures and other variables has been collected based on supervisory data, which are available for quarter-ends. Furthermore, a multivariate regression model has been developed to test whether adjustments in the various regulatory measures are associated with modifications in repo volumes at the individual bank level (see Box A for further details of the dataset and the underlying methodology of the model).

**The findings suggest that at the individual bank level, regulatory reforms did not lead to a material reduction in repo volumes<sup>183</sup> relative to the overall size of banks' exposures.<sup>184</sup>** While the impact of the LCR and NSFR seems to be of little relevance for adjustments in repo volumes, banks' adjustments to higher LRs seem to be somewhat correlated with a reduction in their repo volumes. In particular, the empirical results point towards a robust and negative relationship between the leverage ratio and the repo volume over total exposures measure, although of only a moderate size. For the average bank, an increase in the LR by 1 percentage point is

<sup>183</sup> It should be noted that the analysis here excludes repos with central banks.

<sup>184</sup> Our findings are broadly in line with two other studies focusing on similar issues. First, Bucalossi and Scalia (2016) suggest that neither LR-constrained nor unconstrained euro area banks reduced their repo trading volumes. Second, EBA (2016) suggests a limited impact of the LR on the provision of repo services by European banks at reporting dates. See Bucalossi, A. and Scania, A., "Leverage ratio, central bank operations and repo market", Banca d'Italia Occasional Paper No 347, 2016, and EBA report on the leverage ratio requirements under Article 511 of the CRR, European Banking Authority, August 2016.

correlated with a reduction of approximately 0.5% in the ratio of the bank's repo volume to its total exposures, reducing it from 5.44% to 5.41%. This suggests that when banks have adjusted to higher LR levels, they have not done so materially at the expense of repo volumes relative to other exposures.

**At year-end, larger drops in banks' outstanding repo volumes relative to overall exposures can be observed.** Even after controlling for the impact of regulatory metrics specifically at the year-end, there is still a role for other factors, such as contributions to the SRF or bank levies. It turns out that average declines in repo volumes at year-end amount to more than four times the average impact of the LR. Notably, the effect of the LR on relative repo volumes appears to be smaller at year-end compared with its effects at quarter-end.

**The effects on outstanding reverse repo transactions are in a similar direction, but are generally less robust and smaller.** The findings suggest that banks also reduce their share of reverse repo volumes following an increase in the LR. However, the adjustments in reverse repos are smaller compared with the previous results for repos. Furthermore, accounting for other factors at year-end (such as SRF contributions, etc.), declines in banks' relative share in reverse repo business are also of a smaller magnitude. These results are not unexpected given that at the margin the LR is not affected by reverse repo transactions as explained above.

**An analysis of the potentially non-linear effects of regulatory reforms suggests that no significant further impact may be expected given the current levels of banks' leverage ratios.** Changes in repo activity appear to also depend on the level of the LR. In particular, a threshold analysis suggests a non-linear effect of the LR on repo business: banks adjust relatively more if they are closer to the 3% minimum requirement, while banks with a greater cushion exhibit more modest declines in outstanding amounts of repo transactions.<sup>185</sup> Considering the fact that most banks have already improved their LR well beyond the envisaged minimum requirement (see **Chart C.5** above), it can be inferred that on average no further substantial adjustments are to be expected.

**While our analysis does not establish a causal effect, our results are well in line with aggregate developments.** Our econometric setting does not allow the causal effect of the introduction of regulatory metrics on repo market activity to be isolated. Nevertheless, the correlation results obtained in our analysis are in line with the aggregate evolution of regulatory metrics and the outstanding amount of repo transactions. They confirm the hypothesis that banks' adjustment to the new regulatory measures constrains banks' use of repos, as intended by the regulatory reforms to avoid future excessive use of repos. At the same time, moderate declines of repo volumes relative to banks' overall business suggest that the regulatory reforms did not have a material unintended effect on euro area banks.

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<sup>185</sup> This is supported by the results for changes in repo volumes as the dependent variable. For changes in repo volumes, defined as  $\Delta Repo = (Repo_t - Repo_{t-1}) / Exposure\ measure_{t-1}$ , the results suggest declining adjustments as the LR increases.



## Box A

Econometric model for assessing the relationship between regulatory measures and repo market activity<sup>186</sup>

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### Fixed effects panel data regression model and threshold analysis

We conduct a panel analysis in order to assess the impact of regulatory reforms on repo markets. The following multivariate panel regression model tests for correlations between banks' repo activity and various regulatory measures:

$Y_{i,t} = \beta_0 + \beta_1 LR_{i,t} + \beta_2 LCR_{i,t} + \beta_3 NSFR_{i,t} + \beta_4 LR - constrained_{i,t} + \beta_5 LR - bound_{i,t} + \beta_6 Q4_t + \beta_7 Q4_t * LR_{i,t} + \beta'_8 X_{i,t} + \mu_i + \lambda_t + \epsilon_{i,t}$  where  $Y_{i,t}$  stands for (1) repos and reverse repos (all outstanding volumes excluding those vis-à-vis central banks) over the exposure measure (standardised), (2) the log of repos and reverse repos, and (3) changes in repo and reverse repo volumes<sup>187</sup>.  $LR_{i,t}$  is the leverage ratio,  $LCR_{i,t}$  is the liquidity coverage ratio, and  $NSFR_{i,t}$  is the net stable funding ratio.  $LR - constrained_{i,t}$  is a binary variable equal to one if the bank's leverage ratio is below 4% in the previous period and zero otherwise.  $LR - bound_{i,t}$  identifies whether banks are constrained by capital requirements related to the LR or by risk-based capital requirements.<sup>188</sup> The variable is equal to one if banks are restricted by the LR or by risk-based capital requirements and zero otherwise.<sup>189</sup>  $Q4_t$  is a binary variable for year-end effects which is equal to one for the year-end quarter and zero otherwise;  $X_{i,t}$  is a vector of bank and country-specific control variables (such as non-performing loans over total assets, unemployment, etc.). Quarterly time fixed effects ( $\lambda_t$ ) as well as bank fixed effects ( $\mu_i$ ) are included in the model;  $\epsilon_{i,t}$  is an i.i.d. error term. Table C.1 presents our empirical results.<sup>190</sup>

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<sup>186</sup> Prepared by Claudia Lambert and Lea Steininger.

<sup>187</sup> Changes in repo volumes are defined as:  $\Delta Repo = (Repo_t - Repo_{t-1}) / Exposure\ measure_{t-1}$ .

<sup>188</sup> Please note that common equity Tier 1 does not directly enter the equation due to multicollinearity issues and the resulting high variance inflation factors.

<sup>189</sup> We proxy this variable by interacting the leverage ratio with the risk-weighted asset (RWA) density. The RWA density is the ratio of risk-weighted assets to total assets. Banks with a low RWA density, i.e. below 35%, hold capital primarily to fulfil the leverage ratio. The output is omitted since very high variance inflation factors raise concerns about multicollinearity. Note that outcomes do not change qualitatively with the inclusion of the binary variable.

<sup>190</sup> It should be noted that our results remain qualitatively the same if we control for banks' market-making activities, and are hence robust to the inclusion of reverse repo activity in the repo regressions and vice versa.

