



EUROPEAN CENTRAL BANK
EUROSYSTEM

Financial Stability Review

November 2016



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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 new microprudential and macroprudential competences, including the power to top up national macroprudential measures. The FSR, by providing a financial system-wide assessment of risks and vulnerabilities, 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. At the same time, whereas the ECB's new roles in the macroprudential and microprudential realms rely primarily on banking sector instruments, the FSR continues to focus on 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 three special features aimed at deepening the ECB's financial stability analysis and basis for macroprudential policymaking. The first special feature develops a framework to guide the design and calibration of macroprudential leverage limits for alternative investment funds. The second discusses impediments to the functioning of a market for NPL sales; it highlights indicators of market failure and distinguishes between supply and demand factors that impede market functioning. The third examines the financial stability implications of greater reliance by banks on fee and commission income.

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

Vítor Constâncio
Vice-President of the European Central Bank

Overview

Euro area systemic stress has remained relatively low over the past six months, despite bouts of market turbulence.

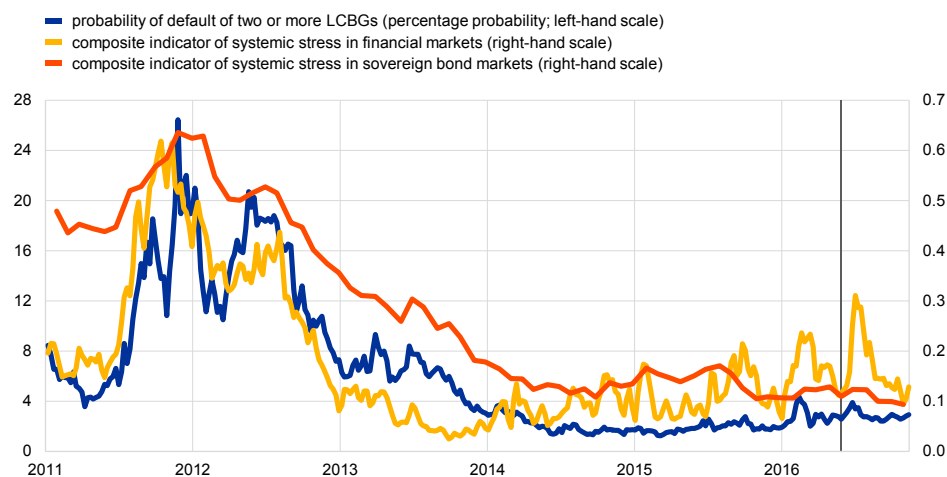
Since mid-2013, both the volatility and the level of the euro area composite indicator of systemic stress have gradually edged upwards (see **Box 1**). The ratcheting-up of this indicator has been associated with a range of local and global stress events and has continued over the past six months. Factors that pushed it up include higher political uncertainty following the outcomes of the UK referendum on EU membership and the US election as well as market concerns about euro area banks' longer-term profitability prospects. At the same time, continued accommodative monetary policy in advanced economies and abating market concerns about the possibility of a sharp slowdown in China have dampened spikes in systemic stress. All in all, despite relatively volatile global financial markets, bank and sovereign systemic stress indicators for the euro area have remained fairly stable at low levels (see **Chart 1**).

Chart 1

Measures of euro area systemic stress remain contained despite increasingly volatile global financial markets

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. 2016; the vertical line represents the publication of the May FSR on 24 May)



Sources: Bloomberg and ECB calculations.

Notes: "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.

Mirroring developments in global markets, euro area asset prices have witnessed a number of sharp corrections in recent years.

This pattern continued over the past six months, as demonstrated, in particular, by higher asset price volatility following the outcomes of the UK referendum and the US election (see **Chart 2**). Most of the market segments affected by the turbulence following the UK referendum quickly recovered the bulk of their losses, not least given a resolute policy response by the Bank of England. Market movements after the US election indicate a rotation from bonds to equities. Bond valuations declined by €1 trillion

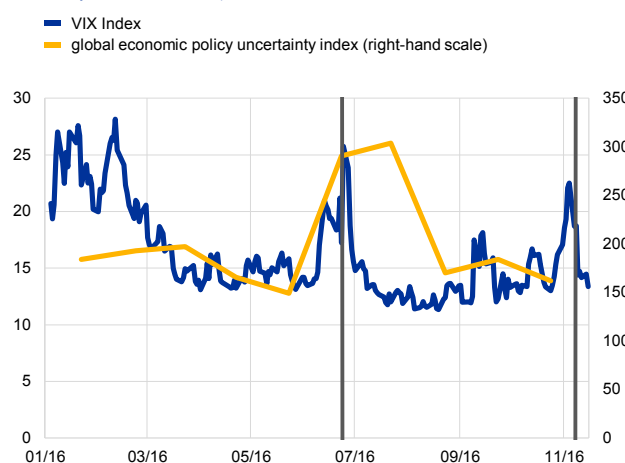
worldwide in the first week after the election, with European markets also being affected, albeit to a smaller degree than US markets. It is uncertain whether these developments will set a trend for the future. However, since the start of the year, corporate bond yields have remained at low levels, inter alia supported by ECB measures undertaken to combat low consumer price inflation. At the same time, euro area equity markets have remained volatile, particularly for cyclical sectors. The declines in euro area banks' stock prices have been sizeable year-to-date as a result of shorter periods of sharp repricing. All in all, as risk premia at the global level remain compressed, more volatility in the near future is likely and the potential for an abrupt reversal remains significant amid heightened political uncertainty around the globe and underlying emerging market vulnerabilities.

Chart 2

Policy uncertainty has increasingly affected global market sentiment in 2016

Global economic policy uncertainty and the VIX Index

(Jan. 2016 – Nov. 2016; the vertical lines mark the dates of the UK referendum in June 2016 and the US election in November 2016; daily observations for the VIX Index and monthly observations for the policy uncertainty index; the last observation for the policy uncertainty index is Oct. 2016)



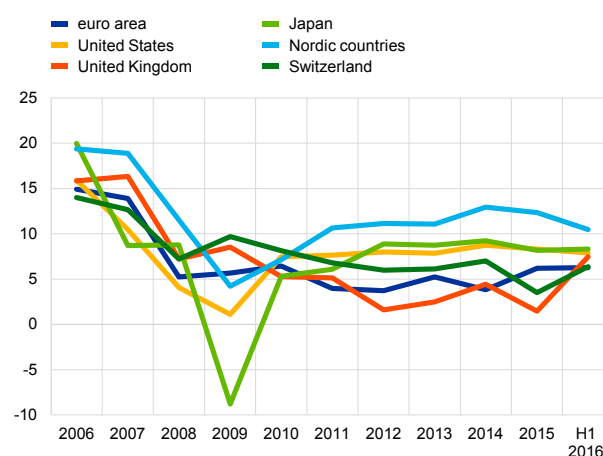
Sources: Bloomberg, www.policyuncertainty.com, Haver Analytics and ECB calculations.

Chart 3

Weak bank profitability in advanced economies during and after the global financial crisis

Median bank return on equity in major advanced economic regions

(2006-16, annual percentage)



Sources: SNL and ECB calculations.





Note: Data for 2016 refer to the first half of the year.

The euro area banking sector remains vulnerable, but proved to be resilient to recent market stress. Subdued economic growth and the associated low interest rate environment have dampened banking sector profitability prospects in the euro area and other advanced economies (see **Chart 3**). In the euro area, volatile stock market developments over the past six months contributed to an increase in banks' cost of equity which may constrain banks' ability to support the real economy via higher lending volumes. Furthermore, banks' capacity to organically generate capital is constrained by low profitability prospects in a still subdued nominal growth environment. In October and early November, a steeper yield curve and growing market expectations that global bank regulation will end up less tight than previously expected contributed to an increase in bank stock prices. The main structural challenges for bank profitability continue to be related to the large stock of non-performing loans in a number of countries, incomplete business model adjustments

and overcapacity in some euro area banking sectors. Going forward, the higher cost of external financing coupled with the prospect of limited internal capital-generating capacity increase the likelihood that an adverse feedback loop could emerge between weak bank profitability and the sluggish economic recovery.

Debt sustainability concerns remain for the sovereign and non-financial sectors. Euro area sovereign stress has remained contained amid the ongoing economic recovery, favourable sovereign financing conditions and the steady improvement in fiscal balances, but policy decisions at both the national and EU levels may lead to weakened fiscal and structural reform efforts. This, in turn, could weigh on both public finances and economic growth.

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: red; margin-right: 5px;"></div> <div style="font-size: 0.8em;">pronounced systemic risk</div> </div>	
<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: orange; margin-right: 5px;"></div> <div style="font-size: 0.8em;">medium-level systemic risk</div> </div>	
<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: yellow; margin-right: 5px;"></div> <div style="font-size: 0.8em;">potential systemic risk</div> </div>	
Global risk repricing leading to financial contagion, triggered by heightened political uncertainty in advanced economies and continued fragilities in emerging markets	
Adverse feedback loop between weak bank profitability and low nominal growth, amid challenges in addressing high levels of non-performing loans in some countries	
Re-emerging sovereign and non-financial private sector debt sustainability concerns in a low nominal growth environment, if political uncertainty leads to stalling reforms at the national and European levels	
Prospective stress in the investment fund sector amplifying liquidity risks and 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.

While banks have continued to de-risk, the euro area investment fund sector has been characterised by higher risk-taking. As financial risk has been migrating across financial sectors, growth in the investment fund sector (driven by both inflows and rising valuations) since the global financial crisis has been notable. Vulnerabilities in the way that funds are allocated and managed were forcefully demonstrated earlier this year when uncertainty over asset valuations in UK commercial real estate markets led to a run on some open-end property funds following the referendum result. The incident revealed the inherent fragility of the open-end fund model. That said, euro area-domiciled funds have remained resilient overall despite a trend of outflows observed in equity funds since the start of this year. The sector's increasing role in capital markets is consistent with the capital markets union (CMU) initiative, providing valuable diversification benefits for the funding of the real

economy. At the same time, the rapid growth in this sector over recent years needs to be met with a commensurate increase in monitoring. Many of these funds are also exposed to liquidity mismatches. This characteristic increases the potential for the investment fund sector to amplify market-wide shocks.

In the prevailing environment, four main risks to euro area financial stability over the next two years can be identified (see Table 1). As they are intertwined, if they were to materialise, they would have the potential to be mutually reinforcing. A common trigger for all of these risks could be weaker nominal growth than currently expected across the euro area.

Risk 1: Global risk repricing leading to financial contagion, triggered by heightened political uncertainty in advanced economies and continued fragilities in emerging markets

Most global asset prices have continued to drift higher, only temporarily interrupted by occasional bouts of elevated financial stress (see Chart 4).

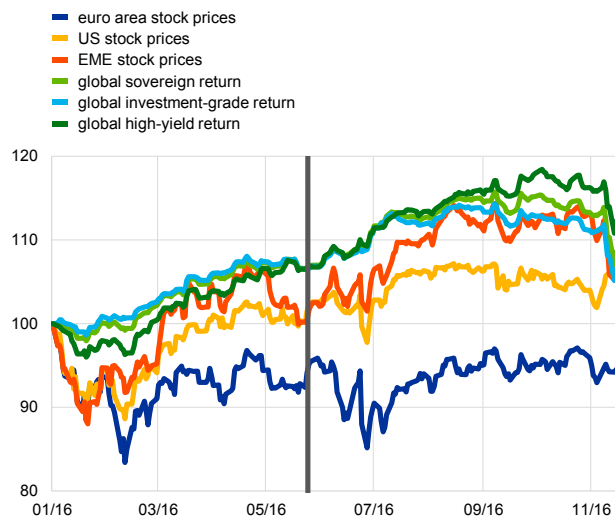
Global bond yields, in particular, have remained low in the past six months, benefiting from accommodative monetary policies and less anxiety about the likelihood of a sharp economic slowdown in emerging economies. In the latter part of the review period, bond yields in advanced economies increased somewhat against the backdrop of expected fiscal stimulus in the United States. In an environment of overall subdued yields on debt instruments, investors have gradually been taking on higher credit and duration risk in their portfolios. This has been the case not only for investment-grade bonds, but also riskier segments of global fixed income markets, which have benefited from the recovery in oil and other commodity prices from the very low levels recorded in early 2016.

Chart 4

Prices of most global bonds and stocks edged up over the past six months

Global stock and bond market developments

(Jan. 2016 – Nov. 2016; all indices are indexed to 100 on 1 Jan. 2016; the vertical line represents the publication of the May FSR on 24 May)



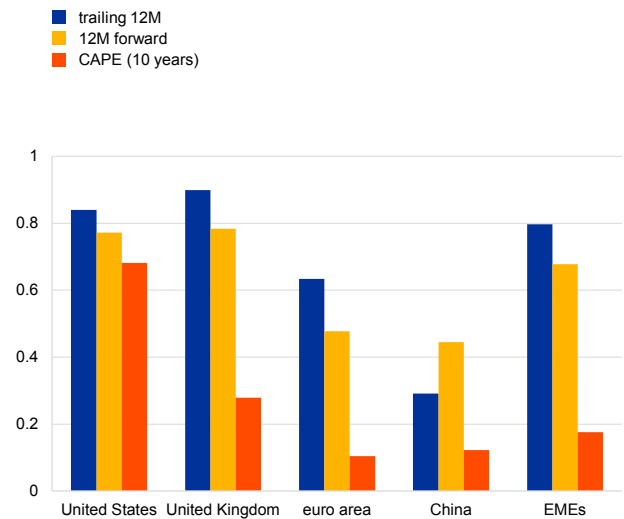
Sources: Thomson Reuters Datastream, JP Morgan and ECB calculations.
Notes: The stock and bond indices are computed by Thomson Reuters Datastream and JP Morgan, respectively. All global bond indices are in US dollars (total return indices). The euro area stock market index is denominated in euro and the US and emerging market economy (EME) stock market indices are in US dollars.

Chart 5

Signs of inflated equity price valuations in some regions

Percentiles for the P/E ratio according to three different methods

(valuations as of October 2016 compared with history, current valuations normalised to a 0-1 scale)



Source: Thomson Reuters Datastream.
Note: "Trailing 12M" is a P/E ratio based on the last year's reported earnings (sample starts in 1985, for EMEs in 1995), "12M forward" is a P/E ratio based on earnings forecasts a year ahead (sample starts in 1990) and the "CAPE (10 years)" is a cyclically adjusted P/E ratio with a ten-year moving average of reported earnings in the denominator (sample starts in 1985, for EMEs in 2005).

The prices in some equity markets are showing signs of stretched valuations.

Valuation measures – including the cyclically adjusted price/earnings ratio (CAPE), arguably the best indicator of valuation based on earnings – are in some regions hovering at levels which, in the past, have been harbingers of impending large corrections. In the United States, three common price/earnings metrics are elevated

(see [Chart 5](#)). Somewhat stretched valuations in certain equity markets may be linked to the low yields offered on debt instruments. In fact, some portfolio flows into equities may stem from the growing negative gap between the yields on government bonds and dividend yields on equities (see [Chart 2.2](#) in Section 2).

Higher political uncertainty has contributed to periods of elevated asset price volatility. The improved market sentiment in the weeks after the UK referendum benefited from a timely and forceful response by the Bank of England, which cut the bank rate and introduced a package of measures designed to provide additional monetary stimulus. The implications of the recent US election for euro area financial stability are highly uncertain at the current juncture. This notwithstanding, economic policies in the United States will likely become more inward-oriented, while the fiscal deficit may grow as a result of tax reductions and increased infrastructure and defence spending. In such a scenario, the euro area economy may be impacted via trade channels and by possible spillover effects from higher interest and inflation rate expectations in the United States.

The market reactions to recent political events were, in many ways, illustrative of a broader pattern in global financial markets over the last years – namely, bouts of elevated market volatility followed by quick corrections in asset prices. As such a pattern takes hold, there are risks that market participants may become complacent as they see a lower likelihood of prolonged asset price corrections. Such complacency could translate into undue risk-taking by investors and potentially contribute to a further stretch in asset price valuations (see [Box 3](#)). More broadly, low financial market volatility may also unearth vulnerabilities stemming from financial institutions' risk management given their widespread use of various value-at-risk (VaR) methods. According to this metric, low financial market volatility reduces the expected loss over a given period, which may further spur risk-taking strategies.

Euro area bond markets have largely mirrored global fixed income markets, while sector-specific concerns have come to weigh on euro area equity markets. Both euro area government and corporate bond yields have remained at low levels in 2016, reflecting market supply and demand, including Eurosystem bond purchases in both market segments. Valuations of corporate bonds have increased, mainly in the investment-grade segments directly influenced by ECB purchases, but also in the high-yield segments. The gyrations in euro area government bond yields in 2016 have mainly been driven by the term premium component, which continues to hover in negative territory. The low level of term premia demanded on euro area bonds requires close monitoring and investors should maintain sufficient buffers to withstand any prospective reversal of premia over the medium term. Euro area equity markets, by contrast, remained exposed to occasional temporary shocks. Sector-specific market concerns related to euro area banks led to elevated stock market volatility during the summer months.

Risks of further asset price corrections remain high and may be amplified by high correlations between asset classes. Euro area and global bonds have been trading at low yield levels. Owing to the non-linear relationship between prices and interest rates (i.e. bond convexity), there is higher price sensitivity when interest

rates are very low or negative. As a result, losses for investors highly exposed to low-yielding bonds with long maturities can be large even for relatively limited reversals of risk premia (see [Chart 6](#)). Furthermore, the possibility of herding behaviour (i.e. more investors chasing the same types of assets) has increased gradually, as investors are finding it more difficult to find assets generating sufficient returns. Increased correlations across asset classes provide indications that one-directional moves in asset classes have become more common in recent years (see [Chart 7](#)). Should market sentiment deteriorate, the high correlations between asset classes may act as an amplifier and, thereby, lead to an even stronger correction of asset prices.

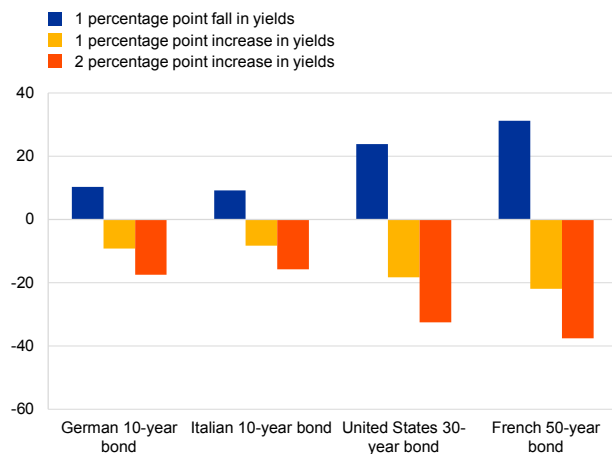
Mirroring these financial market developments, property prices have continued to rise in the euro area. Despite the continued increases, residential property price valuations remain generally modest in the euro area and are broadly in line with those suggested by fundamentals for the euro area as a whole. The situation is, however, heterogeneous across and even within euro area countries. Robust price increases, accelerating mortgage lending growth and emerging signs of overvaluation have been observed for residential property in some countries. Furthermore, valuations of euro area prime commercial property appear to be high amid strong price increases in recent quarters, though data limitations render such estimates highly uncertain.

Chart 6

Capital losses for low-yielding/high-duration portfolios could be substantial if sentiment were to deteriorate

Capital gains/losses following 1 and 2 percentage point changes in bond yields

(capital gains/losses as at 15 November, percentage)



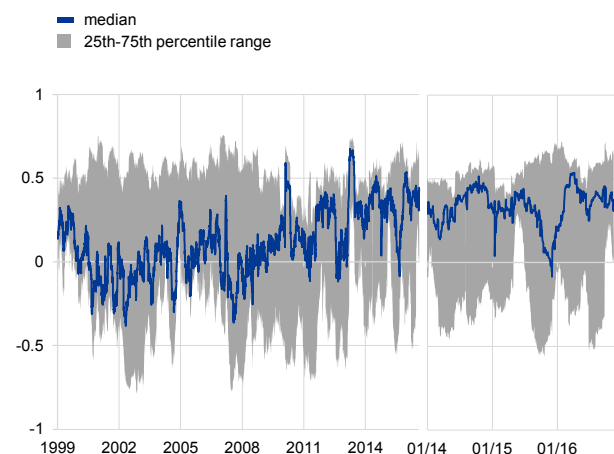
Source: Bloomberg.

Chart 7

Elevated correlations between asset classes may amplify potential price corrections

Distribution of European asset price correlations across asset classes

(Apr. 1999 – Nov. 2016)



Sources: Bloomberg, Merrill Lynch, ECB and ECB calculations.

Notes: The chart shows the median and interquartile range for the correlations across major European fixed income and equity indices. The indices include high-yield bonds, investment-grade bonds and government bonds. The right part of the chart zooms in on the developments since January 2014.

Macroprudential policies are best placed to tackle challenges that could pose threats to financial stability, not least given their country and sector-specific characteristics. Such policies can bolster systemic resilience and curb financial excesses that may occur, thereby allowing monetary policy to focus on its primary

objective of maintaining price stability – also to the benefit of financial stability. Determining the need for macroprudential action targeting the residential real estate market involves the review of a broad set of indicators including prices and valuation indicators, trends in mortgage credit growth, household indebtedness, the economic outlook and banks' exposure to real estate markets (see [Box 2](#)).

Risk 2: Adverse feedback loop between weak bank profitability and low nominal growth, amid challenges in addressing high levels of non-performing loans in some countries

The profitability of euro area banks has remained low but broadly stable, despite continued challenges stemming from the weak growth and low interest rate environment. Euro area banks' return on equity (ROE) remained broadly stable in the first half of 2016 (the aggregate ROE of euro area significant institutions stood at 5.5% in the first half of 2016, slightly below the 6.5% recorded one year earlier).¹ Banks thus managed to weather the headwinds stemming from the continued weak economic recovery and the low interest rate environment. One of the boxes in this issue of the FSR assesses how the current low interest rate environment (stemming from monetary policy measures) has affected bank profitability (see [Box 4](#)). On the one hand, accommodative monetary policy can lead to lower net interest income amid a flattening of the yield curve. Indeed, a flatter yield curve is likely to translate into lower unit interest margins, particularly since deposit rates have little room to move lower. Furthermore, negative deposit facility rates impose a direct cost on banks' holdings of excess liquidity. On the other hand, these effects are at least partly offset by the positive effects of policy measures on macroeconomic conditions, which support intermediation activity and credit quality. Overall, the empirical evidence laid out in the box suggests that recent monetary policy measures have so far had a neutral impact on bank profitability, as the effects on different components of bank profitability have largely offset each other. The increase in euro area bond yields in October and November has contributed to a steepening of the yield curve. If sustained, this may provide some support to banks' net interest income going forward.

Profitability concerns have dampened banks' stock market valuations.

Repeated sharp but short-lived corrections in euro area bank stock prices have continued to test the resilience of the financial sector in recent months. Several factors contributed to the volatility of euro area bank stock prices, but the predominant factor continued to be market concerns about euro area banks' profitability prospects in a low growth and interest rate environment (see [Chart 8](#)). Furthermore, some price discrimination has been observed across banks, depending on their non-performing loan (NPL) exposures, the perceived degree of business model complexity and litigation costs. All in all, the corrections contributed to dampening euro area bank equity valuations and the bulk of listed banks currently trade at large discounts to the book value of their equity (see [Chart 9](#)). The rebound

¹ Based on a sample of 101 euro area significant institutions (source: ECB).

in bank stock prices and valuations seen in October and early November can partly be attributed to the notion that market analysts became somewhat less concerned that the finalisation of Basel III would lead to a tightening of capital standards.

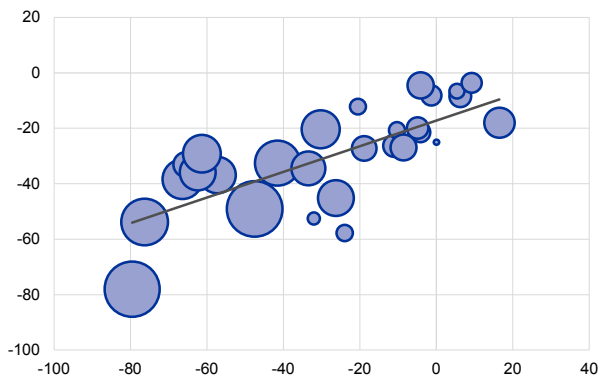
The overall negative outlook for banks has led to a further increase in their cost of equity. Compressed valuations resulted in a slight widening of the negative gap between banks' return on equity and cost of equity. Such a negative gap is not sustainable in the long run since it implies that equity investors in banks require a higher return than the return banks are able to deliver. Over time, this will make it difficult for banks to attract capital and finance growth. This notwithstanding, the financial system has remained resilient to the repeated stock market corrections, not least as banks have significantly strengthened their capital positions in recent years (as also confirmed by the results of the European Banking Authority's 2016 EU-wide stress test). Going forward, banks' cost of equity may benefit from reduced regulatory uncertainty as the revision of the Basel III framework is expected to be completed by the end of the year.

Chart 8

Downward revisions to earnings expectations (in some regions linked to legacy problems) pushed euro area banks' stock prices lower in 2016

Changes in bank stock prices (x-axis) and changes in 2017 net income expectations (y-axis) since January 2016

(annual percentage between 1 Jan. and 15 Nov. 2016)



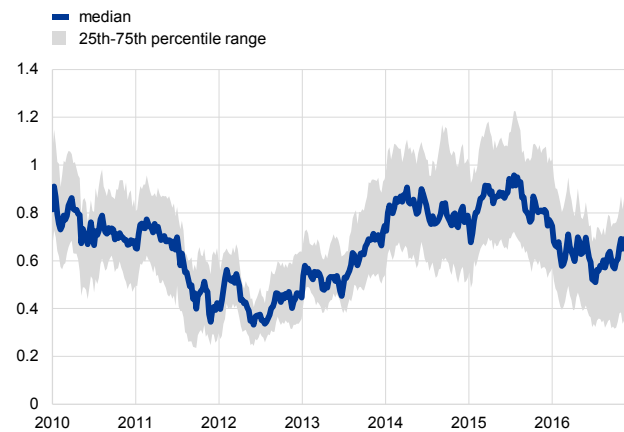
Sources: Bloomberg and ECB calculations.
Notes: The sample consists of banks included in the EURO STOXX bank index. The bubble sizes are proportional to non-performing loan ratios in the fourth quarter of 2015.

Chart 9

The underperformance of euro area bank stocks has led to a broad-based drop in banks' valuations

Price-to-book ratios for large listed euro area banks

(Jan. 2010 – Nov. 2016)



Sources: Bloomberg and ECB calculations.
Note: The sample consists of banks included in the EURO STOXX bank index.

Banks' profitability challenges are exacerbated by the large stocks of non-performing loans in some regions. As NPLs do not generate revenue and also consume capital, they can have a significant adverse impact on banks' profitability (see **Chart 8**). In addition, the high level of NPLs also has adverse macroeconomic implications as many borrowers remain distressed and overindebted in the absence of viable long-term restructuring solutions, thereby having the potential to suppress credit growth. Progress in reducing the level of NPLs has been slow so far. This is related to institution-specific factors, such as limited operational capacity or the lack of adequate management experience. In addition, there are a number of structural

factors impeding the swift resolution of NPLs, including flawed personal and corporate insolvency laws, inefficient judicial systems, the lack of effective out-of-court workout frameworks, an underdeveloped NPL servicing industry and NPL markets as well as accounting and tax impediments.

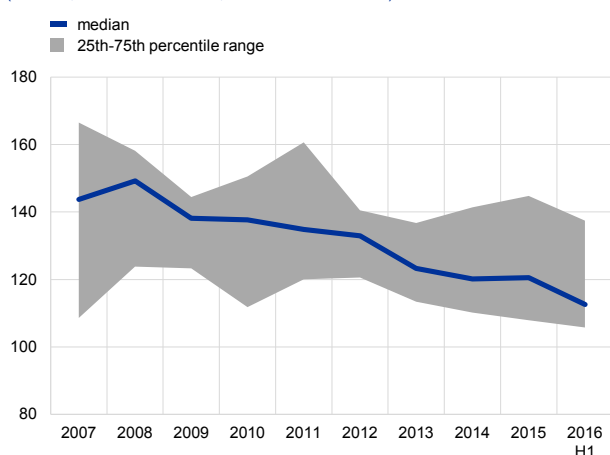
While profitability headwinds stemming from cyclical factors should abate, structural challenges remain and require tackling. Such challenges differ across euro area countries and also depend on banks' business models. In certain regions of the euro area, the banking system is characterised by overcapacity. In these regions, cost-to-income ratios remain high, partly owing to the high number of bank branches. Further bank consolidation and increased efforts to reduce banks' cost bases are needed in these regions.

Chart 10

A gradual return by euro area banks to more stable funding sources has reduced vulnerabilities stemming from abrupt changes in market sentiment

Loan-to-deposit ratios for the euro area

(2007-16, annual median ratio; 2016 refers to H1 data)



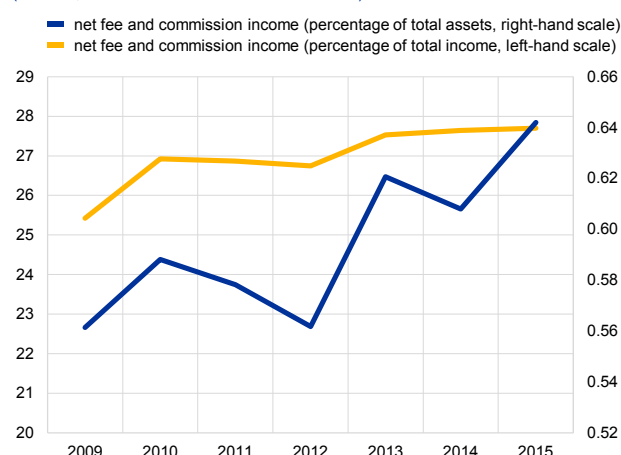
Sources: SNL and ECB calculations.
Note: The sample consists of 37 euro area banks.

Chart 11

A somewhat higher share of fee income in recent years

Euro area banks' net fee and commission income as a percentage of total assets and total income

(2009-15, shares of total income and total assets)



Source: ECB consolidated banking data.

Business model adaptation is needed in the post-global financial crisis environment.

The global financial crisis underlined the need for greater resilience – including more and higher-quality capital. Banks have also been challenged by an operating environment characterised by weak economic growth and record low interest rates. Many have responded by reducing the size of their balance sheets, by building up their capital base and by scaling back riskier activities in favour of core business. In the euro area, this has resulted in a shift from investment bank and wholesale activities towards more traditional retail business. These changes in banks' business models have brought about a decline in euro area banks' loan-to-deposit ratios (see **Chart 10**). These ratios are, however, still above those of some of their global peers which is partly related to the fact that euro area non-financial firms predominantly fund themselves via banks, whereas, for instance, in the United States market-based funding is more common. While initiatives such as CMU will

help firms (including small and medium-sized enterprises) to diversify their sources of finance, banks need to play their role in supporting investment and growth, in an environment of improved resilience, which is of benefit to financial stability.

Further income diversification could help to support bank profitability. Over the past few years, a slow trend towards higher net fee and commission income can be observed for euro area banks (see [Chart 11](#)). As net interest income is compressed in a low growth and interest rate environment, some banks may adapt their business models even further towards fee and commission-generating activities. Such a shift could lead to more diversified income sources and help boost banks' capital-generation ability (see [Special Feature C](#)).

Like banks, euro area insurers face headwinds from the low-yield environment amid weak macroeconomic conditions. In particular, due to low discount rates, the low-yield environment implies an elevated value of liabilities. At the same time, investment income has declined in the first half of 2016 since maturing investments have been gradually reinvested at lower rates. In addition, insurers face significant challenges in underwriting new business in a weak economic environment. To boost yields from investment, the sector has continued to gradually reallocate its portfolio towards more risky and illiquid assets, which makes it more vulnerable to adverse market shocks. However, the sector has proved resilient to recent bouts of market volatility. By and large, the profitability and solvency positions of most large euro area insurers remain solid so far, but the outlook is weakening, particularly for life insurers.

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. Such a comprehensive strategy also includes a large role for microprudential supervision in addressing NPL problems. Various task forces have been set up to focus on the NPL issue from its different angles (micro- and macroprudential) and should yield insights into the design of the best response and long-term strategy for those banks with high NPLs. [Special Feature B](#) of this Review discusses the impediments to the functioning of a market for NPL sales. It highlights indicators of market failure and distinguishes between supply and demand factors that impede market functioning.

Risk 3: Re-emerging sovereign and non-financial private sector debt sustainability concerns in a low nominal growth environment, if political uncertainty leads to stalling reforms at the national and European levels

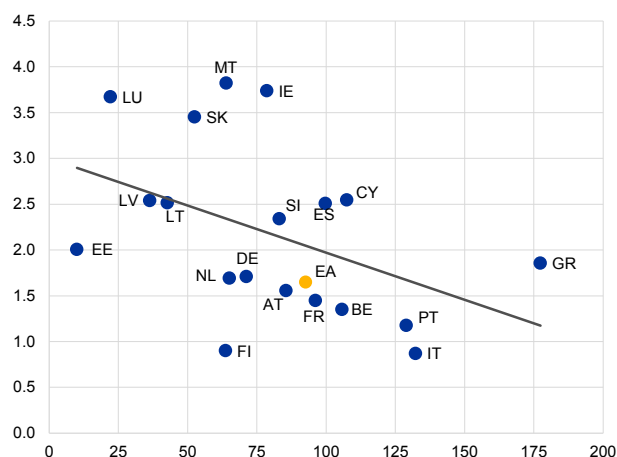
Gauges of euro area sovereign bond market stress remain contained. The composite indicator of systemic stress in euro area sovereign bond markets has remained fairly stable, hovering around levels seen before the global financial crisis in 2008. The ECB's public sector purchase programme, coupled with indications that headline fiscal balances across the euro area are set to improve further on the back

Chart 12

High debt levels may weigh on economic growth prospects

Gross general government debt in 2015 and average GDP growth forecasts for 2016-18

(2015, 2016-18; percentage change, percentage of GDP; x-axis: gross general government debt; y-axis: average GDP growth forecasts for 2016-18)



Sources: European Commission (AMECO) and ECB calculations.

of the ongoing (albeit subdued) economic recovery and the low interest rate environment, have chiefly contributed to the benign sovereign stress conditions. Improved fiscal balances are expected to continue to reduce government indebtedness, albeit from elevated levels. After starting a declining trend in 2015, the aggregate euro area government debt-to-GDP ratio is projected by the European Commission to stand at close to 90% of GDP in 2017, while debt levels vary considerably across countries. A key challenge for government debt sustainability relates to a prolonged period of low nominal growth (see [Chart 12](#)). In this context, a steadfast effort to continue with structural and fiscal reforms with a view to enhancing the long-term growth potential of euro area economies appears warranted. In the short-to-medium term, targeted and prudent measures, where possible, may additionally help to boost economic growth. That said, political uncertainty in several countries has increased. In particular, less reform-oriented and more domestically focused policy agendas may lead to delays in much-

needed fiscal and structural reforms and may reignite pressures on more vulnerable sovereigns.

Risks stemming from elevated debt levels are also material for the non-financial private sector.

The indebtedness of the euro area non-financial corporate sector remains high by both historical and international standards. Firms' leverage has fallen somewhat in recent years, but progress has been slow despite historically low financing costs, which are supporting debt servicing capacity. Indebtedness of the household sector is less of an issue at the aggregate euro area level by international standards, although the situation remains highly heterogeneous across euro area countries. Households in countries with high indebtedness coupled with a buoyant residential property market may be particularly vulnerable to external shocks, such as lower than expected economic growth or changes in financial market sentiment, which could push up financing costs. Given sectoral interlinkages, a potential intensification of vulnerabilities in one sector could spill over to other sectors and countries, with negative systemic repercussions for the banking system.

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 potential growth of the economy.

Risk 4: Prospective stress in the investment fund sector amplifying liquidity risks and spillovers to the broader financial system

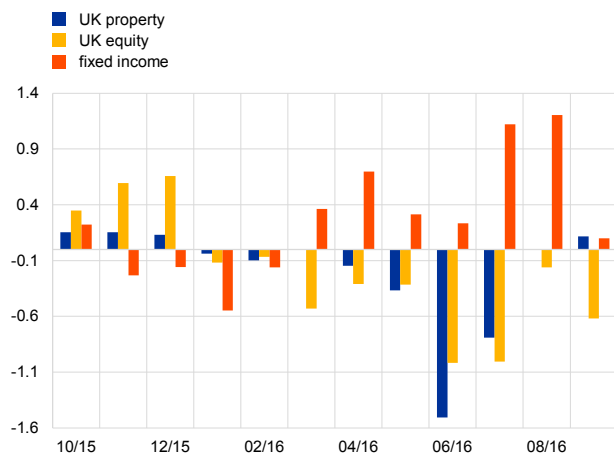
Euro area-domiciled investment funds have remained resilient to recent market stress. That said, a number of vulnerabilities stem from the rapidly growing investment fund sector, particularly funds exposed to liquidity mismatches and funds operating with high leverage. Many of the equity and bond funds are “open-ended” and subject to the possibility of daily redemption calls from shareholders. The June referendum in the United Kingdom vividly illustrated underlying vulnerabilities, with several equity and commercial property-focused funds being subject to high redemption calls (see **Chart 13**). Given the strength of associated outflows, a number of commercial property funds either directly suspended redemptions to protect the interests of long-term investors or introduced other measures to limit withdrawals. Euro area-domiciled property funds remained largely insulated given notice periods or redemption gates, but more importantly their limited exposures to UK property markets. This notwithstanding, the recent bouts of market turbulence in the UK real estate fund market have underlined the need to address financial stability risks stemming from inherent liquidity mismatches also for other types of funds, including fixed income funds.

Chart 13

Investors shunned British property and equity funds following the UK referendum in June

UK investment fund flows

(Oct. 2015 – Sep. 2016; monthly net flow, GBP billions)



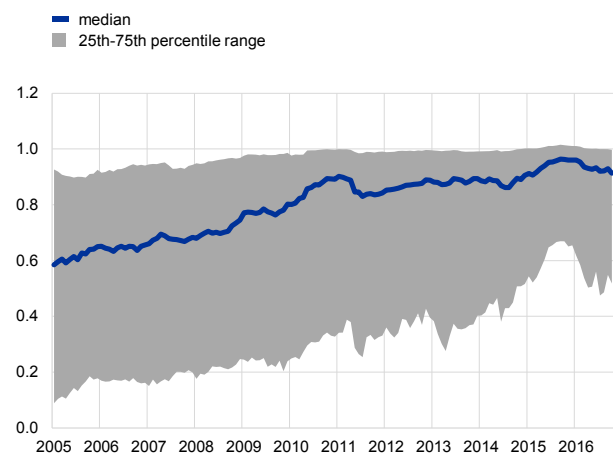
Sources: The Investment Association and ECB calculations.
Note: Funds domiciled in the United Kingdom invested in UK property, UK equity and global fixed income markets.

Chart 14

Fixed income mutual funds have become increasingly exposed to market-wide risk

Individual fund betas relative to fund-specific benchmarks

(Jan. 2005 – Oct. 2016; estimated CAPM betas)



Sources: Thomson Reuters Lipper (LIM) and ECB calculations.
Notes: Median and interquartile range of CAPM (capital asset pricing model) betas for a dataset of 3,525 UCITS bond funds domiciled in the EU. The beta is estimated for each fund on the last business day of every month by regressing excess fund returns on the funds' respective excess benchmark returns (benchmarks as specified in the funds' prospectuses). The minimum observations used for the estimation are 250 business days (i.e. one year) using a rolling window.

Euro area bond funds' investment strategies have become more crowded in recent years which could amplify possible asset price corrections. Fixed income funds' investment strategies have gradually become more challenging in the low interest rate environment, which has made it more difficult to generate absolute returns. As institutional investors find it increasingly difficult to invest in government

bonds, they have begun to search for higher yields at longer maturities and further down the credit risk spectrum. Illiquidity can be another source of relative yield, where less-liquid instruments offer seemingly higher returns, but at the risk of worse future performance if funds are forced to sell in a market downturn. As a result, investment strategies across funds have become more homogeneous. This has pushed cross-asset correlations higher, making funds increasingly exposed to market-wide risk (see [Chart 14](#)). Concerns remain that investors' overall demand for liquidity could suddenly rise in a market-wide downturn, thus adding to market pressures and a decline in secondary market liquidity.

Increased risk-taking by investment funds is also prevalent in holdings of bail-inable bank debt securities. A clear shift in asset allocation can be observed in the last two years from bank debt securities with higher seniority to those with lower seniority. In the markets for bail-inable bank debt, the share of the non-bank financial sector's holdings has grown, while the banking sector's share has been reduced (see [Box 7](#)). These patterns seem to be in line with the general trend of increased risk-taking by investment funds.

While the investment fund sector is subject to prudential regulation, most existing rules lack a systemic perspective and may not be suited to preventing 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 and becomes more interconnected. Alternative investment funds, in particular, operate without regulatory leverage limits and given this sector's size (such funds account for 39% of the European investment fund sector), it has the potential to contribute to systemic stress (see [Special Feature A](#)).

Policy considerations

The revision of the regulatory framework has continued with the aim of creating a sound and robust basis for the operation of financial institutions, markets and infrastructures, thereby reducing systemic risk and strengthening the resilience of the financial system as a whole. In the last six months substantial progress has been made in several areas, such as the revision of the Basel III framework, which is expected to be completed by end-2016. This initiative includes the finalisation of the work on reducing excessive variability in risk-weighted assets, establishing a new framework for the standardised approaches and finalising the design of the leverage ratio. The calibration of these proposals will be informed by detailed impact assessments so as to ensure that overall capital requirements will not increase significantly in the banking system. The finalisation of these elements of the Basel III framework will substantially reduce regulatory uncertainty, which has been a key concern for the banking industry recently.

Work has also continued at the international and EU levels on the review of the regulatory standards for the prudential treatment of banks' exposures to sovereigns. Given that potential changes in this area are expected to have an

impact on a wide range of institutions and activities, this work is being carried out in a careful, gradual and holistic manner.

Also, further progress was made in the revision of the crisis management and resolution framework. Ongoing work in this area aims at ensuring that banks have sufficient loss-absorbing and recapitalisation capacity to implement an orderly resolution, thereby minimising the impact on financial stability and avoiding the use of public money.

Finally, the European Commission has recently initiated a consultation on the review of the EU macroprudential policy framework. Macroprudential policy is a complement to monetary policy and microprudential policy, and the ECB fully supports a comprehensive review of the framework. The primary objective of the review should be to enhance the effectiveness of macroprudential policy without impeding the effectiveness of other complementary policies. The review should encompass the respective provisions included in the various pieces of EU law. In this regard, it is important to reflect the new institutional landscape in the macroprudential policy framework, revise the powers of micro- and macroprudential authorities, streamline the coordination mechanism between authorities, broaden the set of macroprudential policy tools and simplify their activation mechanism to ensure that authorities can address systemic risks in a timely and effective manner.

1 Macro-financial and credit environment

Macro-financial conditions have remained challenging in the euro area amid continued external risks. Concerns regarding the state of the global economy and the soundness of macro-financial fundamentals in major emerging markets have been compounded by uncertainties surrounding the medium and long-term economic, political and institutional consequences of the UK referendum vote and by potential future policy changes under the next US administration. In addition, elevated geopolitical tensions and heightened political uncertainty amid busy electoral calendars in major advanced economies have the potential to reignite global risk aversion and to trigger a major confidence shock, thereby weighing on the underlying global and euro area growth momentum.

Sovereign stress has remained contained in the euro area against the backdrop of the ongoing economic recovery and favourable sovereign financing conditions in terms of both pricing and duration. Nonetheless, sovereign debt sustainability risks remain elevated in some countries despite the declining path seen at the aggregate euro area level. The potential for a slowdown in or reversal of fiscal and structural reform efforts amid heightened political uncertainty is a key challenge in this respect.

In line with overall economic conditions, the euro area **non-financial private sector** has continued to recover, supported by favourable financing conditions, but a still high stock of legacy debt in several countries continues to weigh on the underlying momentum. Looking ahead, the ongoing economic recovery should underpin improving income and earnings prospects for households and non-financial corporations. This, together with high liquid asset holdings and the low interest rate environment, should help support the ongoing process of balance sheet repair and mitigate the risks for those euro area countries with elevated levels of non-financial private sector debt.

The recovery of euro area **property markets** has continued in both the residential and commercial property segments. While overall euro area residential property price valuations are broadly in line with fundamentals, prime commercial property valuations remain well above long-term averages. Continued favourable financing conditions and gradually improving economic prospects should underpin the sustainability of the ongoing recovery, but buoyant developments in some countries and asset classes need to be carefully monitored in the context of the current weak growth and low-yield environment.

1.1 Steady, but modest, euro area economic recovery, despite continued headwinds

The euro area economic recovery has retained its momentum in the first three quarters of 2016 despite some headwinds. Domestic demand continued to be the backbone of economic growth, supported by the ECB's accommodative monetary

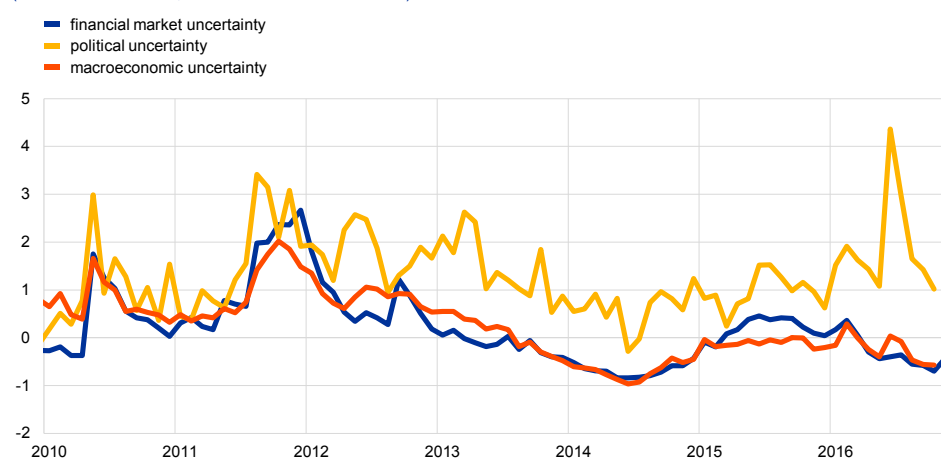
policy measures and a mildly expansionary fiscal stance. Even though overall export dynamics remained muted in a persistently weak external environment, economic growth nonetheless benefited from a small contribution of net exports, partly owing to still positive lagged effects of movements in the effective exchange rate of the euro. Despite the outcome of the UK referendum and the following temporary pick-up in political uncertainty at both the national and EU level, euro area business and consumer sentiment, financial market volatility and overall macroeconomic uncertainty have remained rather resilient so far (see [Chart 1.1](#)), leaving the prospects for the ongoing recovery largely intact.

Chart 1.1

Political and financial market uncertainty have picked up temporarily in the euro area following the UK referendum vote

Macroeconomic and political uncertainty as well as financial risk aversion in the euro area

(Jan. 2010 – Nov. 2016; standard deviations from mean)



Sources: Consensus Economics, Baker, Bloom and Davis (2013), European Commission, ECB and ECB calculations. Notes: Mean for the period Q1 1999 – Q4 2007. Macroeconomic uncertainty is captured by examining a number of measures of uncertainty compiled from various sources, namely: (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. 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. For further details on the methodology, see "How has macroeconomic uncertainty in the euro area evolved recently?", *Monthly Bulletin*, ECB, October 2013.

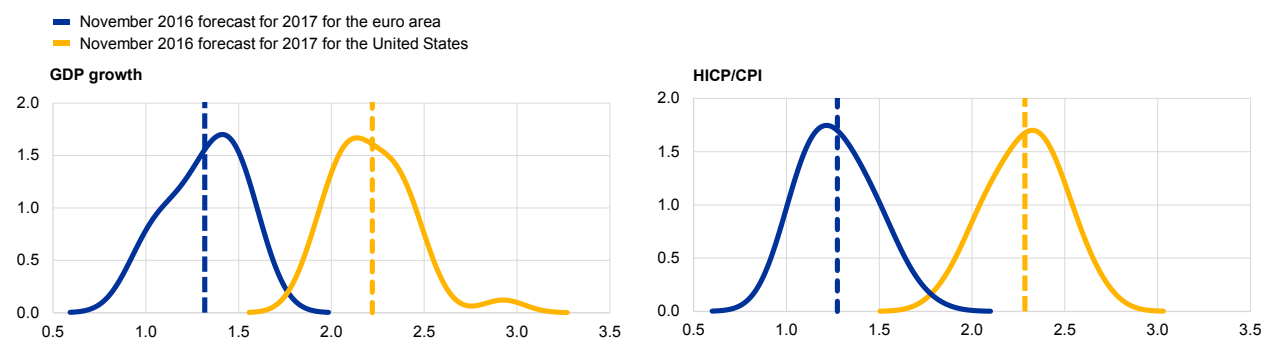
The euro area economic recovery is expected to proceed at a moderate but steady pace. Domestic demand remains supported by the ongoing pass-through of ECB monetary policy stimulus to the real economy. Favourable financing conditions as well as improvements in the demand outlook and in corporate profitability continue to promote a recovery in investment, while sustained employment gains underpin private consumption. By contrast, the necessary balance sheet adjustments in a number of sectors and a sluggish pace of structural reform implementation continue to weigh on the euro area economic recovery. The September 2016 ECB staff macroeconomic projections for the euro area envisage real GDP growth of 1.7% for 2016, followed by an expansion of 1.6% in both 2017 and 2018. Despite the ongoing recovery, a weak growth environment in the euro area continues to contrast with more buoyant developments in other major advanced economies, notably the United States, amid uncertainty regarding the strength and pace of economic expansion as well as inflation prospects (see [Chart 1.2](#)).

Chart 1.2

Low nominal growth expectations for the euro area contrast with more benign conditions in the United States

Distribution of the 2017 real GDP growth and HICP/CPI forecasts for the euro area and the United States

(probability density)



Sources: Consensus Economics and ECB calculations.

Downside risks to the euro area growth outlook continue to relate mainly to the external environment. Uncertainties surrounding developments in emerging markets remain amid cyclical and structural headwinds in key emerging economies. A further slowdown of the Chinese economy, in particular, has the potential to affect the euro area economy via trade and confidence channels, as indicated by an increase in the cross-border correlation of financial stress (see [Box 1](#)). From a financial stability perspective, additional headwinds relate to a possible intensification of geopolitical tensions, a re-emergence of sovereign stress at the euro area country level as well as a further rise in uncertainty as reflected by heightened global risk aversion, increased financial market volatility and elevated political uncertainty at the national and supranational levels. In particular, the upcoming UK-EU negotiations remain subject to considerable uncertainty not only in terms of duration and outcome, but also their long-term economic impact.

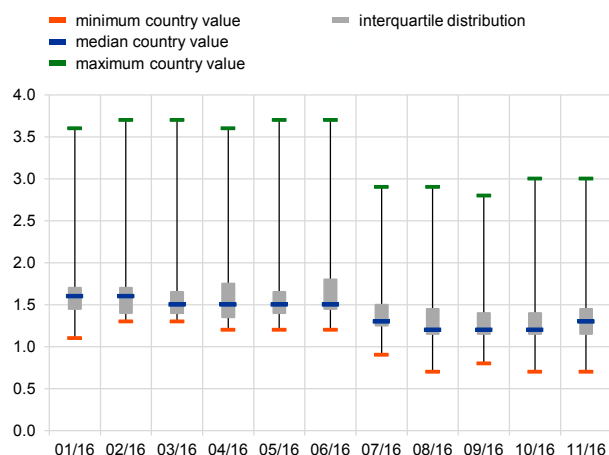
Fragmentation at the country and sector levels remains challenging. The strength of the euro area recovery has remained uneven at the country level, as indicated by the relatively wide cross-country variation of projected GDP growth rates for 2017 (see [Chart 1.3](#)), with a decreasing upward skew given the downward revision of 2017 real GDP growth forecasts in particular (but not only) for Ireland following the UK referendum vote. Although the level of output in the euro area has reached its pre-crisis level, several countries still remain below their respective pre-crisis levels. Similarly, variation across sectors remains marked, with value added and employment in industry, construction and financial services still below pre-crisis levels, while they expanded strongly in some segments of the services sectors, such as information and communication. In line with the ongoing gradual recovery, labour market conditions have continued to improve. That said, continued labour market slack (predominantly, albeit not only) in countries most affected by the financial crisis continues to contrast with relatively tight labour markets in other euro area countries, although the dispersion across countries has declined considerably since mid-2013 (see [Chart 1.4](#)).

Chart 1.3

Overall economic prospects continue to diverge considerably at the country level...

Distribution of real GDP growth forecasts in the euro area for 2017

(Jan. 2016 – Nov. 2016; percentage change per annum)



Sources: Consensus Economics and ECB calculations.

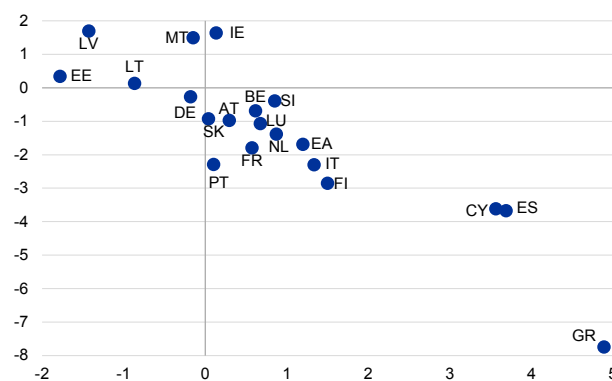
Note: The chart shows the minimum, maximum, median and interquartile distribution across the 11 euro area countries surveyed by Consensus Economics (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain).

Chart 1.4

...amid continued economic and labour market slack in some countries

Unemployment gap (x-axis) and output gap (y-axis) across the euro area

(2015)



Source: European Commission (AMECO database).

Notes: The unemployment gap is calculated as the difference between the headline unemployment rate and the non-accelerating wage rate of unemployment (NAWRU). Output and unemployment gap estimates are surrounded by some degree of uncertainty and can be influenced by both structural and non-structural factors.

Low inflation outturns continue to weigh on nominal growth prospects. Euro area headline inflation has remained at low levels since the publication of the last FSR, while most measures of underlying inflation have not yet shown clear signs of an upward trend. Nevertheless, the current low inflation environment has not become entrenched in second-round effects on wage and price-setting amid resolute ECB policy action (see [Chart 1.5](#)). According to the September 2016 ECB staff macroeconomic projections for the euro area, HICP inflation is expected to average 0.2% in 2016, strongly dampened by a negative contribution from energy inflation related to the past sharp fall in oil prices. As this base effect unwinds, inflation is expected to increase substantially to 1.2% in 2017. The ongoing economic recovery, supported by the ECB's monetary policy measures, and the decline in economic slack are seen to support a further increase in headline inflation to 1.6% in 2018.

External rebalancing in the euro area has continued, but stock imbalances remain high in some countries. Despite significant and sustained current account improvements since 2008, net foreign liabilities of countries most affected by the financial crisis – notably Cyprus, Greece, Portugal and Spain – have remained stubbornly high in the post-crisis period (see [Chart 1.6](#)). This persistence of external stock imbalances can be explained by the gradual nature of the current account adjustment and low nominal GDP growth. This notwithstanding, many euro area debtor countries have started to register gradual improvements in their net international investment positions in the most recent years on the back of current account surpluses and an economic recovery. The longer-term prospects for external rebalancing depend on a number of determinants – in particular, improvements in total factor productivity, which require the continuation of structural reforms to help

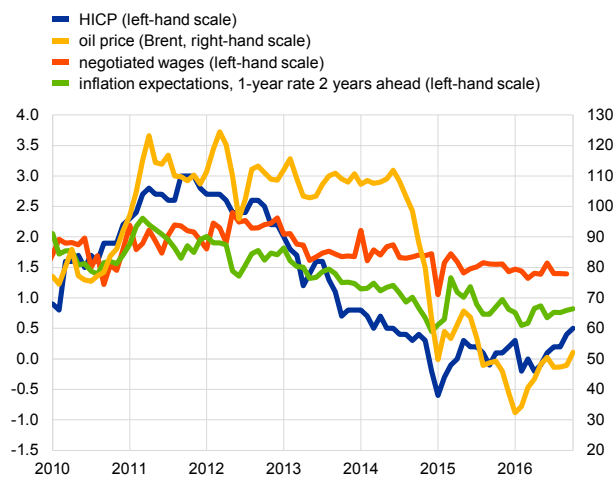
enhance the euro area's medium-term growth potential and reduce fragmentation across the euro area.

Chart 1.5

Risks of a prolonged period of low inflation have remained elevated

Developments in the HICP, market-based inflation expectations, negotiated wages and the oil price (Brent)

(Jan. 2010 – Oct. 2016; percentage, annual percentage change, USD per barrel)



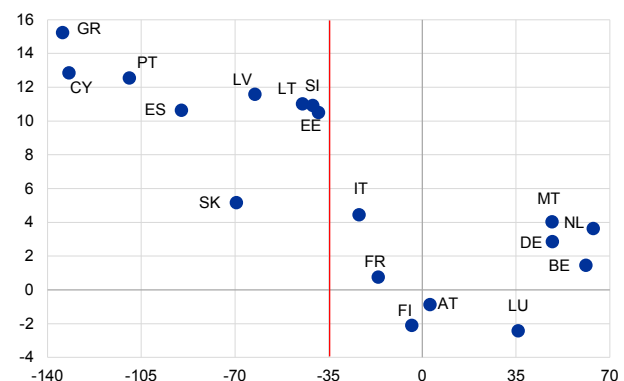
Sources: Bloomberg and ECB.

Chart 1.6

External rebalancing has continued across the euro area, but stock imbalances remain in some countries

Net international investment position in 2015 (x-axis) and the change in the current account balance between 2008 and 2015 (y-axis)

(2015, 2008-15; percentage of GDP)



Sources: Eurostat and ECB.

Notes: The red vertical line shows the threshold of 35% of GDP for net foreign liabilities, which is used in the scoreboard of the European Commission's macroeconomic imbalance procedure to signal potential stock imbalances. Ireland is excluded.

The world economy remains on a low growth trajectory, but is expected to gain traction gradually. Economic activity in advanced economies has continued on a stable, but still modest, path, while having proved fairly resilient to the bouts of volatility surrounding the UK referendum vote. At the same time, economic growth in emerging markets has remained relatively weak from a historical perspective, amid tentative signs of stabilisation in major emerging economies hard hit by the recent commodity price shock (see [Chart 1.7](#)). Looking ahead, global growth is expected to improve, but to remain muted, with the risks to the outlook remaining on the downside. Inter alia, they relate to a potentially more pronounced slowdown in emerging economies, notably China, as domestic and external imbalances adjust. Additional downside risks may stem from a tightening of global financial conditions, a more severe impact from the UK referendum than expected as well as heightened (geo)political uncertainties in many corners of the world.

Global commodity markets have moved sideways amid continued volatility. Oil price increases have paused following the firm recovery from a ten-year low in the first half of 2016 (see [Chart 1.8](#)), with the price predominantly fluctuating within the USD 40-50 per barrel range. The recovery has helped to attenuate the financial stability concerns surrounding the oil industry and to ease macro-fiscal pressures on oil-exporting emerging economies. Alongside the continued global oil supply overhang, oil price developments have continued to be driven predominantly by

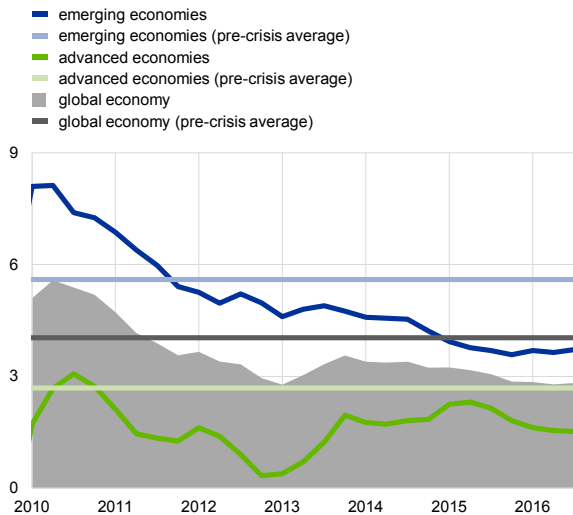
lower demand as a result of the slowdown in emerging economies and uncertainties regarding the outlook for oil market fundamentals.

Chart 1.7

Global growth remains weak amid signs of a bottoming-out in emerging market economies

Real GDP growth across the globe

(Q1 2010 – Q3 2016; annual percentage change)



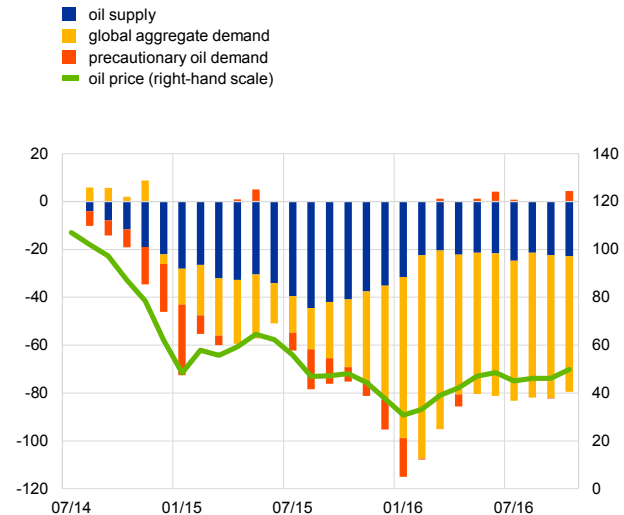
Sources: Haver Analytics and ECB calculations.

Chart 1.8

Oil prices have stabilised, with demand-side factors still predominantly at play

Oil prices and their determinants

(July 2014 – Sep. 2016; cumulated contributions of the different oil shocks in percentage points, USD per barrel)



Sources: Thomson Reuters Datastream and ECB calculations.

Notes: The historical breakdowns of oil prices have been normalised to start at zero in July 2014, when Brent crude oil prices started dropping. A declining contribution indicates that a specific "oil shock" contributed to lowering oil prices and vice versa. The breakdown is based on Kilian, L. and Murphy, D. P., "The role of inventories and speculative trading in the global market for crude oil", *Journal of Applied Econometrics*, Vol. 29(3), 2004, pp. 454-478.

The economic recovery in advanced economies is proceeding at a moderate pace. Economic growth in advanced economies outside the euro area has continued to be supported by relatively low oil prices, improving labour market conditions, resilient confidence, accommodative monetary policies as well as receding headwinds from private sector deleveraging and fiscal consolidation in several countries. The underlying multi-speed recovery across countries is increasingly translating into expectations of divergent monetary policies, as the prospect of withdrawal of monetary policy accommodation in the United States contrasts with further easing in Japan and the United Kingdom. The outcome of the UK referendum marked the materialisation of a downside risk that triggered a rise in uncertainty regarding the future economic prospects of advanced economies (see [Chart 1.9](#)), which – similar to the ensuing financial market volatility – proved rather short-lived (except for the United Kingdom), with limited global economic consequences so far.

While growth prospects appear resilient in most advanced economies, downside risks to the growth outlook remain. Risks to the growth outlook remain on the downside amid continued external risks, in particular those related to a further slowdown of emerging economies and policy uncertainties surrounding the economic transition in China. Moreover, ensuring the long-term sustainability of public finances also remains a challenge for some countries outside the euro area (e.g. the United

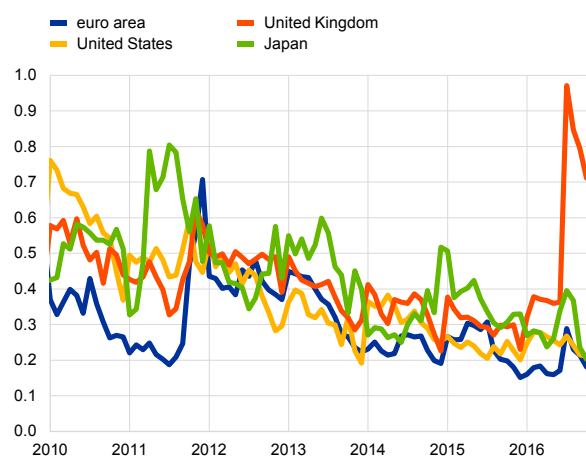
States and Japan), while others (e.g. the United Kingdom, Sweden and Denmark) are still confronted with legacy macro-financial vulnerabilities (e.g. high private sector indebtedness). In addition, rising geopolitical tensions, more pronounced uncertainty surrounding the length and outcome of UK-EU negotiations as well as heightened political uncertainty in the context of upcoming votes and potential policy changes under the next US administration could weigh on the growth outlook.

Chart 1.9

The uncertainty surrounding the future economic prospects of advanced economies has spiked temporarily following the UK referendum vote

Disagreement on one-year-ahead GDP forecasts among professional forecasters

(Jan. 2010 – Oct. 2016; dispersion index)



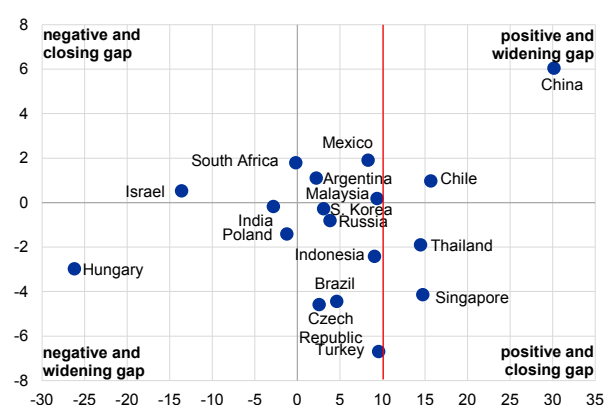
Sources: Consensus forecasts and ECB calculations.

Chart 1.10

Private credit dynamics remain a source of concern in a number of emerging economies

Credit gaps in emerging economies (x-axis) and their annual change (y-axis)

(Q1 2016; percentage of GDP, percentage points)



Sources: BIS and ECB calculations.

Notes: Credit gaps are defined as the deviation from the one-sided Hodrick-Prescott filter trend for domestic credit to GDP. The red vertical line shows the threshold of 10% of GDP for the absolute level of the credit gap beyond which the BIS deems the level of private credit as excessive.

Economic activity in emerging economies continued to be subdued. Economic momentum has remained weak in emerging markets against the backdrop of the ongoing rebalancing of the Chinese economy from an export-led to a more consumption-driven growth path and the ongoing adjustment of commodity-exporting emerging economies to past commodity price falls. That said, there are some signs that activity in major commodity exporters is bottoming out after deep recessions (e.g. in Brazil and Russia), boding well for a gradual recovery going forward. Structural and cyclical challenges in a number of emerging economies are accentuated by underlying macro-financial imbalances, in particular in countries in the late phase of the credit cycle (see [Chart 1.10](#)). Capital flows to emerging markets have proved resilient and accelerated in the aftermath of the UK referendum (see [Chart 1.11](#)). Decomposing the capital inflows into underlying driving factors, the rebound – while remaining somewhat below the quarterly average over the past 15 years – can largely be explained by a pick-up in global risk appetite and possibly the related search-for-yield flows out of advanced economies. Market expectations about the stance of US monetary policy have in the first three quarters of 2016 been broadly neutral to aggregate inflows after several quarters of perceived tightening.

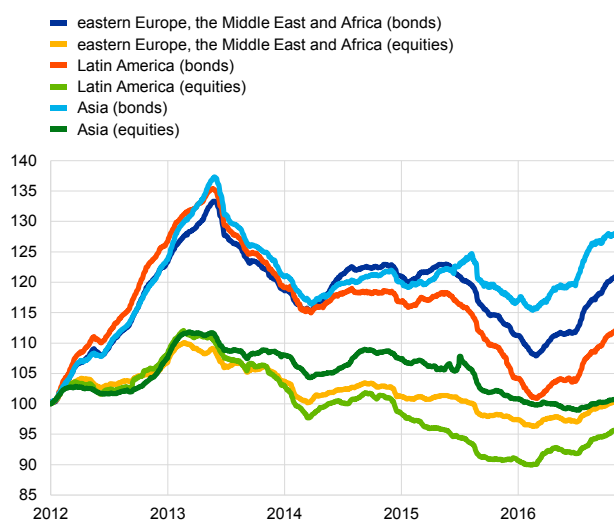
Persistently smaller growth differentials with advanced economies continue to make a negative contribution to emerging market flows (relative to their sample average), suggesting that the rebound in capital flows does not yet reflect the fundamental economic strength of emerging economies (see [Chart 1.12](#)).

Chart 1.11

Capital inflows to emerging economies have picked up markedly as of mid-2016...

Equity and bond flows to emerging market economies

(Jan. 2012 – Nov. 2016; index: Jan. 2012 = 100)



Source: EPFR.

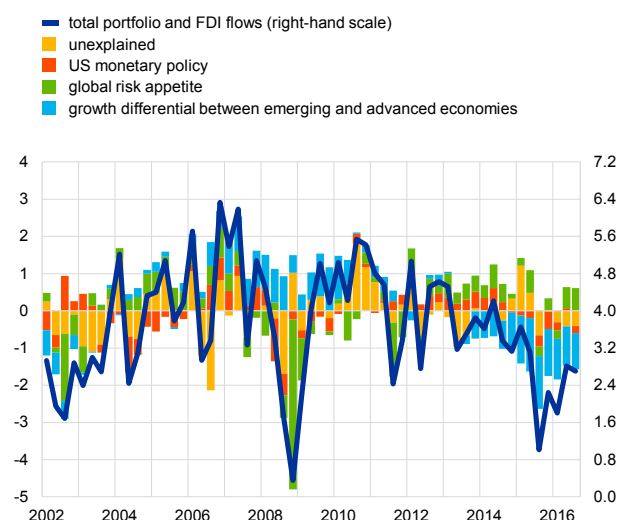
Notes: Bonds include both sovereign and corporate bonds. Indices are constructed based on relative flows over total net assets in order to control for the fact that the number of funds is not constant over time.

Chart 1.12

...predominantly driven by global risk appetite amid sluggish relative growth in emerging economies

Aggregate portfolio and foreign direct investment flows to emerging economies by underlying driving factors

(Q1 2002 – Q3 2016; total portfolio and foreign direct investment flows as a percentage of GDP, deviation from long-term average)



Sources: Haver Analytics, Thomson Reuters Datastream, Institute of International Finance and ECB calculations.

Notes: Decomposition derived from an ordinary least squares (OLS) regression of quarterly total emerging market portfolio and FDI flows as a percentage of emerging market GDP on: (i) a sample percentile of the one-year/three-month US sovereign yield spread, capturing expectations about changes in short-term interest rates; (ii) risk appetite measured by the level and the first difference of the VIX Index; (iii) year-on-year growth differentials between emerging and advanced economies; and (iv) "unexplained" which refers to the regression residual. The left-hand scale shows the deviation of the regressor variables (i)-(iv) from the sample average.

Risks to the emerging market growth outlook are tilted to the downside. First and foremost, the gradual deceleration of the Chinese economy may imply adverse knock-on effects for other Asian and Latin American economies with close trade and financial links with China. Several emerging economies which are dependent on capital inflows also still face the challenge of tighter external financing conditions associated with the expected gradual withdrawal of monetary accommodation in the United States, while some countries and sectors with notable exposures to foreign currency-denominated debt may be vulnerable to marked downward exchange rate pressures vis-à-vis the US dollar. Furthermore, past credit excesses and the related debt accumulation may expose many emerging economies to the risk of sudden capital flow reversals, ensuing corrections in asset prices, sharp exchange rate movements and increasing credit risk should growth prospects deteriorate further. This could unearth more general concerns about the macro-financial health of major emerging economies and adversely affect global confidence. Finally, high political uncertainty, geopolitical tensions as well as possible adverse spillovers stemming

from potential policy changes under the next US administration (e.g. trade policy) could also weigh on growth prospects in a number of regions.

All in all, macro-financial risks to euro area financial stability stem from a combination of external and domestic factors. The weak cyclical conditions together with a structural rebalancing towards a more moderate growth path in emerging economies, heightened (geo)political tensions around the world, uncertainties about the length and outcome of UK-EU negotiations and diverging monetary policies across major advanced economies comprise key risk areas. These factors may not only undermine the sustainability of the recovery at both the euro area and global levels, but also have the potential to affect confidence and trigger renewed tensions in global financial and commodity markets and to prompt a disorderly unwinding of global search-for-yield flows. Macro-financial risks also continue to originate from within the euro area. The ongoing balance sheet repair in the private and public sectors in several countries, continued (albeit diminishing) fragmentation of real economic growth prospects across countries and the sluggish pace of structural reforms continue to restrain euro area growth momentum.

Box 1

Is euro area financial stress becoming more global?

Financial stress indices have become a common tool to measure the current state of (in)stability in an economy's financial system as a whole or major parts of it.² Recent developments in a particular variant of such an index for the euro area, namely the composite indicator of systemic stress (CISS)³, reveal three distinct features: *First*, since mid-2013, the volatility of the CISS has gradually increased, with several large spikes in the last years (see Chart A). This presumably relates to major local and global stress events and may imply heightened risks to financial stability going forward. *Second*, the euro area CISS has displayed a gradual upward trend over this same period. More recently, the immediate stress following the UK referendum outcome lifted the indicator temporarily to levels last observed at the height of the euro area sovereign debt crisis. *Third*, the euro area index's more pronounced swings since 2013 have been correlated with similar movements in other major economic regions – in either the US or Chinese CISS, or both. This may suggest that euro area financial stability conditions have become more intertwined with the international environment.

Understanding the driving factors behind financial stress and the underlying frictions is inherently difficult. For instance, empirical research for the euro area finds that past outcomes for a broad range of macroeconomic and financial variables do not have material predictive power for the CISS.⁴ In addition, contemporaneous relationships between financial stress and other variables

² For a literature survey, see Kliesen, K. L., Owyang, M. T. and Vermann, E. K., "Disentangling Diverse Measures: A Survey of Financial Stress Indexes", *Federal Reserve Bank of St. Louis Review*, September/October 2012, pp. 369-398.

³ The euro area CISS was first published in the special feature on "Systemic risk methodologies", *Financial Stability Review*, ECB, June 2011. Its concept is described in Holló, D., Kremer, M. and Lo Duca, M., "CISS – A composite indicator of systemic stress in the financial system", *Working Paper Series*, No 1426, ECB, March 2012. Regular data updates of the euro area CISS are available from the ECB's Statistical Data Warehouse.

⁴ See Kremer, M., "Macroeconomic effects of financial stress and the role of monetary policy: a VAR analysis for the euro area", *International Economics and Economic Policy*, Vol. 13, 2016, pp. 105-138.

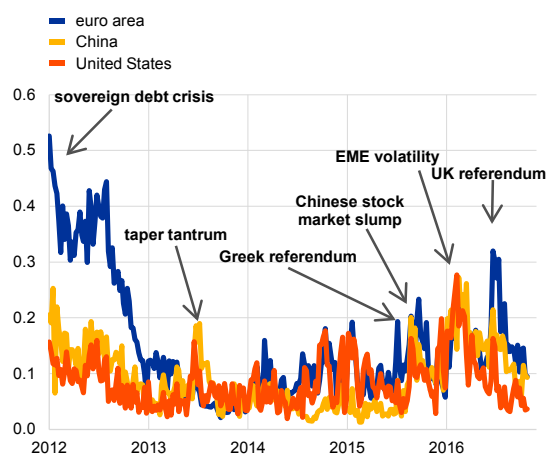
are often weak, and if they show up as stronger, it is not clear how to interpret the direction of causality. For example, the CISS seems to co-move simultaneously with measures of political uncertainty for individual euro area countries and the European Union as a whole. While it is possible that (in particular) extreme levels of financial stress might sometimes raise political uncertainty immediately, the political uncertainty caused by the UK referendum probably drove up financial stress at least temporarily. Survey-based measures of macroeconomic uncertainty in the euro area, by contrast, do not seem to be associated with recent developments in financial stress.

Chart A

Financial stress waxed and waned worldwide...

Composite indicators of systemic stress

(Jan. 2012 – Oct. 2016; weekly data; 0 (minimum) to 1 (maximum) range)



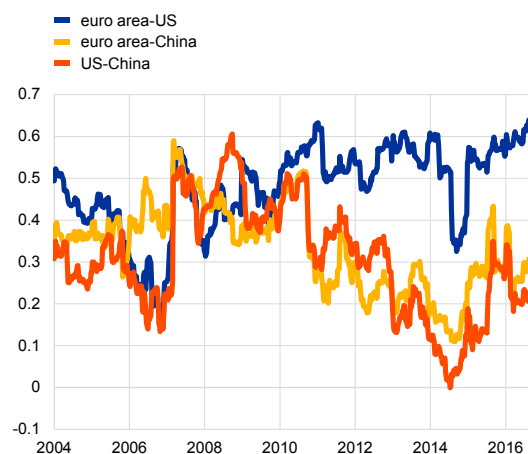
Sources: ECB and ECB calculations.
Note: The CISS methodology is described in Holló, D., Kremer, M. and Lo Duca, M., "CISS – A composite indicator of systemic stress in the financial system", *Working Paper Series*, No 1426, ECB, March 2012.

Chart B

...while becoming more strongly correlated globally, albeit starting from low levels

Time-varying correlation coefficient between weekly changes in the CISS for each pair of countries

(Jan. 2004 – Oct. 2016; weekly data)



Sources: ECB and ECB calculations.
Note: Time-varying correlation coefficients estimated using a multivariate integrated GARCH(1,1) model for weekly changes in the CISS for the euro area, the United States and China.

An exercise decomposing the CISS into constituent components suggests intensified banking problems are a further potential domestic driver of financial stress. Of the five sectors captured by the CISS, the by far strongest contribution to recent changes stems from increased stress in the financial intermediaries sector. The contributions from money, bond, equity and foreign exchange markets are, in contrast, relatively low. Hence, weak profitability and legacy risks in the banking sector may account for the recently more elevated levels of stress in the euro area compared with, for example, the United States or the United Kingdom.

Regarding international factors, there was an increase in the cross-border correlation of financial stress. The time-varying correlation coefficients between weekly changes in the CISS for the euro area, the United States and China show a marked increase in the degree of stress synchronisation for all country pairs since mid-2014 (see Chart B). However, the correlation coefficients picked up from relatively low levels and did not uniformly increase towards historically high values. Nonetheless, the stronger cross-country linkages with respect to financial stress may still suggest an increasing role of global factors for domestic financial stability conditions.

Increased cross-border correlation of financial stress can result from a stronger impact of truly common factors (e.g. global preference shifts) or increased spillover effects from

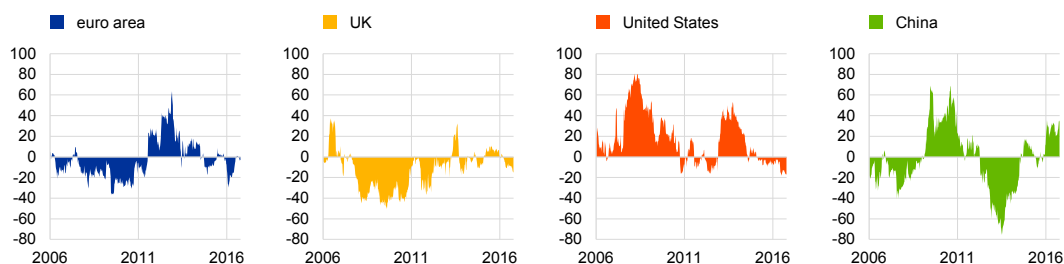
stress originating from abroad. An econometric spillover analysis that disentangles domestic from foreign shock contributions to the forecast error variance of the euro area, US, UK and Chinese CISS finds that when viewed over the full sample (2004-16), the United States clearly dominated as the main source of international financial stress, i.e. was a net sender of stress (see Chart C). This holds particularly true for the global financial recession (2007-09) as well as for the period from 2013 to mid-2014 when market participants started to price in expectations about an imminent tightening cycle in US standard and non-standard monetary policy (“taper tantrum”). That said, the euro area became the dominant source of stress during the sovereign debt crisis, while being a net receiver of stress at other times. The latter fact is even more pronounced for the United Kingdom, although it emerged as a moderate net sender of stress in most of 2015.⁵ Finally, China became the sole net sender of stress in 2016 in the context of increasing financial strains in its domestic financial sector. The results also suggest that China contributed strongly to the international transmission of financial stress shocks in the years 2009 and 2010. In those years, however, China seemed to act like a stabilising force since its stress index fell more rapidly and strongly from the global crisis peaks than in the other three economies.

Chart C

Stronger stress spillovers from China

Net forecast error variance contributions at the country level

(Jan. 2006 – Oct. 2016; weekly data, percentage of total forecast error variance)



Sources: ECB and ECB calculations.

Notes: Spillovers computed within the vector autoregression (VAR) forecast error variance decomposition framework as suggested by Diebold, F. X. and Yilmaz, K., “Better to give than to receive: predictive directional measurement of volatility spillovers”, *Economic Journal*, Vol. 119, 2012, pp. 158-171. The VAR with four lags is estimated over a two-year moving window for weekly data of the euro area, US, UK and Chinese composite indicators of systemic stress. The time series show for each country the sum of the contributions of shocks in that country to the forecast error variance in the other three countries (“spillovers sent”), less the sum of the contributions of shocks in the other countries to the forecast error variance of the country at hand (“spillovers received”).

All in all, the recently somewhat more elevated levels of financial stress in the euro area – as measured by the CISS – seem to reflect a combination of both domestic and external factors. In particular, increased tensions in the domestic financial intermediaries sector as well as persistent international stress spillovers, in particular originating from China in line with the country’s increased role in global trade and financial flows, appear to be major explanatory factors. Despite this rise in the euro area measure of financial stress and empirical studies that show that the CISS has strong and robust predictive power for economic activity, most recent levels of financial stress are still relatively low by historical standards and thus not likely to pose material risks for real economic activity in the euro area.⁶

⁵ The potential spillovers of financial stress from the UK referendum in June 2016 are too recent to have a statistically significant impact within the applied spillover regression framework.

⁶ See Kremer, M., “Macroeconomic effects of financial stress and the role of monetary policy: a VAR analysis for the euro area”, op. cit.

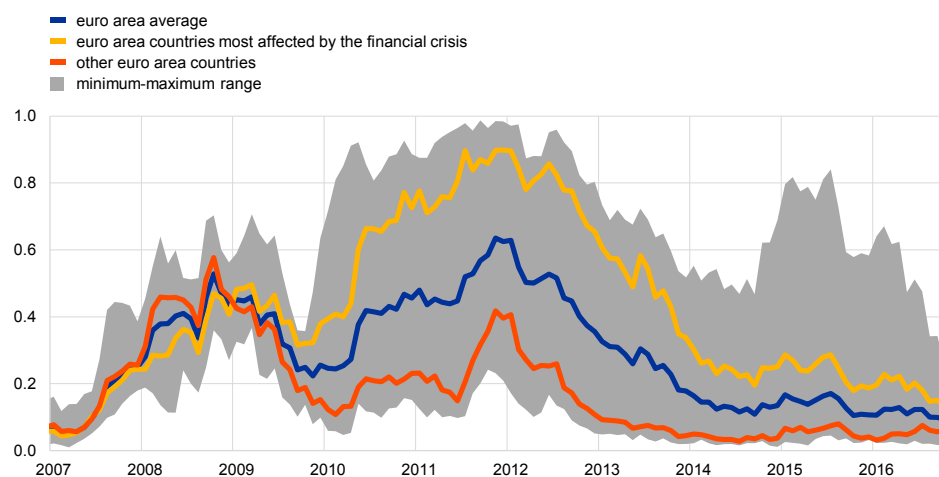
1.2 Latent sovereign debt sustainability concerns despite benign market conditions

Stress conditions in euro area sovereign bond markets continue to be relatively benign, amid decreasing cross-country heterogeneity. Measures of systemic stress in euro area sovereign bond markets have remained fairly stable and hovered around levels seen before the global financial crisis in 2008. The euro area aggregate continues to mask diverging underlying country trends, despite an ongoing gradual convergence in sovereign stress conditions between euro area countries most affected by the financial crisis and other euro area countries (see [Chart 1.13](#)). Benefiting from the ECB's public sector purchase programme, euro area sovereign stress conditions appear to have been largely insulated from both country-specific issues (e.g. uncertainty regarding programme implementation in Greece) and other risk factors linked to political uncertainty. Similarly, the various episodes of repricing of European bank stocks in 2016, for example in the context of country-level bank vulnerabilities (e.g. in Portugal and Italy) or the publication of the European Banking Authority stress-test results, have not durably translated into higher sovereign stress at the euro area level. This may indicate a relative weakening of the sovereign-bank nexus, although there are some lingering market uncertainties regarding the implementation of the bail-in rules under the Bank Recovery and Resolution Directive in place since January 2016.

Chart 1.13
Sovereign bond market tensions have remained contained across the euro area

Composite indicator of systemic stress in euro area sovereign bond markets

(Jan. 2007 – Oct. 2016)



Sources: ECB and ECB calculations.

Notes: The SovCISS aims to measure the level of stress in euro area sovereign bond markets. It is available for the euro area as a whole and for 11 individual euro area countries (Austria, Belgium, Germany, Finland, France, Greece, Ireland, Italy, the Netherlands, Portugal and Spain). Countries most affected by the financial crisis comprise Greece, Ireland, Italy, Portugal and Spain, while other euro area countries 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 (absolute spreads), two realised yield volatilities (the weekly average of absolute daily changes) and two bid-ask bond price spreads (as a percentage of the mid-price). 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.

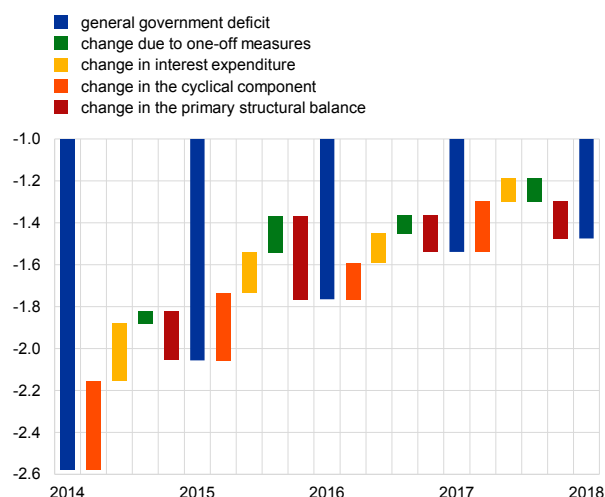
Headline fiscal balances are set to improve further on the back of the ongoing economic recovery and the low interest rate environment. Having fallen from 2.6% of GDP in 2014 to 2.1% of GDP in 2015, the fiscal deficit is expected to decrease further in 2016 at the aggregate euro area level, albeit at a slower pace than in previous years. According to the European Commission's autumn 2016 forecast, the aggregate euro area fiscal deficit is projected to fall to 1.9% in 2016 and further to 1.5% in 2017, while remaining broadly stable in 2018. The improvement in the headline balance over 2016-18 is predominantly driven by gradually improving cyclical conditions and, to a lesser extent, lower interest expenses, which more than compensate for the loosening fiscal stance (see [Chart 1.14](#)).

Chart 1.14

Headline fiscal balances continue to improve, benefiting from the ongoing economic recovery...

General government deficit in the euro area

(2014-18; percentage of GDP)



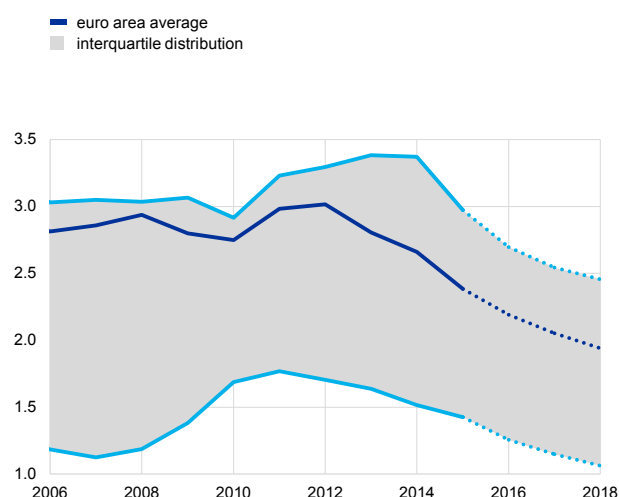
Sources: European Commission (AMECO) and ECB calculations.

Chart 1.15

...and a falling interest payment burden in a low interest rate environment

Interest expenditure of the general government

(2006-18; percentage of GDP)



Sources: European Commission (AMECO) and ECB calculations. Note: Dotted lines indicate forecasts.

The cyclical support is seen to endure despite the UK leave vote and its – so far relatively limited – potential negative repercussions on the conjunctural conditions in the euro area (see Section 1.1). At the same time, interest expenditures are forecast to drop to 1.9% of GDP by 2018 against the background of the low interest rate environment, down from somewhat more than 3% of GDP in 2012 at the height of the euro area sovereign debt crisis, thereby further alleviating the interest payment burden on euro area sovereigns (see [Chart 1.15](#)). At the country level, headline fiscal balances are expected to improve – at least slightly – in almost all euro area countries over the forecast horizon. Headline fiscal deficits are expected to fall below the Maastricht Treaty reference value of 3% of GDP by 2018 in all euro area countries, except France and Spain. Three countries are expected to post budget surpluses (i.e. Germany, Greece and Luxembourg). Despite the expected overall improvement in the euro area fiscal position, underlying challenges persist. In particular, structural budget balances are projected by the European Commission to deteriorate in a number of countries over 2016-18, further challenging the

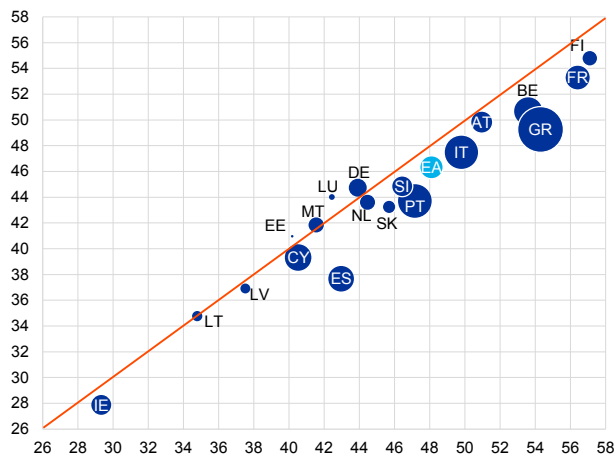
achievement of the medium-term objectives in most euro area countries. Moreover, there are risks that financial sector support may prove deficit-increasing in some countries.

Structural and fiscal reform efforts appear to have lost momentum as urgency has dwindled amid low sovereign financial market stress. The underlying fiscal stance is expected to be moderately expansionary for the euro area as a whole in 2016-18, amid a high degree of cross-country heterogeneity. As improving cyclical economic conditions and lower interest payments alleviate the burden on governments, further progress with fiscal reforms would help generate fiscal buffers for effective countercyclical policies in future downturns. Currently, only a few euro area countries have fiscal space. Cross-country heterogeneity also prevails in terms of the size of the government sector in the euro area (see **Chart 1.16**), although efforts are underway in several countries to review spending in order to rationalise public expenditure. Altering the composition of the budget may also help to create fiscal space by cutting distortionary taxes and unproductive expenditure. This could make it possible to boost capital expenditure (e.g. investment), which has dropped quite substantially since the onset of the financial crisis in most countries (see **Chart 1.17**). In addition, deeper structural reforms would bring long-term benefits by lifting growth potential without endangering fiscal solvency.

Chart 1.16
Despite efforts to rationalise public expenditure, large differences in government size prevail

General government expenditures (x-axis) and revenues (y-axis) across the euro area

(Q2 2016; percentage of GDP)

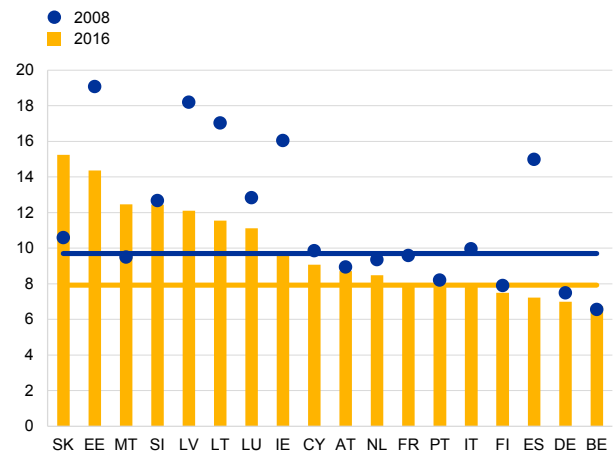


Sources: ECB (Government Finance Statistics) and ECB calculations.
Notes: The size of the bubble indicates the gross general government debt as a percentage of GDP.

Chart 1.17
Boosting capital expenditure could lift growth potential

Share of capital expenditure in total general government expenditure

(2008, 2016; percentages)



Sources: ECB (Government Finance Statistics) and ECB calculations.
Notes: 2008 figures refer to the average value of the four quarters between Q3 2007 and Q2 2008, while the 2016 figures indicate values for the period Q3 2015-Q2 2016. The horizontal lines represent the euro area averages for the two observation periods.

The euro area government debt-to-GDP ratio is expected to continue declining, albeit only gradually. After embarking on a declining trend in 2015, the aggregate euro area government debt-to-GDP ratio is projected by the European Commission to fall further from 91.6% of GDP in 2016 to 90.6% in 2017 and 89.4% in 2018. This trend is supported by the maintenance of the favourable assumptions on the interest

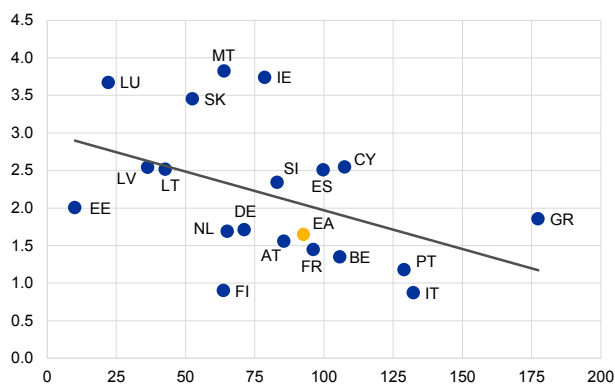
rate-growth differential, primary surpluses and negative debt-deficit adjustments. Nevertheless, some euro area countries under the European Semester surveillance exceeding the 60% of GDP Maastricht Treaty threshold (i.e. Belgium, Spain, France, Italy and Finland) are still projected to see a further – more or less pronounced – rise in their government debt ratios by 2018. Continued primary deficits and/or positive interest rate-growth differentials would, however, complicate putting government debt levels on a sustainable downward path in some other highly indebted countries too (e.g. Italy and Portugal).

Chart 1.18

Debt sustainability concerns remain in a low nominal growth environment...

Gross general government debt in 2015 (x-axis) and average GDP growth forecasts for 2016-18 (y-axis)

(2015, 2016-18; percentage of GDP, percentage)



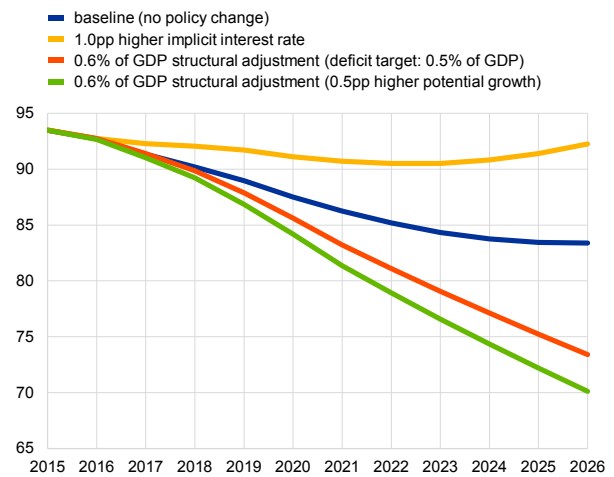
Sources: European Commission and ECB calculations.

Chart 1.19

...and may be accentuated in the event of further shocks

Stylised debt scenarios for the euro area

(2015-26; percentage of GDP)



Sources: European Commission and ECB calculations.

Notes: The baseline scenario for the euro area builds on the assumptions from the European Commission's Fiscal Sustainability Report 2016. Up to 2017, the debt projections build on the European Commission's winter 2016 forecast. As of 2018 (and up to 2026), potential growth is assumed to develop in line with the country-specific paths agreed in the Economic Policy Committee's Output Gaps Working Group. Long-term real interest rates are assumed to converge to 3%. The implicit interest rate on government debt (computed as interest payments on the previous year's debt as a percentage of the current year's debt) is assumed to increase from 2.5% to 3.7% over the simulation horizon. Inflation, as measured by the change in the GDP deflator, is assumed to converge to 2% by 2020 in parallel to the closing of the output gap. The structural balance is assumed to be only affected by the cost of ageing – as projected in the 2015 Ageing Report – and assumed changes in interest spending. In the interest rate shock scenario, a one percentage point level shift in the implicit interest rate is applied as of 2017 over the entire simulation horizon.

Overall, government debt sustainability risks remain elevated amid numerous challenges, not least rising political uncertainty. In the short term, the main challenges to government debt sustainability relate to a prolonged period of low nominal growth (see **Chart 1.18**), residual risks related to financial sector support, as well as insufficient structural and fiscal reforms to durably restore debt sustainability, given heightened political uncertainty in several countries. Regarding the latter, political uncertainty continued to rise not only at the national level given busy electoral calendars in 2017 in major euro area countries, but also at the EU level in the aftermath of the UK referendum. In particular, less reform-oriented and more domestically focused policy agendas may lead to the delay of much needed fiscal and structural reforms and may reignite pressures on more vulnerable sovereigns. In

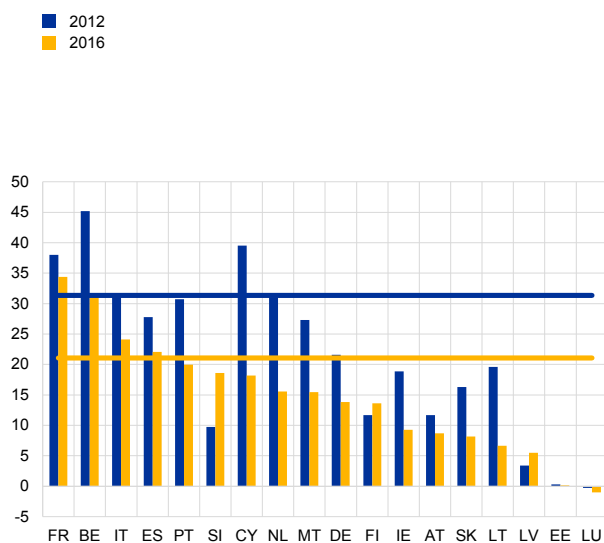
this context, currently generally easy financial conditions – though alleviating fiscal costs – may expose many euro area countries to sudden flow reversals should a risk repricing by market participants take place in the event of the materialisation of a political tail-risk scenario. In the medium-to-long run, these challenges are compounded by vulnerabilities related to the potential rise in interest rates/yields, lower potential GDP growth and ageing-related costs. In particular, a new macroeconomic shock may challenge the sustainability of public finances in the euro area. Under a stylised “no fiscal policy change” scenario, government debt at the euro area level would decline by around 10 percentage points of GDP in the coming decade (see [Chart 1.19](#)). Structural fiscal adjustments would put the aggregate euro area debt ratio on a steeper declining path, while assuming also a higher potential GDP growth would result in even more favourable debt dynamics. However, simulation results suggest that a lasting interest rate shock would put public debt on an increasing path towards the end of the projection horizon.

Chart 1.20

Government financing needs have fallen considerably since the height of the euro area sovereign debt crisis

Gross general government financing needs in the euro area

(2012, 2016; percentage of GDP)



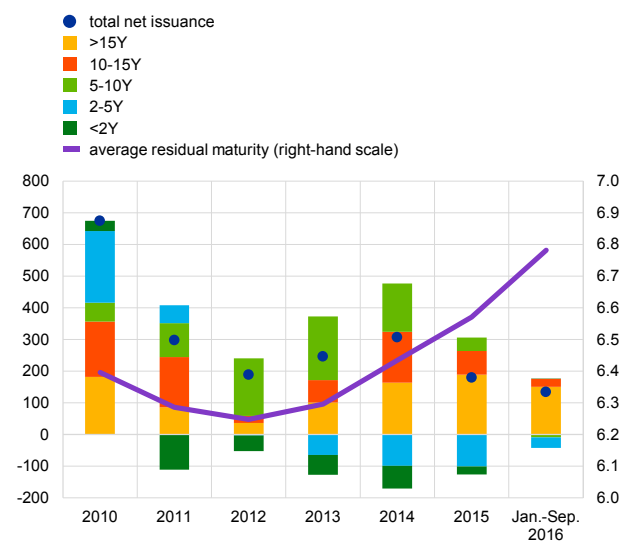
Sources: ECB Centralised Securities Database (CSDB) and ECB calculations.
Notes: The financing need is calculated as the sum of the budget deficit and the gross redemption of outstanding government debt for a given year. For more details on the CSDB, see “New and timely statistical indicators on government debt securities”, *Statistics Paper Series*, No 8, ECB, June 2015. The horizontal lines represent the euro area averages for the two observation periods.

Chart 1.21

The shift of issuance activity towards the long end of the maturity spectrum has continued

Issuance of government debt securities by original maturity

(2010-16; EUR billions, years)



Source: ECB Centralised Securities Database (CSDB) and ECB calculations.

Notwithstanding challenges to sovereign debt sustainability, financing conditions have remained favourable in terms of both pricing and duration.

Overall, the gross financing needs of euro area governments have dropped from 31.5% of GDP in 2012 at the height of the euro area sovereign debt crisis to around 21% of GDP in 2016 (see [Chart 1.20](#)). Still, for some euro area countries, debt service needs remain substantial. Overall, the shift in issuance activity towards the long end of the maturity spectrum in most countries in the current low-yield environment has continued. In terms of durations, net issuance of government

securities with maturities below five years remains negative and contrasts with strong increases in issuance activity beyond the 15-year horizon (see [Chart 1.21](#)). As a result, the average residual maturity of outstanding euro area government debt securities continued to increase, reaching 6.8 years by September 2016 amid sizeable cross-country divergence. Given the current environment of low and further declining (or even negative) government bond yields at short maturities, this trend is likely to continue in the near term, as investors search for higher returns by increasing the duration of purchased assets, while governments aim to lock in long-term financing at low costs.