**Table C.2**

Regression on selected financial and macro variables

	Repo / Exposure measure			ΔRepo	RevRepo / Exposure measure			ΔRevRepo
<b>LR</b>	-0.004** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)	-0.0002 (0.001)	-0.001* (0.001)	-0.002** (0.001)	-0.003*** (0.001)
<b>NSFR</b>	0.016 (0.022)	0.021 (0.022)	0.013 (0.024)	0.019 (0.015)	0.02 (0.017)	0.024 (0.016)	0.025 (0.018)	0.029* (0.016)
<b>LCR</b>	-0.003 (0.003)	-0.005 (0.003)	-0.006* (0.003)	-0.005** (0.002)	-0.001 (0.001)	-0.002 (0.002)	-0.002 (0.002)	-0.0005 (0.002)
<b>LR-constrained</b>	-0.005* (0.003)	-0.005** (0.003)	-0.002 (0.003)	-0.003 (0.003)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.001 (0.002)
<b>Q4</b>	-0.009** (0.004)	-0.030*** (0.008)	-0.037*** (0.007)	-0.051*** (0.01)	-0.004 (0.002)	-0.020*** (0.005)	-0.020*** (0.005)	-0.031*** (0.008)
<b>Q4*LR</b>		0.004*** (0.001)	0.004*** (0.001)	0.006*** (0.001)		0.003*** (0.001)	0.003*** (0.001)	0.004*** (0.001)
<b>Bank-specific covariates</b>	No	No	Yes	Yes	No	No	Yes	Yes
<b>Macro covariates</b>	No	No	Yes	Yes	No	No	Yes	Yes
<b>No of banks</b>	52	52	51	51	42	42	41	41
<b>No of obs.</b>	480	480	461	461	396	396	380	380
<b>Within R2</b>	0.383	0.404	0.434	0.120	0.237	0.278	0.264	0.162

Source: ECB.

Notes: The regressions include a constant, bank fixed effects, time fixed effects, lagged dependent variables, as well as a binary variable indicating whether banks are bound by the leverage ratio or the risk-based capital requirements ratio. Standard errors are in parenthesis. The \*\*\*, \*\* and \* stand for significant coefficients at the 1%, 5% and 10% levels, respectively. Results are robust to the exclusion of the lagged dependent variable. The analysis is based on supervisory data (FINREP, COREP and Short Term Exercise (STE)); macro variables are obtained from the ECB's Statistical Data Warehouse.

In addition to the panel estimation, we test for potentially non-linear effects of the LR on the dependent variables in question. Put differently, the average effects of the LR on repo activity may depend on the respective range of the leverage. Accordingly, the model determines data-driven thresholds. Following Hansen (1999), the panel threshold regression model is defined as follows:

$$Y_{i,t} = \begin{cases} \beta_0 + \beta_{11} LR_{i,t} + \beta'_2 X_{i,t} + \epsilon_{i,t} \\ \beta_0 + \beta_{12} LR_{i,t} + \beta'_2 X_{i,t} + \epsilon_{i,t} \end{cases}$$

The leverage ratio  $LR_{i,t}$  is the threshold variable dividing the observations into different regimes.  $\gamma$  is the unknown threshold value and  $X_{i,t}$  is a vector of covariates, including regulatory metrics, binary variables and control variables.

## Box B

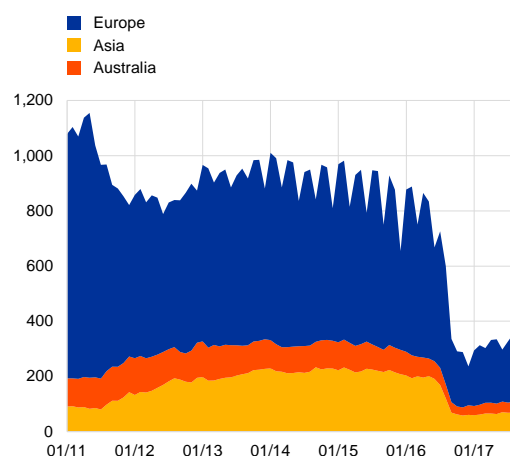
### Evidence of window-dressing in the money market<sup>191</sup>

The reforms of US institutional prime money market funds (MMFs), which entered into force in October 2016,<sup>192</sup> are estimated to have reduced European banks' US dollar funding by about USD 200 billion (see Chart A.1). However, over the same period, European banks gained approximately USD 260 billion of dollar funding by engaging in repurchase agreements with other categories of US MMFs (see Chart A.2). In particular, European banks obtained around USD 240 billion of additional dollar funding from repo trades backed by US government securities with government MMFs.<sup>193</sup>

**Chart A.1**

US prime MMFs' total investments in each region

(Jan. 2011 – Aug. 2017; monthly data, USD billions)

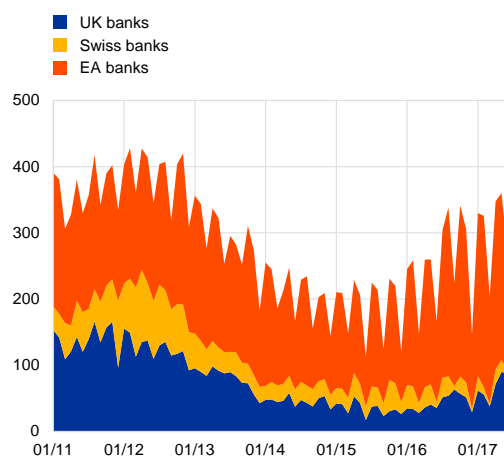


Source: US Office of Financial Research.

**Chart A.2**

US MMFs' European counterparties in repurchase agreements

(Jan. 2011 – Aug. 2017; monthly data, USD billions)



Source: US Office of Financial Research.

Regional differences in the implementation of the rules on the leverage ratio – defined as banks' Tier 1 capital over their exposure – may have facilitated the observed rise in repos with US MMFs by euro area and Swiss banks.<sup>194</sup> The Basel III leverage ratio framework foresees that the leverage ratio should be reported and disclosed based on the balance sheet of the last day of the quarter, but it also allows the use of more frequent calculations (e.g. daily or monthly averaging of balance sheets). Banks in the euro area, Switzerland and Japan compute their leverage ratio using the end-

<sup>191</sup> Prepared by Paola Donati, Martina Jancoková and Thomas Kostka.

<sup>192</sup> Until October 2016, all US MMFs had a constant net asset value of USD 1 and their shares could be bought or sold for USD 1 with no uncertainty. The reforms require "prime" MMFs with an institutional investor base to let their net asset value float with the value of the underlying securities, and to adopt liquidity fees and restrictions on redemptions ("gates") to limit cash outflows under conditions of market stress. Prime MMFs invest primarily in corporate debt securities.

<sup>193</sup> US MMFs fall under three main categories: (1) prime MMFs; (2) tax-exempt MMFs; and (3) government MMFs. The latter invest their assets in cash, government securities and repos backed by US Treasuries, government agency securities and other collateral. Some government MMFs have neither fees nor gates and these are the MMFs with which European banks have traded almost exclusively.

<sup>194</sup> See also Egelhof, J., Martin, A. and Zinsmeister, N., "Regulatory Incentives and Quarter-End Dynamics in the Repo Market", *Liberty Street Economics*, Federal Reserve Bank of New York, 7 August 2017; Mackenzie Smith, R., "L'exception française: why French banks dominate US repo trading", Risk.net, 1 September 2016; and Devasabai, K., "Can US money funds rely on French banks for repo liquidity?", Risk.net, 1 September 2016.

of-quarter balance sheet. Instead, UK and US banks consider the daily averages of their leverage ratios over the quarter. In spite of these differences, Chart A.2 shows that UK banks also expanded the volumes of their repo funding from US MMFs intra-quarter, although the increases observed in Swiss and in particular euro area banks' positions are more pronounced.

Regulatory measures such as the leverage ratio have been introduced to reduce the risks stemming from banks' funding structures and especially from excessive leverage built up through wholesale short-term funding. In particular, these measures aim to ensure that the risks associated with excessive leverage are internalised by market participants. As such, they are meant to also have an impact on banks' repo funding. Against this background, the observed patterns in the repo trading of European banks with US MMFs call for further analysis of the impact of the different leverage ratio calculation methodologies possible under Basel III and whether there is a need for a unified methodology.