Available financial assets could be used to cushion sudden increases in sovereign financing needs. Financial assets held by euro area sovereigns are substantial, amounting to 39.2% of GDP in the second quarter of 2016, amid considerable cross-country heterogeneity. At the same time, the market value of consolidated general government liabilities in the euro area was 112.7% of GDP, yielding net debt of 73.5% of GDP. Equity and investment fund shares/units account for the bulk of such financial assets in most euro area countries, suggesting that the sale of state-owned assets could play a role in alleviating debt sustainability concerns if the proceeds were to be used to retire outstanding government debt.

1.3 Favourable financing conditions continue to underpin the recovery of the non-financial private sector

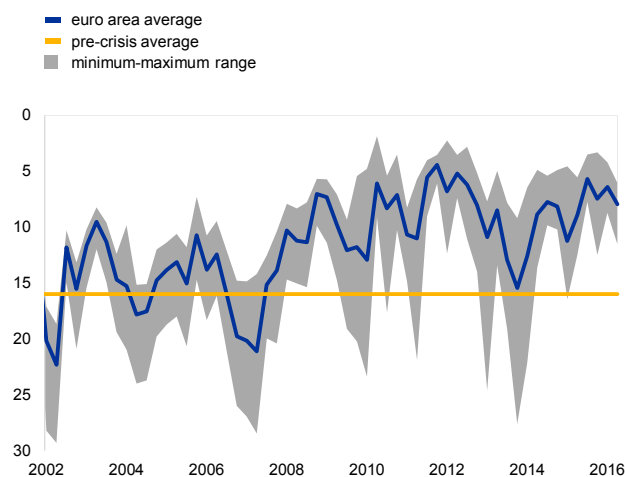
Mirroring overall economic conditions, the income position of euro area households has remained weak, albeit improving. A distance-to-distress indicator – combining balance sheet information with asset price volatility – suggests that overall credit risks related to household balance sheets in the euro area remained at relatively elevated levels in the second quarter of 2016 (see [Chart 1.22](#)). Disposable income growth of euro area households remained muted in the second quarter, while growth in household net worth accelerated from the previous quarter as a result of lower valuation losses on households' financial asset holdings (reflecting the smaller decline in equity prices compared with the previous quarter) and the continued robust capital gains on real estate holdings (see [Chart 1.23](#)). Looking ahead, the euro area household sector is expected to recover further, buttressed by relatively resilient household sentiment and confidence as well as improving labour market conditions, even though high unemployment still weighs on households' income prospects in some euro area countries.

Chart 1.22

Risks related to euro area household balance sheets have remained broadly stable at elevated levels

Households' distance to distress in the euro area

(Q1 2002 – Q2 2016; number of standard deviations from estimated default point)



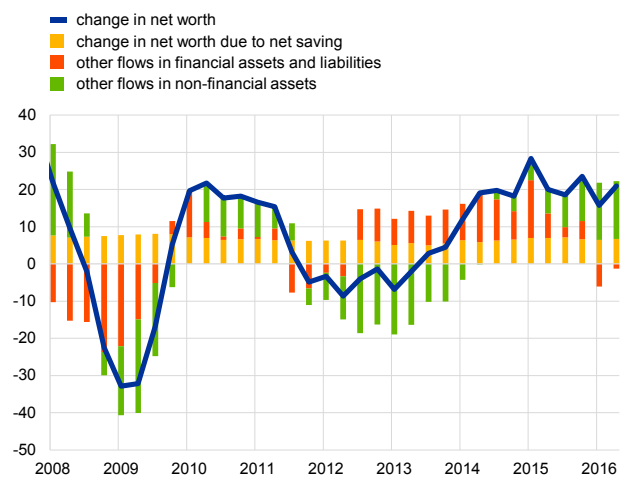
Sources: ECB, Bloomberg, Thomson Reuters Datastream and ECB calculations.
Notes: A value closer to zero for the distance to distress indicates higher credit risk. The chart shows the median and the minimum-maximum distribution across 11 euro area countries for which historical time series cover more than one business cycle. For details of the indicator, see Box 7 in *Financial Stability Review*, ECB, December 2009.

Chart 1.23

Gradually improving net worth of households helps mitigate balance sheet pressures

Change in the net worth of euro area households

(Q1 2008 – Q2 2016; four-quarter moving sum, percentage of gross disposable income)



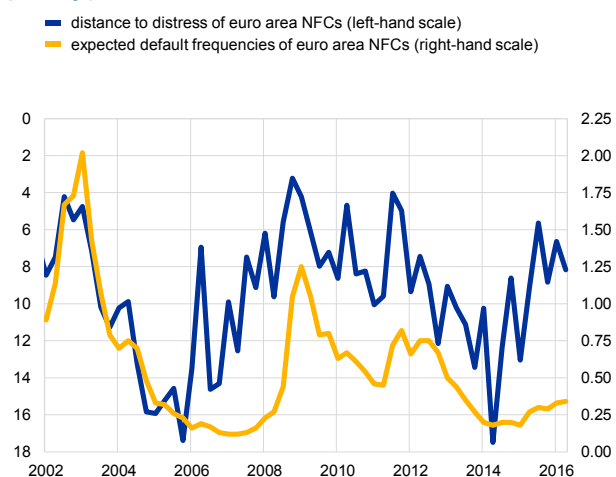
Sources: Eurostat, ECB and ECB calculations.
Notes: Other flows in non-financial assets mainly include holding gains and losses on real estate (including land). Other flows in financial assets and liabilities mainly include holding gains and losses on shares and other equity, while changes in net worth due to net saving comprise net saving, net capital transfers received and the discrepancy between the non-financial and financial accounts. Based on the European System of Accounts 2010.

Chart 1.24

Corporate balance sheet risks appear to have risen amid increased financial market volatility

Euro area NFCs' distance to distress and expected default frequency

(Q1 2002 – Q2 2016; number of standard deviations from estimated default point, percentage)



Sources: ECB, Bloomberg, Thomson Reuters Datastream, Moody's and ECB calculations.
Notes: A value closer to zero for the distance to distress indicates higher credit risk. The chart shows the median value across 11 euro area countries for which historical time series cover more than one business cycle. For details of the indicator, see Box 7 in *Financial Stability Review*, ECB, December 2009.

Non-financial corporate profits continue to recover, but overall profitability remains weak.

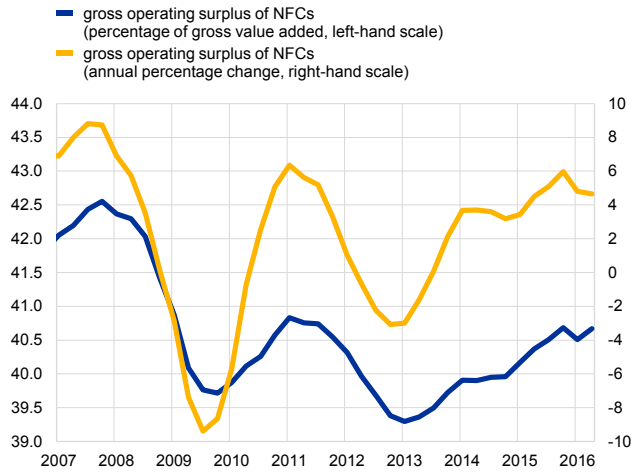
Various stress and default indicators suggest that risks related to non-financial corporate balance sheets have tended to increase (see [Chart 1.24](#)). In particular, the distance-to-distress indicator remained close to levels seen in the global financial crisis and the euro area sovereign debt crisis, mainly owing to heightened financial market volatility throughout 2016. The earnings-generating capacity of euro area non-financial corporations (NFCs) has improved somewhat, driven by the gradual economic recovery, but corporate profitability has remained muted by historical standards (see [Chart 1.25](#)), inter alia reflecting the limited ability of firms to pass on rising costs to output prices in an environment of weak demand and needed competitiveness gains. However, corporate profitability is expected to improve as the recovery gathers pace, thereby also alleviating pressures on more vulnerable firms which are confronted with debt-servicing difficulties.

Chart 1.25

Corporate profits are improving, but profitability remains subdued

Gross operating surplus of euro area NFCs

(Q1 2007 – Q2 2016; percentage of gross value added, annual percentage change)



Sources: Eurostat and ECB calculations.

The large stock of legacy debt continues to weigh on the euro area non-financial private sector.

On average, the indebtedness of euro area households fell to slightly below 59% of GDP in the first half of 2016 – a level last observed just before the start of the global financial crisis in 2008. Even if this figure is relatively low by international standards, it remains high historically. By contrast, the level of non-financial corporate debt – at 108% of GDP on an unconsolidated basis or 84% of GDP on a fully consolidated basis in the second quarter of 2016 – was higher than both international and historical norms. Balance sheet repair in the household and non-financial corporate sectors is proceeding only gradually at the aggregate euro area level, as the weak nominal growth environment and legal impediments (e.g. design of bankruptcy procedures, costs and length of contract enforcement, etc.) in several countries are hindering a more forceful deleveraging of the non-financial private sector. That said, these aggregate figures mask a considerable

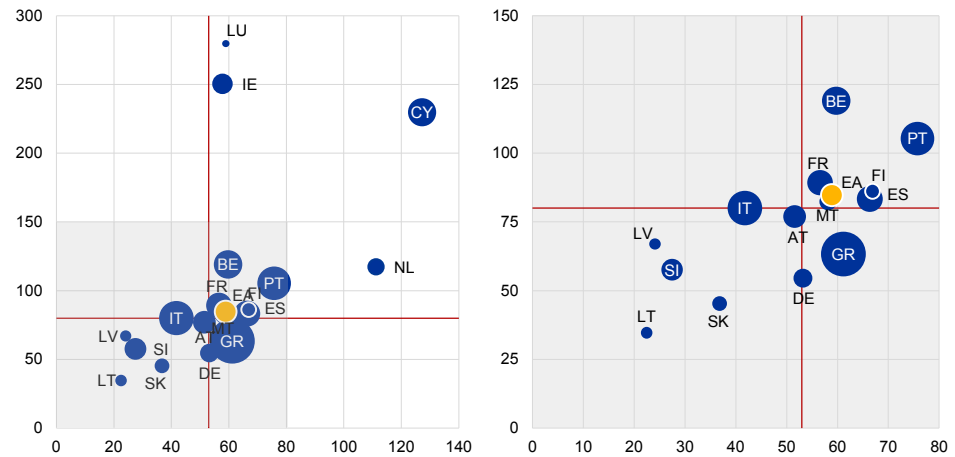
degree of heterogeneity at the country level (see [Chart 1.26](#)).

Chart 1.26

High indebtedness across sectors remains a cause for concern in some countries

Household indebtedness (x-axis) and non-financial corporate indebtedness (y-axis)

(Q2 2016; percentage of GDP)



Sources: European Commission and ECB.

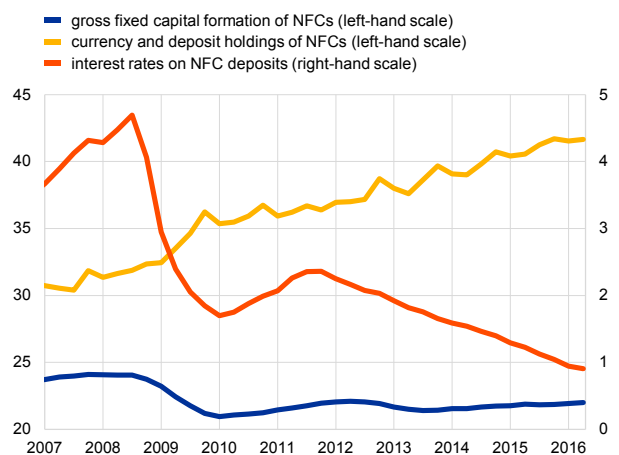
Notes: The size of the bubble reflects the level of general government debt as a share of GDP. Non-financial corporate debt is consolidated. Consolidated non-financial corporate debt figures include cross-border inter-company loans, which tend to account for a significant part of debt in countries where a large number of foreign entities, often multinational groups, are located (e.g. Belgium, Cyprus, Ireland, Luxembourg and the Netherlands). The horizontal and vertical lines represent the estimated macroeconomic imbalance procedure (MIP) benchmarks of 80% of GDP for consolidated non-financial corporate debt and 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.

Chart 1.27

Corporate deposits are on the rise despite falling deposit rates, but corporate investment remains muted

Interest rates on corporate deposits, as well as NFCs' gross fixed capital formation and currency and deposit holdings

(Q1 2007 – Q2 2016; percentage of gross value added, percentage per annum)



Sources: Eurostat, ECB and ECB calculations.

In some euro area countries, continued high debt levels, together with adverse interest rate-growth differentials, still pose a challenge to corporate debt sustainability. This suggests further deleveraging needs in a number of countries, even if gradually improving corporate profitability coupled with record low interest payment burdens are underpinning borrowers' debt servicing capabilities. Moreover, given the uncertainty surrounding the strength of the global economic recovery, rising political uncertainty and low opportunity costs of holding liquid assets, euro area NFCs have continued to increase their cash balances, which could make a significant contribution to both reducing leverage and financing the economic recovery by supporting investment activity (see [Chart 1.27](#)). Looking ahead, the ongoing balance sheet repair should help offset the risks related to an eventual normalisation of interest rates and the ensuing rise in debt servicing costs. This might challenge borrowers in those countries where loans with floating rates or rates

with rather short fixation periods are more widespread. A higher debt service burden for borrowers in a rising interest rate environment is also likely to be partly offset by the positive impact of a pick-up in economic dynamics on households' and firms' income and earnings situation.

While remaining muted, bank lending flows to the non-financial private sector have continued to recover in the context of falling lending rates. On average, bank lending to euro area households and NFCs has gradually strengthened further (see [Chart 1.28](#)), chiefly supported by the ECB's monetary policy measures, including the new series of targeted longer-term refinancing operations introduced in March 2016. The recovery in bank lending has been supported by historically low bank lending rates across the maturity spectrum in almost all lending categories, as lower bank funding costs progressively translate into reduced lending rates. Nonetheless, overall loan dynamics have remained weak, given residual deleveraging needs and high liquidity buffers of households and NFCs. The aggregate picture masks diverging trends at the country level, however. Credit to the non-financial private sector has continued to contract in countries most affected by the financial crisis, such as Cyprus, Ireland, Slovenia, Spain, Greece and Portugal, while other euro area countries, such as Luxembourg, Slovakia, Lithuania and Estonia, saw more buoyant developments. With regard to bank lending to euro area households by purpose, a rather pronounced expansion of consumer credit contrasts with a more moderate recovery in loans for house purchase and a continued contraction in other types of lending.

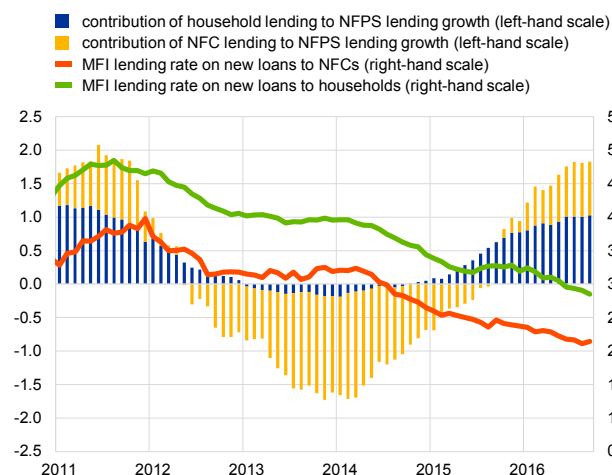
The recovery of bank lending is underpinned by benign demand and supply conditions. The latest euro area bank lending survey of October 2016 suggests a continued increase in loan demand across all loan categories. The low general level of interest rates remained a key factor contributing to increased demand for all types

of loans. For loans to NFCs, financing needs for inventories and working capital and for fixed investment, as well as other financing needs, contributed to a continued increase in demand. As for housing and consumer loans, alongside improved consumer sentiment, stronger demand for loans was also buttressed by favourable housing market prospects and financing needs for spending on durable goods. Supply-side constraints have remained unchanged for lending to enterprises following nine consecutive quarters of easing, while credit standards have eased for both loans for house purchase and consumer credit. Competitive pressures and banks' lower risk perceptions have contributed to an easing in banks' credit standards across all lending categories. Looking at maturities, banks have eased slightly their credit standards on short-term loans to enterprises, while they have tightened them somewhat on long-term loans to enterprises. Across firm sizes, credit standards were eased marginally on loans to large firms, while they remained broadly unchanged for loans to small and medium-sized enterprises (SMEs). The latest survey on the access to finance of enterprises (SAFE) suggests that improvements in financing conditions were widespread across firm sizes, but access to finance for large enterprises still remained better than that of SMEs (see [Chart 1.29](#)).

Chart 1.28
Bank lending to the euro area non-financial private sector has recovered further, while lending rates continue falling

Bank lending to the euro area non-financial private sector and contributions, as well as MFI lending rates on new loans to households and NFCs

(Jan. 2011 – Sep. 2016; annual percentage point contribution, percentage per annum)

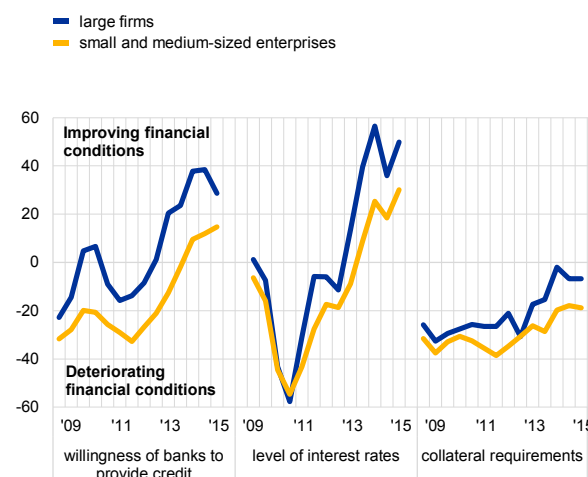


Sources: ECB and ECB calculations.
Note: NFPS stands for non-financial private sector, which comprises the non-financial corporate sector as well as the household sector (including non-profit institutions serving households).

Chart 1.29
Access to funding has continued to improve for both large as well as small and medium-sized enterprises

Financing conditions of euro area SMEs in comparison with large firms

(H1 2009 – H2 2015; net percentage of respondents, change over the past six months)



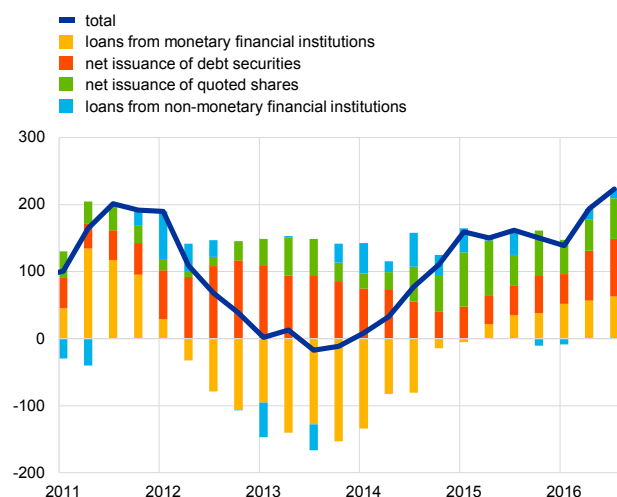
Source: ECB calculations based on the survey on access to finance of enterprises (SAFE).
Note: The levels of interest rates and collateral requirements are presented using inverted signs. Net percentages are defined as the difference between the percentage of enterprises reporting that a given factor has increased/improved and the percentage of those reporting that it has declined/deteriorated.

Euro area firms continued to benefit from favourable financing conditions also in terms of non-bank sources of financing. Euro area NFCs' external financing from non-bank sources strengthened further in the second and third quarters of 2016

(see [Chart 1.30](#)). This development was largely supported by the historically low overall nominal costs of external financing against the backdrop of the ECB's latest monetary policy measures and the decline in global bond yields observed until the end of the summer. The net issuance of debt securities has increased since the start of the ECB's corporate sector purchase programme, with the cost of market-based debt touching fresh record lows (see [Chart 1.31](#)). That said, rising volumes were more a function of increases in the average issuance size and less a consequence of a higher number of issuers and/or deals. This pattern suggests that market-based debt financing remains accessible mostly to larger firms. The net issuance of quoted shares by NFCs continued to be modest, as the cost of equity remained fairly elevated amid bouts of volatility in euro area (and global) stock markets and in view of NFCs' still muted profitability prospects.

Chart 1.30
External financing flows for euro area non-financial corporations have picked up...

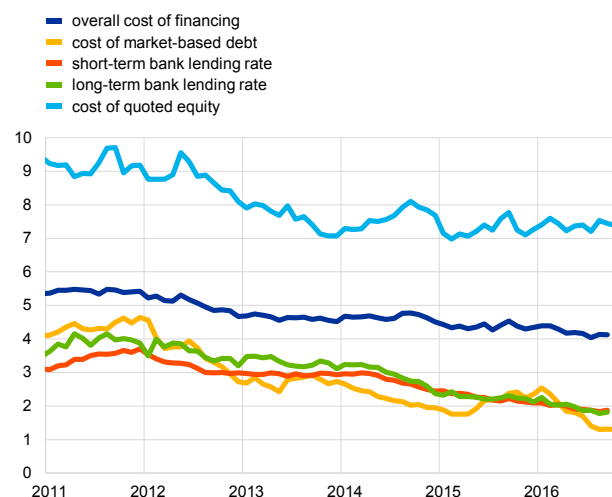
External financing of euro area NFCs
(Q1 2011 – Q3 2016; EUR billions, four-quarter moving flow)



Sources: Eurostat, ECB, Dealogic and ECB calculations.
Note: Loans from monetary financial institutions to NFCs are corrected for cash pooling, loan sales and securitisations, while loans from non-monetary financial institutions exclude loan securitisations.

Chart 1.31
...while overall external funding costs of euro area non-financial corporations remained low

Nominal cost of external financing of euro area NFCs
(Jan. 2011 – Oct. 2016; percentage per annum)



Sources: ECB, Merrill Lynch, Thomson Reuters Datastream and ECB calculations.
Notes: The overall cost of financing for NFCs is calculated as a weighted average of the cost of bank lending, the cost of market-based debt and the cost of equity, based on their respective amounts outstanding derived from the euro area accounts. The cost of equity estimates are based on a three-stage dividend discount model.

Favourable financing conditions should contribute to a further recovery in bank lending, but headwinds remain. The financing conditions of euro area NFCs remain favourable and supportive of both investment and debt servicing, although the cost of debt financing has recently shown signs of a possible turnaround predominantly driven by global factors. In addition to improving supply and demand conditions, the ECB's monetary policy measures should foster the recovery of bank lending and help reduce funding costs for NFCs. However, remaining deleveraging needs, heightened political uncertainty at the national and EU levels, rising stock market volatility and a potential risk repricing in bond markets may constrain the availability and/or increase the cost of financing for NFCs in the euro area and dampen the positive effects of very accommodative ECB policies.

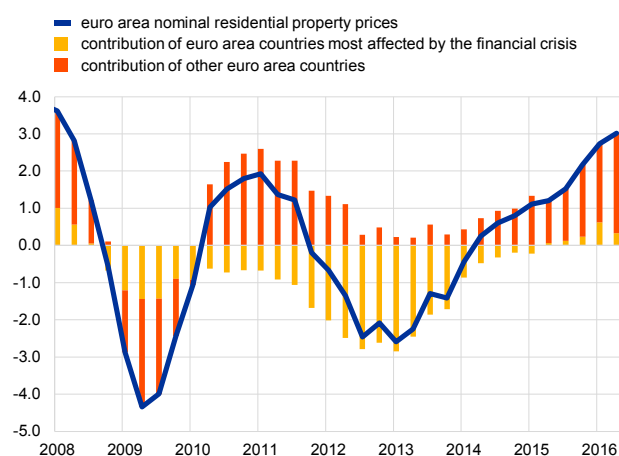
The ongoing recovery in euro area property markets has accelerated and become more broad-based across countries. Bolstered by low interest rates and the ongoing economic recovery, residential property markets gained further traction at the aggregate euro area level in the first half of 2016, expanding at the highest growth rate since early 2008 (see [Chart 1.32](#)). Demand factors appear to be the drivers of house price growth, while supply-side cost pressures remain muted, with overall construction input costs broadly stable since early 2013 (see [Chart 1.33](#)). At the same time, euro area commercial property markets have maintained a strong momentum amid improving business confidence, strong foreign demand and the ongoing search for yield.

Chart 1.32

Recovery in residential property markets is accelerating and becoming more broad-based across countries...

Decomposition of euro area residential property price growth into groups of countries

(Q1 2008 – Q2 2016; percentage change per annum, percentage point contribution)



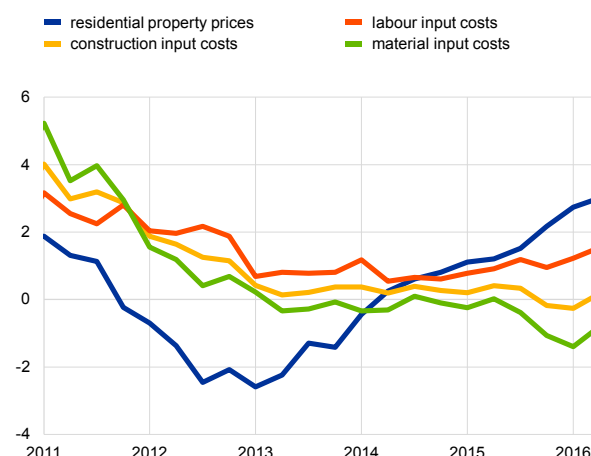
Sources: ECB calculations based on national data.
Note: The countries most affected by the financial crisis are Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain.

Chart 1.33

...driven by demand factors, while upward supply-side price pressures remain contained

Construction input costs and residential property prices in the euro area

(Q1 2011 – Q2 2016; annual percentage change)



Source: Eurostat.

Residential and commercial property price dynamics appear to have become less diverse across countries, as the adverse ramifications of multi-year corrections in the context of the global financial crisis gradually dissipate at the country level. For residential property markets, this is evident from the positive contribution of euro area countries most affected by the financial crisis to overall euro area house price growth, with all countries but Cyprus, Greece and Italy recording positive property price growth rates in the first half of 2016. Cross-country variation decreased further in commercial property markets too, amid a firming recovery in those countries that saw marked corrections during the financial crisis.

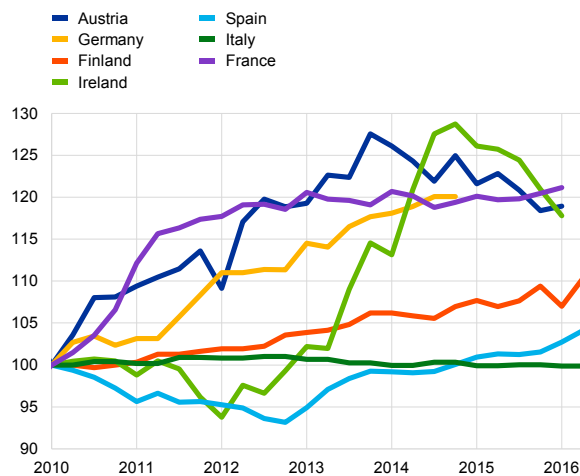
Heterogeneity prevails also across regions and property types. Diminishing heterogeneity across countries is nuanced by continued divergence in regional price dynamics at the national level. Price developments in capital and/or large cities have tended to exceed price trends at the overall country level in many countries (see [Chart 1.34](#)) and may spread to surrounding areas and, eventually, ripple out to the rest of the country. At the same time, euro area commercial property markets saw a

strong divergence of price developments across various property types. In particular, the prime retail segment has remained buoyant in the context of the current low-yield environment and the ongoing search for yield (see [Chart 1.35](#)). As a result, investment activity in euro area commercial property markets has remained robust, despite some moderation in transaction volumes in the first half of 2016 as investors took a more cautious stance with regard to their portfolio allocation choices in the context of the UK referendum. That said, the related turbulence in the UK commercial property fund sector has not spilled over to euro area commercial property markets (see Section 3.1.3). Strong demand, mainly by non-European investors (Chinese pension funds in particular), is accompanied by a continued decline in prime commercial property yields, which are below pre-crisis levels in all euro area countries but Greece. In addition, strong competition for prime assets and yield compression in core euro area commercial property markets are increasingly driving property investors towards the non-prime segment and non-core countries.

Chart 1.34
Country-level developments still mask underlying regional disparities

Residential property prices in the capital city/big cities vis-à-vis the national aggregate

(Q1 2010 – Q2 2016; index: 2010 = 100)

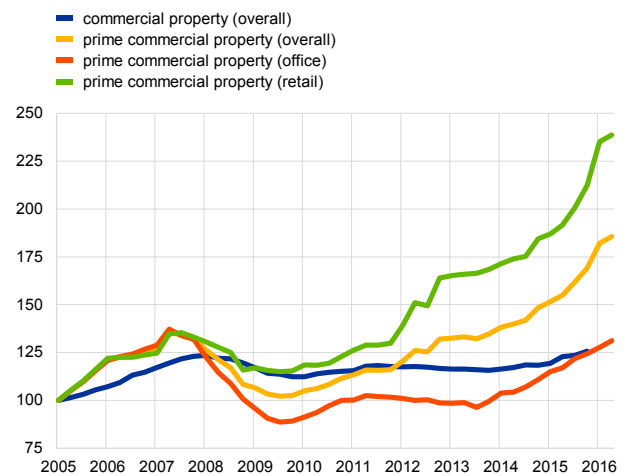


Sources: BIS, national sources and ECB calculations.

Chart 1.35
Buoyant developments in prime markets have continued, predominantly driven by the retail segment

Commercial property price indices

(Q1 2005 – Q2 2016; index: Q1 2005 = 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.

While euro area residential property prices are estimated to be broadly in line with fundamentals, prime commercial property prices remain well above their long-term average. Aggregate valuation estimates for the euro area (see [Chart 1.36](#)) mask highly heterogeneous developments at the country level. Estimated undervaluations in both the residential and commercial realms in countries that experienced large corrections in the context of the global financial crisis, such as Greece, contrast with estimated overvaluations in other countries like Austria and Belgium. Developments at the country level may also hide strong regional disparities, as indicated by the estimated overvaluation of residential property in

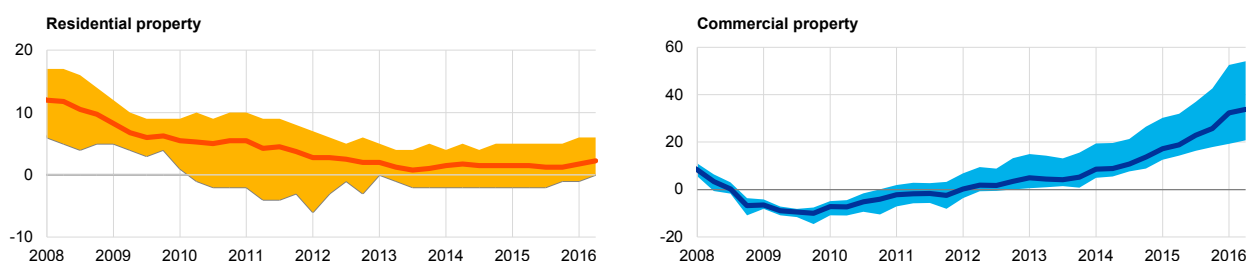
some large cities, for example in Austria and Germany.⁷ That said, while offering a consistent set of benchmarks across countries, these valuation estimates are surrounded by a high degree of uncertainty, as their national relevance is conditioned by country-level specificities like fiscal treatment or structural property market characteristics (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.

Chart 1.36

Residential property prices stayed broadly in line with fundamentals, while commercial property prices remained above their long-term average

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

(Q1 2008 – Q2 2016; percentage, average valuation, minimum-maximum range across different 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 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 details of the valuation estimates for prime commercial property, see Box 6 in *Financial Stability Review*, ECB, December 2011.

All in all, the recovery of euro area property markets should maintain momentum, but potential pockets of vulnerability may emerge in certain countries and asset classes. On the demand side, favourable funding conditions as well as diminishing affordability constraints owing to further strengthening labour market conditions (in terms of both income and employment prospects) are likely to underpin the ongoing recovery in euro area residential property markets. At the same time, supply-side conditions are expected to improve further, in line with the ongoing economic recovery, as indicated by rising confidence in the construction sector and the increasing number of building permits granted, which should help mitigate upward price pressures. This outlook may be vulnerable to adverse economic shocks, which may challenge the sustainability of the recovery and reverse the ongoing process of de-fragmentation across countries and market segments. In particular, deteriorating economic and financing conditions, or from a more medium-term perspective, rising 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. That said, at the current juncture, early warning estimates do not indicate the build-up of underlying vulnerabilities stemming from residential property markets at the aggregate euro area level (see [Chart 1.37](#)). Similarly, there are also no signs of the ongoing recovery of euro area residential property markets translating into broad-based rapid housing loan growth

⁷ See the February 2016 issue of the Deutsche Bundesbank's Monthly Report and Schneider, M., Wagner, K. and Waschiczek, W., "The OeNB property market monitor", October 2016.

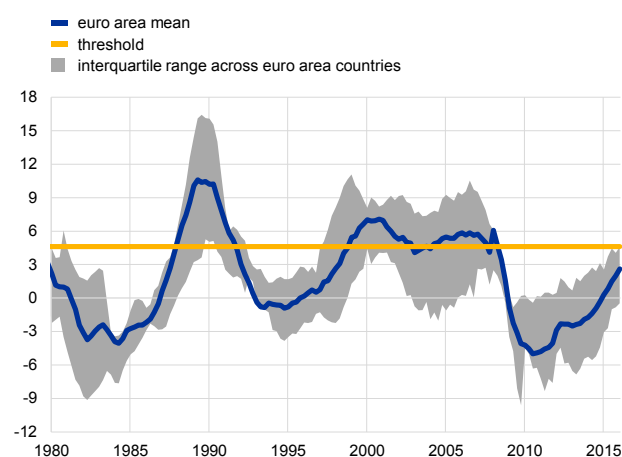
in the euro area, even if in some countries price and credit developments may warrant close monitoring in the context of the current low-yield environment (see [Chart 1.38](#)).

Chart 1.37

Early warning estimates currently do not indicate the build-up of systemic risk at the aggregate euro area level...

Mean and interquartile range of euro area real residential property prices and indicative signalling threshold

(Q1 1980 – Q1 2016; three-year growth rate of real residential property prices (annualised), percentage)



Sources: OECD and ECB calculations.

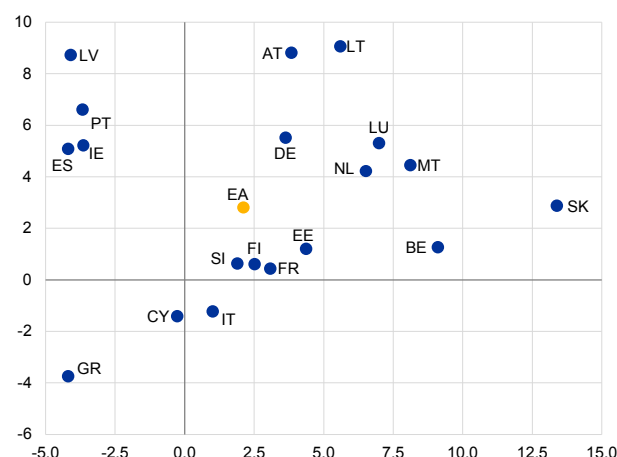
Notes: The shaded area represents the interquartile range across euro area countries. The signalling thresholds of 0.4, 0.5 and 0.6 are obtained by minimising the loss function of a policymaker with a preference for not missing financial crises rather than issuing false alarms. The threshold value was chosen based on the early warning properties of the indicator. The threshold corresponds to the lowest early warning threshold that results in a conditional pre-crisis probability of 17.5% for the data sample at hand, upon a warning signal being issued. The unconditional pre-crisis probability in the sample at hand is around 9%. Pre-crisis periods are defined as 12-5 quarters prior to systemic banking crises.

Chart 1.38

...but credit and property price developments may warrant close monitoring in some countries

Growth in loans for house purchase (x-axis) and residential property price growth (y-axis) across the euro area

(H1 2016 vs. H1 2015; annual percentage change)



Sources: ECB and ECB calculations.

Notes: Bank lending data are not adjusted for loan sales and securitisations. Securitisation may, however, play an important role in some countries, for example Belgium, where adjusted time series would yield lower growth rates for housing loans. The figures for Cyprus and Lithuania reflect the annual change in Q1 2016, given the lack of Q2 data.

The new macroprudential toolkit equips authorities to mitigate possible risks to financial stability at the country level in a targeted and granular way. In fact, based on a broader set of measures which go beyond prices and valuations, some countries appear to be increasingly exposed to property-related risks. In some countries such as Austria, Belgium and Luxembourg, where a range of residential real estate indicators are growing, there is the risk that expectations of continued price increases feed into demand and lending policies, with credit standards being relaxed. In other countries, like Finland and the Netherlands, prevailing real estate-related imbalances associated in particular with elevated household indebtedness and large bank exposures to real estate-related loans may amplify adverse shocks and lead to negative interactions between the macroeconomic environment and the housing market. As a result, a number of countries have already introduced macroprudential measures to avoid a potential build-up of vulnerabilities, in particular in residential property markets. 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 which are based on Union law if needed (see [Box 2](#)).

Box 2

Monitoring euro area residential real estate markets from a macroprudential perspective

No other macroeconomic segment has been more closely linked to financial stability than residential real estate. Historical evidence shows that financial crises involving housing market imbalances have had severe negative repercussions on the overall financial system and economic growth. Accordingly, policies to contain risks stemming from residential property markets have assumed a key role in the macroprudential toolkit. Judiciously informing their use is, however, challenging given the multitude of factors behind real estate developments. This calls for an encompassing view that goes beyond traditional standardised price and valuation metrics.

As part of its new responsibilities in the area of macroprudential policy, the ECB has stepped up efforts to monitor country-specific developments in residential real estate markets. In line with the Single Supervisory Mechanism (SSM) Regulation, which gives the ECB the power to top up national competent/designated authorities' decisions regarding the activation of certain measures,⁸ when carrying out its macroprudential policy work, the ECB has adopted an internal residential real estate risk assessment framework in order to detect early signs of vulnerabilities in individual SSM countries for financial stability and related policy purposes. The objective of the framework is preventative (rather than corrective), given the policy mandate, and consists of two main elements. First, the analysis incorporates a countercyclical perspective, with the main aim of preventing the build-up of risks. Second, it focuses on making the system more resilient to potential shocks from a forward-looking perspective.⁹ This framework also feeds into broader EU initiatives, most notably as part of the analytical support for the European Systemic Risk Board (ESRB), and is complementary to the assessment of the real estate market performed by the ECB when carrying out its banking supervision work, with different objectives, such as supporting banks in their real estate-related analysis.

The core of the ECB's risk identification within the macroprudential framework rests on a comprehensive set of indicators at the level of individual SSM countries. The underlying pool of variables covers numerous financial and economic indicators, reflecting both cyclical and structural conditions in the housing market of each country. Indicators are chosen on the basis of the evidence gained from past episodes of financial instability caused by real estate imbalances. A first set of indicators includes those regularly disseminated in the FSR which target residential real estate prices and valuations as strong price increases and underlying price misalignments tend to precede periods of financial instability and economic recessions.¹⁰ As valuation metrics are surrounded by a high degree of uncertainty, the ECB also uses various model-based approaches¹¹, while it also assesses the impact of changes in fundamental variables affecting valuations (e.g. interest rates). A second set of indicators covers lending conditions and household balance sheet soundness. Strong mortgage lending growth could lead to higher indebtedness and could be a symptom of relaxing credit standards, thereby increasing the fragility of the overall system. At the

⁸ Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions. The macroprudential tools available to the ECB are laid down in the Capital Requirements Regulation and Directive (CRR/CRD IV).

⁹ Real estate risks that have already materialised fall outside the scope of such a preventative toolkit and require a broader policy response (e.g. the legacy stock of non-performing residential real estate loans).

¹⁰ For more details, see Box 3 in *Financial Stability Review*, ECB, May 2015.

¹¹ For more details, see Box 3 in *Financial Stability Review*, ECB, November 2015.

same time, weak household balance sheets, stemming from high levels of indebtedness, low household wealth and high debt service ratios, make the unwinding of residential real estate imbalances more likely and more severe.

These indicators are assessed against historically generated early warning thresholds and transformed into risk ratings on the basis of them. The thresholds are identified by looking at the distribution of the indicators or by following experts' views or they are estimated on the basis of historical data in the spirit of the early warning model literature.

Indicators are also aggregated into composite measures that capture the overall level of residential real estate vulnerabilities in one country. This step facilitates the identification of vulnerable markets that require deeper analyses to reach a final risk assessment. To this end, consideration is given to other qualitative information on residential real estate markets and country-specific mitigating factors.

Vulnerabilities are also cross-checked against the exposure of banks to the real estate sector, as a share of total assets, GDP and capital. The assessment takes into account the exposures to overall real estate, including all types of collateralised lending and credit to industrial activities in relation to real estate. This allows an assessment of risks stemming from potential spillovers and co-movements between residential and commercial real estate. The exposures and the associated collateral are analysed in detail and monitored by ECB Banking Supervision. Other aspects that need to be closely monitored are lending conditions, including, where available, loan-to-value ratios, debt-to-income ratios and debt service-to-income ratios of new loans.

Beyond the above analytical elements, the ECB also pays attention to a broad array of structural indicators that can amplify or attenuate shocks. These include, for example, the share of floating interest rate mortgages, home ownership rates, the fraction of homeowners with mortgages, the share of households with "underwater" mortgages¹², the role of the construction sector in the overall economy, taxation regimes and country specificities. Finally, the ECB also conducts internal bank stress tests to evaluate the resilience of the banking system under an adverse scenario, defined specifically for the risk assessment of a downturn in housing markets with potential negative ramifications for the rest of the economy.

Taken together, all of the elements of the ECB's risk identification framework give a detailed picture, providing a foundation for consistently assessing vulnerabilities in residential real estate markets across euro area countries. However, country specificities which are not (or insufficiently) captured by this framework need to be taken into account and justify a role for cross-checking rule-based indications with expert judgement. With time, the depth of the analysis is expected to benefit from improving data quality and availability (including harmonised indicator definitions), strengthening the granularity and the homogeneity of the assessment of risks across countries and market segments.

¹² An "underwater" mortgage is defined as a situation where the value of the mortgage loan exceeds the market value of the home.

2 Financial markets

Global financial markets have witnessed a number of sharp – but short-lived – asset price corrections in recent years. This trend has continued over the past six months, as demonstrated, in particular, by higher asset price volatility following the outcomes of the UK referendum and the US election. These outcomes increased political uncertainty in the European Union, notably concerning the willingness to push through growth-enhancing structural reforms going forward.

In addition to temporary bouts of volatility, global markets have been characterised by an environment of accommodative monetary policy and subdued growth expectations, which have led investors to search for yield. In this environment, global bond yields across the credit spectrum have remained low. In the low-yield environment, an increase in investors' preference for taking on higher duration in their portfolios has been observed. Furthermore, riskier assets, in particular equities, benefited from abating market worries about financial stability concerns originating from emerging market economies (EMEs). However, the likelihood that EMEs would be negatively affected by spillovers from advanced economies has recently increased.

The low-yield environment also prevailed in euro area bond markets, influenced by ECB asset purchases. Money markets remained fully functional and the high degree of monetary policy accommodation was smoothly transmitted to interbank rates and to lending rates for households and firms. At the same time, equity markets remained subject to occasional short-lived shocks. Sector-specific market concerns related to euro area banks led to elevated volatility during the summer months.

Notwithstanding the broad resilience of the financial system to recent market turbulence, risks of further asset price corrections have increased. The main triggers that could unearth an abrupt reversal in risk premia stem from: (i) heightened political uncertainties in advanced economies; (ii) continued fragilities in emerging markets as a whole that could trigger strong shifts in capital flows; or (iii) higher global asset price volatility stemming from any prospect of unforeseen shifts in market expectations relating to US monetary policy or inflation. As a result, investor buffers need to be capable of withstanding a possible reversal of risk premia. Reversals of risk premia have tended to be short-lived to date – indeed, the persistence of volatility shocks in euro area and global stock markets has fallen markedly in recent years, leading to a potential for complacency which could translate into undue risk-taking by investors.

2.1 Continued search for yield in global markets amid political uncertainty and financial sector concerns

Over the past six months, bond and stock markets have absorbed several short-lived bouts of elevated stress. In the early part of the review period, global

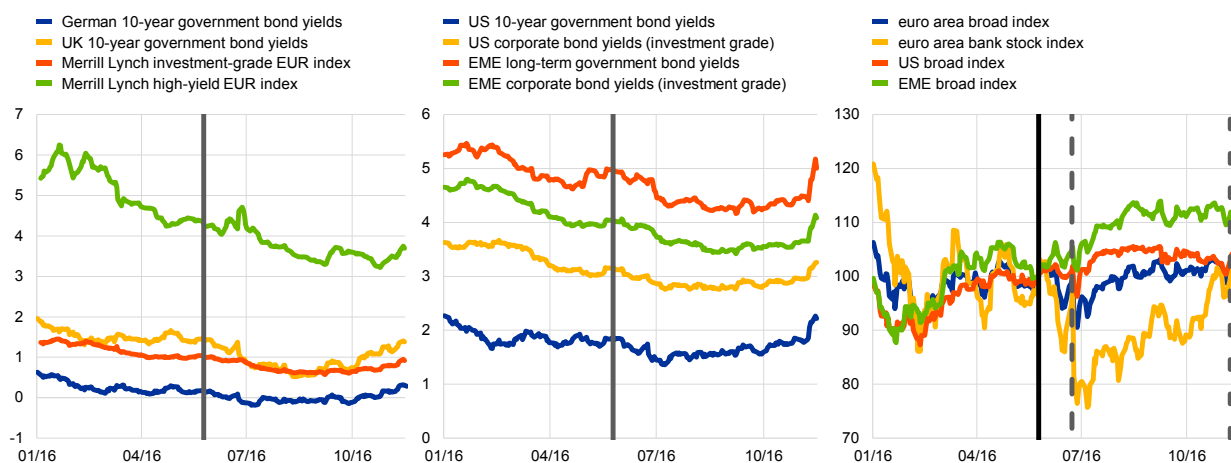
bond yields continued on their downward trajectories in an environment of still muted near-term global economic growth prospects and accommodative monetary policies around the world, coupled with yield-seeking behaviour by investors (see [Chart 2.1](#)). In October and early November, however, bond yields in advanced economies increased against a backdrop of somewhat higher global growth prospects. At the same time, stock prices in a number of advanced economies and EMEs increased over the review period. While this could point to stock markets' resilience, the high level of stock prices may also have an alternative interpretation – namely, a potentially over-optimistic pricing compared with firms' earnings prospects.

Chart 2.1

Yields on global bonds have continued to decline, while the prices of global equities have fluctuated sharply

Changes in global bond yields (left and middle panels) and stock prices (right panel) since the May 2016 FSR (vertical solid lines)

(1 Jan. 2016 – 15 Nov. 2016, daily observations; left and middle panels: percentage per annum; right panel: stock prices indexed to 100 on 24 May; the dashed lines in the right panel represent the dates of the UK referendum (23 June) and the US election (8 November))



Sources: Bloomberg, Thomson Reuters Datastream and ECB calculations.

Higher political uncertainty impacted global asset prices over the review period.

Both the UK referendum and the US election led to short-lived episodes of market turmoil followed by quick recoveries. This pattern was particularly pronounced following the UK referendum in June. The outcome initially sparked a strong reaction in global asset prices. This reaction was particularly noteworthy not only in the United Kingdom, but also in the euro area. The resulting drop in market participants' risk appetite was sharp and reflected in many ways a standard correction affecting stock markets, amid falling bond yields and a depreciation of the pound sterling. From a financial stability standpoint, though, the most noteworthy feature was the specific impact on assets linked to the UK commercial property markets and the euro area banking sector. Several open-end commercial property funds in the United Kingdom either temporarily suspended redemptions to protect the interests of long-term investors or introduced other measures to limit withdrawals (see also [Section 3.1.3](#)). Furthermore, as a result of the heightened risk aversion, "high beta" stocks underperformed significantly after the referendum. In particular, the euro area banking sector – amid low expected earnings and, in some cases, high non-performing loans – was hard-hit. The market reactions turned out to be mostly of a temporary nature, however, and most asset classes quickly recovered from their

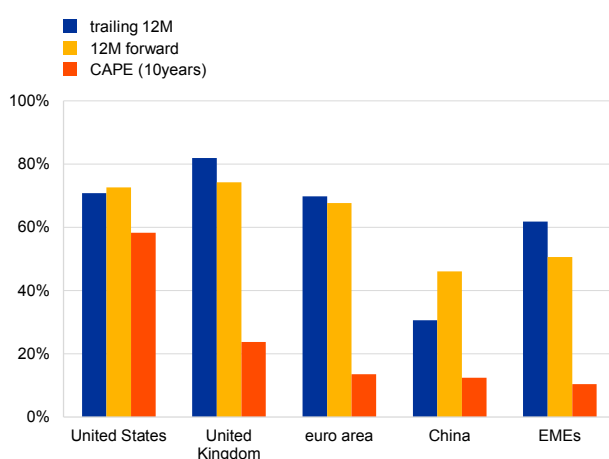
initial losses (apart from the pound sterling, which still trades well below its pre-referendum levels). The improved market sentiment clearly benefited from a timely and forceful response of the Bank of England, which cut the bank rate and introduced a package of measures designed to provide additional monetary stimulus. Market movements in the week after the US election were less pronounced. The implications of the recent US election for euro area financial stability are highly uncertain at the current juncture. This notwithstanding, economic policies in the United States will likely become more inward-oriented, while the fiscal deficit may grow as a result of tax reductions and increased infrastructure and defence spending. In such a scenario, the euro area economy may be impacted via trade channels and by possible spillover effects from higher interest and inflation rate expectations in the United States.

Chart 2.2

Signs of inflated stock prices in some regions and valuations supported by low alternative returns in the bond markets

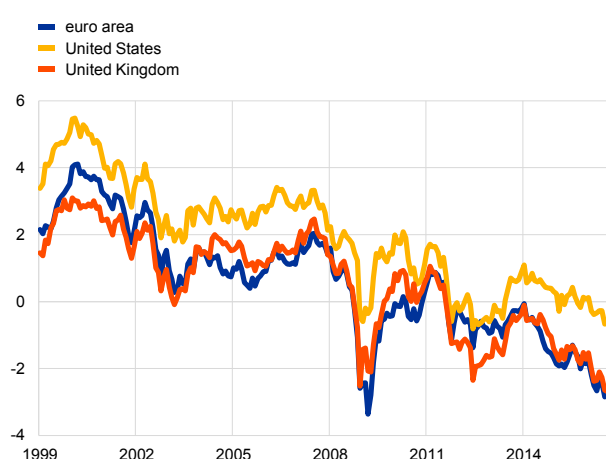
Percentiles for the P/E ratio according to three different methods

(valuations as of October 2016 compared with history, current valuations normalised to a 0-1 scale)



Gap between ten-year government bond yields and equity market dividend yields

(Jan. 1999 – Nov. 2016, monthly data, percentage per annum)



Sources: Thomson Reuters Datastream and ECB calculations.

Notes: Left panel: "trailing 12M" is a P/E ratio based on the last year's reported earnings (sample starts in 1985, for EMEs in 1995), "12M forward" is a P/E ratio based on earnings forecasts a year ahead (sample starts in 1990) and "CAPE (10 years)" is a cyclically adjusted P/E ratio with a ten-year moving average of reported earnings in the denominator (sample starts in 1985, for EMEs in 2005).

Despite temporary bouts of stress, global risk sentiment has improved overall as concerns about an unravelling of imbalances in EMEs have abated somewhat.

In particular, anxiety in the markets about a sharp economic slowdown in China subsided somewhat as continued monetary accommodation and fiscal stimulus provided support to the economy in the near term, albeit at the risk of a further build-up of medium-term vulnerabilities as credit continued to outpace GDP growth (see also [Chart 1.10](#)). The riskier segments of global asset markets also benefited from the recovery in oil and other commodity prices from the low levels recorded in early 2016.

The prices in some of the riskier global asset segments have begun to signal stretched valuations, as the short-lived nature of volatility spikes in recent

years points to a potential underpricing of risk. The prices in some equity markets have begun to signal stretched valuations. Valuation measures – including the cyclically adjusted price/earnings (CAPE) ratio, arguably the best indicator of valuation based on earnings – are in some regions hovering at levels which, in the past, have been harbingers of impending large corrections. In the United States, three common price/earnings metrics are elevated (see **Chart 2.2**). Moreover, it cannot be ruled out that favourable earnings yields in stock markets compared with the declining yields on debt instruments have supported stock price valuations. Furthermore, as discussed in **Box 3**, the persistence of volatility shocks in global stock markets has fallen markedly in recent years. Going forward, should this become a regular pattern, market participants may become complacent as they see a lower likelihood of prolonged stock market corrections. Such complacency could translate into undue risk-taking by investors and potentially contribute to a further stretching of asset price valuations.

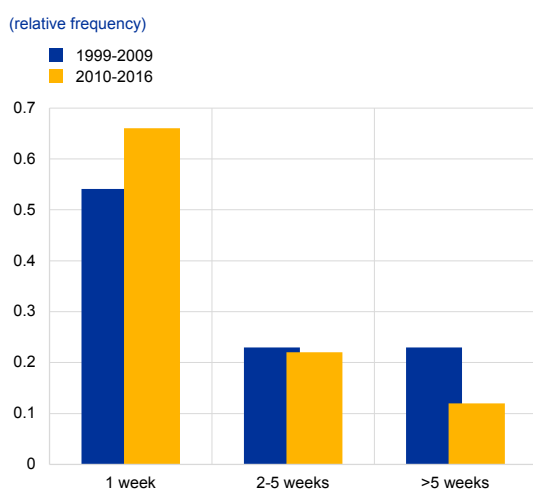
Box 3

Have global uncertainty shocks become less persistent?

Global financial markets have been marked by a number of short-lived episodes of elevated volatility in recent years. Strong corrections in asset markets can have adverse financial stability implications for the financial system owing to the losses that have to be absorbed, thereby reducing available buffers. A prolonged period of volatile and falling asset prices may also weaken the real economy via wealth effects and confidence channels. While large or persistent shocks to asset price volatility can cause clear harm to financial stability, so too might seemingly more insidious short-lived corrections. Indeed, amid surges in market volatility that are short-lived and quick to fade, investors are more likely to take undue risks.

Chart A

Fewer episodes of protracted increases in S&P 500 volatility



Sources: Bloomberg and ECB calculations.

Notes: Weeks until elevated volatility of the US S&P 500 index reverts back to its five-year moving average. The volatility of the S&P 500 index is derived using a GARCH(1,1) estimation of daily returns.

As the global financial crisis fades, periods of elevated financial market uncertainty have become increasingly short-lived in recent years. Looking at the US stock markets, in the past six years there have been fewer protracted episodes of high volatility of the S&P 500 index than in the pre-financial crisis era. In particular, only one out of ten surges in the S&P index’s return volatility has persisted for more than five weeks, down from two out of ten in the late phase of the so-called “Great Moderation” between 1999 and 2009 (see **Chart A**). Conversely, the occurrence of short-lived surges, when volatility declined back to average levels within a week, has increased.

This falling duration of shock impacts also becomes evident in a systematic econometric analysis. **Chart B** shows, for US and euro area stock markets, respectively, time-

varying estimates of the share of a one-standard-deviation shock to the return volatility of the US

and euro area equity markets that persists beyond ten trading days, derived from a univariate GARCH model. A higher measure indicates that shocks to volatility are slower to fade and vice versa.

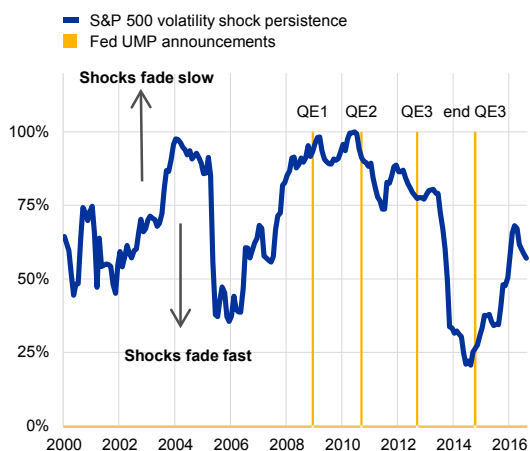
The credibility and efficacy of monetary policy measures may have been a contributor to this observed decline in protracted stock market volatility. Dynamics of volatility persistence estimates over time suggest that monetary policy accommodation may have influenced the persistence of shocks to market uncertainty. **Chart B** also shows the timing of major unconventional monetary policy measures in the two economies. Indeed, the different dynamics in this indicator appear to reflect the different stages of unconventional monetary policy accommodation across the two economies. For the United States, volatility persistence gradually declined after the introduction of the various asset purchase programmes (QE 1-3), but rose again after the Federal Reserve ceased to engage in large-scale asset purchases in October 2014. Likewise, volatility persistence in the euro area stock market declined after major non-standard measures were announced by the ECB. Recently, the decline in persistence coincided with the adoption of the ECB's public sector purchase programme and corporate sector purchase programme.

Chart B

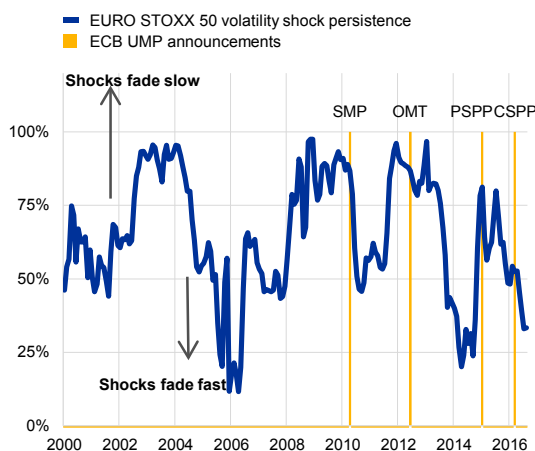
Time-varying estimates of persistence implied in GARCH(1,1) stock market volatility

(share of shock to volatility persisting beyond ten trading days)

a) United States: S&P 500



b) Euro area: EURO STOXX 50



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 (IRF) of a GARCH(1,1) model for the respective stock index, estimated over a one-year rolling window of daily information. UMP stands for unconventional monetary policy, QE for quantitative easing, SMP for Securities Markets Programme, PSPP for public sector purchase programme and CSPP for corporate sector purchase programme.

From a financial stability viewpoint, neither extremely high levels, nor extremely low levels of volatility persistence appear to be desirable. If volatility is highly persistent, as was the case during the global financial crisis and the euro area sovereign debt crisis, adverse shocks to financial market confidence are long-lasting and potentially self-feeding as markets are slow to recover from asset price turmoil. In these situations, central bank actions are likely to be stabilising for financial markets and the economy at large. However, low volatility persistence can incentivise risk-taking, as experienced in the run-up to the global financial crisis when both persistence and the overall level of volatility were very low for an extended period of time. Specifically, shorter durations of elevated volatility mechanically compress backward-looking risk measures, which shape investors' risk

management decisions. The decline in the price of risk changes the relative price of assets with a given risk/return trade-off and may lead to portfolio rebalancing in favour of riskier assets.¹³

Monetary policy alone does not explain this falling persistence – clearly, other factors could also affect the persistence of uncertainty shocks. Monetary policy is likely not the sole factor determining the persistence of shocks to market uncertainty. In general, high levels of economic uncertainty as well as uncertainty about the political economy might explain a higher persistence of uncertainty shocks. Conversely, overall low levels of economic and policy uncertainty are likely to be associated with lower levels of shock persistence as investors are quick to digest any negative news and refocus on an overall sound economic outlook. Moreover, changes in market liquidity could help to explain varying degrees of shock persistence. In particular, a more liquid market should *ceteris paribus* contribute to absorbing adverse shocks faster and vice versa. Finally, the level of investor leverage might be another determinant; if investors, whether banks or non-banks, are highly leveraged, balance sheet losses incurred as a result of market turmoil are more likely to necessitate fire sales of assets which could reinforce the initial shock. Hence, declining shock persistence, as recently recorded for the overall euro area equity market, might reflect higher capital buffers of banks as well as the increased (decreased) share of asset managers (e.g. hedge funds) among investors with generally lower (higher) levels of leverage.

All in all, there have been significant changes in the persistence of shocks to market volatility over the last years. A standard GARCH-based approach applied to global stock markets finds evidence that volatility since 2010 has tended to return more quickly to its long-term mean (compared with the pre-crisis situation). Clearly, the factors explaining this are manifold, ranging from stronger regulatory standards amid an evolving financial market microstructure, elements of the macro-financial environment, to the efficacy of monetary policies. The latter, in particular, appears to be associated with the fact that there have been fewer manifestations of financial instability in recent years. While this suggests strong monetary policy credibility and efficacy, these policies should not inadvertently lead to insufficiently vigilant risk management at an entity level. Clearly, countercyclical policy settings will need to internalise this to avoid any undue build-up of system-wide risk.

Notwithstanding the benefits of low yields in supporting the economic recovery, they might produce negative externalities in financial markets in the form of excessive risk-taking – particularly if protracted. The share of government bonds trading with a negative yield has increased rapidly in recent years. In October 2016, the total amount of outstanding government bonds with negative yields stood at USD 8.4 trillion. Across economies, the bulk of bonds trading with negative yields mainly emanated from the euro area and Japan (see **Chart 2.3**). To date, negative effects in the euro area appear contained as euro area asset prices are still recovering from stress a few years ago. Looking forward, however, a prolonged period of very low bond yields could entail risks. In particular, the scope for particularly low yield levels to hamper market participants' ability to accurately price risk requires monitoring. For example, very low or negative interest rates make standard net present value calculations less informative and thus obfuscate not only

¹³ For a more detailed discussion of that channel, see Box 3 entitled "Financial market volatility and banking sector leverage", *Financial Stability Review*, ECB, November 2014.

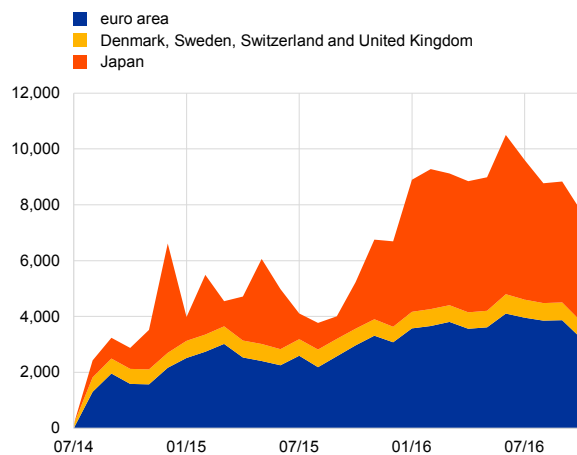
real investment decisions, but also the interpretation of common valuation metrics such as the dividend discount model.

Chart 2.3

Share of bonds with negative yields is on the rise...

Outstanding amount of sovereign bonds with negative yields

(July 2014 – Oct. 2016, monthly data, nominal amount outstanding in USD billions)



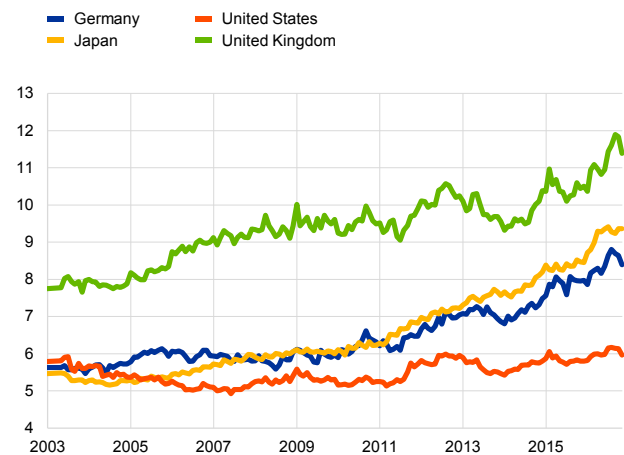
Sources: Dealogic, Bloomberg and ECB calculations.

Chart 2.4

...and durations are steadily trending up

Duration of global government bonds

(Jan. 2003 – Oct. 2016, monthly data, in years)



Source: Bloomberg.

Note: The durations have been computed for all outstanding bonds using the Macaulay methodology.

In order to preserve returns in the very low interest rate environment, investors have increased the duration of their portfolios. Evidence based on securities holdings statistics in the euro area suggests that investment funds, in particular, have extended their duration in recent years (see [Chart 3.36](#) in [Section 3.1.3](#)). This observation is also consistent with issuer statistics from various treasuries. Average durations of German, Japanese, US and UK government securities have increased markedly, by around two years since early 2011 (see [Chart 2.4](#)). From an issuer perspective, however, this development is beneficial as long-term financing can be locked in at low costs.

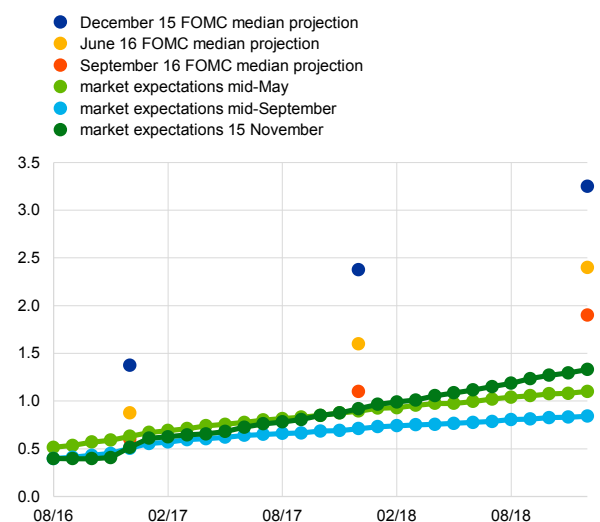
Investors' increasing exposure to low-yielding instruments and the high duration of their investments make them progressively vulnerable to a shift in market sentiment. Three potential triggers, in particular, could unearth vulnerabilities and push global risk premia higher. First, heightened political uncertainties in advanced economies have the potential to increase market volatility. Second, continued fragilities in emerging markets as a whole could trigger shifts in capital flows, which may result in elevated financial market volatility. Third, the divergence between financial markets' and the Federal Open Market Committee (FOMC) members' views on the path of future policy rates has declined somewhat since May. This notwithstanding, the deviation indicates the possibility of global asset price volatility stemming from unforeseen shifts in market expectations relating to US monetary policy or inflation (see [Chart 2.5](#)).

Chart 2.5

Despite the upward revisions over the review period, market participants still see a lower likelihood of rate hikes than FOMC members

US federal funds rate forecasts by the FOMC and financial markets

(FOMC median projections and market expectations)



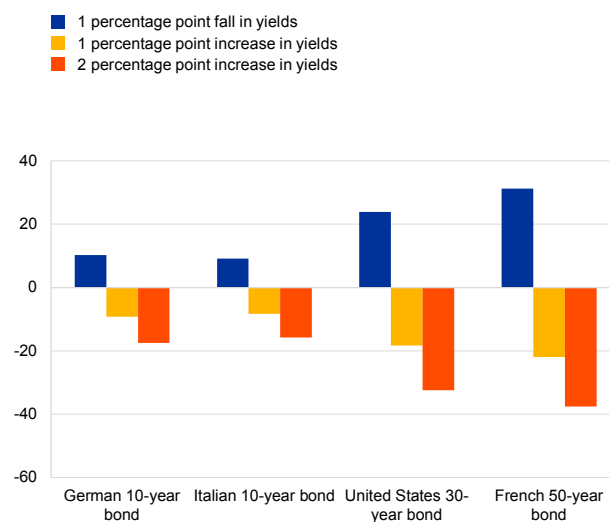
Sources: Bloomberg, Federal Reserve Board and ECB calculations.

Chart 2.6

Capital losses for low-yielding/high-duration portfolios could be substantial if sentiment were to worsen

Capital gains/losses following muted movements in bond yields

(capital gains/losses as at 15 November, percentage)



Source: Bloomberg.

A sharp upward adjustment of global risk premia could be amplified by herding behaviour, potentially resulting in large capital losses for portfolios highly exposed to low-yielding debt instruments. The possibility of herding behaviour, where more investors are chasing the same types of assets, has increased gradually as investors are finding it increasingly difficult to find value-generating assets.

Increased correlations across asset classes (see [Chart 7](#) in the [Overview](#)) are indeed providing indications that one-directional moves in asset classes have become more common in recent years. Should market sentiment deteriorate, the high correlations between assets may act as an amplifier and lead to an even stronger correction of asset prices. Furthermore, owing to the non-linear relationship between prices and interest rates (i.e. bond convexity), there is higher price sensitivity when interest rates are very low or negative. As a result, losses for investors highly exposed to low-yielding bonds with long maturities can be large even for relatively limited movements in underlying interest rates (see [Chart 2.6](#)).

More generally, price irregularities in financial markets have become more prominent in recent years, complicating the derivation of policy-relevant information from market prices. Price anomalies have become particularly pronounced in various swap instruments.

Throughout the crisis years, cross-currency basis swaps (CCBSs) have traded in negative territory for a number of currencies vis-à-vis the US dollar. In theory, large non-zero spreads represent a

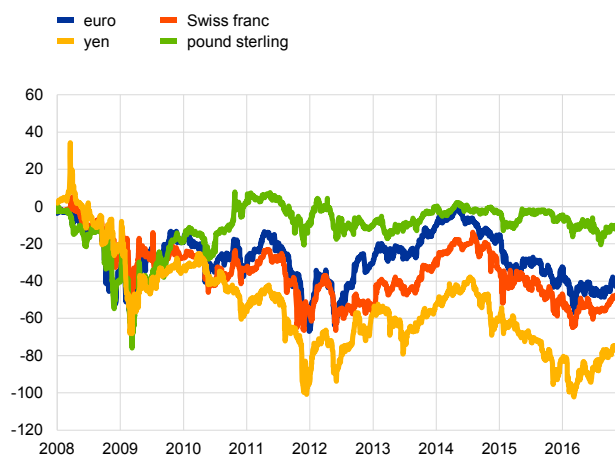
violation of an arbitrage condition.¹⁴ These swap spreads signal the relative preference for one currency over another and thus the increasingly negative spread reflects the premium that foreign banks with limited access to US dollar deposits are willing to pay to obtain US dollar liquidity in the interbank market (see [Chart 2.7](#)).

Chart 2.7

Cross-currency basis swaps moved further into negative territory, partly reflecting strong hedging demand

Five-year cross-currency basis swap spreads against the US dollar

(1 Jan. 2008 – 15 Nov. 2016, daily data)



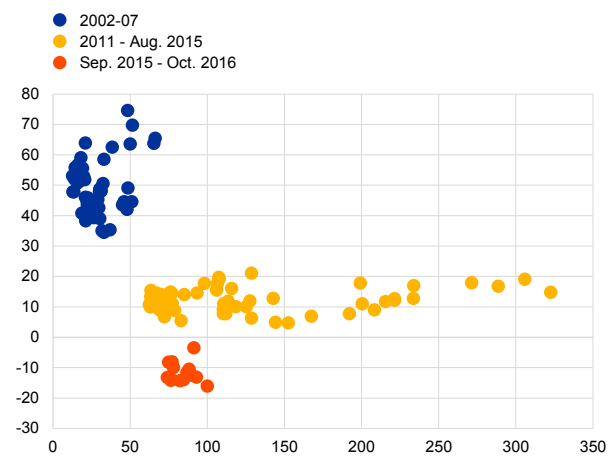
Source: Bloomberg.

Chart 2.8

The relationship between swap spreads and banks' credit risk has broken down since 2011

Ten-year US swap spreads and large US banks' CDS spreads

(Jan. 2002 – Oct. 2016, monthly data, basis points; x-axis: US bank CDS spreads; y-axis: ten-year US swap spreads)



Source: Bloomberg.

Note: Bank credit spreads are represented by the average of the five-year credit default swap (CDS) spreads for Goldman Sachs, Morgan Stanley, JP Morgan, Citigroup, Bank of America and Wells Fargo.

Part of the widening of the basis spreads in 2016 can be attributed to regulatory changes. In particular, stricter regulations for US prime money market funds (MMFs), aimed at avoiding runs during crisis situations, have contributed to an increase in the cost of unsecured US dollar funding.¹⁵ Another part of the implicit increase in the US dollar funding premium can be attributed to the potential for increased monetary policy divergence between the United States and other advanced economies. Relatively higher US dollar yields have boosted foreign investments in US dollar assets. Hedging these investments against US dollar downside risk increases the demand for taking a corresponding position in a CCBS contract. Conversely, US corporates, seeking lower funding costs abroad, have recently issued large amounts of euro-denominated debt (while also benefiting from lower credit spreads in euro asset markets). To avoid (potential) currency mismatches on their balance sheets,

¹⁴ A non-zero spread amounts to a violation of the so-called "covered interest parity", according to which there is a no-arbitrage relationship between (i) two countries' interest rate differentials and (ii) the observed spot and forward rates.

¹⁵ In contrast to MMFs invested in short-term sovereign paper, MMFs invested in short-term bank debt (e.g. commercial paper) were required to adopt a floating net asset value system with effect from 14 October 2014. As a consequence, many MMFs have shifted large portfolio shares from USD-denominated commercial paper to US Treasury bills.

these issuers might hedge against the risk of dollar depreciation, further widening the CCBS spread. Adding to these factors, there might be strong intraday gyrations in CCBS markets stemming from temporary impairments to market liquidity. For example, market analysis has suggested that following the UK referendum, some market-makers partially withdrew from the CCBS markets in a context of higher uncertainty.

Price anomalies are not restricted to currency swaps – current prices of plain-vanilla interest rate swaps also indicate price dislocations. In early 2016 the interest rate on the fixed leg of ten-year US interest rate swaps began to trade below the rate on comparable US Treasuries. In theory, negative swap spreads (measured as the difference between the rate on the fixed leg of the swap and comparable Treasury rates) would indicate that investors perceive the credit risk of US banks (usually the counterparty in the swap transactions) to be lower than for the US government. Market sources suggest that a confluence of factors have contributed to this somewhat abnormal pricing behaviour. First, one cyclical driver might be related to strong demand of corporate debt issuers to swap their interest payments on their long-term debt (i.e. the fixed leg) into (still) lower floating rates (i.e. the variable leg). Second, longer-term structural factors may have played a role as well. For instance, the counterparty risk implied in swap contracts, which had warranted a positive swap spread in the past because they were traded in the over-the-counter (OTC) markets, has been reduced as these trades now tend to be cleared at central counterparties. Indeed, the relationship between ten-year US swap spreads and market-perceived credit risk for large US banks has broken down in recent years (see [Chart 2.8](#)).

2.2 Euro area market developments

Euro area government and corporate bond yields have remained at low levels since May, reflecting the subdued nominal growth outlook and reduced credit risk. Amid Eurosystem bond purchases, money markets have functioned effectively, with interest rates on unsecured and secured instruments hovering close to the ECB deposit facility rate in an environment of high excess liquidity in the system. Similarly, liquidity conditions in the government bond markets have remained solid. By contrast, some signs of tight liquidity conditions have appeared in the euro area corporate bond markets, while euro area stock markets have experienced bouts of volatility with strong price discrimination across economic sectors.

Policy expectations derived from financial market instruments have tightened somewhat since May. Market-based expectations of future EONIA rates have shifted up since the May FSR (see [Chart 2.9](#)), reflecting a slight pick-up in real interest rates on the back of a perceived improvement in global growth prospects as well as an increase in inflation expectations, particularly in the wake of the US presidential election. ECB operations (mainly the second series of targeted longer-term refinancing operations, TLTRO-II, and the expanded asset purchase programme) boosted excess liquidity, which reached around €1 trillion at the beginning of September 2016 and increased further to €1.1 trillion by mid-November. The high excess liquidity in the system has contributed to pushing money market

rates lower. In the unsecured segment, the share of overnight interbank borrowing at rates below the deposit facility rate grew larger, but was still relatively low. In the context of growing excess liquidity, some banks have offered institutions with no access to the ECB facilities (e.g. non-euro area banks, euro area corporate customers and institutional investors) the possibility to deposit their cash with them at rates significantly below the ECB deposit facility rate. Such deposits were then placed at the central bank at the ECB deposit facility rate.

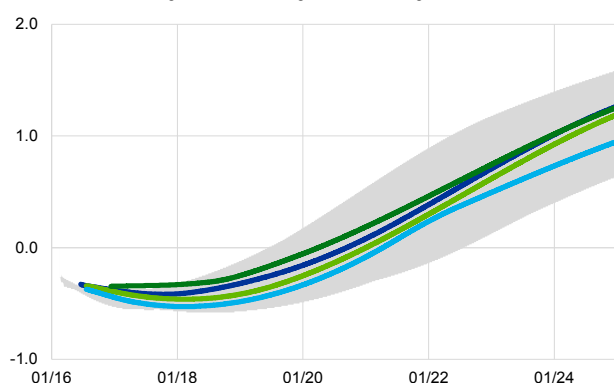
Chart 2.9

Monetary policy is expected to remain accommodative for the foreseeable future

EONIA forward yield curve estimated from overnight index swaps

(percentage per annum)

- publication of the May FSR (24 May 2016)
- pre-UK referendum (23 June 2016)
- post-UK referendum (24 June 2016)
- latest observation (15 Nov. 2016)
- min-max range since Governing Council meeting in Jan. 2016



Sources: Thomson Reuters Datastream and ECB calculations.

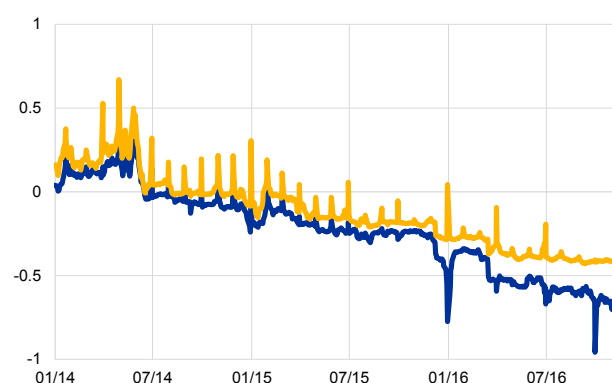
Chart 2.10

Repo rates continued to trend downwards

Repo funding rate for Germany and Italy

(1 Jan. 2014 – 15 Nov. 2016, daily data, percentage points)

- Germany
- Italy



Source: ICAP.

The excess liquidity in the system has also pushed interest rates on secured money market funding lower. Market participants attributed the lower rates on general collateral repurchase agreements to several factors: (i) the build-up of cash holdings by market participants which lack access to the ECB deposit facility and hence are willing to lend at lower rates; and (ii) the ability of some counterparties to borrow euro in the foreign exchange swap market at levels significantly below the ECB deposit facility rate which are then lent in repo markets at higher rates close to but below the deposit facility rate. In addition, the diverging movements in repo rates around balance sheet reporting dates continued, reflecting supply-demand imbalances in the market for high-quality collateral (see [Chart 2.10](#)).

Euro area long-term government bond yields remained at low levels over the review period, although displaying some volatility as a result of policy factors (see [Chart 2.11](#)). A renewed focus on additional monetary policy easing by leading central banks provided a supportive backdrop for global fixed income markets during the first half of the review period. The outcome of the UK referendum drove euro area market sentiment in June. Furthermore, following the initial announcement of the Bank of England asset purchase programme in August, there was a further

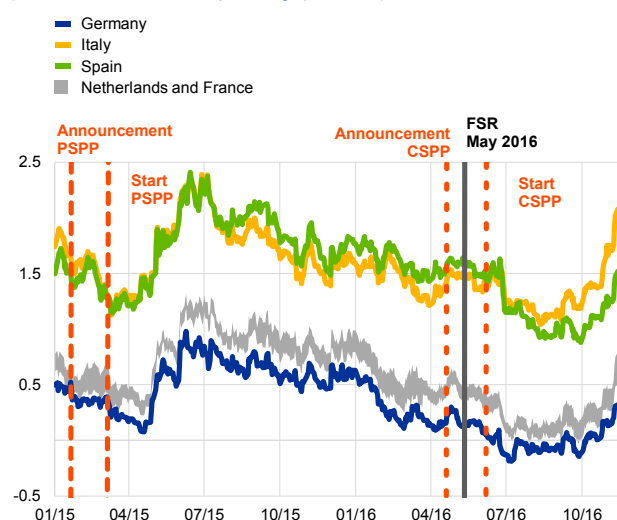
broad-based decline in euro area yields, with the largest declines observed at longer maturities. In October and the first half of November, however, euro area bond yields increased somewhat owing to improved global growth prospects. Taking a longer perspective, apart from the sharp sell-off in spring 2015, euro area government bond yields have trended down in a measured manner in recent years, supported by the measures taken by the ECB to combat the low-inflation environment. The bulk of the decline in euro area government bond yields since the peak in June 2015 has been related to lower term premia demanded by investors (see [Chart 2.12](#)). The low levels of term premia demanded on euro area bonds do, however, require close monitoring and investors should maintain sufficient buffers to withstand any prospective reversal of premia over the medium term.

Chart 2.11

Euro area government bond markets are responding to ECB measures...

Euro area ten-year government bond yields

(1 Jan. 2015 – 15 Nov. 2016, percentage per annum)



Sources: Bloomberg and ECB calculations.

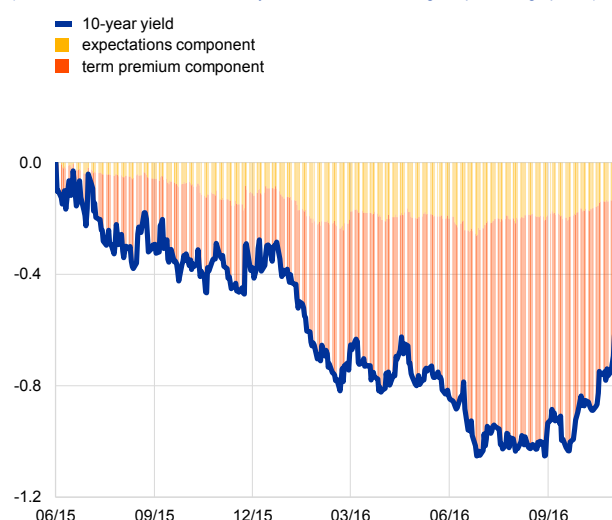
Notes: The public sector purchase programme (PSPP) was announced on 22 January 2015 and started on 9 March 2015. The corporate sector purchase programme (CSPP) was announced on 21 April 2016 and started on 8 June 2016.

Chart 2.12

...as is evident in a compression of term premia in euro area ten-year government bond yields

Cumulative changes in the expectations component and term premium component of euro area ten-year government bond yields since the June 2015 peak

(10 June 2015 – 15 Nov. 2016, daily data, cumulative change in percentage points)



Sources: Bloomberg, New York Federal Reserve and ECB calculations.

Notes: The JSZ term premium for the euro area is derived from a Gaussian dynamic term structure model (for more details, see Joslin, S., Singleton, K. and Zhu, H., "A New Perspective on Gaussian Dynamic Term Structure Models", *Review of Financial Studies*, Vol. 24, No 3, 2011). The term premium is modelled on euro area ten-year overnight index swap (OIS) rates.

Market perceptions of sovereign risk remained contained. A model-based indicator of sovereign risk embedded in euro area government bond yields edged up slightly during the financial market turmoil recorded around the turn of the year and also ahead of the UK referendum. After the referendum, however, this indicator of sovereign risk declined and remained at low levels in the months thereafter. The resolute action taken by the Bank of England, the ongoing economic recovery in the euro area and favourable sovereign financing conditions in terms of both pricing and duration contributed to this reduction in sovereign risk. The view that systemic stress in euro area sovereign bond markets in 2016 has been contained overall is consistent with the sovereign composite indicator of systemic stress (CISS) (see

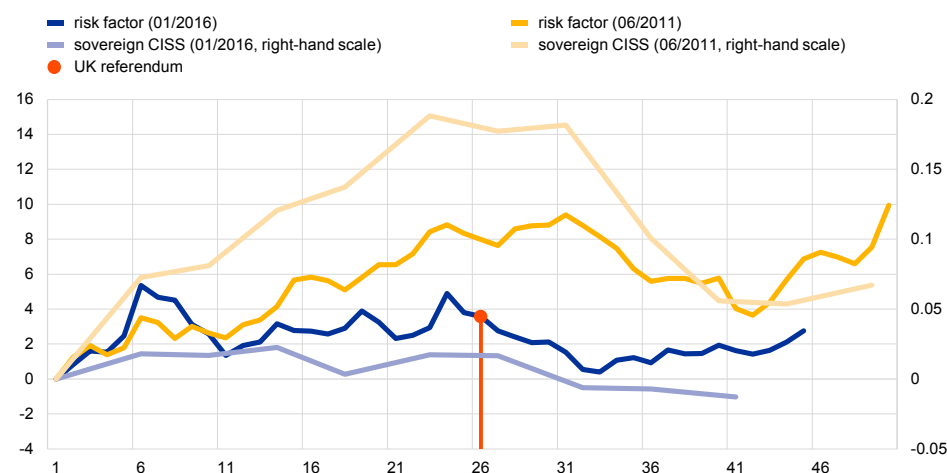
Chart 2.13). Taking a longer perspective, the relatively limited movements in sovereign stress indicators in 2016 are in sharp contrast with the dynamics recorded in 2011 when sovereign tensions escalated.

Chart 2.13

Sovereign risk embedded in euro area government bond yields proved resilient to market tensions during the first half of 2016

The evolution of a factor capturing sovereign risk in bond yields and the sovereign CISS indicator since January 2016 and during the run-up to the peak of sovereign tensions in 2011

(x-axis: weeks since the beginning of specified months; y-axis (left-hand scale): risk factor measured in cumulative standard deviations of weekly changes in bond yields; y-axis (right-hand scale): composite indicator of systemic stress in euro area sovereign bond markets)



Sources: Thomson Reuters Datastream and ECB calculations.

Notes: The period starting in June 2011 was chosen as a reference benchmark to quantify financial stress in sovereign bond markets. The risk factor displayed in the chart is based on a factor model of euro area long-term sovereign bond yields, which decomposes yield co-movements into a component driven by the monetary policy stance and related expectations and a component reflecting sovereign risk (Adam, T. and Lo Duca, M., ECB, mimeo, 2016). The sovereign CISS indicator is based on Holló, D., Kremer, M. and Lo Duca, M., "CISS – A composite indicator of systemic stress in the financial system", *Working Paper Series*, No 1425, ECB, March 2012.

The yields on euro area corporate bonds across the credit spectrum have remained low, partly supported by the Eurosystem's corporate sector purchase programme. The Eurosystem's asset purchases are aimed at

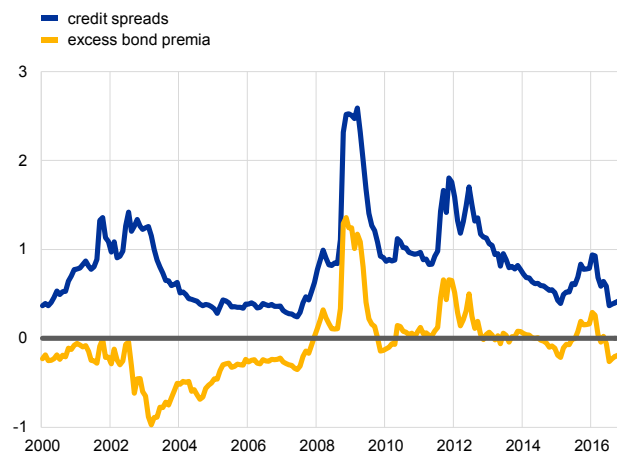
strengthening the transmission of monetary policy to financing conditions of the real economy and, in conjunction with the other non-standard monetary policy measures in place, they provide further monetary policy accommodation. Against this background, examining the evolution of credit risk valuations up until October suggests an edging-up in both the high-yield and investment-grade segments of the non-financial corporate bond market (see **Chart 2.14** and **Chart 2.15**). Corporate bond spreads in the high-yield segment are below their long-term averages in spite of weak fundamental data (e.g. slow earnings growth). According to model-based evidence, however, at present levels, high-yield bonds still appear to be valued broadly in line with fundamentals, following a brief period of undervaluation in early 2016. For investment-grade bonds, values below those implied by historical regularities at the start of the year suggest a modest degree of overvaluation, similar to episodes witnessed in early 2010 and early 2015.

Chart 2.14

Euro area investment-grade bond spreads are lower, pushing credit risk valuations higher...

Investment-grade bond spreads and excess bond premia for euro area non-financial corporations

(Jan. 2000 – Oct. 2016, monthly data, percentage per annum)



Source: De Santis, R., "Credit spreads, economic activity and fragmentation", *Working Paper Series*, No 1930, ECB, 2016.

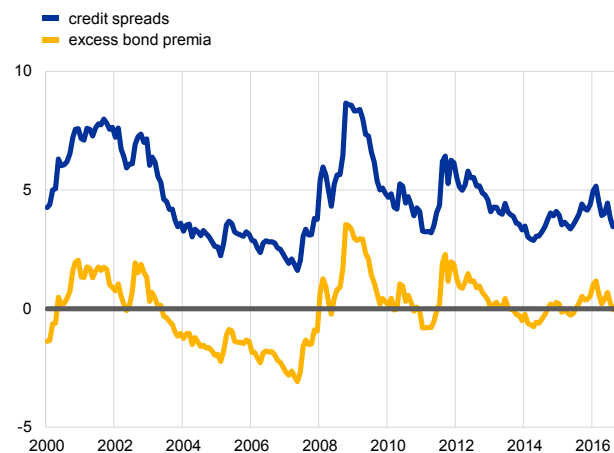
Notes: The excess bond premium is the deviation of the corporate credit spreads from the measured default risk of the issuer. It is obtained by estimating the asset swap spreads of the individual bonds on the basis of credit risk measures (i.e. individual credit ratings and sectoral expected default frequency), the outstanding amount, the coupon and the maturity, and on the basis of industry and country dummies using panel methodology. The data include investment-grade and high-yield bonds. The reported aggregate measures are compiled as the mean of the individual deviations. The latest observation is for 26 August 2016. The euro area countries covered are Austria, Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands and Spain.

Chart 2.15

...and spreads on riskier high-yield bonds are also lower

High-yield bond spreads and excess bond premia for euro area non-financial corporations

(Jan. 2000 – Oct. 2016, monthly data, percentage per annum)



Source: De Santis, R., "Credit spreads, economic activity and fragmentation", *Working Paper Series*, No 1930, ECB, 2016.

Note: See notes to Chart 2.14.

Market liquidity conditions in euro area bond markets appear mixed. Market liquidity conditions remain difficult to interpret in the context of central bank purchases and the mixed signals coming from various sources. As for survey-based evidence, the "Survey on credit terms and conditions in euro-denominated securities financing and over-the-counter derivatives markets" (SESFOD) suggests that, although the liquidity and functioning of some euro area sovereign and corporate bond markets deteriorated over the last one and a half years, there was little change reported in the third quarter of 2016.¹⁶ However, quantitative indicator-based evidence is not fully consistent with this assessment. One measure of a liquid market is where the execution of regular-sized transactions will have a limited price impact.¹⁷ Such a "liquidity score" index for the euro area government bond markets, estimated on a bond-by-bond basis as the ratio of deal sizes to the unexpected price impact, suggests that liquidity conditions have remained sound across euro area countries in recent quarters. The liquidity score in Germany suggests fairly stable liquidity conditions in 2015-16 and the score for Italy points to an improvement in the

¹⁶ The September 2016 SESFOD survey results are available [here](#).

¹⁷ Market liquidity is usually defined as ample when: (i) the cost of turning around a position over a short period of time is low; (ii) the size of an order flow innovation required to change prices by a given amount is low; and (iii) the speed with which prices recover from a random, uninformative shock is low. These three concepts are often labelled as tightness, depth and resilience. The liquidity score presented here mainly captures the notion of resilience. See also *Financial Stability Review*, ECB, May 2016, p. 52.

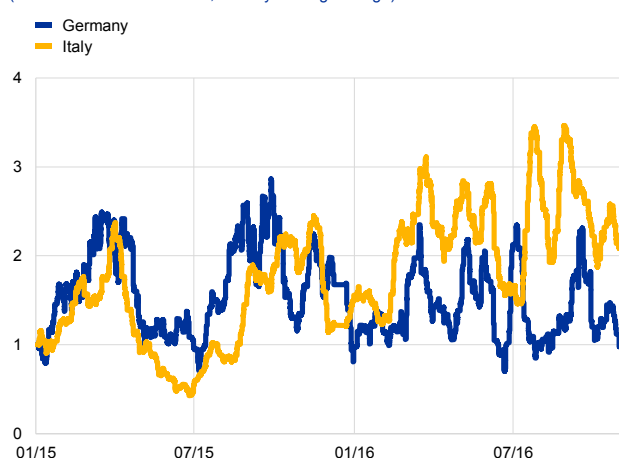
Italian markets (see [Chart 2.16](#)). As regards the euro area corporate bond markets, standard indicators such as bid-ask spreads have remained fairly compressed over the past six months (see [Chart 2.17](#)). At the same time, other indicators do suggest some liquidity constraints. In particular, the number of trades has increased sharply in recent years, whereas the overall volume has remained broadly stable. This could suggest some difficulties in executing large transactions.

Chart 2.16

Liquidity conditions in the euro area government bond markets are relatively favourable

Liquidity scores for the German and Italian government bond markets

(1 Jan. 2015 – 15 Nov. 2016, ten-day moving average)



Sources: Bloomberg, Reuters, MTS and ECB calculations.

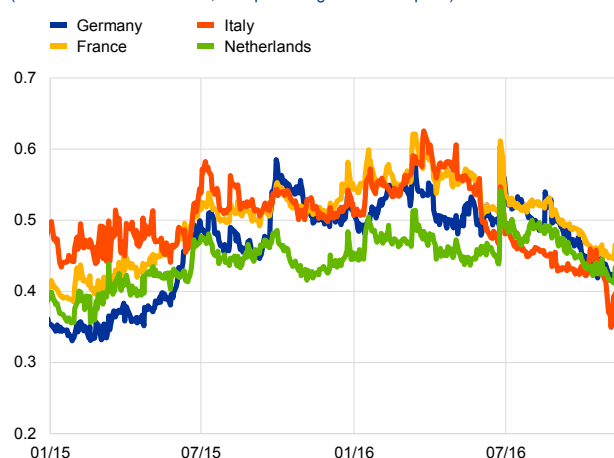
Notes: The chart shows the ten-day moving average of the liquidity score for Italy and Germany. The deal size is defined as the traded volume over the number of trades for each bond. The price impact measure is a proxy for the unexpected (absolute) change defined as the difference between the absolute price change in the respective bond and the corresponding absolute price change in the overnight index swap rate. A higher value of the liquidity score thus indicates improved liquidity conditions. Due to the normalisation, it is not possible to make an absolute comparison between the liquidity scores of the two depicted countries, i.e. the fact that the liquidity score for Italy is above the German score does not imply that the liquidity situation in the Italian market is better (in absolute terms) than that in the German market.

Chart 2.17

Broadly stable bid-ask spreads for corporate bonds in 2016

Bid-ask spread of euro-denominated non-financial corporate bonds issued by euro area issuers

(1 Jan. 2015 – 15 Nov. 2016, as a percentage of the mid-price)



Sources: iBoxx and ECB calculations.

Note: The mid-price is the average of the bid and ask prices of each bond; the weight applied to each bond when compiling the indicator corresponds to its respective weight in the iBoxx € Corporates index.

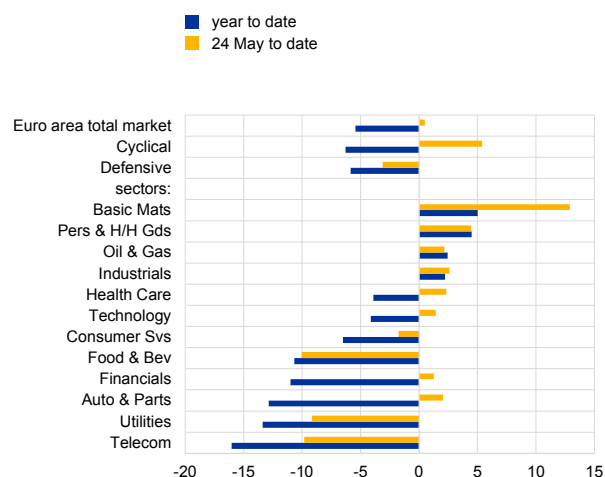
Euro area equity markets have continued to be characterised by regular short-lived shocks, with a particularly pronounced sectoral impact for banks. The outcome of the UK referendum led to a particularly pronounced bout of heightened risk aversion. Looking at the different sectors, the financial sector – and banks in particular – have underperformed year to date (see [Chart 2.18](#)). A decomposition of euro area stock prices using a dividend discount model shows that most of the fall in stock prices during the associated turmoil in June was related to lower earnings expectations as well as a higher equity risk premium required by investors (see [Chart 2.19](#)). The correction was short-lived, however, not least given the resolute policy action of the Bank of England.

Chart 2.18

Strong dispersion of euro area stock prices in 2016

Sectoral stock price performance in the euro area

(1 Jan. 2016 – 15 Nov. 2016, percentage per annum)



Source: Thomson Reuters Datastream.

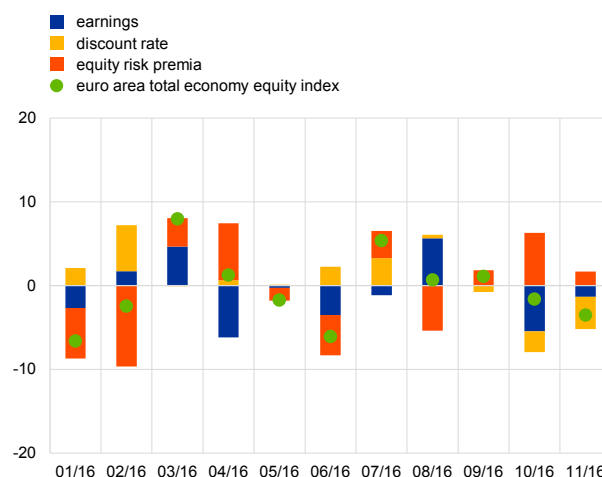
Notes: The cyclical sectors are financials, basic materials, and automobiles and parts. The defensive sectors are utilities, personal and household goods, food and beverages, and health care.

Chart 2.19

Higher equity risk premia and downward revisions to earnings during the June turmoil

Contributions to changes in euro area stock prices

(Jan. 2016 – Nov. 2016, monthly data, percentage)



Sources: Thomson Reuters Datastream and ECB calculations.

Note: Contributions to monthly changes in stock prices, estimated using a dividend discount model applied to financial sector equities.

The scope for investor diversification in equity markets tends to decline during periods of higher stress. From a financial stability viewpoint, computations of a large number of pairwise correlations of individual stock returns can serve as a gauge of systemic risk. A time-varying indicator of systemic stress in equity markets accurately captures such episodes since the 1970s (see [Chart 2.20](#)) by measuring the share of idiosyncratic risk¹⁸ that cannot be diversified by holding a broad (market) portfolio of equities.¹⁹ More recent developments suggest that benefits from portfolio diversification deteriorated markedly during the stock market turmoil in January/February and after the UK referendum. Both in the euro area and in the United States, diversification opportunities by mid-November were broadly in line with their long-term averages.

¹⁸ The indicator ranges from zero (full diversification of idiosyncratic risk possible by holding a broad equity portfolio) to one (no diversification possible).

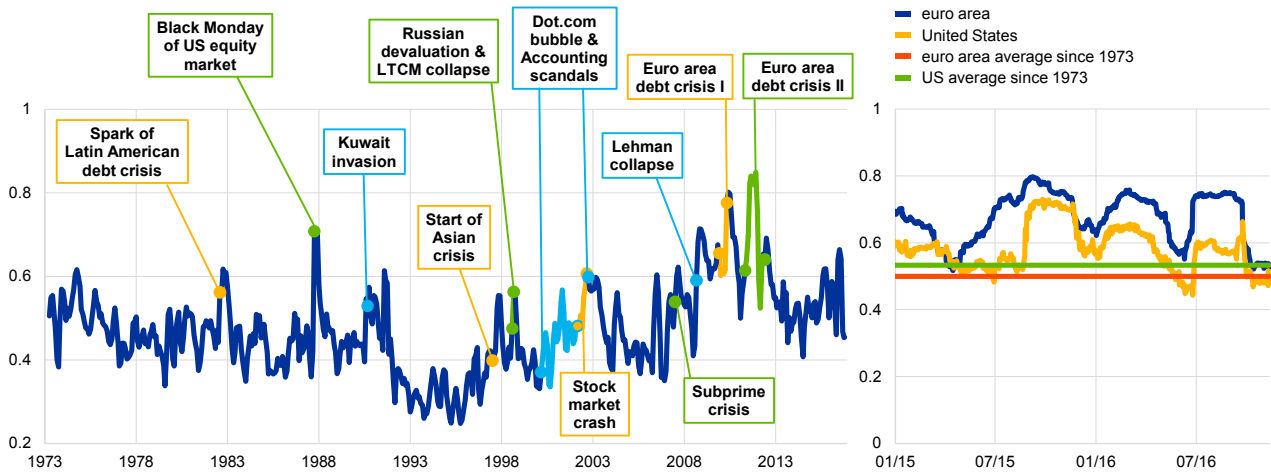
¹⁹ For a similar indicator applied to euro area bank stocks, see the box entitled “A decomposition of euro area bank stock volatility”, *Financial Stability Review*, ECB, December 2005.

Chart 2.20

Less diversification in global stock markets during periods of financial stress

Index of diversification of global equity markets (United States and euro area). Higher index values denote lower diversification opportunities in equity markets

(Jan. 1973 – Nov. 2016; left panel: combined index for the United States and the euro area, monthly data, normalised index between 0 and 1)



Sources: Thomson Reuters Datastream and ECB calculations.

Notes: Left panel: end-of-month data; right panel: daily data. All euro area equity prices and corresponding capitalisations are expressed in US dollars.