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## Conclusions

**Overall, the analysis presented in this special feature supports the notion of an overall functioning repo market in the euro area and the view that regulatory reforms have not had a material unintended effect on the amount of euro area banks' outstanding repo transactions.** Analysis based on the MMSR data shows that the recent tensions observed in the repo market have been driven by a combination of various factors, among which regulatory reporting and non-standard monetary policy measures also played a key role. While these tensions have receded in 2017, further monitoring and analysis of the impact of various factors, including regulatory reporting, is warranted. Empirical analysis based on individual bank data suggests that while regulatory reforms have indeed been able to reduce the excessive use of repos as intended, they have not led to a significant reduction in the share of repo and reverse repo activity of euro area banks. This supports the view that the reforms have not had a material unintended effect on the amount of euro area banks' outstanding repo transactions. Thus, changes to the treatment of repo transactions in regulatory standards cannot be justified on these grounds. Beyond that, a more lenient treatment of repos could lead to the re-emergence of risks related to the build-up of excessive leverage and over-reliance on short-term wholesale funding in financial markets related to securities financing transactions and the re-use of collateral.<sup>195</sup> Nevertheless, the findings suggest that window-dressing behaviour by banks appears to be an important factor behind volatility around reporting dates and thus could be an unintended effect of regulation. Hence, further analysis is warranted to establish whether some regulatory and other metrics could be calculated based on averaging rather than the balance sheet on a single date. This could help reduce the volatility observed and contribute to a smoother functioning of markets around these dates.

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<sup>195</sup> The FSB Re-hypothecation and Re-use Expert Group also highlighted the LR as the main brake put in place after the crisis to address these concerns. See "[Transforming Shadow Banking into Resilient Market-based Finance – Re-hypothecation and collateral re-use: Potential financial stability issues, market evolution and regulatory approaches](#)", Financial Stability Board, January 2017.

## D Higher future financial market volatility: potential triggers and amplifiers

Magnus Andersson, Lieven Hermans and Thomas Kostka

*The reduction in asset price volatility in recent years has taken place in tandem with investors lowering the premia required for lower-rated assets. The current favourable market sentiment could however change abruptly if, for instance, investors were to reassess the outlook for growth or monetary policy. Potential surges in asset price volatility could be amplified by: (i) investors selling off assets perceived as overvalued; (ii) the high levels of corporate leverage; and/or (iii) a rapid unwinding of market positions that benefit from low volatility. Low volatility in financial markets is therefore being closely monitored by financial stability authorities, as it may mask an underpricing of risks and a build-up of financial imbalances.*

### Introduction

**Asset price volatility stands at historically low levels.** One of the most prominent broad-based measures of global asset price volatility is the VIX index, which is a gauge of expected volatility of the US S&P 500 index. This metric, sometimes dubbed the “fear gauge”, has been fluctuating at historically low levels in recent quarters. The low volatility extends beyond US stock markets, as asset price gyrations have been subdued across most asset classes and economies. This is consistent with the assessment that the drivers of lower volatility in recent years have also been global in nature, related to business cycle developments and very accommodative monetary policies across advanced economies (see also [Section 2](#)).

**Low financial market volatility can harbour risks to financial stability.** Low volatility in financial markets has materialised in an environment in which investors’ search-for-yield behaviour has driven credit spreads down, particularly for assets with lower ratings (see [Chart D.1](#)). This environment may generate incentives for investors to engage in excessive risk-taking. Low financial market volatility may cause a rise in vulnerabilities stemming from financial institutions’ risk management, given their widespread use of various value-at-risk (VaR) methods (a methodology which puts a high weight on the most recent observations). According to this risk metric, low financial market volatility reduces the expected loss over a given period, which may have further spurred risk-taking in the recent past. Low volatility may also encourage the build-up of leverage, synthetic or real. Furthermore, the low volatility observed for most global asset price indices has been driven by reduced correlations across the individual assets included in the indices. Investors may become overly complacent in such an environment, believing that their portfolios are adequately diversified. This may lead to further risk-taking and, potentially, large losses in the event of a sudden increase in volatility (and assets becoming more correlated).<sup>196</sup>

<sup>196</sup> For further discussion, see “[The Volatility Paradox: Tranquil Markets May Harbor Hidden Risks](#)”, *Financial Markets Monitor*, Second Quarter 2017, Office of Financial Research, August 2017.

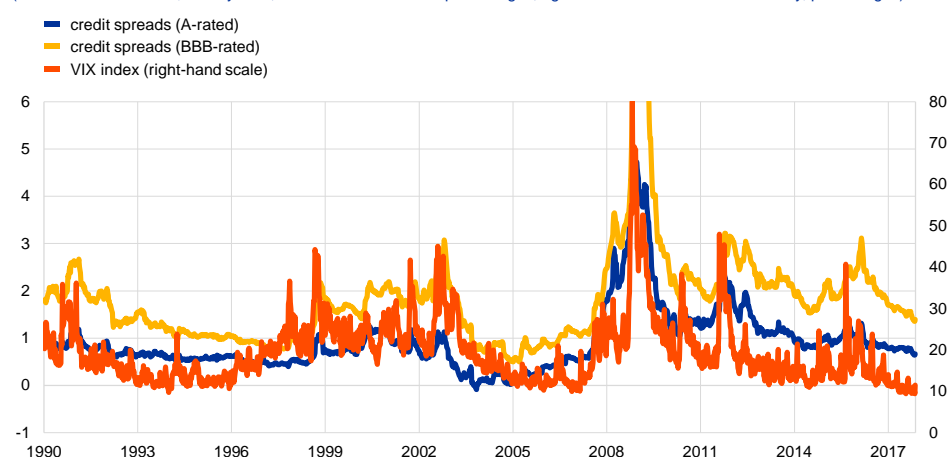
More generally, a sudden spike in volatility could trigger a demand for higher premia on riskier assets and thereby lead to mark-to-market losses and prompt outflows from riskier asset classes and regions. Moreover, if credit spreads and equity risk premia were to rise, funding costs for non-financial firms would increase, which would pose liquidity and solvency risks for the more vulnerable firms, possibly amplifying the initial sell-off.

### Chart D.1

#### Close co-movement between stock market volatility and credit spreads

##### VIX index and US corporate credit spreads

(Jan. 1990 – Nov. 2017, weekly data; left-hand scale: annual percentages; right-hand scale: annualised volatility, percentages)



Sources: Bank of America Merrill Lynch and Thomson Reuters Datastream.

#### **This special feature describes some of the main triggers and amplifiers which could contribute to a potential ratcheting-up of volatility.**

One way to conceptualise prospective increases in asset price volatility is to identify potential triggers and vulnerabilities that could amplify volatility cycles. The special feature starts by discussing whether elevated market volatility could be triggered by a worsening growth outlook (or greater uncertainty surrounding growth) or by an abrupt change in market expectations about the timing of monetary policy normalisation. As discussed in the second part, should any of these (or other possible) triggers materialise, volatility may rise sharply on account of elevated corporate leverage, high valuations or a rapid unwinding of market positions. An indicator approach is employed to illustrate the relevant issues. While the focus is largely on the US stock market, owing to its prominence in market discussions, the assessment of financial stability risks and vulnerabilities holds for most advanced economies, including the euro area.

#### The macro environment and its impact on market volatility

**Aggregate asset price developments are closely linked to macroeconomic performance.** Thus, one plausible explanation for the low level of market volatility

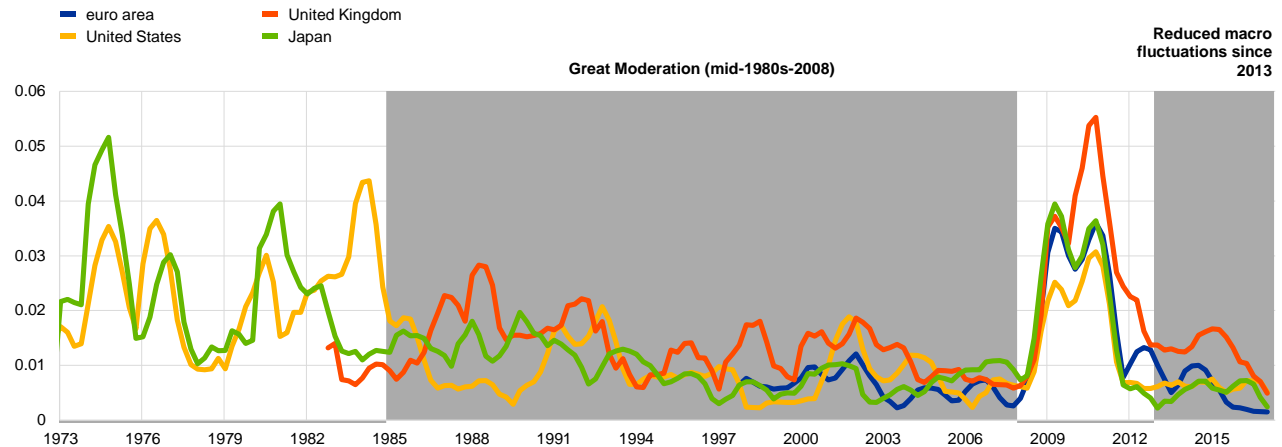
could be that the macro environment has become more stable.<sup>197</sup> If so, greater uncertainty in the future about the business cycle could contribute to elevated volatility in markets.