3 Euro area financial institutions

The risk outlook for banks has remained broadly unchanged since May. Euro area banks' stock prices experienced bouts of volatility over the past six months amid continued concerns about the low nominal growth environment as well as the large stock of unresolved non-performing assets in some countries. In October and early November, however, banks' stock prices recovered somewhat. This was partly related to the steepening of yield curves that, if sustained, may provide some support for euro area banks' profitability prospects, although these are currently at low levels. Furthermore, market analysts became somewhat less concerned that the finalisation of Basel III would lead to a further significant tightening of capital standards. This notwithstanding, structural factors – including overcapacity in certain banking markets, a limited degree of income diversification and cost inefficiencies in several banking sectors – also continue to cloud the outlook for the euro area banking system. In addition, limited organic capital generation and increased constraints on banks' external financing are weighing on the banking sector's capacity to build up capital buffers, thereby creating the risk of eventually hampering their ability to support the economic recovery via higher lending.

Similar to banks, euro area insurers continue to face challenges from the low-growth and low-yield environment. In particular, life insurers' profitability prospects are challenged by the prolonged period of low interest rates. Facing these headwinds, the sector has continued to adjust its portfolio allocation towards higher-yielding but more risky and illiquid assets to boost returns, though at a slower pace than in 2015.

Growth in the euro area investment fund sector, underpinning much of the expansion of the non-bank sector over the last years, recovered in the second and third quarters of 2016 amid volatile asset markets and continued net inflows. While euro area-domiciled investment funds have remained resilient to recent periods of market stress, increased risk-taking by institutional investors over the past years has led to a shift towards investments with longer maturities and higher credit risk. For bond funds, in particular, this implies heightened sensitivity to a prospective simultaneous reversal in bond yields and fund flows.

On the policy front, the reform of the risk-based capital framework is nearing completion. This initiative includes the finalisation of the work on reducing excessive variability in risk-weighted assets as well as establishing a new framework for the standardised approaches. The finalisation of these elements of the Basel III framework should help reduce regulatory uncertainty and restore confidence in the risk-based capital framework.

3.1 Banks are sufficiently capitalised, but profitability concerns continue to linger

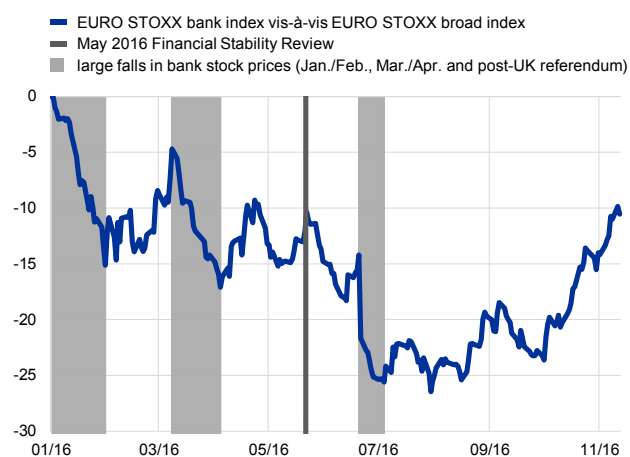
3.1.1 Profitability challenges coupled with low nominal growth could unearth vulnerabilities in the banking sector²⁰

Chart 3.1

Several strong corrections in euro area banks' stock prices in 2016

EURO STOXX bank index vis-à-vis EURO STOXX broad index

(percentage, indexed to 0 on 1 Jan. 2016; shaded areas: January/February turmoil (1 January to 3 February), March/April turmoil (11 March to 7 April) and post-UK referendum (23 June to 6 July))



Sources: Bloomberg and ECB calculations.

Note: Large bank stock corrections are defined here as a drop by more than 10% vis-à-vis the overall index.

Stock market valuations experienced bouts of volatility in the course of 2016 amid continued concerns about bank profitability.

In a low nominal growth and low interest rate environment, persistently weak bank profitability coupled with a large stock of legacy problem assets in some countries induced further corrections in banks' share prices. Marked corrections in bank equity valuations took place after the "Brexit" referendum on 23 June and, to a much lesser degree, after the disclosure of EU-wide stress-test results in late July. In October and early November, euro area banks' stock prices recovered and reached levels similar to those seen at the beginning of the review period. Despite these recent corrections, the overall volatile stock price developments led to some increase in banks' cost of equity, which – coupled with low profitability levels – led to a small widening of the gap between banks' return on equity and cost of equity. Should banks' cost of equity remain higher for an extended period of time, this could lead to increased constraints on banks' external financing which, together with limited organic capital generation, could weigh on

their capacity to build up capital buffers, thereby creating the risk of eventually hampering their ability to provide credit to the real economy.

Looking ahead, cyclical challenges related to the subdued economic outlook entail downside risks to the prospects for bank profitability.

Furthermore, in some countries, a persistent high stock of legacy problem assets continues to tie up capital and weigh on banks' ability to lend. Structural factors, including overcapacity in certain banking markets, a limited degree of income diversification and cost inefficiencies in several banking sectors also continue to cloud the outlook for the euro area banking system.

²⁰ The analysis of profitability, asset quality and solvency trends in this section is based on data for SSM significant institutions. Aggregate ratios for different time periods are calculated for a balanced sample of significant institutions.

Renewed concerns about banks' profitability prospects contributed to occasional bouts of volatility in stock markets

Euro area bank stocks have been subject to a number of corrections in 2016.

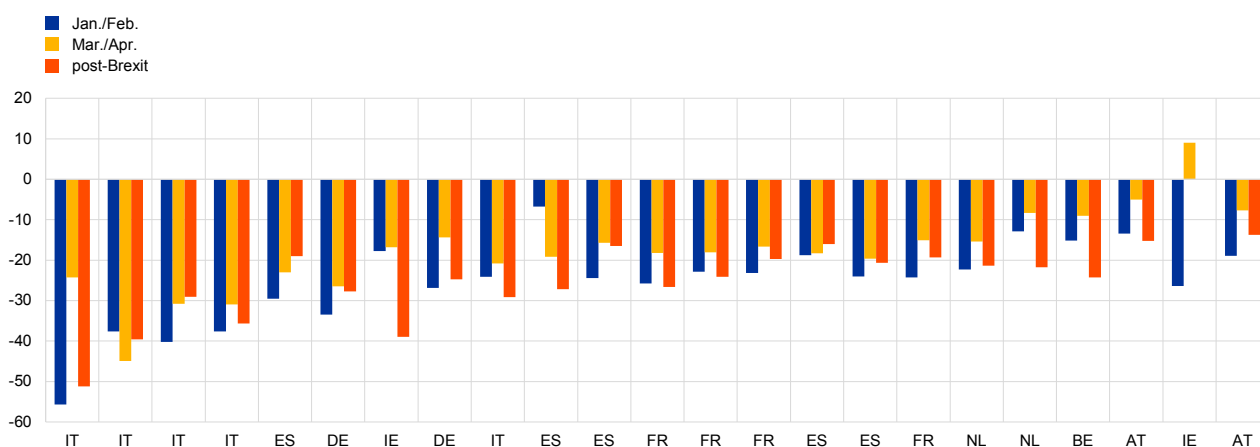
The repeated stock market corrections have, overall, been sharp but relatively short-lived (see [Chart 3.1](#)). Looking at the individual stock price developments, some commonality in price discrimination can be observed. Banks which experienced the largest price declines during the correction around the turn of the year were also hard-hit during the spring turmoil and following the UK referendum (see [Chart 2.1](#)).

Chart 3.2

Stock price discrimination across euro area banks relatively similar during the 2016 corrections

Stock price developments for 23 euro area listed banks during three periods of falling prices

(bars represent the percentage change in individual banks' stock prices during three periods: January/February (1 January to 3 February), March/April (11 March to 7 April) and post-UK referendum (23 June to 6 July), x-axis represents countries where individual banks are domiciled)



Sources: Bloomberg, Thomson Reuters Datastream and ECB calculations.

Concerns about low profitability and legacy assets can partly explain the marked periods of stock price corrections for euro area banks.

Although stock price movements are inherently difficult to fully explain even ex post, there are some underlying features that probably contributed to market concerns about euro area bank stocks in 2016. First, one overriding theme is that low profitability prospects seem to have been the main culprit in the dismal performance of the sector. As analysts have gradually revised down banks' near-term earnings prospects, stock prices have shifted down accordingly (see [Chart 3.3](#)). Second, some price discrimination has taken place for banks with a large stock of legacy non-performing assets. This can be illustrated by the behaviour after the outcome of the UK referendum when large price falls were observed for euro area banks with elevated levels of non-performing loans (NPLs). By contrast, no discernible difference in the stock price performance of banks with high versus low direct exposure to the United Kingdom could be detected despite the downward revisions to UK economic growth prospects that took place after the referendum (see [Chart 2.4](#)). Third, stock prices for some banks have been further weakened by the perceived degree of business model complexity and high litigation costs.

In October and early November, banks' stock prices recovered sharply, partly related to a perception that the steepening of yield curves recorded over the same period may, if sustained, provide some support to net interest margins.

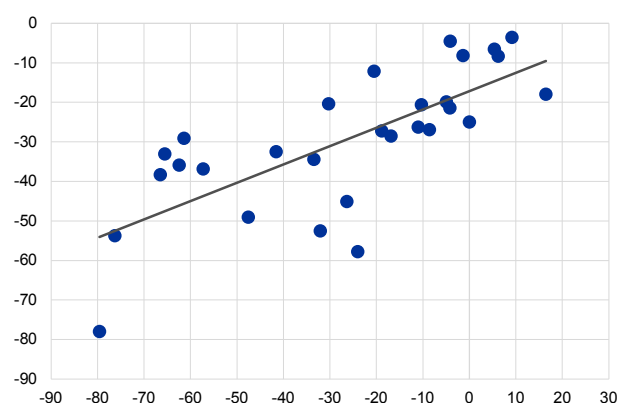
Furthermore, some of the increase in banks' stock prices in the latter part of the review period can be linked to market analysts becoming somewhat less concerned that the finalisation of Basel III would lead to a further significant tightening of capital standards.

Chart 3.3

Banks' stock price performance in 2016 closely tracks changes in profitability prospects

Changes in euro area banks' stock prices (x-axis) and changes in 2017 net income expectations (y-axis) since 1 January

(annual percentage change between 1 Jan. and 15 Nov. 2016)



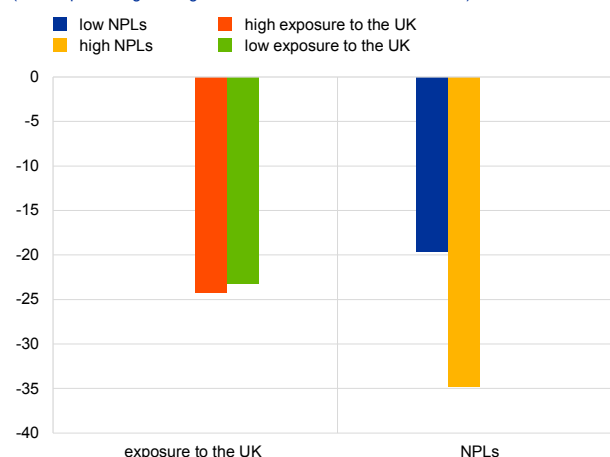
Sources: Bloomberg and ECB calculations.

Chart 3.4

Factors driving banks' stock price losses after the UK referendum

Euro area banks' stock price reactions around the UK referendum for banks with high/low direct exposure to the UK and for banks with high/low NPLs

(annual percentage change between 23 June and 27 June 2016)



Sources: Bloomberg, ECB and ECB calculations.

Note: Low and high-value samples divide the population of banks into two equal halves according to the measure (exposure to the United Kingdom and NPLs) and the median stock price loss is taken for each sample.

Overall, the systemic implications of the turmoil in banks' stock prices were limited. Over the past few years, banks have significantly strengthened their balance sheets and built up their resilience to adverse shocks. This was also confirmed by the overall comforting results of the EU-wide stress test published in late July. This suggests that the strong stock price corrections in the first three quarters of the year cannot be attributed to general concerns regarding euro area banks' solvency positions, with a few notable exceptions related to individual bank restructuring plans.

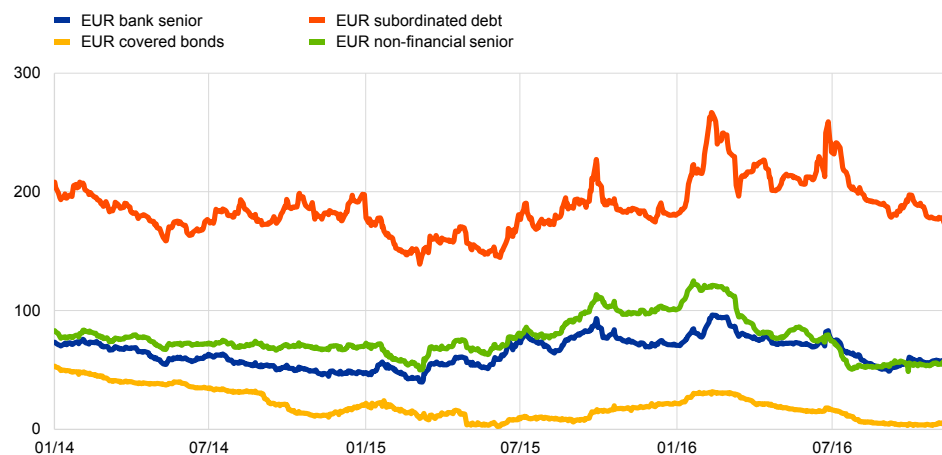
Bank funding markets have also been adversely affected by heightened volatility in financial markets in 2016, but funding stress remained generally contained. Spreads on subordinated bank debt widened markedly in the aftermath of the UK referendum, with spreads on senior bank debt also moving somewhat higher (see [Chart 3.5](#)). Funding conditions improved thereafter, with bank debt spreads tightening back to levels below those observed before the early 2016 episode of market turbulence.

Chart 3.5

Bank funding stress remained contained despite the temporary widening of spreads following the UK referendum

Spreads on euro area banks' senior debt, subordinated debt, covered bonds and non-financial senior debt

(Jan. 2014 – Nov. 2016; basis points)



Sources: ECB and Markit.

Persistently low profitability and the protracted corrections in bank equity valuations could dampen lending supply

The strong volatility in bank equity prices observed since the start of the year resulted in lower bank valuations and pushed banks' cost of equity higher (see Chart 3.6). Reflecting the poor performance of bank equity prices in the first three quarters of 2016, price-to-book ratios continued to decrease to levels significantly below one, raising concerns about the earnings-generating capacity of some of the existing assets. The corresponding increase in banks' cost of equity (COE) to around 10% in the second quarter of 2016, coupled with banks' return on equity (ROE) of around 5%²¹ in the same period, contributed to a renewed widening of the ROE-COE gap. Banks that cannot deliver returns that at least equal their COE for an extended period face the risk of restricted access to equity markets, as well as the risk of increases in the cost of debt funding should credit investors become concerned about their resilience. This, in turn, could lead to an adverse feedback loop whereby higher funding costs could further depress bank profitability.

Stock market valuations have tracked future loan growth in recent years.

Historically, bank equity prices and growth in loans to non-financial corporations have shown a strong correlation (see Chart 3.7), which is why protracted declines in banks' stock prices and the increase in banks' cost of equity²² have been a cause for

²¹ This refers to the weighted average ROE of listed euro area banks in the EURO STOXX bank index for the 12-month period up to the second quarter of 2016.

²² This is not a mechanical relationship. For example, a drop in stock prices with a proportional fall in earnings expectations would leave the cost of equity unchanged.

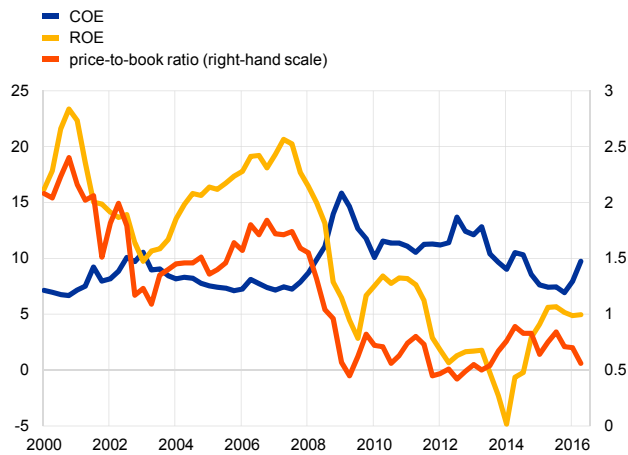
concern in the markets as regards future lending dynamics. Although such high correlations between variables do not necessarily signal a causal relationship, it is reasonable to assume that a higher cost of equity (and lower stock prices) makes it more costly to fund new lending and results in lower credit growth. At the same time, since bank credit is simultaneously determined by supply and demand, various factors could, in theory, drive the strong co-movement, such as the economic outlook, borrowers' asset quality, banks' balance sheet health or earnings prospects.

Chart 3.6

The profitability gap increased again

Cost of equity, return on equity and price-to-book ratio

(Q1 2000 – Q2 2016; percentage)



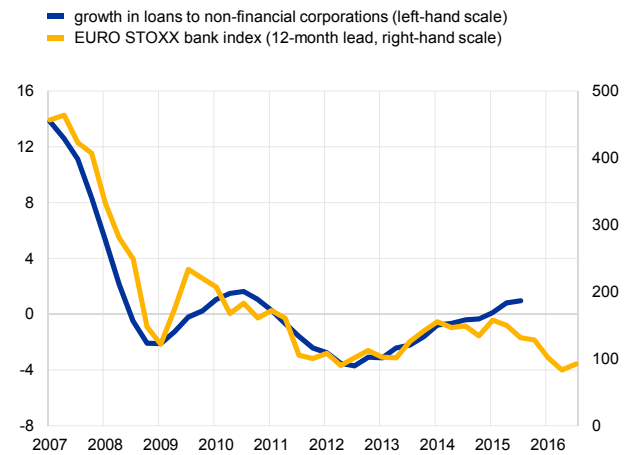
Sources: Bloomberg, Thomson Reuters Datastream and ECB calculations.
Note: Cost of equity is the expected return on the EURO STOXX weekly market index with one-year rolling betas.

Chart 3.7

EURO STOXX bank index largely co-moves with future loan growth

Annual growth in loans to non-financial corporations and the EURO STOXX bank index

(Q1 2007 – Q3 2016; percentage, index)



Sources: Bloomberg, ECB and ECB calculations.

The renewed slight widening of banks' negative profitability gap coincides with a period of continuing adjustment to evolving capital requirements, which may restrict credit provision to households and firms. Banks are still adjusting to new capital requirements, with some regulatory ambiguity remaining about key elements of regulation (e.g. regarding the calibration of risk-weighted capital requirements). This may have translated into some uncertainty in banks about how pending regulatory changes may affect certain business lines and, ultimately, their overall capital requirements. The volatility in banks' share prices observed throughout the year could make external capital accumulation more difficult via an increase in banks' cost of equity, which – together with limited internal capital generation due to low profitability – could mean less additional capital accumulation by banks in the near future, thereby constraining their lending supply. However, the reform of the risk-weighted capital framework – a source of regulatory uncertainty for both banks and investors – is nearing its finalisation, suggesting that this potential impediment is becoming less important.

Challenges for bank profitability increasingly derive from cyclical factors despite some recent resilience

Bank profitability remained at low levels in the first half of 2016, as falling loan loss provisions resulting from improved credit quality were increasingly offset by weaker revenues in a low interest rate and a flat yield curve environment.

Euro area significant institutions' aggregate ROE dropped to 5.5% in the first half of 2016, from 6.5% a year earlier. Continued weak profitability mainly reflects the challenges for banks to generate revenues in a low growth and low interest rate environment, as illustrated by declines in both net interest income and, in particular, non-interest income in the first half of the year (see **Chart 3.8**). On the positive side, loan loss provisions continued to fall amid a gradual (albeit modest) economic recovery, thereby largely offsetting weaker revenues. Taking a longer perspective, **Box 4** looks at the impact that monetary policy measures had on bank profitability. The results suggest that the impact stemming from monetary policy does not appear to be particularly strong compared with the multiple other factors challenging bank profitability – some structural, some cyclical.

Box 4

The ECB's monetary policy and bank profitability

Banks' ability to generate adequate profits is relevant for the sustainability of the banking system and, as such, for its ability to provide adequate funding to the economy. Profitable banks are able to attract capital from market investors and to generate capital through retained earnings. Since the financial crisis, euro area banks' profitability has been low. This has reflected many factors, including the recognition of losses in the wake of the crisis, restructuring efforts with the aim of improving resilience, as well as an environment of low economic growth and low interest rates. The ECB has mitigated risks to euro area price stability stemming from the crisis by lowering policy rates and adopting a wide range of non-conventional monetary policy measures, in particular the negative deposit facility rate, the expanded asset purchase programme and the targeted longer-term refinancing operations (TLTROs). Since the transmission of these measures hinges on the banking system, they have the potential to affect bank profitability.

In addition to its aggregate impacts, monetary policy action specifically affects bank profitability through several different channels – with an unclear ex ante cumulative impact.

On the one hand, monetary policy can lead to lower net interest income amid a flattening of the yield curve. Indeed, the latter is likely to translate into lower unit interest margins, since liabilities tend to have shorter maturities and to respond less to decreasing interest rates, in particular at very low levels. Furthermore, negative deposit facility rates impose a direct cost on banks' holdings of excess liquidity. On the other hand, the package of monetary policy measures in place ensures that bank funding conditions are meaningfully eased, e.g. by allowing banks to obtain long-term funding at negative rates through the TLTROs. More importantly, the adverse effects on net interest margins are at least partly offset by the positive impact of policy measures on macroeconomic conditions, which leads to increased intermediation activity and credit quality. At the same time, asset

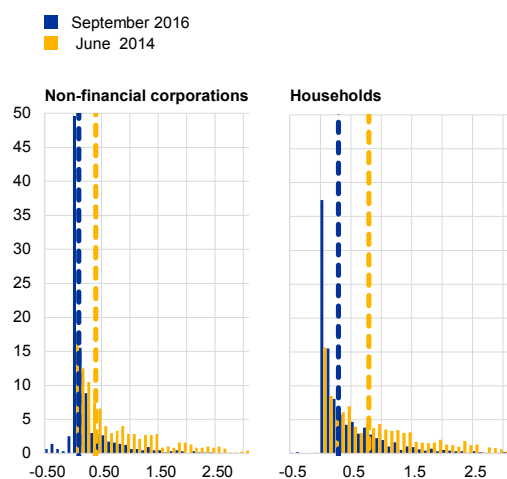
purchases and other measures contributing to lower interest rates increase the value of the securities held by banks, with a positive impact on profits.²³

Chart A

Deposit rates have been stacking up against the zero line

Distribution of interest rates on deposits held by households and NFCs across individual MFIs

(percentage per annum)



Source: ECB.

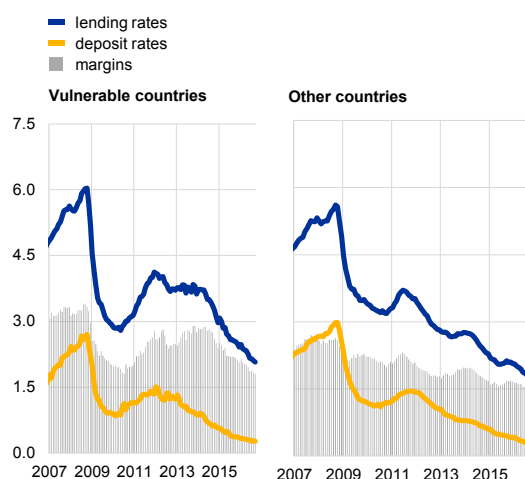
Notes: Deposit rates on new business as reported by individual banks for each of the available product categories. The dashed lines show the weighted average deposit rates in June 2014 and July 2016.

Chart B

Loan-deposit margins have been narrowing since the introduction of the credit easing package in June 2014

Loan and deposit interest rates and margins on new business

(percentage per annum)



Sources: ECB and ECB calculations.

Notes: Loan and deposit composite rates are calculated using the corresponding outstanding amount volumes as weights. Latest observation: September 2016.

Starting with the effect on net interest income, a deterioration can occur if interest rates pertinent for the assets side of bank balance sheets decline by more than those on the liabilities side.

Such an asymmetric effect is more pronounced when policy and short-term market rates are negative. An important reason for this is that banks may be unable or unwilling to lower the rates they pay on retail deposits below zero, given competitive pressures in the deposit market or the fact that at some stage banknotes could become a more attractive store of value for these depositors. Evidence for the euro area points to some downward rigidity in the pricing of deposits, as the distribution of individual deposit rates has been increasingly stacking up against the zero line (Chart A). At the same time, in the case of households only 37% of new deposits were, as of September 2016, yielding a 0% return (compared with 50% in the case of non-financial corporations (NFCs)), indicating that in this segment the scope for repricing may not have been fully exhausted yet. This notwithstanding, downward rigidity of deposit rates as lending rates continue to fall translates into a narrowing of loan-deposit margins earned by banks, as indeed has been observed since the introduction of the ECB's credit easing package in June 2014 (Chart B). The narrowing of margins has been more pronounced in the case of banks in euro area countries most affected by the financial crisis than in other euro area countries, where the margins are, however, lower on

²³ The extent to which increases in the value of securities held is reflected in higher bank profits depends on the valuation method used (i.e. whether holdings are marked to market), which in turn depends on the accounting portfolio the securities are held in.

average. At the same time, lending rates in vulnerable countries likely embed a higher credit risk component, which – to some extent – is reflected in the margin.

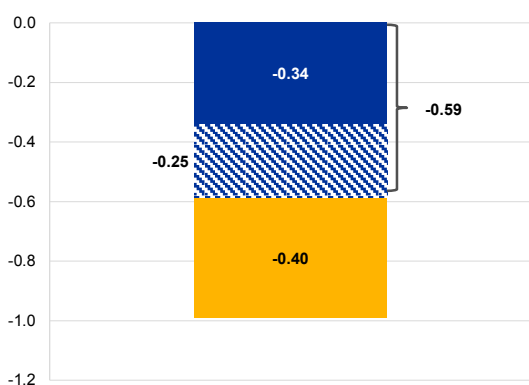
Chart C

A quarter of the reduction in loan-deposit margins can be attributed to negative rates

Model-based decomposition of the change in median loan-deposit margin between June 2014 and September 2016

(percentage per annum)

- overall impact of monetary policy measures since June 2014
- ▨ of which: pure negative rate effect
- other effects



Sources: ECB and ECB estimates.
Note: Loan-deposit margin refers to new business.

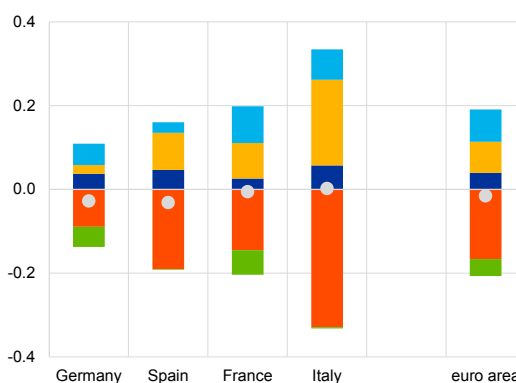
Chart D

The overall impact of non-standard monetary policy measures on bank profitability is expected to be modest

Estimated effect of monetary policy on bank profitability over the period 2014-17

(percentage point contribution to return on assets)

- quantity effect on NII
- credit quality
- NII exc. EL charge and quantity effect
- EL charge
- capital gains
- net effect



Sources: European Banking Authority, ECB and ECB estimates.
Notes: Capital gains based on data on a consolidated basis for 68 euro area banking groups included in the list of significant institutions under direct ECB supervision and in the 2014 EU-wide stress test. Euro area figures calculated as the weighted average for the countries included in the sample using the ECB's CBD data for the weight of each country's banking system in the euro area aggregate. NII stands for net interest income and EL for excess liquidity.

Only a part of the narrowing of loan-deposit margins can be directly attributed to negative rates.

An illustrative model-based analysis can be used to decompose the overall reduction in loan-deposit margins into effects that are specific to the negative rate environment and other factors. Individual bank loan-deposit margins are modelled on the basis of the level of the short-term interest rate (three-month EURIBOR), the charge on excess central bank reserves (i.e. the negative deposit facility rate), the slope of the yield curve (spread between ten- and two-year government bond yields), individual bank characteristics (size of excess liquidity holdings, reliance on core deposits and size of the loan portfolio) and the unemployment rate, to capture the state of the macroeconomy as a proxy for credit risk.²⁴ In this model, the impact of negative rates on bank margins is captured via an interaction term between the level of the short-term rate and the charge on excess liquidity. According to this analysis, a quarter of the 99 basis point reduction in the median loan-deposit margin over the June 2014-September 2016 period can be attributed to this impact (Chart C). A further third of the narrowing of margins is associated with the overall impact of the measures decided since June 2014, via their effect on market rates.

²⁴ The model also includes a constant, a lag of the dependent variable and bank fixed effects.

The ECB's non-standard monetary policy measures have a positive impact on credit quality and capital gains that tends to offset the decline in net interest income.

An encompassing assessment including all the channels described above is made by comparing actual developments and baseline projections for the period between 2014 and 2017 with a counterfactual scenario which excludes the effect of the monetary policy measures decided since June 2014.²⁵ In line with the general perception, also reported in many market commentaries, the reduction in interest rates on a large set of financial assets at different maturities is reflected in lower bank net interest income. Savings in funding costs do not fully offset lower interest income in the context of a flatter yield curve, as banks tend to fund longer-term assets with shorter-term liabilities, thereby engaging in maturity transformation. This is compounded by the fact that, as discussed above, deposit rates tend to be particularly sticky at very low levels of interest rates. At the same time, increases in the market value of sovereign bonds held by banks generate capital gains. In addition, the estimated positive effects of the recent monetary policy measures on the economic outlook contribute to increasing intermediation volumes and to improving credit quality.

On balance, the impact of current monetary policy does not appear to be particularly strong compared with the multiple other factors challenging bank profitability – some structural, some cyclical.

The overall impact of recent monetary policy measures on bank profitability would be expected to be broadly neutral as the effects on different components of bank profitability tend to largely offset each other (Chart D). Indeed, weak macroeconomic prospects are currently at the heart of cyclical challenges facing banks. Therefore, by supporting macroeconomic recovery and price stability, accommodative monetary policy can make an important contribution to strengthening the operating environment for banks.

Bank profitability continued to display significant heterogeneity across euro area countries.

This was partly related to differences in banks' and banking sectors' sensitivity towards the low interest rate environment, as well as to large cross-country differences in the magnitude of NPL stock problems. Sensitivity to the low interest rate environment is dependent on a number of factors, such as the reliance on net interest income for revenue generation, the interest rate sensitivity of assets (e.g. the share of floating rate mortgage loans), the share of deposit funding, the room for further deposit repricing, as well as market structure or the degree of bank competition.

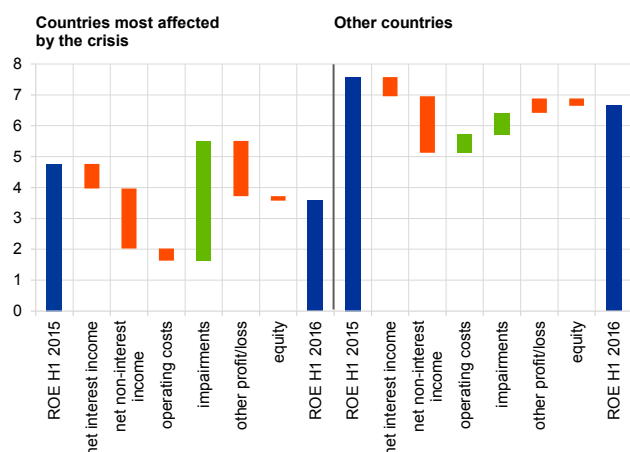
²⁵ The impact of the APP on bond yields and the respective effect on lending rates and volumes is consistent with the Eurosystem macroeconomic projections. The decrease in interest rates brought about by the APP is reflected in new business volumes and in the outstanding amount of variable rate instruments. For debt securities held and issued by banks, detailed information on maturity and the type of interest rate is retrieved from the Securities Holdings Statistics (SHS) database. For loans and deposits, this information is proxied based on MFI balance sheet data. Due to the low level of interest rates, it is assumed that banks only benefit from lower interest rates on long-term deposits. The assessment of capital gains takes into account detailed data on the maturity, counterparty country and accounting portfolio of securities held by banks, as published by the EBA.

Chart 3.8

Euro area banks' profitability remained at low levels in the first half of 2016, as revenue declines were not offset by lower provisioning

Decomposition of the change in significant institutions' aggregate return on equity in the first half of 2016

(H1 2015 – H1 2016; percentage points)



Source: ECB supervisory data.

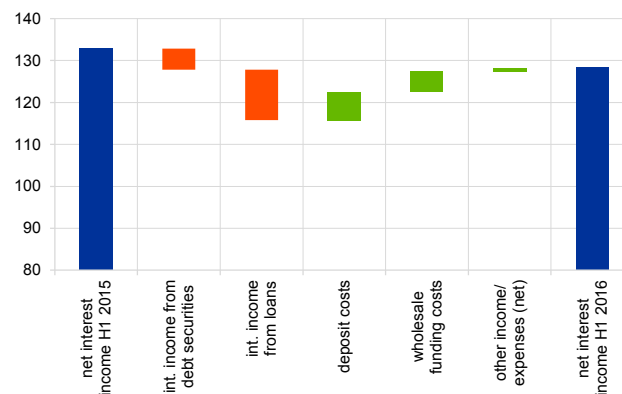
Note: Based on a sample of 101 significant institutions.

Chart 3.9

Net interest income dropped as a fall in lending and securities-related interest income was not offset by lower funding costs

Decomposition of the change in significant institutions' aggregate net interest income in the first half of 2016

(H1 2015 – H1 2016; EUR billions)



Sources: ECB supervisory data.

Note: Based on a sample of 101 significant institutions.

Looking at the key drivers of bank profits, net interest income remained under pressure, mainly as a result of margin compression. The aggregate net interest income of euro area significant institutions fell by around 3% in the first half of 2016 on a year-on-year basis, mainly due to the compression of margins. In fact, euro area banks' net interest margin (defined as the ratio of net interest income to total assets) dropped to 1.18% in the first half of 2016, from 1.24% a year earlier. A decomposition of the change in euro area significant institutions' aggregate net interest income shows that the significant decline in interest income from lending activities (in particular from household loans) was the main drag on net interest income, while a lower contribution of interest income from the debt securities portfolio also played a role (see [Chart 3.9](#)).

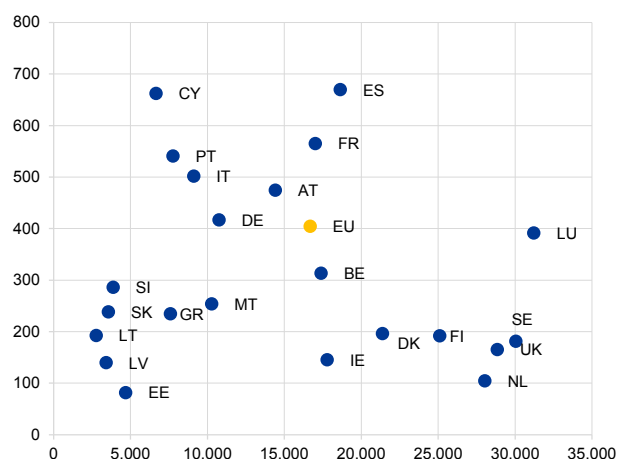
Euro area banks were not able to compensate for the decline in net interest income by increasing non-interest income. Following an increase in 2015, euro area significant institutions reported a 4% year-on-year decline in net fee and commission income in the first half of 2016, mainly due to a drop in fee income components more sensitive to financial market volatility, such as those related to securities issuance, asset management or the distribution of investment products (see Special Feature C). Likewise, banks' trading income has been negatively affected by the repeated bouts of volatility during the course of the first half of 2016, with the approximate 20% annual decline also influenced by the mostly favourable financial market conditions in the corresponding period of 2015.

Chart 3.10

Significant diversity in the EU in terms of bank efficiency and branch network density

Assets per employee and branch network density in EU countries

(2015; x-axis: assets per employee (EUR thousands); y-axis: number of bank branches per 1 million inhabitants)



Source: ECB.

Continued challenges to revenue generation shifted banks' focus to cost-cutting efforts, but progress in improving cost-efficiency remains uneven across countries and institutions.

Notwithstanding significant cost-cutting efforts since the 2008 financial crisis,²⁶ at the country level, there is significant diversity in the European Union in terms of bank efficiency (proxied by assets per employee) and branch density (see [Chart 3.10](#)).²⁷ While this reflects a multitude of factors (e.g. banking structure, financial depth, social/cultural factors), differences in relative prices of production factors), this heterogeneity also suggests that in some banking sectors there is scope for further efficiency gains, in particular in those countries with low levels of assets per employee and low branch efficiency.

At bank level, a number of institutions have announced, or are implementing, cost-cutting plans as part of their restructuring efforts.

Planned cost-cutting measures include headcount reductions, branch closures that are coupled with the digitalisation of processes, as well as the increased use of digital

distribution channels. In fact, there seems to be a negative relationship between the proportion of customers using internet banking and branch network density, suggesting that a shift towards digital channels is key to branch network optimisation and could result in cost savings. At the same time, these cost-cutting measures are mostly part of multi-year strategies and are accompanied by restructuring costs or additional IT investment costs, so (net) cost savings will likely materialise only in the medium term. In fact, analysts see limited opportunities for material cost reductions by 2018, with only an aggregate 2% decline expected in large listed euro area banks' operating costs between 2016 and 2018.

Increasing competition from non-bank competitors (e.g. "fintech" companies) could also create opportunities for banks to boost bank profitability.

By embracing fintech innovations and cooperating with fintech start-ups, banks could increase operational efficiency through cost-cutting. Accelerating technological advances could also give rise to new sources of revenue, possibly allowing banks' to protect their current market shares. The digitalisation of financial services is already quite advanced in several Nordic countries, which is also reflected in their cost-to-income ratios which are the lowest in the European Union.

Looking ahead, banks' return to sustainable profitability will depend on their ability to adjust to an operating environment of stricter regulatory requirements and low interest rates.

Banks with business models that are largely oriented towards retail customers will be more vulnerable to the low interest rate

²⁶ For instance, this included a reduction in the number of branches by over 30% in several countries.

²⁷ Other measures of efficiency (productivity) include revenues/employees or employees/customers.

environment, as will banks with less income diversification. Moreover, banks with higher cost structures will need to further increase cost-efficiency. Accordingly, medium-term strategic plans announced by banks suggest that responses to the above challenges will include, among other things, the diversification of income sources (in particular by increasing the share of fee income), a shift towards higher-margin lending activities (e.g. consumer lending), as well as cost containment. Competitive pressures from both within and outside the banking sector (e.g. from fintech companies) likewise indicate increasing difficulties for banks to continue operating efficiently with their existing business models, although some banks are enhancing their business strategies with measures that aim to exploit the opportunities from digitalisation (e.g. via the acquisition of or partnerships with fintech companies).

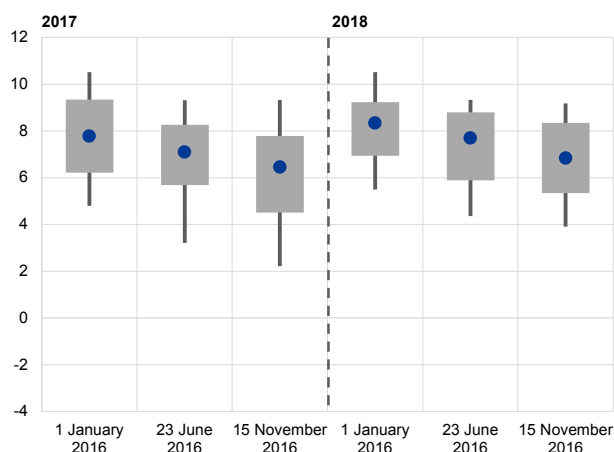
Structural challenges to profitability in some banking sectors are also linked to industry structure and excess capacity. Despite a rationalisation of branch networks and headcount reductions since the financial crisis, cost-efficiency varies widely across banks and countries, suggesting that some banks have considerable room for improving operational efficiency either via organic cost-cutting or cost-efficiency gains through consolidation. Consolidation could bring some profitability benefits at the sector level by increasing cost and revenue synergies without worsening the so-called “too-big-to-fail” problem. However, progress in bank consolidation in the euro area, in particular across borders, remains limited to date.

Chart 3.11

Analysts have continued to lower their expectations for banks' future profitability

Return on equity forecasts for listed euro area banks for 2017 and 2018

(2017-18; percentage)



Source: Bloomberg.

Overall, these cyclical and structural profitability challenges are also mirrored in the downward revisions of analysts' expectations for banks' future profitability over the past six months. Since late June, analysts have continued to lower their return on equity forecasts for listed euro area banks, with the median ROE forecasts between 6% and 7% for 2017 and 2018 (see [Chart 3.11](#)). This suggests that market participants do not foresee a material improvement in bank profitability in the next two years, possibly implying the continuation of the negative profitability gap for most banks.

Despite a modest improvement in asset quality, the large stock of unresolved legacy assets in some countries continues to weigh on new lending

Euro area banks' asset quality slightly improved in the first half of 2016, mainly driven by a decline in NPL ratios in the corporate sector. The aggregate non-performing exposure (NPE) ratio for euro area significant institutions (for total loans and advances) dropped to 6.8% at end-June 2016 from 7.2% at end-2015 (see [Chart 3.12](#)), with improvements also extending to the majority of high NPE countries. The decline in the aggregate NPE ratio was due to a

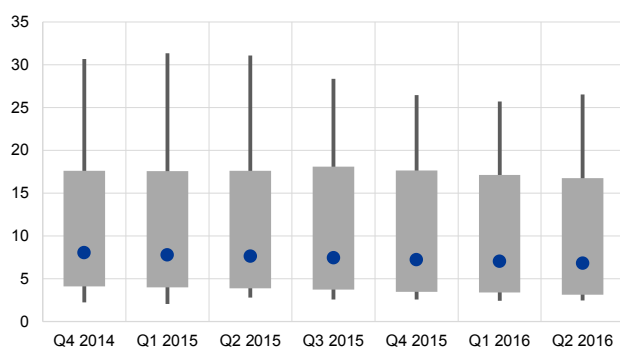
combination of a 2% decline in NPEs and a 3.7% increase in total loans (or 1.4% for loans to the non-financial private sector).²⁸ By sector, the improvement in euro area banks' loan quality was mainly driven by the 0.6 percentage point drop in the NPE ratio for corporate loans, although it still stood at around 12% at end-June 2016. By loan type, the largest NPE ratio declines in the first half of 2016 were observed for small and medium-sized enterprise (SME), commercial real estate (CRE) and consumer loans, although they remain at high levels (see [Chart 3.13](#)).

Chart 3.12

Banks' asset quality modestly improved in the first half of 2016, but NPE ratios remain stubbornly high in some countries

Non-performing exposure ratios of significant institutions in the euro area (based on country aggregates)

(Q4 2014 – Q2 2016; percentage; median, interquartile range and 10th-90th percentile range)



Source: ECB.

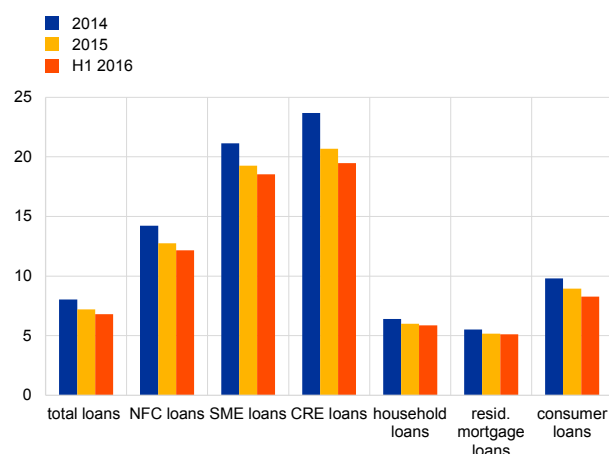
Notes: Based on country aggregates for significant institutions. Non-performing exposure ratios are shown for total loans and advances.

Chart 3.13

The modest decline in banks' aggregate NPE ratio was driven by a drop in NPE ratios for CRE and SME loans, although they still remain at elevated levels

Non-performing exposure ratios of significant institutions in the euro area, by sector and loan type

(2014 – H1 2016; percentage)



Source: ECB.

At the same time, the coverage of non-performing loans by loan loss reserves remained broadly stable in the first half of 2016, though showing some improvement at banks with below-average coverage ratios. The aggregate ratio of reserves to NPEs (for loans and advances) remained broadly unchanged between end-2015 and June 2016, at around 46% (see [Chart 3.14](#)).

Coverage ratios vary widely in the euro area, with country-level ratios ranging from 28% to 67% at the end of the first half of 2016. Coverage ratios improved in some countries where NPE ratios are high, but in some cases remain below the euro area average.

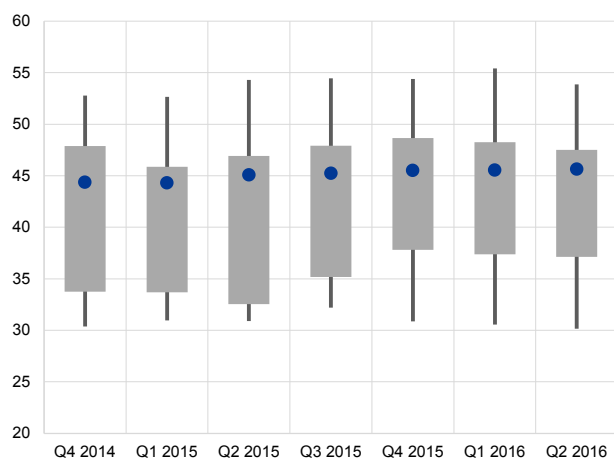
²⁸ Much of the increase in total loans was related to loans to central banks, credit institutions and general governments.

Chart 3.14

Coverage ratios remained broadly stable in the first half of 2016

Coverage ratios of significant institutions in the euro area (based on country aggregates)

(Q4 2014 – Q2 2016; percentage; median, interquartile range and 10th-90th percentile range)



Source: ECB.

Notes: Based on country aggregates for significant institutions. The coverage ratio is defined as the ratio of accumulated impairments on NPEs to NPEs.

Despite recent modest improvements, progress in reducing NPE levels remains slow in several countries, leading to increased supervisory efforts to improve NPL management practices.

In this context, the draft ECB guidance on non-performing loans²⁹ recommends that banks with a high level of NPLs establish a clear strategy aligned with their business plan and risk management framework to effectively manage and ultimately reduce their NPL stock. The draft guidance recommends that banks with high NPLs implement realistic and ambitious NPL reduction targets, while recognising that it will take some time until NPLs are reduced to reasonable levels. At the same time, supervisors also aim to focus more closely on the timeliness of provisions and write-offs (for a further discussion of issues related to NPL resolution, see Special Feature B).

Looking beyond the challenges arising from legacy problem assets, some euro area banks continue to be faced with elevated credit quality concerns relating to their exposures to emerging economies.

While direct exposures of euro area banks to emerging market assets remain limited (see Box 1 of the May 2016 FSR), potential shocks to EMEs could also be transmitted through indirect channels via trade links and a broader financial market confidence channel. Analysis of potential spillovers from emerging markets to euro area banks presented in Box 5 suggests that the responses of euro area banks to EME sovereign shocks could be sizeable, in particular in the event of a broad EME market stress.

Bank capital positions improved further

Banks' solvency ratios improved further in the first half of 2016, at least on a fully loaded basis, mainly helped by increases in capital. Euro area significant institutions' fully loaded common equity Tier 1 (CET1) ratio increased further in the first two quarters of 2016, with the median ratio rising by around 30 basis points to 13.4% (see Chart 3.15). At the same time, the median phased-in CET1 ratio remained broadly unchanged from end-2015, at just below 14%, with a slight decline in the first quarter of 2016, due to higher CET1 deductions from the beginning of 2016 in line with the CRD IV phase-in schedule, followed by an uptick in the second quarter. The improvement in banks' aggregate fully loaded CET1 ratio was mainly driven by increases in CET1 capital, on aggregate, which offset the modest negative impact of risk-weighted asset increases (see Chart 3.16).

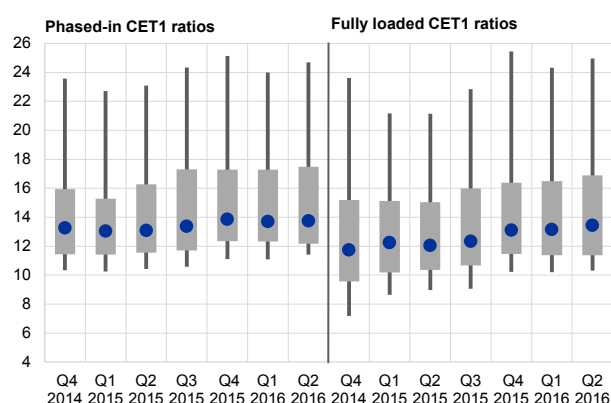
²⁹ See [Draft guidance to banks on non-performing loans](#), ECB, September 2016.

Chart 3.15

Solvency ratios remained broadly stable on a phased-in CET1 basis in the first two quarters of 2016, but continued to increase on a fully loaded basis

Phased-in and fully loaded common equity Tier 1 capital ratios of significant institutions in the euro area

(Q4 2014 – Q2 2016; percentage; median, interquartile range and 10th-90th percentile range)



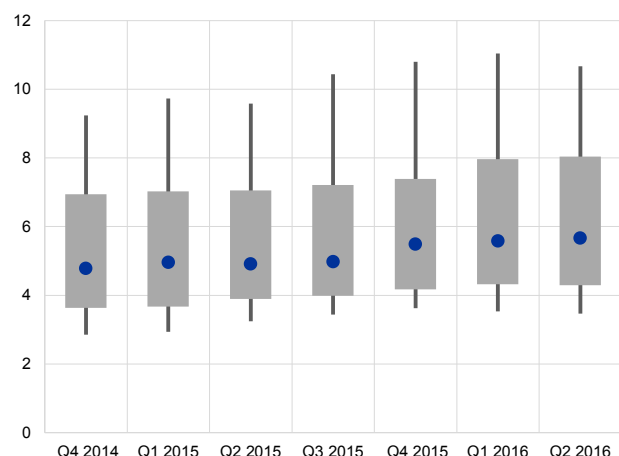
Source: ECB.

Chart 3.17

Leverage ratios edged up further, with the large majority of banks above 4%

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

(Q4 2014 – Q2 2016; percentage; median, interquartile range and 10th-90th percentile range)



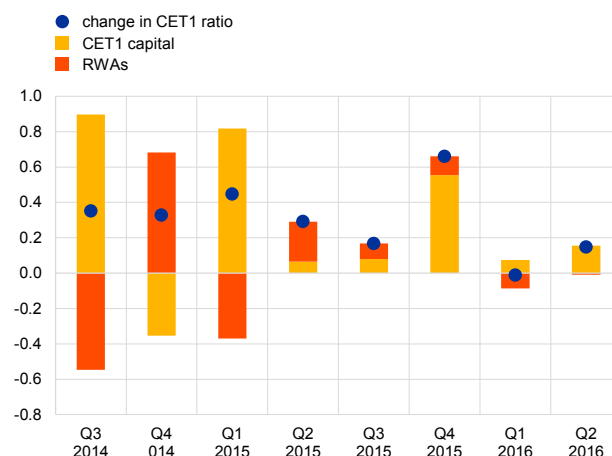
Source: ECB supervisory data.