## Chart D.2

### Volatility of real GDP growth has returned to pre-crisis levels

#### Real GDP volatility for the United States, the euro area, the United Kingdom and Japan

(Q1 1973 – Q1 2017, quarterly data, standard deviation of year-on-year changes in real GDP, eight-quarter moving window)



Sources: Haver Analytics and ECB calculations.

Note: The grey shaded areas indicate periods of low business cycle fluctuations.

#### The amplitude of business cycle fluctuations has receded across the globe.

Taking a broad perspective, **Chart D.2** displays long time series of real GDP volatility in four advanced economies. During the period from the mid-1980s until the outbreak of the financial crisis in 2008, business cycle fluctuations in advanced economies remained at relatively low levels, a phenomenon that has been dubbed the “Great Moderation”.<sup>198</sup> After the ratcheting-up of volatility during the global financial crisis, macro volatility has recently fallen below the levels observed before the crisis across all four economies.

<sup>197</sup> In theory, stock prices are a function of current and expected future dividends, discounted by a risk-free rate and an equity risk premium (the latter being compensation for perceived uncertainty regarding future cash flows). Dividends are usually paid out as a function of firms’ earnings. Taking a macro perspective, corporate earnings and aggregate economic activity should be expected to develop broadly in line with each other over the long term. Empirical studies have indeed found a positive relationship between the two, although earnings cycles tend to display larger amplitudes. See, for instance, the box entitled “The relationship between listed companies’ earnings growth and output growth in the economy as a whole”, *Monthly Bulletin*, ECB, September 2007.

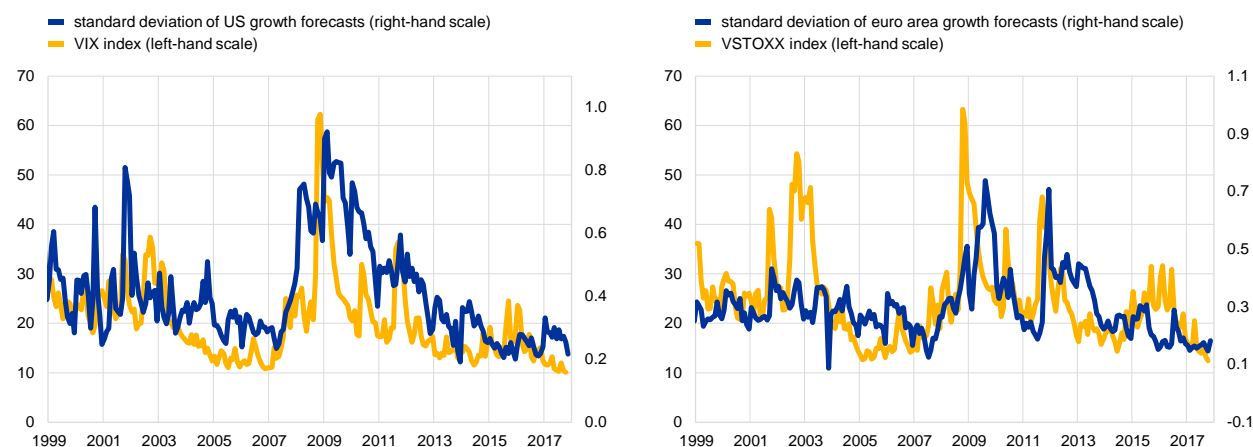
<sup>198</sup> Several possible reasons why macro volatility remained low over this period have been suggested. First, many central banks moved towards an inflation target as their main objective. More systematic monetary policies may have contributed to dampening macro fluctuations. Second, the economic structure gradually shifted away from manufacturing to services (an industry which is more predictable and less volatile). Third, the adoption of more efficient inventory practices such as “just-in-time” may also have contributed to the more stable macro environment. For an overview, see Bernanke, B., “The Great Moderation”, remarks at the meeting of the Eastern Economic Association, Washington, DC, February 2004.

### Chart D.3

More aligned business cycle expectations among analysts may have also contributed to lower market volatility

#### Standard deviation of analysts' one-year-ahead real GDP growth expectations and the VIX index (left panel) and the VSTOXX index (right panel)

(Jan. 1999 – Nov. 2017, monthly data; left-hand scale: annualised volatility, percentages; right-hand scale: standard deviation)



Sources: Consensus Economics, Bloomberg and ECB calculations.

**As GDP growth volatility has declined, analysts' business cycle predictions have converged.** Chart D.3 shows the cross-sectional standard deviations of one-year-ahead US and euro area real GDP expectations provided by individual analysts. These measures of the degree of disagreement across analysts regarding US and euro area growth performance have gradually declined in recent years and have developed broadly in line with stock market volatility in the two economies. The combined effect of reduced actual business cycle fluctuations and more agreement among analysts about the economic outlook may have dampened the fluctuations in the equity risk premium component used in asset valuations and is thus likely to have contributed to lower stock market volatility.

**A worsening macro outlook may push volatility higher.** A deteriorating growth outlook would reduce firms' earnings prospects, triggering lower stock prices. This, in turn, could lead to higher volatility in markets, as investors' views about future cash flows from financial assets may diverge. This can be seen, for example, in the United States, where since 1929 stock market volatility has increased sharply at the start of recessions and then remained elevated for an extended period (see Chart D.4). As seen in the chart, the pattern of elevated volatility after the outbreak of recessions is consistent across various sub-samples.

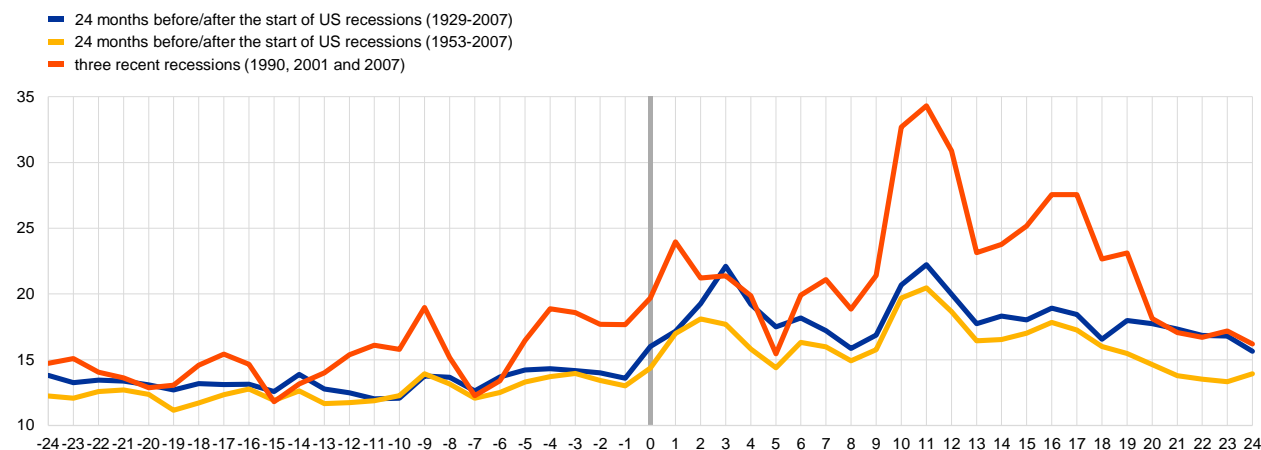


## Chart D.4

### US stock market volatility remains elevated after the outbreak of recessions

#### US stock market volatility around the starting dates of US recessions since 1929

(monthly data, annualised average US stock market volatility 24 months before and after US recessions)



Sources: Haver Analytics and ECB calculations.

### Revised expectations regarding the future path of monetary policy could trigger an increase in volatility

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

Monetary policy actions can have a large and broad-based impact on both the level and the volatility of asset prices. As all asset prices are inherently forward looking, policy actions not fully anticipated by investors tend to have a particularly marked impact.<sup>199</sup> For example, an examination of all Federal Open Market Committee (FOMC) meetings since 1990 shows that monetary policy meetings that were perceived as unexpectedly hawkish (judging by the daily move in exchange rates or bond yields) led to elevated equity market volatility, while loosening monetary policy shocks had the opposite effect (see [Chart D.5](#)). The VIX index stood on average approximately 15% higher 20 trading days after a monetary tightening event. Thus, a faster than expected removal of the accommodative monetary policy stance in the United States and other advanced economies could trigger increases in asset price volatility.

#### **Shocks to volatility might also become more persistent as monetary policy tightens.**

During the years when various unconventional monetary policy measures were being introduced, surges in both US and euro area stock market volatility have tended to reverse more quickly to moderate or lower levels; in other words, they

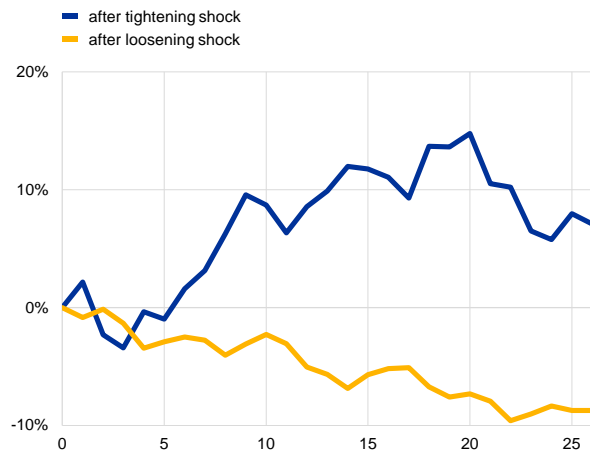
<sup>199</sup> See, for instance, Gürkaynak, R., Sack, B. and Swanson, E., "Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements", *International Journal of Central Banking*, May 2005; and Andersson, M., "Using Intraday Data to Gauge Financial Market Responses to Federal Reserve and ECB Monetary Policy Decisions", *International Journal of Central Banking*, June 2010.

became less persistent (see, e.g., [Chart D.6](#) regarding the United States).<sup>200</sup> This pattern may have reflected a growing perception among financial market participants that, in the event of high market stress, central banks would be ready to step in to normalise conditions. Conversely, again looking at US data, volatility persistence began to increase after these policies ended. Taking the US evidence as a blueprint, as growth in advanced economies gradually improves and monetary policies become gradually less accommodative, market participants may consider it less likely that central banks would need to step in and intervene, which, in turn, could increase the duration of elevated financial market volatility episodes.

**Chart D.5**  
US stock market volatility edges up after monetary policy tightening shocks

**Evolution of the VIX index over 25 days following tightening/loosening monetary policy shocks**

(1990-2017, daily data, average volatility, percentages, index normalised to zero on the day before the monetary policy shock)

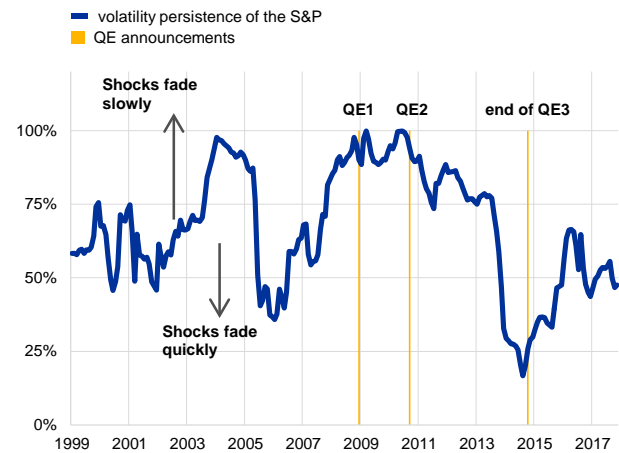


Sources: Haver Analytics and ECB calculations.  
Notes: Monetary policy shocks are derived in a manner similar to Rogers, J., Scotti, C. and Wright, J., "Evaluating asset-market effects of unconventional monetary policy: a multi-country review", *Economic Policy*, Vol. 29(80), October 2014, pp. 749-799. A tightening (loosening) shock is assumed if the narrow measure of the nominal effective exchange rate of the dollar appreciates (depreciates) by more than one standard deviation on the day of the FOMC meeting. The two lines track the average response in the log level of the VIX index following a tightening (loosening) shock over a 25 trading day horizon. The axis value of zero corresponds to the day before the FOMC meeting. The sample includes all FOMC meetings since January 1990. The methodology is robust to the use of other metrics to identify the shock (e.g. one-year or ten-year Treasury bond yield).

**Chart D.6**  
Tighter monetary policy may contribute to greater persistence of equity market volatility

**Time-varying estimates of persistence implied in GARCH(1,1) stock market volatility in the United States**

(Jan. 1999 – Nov. 2017, share of shock to volatility persisting beyond ten trading days, percentages)



Sources: Bloomberg and ECB calculations.  
Notes: The y-axis shows the percentage share of a shock to stock market volatility, derived from the impulse response function of a GARCH(1,1) model for the respective stock index, estimated over a one-year rolling window of daily information. The vertical yellow lines mark the dates of quantitative easing (QE) announcements by the Federal Reserve System.

**A rapid unwinding of market positions and elevated leverage could amplify an increase in volatility**

**A sudden increase in volatility may be amplified by a number of looming vulnerabilities.** Excessive risk-taking in a very tranquil market environment can potentially lead to a build-up of a number of vulnerabilities, such as asset mispricing, increased leverage or an increasing prevalence of one-directional position-taking

<sup>200</sup> See the box entitled "Have global uncertainty shocks become less persistent?", *Financial Stability Review*, ECB, November 2016.

that relies on continued low volatility. Should conditions in markets eventually deteriorate, investors may respond by selling assets perceived as overvalued, overly discriminating against sectors with high leverage and embarking on large-scale unwinding of previously profitable positions. Taken together, these vulnerabilities have the potential to amplify any initial increase in volatility.

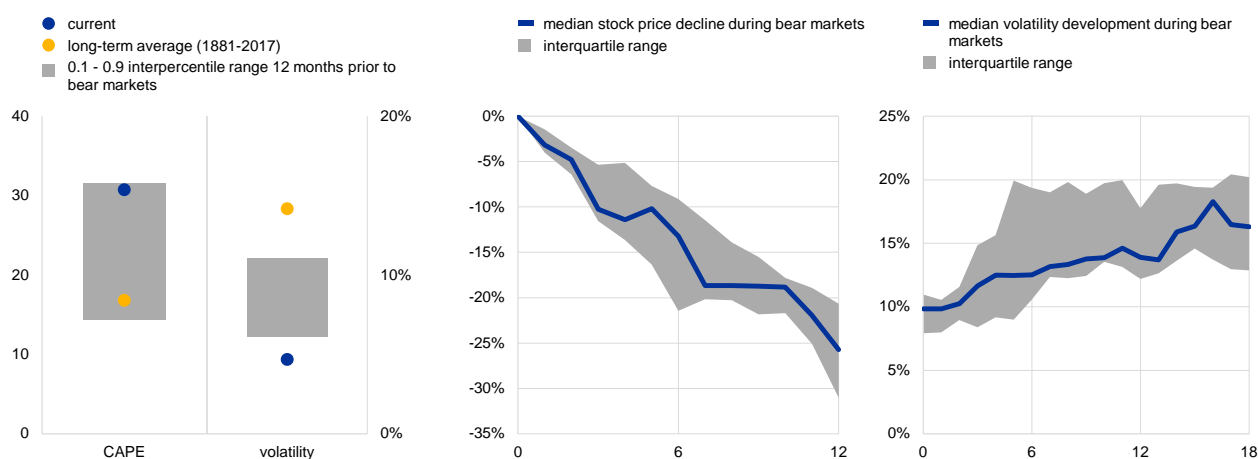
**High valuations and low volatility have, in the past, been harbingers of future bear markets and elevated volatility.** One of the potential side effects of prolonged periods of low volatility is that investors may engage in excessive risk-taking. One indication of such behaviour is that financial asset prices start to decouple from underlying fundamentals. Looking back at historical episodes in US stock markets, in the year preceding the 13 strongest bear markets observed since 1881, levels of volatility were low and valuations elevated (as measured by cyclically adjusted price/earnings (CAPE) ratios) relative to the historical average (see left panel of [Chart D.7](#)). As stock markets subsequently corrected (see middle panel of [Chart D.7](#)), volatility increased sharply (see right panel of [Chart D.7](#)). The current valuation/volatility environment looks exceptional, even compared with the situations preceding the historical sharp corrections in US stock markets.