Chart 3.16

The improvement in banks' aggregate fully loaded CET1 ratios was driven by increases in CET1 capital, which offset the impact of risk-weighted asset increases

Contribution of changes in capital and risk-weighted assets to euro area institutions' aggregate fully loaded common equity Tier 1 capital ratio

(Q3 2014 – Q2 2016; percentage points)



Sources: ECB and ECB calculations.

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

Euro area banks' leverage ratios also continued to improve in the first half of 2016.

At end-June 2016, the median fully loaded leverage ratio for significant institutions rose to 5.7% from 5.5% six months earlier (see [Chart 3.17](#)). Differences across banks of different sizes persisted, with euro area global systemically important banks (G-SIBs) remaining significantly more leveraged than other significant banks, while (according to the latest Basel consultation document) they are likely to face leverage ratio requirements in excess of 3%. The median leverage ratio for euro area G-SIBs stood at 4% at end-June 2016, but some institutions still need to make further progress to reach their leverage ratio target of at least 4%.

Looking ahead, the finalisation of Basel III capital rules will have an important bearing on banks' capital requirements, although it should not result in a significant increase in overall capital requirements in the banking system. The elements

of the Basel III framework being finalised include the

work on reducing excessive variability in risk-weighted assets, a new standardised approach for credit risk and a new operational risk framework, as well as the design of the leverage ratio (see Section 3.3 for more details). The finalisation of these

elements will substantially reduce regulatory uncertainty, which has been a key concern for the banking industry recently.

Box 5

The potential for spillovers from emerging markets to euro area banks

Many emerging market economies (EMEs) are facing a difficult combination of slow growth, weak commodity prices, and further tightening credit conditions. These challenging aggregate conditions point to the potential for negative spillovers to the euro area. Direct exposures of euro area banks to emerging market assets remain limited (see Box 1 of the May 2016 FSR). At the same time, potential shocks could be transmitted through indirect channels to euro area banks via EMEs' trade links with euro area countries and a broader financial market confidence channel stemming from uncertainty about growth prospects in EMEs. Such indirect channels are complex. One way of gauging them is by measuring the market perception of the potential for spillovers of financial risk from emerging markets to euro area banks.

Chart A

Computation of a bank-specific vulnerability measure

Impulses from EM sovereigns	Responses of euro area banks	Change in CDS & stock price of:
		EAbank_1 ... EAbank_N
Change in CDS of:	EM_1	
	EM_M	
Vulnerability of EAbank (j)		$\sum_{i=1}^M \frac{GIRF(i,j)}{M}$

Source: ECB.

A possible modelling strategy is to relate shocks to financial market pricing of EME sovereigns to the response of European banks³⁰.

Specifically, measures of euro area bank vulnerability to EME sovereign shocks can be derived based on generalised impulse responses (GIRs) from a mixed cross section global vector autoregressive (MCS-GVAR) model, comprising credit default swap (CDS) spreads and bank equity returns as the main inputs to the model.³¹ The model is estimated based on daily data spanning the period from January 2011 to September 2016 and includes two institutional sectors: sovereigns (of emerging markets and the euro area) and banks (of the euro area).³² The model relates daily

changes in CDS spreads for sovereigns and banks, together with daily bank equity returns for banks. The VIX (the Chicago Board Options Exchange's Volatility Index) is included in the model to control for global conditions. To construct the model, three sets of weights are used, linking the two cross-sections: (i) to link sovereigns, trade weights are used (the sum of nominal bilateral exports and imports for any pair of countries); (ii) to link banks, bilateral loan and deposit volume exposures

³⁰ Gross, M. and Tereanu, E., "Assessing the spillover potential from emerging market economies to European banks", ECB, mimeo.

³¹ Gross, M. and Kok, C., "Measuring contagion potential among sovereigns and banks using a mixed cross section GVAR", *Working Paper Series*, No 1570, ECB, August 2013. See also Gross, M., Kok, C. and Zochowski, D., "The impact of bank capital on economic activity – Evidence from a Mixed-Cross-Section GVAR model", *Working Paper Series*, No 1888, ECB, March 2016; and Gross, M., Henry, J. and Semmler, W., "Destabilizing effects of bank overleveraging on real activity – An analysis based on a Threshold MCS-GVAR model", *Macroeconomic Dynamics*, forthcoming.

³² The sample comprises 16 EU sovereigns, 19 EME sovereigns and 18 EU banks. The sample choice was driven by CDS data availability and sufficient market liquidity as well as sufficient bank size (drawing on the SSM sample of banks).

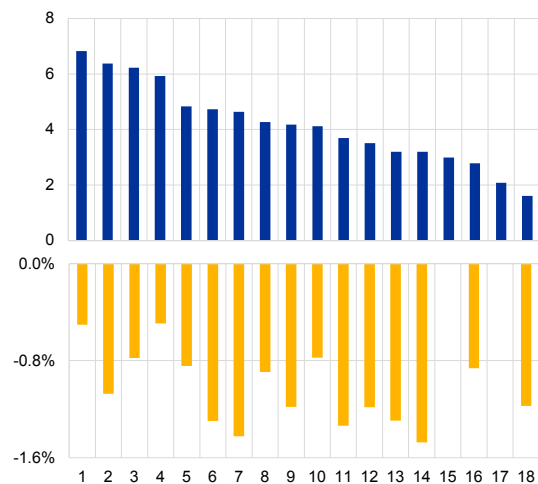
from a supervisory database are used; and (iii) to link euro area banks and countries, supervisory data on total bank assets vis-à-vis a country are employed.

Chart B

Bank CDS responses are more pronounced compared with equity price returns

Responses of selected euro area banks' CDS spreads and equity returns to an EME sovereign shock

(top panel: bank CDS spreads (blue), basis points; bottom panel: bank equity returns (yellow), percentages)



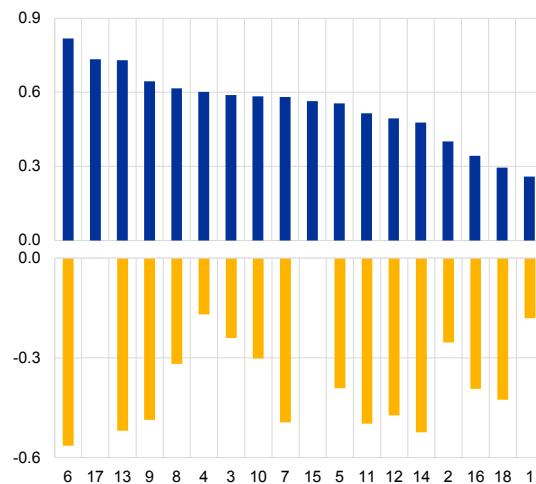
Sources: ECB and ECB calculations.

Chart C

Despite heterogeneity, some of the CDS responses appear sizeable

Normalised responses of selected euro area banks' CDS spreads and equity returns to an EME sovereign shock

(top panel: bank CDS spreads (blue); bottom panel: bank equity returns (yellow), multiples of own standard deviations)



Sources: ECB and ECB calculations.

A set of GIRs can be computed using this model by sequentially alternating the “shock origin” and recording all other responses.

While this can be examined from multiple perspectives, a relevant choice for this analysis is a “bank average vulnerability measure” (Chart A). The bank-specific vulnerability estimates are represented by the maximum of the cumulative CDS spread changes, and the minimum of the cumulative returns of bank equity prices, both over a five-business-day simulation horizon (Chart B). The size of the shock considered for the EME sovereigns was based on a rare one-day-in-four-years event.³³ The resulting responses are also presented in normalised form in Chart C, expressed as multiples of historical standard deviations of the banks’ daily CDS spreads and equity price returns.³⁴ The average standard deviation multiple across banks equals 0.54 and -0.35 for CDS and equity price responses, respectively. Some banks’ CDS responses appear sizeable, reaching standard deviation multiples of up to 0.8.

³³ Based on the observed EME daily sovereign CDS changes (not the model residuals). The shocks corresponding to the 0.1% probability range between 11 basis points for Qatar and 110 basis points for Russia (an average of about 100 basis points across EMEs). Relative to the end-of-sample observation on 13 September 2016, the shocks correspond to multiples between 1.1 and 1.7 (an average of 1.3).

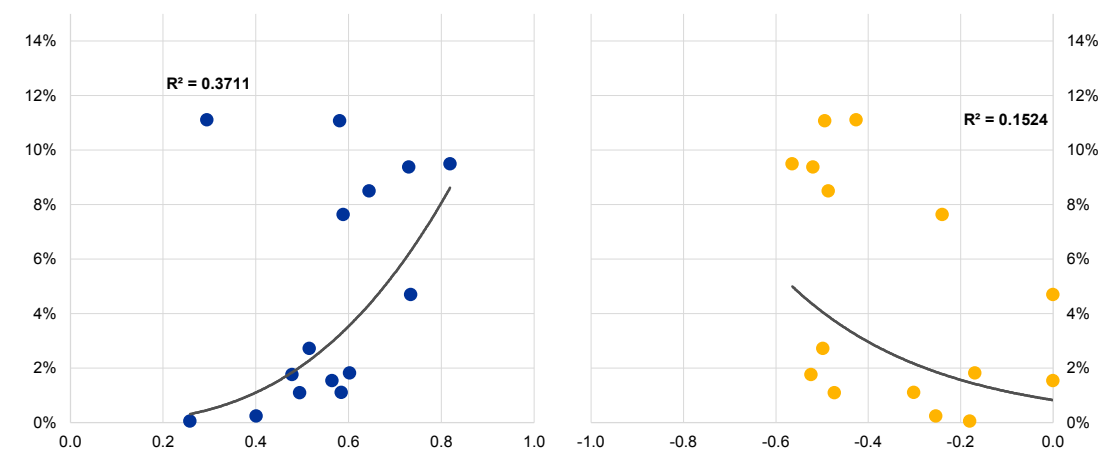
³⁴ The normalisation is meant to place the response in relation to each bank’s idiosyncratic amount of risk and thereby make the responses across banks more comparable. The rationale is that the same raw CDS or equity price response does not have the same implication for a bank that has been significantly more risky (volatile) in historical terms.

Chart D

The correlation between banks' CDS and equity responses to an EME shock and the relative size of the direct exposure is of the expected sign; however, the size of exposure is not sufficient to explain the magnitude of the responses

Correlation between bank responses to an EME shock and the relative size of the direct exposure

(x-axis: individual banks' exposure weight, percentage of total direct exposure to EMEs in the sample; y-axis: bank normalised CDS response (in multiples of own standard deviations (blue dots), bank normalised equity return response (in multiples of own standard deviations (yellow dots))



Sources: ECB and ECB calculations.

The analysis suggests that simply the “width” of a direct exposure channel (identified through actual asset holdings in an emerging market) may not be sufficient to assess the spillover potential from EMEs to European banks (Chart D). Although the positive (negative) relation between CDS spreads (equity prices) and the exposure weights is confirmed in the data, the low R^2 in Chart D suggests that the type of exposures, the extent to which banks are hedged, and the sufficiency of loan loss reserves for loan book exposures all appear to play a role in determining the banks' susceptibility to an EME sovereign shock. Overall, the analysis suggests that the responses of euro area banks could be sizeable, in particular in the event of a broad EME market stress, and they appear to be heterogeneous. Therefore, a close monitoring and assessment of the channels transmitting emerging market vulnerabilities to euro area banks is warranted.³⁵

3.1.2 Euro area insurance sector: constrained by headwinds from the low-yield environment amid weak macroeconomic conditions

Like banks, large euro area insurers continue to face challenges from the low-yield environment amid weak macroeconomic conditions. In particular, the

³⁵ A few caveats should be noted. The model is not a structural model (it can be referred to as semi-structural instead, given that it involves various weight sets, including supervisory exposure data) and hence it remains difficult to distinguish the relative importance of profitability and solvency concerns, for instance, or to identify causal relationships more generally. Moreover, the CDS spreads and bank equity prices measure risk perceptions only approximately, while the complex interactions between EME sovereigns and euro area banks would be only partially reflected in links informed by bilateral trade and asset exposures.

prolonged period of low rates continues to weaken insurers' investment income, while low discount rates also imply an elevated level of liabilities. In addition, underwriting new business is also challenging in a weak economic environment. Facing those headwinds, the sector has continued to adjust its portfolio allocation towards more risky and illiquid assets to boost returns from investments, though at a slower pace than in 2015. While the financial performance of large euro area insurers has remained subdued, it proved to be resilient to recent bouts of market volatility such as those following the outcome of the UK referendum on EU membership. Although profitability prospects are weakening, especially for life insurers, the profitability of most large euro area insurers remains solid so far.

The sector has also continued to adjust to the new Solvency II regime, which entered into force in January 2016. Although the first annual statements under the new regime are required to be published only in early 2017, some insurers have already started to voluntarily disclose Solvency II figures. The comparability of these figures is however hampered by the transitional measures in place. The provisional figures show that the Solvency II ratios of large euro area insurers are above the prudential requirement of 100%, ranging from around 140% to around 240% in the first quarter of 2016.

Despite ongoing adjustment of business models, life insurers' profitability in particular is challenged by the prolonged period of low interest rates. To limit their exposure to interest rate risk, life insurers have aimed to increase their sales of unit-linked policies over the last couple of years, but the sales lost some growth momentum in the first half of 2016. These developments could reflect the low attractiveness of these products compared with traditional saving products and/or intense competition from asset management products offered by the rest of the financial sector. As a result, some insurers have recently opted to offer products which combine guaranteed and unit-linked components or are fee-based. Although not an immediate financial stability concern, life insurers need to tackle the current challenges as soon as possible in order to prevent solvency concerns in the medium-to-long term.

Non-life insurers are somewhat less affected by the low-yield environment, but they also face significant challenges. Competitive pressures in the sector have been intensified by digital start-ups, which offer highly personalised, timely and convenient products. Despite being small scale, investment in the so-called "insurtech" start-ups more than tripled in 2015. Most recently, the performance of both the non-life and the reinsurance industry has been dampened by the recent surge in catastrophe losses related inter alia to strong earthquakes in Japan and Ecuador as well as powerful storms in Europe and the United States. In addition, the reinsurance sector continues to compete with alternative capital sources such as catastrophe bonds, which are on the rise.

Financial condition of large insurers³⁶

The performance of large euro area insurers remained subdued as insurers continued to face the low-yield environment and weak macroeconomic conditions.

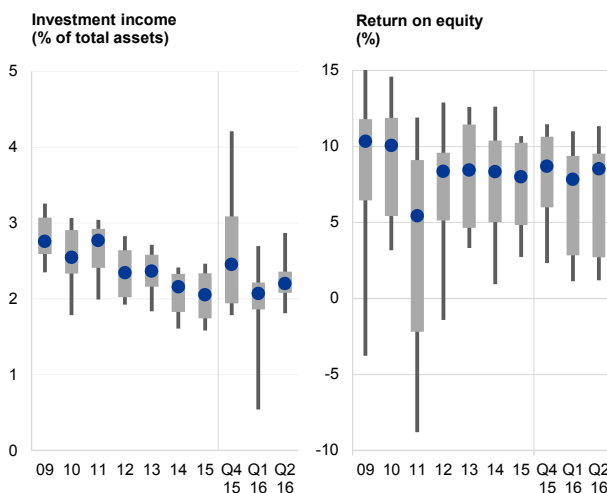
Overall, the low-yield environment continued to be a drag on insurers' investment income over total assets, which dropped back to levels close to 2% after the strong results recorded in the last quarter of 2015 (see [Chart 3.18](#)). In the weak macroeconomic conditions, both life and non-life insurers also faced significant challenges in underwriting new business. The annual growth rate of life premiums in the first half of 2016 turned negative for many large euro area insurers, while the median growth rate in the non-life segment was close to zero in the same period (see [Chart 3.19](#)). Since many life insurers have recently been shifting their business models from guaranteed to unit-linked products, the weak results may reflect the difficulty in selling these products amid competition from other sectors (such as investment funds) and generally low expectations regarding future yields on investments.³⁷ The developments are, however, heterogeneous across the individual life insurance firms, which suggests that competition within the life insurance sector has also played a role. Similarly, intense competition in the non-life sector continues to partly explain the modest growth in this segment.

Chart 3.18

Investment income dropped after the strong results in the last quarter of 2015

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

(2009 – Q2 2016; percentage, 10th and 90th percentiles, interquartile distribution and median)



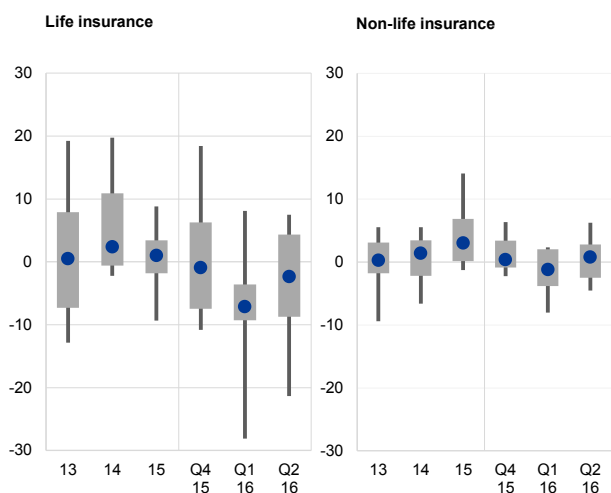
Sources: Bloomberg, individual institutions' financial reports and ECB calculations.
Note: Investment income excludes unrealised gains and losses.

Chart 3.19

Underwriting business in life insurance faces significant challenges due to a change in business mix

Annual growth rates of gross premiums written for a sample of large euro area insurers

(2013 – Q2 2016; percentage, 10th and 90th percentiles, interquartile distribution and median)



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

³⁶ The analysis is based on a varying sample of 24 listed insurers and reinsurers with total combined assets of about €4.5 trillion in 2015, which represent around 65% of the assets in the euro area insurance sector. Quarterly data were only available for a sub-sample of these insurers.

³⁷ In unit-linked products, policyholders (rather than insurance companies) bear the capital market risk as the return on these products is directly linked to the performance of financial markets.

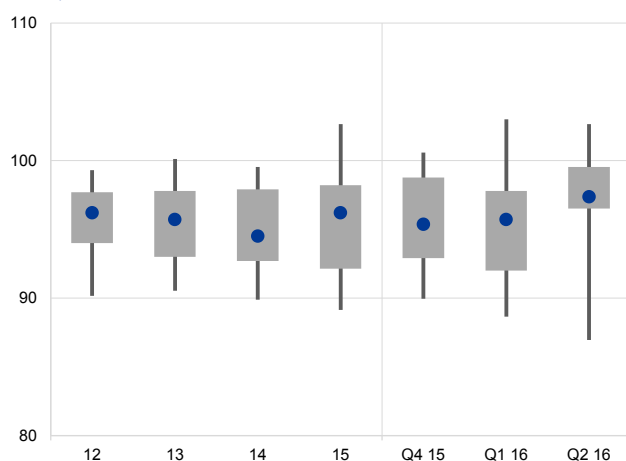
Despite the challenging operating environment, the profitability of most large euro area insurers remained solid. Specifically, the median return on equity hovered at around 8% in the first half of 2016, which is in line with the results in the previous four years. Having said this, the quarter of firms at the low end of the distribution exhibited returns on equity below 3% in the two first quarters of 2016, which is around 2 percentage points less than in 2015. Hence, the weak investment income and underwriting results also weighed on the overall profitability outcomes of some large insurers. On the non-life side, the uptick in catastrophe losses in the second quarter of 2016 also pushed the combined ratios – which measure incurred losses and expenses as a proportion of premiums earned – closer to 100% (see **Chart 3.20**). By and large, however, the ratios remained below 100%, which indicates that most non-life companies are managing the balance between the costs and underwriting profits of their daily business in a sustainable manner.

Chart 3.20

As natural catastrophe losses ticked up, the costs of non-life business increased

Combined ratio for a sample of large euro area insurers

(2012 – Q2 2016; percentage, 10th and 90th percentiles, interquartile distribution and median)



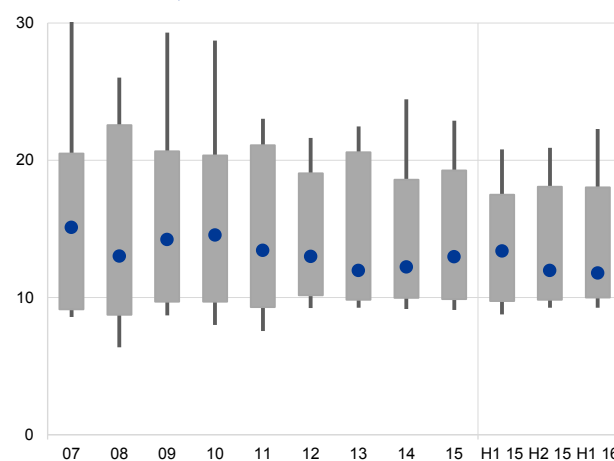
Sources: Bloomberg, individual institutions' financial reports and ECB calculations. Notes: The combined ratio expresses the sum of incurred insurance losses and expenses as a share of net premiums earned. A ratio of below 100% indicates an underwriting profit.

Chart 3.21

Capital positions of euro area global insurers solid despite the decrease in the first half of 2016

Capital distribution for a sample of large euro area insurers

(2007 – H1 2016; percentage of total assets, 10th and 90th percentiles, interquartile distribution and median)



Sources: Bloomberg, individual institutions' financial reports and ECB calculations. Note: Capital is the sum of borrowing, preferred equity, minority interests, policyholders' equity and total common equity.

Large euro area insurers' capital positions remained at comfortable levels (see Chart 3.21). In recent years, European insurers have been building up capital buffers in order to meet the requirements of the Solvency II regime, which came into force in January 2016. In particular, insurers have been changing their business mix towards less capital risk-intensive products and increasing maturities on the assets side in order to decrease the maturity mismatch between assets and liabilities. In addition, the preparation for the new regime was accompanied by a recent surge in mergers and acquisitions, which reached a record high in 2015.³⁸

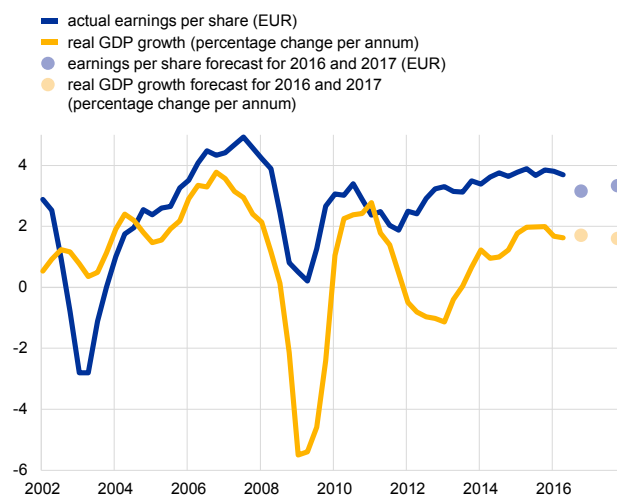
³⁸ For more details, see *Insurance M&A struggles to keep up with 2015's record pace*, SNL, September 2016 ([link](#)).

Chart 3.22

Analysts expect a slight drop in profitability for large euro area insurers

Earnings per share of selected euro area insurers and euro area real GDP growth

(Q1 2002 – 2017)



Sources: ECB, Thomson Reuters Datastream and ECB calculations.
Note: The real GDP growth forecast is based on the September 2016 ECB staff macroeconomic projections for the euro area.

Although the first annual statements under the Solvency II regime are required to be published only in early 2017, some insurers have already started to disclose Solvency II figures on a voluntary basis. The provisional figures – available for around half of the firms in the sample – show that the Solvency II ratios are above the prudential requirement of 100%, ranging from around 140% to around 240% in the first quarter of 2016.³⁹ Although Solvency II introduces a harmonised regime for insurance companies at the European level, the reported ratios are not fully comparable, owing to the complex nature of the underlying capital models, a number of transitional measures in place and some discretion in the implementation of the new regime across jurisdictions.⁴⁰ In addition, the current level of the ultimate forward rate (UFR) provided in Solvency II may not appropriately reflect the long-term expectations about interest rates and inflation. A downward adjustment of the UFR – as discussed by the European Insurance and Occupational Pensions Authority (EIOPA) – would lead to higher valuations of insurance liabilities with negative effects on solvency ratios.⁴¹

Insurance sector outlook: market indicators

Market-based indicators suggest a slight drop in insurers' profitability over the next years. Amid the low-yield and weak macroeconomic environment, profitability forecasts suggest a declining trend in the next years (see **Chart 3.22**). The profitability outlook remains particularly challenging in the low-yield environment for insurers with high policyholder guarantees operating in countries with limited scope to lower these guarantees, especially if those are non-diversified, small and medium-sized life insurers. The subdued growth outlook, combined with increased political uncertainty at both the national and EU level, further weigh on insurers' profitability prospects in both the life and non-life segments.

³⁹ The Solvency II ratio is calculated as total available capital resources over the Solvency Capital Requirement (SCR). The latter is calibrated using the value at risk (VaR) of the basic funds of a company subject to a confidence level of 99.5% over a one-year period. Hence, a ratio over 100% indicates that an insurance firm has available capital resources that exceed the SCR.

⁴⁰ The SCR (i.e. the denominator in Solvency II ratios) may be calculated using either the standard formula prescribed by the European Insurance and Occupational Pensions Authority (EIOPA) or an internal model formula validated by the supervisory authorities.

⁴¹ In April 2016, EIOPA issued a consultation paper, in which it states its intention to adopt a methodology to derive the UFR that would lead to a downward adjustment of the current level. The current level for obligations denominated in most currencies including the euro is set to 4.2%. Under Solvency II, the UFR is used to determine long-term risk-free interest rates, which are not directly observable in the market and thus require extrapolation towards a specific level (the UFR). The extrapolated rates are then used to discount insurers' long-term liabilities, i.e. the higher the UFR, the lower the present value of those liabilities.

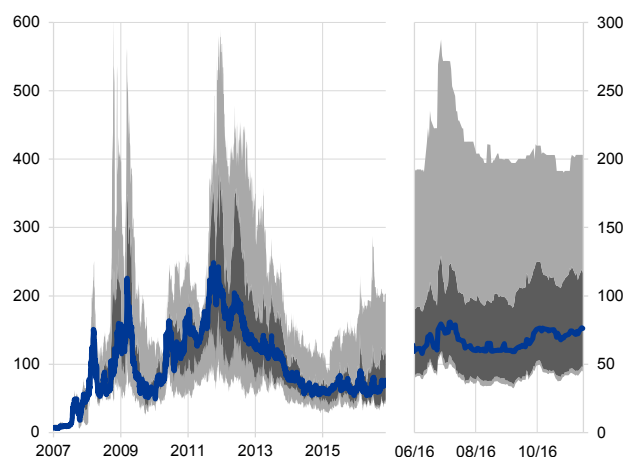
Spreads on credit default swaps (CDSs) written on euro area insurers have continued to widen (see Chart 3.23). This trend can be partially attributed to recent increases in insurers' exposure to more risky and illiquid assets. Although insurance firms need additional capital buffers for riskier investments to meet the solvency requirements, insurers are expected to continue piling up investment risk over the next year in their search for yield. Because of insurers' long-term liabilities, they are likely to (further) increase their investment in illiquid assets such as private equity, property and infrastructure, which are less attractive for other types of investors that have to keep their books more liquid. More investment risks on insurers' assets side make them more vulnerable to adverse economic and market shocks, which in turn could contribute to a further deterioration in credit and equity markets with negative repercussions for insurers' capital positions.⁴²

Chart 3.23

Widening CDS spreads indicate an increase in concerns about credit risk

CDS spread for large euro area insurers

(3 Jan. 2007 – 15 Nov. 2016; basis points, senior debt, five-year maturity)



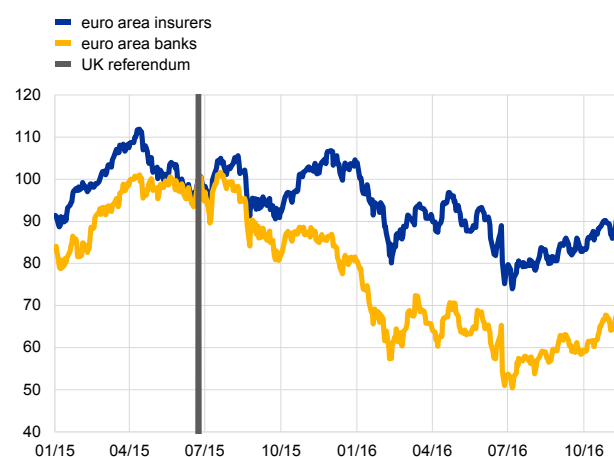
Sources: ECB, Thomson Reuters Datastream and ECB calculations.
Note: The light and dark shaded areas indicate, respectively, the minimum/maximum range and interquartile range for the CDS spreads of selected large euro area insurers.

Chart 3.24

Stock prices of euro area insurers reacted less than those of banks to the UK referendum outcome

Stock price indices for euro area insurers and banks

(1 Jan. 2015 – 15 Nov. 2016; daily observations, indexed to 100 on 23 June 2016)



Sources: Thomson Reuters Datastream and ECB calculations.
Note: Based on euro area insurance and bank indices.

Insurers' stock prices and CDS spreads experienced elevated volatility after the outcome of the UK referendum held on 23 June 2016. Market reactions to the outcome were, however, relatively short-lived and they were also more contained than those recorded in the banking sector. More specifically, the declines of euro area banks' stocks in the days following the UK referendum exceeded those of euro area insurers and overall the bank stocks have remained at lower levels since then (see **Chart 3.24**). Looking forward, the long-term impact of the UK referendum outcome on the insurance sector is expected to substantially depend on the new regime to be agreed between the United Kingdom and other EU countries. With respect to the new Solvency II regime, insurers in both the euro area and the United

⁴² See also the discussion in the next section on recent adjustments in investment portfolios.

Kingdom have already covered the implementation costs and, therefore, large deviations from this regime are not expected in the short-to-medium term.

Investment portfolios adjusted further in the low-rate environment

The bulk of euro area insurers' portfolios remain invested in fixed income instruments, which makes the sector's investment income particularly sensitive to interest rate risk (see Chart 3.25).

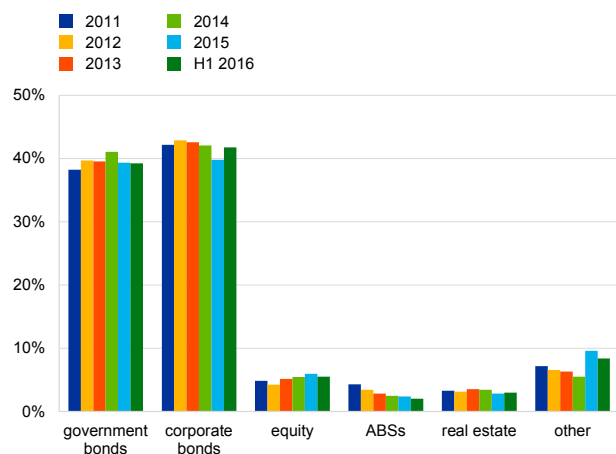
Specifically, as insurers' portfolios continue to be dominated by government and corporate bonds, investment income tends to decline in a prolonged period of low interest rates because maturing assets and cash flows from premiums are typically (re)invested in low-yielding instruments. Although low rates also imply higher valuations, the valuation effect is typically lower on the assets side than on the liabilities side because the duration of the liabilities often exceeds that of the assets. This poses major challenges for life insurers, which are bound to pay out long-term guaranteed rates on the bulk of their liabilities. Therefore, investment strategies of many euro area insurers have recently been driven by the need to boost yields from investment, which is then reflected by gradual shifts in portfolio allocations.

Chart 3.25

Euro area insurers' investment portfolios shift towards corporate bonds

Investment portfolio split of selected euro area insurers

(2011 – H1 2016; percentage of total investment, weighted average)



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

Note: Based on data for 15 large euro area insurers and reinsurers.

The trend towards riskier investment portfolios continues, although at a slower pace than in 2015.

First of all, large euro area insurers significantly increased holdings of corporate bonds, which are riskier than other fixed income instruments such as government bonds (see Chart 3.25). Second, a breakdown of the bond portfolio by rating suggests that holdings of BBB bonds are the second most prominent investment category in euro area insurers' bond portfolios (after AA-rated bonds) (see Chart 3.26).⁴³ Third, large euro area insurers increased their exposures to government bonds issued by "other" countries, i.e. neither the euro area, nor the United Kingdom, nor the United States (see Chart 3.27). Furthermore, reports from individual firms also suggest that insurers are increasing their exposures to illiquid assets such as property and infrastructure investments. These features notwithstanding, the pace of the portfolio adjustment in the first half of 2016 slowed down and was somewhat less pronounced than in previous years.

Although alternative investment allocations can bring diversification benefits, the increasing riskiness and illiquidity of insurers' portfolios is also a potential source of risk to financial stability. Large euro area insurers are important

⁴³ See also Chart 3.35.

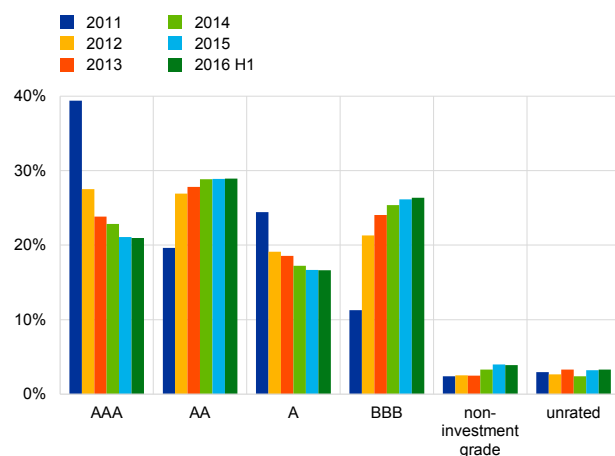
institutional investors and, therefore, their investment behaviour plays a key role in the stability of the financial system. In particular, if several large insurers were simultaneously forced to liquidate parts of their financial portfolios (e.g. to cover losses from a large catastrophic event, as a reaction to adverse economic and market shocks or in the event of mass rating migration⁴⁴), they would have to sell the financial assets at market value. The associated market impact of such sales could induce another wave of fire sales, potentially threatening the stability of the financial system. Though limited, there is some evidence that insurers in a few countries acted procyclically with their asset allocations (e.g. following the dotcom crash of the early 2000s or during the recent financial and the European sovereign debt crises).⁴⁵ For the assessment of the potential spillover effects between insurance companies, banks and shadow banks, see Box 6, which presents a time-varying measure of interconnectedness among these different market players and thus provides insights about the contagion risks in the European financial sector as a whole.

Chart 3.26

The trend towards increasing exposures to higher-yielding bonds slowed down...

Bond investments of selected large euro area insurers split by rating category

(2011 – H1 2016; percentage of total investment portfolio, weighted average)



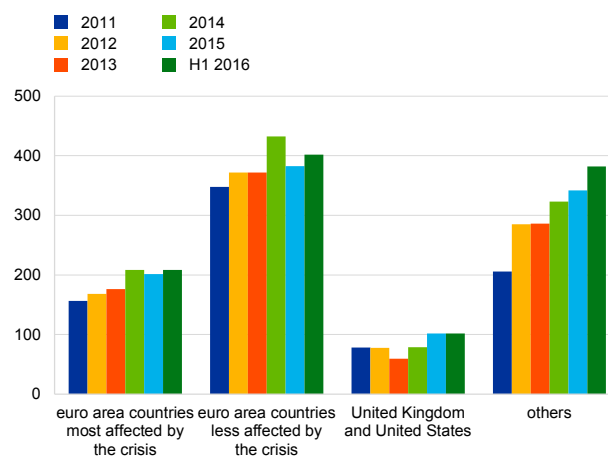
Sources: JPMorgan Cazenove, individual institutions' financial reports and ECB calculations.
Note: Based on data for 15 large euro area insurers and reinsurers.

Chart 3.27

...while exposures to non-euro area sovereigns continued to increase

Geographical split of the government bond holdings of selected large euro area insurers

(2011 – H1 2016; EUR billions)



Sources: JPMorgan Cazenove, individual institutions' financial reports and ECB calculations.
Notes: Euro area countries most affected by the crisis include Greece, Ireland, Italy, Portugal and Spain. Euro area countries less affected by the crisis include Belgium, France, Germany, Luxembourg and the Netherlands. The countries are split into the two different groups on the basis of whether a country experienced a significant deterioration in its long-term credit rating since the onset of the financial crisis. A significant deterioration is defined as a downgrade by two or more credit quality steps on the Eurosystem's harmonised rating scale between the end of 2008 and the end of 2015 according to at least one of the three credit rating agencies which cover all euro area sovereigns. Based on available data for 15 large euro area insurers and reinsurers.

⁴⁴ For a discussion of a mass rating migration as a possible trigger for forced selling of investment assets, see Section 3.1.2 of *Financial Stability Review*, ECB, May 2016, p. 82.

⁴⁵ For more details, see Section 3.2 of *Report on systemic risks in the EU insurance sector*, ESRB, December 2015, p. 15.

Life insurance: unit-linked business loses growth momentum

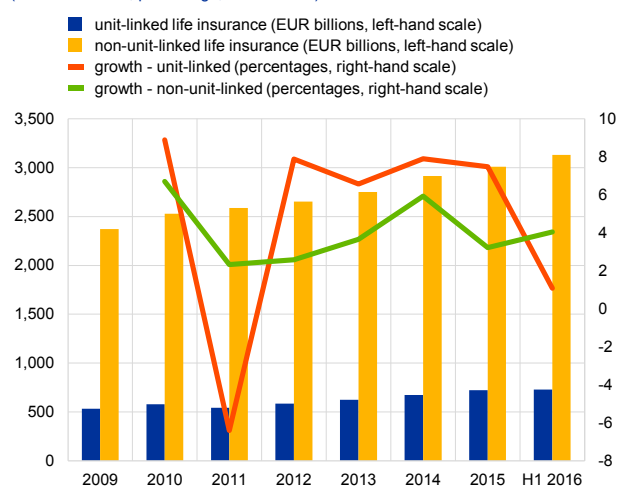
To limit exposures to interest rate risk, life insurers have been increasingly offering unit-linked products (see Chart 3.28). Historically, life insurers in the euro area offered traditional saving policies with guaranteed rates of return⁴⁶ and, as a result, this type of policy represents more than 80% of life insurance policies in the euro area. One disadvantage of these policies from the insurer's point of view is that the insurer bears the interest rate risk. This is proving to be particularly challenging in the current low-yield environment, in which it has become difficult for insurers to generate a margin above the average guaranteed rate on existing business. Therefore, many life insurers have reoriented their offering towards unit-linked policies (i.e. policies in which the investment risk is borne by the policyholder) and net equity of households invested in unit-linked products grew at an annual rate of around 8% in 2014 and 2015. These growth rates should however be interpreted with caution because they do not reflect only the actual sales/purchases but incorporate also other factors, notably changes in valuation, which are likely to be a significant factor driving fluctuations in the growth of unit-linked products over time.⁴⁷

Chart 3.28

Unit-linked life insurance loses growth momentum

Net equity of households in unit-linked and non-unit-linked life insurance products

(2009 – H1 2016; percentage, EUR billions)



Source: ECB insurance corporation and pension fund statistics.

Notes: Based on data from 15 euro area countries. The ECB's insurance corporation and pension fund statistics are collected taking a short-term approach and are not fully harmonised.

Despite these limitations, the available data suggest that sales of unit-linked products have lost some growth momentum in the first half of 2016.

Specifically, the growth rate of unit-linked products in this period dropped to around 1% only, compared with around 4% for non-unit-linked life policies. The drop suggests that euro area insurers may face difficulties in selling (purely) unit-linked products in the future. One likely reason is that risk-averse policyholders find these products less attractive than traditional saving products, especially in the current low-rate environment. Another reason could be that unit-linked policies are similar to saving and asset management products offered by other financial institutions and thus insurers face particularly intense competition in this market segment.

Going forward, alternative saving products, which combine guaranteed and unit-linked components, or fee-based products, may prove to be a more promising avenue. Although products with combined elements provide lower guarantees than traditional saving policies (e.g. guarantees may be offered only at

the maturity of the policy and not on a yearly basis), they may still be sufficiently attractive for policyholders to achieve decent sales, while at the same time they also

⁴⁶ Traditional life insurance products offer a yearly guarantee for a long duration.

⁴⁷ Because of current data limitations, it is not possible to separate the two effects. In particular, the ECB's insurance corporation and pension fund statistics are collected taking a short-term approach and do not contain data on transactions. Therefore, the figures reflect – in addition to the actual flows of financing (sales and purchases of items) – several other factors such as valuation effects arising from changes in prices or exchange rates, reclassifications, other changes in the volume of assets and/or improvements in data quality (e.g. better coverage).

limit insurers' exposures to interest rate risk. Since part of the investment risk is still borne by insurers, these products do not however mitigate financial stability risk to the same extent as pure unit-linked products.

Non-life insurance and reinsurance markets: intense competition and technology reshape business

Non-life insurers also face significant challenges, despite being somewhat less affected by the low-yield environment than life insurers. Since non-life insurers tend to have both liabilities and assets of lower duration than life insurers, they are somewhat less exposed to a prolonged period of low interest rates than life insurers.⁴⁸ Still, as low yields put downward pressure on investment margins, most non-life firms cope with this environment by focusing on underwriting discipline and cost optimisation. Underwriting new business has, however, also become increasingly difficult in the prolonged weak macroeconomic environment and amid tough competition coupled with a mature insurance market in the euro area.

Traditional market incumbents, especially in non-life retail business, also face increasing competition from digital start-ups and other software-based companies. These companies usually reduce operational costs through highly automated processes, on the one hand, while providing highly personalised, timely and convenient services, on the other. Despite its small scale at the moment, the insurance technology industry ("insurtech") is growing quickly. Compared with 2014, investment in insurtech start-ups more than tripled in 2015, rising to above USD 2.6 billion, and it is becoming a global (rather than US-specific) phenomenon.⁴⁹ New market entrants often focus on filling market gaps that arise from new trends. By being "connected" in real time, insurtech firms often benefit from access to vast amounts of data about the customer, which enables them to monitor customers' habits and to adjust pricing to more accurately reflect the underlying risks. Therefore, investments in innovation and technology have become one of the key strategic considerations also for the traditional market incumbents.

The surge in catastrophe losses in the first half of 2016 has dampened the performance of the non-life and reinsurance industries, but may have a positive impact in the long run. Total insured losses amounted to USD 27 billion across the globe. Although in line with the ten-year historical average, the figure significantly exceeds the 30-year historical average of USD 15 billion. Among others, the main drivers of these losses were strong earthquakes in Japan and Ecuador as well as powerful storms in Europe and the United States.⁵⁰ As this surge comes after

⁴⁸ For more details on the impact of the low interest rate environment on different types of euro area insurers, see 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.

⁴⁹ For more details, see Frenzy et al., "Innovation in insurance: How technology is changing the industry", Institute of International Finance, September 2016 (available [here](#)). Data on investment in insurtech start-ups come from CB Insights (www.cbinsights.com).

⁵⁰ For more details, see "Loss review for the first half of 2016: Storms and earthquakes drive losses up", MunichRe, July 2016 (available [here](#)).

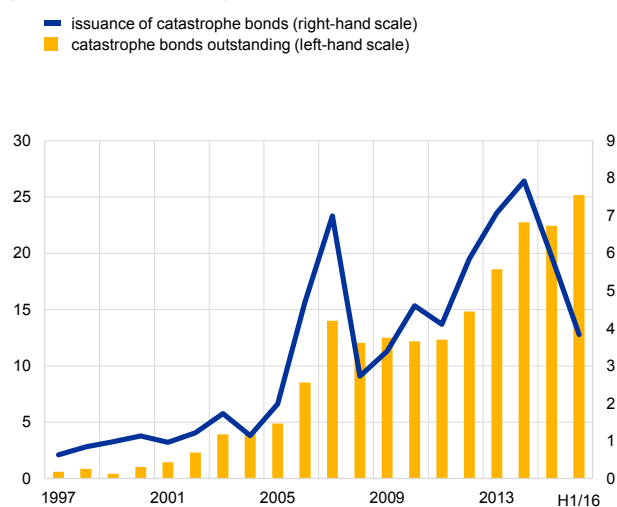
several years of below-average catastrophe losses that contributed to declining reinsurance rates and prices (see [Chart 3.30](#)), the recent catastrophe loss experience may help trigger demand for reinsurance in the future. Higher demand for reinsurance could also be induced by the new Solvency II regime, under which the purchase of reinsurance products brings capital relief.

Chart 3.29

Amounts outstanding of catastrophe bonds continue to rise...

Catastrophe bond issuance and amounts outstanding

(1997 – H1 2016; USD billions)



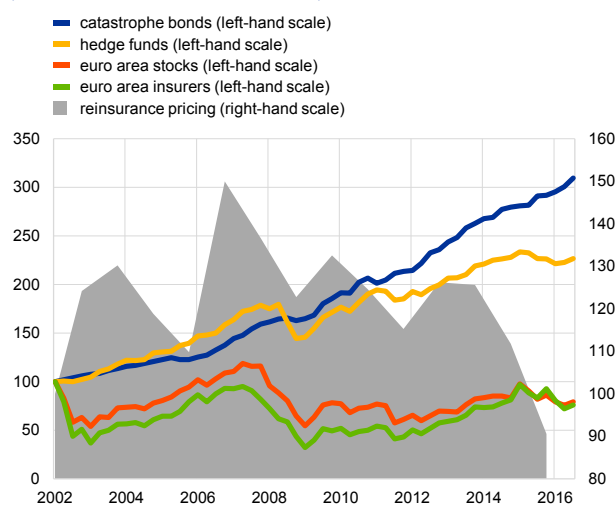
Source: Guy Carpenter.

Chart 3.30

...as they withstand recent bouts of market volatility and confirm their uncorrelated nature

Cumulative return profiles, broken down by market asset class and reinsurance pricing

(Q1 2002 – Q2 2016; index: Q1 2002 = 100)



Sources: Bloomberg, Guy Carpenter and ECB calculations.
Notes: The series for pricing ends in Q4 2015. The EURO STOXX index is used as the benchmark for euro area stocks. The Guy Carpenter World Property Catastrophe RoL Index tracks changes in property catastrophe reinsurance premium rates on a worldwide basis.

Alternative capital sources such as catastrophe bonds continue to challenge the traditional reinsurance business.

Despite the decline in catastrophe bond issuance in 2015, the outstanding amounts continued to rise during the first half of 2016 and exceeded USD 25 billion at the end of June 2016 (see [Chart 3.29](#)). The uncorrelated nature of the underlying risk of catastrophe bonds with the rest of the financial markets,⁵¹ coupled with relatively high yields, is particularly appealing to investors in the current environment, as high-yielding alternative investments with diversification benefits are scarce. Catastrophe bonds indeed proved to be resilient to the recent bouts of market volatility and equity declines (see [Chart 3.30](#)). Nevertheless, given the absence of large-scale catastrophe losses in recent years, the robustness of the catastrophe bond market when faced with such events is still to be tested.

⁵¹ Compared with bonds issued by a certain company/sovereign, the main risk faced by investors in catastrophe bonds is typically a risk linked to a (natural) catastrophe event instead of a risk linked to a credit event. If a catastrophe event occurs, the principal (or part thereof) is not paid out to the investor, but is used by the insurance company to cover its claims.

Box 6

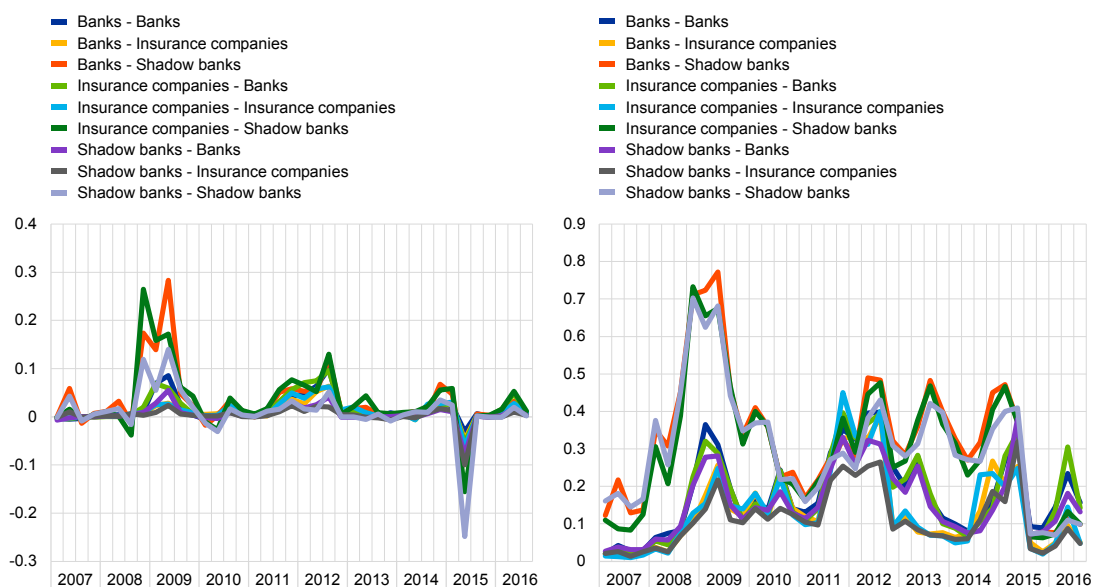
Assessing the spillover potential between banks, shadow banks and insurance companies in Europe

Financial distress in the non-bank financial sector can be transmitted to the banking sector through a number of direct and indirect transmission channels. First, the banking sector may be directly exposed to non-bank financial institutions through equity investment or credit claims. Credit claims often arise in connection with prime brokerage services through which non-bank financial firms increase their leverage. In addition, the liquidity credit lines that provide non-financial firms with a backstop against an outflow of their short-term liabilities could also give rise to a significant exposure. Second, non-bank financial institutions play an important role in the funding of the banking sector by investing in bank debt securities and providing liquidity through secured money markets, as well as through the provision of collateral. Third, banks and non-bank financial institutions are also indirectly interconnected through common exposures to assets. Distress in one of these sectors may give rise to asset fire sales, which would depress the prices of assets held by the other sector and, through mark-to-market accounting, adversely impact the profits and capital of that sector.

Chart A

dCoES estimates for a significant sample of banks, shadow banks and insurance companies

(dCoES measured in PD percentage points)



Sources: ECB and ECB calculations.

Notes: The weighted aggregate dCoES estimates are total asset-weighted averages of the underlying institution-to-institution level dCoES estimates linking all pairs of institutions from a sample of 1,911 firms. The chart on the right shows the 95th percentile of the institution-to-institution level estimates per sector combination instead of a weighted aggregate.