### Chart D.7

Periods of low stock market volatility may incentivise higher risk-taking; stock market corrections and elevated volatility may follow

**Stock market valuations and volatility levels in the year preceding 13 US bear markets since 1881 (left panel); stock price developments and volatility movements during the 13 bear markets (middle and right panels)**

(left panel: US CAPE ratio levels and annualised stock market volatility; middle panel: 12-month cumulative US stock price developments in percentages; right panel: 18-month development in US stock market volatility, annualised volatility)



Sources: [R. Shiller's homepage](#) and ECB calculations.

Notes: The 13 bear markets identified by Shiller are: 1892, 1895, 1902, 1906, 1916, 1929, 1934, 1937, 1946, 1961, 1987, 2000 and 2007 (for details, see [R. Shiller's 22 September 2017 column](#)). The dataset only allows for monthly computations. Thus, the volatilities shown in the left and right panels are computed based on the (annualised) standard deviation of monthly returns over a one-year period. This is the reason why the right panel has been extended to 18 months compared with 12 months for the middle panel.

**Alternative measures derived from options markets indicate that some investors currently see an increased likelihood of stock price corrections.**

Along with the low volatility and signs of overheated US stock prices, it appears that an increasing number of investors have engaged in trades to protect their portfolios from, or to speculate on, a correction in stock prices. In fact, the skewness of the future equity return distribution implied by S&P 500 options at different strike prices

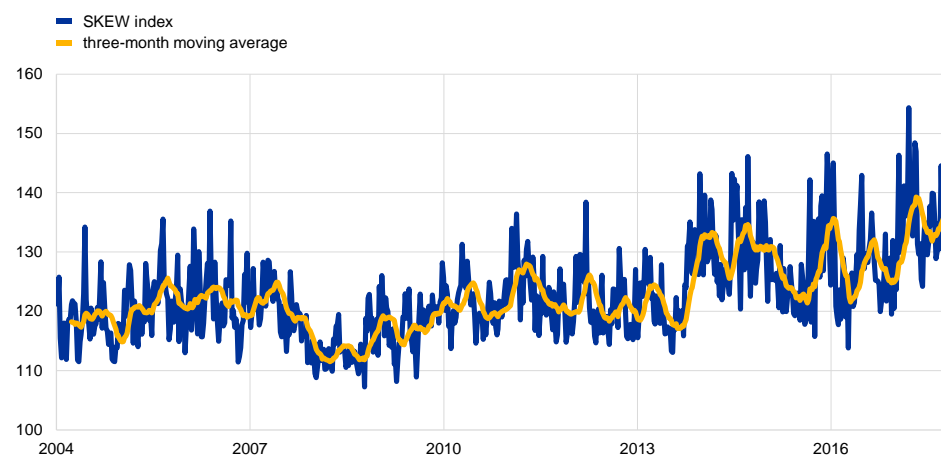
has increased in recent quarters (see [Chart D.8](#)). This suggests that investors are bidding up the prices of out-of-the-money put options – a trade which would benefit from falling stock prices.

### Chart D.8

Information derived from out-of-the-money options indicates higher risks of future stock price corrections

#### SKEW index derived from options on the S&P 500 index

(Jan. 2004 – Nov. 2017, weekly data, level of SKEW index)



Sources: Bloomberg.

Note: SKEW values generally range from 100 to 150; the higher the value, the higher the perceived tail risk.

**High indebtedness among firms may amplify the speed and magnitude of a potential correction of asset price volatility.**<sup>201</sup> As the leverage of firms increases, they become more risky, which – in principle – should justify higher stock market volatility. US aggregate data provide historical evidence of such a relationship (see [Chart D.9](#), left panel). Since 2011, however, indebtedness of US firms has gradually increased without any corresponding increase in volatility. Should this relationship be reinstated in the event of an initial increase in stock price volatility, it would act as an amplifier and fuel further stock market gyrations.

**The time-series evidence is corroborated by firm-level data.** The right panel in [Chart D.9](#) presents the history of the cross-sectional correlation of individual firms' leverage ratios and stock price volatility (based on the firms in the current panel of the Dow Jones 65 Composite Average). Historically, a positive correlation between the two metrics can be observed for a majority of firms. As seen with the time-series evidence, since 2011 this relationship has broken down, although it tentatively re-emerged in 2016. In sum, the micro and macro evidence presented here suggests

<sup>201</sup> This is closely related to the “leverage effect” described by Black (1976), which suggests a causal relationship between stock returns and volatility changes. When equity prices of companies fall, their leverage increases, since the value of their debt rises relative to that of their equity. As a result, stocks traded in the markets become riskier, and hence more volatile. In other words, stock market volatility should increase/fall when leverage goes up/down. The empirical literature has, however, found mixed evidence regarding the existence of a leverage effect. See Black, F., “Studies of Stock Price Volatility Changes”, proceedings of the 1976 meeting of the Business and Economics Statistics Section, American Statistical Association, 1976, pp. 177-181; and Hasanhodzic, J. and Lo, A., “[Black’s Leverage Effect Is Not Due To Leverage](#)”, February 2011.

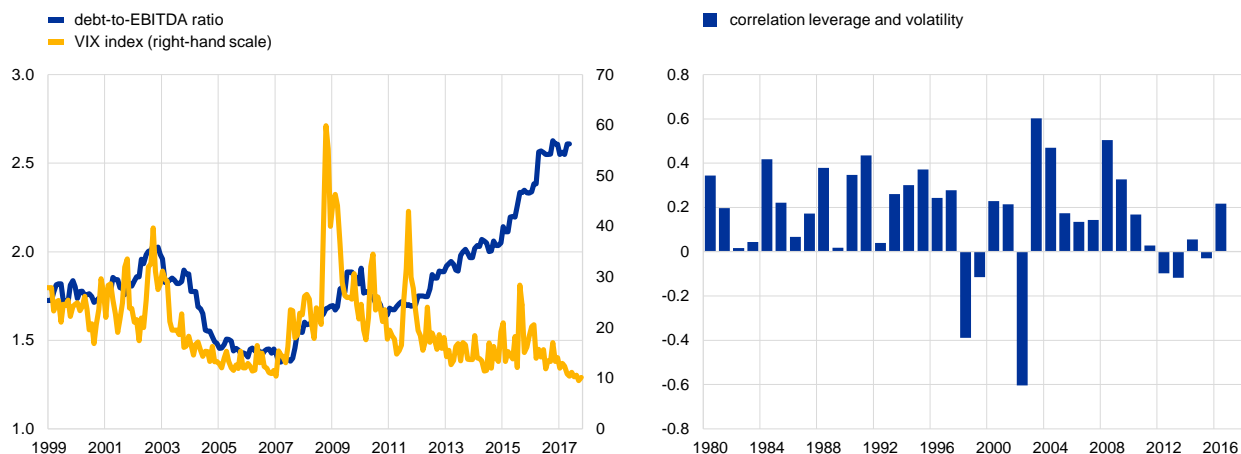
that, should equity prices suffer a correction, the high leverage levels evident in US listed companies may act as a further accelerator of the pick-up in equity price volatility.

### Chart D.9

#### Decoupling between stock market volatility and firms' leverage in the United States

US gross debt-to-EBITDA ratio and the VIX index (left panel) and average annual correlation between the leverage and volatility of individual firms included in the Dow Jones 65 Composite Average index (right panel)

(left panel: Jan. 1999 – Oct. 2017, median debt-to-EBITDA ratio; right panel: 1980-2017, average annual correlation)



Sources: Bloomberg and ECB calculations.

Notes: EBITDA stands for earnings before interest, taxes, depreciation and amortisation. Leverage for firms included in the S&P 500 index.

**Finally, an increase in volatility could be exacerbated by investors winding down short volatility positions.** Non-commercial investors have held increasing numbers of short positions in VIX futures and options. The classification of non-commercial investors is usually done to identify traders using the derivatives markets for speculative purposes (including hedge funds, asset managers and individual investors).<sup>202</sup> Such investors often use leverage to boost potential profits and therefore their losses could have more systemic implications for the financial sector at large.<sup>203</sup> The short positions in the VIX are a bet that volatility will remain low – a strategy that has been highly profitable in the last two years (see left panel of [Chart D.10](#)). The source of these profits can be derived from the slope of the VIX futures curve. If the level of the VIX index is low, futures prices tend to predict a gradual increase in the VIX over the coming months towards more normal volatility

<sup>202</sup> Speculative, or non-commercial, investors tend to be characterised by their engagement in directional bets on the underlying of the derivative (the VIX index, in this case). The opposite positions tend to be held by dealers, who match the demand of the speculative investors against a premium. Dealers typically hedge their positions, as they do not engage in directional bets. This notwithstanding, this simplified distinction should be treated with some caution. There may also be non-commercial investors with non-speculative motives.

<sup>203</sup> According to more granular data from the Commodity Futures Trading Commission, hedge funds' net short positions in short VIX futures contracts have accounted for approximately 97% of total speculative net short positions in futures and options in 2017.

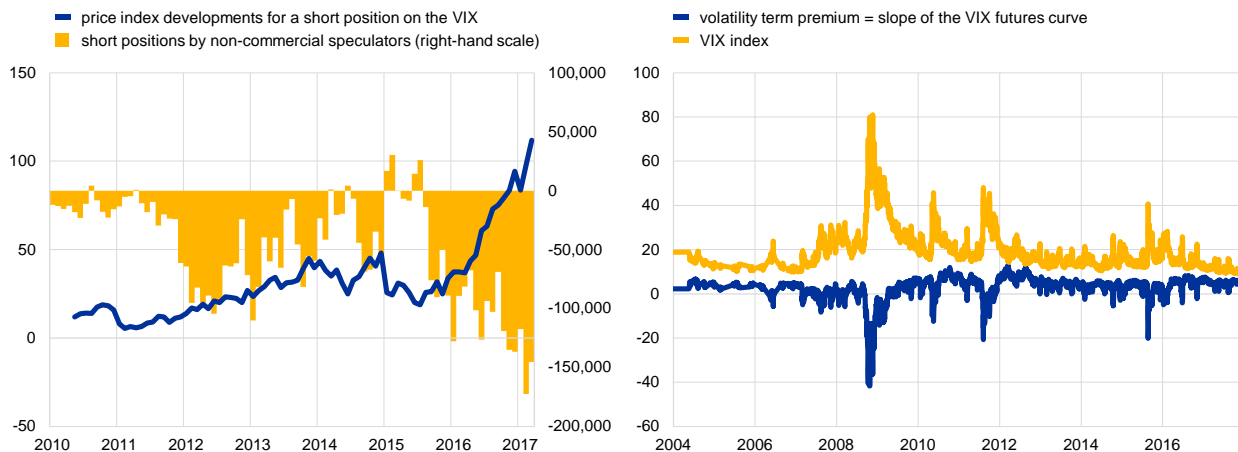
levels (see right panel of [Chart D.10](#)).<sup>204</sup> As VIX futures prices are in this case higher than the “spot” VIX, a short position in a VIX future is profitable if the VIX index remains broadly stable or declines. A significant increase in volatility, on the other hand, has two adverse effects on this “carry trade”. First, current short positions give rise to losses as the VIX rises above its futures price. Second, short positions in the VIX will, in general, remain unprofitable while the VIX is high; the slope of the futures curve typically turns negative during periods of elevated volatility, as the VIX is then expected to decline towards more moderate levels. As a result, as volatility picks up, these short, potentially leveraged, positions can be expected to be unwound rapidly, possibly aggravating the initial rise in asset price volatility.

## Chart D.10

Low-volatility trades have been highly profitable in the recent past

Price index for a short-positioned VIX trade (XIV, blue line) and non-commercial speculators’ net short positions in VIX futures (left panel), and the VIX index and the slope of the VIX futures curve (right panel)

(left panel: Jan. 2010 – Oct. 2017, monthly data; left-hand scale: price index; right-hand scale: number of net short contracts; right panel: Jan. 2004 – Nov. 2017, daily data, VIX index points)



Sources: Bloomberg, Commodity Futures Trading Commission and ECB calculations.

Notes: The blue line in the left panel refers to developments in the VelocityShares Daily Inverse VIX Short-Term ETN (XIV). This is an exchange-traded note (ETN) which provides investors with a cash payment at the scheduled maturity or early redemption based on the inverse performance of the underlying index (i.e. the VIX index). The yellow bars in the left panel indicate the number of long VIX futures contracts minus short VIX futures contracts purchased by non-commercial (i.e. speculative) investors. The blue line in the right panel corresponds to the difference between the price of a VIX future with a six-month residual maturity and the “spot” VIX index.

## Conclusions

**This special feature has documented a number of triggers and amplifiers that could lead to higher financial market volatility in the future.** Looking back, the reduction in global market volatility in recent years can be linked in part to fundamentals. In particular, reduced business cycle uncertainty and predictable

<sup>204</sup> The fair value of VIX futures differs from other “plain vanilla” futures (which are derived from the cost-of carry relationship between the futures and the underlying asset). Since there is no carry between the VIX and a position in VIX futures, the fair value of VIX futures cannot be derived by a similar relationship. Instead, an estimate of the VIX futures price entails modelling the process for the VIX and estimating the parameters of the model from historical values of the VIX and VIX futures prices. This implies some degree of mean reversion where very low levels of the actual VIX index tend to correspond with higher VIX futures levels. For more details of the features of VIX futures, see the [Chicago Board Options Exchange website](#).

accommodative monetary policies have probably contributed to dampening asset price fluctuations around the globe. However, this environment may change over the FSR risk horizon of 24 months. Volatility is likely to increase – possibly in an abrupt manner – should macroeconomic conditions deteriorate or should markets abruptly revise their expectations regarding the phasing-out of accommodative monetary policy conditions. In addition, a number of vulnerabilities have the potential to amplify any initial increase in volatility. Investors may respond to an increase in financial market volatility by selling assets perceived as overvalued. Moreover, the volatility of assets linked to firms and sectors with high leverage may increase disproportionately. Finally, a large-scale unwinding of previously profitable low-volatility strategies may occur. Regarding the latter point, although the low-volatility risk is widely recognised by financial market analysts, investor positioning suggests that many investors may still be too complacent about this risk. In the euro area, the implications of a possible sharp increase in volatility would be partly mitigated by the accommodative monetary policy, as well as by the limited signs that asset prices are stretched relative to fundamentals. Nevertheless, investors need to ensure that they have sufficient buffers to withstand higher market volatility in the future and possible adverse repercussions, such as falling financial asset prices and wider credit spreads.