Against this backdrop, assessing the potential for contagion among different kinds of financial institutions is an important element to understand the systemic dimension of financial stability risks in the European financial sector as a whole. To this end, a time-varying measure of the interconnectedness of shadow banks, banks and insurance companies has been developed. The analysis relies on the delta-Conditional Expected Shortfall (dCoES) methodology which is a non-parametric variant of the parametric CoVaR/CoES method developed by Adrian and Brunnermeier

(2014)⁵². Using the expected shortfall (ES) concept, one can measure the marginal contribution of an institution *i* to *j*'s (tail) risk, as the difference between the conditional ES, which attempts to measure risk in the tail, and the median conditional ES, reflecting conditions for institution *i* during normal, non-stressed market conditions:

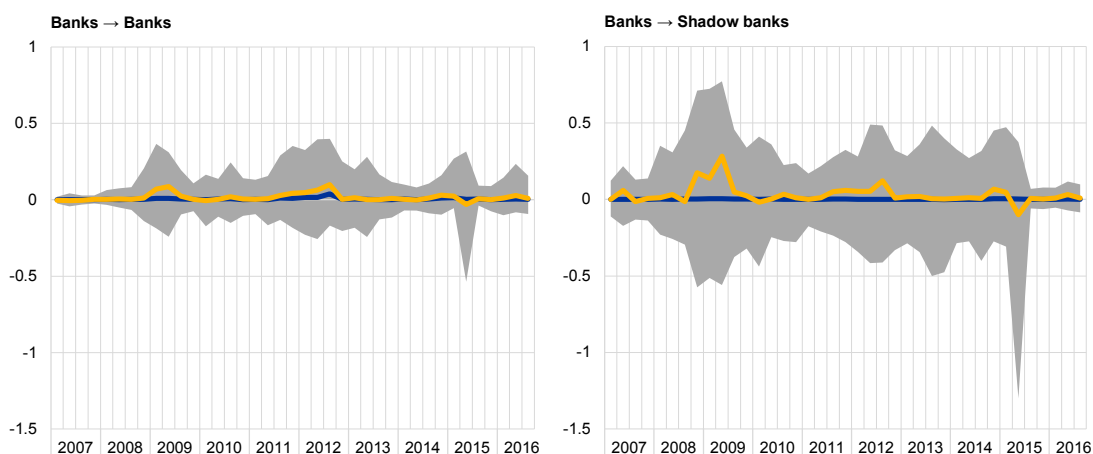
$$dCoES_q^{ji} = CoES_q^{ji} - CoES_{50}^{ji}$$

This measure is computed for all pairs of institutions in a combined sample of 1,911 firms from Europe, based on one-quarter non-overlapping windows of daily data for their probabilities of default (PDs) over the period from January 2007 to September 2016.⁵³ The time-varying institution-to-institution level dCoES estimates are grouped into three sectors to subsequently compute asset-weighted aggregates linking the three sectors. The results are shown in Chart A. They suggest that there are two periods during which significant rises in spillover potential could be observed: Q4 2008-Q2 2009 and Q3 2011-Q3 2012. The two periods correspond to: (i) the aftermath of the collapse of Lehman Brothers that marked the beginning of the global financial crisis; and (ii) the ensuing euro area sovereign debt crisis that reached its apogee between the third quarter of 2011 and the third quarter of 2012.

Chart B

dCoES estimates over the Q1 2007-Q3 2016 period

(dCoES measured in PD percentage points)



Sources: ECB and ECB calculations.

Note: The weighted aggregate dCoES estimates (yellow line) are total asset-weighted averages of the underlying institution-to-institution level dCoES estimates linking all pairs of institutions belonging to the two sectors indicated in the header of the chart.

Chart B presents as an example out of the nine possible sector combinations the evolution of the cross-institution distribution of the dCoES weighted aggregates (in this case along with the whole cross-institution distribution) for the bank-bank and bank-shadow bank combinations to provide an additional illustration of the results. The weighted aggregate dCoES from Chart A (left panel) for these two sector combinations correspond to the yellow lines in Chart B, while the 95th percentile

⁵² Adrian, T. and Brunnermeier, M. K., "CoVaR", Federal Reserve Bank of New York Staff Report No 348, September 2008 (revised September 2014).

⁵³ This measure is calculated using expected default frequencies provided by Moody's KMV for a sample of 1,911 financial institutions from 20 EU countries. The data cover 39 quarters of daily data (2,534 daily observations) over the Q1 2007-Q3 2016 period. Of the 1,911 total, 14% are banks. The remainder of the sample includes insurance companies, finance companies, investment management companies, and security brokers and dealers.

evolution from Chart A (right panel) corresponds to the upper end of the shaded area in Chart B. The visualisation helps reveal again the wider distribution of the potential for contagion including the shadow banking system over the considered time period.

Overall, tail risk-based measures such as the dCoES are useful as a contemporaneous monitoring tool, which in addition to an aggregate measurement of spillover strength across specific financial market segments can also be used to identify the most influential or most vulnerable firms (over time) or those firms that are both influential and vulnerable at the same time (not presented here). Such tail-risk measurement remains a reduced-form measurement, however, and warrants a deeper structural investigation with a view to identifying changes in exposure structures, for instance, to seek answers as to why spillover potential changes over time.

3.1.3 The non-bank financial sector continues to grow on account of investment fund inflows, following an intermittent slowdown

Growth in the investment fund sector, underpinning much of the expansion of the non-bank sector over the last years, recovered during the second and third quarters of 2016 amid volatile asset markets and continued net inflows.

Growth of the investment fund sector, which was previously helped in the euro area as well as globally by credit disintermediation and the low interest rate environment in the aftermath of the global financial crisis, continued to rise in the second and third quarters of 2016. While a partial reversal of net inflows could be observed at the beginning of 2016, inflows resumed in the following months amid volatile asset markets. These inflows were concentrated mainly in bond and mixed funds, whereas equity funds domiciled in the euro area received very limited net inflows and net outflows could be observed for hedge funds (see [Chart 3.31](#)). The large and growing exposures of euro area investment funds over the past decade, in particular, have spurred concerns that the potential for this sector to amplify market-wide shocks has increased. Open-ended funds seemingly offer investors the possibility to engage in less-liquid markets, while being able to quickly respond to market-moving events by selling fund shares. On the downside, investors' overall demand for liquidity can suddenly rise in a market downturn, thus forcing the funds to adjust portfolios with an impact on secondary market liquidity when such liquidity is needed the most.

The run on some property funds in the aftermath of the UK referendum was a reminder that open-ended fund structures with daily callable claims can bear significant liquidity risk.

Redemption requests started before the referendum, when investors began mitigating risks of negative effects on UK real estate in the event of "Brexit". Between April and July 2016 the UK commercial property fund markets experienced cumulated net outflows of about 10% of managed assets (see [Chart 3.32](#)). In the week starting on 4 July, some of the largest UK commercial property funds (managing more than GBP 20 billion of assets, representing 60-70% of the market) announced the suspension of redemptions when redemption requests had grown too large following the UK referendum. Containment measures used by the fund managers prevented further outflows and safeguarded shareholders who

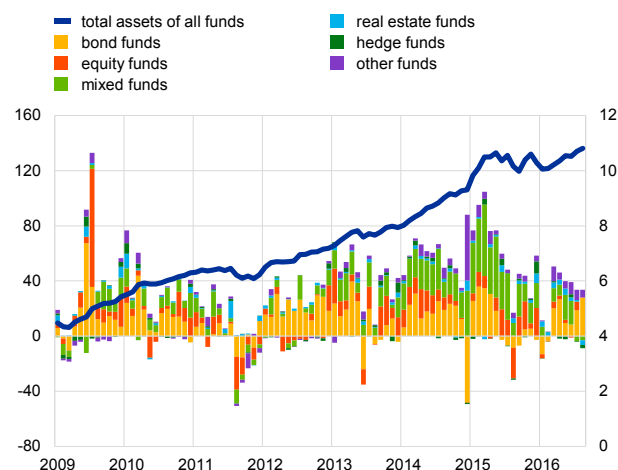
remained invested in the funds. Given both the largely idiosyncratic shock to the UK commercial real estate market and the limited exposures of euro area real estate funds to that market, channels for direct contagion from this event to euro area investment funds were limited. Only 7% of euro area real estate fund assets are invested outside the euro area (around €20 billion), including the United Kingdom. At the same time, euro area-domiciled property funds have notice periods or redemption gates in place and therefore are less prone to runs. The experience in the UK property fund market also showed that containment tools, such as the suspension of redemptions, can be effective in dealing with a sector in distress, but these measures are not suited to pre-empting the build-up of system-wide risks.

Chart 3.31

Growth in euro area investment funds continued due to net inflows amid volatile asset markets

Monthly net flows by type of fund and total assets

(Jan. 2009 – Aug. 2016; net flows in EUR billions (left-hand scale), total assets in EUR trillions (right-hand scale))



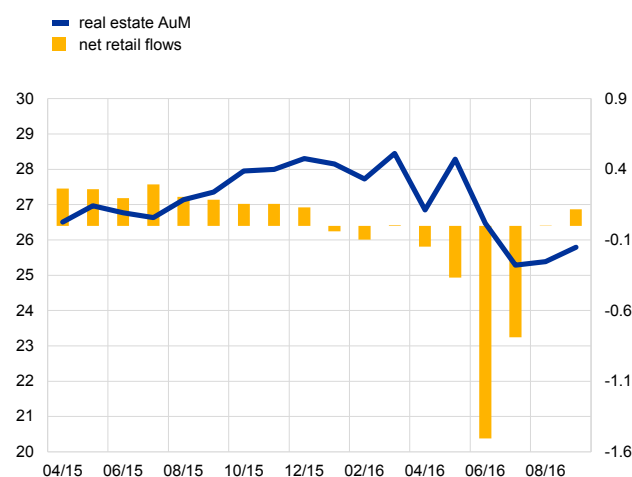
Source: ECB investment fund statistics.

Chart 3.32

British property funds had to cope with large outflows following the UK referendum in June

UK investment fund flows and funds under management

(Apr. 2015 – Sep. 2016; total assets in EUR billions (left-hand scale), net flows in EUR billions (right-hand scale))



Sources: The Investment Association and ECB calculations.
Notes: Funds domiciled in the United Kingdom invested in UK commercial real estate. AuM stands for assets under management.

Global investors withdrew money from European equities in a market environment affected by uncertainties following the UK referendum, continued low profitability prospects of euro area banks, and still modest nominal growth in the euro area. Continuous net outflows from euro area equities have been observed since last year, while net flows into UK equities turned negative only since the run-up to the referendum (see [Chart 3.33](#)). A less negative outlook than anticipated has yet to persuade investors to stop allocating money away from European equities. Meanwhile, fixed income funds invested in the euro area and the United Kingdom have experienced a reversal of net flows since March. The cumulated net inflows have turned positive since then for both funds invested in the euro area and those invested in the United Kingdom. While the sector has generally been able to cope with more volatile flows, the concern is that some investment funds have become increasingly vulnerable to a sudden reversal of flows under more extreme market scenarios.

Institutional investors have been reconsidering their asset allocations in the light of continued central bank asset purchases and have been increasing their exposures to assets outside the euro area sovereign bond markets. As

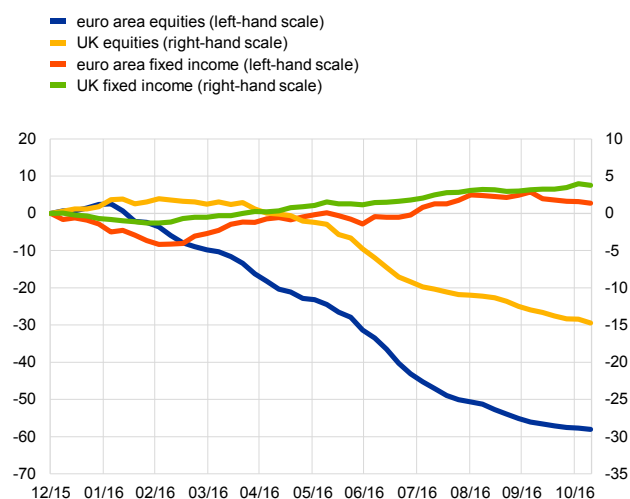
low or negative-yielding government bonds appeared increasingly unattractive, euro area investment funds have become a net seller of these bonds in the three quarters since the fourth quarter of 2015. The exposures have been reduced by a net amount of €57 billion (see [Chart 3.34](#)). Euro area investment funds have also sold €48 billion worth of MFI debt securities since the fourth quarter of 2014. Meanwhile, the funds have been stepping up exposures to the non-financial corporate sector, and the non-euro area bond markets including those of the United States, emerging markets and the rest of the EU. Around 48% of total euro area investment funds' financial assets are held in non-euro area equities and debt securities.

Chart 3.33

Global investors avoided UK and euro area equities, but until recently remained positive about fixed income

Investment funds' cumulated net country flows

(30 Dec. 2015 – 9 Nov. 2016; cumulated weekly net flows in EUR billions)



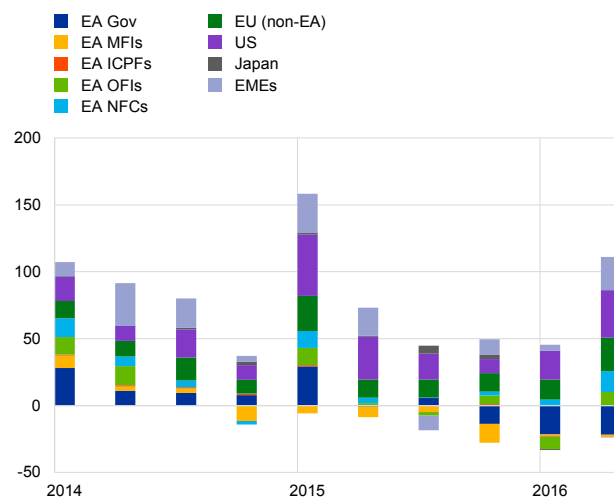
Sources: EPFR and ECB calculations.

Chart 3.34

Euro area investment funds have become a net seller of euro area government bonds

Quarterly net purchases of fixed income securities by euro area investment funds

(Q1 2014 – Q2 2016; net transactions in EUR billions)



Sources: ECB investment fund statistics and ECB calculations.

Notes: EMEs stands for emerging market economies, NFCs for non-financial corporations, OFIs for other financial intermediaries, ICPFs for insurance corporations and pension funds and MFIs for monetary financial institutions.

Cross-border exposures have grown significantly over the past years, leaving the euro area fund sector more exposed to developments in global markets. In

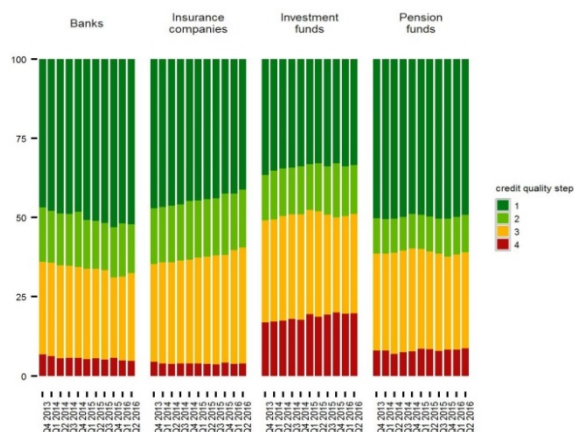
terms of country allocation, the available breakdowns show that 15% of debt and equity instruments (including fund shares) are held in the United States, 9% in the non-euro area EU countries, and 2% in Japan. Exposures to emerging markets of up to 15% had temporarily been reduced in the light of elevated market volatility in the third quarter of 2015. However, another €40 billion of debt and equity securities have been added since then. With its large and growing share in cross-border exposures, the investment fund sector represents an important channel for spillovers to and from the euro area.

Chart 3.35

Some slowdown in the portfolio shifts of investment funds towards lower-rated debt securities

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

(Q4 2013 – Q2 2016; percentage of total assets)



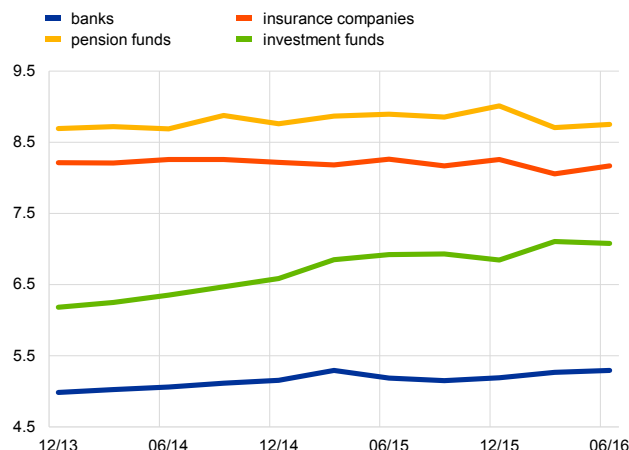
Sources: ECB Securities Holdings Statistics by Sector and ECB calculations.
Notes: Credit quality steps are defined in accordance with the Eurosystem credit assessment framework (ECAAF), which provides a harmonised rating scale classifying ratings into three credit quality steps. The first category includes 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 three. 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 excludes money market funds.

Chart 3.36

Investment funds continued to increase residual maturities in their portfolios

Average residual maturity of debt securities held by the euro area financial sector

(Q4 2013 – Q2 2016; average residual maturity in years)



Sources: ECB Securities Holdings Statistics by Sector and ECB calculations.
Notes: Long- and short-term, euro and foreign currency-denominated debt securities are included only if they have an ISIN reported, are considered "alive" and have a residual maturity of up to 30 years. Banks hold a particularly large share of securities with reported maturity exceeding 30 years for which precise information is less reliable (e.g. for securities without a definite date of maturity) and which are therefore excluded. In order to estimate the average, residual maturities are weighted by the nominal amount held of each security by each sector over the total debt holdings of each sector.

In a negative-yield environment, it seems that institutional investors have been venturing into longer maturities and further down the credit risk spectrum. A common pattern observed during the past few years is that some institutional investors have shifted their asset allocation from higher to lower-rated debt securities and increased the duration of their portfolios (see [Chart 3.35](#) and [Chart 3.36](#)). This pattern is particularly pronounced for investment funds and insurance companies, but may also be present in other institutions which fall outside the limited scope of official statistics. Increased risk-taking by investment funds is also evident in their allocation to bail-inable bank debt securities. A clear shift in allocation can be observed in the last two years from debt securities with higher to lower seniority levels (see [Box 7](#)). These patterns seem to support the general trend of increased risk-taking by investment funds and ICPFs, matching their portfolio shifts towards lower-rated debt securities. The longer durations and higher risk exposures leave investors more exposed to any nominal changes in rates as well as spreads.

Box 7

The evolution of sectoral holdings of bail-inable bank debt

The sectoral distribution of holdings of bank debt has a clear bearing on contagion and – by extension – on financial stability in the event of bank distress. Indeed, under the new bail-in regime in the EU, eventual write-downs (and/or conversion into equity) upon bank bail-in need to be distributed among shareholders and creditors according to a predefined creditor hierarchy, while

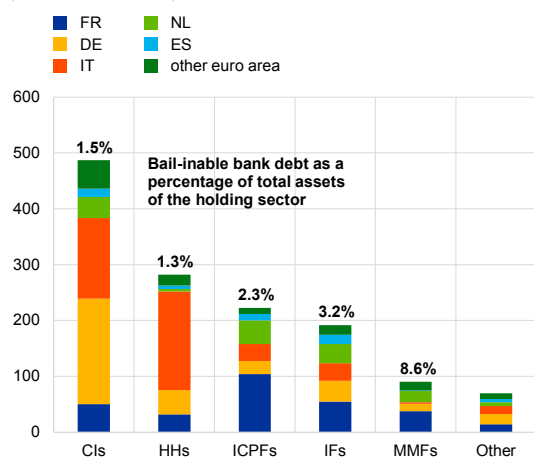
avoiding contagion effects on the broader financial system.⁵⁴ On the one hand, if a bank were to struggle, high financial sector concentration of its bail-inable debt could lead to concerns over spillover effects. On the other hand, if the bail-inable instruments were held mainly by the household sector, the use of bail-in tools in a bank resolution process may have negative effects on the economy resulting from effects on spending and potential political tensions.

Chart A

Some heterogeneity of bank debt holdings across sectors and by country of issuance

Holdings of bail-inable bank debt securities by euro area holding sector and by country of issuance

(Q1 2016; EUR billions)



Sources: ECB Securities Holdings Statistics by Sector and ECB calculations. Notes: Bail-inable debt includes senior unsecured and subordinated bank debt securities. Breakdowns in the chart show issuance by domicile of the issuing bank and holdings by euro area sectors. Percentages on top of columns show debt holdings relative to total assets (for financial sectors) and relative to financial assets (for households).

German banks is held predominantly by credit institutions (CIs). A large share of the bail-inable debt issued by Italian banks is held by households (HHs), while that held by credit institutions is lower but also significant. For other countries, the share of households is much smaller, although it is non-negligible for debt issued by German banks. Sectoral exposures are relatively minor when compared with the amount of total assets held by each sector. Only money market funds (MMFs) have notable exposures to bail-inable bank debt relative to the size of their balance sheets (8.6%) due to their distinct business model.⁵⁵

Cross-country differences also exist in the investor base of bail-inable bank debt when distinguishing between the domiciles of investors at the national, euro area and international levels (see Chart B). Much of the bail-inable debt of the two largest issuing countries, i.e. Germany and France, is held either domestically or outside the euro area. The large share of non-euro area holdings may indicate that bail-in operations on euro area banks can also

For macroprudential, supervisory and resolution authorities, such financial stability concerns underscore the importance of assessing the distribution of such bail-inable debt and monitoring its evolution over time. With a view to examining the sectoral holdings of debt issued by euro area banks in a cross-sectional and time dimension, the ECB's Securities Holdings Statistics (SHS) can be used for this purpose and can be combined with information from the Centralised Securities Database (CSDB) on the type of debt and the seniority level, allowing a granular view of the holdings also by seniority type.

At the euro area level, there is some heterogeneity in the holdings of bail-inable bank debt across sectors and by country of issuance (see Chart A). For instance, bail-inable debt issued by French banks is held predominantly by insurance corporations and pension funds (ICPFs), whereas debt issued by

⁵⁴ The bail-in tool as prescribed by the EU Bank Recovery and Resolution Directive (BRRD) enables the resolution authority to write down and to convert into equity the claims of a broad range of bank creditors, according to a predefined creditor hierarchy. For more details, see the special feature entitled "Systemic implications of the European bail-in tool: a multi-layered network analysis", *Financial Stability Review*, ECB, May 2016.

⁵⁵ For a more detailed analysis of the who-to-whom holdings, see Hüser, A.-C. and Kok, C., "Mapping bank securities across euro area sectors: comparing funding and exposure networks", *ECB mimeo*.

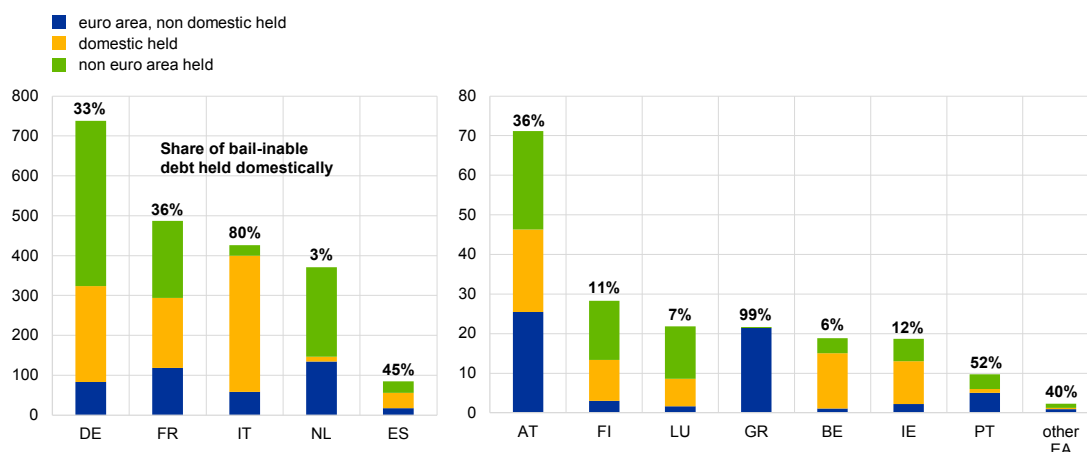
have non-negligible effects on the rest of the world. There is a more limited share of non-domestic euro area holdings, except for issuances by Dutch banks, and to some extent French banks, which are held by a geographically more diversified investor base. Italy stands out with a relatively high share of domestic investors. Overall, the large share of intra-bank holdings reflects a high degree of interconnectedness in the euro area banking sector.⁵⁶

Chart B

Home bias present in most countries, but a relatively high share of non-euro area investors

Bail-inable debt by country of issuance and domicile of investor

(Q1 2016; EUR billions)



Sources: ECB Securities Holdings Statistics by Sector and ECB calculations.

Notes: Bail-inable bank debt includes senior unsecured and subordinated debt issuances and excludes secured issuances (e.g. covered bonds) and issuances for which a seniority flag was not available in the database.

The evolution of sectoral holdings of bail-inable bank securities shows some notable patterns coinciding with the introduction of the BRRD (see Chart C).

The BRRD was introduced at the beginning of 2015 and the bail-in tool came into force in January 2016. Against this background, given the increased likelihood of being bailed in, some investors may have been incentivised to reduce their holdings of bank securities lower in the creditor hierarchy, while increasing holdings of securities with higher seniority (or disposing of holdings of bank debt and equity altogether).⁵⁷ The decrease in bank debt holdings of credit institutions stands out in particular. This decline in exposures to bail-inable debt was accompanied by a relative increase of secured debt holdings between the fourth quarter of 2014 and the first quarter of 2016. Households have also decreased their holdings of bank debt overall, but – unlike banks – they have increased their share of subordinated debt.

⁵⁶ For a more detailed analysis of the cross-country, cross-sectoral differences in bank debt holdings, see Pigum, C., Reiningger, T. and Stern, C., "Bail-in: who invests in non-covered debt securities issued by banks", *Oesterreichische Nationalbank Financial Stability Report*, forthcoming.

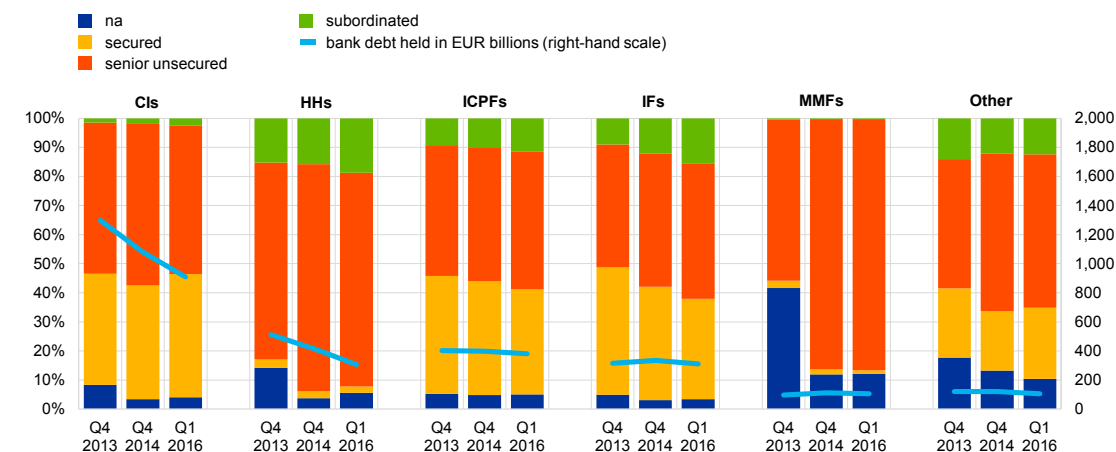
⁵⁷ If the bail-in is triggered, shareholders will be bailed in first, followed by subordinated and then senior unsecured creditors. See also Special Feature B, *Financial Stability Review*, ECB, May 2016.

Chart C

The non-bank sectors have shifted their holdings from higher to lower seniority levels, while banks have reduced their exposures to bail-inable debt

Share in nominal bank debt securities holdings by sector and seniority

(Q4 2013, Q4 2014, Q1 2016; percentages (left-hand scale), EUR billions (right-hand scale))



Sources: ECB and ECB calculations.

Notes: Seniority levels are classified into subordinated debt, senior unsecured debt (both bail-inable) and secured debt (not bail-inable). The residual "na" includes securities for which a seniority flag was not available in the database. The calculations are based on the nominal amounts of euro and foreign currency-denominated securities, including "alive" and "non-alive" securities. The investment fund (IF) sector excludes money market funds. "Other" includes financial vehicle corporations, other financial intermediaries, non-financial corporations, governments and holdings not classified elsewhere.

Another important observation is the clear shift in asset allocation by the non-bank sectors from debt securities with higher to lower seniority levels over the last two years. Such a shift is more pronounced for investment funds (IFs), but it can also be observed for ICPFs and households. These patterns seem to be in line with the general trend of increased risk-taking by investment funds and ICPFs observed in their portfolio shifts towards lower-rated debt securities. Based on market values, there are indications that exposures of most sectors to bank equities have declined, most notably for investment funds, credit institutions and households, reflecting falling bank stock prices as well as portfolio shifts within the securities holdings.⁵⁸ Overall, it appears that exposures to unsecured bank debt have partly shifted from the banking sector to households, ICPFs and investment funds. Tighter risk-taking constraints for banks compared with other sectors may have played a role in these shifts of bail-inable bank debt.⁵⁹

These shifts of bail-inable debt holdings to sectors outside the core financial system may appear desirable from a financial stability perspective, because risks are borne by investors that are potentially of less systemic relevance. However, there are diverging views as to who should optimally be invested in bail-inable debt securities. Should the risk of losses materialise for a broader set of investors, including private savers, this could have a detrimental effect on spending and the economy. Moreover, the sophistication of investors should matter as the market-disciplining effect of bail-in could be limited, for instance, if households were not demanding adequate risk premia. Ultimately, the observed shifts in bail-inable debt holdings also lend support to concerns

⁵⁸ Given that equity holdings are measured at market value, it is not possible to fully disentangle the share of the decrease due to the shedding of assets and the share due to lower equity prices, which have been falling over the same period.

⁵⁹ See also the discussion in Special Feature B, *Financial Stability Review*, ECB, May 2016.

about the growing susceptibility of non-bank financial intermediaries⁶⁰ and political considerations associated with any bail-in decision which would affect a broader investor base.

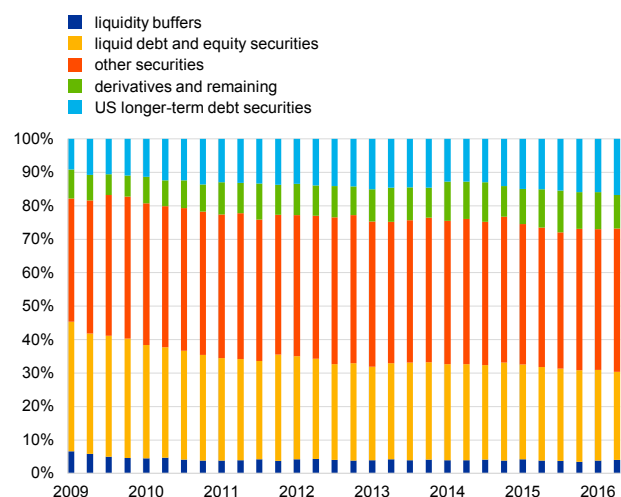
Illiquidity can be another source of relative yield amid these changing investment patterns, where the less-liquid instruments offer seemingly higher returns but at the risk of worse future fund performance if forced to sell in a market downturn. Liquidity and maturity transformation continues to grow among bond funds in the context of these changing sector-wide investment patterns. Balance sheet indicators point to a decrease in the most-liquid positions of bond funds since 2009, including cash holdings, debt securities issued by euro area governments and short-term instruments (see **Chart 3.37** and **Chart 3.38**).

Chart 3.37

Composition of assets held by euro area bond funds has shifted towards longer-term and less-liquid assets

Assets held by euro area bond funds

(Q1 2009 – Q2 2016; percentage of total assets)



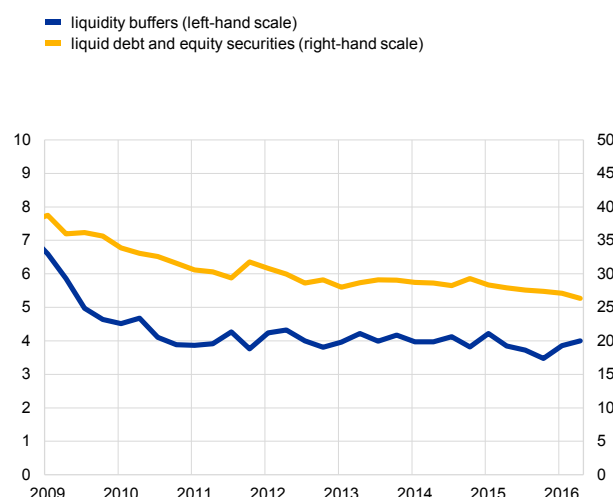
Sources: ECB investment fund statistics and ECB calculations.
Notes: Liquidity buffers include loans and deposits, where the statistical classification does not allow a distinction between loans and deposits. Liquid debt and equity securities include debt securities issued by euro area governments, debt securities issued with an original maturity under one year and equities issued in the EU, Japan and the United States. "Derivatives and remaining" refers to derivatives exposures and other on-balance-sheet exposures, including accrued interest.

Chart 3.38

Bond funds' liquidity buffers and share in liquid assets have declined since the global crisis

Bond funds' cash buffers and liquid assets

(Q1 2009 – Q2 2016; percentage of total assets)



Sources: ECB investment fund statistics and ECB calculations.
Note: See the notes to **Chart 3.37**.

While the sector faces higher liquidity and maturity mismatches, redemption profiles of most bond funds have remained unchanged. In the current market environment, rent-seeking seems all the more attractive for investors if positions can be unwound upon the first signs of distress. In such an environment, open-ended mutual funds, exchange-traded funds (ETFs) and other structures seemingly offer the possibility to engage in higher-yielding markets, but without giving up the possibility to liquidate positions quickly upon signs of distress. However, the higher risk and longer

⁶⁰ For an analysis of the possible role of institutional investors in bank debt securities markets, see Oprică, S. and Weistroffer, C., "Institutional presence in secondary bank bond markets – How does it affect liquidity and volatility?", *Working Paper Series*, ECB, forthcoming.

durations also leave investors more exposed to any nominal changes in rates as well as spreads. Less-liquid portfolios and lower cash holdings leave a limited buffer against bouts of volatility and large outflows. Concerns remain that investors' overall demand for liquidity could suddenly rise, thus adding to market pressures and contributing to a decline in secondary market liquidity.

Fixed income strategies have become increasingly dependent on market-wide risk factors, which could amplify the effect of possible asset price corrections.

Generating absolute returns has gradually become more challenging in the low interest rate environment. Fund managers face the difficult choice between expanding their cyclical exposures, including those with longer duration and lower ratings, and raising exposures which are less risky but yield negative returns and possibly attract fewer inflows. Higher cross-asset correlations have made it even more difficult to keep return sensitivity to market-wide factors at bay. As a result of these higher correlations and the growing share of fund-intermediated investments, strategies have become more crowded in fixed income markets. Estimated market betas for a large sample of UCITS fixed income funds relative to fund-specific benchmark indices point to a gradual increase in market-wide risk exposures over the past years (see [Chart 14](#) in the Overview). This has made funds increasingly exposed to market-wide risk, strengthening channels for the transmission of market-wide shocks, not only among bond funds but also to other types of investors. These channels have become more important with the growth of the non-bank financial sector in recent years in general.

The euro area money market fund (MMF) sector continued to grow amid the current negative rate environment. Following a prolonged period of net outflows after the financial crisis, cumulated net flows started to level off in 2014 and grew in 2015. In the first quarter of 2016 some net outflows could be observed mainly from non-euro area investors, while in the second quarter MMFs received more broad-based net inflows. Non-euro area investors as well as euro area investors have contributed to this growth; the figures shown in [Chart 3.39](#) include euro as well as foreign currency flows into euro area MMFs, including GBP and USD flows. The reasons for the expansion of MMFs include lower competition from banks amid an environment of ample liquidity and few alternatives for cash-like instruments where investors are sensitive to relative performance. Some MMFs have reportedly received inflows from large non-financial corporates that face zero or negative bank deposit rates on their overnight deposits, rendering fund investments more attractive in comparison. These corporates have partly shifted the cash balances that they previously held in overnight bank accounts to money market funds.

Money market funds have incentives to take somewhat higher risk, as they compete with alternative cash-like investments. It is noteworthy that, on average, bank deposits are still to some extent higher yielding than MMF returns (see [Chart 3.40](#)). While bank deposit rates for corporates are still slightly positive on average, MMF returns have in fact been negative since 2015. However, these average rates conceal heterogeneity of bank deposit rates offered to different depositor types, i.e. with some banks passing on negative policy rates to non-financial corporates. In order to maintain returns relative to alternative cash or cash-like claims above critical

levels, euro-denominated MMFs have an incentive to venture into higher-yielding assets and to take on more risk. MMF balance sheet data suggest that MMFs have recently increased their share of non-government paper, looking for potentially higher-yielding assets. However, such risk-taking is bound by regulatory limits regarding certain asset exposures. MMFs are also inclined to engage more in maturity transformation, albeit within regulatory limits. Regarding MMF's corporate exposures, since 2014 the share of MMFs' holdings of non-financial corporate debt has risen at the expense of holdings of debt securities issued by credit institutions. These shifts in exposures come with a risk of unravelling if short-term rates were to rise.

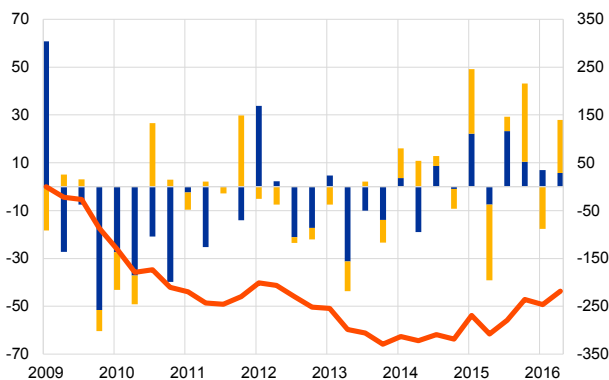
Chart 3.39

Money market funds have received net inflows in the recent quarters in the low-yield environment

Quarterly net flows into and out of MMFs

(Q1 2009 – Q2 2016; shares issued (flows) in EUR billions)

- quarterly from 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 BSI statistics and ECB calculations.

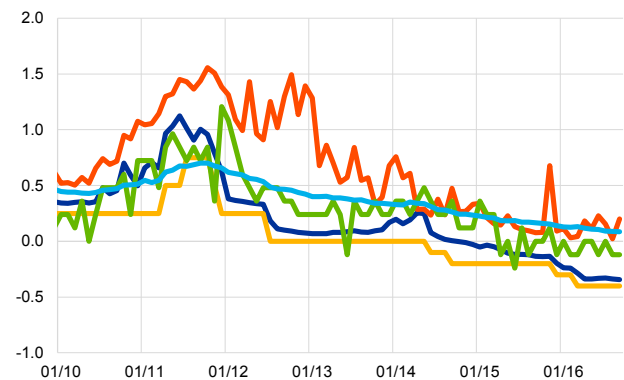
Chart 3.40

Money market funds appear relatively attractive as they compete with alternative cash-like instruments

Annualised returns of euro-denominated MMFs in comparison with interbank, policy and deposit rates

(Jan. 2010 – Sep. 2016; percentage)

- EONIA
- ECB deposit facility
- bank repos
- MMF returns
- bank deposits - non-financial corporations



Sources: EPFR, 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.

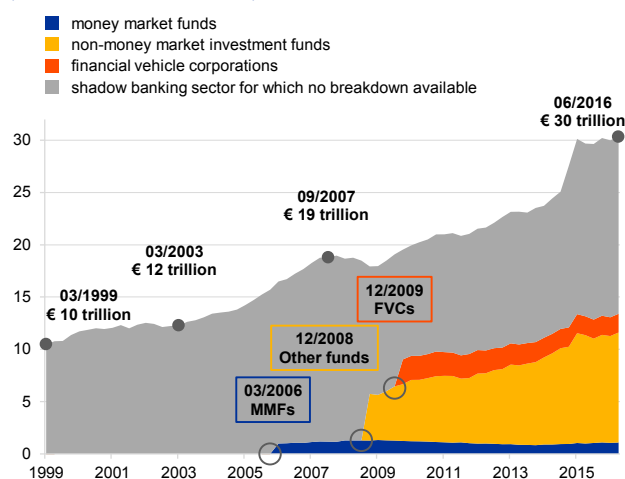
As regards foreign currency-denominated MMFs, USD MMFs expanded faster than funds investing in the euro-denominated money market. The MMF holdings of USD securities have been on the rise since 2011. However, some of the increase in the USD assets underlying growth of the sector more recently was also driven by exchange rate effects, i.e. the US dollar appreciating against the euro. In the United States, anticipation of new regulation which came into force on 14 October led to a significant shift from prime funds to government funds. A main element of the new regulation is that prime funds in the United States need to transact at a variable net asset value (VNAV), whereas the funds transacted previously at constant net asset value (CNAV). Stricter regulations for US prime MMFs may have resulted in a decline in the supply of unsecured US dollar funding by these funds. A broader-based USD funding risk for euro area banks appears to be limited though, as the current low-yield environment has so far ensured ample

liquidity. An abrupt shift in risk sentiment could still lead to a shortage of USD funding for some weaker euro area banks.

Chart 3.41

The assets of the non-bank, non-insurance financial sector have somewhat expanded

(Q1 1999 – Q2 2016; EUR trillions)



Sources: ECB and ECB calculations.

Notes: A breakdown of statistical data for MMFs, other funds and financial vehicle corporations (FVCs) is available only from the indicated dates onwards. The broad shadow banking sector includes MMFs and all other non-monetary financial institutions apart from insurance corporations and pension funds.

Concerns remain that risks may be building up in the parts of the financial sector for which a detailed statistical breakdown is not readily available. Total assets held by the non-bank, non-insurance financial sector comprising MMFs, non-MMF investment funds and financial vehicle corporations (FVCs) have somewhat expanded since the first quarter of 2016 (see **Chart 3.41**).

Growth in the investment fund sector has picked up again, driving the expansion of the non-bank financial sector, while the much smaller MMF sector has also continued to grow. FVCs have remained stable over the past quarters owing to somewhat stronger loan origination and securitisation activity by euro area credit institutions. While it appears that the non-bank financial sector is growing, a significant proportion (up to 50%) cannot be classified by euro area accounts according to the type of entity (the residual “other financial intermediaries” or OFIs). In the past few years, the ECB has started to collect some balance sheet data for the OFI sector, which has shed some light on the composition of and notable shifts

within non-bank financial sector assets. At the national level, more detailed information on the types of entities is available for at least some countries. For example, De Nederlandsche Bank collects monthly survey data on so-called special financial institutions (SFIs), which include information on individual sub-sector components, such as holding companies. From these national sources it is estimated that at least two-thirds of the residual OFIs are special financial institutions, holding companies or other entities not engaged in shadow banking activities. For the remainder, there is a possibility that those entities engage in risky liquidity transformation or credit intermediation.⁶¹

Significant progress has been made more recently in reducing this OFI residual by enhancing statistics at the national level. For instance, the Central Bank of Ireland has introduced a non-securitisation special-purpose vehicle (SPV) data collection. In order to address data gaps and to improve oversight of the SPV sector, new quarterly reporting requirements for SPVs were announced in July. This data collection is based on the application of the FVC granular reporting form to SPVs which are not principally engaged in securitisation. Further data collections are undertaken by the ECB for the sectoral accounts which might help to produce additional data breakdowns for the OFI sub-sectors and further reduce the OFI residual.

⁶¹ The Financial Stability Board has been gathering data at the national level to close the remaining gaps and to help determine whether certain entities engage in shadow banking activities.

3.2 Evaluating the resilience of euro area financial institutions through scenario analysis

This section provides a quantitative assessment of four macro-financial scenarios that map the main systemic risks identified in the analysis presented in the previous sections of this report (see Table 3.1). 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.⁶² The presented results for the euro area banking groups are not comparable with the results of bottom-up supervisory exercises, such as the 2016 European Banking Authority (EBA) bank stress-testing exercise, which relied primarily on the internal bank risk models instead of top-down models. Moreover, the adverse scenario used for the EBA exercise encompasses several risk factors instead of the more targeted scenarios designed for this assessment. Similarly, the results for the euro area insurers are obtained using a conceptually and methodologically different approach from the ongoing bottom-up EU-wide stress-testing exercise carried out by the European Insurance and Occupational Pensions Authority (EIOPA), which also covers a much broader range of European insurers.⁶³ 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 or possible feedback from banks and insurers to other non-bank financial institutions. It only considers potential spillovers from investment funds to euro area banks and insurers.

Table 3.1
Mapping the main systemic risks into adverse macro-financial scenarios

Risk	Scenario	Key assumptions driving impact on GDP
Global risk repricing leading to financial contagion, triggered by heightened political uncertainty in advanced economies and continued fragilities in emerging markets	Global risk aversion scenario	Financial market turbulence triggered by an increase in long-term risk-free interest rates, stock price declines, a widening of corporate bond spreads and lower euro area foreign demand
Adverse feedback loop between weak bank profitability and low nominal growth, amid challenges in addressing high levels of non-performing loans in some countries	Weak bank operating environment scenario	Shocks to private investment and consumption
Re-emerging sovereign and non-financial private sector debt sustainability concerns in a low nominal growth environment, if political uncertainty leads to stalling reforms at the national and European levels	Debt sustainability crisis scenario	Renewed rise in sovereign bond yields to elevated levels and stock price declines
Prospective stress in the investment fund sector amplifying liquidity risks and spillovers to the broader financial system	Investment fund spillover scenario	Broad-based disorderly asset sales by the investment fund sector, leading to higher bank funding spreads, falling asset prices and a higher cost of capital for the real economy

Source: ECB.

⁶² 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 side of the euro area insurance sector. For a more detailed description of the tools, see Henry, J. and Kok, C. (eds.), "A macro stress-testing framework for systemic risk analysis", *Occasional Paper Series*, No 152, ECB, October 2013, as well as "A macro stress-testing framework for bank solvency analysis", *Monthly Bulletin*, ECB, August 2013.

⁶³ For a description of the methodology and results of the EIOPA exercises, see *EIOPA insurance stress test 2014*, 28 November 2014. The results of the ongoing 2016 EU-wide insurance exercise are expected to be disclosed in December 2016.

Main features of the adverse macro-financial scenarios

The four macro-financial scenarios are designed using a range of tools.

Statistical simulations are used to derive shocks to government bond spreads, stock prices, and asset values of investment funds, as well as responses of other financial market parameters to these shocks. International spillovers of financial shocks from non-EU countries are modelled using Bayesian vector autoregression (BVAR) models and a global vector autoregression (GVAR) model⁶⁴, while the impact of global developments outside the European Union on euro area foreign demand is assessed using NiGEM (National Institute Global Econometric Model). The impact of the shocks on the euro area economies has been derived using stress-test elasticities (STEs).⁶⁵ The baseline scenario used in the assessment is derived from the European Commission's spring economic forecast.

The global risk aversion scenario reflects the risk of an abrupt reversal of investor confidence and rise in risk aversion worldwide. This scenario would be triggered by simultaneous financial market turmoil in the fixed income markets in the advanced economies and a rapid increase in global financial market uncertainty. The heightened market volatility would push the prices of euro area financial assets down. Stock prices would fall by 14% and long-term interest rates would increase by slightly more than 100 basis points. The economic outlook for the euro area would be adversely affected by the reduction in foreign demand for euro area exports by about 8%, concentrated in the emerging market economies. This scenario translates into an overall deviation of euro area GDP of 1.7% below the baseline level by the middle of 2018.

The weak bank operating environment scenario captures the risk of persistently weaker than anticipated domestic economic activity in many euro area countries, in an environment of negative headline inflation. It includes a sharp decline in private consumption and investment, and assumes that commodity prices would return to their very low levels observed in early 2016. Overall, the level of euro area real GDP would stand about 4.1% below the baseline by mid-2018. Interest rates and bank funding costs would remain low, evolving in line with the baseline projection in this scenario.

The debt sustainability crisis scenario envisages a renewed increase in euro area sovereign bond yields to elevated levels. Long-term government bond yields are assumed to increase over a one-year period by about 90 basis points above current market expectations. A significant dispersion of government bond yields across euro area countries would re-emerge, as the shocks to sovereigns with weaker fundamentals would exceed 200 basis points. Responding to the adverse developments in the sovereign debt markets, euro area stock prices would fall

⁶⁴ For details on the GVAR model, see Dees, S., di Mauro, F., Pesaran, M. H. and Smith, L. V., "Exploring the International Linkages of the Euro Area: A Global VAR Analysis", *Journal of Applied Econometrics*, Vol. 22, 2007, pp. 1-38.

⁶⁵ STEs are a multi-country, EU-wide simulation tool. They are based on impulse response functions (from ESCB central banks' models) of endogenous variables responding to predefined exogenous shocks. They also incorporate intra-EU trade spillovers.

sharply, by 20%. The debt sustainability concerns would also trigger a demand shock in the residential property markets, leading to a decline in house prices by about 14% below the baseline levels. These developments would reduce euro area GDP by about 1.2% compared with the baseline by the second quarter of 2018.

The investment fund spillover scenario considers the spillovers from the non-bank financial sector to the euro area banking and insurance sectors via the funding channel and lower asset valuations. Unexpected increases in redemptions by investors in investment funds would lead to forced sales, which would put lasting pressure on euro area asset prices.⁶⁶ Funding constraints in the euro area banking sector would emerge and the cost of funding – in particular through short-term and long-term unsecured instruments – would increase. Banks would adjust to tighter funding conditions by increasing their lending spreads, thus increasing the cost of capital of the private sector. Overall, this scenario would reduce euro area GDP by about 0.9% compared with the baseline level by the second quarter of 2018. Bank long-term funding spreads would increase by about 50 basis points and short-term unsecured money market spreads would widen by about 45 basis points.

Looking at the impact of the different scenarios, the weak bank operating environment scenario would have the strongest impact on euro area economic activity, while the debt sustainability scenario would lead to the most pronounced impact on property prices and the global risk aversion scenario would cause the largest increase in government bond yields (see Table 3.2).

The first two scenarios, corresponding to medium-level systemic risks, are considered to be more probable than the other two scenarios, which are associated with potential systemic risks (see the Overview). Therefore, the global risk aversion scenario and the weak bank operating environment scenario represent a somewhat greater cause for concern.

Table 3.2

Overall impact on euro area GDP growth under the adverse macro-financial scenarios

	2015	2016	2017	Q2 2018
Baseline (annual percentage growth rates)	1.7	1.6	1.8	
	percentage point dev. from baseline growth			% dev. from baseline level
Global risk aversion scenario		-0.4	-0.9	-1.7%
Weak bank operating environment scenario		-1.2	-2.1	-4.1%
Debt sustainability crisis scenario		-0.2	-0.7	-1.2%
Investment fund spillover scenario		-0.2	-0.5	-0.9%

Sources: European Commission, ECB.

With regard to the key financial market parameters, the global risk aversion scenario involves a steepening of the yield curves in the euro area, with

⁶⁶ 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 returns on investment in shadow banking entities and financial market variables, such as stock prices or interest rates.

limited cross-country variation, together with a significant drop in stock prices (see Table 3.3). By contrast, the degree of steepening of the yield curve under the debt sustainability crisis scenario exhibits a large dispersion across the individual euro area countries. Under the weak bank operating environment scenario, the yield curve would remain unchanged, while in the case of the investment fund spillover scenario, a slight flattening would be associated with an upward shift of the curve.