## Abbreviations

### Countries

<b>BE</b>	Belgium	<b>HR</b>	Croatia	<b>PL</b>	Poland
<b>BG</b>	Bulgaria	<b>IT</b>	Italy	<b>PT</b>	Portugal
<b>CZ</b>	Czech Republic	<b>CY</b>	Cyprus	<b>RO</b>	Romania
<b>DK</b>	Denmark	<b>LV</b>	Latvia	<b>SI</b>	Slovenia
<b>DE</b>	Germany	<b>LT</b>	Lithuania	<b>SK</b>	Slovakia
<b>EE</b>	Estonia	<b>LU</b>	Luxembourg	<b>FI</b>	Finland
<b>IE</b>	Ireland	<b>HU</b>	Hungary	<b>SE</b>	Sweden
<b>GR</b>	Greece	<b>MT</b>	Malta	<b>UK</b>	United Kingdom
<b>ES</b>	Spain	<b>NL</b>	Netherlands	<b>US</b>	United States
<b>FR</b>	France	<b>AT</b>	Austria		

In accordance with EU practice, the EU Member States are listed in this report using the alphabetical order of the country names in the national languages.

### Others

<b>ABS</b>	asset-backed security	<b>EBP</b>	excess bond premium
<b>AIF</b>	alternative investment fund	<b>ECAF</b>	Eurosystem credit assessment framework
<b>AMC</b>	asset management company	<b>EDF</b>	expected default frequency
<b>APP</b>	expanded asset purchase programme	<b>EDIS</b>	European deposit insurance scheme
<b>BCBS</b>	Basel Committee on Banking Supervision	<b>EDW</b>	European Data Warehouse
<b>BIS</b>	Bank for International Settlements	<b>EIOPA</b>	European Insurance and Occupational Pensions Authority
<b>bps</b>	basis points	<b>EMEs</b>	emerging market economies
<b>BRICs</b>	Brazil, Russia, India and China	<b>EMIR</b>	European Market Infrastructure Regulation
<b>BRRD</b>	Bank Recovery and Resolution Directive	<b>EMMS</b>	Euro Money Market Survey
<b>CAPE</b>	cyclically adjusted price/earnings (ratio)	<b>EMU</b>	Economic and Monetary Union
<b>CAPM</b>	capital asset pricing model	<b>EONIA</b>	euro overnight index average
<b>CBOE</b>	Chicago Board Options Exchange	<b>ESA 2010</b>	European System of Accounts 2010
<b>CBPP</b>	covered bond purchase programme	<b>ESAs</b>	European Supervisory Authorities
<b>CCP</b>	central counterparty	<b>ESCB</b>	European System of Central Banks
<b>CDS</b>	credit default swap	<b>ESFS</b>	European System of Financial Supervision
<b>CESR</b>	Committee of European Securities Regulators	<b>ESMA</b>	European Securities and Markets Authority
<b>CET1</b>	common equity Tier 1	<b>ESRB</b>	European Systemic Risk Board
<b>CGFS</b>	Committee on the Global Financial System	<b>ETF</b>	exchange-traded fund
<b>CISS</b>	composite indicator of systemic stress	<b>EU</b>	European Union
<b>COREP</b>	common reporting framework for capital adequacy information	<b>EUR</b>	euro
<b>CPI</b>	Consumer Price Index	<b>EURIBOR</b>	euro interbank offered rate
<b>CRD</b>	Capital Requirements Directive	<b>FINREP</b>	reporting framework for financial information
<b>CRE</b>	commercial real estate	<b>FOMC</b>	Federal Open Market Committee
<b>CRR</b>	Capital Requirements Regulation	<b>FSB</b>	Financial Stability Board
<b>CSD</b>	central securities depository	<b>FSR</b>	Financial Stability Review
<b>DFR</b>	deposit facility rate	<b>FVC</b>	financial vehicle corporation
<b>DG</b>	Directorate General for Economic and Financial Affairs, European Commission	<b>FX</b>	foreign exchange
<b>ECFIN</b>	Affairs, European Commission	<b>GBP</b>	pound sterling
<b>DGS</b>	deposit guarantee scheme	<b>GDP</b>	gross domestic product
<b>EA</b>	euro area	<b>G-SIB</b>	global systemically important bank
<b>EBA</b>	European Banking Authority	<b>G-SII</b>	global systemically important institution/insurer
<b>EBITDA</b>	earnings before interest, taxes, depreciation and amortisation	<b>HICP</b>	Harmonised Index of Consumer Prices



<b>HLA</b>	Higher Loss Absorbency	<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>HQLAs</b>	high-quality liquid assets	<b>OFIs</b>	other financial intermediaries/institutions
<b>IAIG</b>	internationally active insurance group	<b>OIS</b>	overnight index swap
<b>IAIS</b>	International Association of Insurance Supervisors	<b>O-SIIs</b>	other systemically important institutions
<b>ICMA</b>	International Capital Market Association	<b>OTC</b>	over-the-counter
<b>ICPFs</b>	insurance corporations and pension funds	<b>P/E</b>	price/earnings (ratio)
<b>ICR</b>	interest coverage ratio	<b>P2G</b>	Pillar 2 guidance
<b>ICS</b>	Insurance Capital Standard	<b>P2R</b>	Pillar 2 requirement
<b>IFRS</b>	International Financial Reporting Standards	<b>PCE</b>	personal consumption expenditure
<b>ILS</b>	inflation-linked swap	<b>PD</b>	probability of default
<b>IMF</b>	International Monetary Fund	<b>PMI</b>	Purchasing Managers' Index
<b>IOSCO</b>	International Organization of Securities Commissions	<b>PPI</b>	prudential policy index
<b>IRB</b>	internal ratings-based	<b>PSPP</b>	public sector purchase programme
<b>IRR</b>	internal rate of return	<b>QE</b>	quantitative easing
<b>IRRBB</b>	interest rate risk in the banking book	<b>ROE</b>	return on equity
<b>JPY</b>	Japanese yen	<b>RRE</b>	residential real estate
<b>LCBG</b>	large and complex banking group	<b>RWAs</b>	risk-weighted assets
<b>LCR</b>	liquidity coverage ratio	<b>S&amp;P</b>	Standard & Poor's
<b>LGD</b>	loss given default	<b>SBBS</b>	sovereign bond-backed security
<b>LR</b>	leverage ratio	<b>SCR</b>	Solvency Capital Requirement
<b>LTG</b>	long-term guarantee	<b>SIPS</b>	systemically important payment system
<b>LTV</b>	loan-to-value (ratio)	<b>SMEs</b>	small and medium-sized enterprises
<b>M&amp;As</b>	mergers and acquisitions	<b>SMP</b>	Securities Markets Programme
<b>MFI</b>	monetary financial institution	<b>SPV</b>	special-purpose vehicle
<b>MiFID</b>	Markets in Financial Instruments Directive	<b>SRB</b>	systemic risk buffer
<b>MIP</b>	macroeconomic imbalance procedure	<b>SREP</b>	Supervisory Review and Evaluation Process
<b>MMF</b>	money market fund	<b>SRF</b>	Single Resolution Fund
<b>MMSR</b>	money market statistical reporting	<b>SRM</b>	Single Resolution Mechanism
<b>MREL</b>	minimum requirement(s) for own funds and eligible liabilities	<b>SRMR</b>	Single Resolution Mechanism Regulation
<b>MRO</b>	main refinancing operation	<b>SSM</b>	Single Supervisory Mechanism
<b>MTO</b>	medium-term objective	<b>STE</b>	Short Term Exercise
<b>NAV</b>	net asset value	<b>TLAC</b>	total loss-absorbing capacity
<b>NBNI</b>	non-bank, non-insurance	<b>UCITS</b>	undertakings for collective investment in transferable securities
<b>NEER</b>	nominal effective exchange rate	<b>USD</b>	US dollar
<b>NFC</b>	non-financial corporation	<b>VaR</b>	value at risk
<b>NFCI</b>	net fee and commission income	<b>VIX</b>	Chicago Board Options Exchange's Volatility Index
<b>NII</b>	net interest income		
<b>NPL</b>	non-performing loan		
<b>NSFR</b>	net stable funding ratio		

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