Table 3.3

Overall impact of the adverse macro-financial scenarios on interest rates and asset prices

	Global risk aversion scenario	Weak bank operating environment scenario	Debt sustainability crisis scenario	Investment fund spillover scenario
Average euro area increase in short-term interest rates (basis points)	0	0	0	45
Average euro area increase in long-term government bond yields (basis points)	100	0	90	65
Reduction in euro area real estate prices (% deviation from baseline)	-3	-2	-14	-2
Reduction in euro area equity prices (%)	-14	0	-13	-24

Source: ECB.

The four risks may act as triggers for each other, so that the scenarios may materialise jointly, reinforcing the already severe macro-financial conditions prevailing under each of the individual scenarios.

Solvency results for euro area banking groups

The impact of the four scenarios on bank solvency is broken down into the direct impact on the capital of individual banks, on the one hand, and indirect effects stemming from cross-institutional contagion, on the other. The direct impact is obtained from a projection of the main variables that determine banks' solvency, such as the credit risk parameters, profits and risk-weighted assets. The indirect effects are related to the hypothetical defaults by banks breaching the minimum capital requirements as a result of losses borne through the direct impact, thereby amplifying the losses of other institutions.

Under the baseline scenario, the capital position of the euro area banking groups⁶⁷ is projected to improve. The aggregate common equity Tier 1 (CET1) capital ratio is projected to increase by about 0.8 percentage point, to 14.1% by the middle of 2018 (see **Chart 3.42**). This improvement would be driven by positive operating profits, which exceed the negative contribution of credit losses by about 0.8 percentage point. Other effects on capital play a marginal role.

The debt sustainability crisis scenario would, in spite of its relatively low likelihood, lead to the most severe outcome in terms of bank solvency (see Chart 3.43). It would be followed by the global risk aversion scenario and the investment fund spillover scenario. While the impact of the weak bank operating

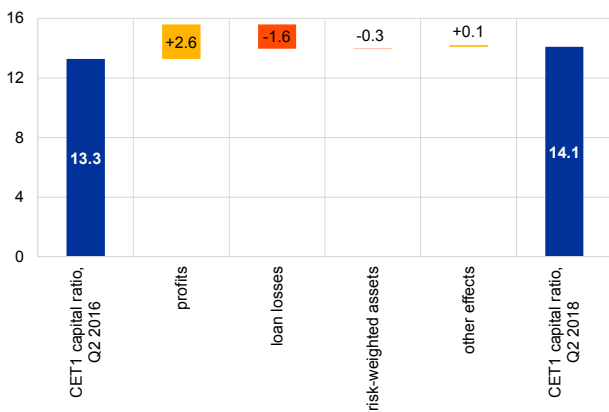
⁶⁷ The scenario analysis covers about 100 large and medium-sized banking groups directly supervised by the ECB. The starting point for the analysis is at end-June 2016.

environment scenario would be the least severe, the repercussions of that scenario would be likely to persist beyond the two-year horizon presented here owing to the transmission lag between economic conditions and bank solvency.

Chart 3.42

Under the baseline scenario, the euro area bank solvency position would improve by 0.8 percentage point

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 contribution)

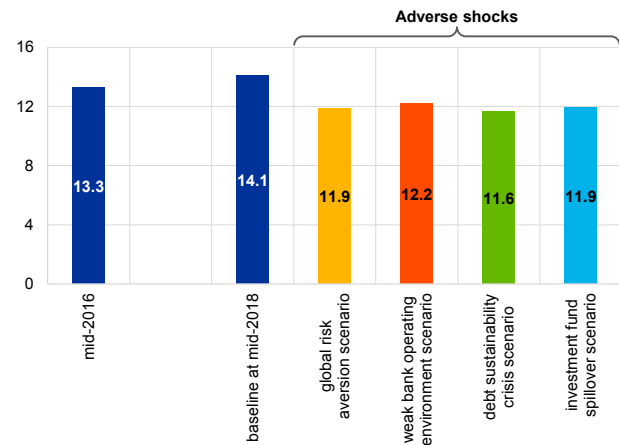


Sources: Individual institutions' financial reports, EBA, ECB and ECB calculations.

Chart 3.43

The adverse scenarios would reduce the aggregate capital ratio by between 1.9 and 2.5 percentage points

Average CET1 capital ratios of euro area banking groups under the baseline and adverse scenarios (2016-18; percentage, average of euro area banking groups)



Sources: Individual institutions' financial reports, EBA, ECB and ECB calculations.

The adverse scenarios would lead to an increase in the cost of credit risk. The deviation of bank capital ratios from the baseline projection is largely explained by higher impairment provisions on loans, which would reduce the aggregate CET1 capital ratio by between 0.7 and 1.0 percentage point compared with the baseline result. These provisions would be particularly high under the weak bank operating environment scenario, amounting to 2.5% of risk-weighted assets, reflecting the sharp deterioration in economic conditions assumed under that scenario.

Operating profits would fall under all adverse scenarios. The most pronounced impact would be observed under the investment fund spillover scenario (-0.8 percentage point compared with the baseline), under which net interest income would contract, reflecting the assumed shocks to the cost of wholesale unsecured funding. The weak bank operating environment scenario would be the most benign of the four scenarios with respect to operating profits, which deviate by -0.5 percentage point from the baseline.

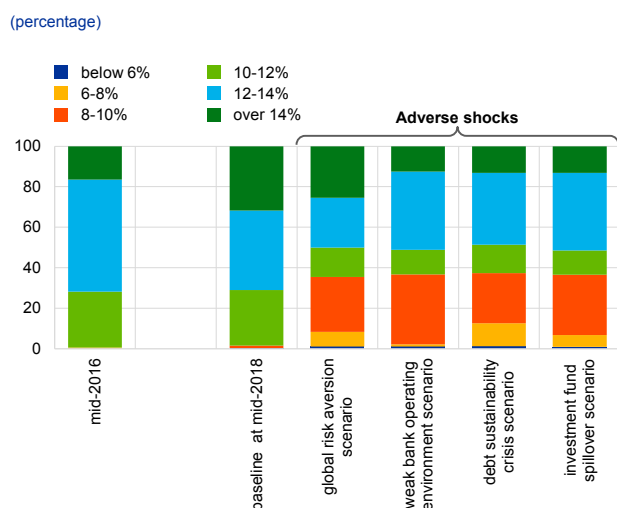
Losses on debt securities held at fair value would be relatively high under the debt sustainability crisis scenario, contributing about 0.5 percentage point to the decline in the CET1 ratio. The impact of changes in risk-weighted assets and other items would be more homogeneous across the four scenarios. The increase in risk-weighted assets would reduce the aggregate CET1 ratio by up to 0.2 percentage point.

Only a few small banks would face solvency difficulties under the adverse scenarios. The share of euro area banks with a CET1 ratio lower than 6% of bank total assets would not exceed 1.5% under any of the four scenarios. For the majority of banks, the CET1 ratio would remain above 12% (see [Chart 3.44](#)).

The impact of interbank contagion on bank solvency is therefore projected to be moderate (see Chart 3.45).⁶⁸ For the simulated networks with the strongest contagion effects, the system-wide CET1 capital ratio would fall, in addition to the first-round losses, by less than 0.05 percentage point under the debt sustainability crisis scenario. Contagion effects would be even more muted under the other three scenarios. It should nonetheless be noted that this simulation is restricted to direct contagion via bilateral exposures, and does not capture contagion through other channels such as asset prices or the price and availability of funding.

Chart 3.44
The vast majority of banks would remain well capitalised under the four adverse scenarios

Distribution of banks' assets by CET1 capital ratio

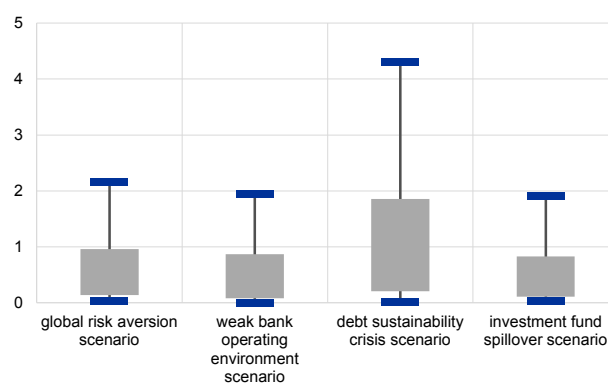


Sources: Individual institutions' financial reports, EBA, ECB and ECB calculations.

Chart 3.45
Contagion through interbank exposures would lead to a minor increase in the total solvency impact

Reduction of the CET1 capital ratio of euro area banks due to interbank contagion: dispersion across simulations

(basis points of CET1 capital ratio; box: interquartile range; bars: 10th-90th percentile range)



Sources: Individual institutions' financial reports, EBA, ECB and ECB calculations.

The findings of this scenario analysis are in line with the conclusions of the 2016 EU-wide stress-testing exercise coordinated by the EBA. Although that exercise is of a different nature, it also demonstrates the overall resilience of the largest euro area banks⁶⁹ to adverse macro-financial developments of a more complex and severe nature. The adverse scenario of that exercise captured jointly the main risks to financial stability in the EU identified by the European Systemic Risk Board (ESRB). It assumed that a protracted recession would take place in the

⁶⁸ For a description of the methodology, see Halaj, G. and Kok, C., "Assessing interbank contagion using simulated networks", *Working Paper Series*, No 1506, ECB, 2013, and *Computational Management Science* (10.1007/s10287-013-0168-4).

⁶⁹ The sample of the EU-wide stress-testing exercise was narrower than the sample used in this report, consisting of the 37 largest euro area banking groups and a further 14 banking groups based in non-euro area EU countries.

euro area, coupled with deflation persisting for two years and major financial market turbulence.⁷⁰ Overall, euro area GDP would deviate from its baseline level by 6.8% by the end of 2018. Under these adverse conditions, the aggregate CET1 ratio of the largest euro area banks would fall from about 13.0% to about 9.1%. Although the stress impact would be considerable, it would not trigger a large-scale solvency issue for EU banks.

Assessing the resilience of euro area insurers

The assessment of the impact of the main euro area financial stability risks on large euro area insurers is conducted using publicly available data for 11 major euro area insurance groups up to the fourth quarter of 2015. Shocks to the insurers in the sample are assumed to be instantaneous and to hit the valuation of both the assets and liabilities of insurance corporations. Due to the lack of sufficiently granular data, this impact assessment aims to spell out the main risks in economic terms, i.e. changes in net asset value, rather than trying to gauge the impact in terms of prudential solvency ratios.

The following market, credit and underwriting risks are assessed: (i) an increase in interest rates; (ii) a fall in equity and property prices; (iii) a deterioration in the creditworthiness of borrowers through a widening of credit spreads for marketable instruments; (iv) an increase in lapse rates⁷¹; and (v) an increase in loss rates of loan portfolios. This assessment uses the same four scenarios that were presented earlier in this section. **Table 3.4** summarises the key aspects of the scenarios used in this exercise. Against this background, the risks for insurance companies are transmitted through three channels, namely: (i) valuation effects on financial securities and liabilities owing to changes in stock prices, sovereign yields and swap rates; (ii) sales of assets due to unforeseen redemptions resulting from increased lapse rates; and (iii) changes in the credit quality of loan portfolios. In this context, a number of simplifying assumptions had to be made for this exercise.⁷²

⁷⁰ The four systemic risks identified by the ESRB General Board as the most material threats to the EU financial system are: (i) a sudden increase in global risk premia, amplified by low secondary market liquidity; (ii) low profitability prospects in a low nominal growth environment; (iii) rising debt sustainability concerns in public and non-financial private sectors; and (iv) prospective stress in the shadow banking sector, amplified by spillover and liquidity risk. For the detailed description of the scenario of the 2016 EU-wide bank stress-testing exercise, see *Adverse macro-financial scenario for the EBA 2016 EU-wide bank stress testing exercise*, European Systemic Risk Board, 29 January 2016.

⁷¹ The lapse rate is defined as the fraction of contracts terminated prematurely by policyholders.

⁷² For a comprehensive explanation of the underlying assumptions, please refer to Section 3.2 of the May 2015 FSR.

Table 3.4

Technical assumptions regarding the individual risk drivers of insurers' balance sheets

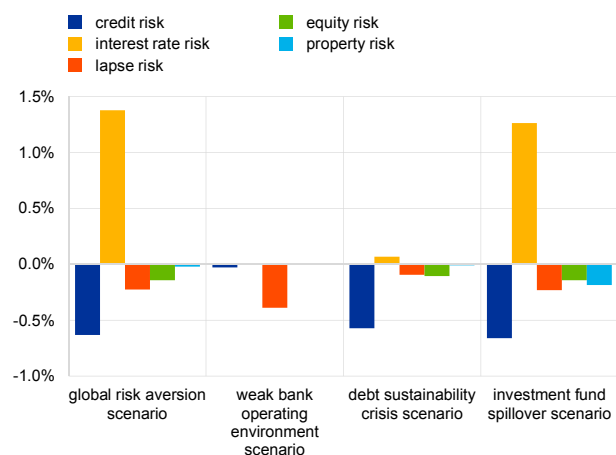
Risk drivers	Technical assumptions
Credit risk	Credit risk assessment carried out using: (i) breakdowns by rating or region, depending on data availability; and (ii) loss rate starting levels, which are stressed using the same methodology as that applied for assessing the resilience of euro area banks.
Interest rate risk transmission	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.
Market valuations of securities	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.
Lapse risk	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 ⁷³ . Unexpected component of lapses ⁷⁴ leads to surrender payments ⁷⁵ . 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.
Other assumptions specific to the sensitivity of investment income	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.

Chart 3.46

Change in the net asset values of large euro area insurers under different scenarios

(Q4 2015; percentage of total assets)



Sources: Individual institutions' financial reports and ECB calculations.

The investment fund spillover scenario is projected to have the strongest adverse impact on insurance companies (see Chart 3.46).

It is followed by the weak bank operating environment scenario. In these two scenarios, euro area insurers exhibit average total declines in their net asset values amounting, respectively, to 0.7% and 0.4% of their total assets. Insurers are projected to benefit from the global risk aversion scenario, under which their net asset values are projected to increase. The impact of the debt sustainability crisis scenario is projected to be limited.

Under all the considered scenarios but the weak bank operating environment scenario, valuation of corporate and bank bonds appears to be the most significant negative driver in terms of the change in net asset value.

Although the channels of materialisation of macro-financial risks are heterogeneous across individual insurance groups, the

widening of credit spreads leads to a similar quantitative impact across three scenarios, i.e. the debt sustainability crisis, the global risk aversion, and the investment fund spillover scenarios. Changes in credit spreads, related mainly to

⁷³ 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.

⁷⁴ 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.

⁷⁵ 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.

corporate bonds, cause, in the first of these scenarios, a decline of about 0.7% in net asset values expressed as a percentage of total assets. Under the other two scenarios, the decrease would be slightly smaller.

Interest rate shocks contribute positively to net asset values of insurers under the debt sustainability crisis and global risk aversion scenarios, fully compensating for the adverse impact of the other risks, including credit risk.

The positive impact of the interest rate shock reflects the specific nature of insurers' balance sheet structure, namely the overall longer duration of liabilities relative to the duration of assets. Liabilities of insurers fall in value by more than the assets, as the rise in interest rates is combined with a simultaneous steepening of the yield curve. The magnitude of the positive impact on insurers' balance sheets reaches 1.4% of total assets in the global risk aversion scenario and 1.3% in the debt sustainability crisis scenario. By contrast, under the investment fund spillover scenario, the moderate flattening of the yield curve has an almost neutral effect on insurers' net asset values as a percentage of total assets, at +0.1%. By assuming an unchanged yield curve, the weak bank operating environment scenario has a muted impact on interest rate risk.

Variations in equity price losses would be moderate. The negative impact of the adverse equity price shocks would reach, at most, 0.14% of net asset value under the global risk aversion and the debt sustainability crisis scenarios. The weak impact reflects the limited exposure of euro area insurers to equity risk. Finally, lapse risk-related losses would be the highest under the weak bank operating environment scenario, reflecting the more adverse developments in GDP growth and the unemployment rate under this scenario.

In comparison with the previous exercise⁷⁶, the stress impacts are more contained, reflecting the greater resilience of the insurance sector to the threats targeted by the macro-financial scenarios, in spite of the persistence of the low interest rate environment.

3.3 Regulatory framework

This section provides an overview of a number of regulatory initiatives in the areas of banking, financial markets, financial infrastructures and insurance that are of particular importance for enhancing financial stability in the EU. The initiatives aim at both reducing systemic risk and strengthening the resilience of the financial system as a whole.

⁷⁶ Please refer to Section 3.2 of the May 2016 FSR.

Regulatory initiatives for the banking sector

1. Prudential rules for banks

Macroprudential review:

A key regulatory initiative from a financial stability perspective is the review of the EU macroprudential framework. In its consultation document, published on 1 August, the European Commission highlighted that macroprudential regulation has evolved incrementally over recent years and this piecemeal approach has created a number of weaknesses in the framework. The review therefore aims to align the different elements of the macroprudential framework to ensure it functions more effectively and to create the right balance between national flexibility and the harmonisation of rules at the EU level.

The establishment of a sound regulatory framework is of paramount importance for national designated authorities (NDAs), as well as for the ECB when acting in its capacity as a macroprudential authority, for the effective conduct of macroprudential policy in the Member States and in the Single Supervisory Mechanism (SSM), respectively. Against this background, the importance of macroprudential policy as a complement to monetary policy and microprudential policy should be highlighted. This complementarity of policies is particularly important in a monetary union where macroprudential policy can address country or sector-specific imbalances, thereby also contributing to addressing the heterogeneity in financial and business cycles across Member States.

The ECB fully supports a comprehensive review of the macroprudential policy framework. The primary objective of the revision should be to enhance the effectiveness of the macroprudential policy framework without impeding the effectiveness of the other complementary policies. In this regard, it is important to reflect the new institutional landscape in the macroprudential policy framework, notably the establishment of the SSM, as well as to revise the specific powers of micro- and macroprudential authorities, streamline the coordination mechanism between authorities, broaden the macroprudential policy tools and simplify their activation mechanism so as to ensure that authorities can address systemic risks in a timely and effective manner.

Of particular importance from the ECB's perspective is the proper recognition in all relevant pieces of EU law of its responsibility – together with the NDAs – for the macroprudential policy of the Member States participating in the SSM. This requires a thorough revision of the current legislation since the macroprudential framework set out in the Capital Requirements Regulation and Directive (CRR/CRD IV) as well as in the ESRB Regulation predates the establishment of the banking union and in particular of the SSM. The ECB looks forward to contributing to the legislative work in this area.

Review of the capital framework:

The Basel Committee on Banking Supervision (BCBS) has undertaken a strategic review of the capital framework to tackle the excessive and unwarranted variability in risk-weighted assets (RWAs), reduce the complexity of the regulatory framework and improve the comparability of banks' capital ratios. In this context, the BCBS published on 10 December 2015 a consultation document with proposed revisions to the standardised approach (SA) for credit risk, aimed at striking an appropriate balance between simplicity and risk sensitivity. In this regard, the Committee proposed not to assign a flat risk weight to mortgages any longer, but to link the risk weighting to the loan-to-value (LTV) ratio. Furthermore, a different treatment with higher risk weights has been proposed for real estate exposures where repayment is materially dependent on the cash flows generated by the property securing the exposure. For exposures to banks and corporates, the December 2015 proposal reintroduced the use of ratings, albeit in a non-mechanistic manner (the previous BCBS consultation document, published in December 2014, had removed all references to external credit ratings and substituted them with a set of risk drivers). The BCBS also published on 24 March 2016 a consultation document on the revision of the internal ratings-based (IRB) approach for credit risk. The BCBS has proposed: (i) removing the option to use the IRB approach for certain exposure classes for which modelling is regarded as insufficiently reliable for regulatory capital purposes; (ii) setting floors for model parameters for exposure classes where constrained modelling will be allowed; and (iii) better specifying parameter estimation practices where the IRB approach remains available. Finally, the BCBS is considering the potential introduction of an aggregate output floor based on the risk weights obtained under the standardised approach.

These reforms are intended to finalise Basel III, strengthening bank capital rules and restoring confidence in the risk-based capital framework. The BCBS's oversight body, the Group of Central Bank Governors and Heads of Supervision (GHOS), has attached a condition to the adoption of the new rules, namely that the reforms should not significantly increase overall capital requirements. This commitment, first made in January 2016 and reiterated in September 2016, refers to the banking system as a whole and does not exclude that some "outlier" banks might face a significant increase in capital requirements. The BCBS has conducted in the course of 2016 a cumulative quantitative impact study (QIS) aimed at testing the effects of the proposed new rules on capital levels, taking into account all the changes introduced to finalise the Basel III framework (e.g. the new standardised approach for credit risk, the revised IRB approach, the new operational risk framework and the final elements of the leverage ratio). The outcome of the QIS will help the BCBS to make an informed decision on the final design and calibration of the measures. The BCBS is studying the impact taking into account a set of policy scenarios, as well as different bank sizes and business models.

Liquidity regulation (net stable funding ratio, NSFR):

Ahead of the Basel NSFR implementation in the EU, the European Commission launched in May a consultation on several areas of concern. The consultation

follows the Commission's call for evidence in September 2015, in response to which many respondents expressed concerns about the fact that the NSFR could unduly constrain banks' ability to finance the real economy. The main areas of concern regard: (i) the excessive impact on bank lending and, in particular, on specific banking models; (ii) the identification of a more risk-sensitive measure than that proposed by the Basel standards to capture future funding risk arising from derivative transactions; (iii) the impact of the NSFR charges on short-term secured transactions with financial institutions, and (iv) the proportionality of the NSFR application. As highlighted in its response to the consultation, the Eurosystem considers that the available evidence for European banks does not suggest an excessive impact of the NSFR for the majority of banks, agrees with the deficiencies identified in the assessment of funding needs arising from derivatives exposures, and supports further work on this. Regarding the third issue, the Eurosystem considers the net funding requirements imposed on short-term secured transactions to be adequate to prevent institutions from over-relying on short-term wholesale funding to meet their funding needs. Finally, the Eurosystem considers that the NSFR should be applied irrespective of the size of a credit institution and supports the European Banking Authority (EBA)'s recommendation that central counterparties should be exempted from the NSFR, considering their role as intermediaries.

2. Crisis management and resolution of banks

BRRD/MREL:

Recent financial crises across EU Member States revealed particular deficiencies in banks' safeguards, highlighting the importance of ensuring sufficient and credible loss-absorbing capacity. In response to this challenge, and also following up on G20 and Financial Stability Board (FSB) recommendations, new regulatory requirements – namely the total loss-absorbing capacity (TLAC) for global systemically important banks (G-SIBs) at the international level and the minimum requirement for own funds and eligible liabilities (MREL) for all EU credit institutions – have been introduced. As regards the latter, MREL – as defined in the Bank Recovery and Resolution Directive (BRRD) – aims at ensuring that banks hold sufficient amounts of own funds and eligible liabilities that could be readily used to absorb losses and to recapitalise the bank in case of resolution. In this respect, MREL helps ensure that in cases of resolution the costs are shouldered by banks' shareholders and creditors, rather than taxpayers. Thus, MREL – also as a pillar that ensures the credibility of the bail-in regime – contributes to the resolvability of banks and to safeguarding financial stability, while at the same time it helps mitigate the build-up of systemic risk. Having said that, MREL contributes also to avoiding both moral hazard and the overburdening of public finances, which might have a severe impact on both the real economy and the financial system.

The BRRD, published in June 2014, has been transposed into the national legislation of all Member States. Furthermore, following the EBA's work – as provided in the BRRD – the European Commission published a delegated regulation in May 2016 supplementing the BRRD with regard to regulatory technical standards,

specifying the criteria relating to the methodology for setting MREL. It is foreseen that the BRRD will be revised by the end of 2016. In this context, the EBA published an interim report on MREL in June and the final MREL report, as required under the BRRD, is expected to be submitted to the Commission this year. Based on the findings of this EBA report, the Commission will submit a legislative proposal on the implementation of TLAC in the EU and make other revisions in the MREL framework by end-2016.

3. European Deposit Insurance Scheme (EDIS)

In November 2015 the Commission published a proposal for a regulation establishing a European Deposit Insurance Scheme (EDIS), accompanied by a communication on completing banking union. At the ECOFIN Council meeting on 17 June, the Council conclusions on a roadmap to complete banking union including risk-sharing (EDIS and a backstop to the Single Resolution Fund) and risk-reduction measures were adopted.

In the ECB's view, it is important that such a scheme is in place and operational as soon as possible and that progress continues to be made on the risk-reduction agenda. A rapid implementation of EDIS is necessary to ensure a uniformly high level of depositor protection across the banking union, so as to promote the completion of the banking union and to further enhance and safeguard financial stability. Deposit insurance is both an ex ante tool to enhance confidence and prevent bank runs and an ex post tool to protect against the adverse consequences of individual bank failures. In parallel, progress should continue on implementing reforms which will contribute to reducing risks in the banking system, such as implementing remaining banking reforms (e.g. TLAC) but also further measures such as the reduction of non-performing loans and a harmonisation of insolvency laws.

Table 3.5**Selected regulatory initiatives at the international level and new legislation and legislative proposals for the banking sector in the EU**

Initiative	Description	Current status
SA and IRB review	<p>The BCBS published a second consultation document on revisions to the standardised approach (SA) for credit risk. The proposals aim to strike an appropriate balance between simplicity and risk sensitivity.</p> <p>The BCBS also published a consultation document to address excessive RWA variability for credit risk related to the IRB approach, removing the option to use such an approach for certain exposures. Where the IRB approach is still allowed, input floors – e.g. for probability of default and loss given default – would be introduced, as well as a better specification of parameter estimations. The possibility of output floors in relation to the SA is also under consideration.</p>	<p>The second SA consultation document was published on 10 December 2015 (first consultation document: 22 December 2014). The IRB consultation document was published on 24 March 2016. In the course of 2016 the BCBS has conducted a QIS, the outcome of which will help the BCBS to make an informed decision on the final design and calibration of the revised SA and IRB framework.</p>
TLAC standard and MREL review	<p>The FSB agreed in November 2015 on a new international TLAC standard for G-SIBs, ensuring that there will be sufficient loss-absorbing and recapitalisation capacity in resolution. In the EU, TLAC will be implemented through the ongoing MREL review, which will be concluded in 2016.</p>	<p>The BRRD specifies that the EBA shall submit a report to the European Commission and, on the basis of this report, the Commission will submit a legislative proposal on the harmonised application of MREL, if appropriate, and implement TLAC for the G-SIBs in the EU. The EBA published an interim report on MREL in June and its final MREL report is expected this year. The Commission has indicated that a legislative proposal will be published before end-2016.</p>
EDIS	<p>The EDIS proposal foresees the establishment of a fully fledged European depositor protection scheme as of 2024, via an increased mutualisation in three steps (reinsurance, coinsurance, full EDIS).</p>	<p>The European Commission published a legislative proposal for a European Deposit Insurance Scheme on 24 November 2015, together with a communication on completing banking union. EDIS is considered the third pillar of a fully fledged banking union, as notably outlined in the Five Presidents' Report.⁷⁷ The EDIS proposal is currently being discussed at the Council in an Ad Hoc Working Party, which is also discussing 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 2016.⁷⁸</p>
NSFR	<p>The European Commission is currently implementing the NSFR in Europe. The NSFR becomes a minimum standard on 1 January 2018.</p>	<p>The European Commission consulted in May on several issues regarding the NSFR standard, to assess whether certain provisions of the standard could unduly constrain banks' ability to finance the real economy.</p>
Simple, transparent and standardised (STS) securitisations	<p>The STS initiative acknowledges that simple and transparent securitisations have performed better, including through crisis periods, than other securitisation structures and therefore should be treated in a differentiated manner in regulation. The proposed Securitisation Regulation would apply to all securitisations and includes due diligence, risk retention and transparency rules, together with criteria to identify STS securitisations. The proposal to amend the CRR puts forward, inter alia, lower capital charges for securitisations that meet the STS criteria, as well as a number of additional criteria specific to the bank capital framework.</p>	<p>The European Commission made the two proposals (the Securitisation Regulation and the CRR amendment) on 30 September 2015. The EU Council agreed on a negotiating stance on the two proposals on 2 December. The European Parliament expects to finalise its stance by the end of 2016. Triilogue negotiations are currently expected in early 2017. The ECB published its opinion on the Commission's proposals on 14 March.</p> <p>The BCBS incorporated STC (simple, transparent and comparable) securitisations in the bank capital framework and published an updated securitisation framework in July 2016.</p>

Regulatory initiatives for financial markets and financial infrastructures

In addition to the initiatives in the area of banking regulation, several steps have also been taken to address the risks in financial markets and to strengthen the resilience of financial infrastructures.

1. Market-based finance/investment funds

In the field of market-based finance, the FSB has continued its work on the deliverables laid out in the roadmap on “Transforming shadow banking into

⁷⁷ [Report on Complementing Europe's Economic and Monetary Union](#), published on 22 June 2015.

⁷⁸ [Opinion of the European Central Bank of 20 April 2016](#) (CON/2016/26).

resilient market-based financing”, published on 14 November 2014. On 22 June 2016 the FSB published its proposed policy recommendations to address the risks associated with asset management activities, for public consultation. This work focuses 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 a stressed condition; 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 beyond banking.

In Europe, after the publication of the Regulation on transparency of securities financing transactions and of reuse on 23 December 2015, work is ongoing on the regulatory technical standards defining the data elements to be reported to trade repositories. Depending on the category of the reporting entity, the reporting will start at different stages from 12 to 21 months after the entry into force of the relevant technical standards (i.e. between mid-2018 and mid-2019).

2. Financial infrastructures

The ECB Regulation on oversight requirements for systemically important payment systems entered into force on 12 August 2014, aiming at, inter alia, ensuring efficient management of legal, credit, liquidity, operational, general business, custody, investment and other risks of systemically important payment systems (SIPs). Four payment systems are subject to this Regulation: TARGET2 (operated by the Eurosystem), EURO1 and STEP2-T (both operated by EBA Clearing), and CORE (FR) (operated by STET). These systemically important payment systems had to comply with the requirements of the Regulation by August 2015. All of the systems are currently being assessed against the Regulation. The Regulation is currently being reviewed and it is envisaged to consult the public on potential revisions.

Implementation of the European Market Infrastructure Regulation (EMIR) has continued to progress. Since 21 June 2016 certain types of standardised interest rate swaps (IRSs) are required to be cleared through central counterparties (CCPs). A similar obligation will enter into force for standardised CDSs in February 2017. On 4 October 2016 the Commission adopted a delegated regulation specifying how margin should be exchanged for OTC derivative contracts that are not cleared by a CCP. The delegated regulation is subject to a period for objection by the European Parliament and the Council before it is published in the Official Journal of the European Union.

In September 2015 the ECB published its response to the Commission’s consultation on the review of EMIR, in which it proposed amending the Regulation in order to fully recognise the ECB’s role in the field of banking supervision, to address issues related to the quality and availability of derivatives data, and to further enhance the requirements for mitigating

procyclicality. Regarding procyclicality, the proposals aim to ensure that CCPs are adequately protected from increases in market volatility without needing to exert potentially destabilising liquidity pressure on their clearing members. Moreover, the ECB supports the inclusion of macroprudential intervention tools in EMIR (for example, providing authorities with the power to set time-varying margin and haircut requirements for derivative transactions), in order to prevent the build-up of systemic risk resulting, in particular, from excessive leverage, and to further limit the procyclicality of margins and haircuts.

Table 3.6

Selected new legislation and legislative proposals for financial markets and financial infrastructure in the EU

Initiative	Description	Current status
ECB Regulation on oversight requirements for systemically important payment systems	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.
European Market Infrastructure Regulation (EMIR)	The Regulation aims to bring more safety and transparency to the OTC derivatives market and sets out rules for, inter alia, central counterparties and trade repositories.	The Regulation entered into force on 16 August 2012.
Regulation on improving the safety and efficiency of securities settlement in the EU and on central securities depositories (CSD Regulation)	The aim of the Regulation is to increase the safety and efficiency of securities settlement and settlement infrastructures (i.e. central securities depositories) in the EU. It introduces an obligation of dematerialisation for most securities, harmonised settlement periods for most transactions in such securities, settlement discipline measures and common rules for central securities depositories.	The Regulation entered into force on 17 September 2014. The European Commission is currently considering technical standards drafted by the European Securities and Markets Authority (ESMA) and the EBA, in close cooperation with members of the ESCB. Once endorsed by the Commission, both the European Parliament and the Council have an objection period.
Markets in Financial Instruments Directive and Regulation (MiFID II/MiFIR)	The legislation applies to investment firms, market operators and services providing post-trade transparency information in the EU. It is set out in two pieces of legislation: a directly applicable regulation dealing, inter alia, with transparency and access to trading venues, and a directive governing authorisation and the organisation of trading venues and investor protection.	Directive 2014/65/EU on markets in financial instruments (MiFID II) and Regulation (EU) No 600/2014 on markets in financial instruments (MiFIR) were both published in the Official Journal of the EU on 12 June 2014.
Regulation on transparency of securities financing transactions and of reuse (SFTR)	The Regulation contains measures aimed at increasing the transparency of securities lending and repurchase agreements through the obligation to report all transactions to a central database. This seeks to facilitate regular supervision and to improve transparency towards investors and on re-hypothecation arrangements.	Regulation (EU) 2015/2365 of the European Parliament and of the Council of 25 November 2015 on transparency of securities financing transactions and of reuse was published in the Official Journal of the EU on 23 December 2015.

Regulatory initiatives for the insurance sector

In Europe, the European Insurance and Occupational Pensions Authority (EIOPA) launched the 2016 EU-wide insurance stress test, using the Solvency II framework and harmonised reporting requirements.

The stress test will assess the resilience of the European insurance sector to severe adverse market scenarios.⁷⁹ The results will be disclosed in December 2016.⁸⁰ Moreover, EIOPA prepared – as requested by the European Commission – its technical advice⁸¹ on the

⁷⁹ The stress test comprises three scenarios: (i) the baseline scenario, i.e. the pre-stress valuation of the balance sheet; (ii) the scenario with a prolonged low-yield environment; and (iii) the “double-hit” scenario, i.e. a negative market shock to asset prices combined with a low risk-free rate.

⁸⁰ See [EIOPA’s website](#) for more information.

⁸¹ [Final Report on Consultation Paper no. 16/004 on the request to EIOPA for further technical advice on the identification and calibration of other infrastructure investment risk categories, i.e. infrastructure corporates](#), EIOPA, 30 June 2016.

identification and calibration of infrastructure corporates. In its advice, EIOPA made some recommendations⁸² to further support the aim of creating a high-quality, long-term asset class for infrastructure by capturing relevant investments in corporates. Furthermore, the Commission requested EIOPA's advice⁸³ on the review of specific items in the Solvency II Delegated Regulation, following the public consultation on the benefits, unintended effects, consistency and coherence of the financial legislation adopted in response to the financial crisis. The Commission asked EIOPA to focus on the proportionate and simplified application of the requirements, and the removal of unintended inconsistencies by 31 October 2017. At a later stage, EIOPA's technical advice may also be requested with regard to the removal of unjustified constraints on financing.

At the international level, the assessment methodology for the designation of global systemically important insurers (G-SIIs), which has been used since 2013, has been revised by the International Association of Insurance Supervisors (IAIS). The updated methodology⁸⁴ outlines a five-phase approach to the G-SII assessment process and modifies certain indicators used in the initial assessment methodology to improve, among other things, the connection with systemic risk and data quality. The IAIS also published a paper⁸⁵ which explains why certain insurance product features and related activities may raise the potential for an insurer to pose systemic risk upon failure. In November the IAIS published a new list of insurers which have been designated as G-SIIs. This list is based on the updated methodology, but it includes the same entities as last year. Finally, the IAIS published a consultation paper on the risk-based global Insurance Capital Standard (ICS)⁸⁶ with the focus on valuation methodologies, qualifying capital resources and the implementation of risk-based approaches to determine regulatory capital requirements. The ICS is scheduled for adoption by the IAIS in late 2019.

Other initiatives

Capital markets union

The ECB supports the next steps to accelerate the capital markets union (CMU) as announced in the September 2016 European Commission communication. In this context, the ECB in particular welcomes the planned actions in the areas of insolvency law and taxation. A fully fledged CMU needs to tackle differences in the national and European legislative frameworks which pose an

⁸² EIOPA recommends that certain infrastructure corporates qualify for treatment as infrastructure projects provided that there is an equivalent level of risk. It recommends creating a separate differentiated treatment for equity investments in high-quality infrastructure corporates.

⁸³ [Request to EIOPA for Technical Advice on the Review of Specific Items in the Solvency II Delegated Regulation](#), European Commission, 18 July 2016.

⁸⁴ [Updated G-SII Assessment Methodology](#), IAIS, 16 June 2016.

⁸⁵ [Systemic Risk from Insurance Product Features \(previously referred to as Non-traditional Non-insurance activities and products\)](#), IAIS, 16 June 2016.

⁸⁶ [Risk-based Global Insurance Capital Standard Version 1.0](#), IAIS, 19 July 2016.

obstacle to cross-border activities. The ECB also supports and will contribute to the market infrastructure-related actions foreseen in the September 2015 Commission Action Plan, in particular the conflict of laws initiative and the code of conduct for withholding tax procedures.

In its response to the Commission’s review of the EU macroprudential policy framework, the ECB highlighted a number of key CMU-related issues. First, the macroprudential framework needs to be aligned with the new institutional reality of the banking union. Second, an efficient framework with a complete toolkit will be essential to ensure the soundness of the banking sector, which will also benefit CMU as banks play an important role as financial intermediaries. Third, the review is essential to cater for potential financial stability effects of CMU and to ensure an effective and coherent prudential framework. Not least, the review provides the opportunity to create a framework for non-banks which would need to be anchored in legislation to enable authorities to address risks arising from the continuously growing non-bank sector. This is in particular important to meet the needs arising from more developed and integrated capital markets. The toolkit could include measures directed at non-bank entities and activities, such as margin and haircut requirements for derivatives and securities financing transactions as well as leverage and liquidity requirements for investment funds. However, at this stage it is important to first establish the legal basis for such macroprudential tools.

The STS securitisation framework, which has been supported by the ECB since its inception, is one of the “low-hanging fruits” of the CMU project.

Following the rapid adoption by the European Council of its compromise text last December, work is progressing in the European Parliament, where the rapporteurs for the two securitisation proposals (the EU Securitisation Regulation and the CRR update) and Members of the European Parliament have proposed amendments. An important issue in the discussions is the level of the retention rate, where several parties support an increase to 20-25%, from the current 5% level. Proposals to increase the retention rate should take into consideration the impact on the policy objective of revitalising the European securitisation markets and whether measures to further increase alignment of interests are not better achieved by complementary policy actions such as increased transparency and the introduction of the framework for simple, transparent and standardised securitisations. A vote in the plenary session is expected by the end of the year. A rapid finalisation of the legislative proposal will be key to provide the necessary regulatory clarity and stability to securitisation market participants and to support sustainable growth of the EU securitisation market.

Finally, as the ECB has stressed in the past, CMU warrants a strengthened implementation and enforcement of rules, and an appropriate supervisory framework, which in the long run should lead to a single European capital markets supervisor.

Special features

A Towards a framework for calibrating macroprudential leverage limits for alternative investment funds⁸⁷

Alternative investment funds (AIFs) in Europe operate without regulatory leverage limits. Competent authorities within the EU have the legal power to impose macroprudential leverage limits on AIFs, but no authority has implemented this tool so far. This joint European Central Bank-De Nederlandsche Bank (DNB) special feature (i) presents a macroprudential case for limiting the use of leverage by investment funds, (ii) develops a framework to inform the design and calibration of macroprudential leverage limits to contain the build-up of leverage-related systemic risks by AIFs, and (iii) discusses different design and calibration options. By way of example, it uses supervisory information on AIFs managed by asset managers based in the Netherlands. The article concludes by recommending a way forward to develop an EU-level framework for a harmonised implementation of macroprudential leverage limits for AIFs, which forms a key part of the agenda of the European Systemic Risk Board (ESRB) to develop macroprudential policy beyond banking.⁸⁸

Introduction

Since the global financial crisis, the investment fund sector has expanded rapidly and this growth has been accompanied by increased risk-taking. Since 2008 total net assets of European investment funds more than doubled from €6.2 trillion to €13.3 trillion in the second quarter of 2016.⁸⁹ Notably, in the same period, the size of European alternative investment funds more than tripled from €1.6 trillion to €5.2 trillion.⁹⁰ While this growing role of funds in credit intermediation and capital markets provides useful diversification benefits for the real economy, risks are increasing as funds have shifted their holdings from higher to lower-rated debt securities, hold a decreasing share of liquid assets, and continue to expand their exposure to emerging markets.⁹¹ Moreover, in the current “low-for-long” interest rate environment, such risk-taking in search of yield is likely to continue.

Policymakers at the European and global levels are discussing ways to strengthen regulation for asset management, including on the use of leverage. Central banks, markets and securities regulators have all expressed concerns about

⁸⁷ This special feature was prepared by Koen van der Veer, Anouk Levels (DNB), Raymond Chaudron (DNB), Michael Grill, Luis Molestina Vivar, Monica Petrescu and Christian Weistroffer.

⁸⁸ *Macroprudential policy beyond banking: an ESRB strategy paper*, ESRB, July 2016.

⁸⁹ *Trends in the European Investment Fund Industry in the Second Quarter of 2016*, European Fund and Asset Management Association, September 2016.

⁹⁰ Notably, starting in 2014, AIFs are classified according to the regulatory definition in the Alternative Investment Fund Managers Directive. Since then, net assets have increased by 28%.

⁹¹ *Financial Stability Review*, ECB, May 2016.

potential financial stability risks stemming from the asset management industry.⁹² Importantly, the Financial Stability Board (FSB) has recently published its proposed policy recommendations to address structural vulnerabilities from asset management activities.⁹³ Apart from regulatory responses to address liquidity mismatches, risks related to securities lending activities and operational risk, the FSB recommends that authorities monitor the use of leverage by funds and take action when funds pose significant leverage-related risks to the financial system.

Alternative investment funds operate without regulatory leverage limits. Since mid-2013, AIFs in Europe have been regulated under the Alternative Investment Fund Managers Directive (AIFMD). These funds currently account for 39% of the European investment fund sector and include various types of funds such as mixed funds, bond funds, (private) equity funds, real estate funds, funds-of-funds, hedge funds, and money market funds. Under the AIFMD, funds are required to report their use of leverage, but operate without regulatory leverage limits.

To date, competent authorities within the EU have not used their legal powers to impose macroprudential leverage limits on alternative investment funds.

The AIFMD allows competent authorities to impose limits on the level of leverage that asset managers employ in their AIFs in order to “limit the extent to which the use of leverage contributes to the build-up of systemic risk in the financial system or risks of disorderly markets”. So far, however, no authority has implemented this tool, and a framework at the EU level to support a harmonised implementation of macroprudential leverage limits has yet to be developed.

This joint ECB-DNB special feature aims to contribute to the development of an EU framework for implementing macroprudential leverage limits for AIFs. It presents a macroprudential case for limiting the use of leverage by investment funds, develops a framework to inform the design and calibration of macroprudential leverage limits for AIFs, and discusses different design and calibration options. The options discussed focus on cross-sectional aspects, while acknowledging that time-varying aspects should also be considered – yet at a later stage.⁹⁴ The analysis builds on supervisory information available on AIFs managed by asset managers in the Netherlands, where the third-largest AIF population in Europe is domiciled.⁹⁵ Importantly, this information is used only to show how the same information available on AIFs in Europe could be used when developing a framework for a harmonised implementation of macroprudential leverage limits for AIFs.

⁹² See *Financial Stability Report*, Bank of England, December 2015; *Report on Trends, Risks and Vulnerabilities*, No 2, European Securities and Markets Authority, 2015; *Financial Stability Review*, ECB, May 2016; *Update on Review of Asset Management Products and Activities*, Financial Stability Oversight Council, April 2016; speech by Vítor Constâncio, “Risk sharing and macroprudential policy in an ambitious Capital Markets Union”, April 2016; speech by Steven Maijor, “Measuring and assessing stability risks in financial markets”, May 2015; and speech by Mary Jo White, “Enhancing Risk Monitoring and Regulatory Safeguards for the Asset Management Industry”, December 2014.

⁹³ *Consultative Document: Proposed Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities*, Financial Stability Board, June 2016.

⁹⁴ The approach of setting a limit before considering time-varying aspects would be consistent with the approach taken by the Basel Committee on Banking Supervision to design the leverage ratio for banks.

⁹⁵ In net asset value terms, AIFs in Europe are domiciled in Germany (29%), France (18%), the Netherlands (14%), Luxembourg (11%), Ireland (9%), United Kingdom (8%) and other EU countries (13%).

Leverage and systemic risks

Negative externalities due to the build-up of excessive leverage give rise to systemic risk in the financial system. System-wide leverage becomes excessive when it makes economies prone to costly financial crises. Evidence shows that costly crises since the late 19th century have more often than not been the result of credit booms gone bust⁹⁶, and the build-up of leverage and subsequent deleveraging by banks and within financial markets more generally is widely viewed as a cause of the 2007-09 global financial crisis and its severe economic impact. Negative externalities related to excessive leverage may materialise via: (i) system-wide fire sales⁹⁷ to repay debts or margin calls that result in asset price declines for other market participants; (ii) spillovers to counterparties and financial networks; or (iii) restrictions on new lending that generate a credit crunch.

Market participants can contribute to the build-up of excessive leverage when they do not internalise costs that their actions impose on the financial system. Pressure of short-term competition, optimism about future asset prices and the favourable tax treatment of debt over equity can all encourage financial institutions to lever up and increase an institution's vulnerability to unplanned corrective measures such as fire sales.⁹⁸ Also, since market participants can enter into certain derivative contracts at little cost, there is an incentive to increase leverage synthetically to multiply gains, at the risk of magnifying losses.⁹⁹ And while evidence shows that a financial institution's contribution to systemic risk tends to increase with its use of leverage¹⁰⁰, financial institutions typically do not internalise the costs of financial crises which may be triggered or amplified by system-wide excessive leverage.

Investment funds can also build up excessive leverage and thereby contribute to systemic risk, providing a fundamental rationale for capping their leverage. Investment funds can employ leverage to increase expected returns. Importantly, not only the level of leverage but also other fund features – in particular their liquidity risks – determine the excessiveness of leverage. For example, the redeemable nature of shares in open-end investment funds makes them structurally vulnerable to sudden redemptions which can affect the liquidity position of funds and trigger fire sales. Notably, this callable nature of fund shares makes fund equity different from bank equity and introduces run risk even at comparably lower levels of leverage.¹⁰¹

⁹⁶ Schularick, M. and Taylor, A. M., "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870-2008", *American Economic Review*, Vol. 102(2), 2012, pp.1029-1061.

⁹⁷ A fire sale can be defined as a forced sale of an asset at a dislocated price. The asset sale is forced in the sense that the seller cannot pay creditors without selling assets. The price is dislocated because the highest potential bidders are typically involved in a similar activity as the seller, and are therefore themselves indebted and cannot borrow more to buy the asset. See Shleifer, A. and Vishny, R., "Fire Sales in Finance and Macroeconomics", *Journal of Economic Perspectives*, Vol. 25(1), pp. 29-48.

⁹⁸ See Scharfstein, D. and Stein, J., "Herd Behavior and Investment", *American Economic Review*, Vol. 80(3), 1990, pp. 465-479.; and Thurner, S., Farmer, J. D. and Geanakoplos, J., "Leverage Causes Fat Tails and Clustered Volatility", *Quantitative Finance*, Vol. 12(5), 2012, pp. 695-707.

⁹⁹ See "Synthetic leverage in the asset management industry", *ESMA Report on Trends, Risks and Vulnerabilities*, No 2, 2016.

¹⁰⁰ Adrian, T. and Brunnermeier, M. K., "CoVaR", *American Economic Review*, Vol. 106, 2016, pp. 1705-1741.

¹⁰¹ See also Doyle, N., Lieven, H., Molitor, P. and Weistroffer, C., "Shadow banking in the euro area: risks and vulnerabilities in the investment fund sector", *Occasional Paper Series*, ECB, June 2016, Box 3.

In addition, the investment fund sector's increasing role in credit intermediation and interconnectedness with the rest of the financial system further add to the potential for investment funds to create and/or amplify systemic costs.¹⁰² Overall, systemic externalities of excessive leverage justify macroprudential policies that *pre-emptively* restrict the use of leverage, thereby improving general welfare.¹⁰³

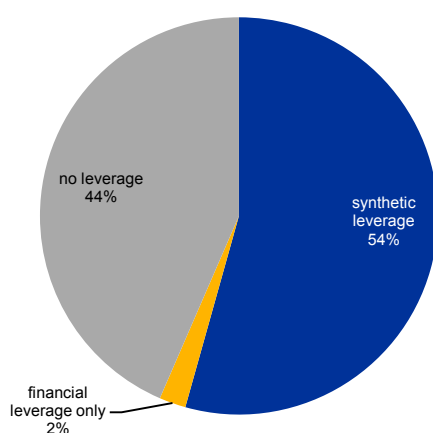
Measuring the use of leverage by alternative investment funds

Chart A.1

More than half of AIFs operated by managers in the Netherlands use some form of leverage

Categorising AIFs in the Netherlands according to financial and synthetic leverage

(net asset value)



Source: DNB.

Notes: For synthetic leverage, the maximum of reported gross and commitment leverage is considered. Financial leverage is calculated as the sum of the net asset value and (un)secured cash borrowing, divided by the net asset value.

Investment funds can obtain financial leverage via direct borrowings and securities financing transactions, and synthetic leverage using derivatives. Unlike financial leverage, synthetic leverage cannot be observed from balance sheets.

Derivatives allow an investor to earn a return on an underlying exposure, while committing only a small portion of equity upfront. Because derivatives are accounted for at market value, this synthetic leverage will not show up on the balance sheet and neither does the potential exposure or risk. More than half of the AIFs (in net asset value terms) in the Netherlands use some form of leverage; 54% of the funds use synthetic leverage (Chart A.1). Leverage is most prevalent in hedge funds, but other fund types can also be substantially leveraged (Chart A.2).¹⁰⁴

The AIFMD leverage measures incorporate both financial and synthetic leverage and provide an upper and lower bound. Under the AIFMD, leverage is measured as the ratio of exposure to net asset value.

The exposure measure takes into account on- and off-

balance-sheet items, where derivatives are converted into cash-equivalent positions. The gross leverage ratio is based on the sum of all exposures, while the commitment leverage ratio accounts for netting and hedging.¹⁰⁵ As such, the gross leverage ratio and the commitment leverage ratio can be seen as an upper and lower bound estimation. Also, gross leverage is generally greater than or equal to financial

¹⁰² *Financial Stability Review*, ECB, May 2016.

¹⁰³ See Bianchi, J., "Overborrowing and Systemic Externalities in the Business Cycle", *American Economic Review*, Vol. 101(7), 2011, pp. 3400-3426; and Aymanns, C. and Farmer, J. D., "The Dynamics of the Leverage Cycle", *Journal of Economic Dynamics and Control*, Vol. 50, 2015, pp. 155-179. Notably, subject to a thorough impact assessment, any final proposal on macroprudential leverage limits which directly target the use of leverage by AIFs should account for the potential interaction with instruments, such as macroprudential liquidity tools, margins and haircuts, which may also mitigate leverage-related systemic risks (see Battistini, N., Grill, M., Marmara, P. and van der Veer, K., "A case for macro-prudential margins and haircuts", Special Feature A in *Financial Stability Review*, ECB, May 2016).

¹⁰⁴ For the purpose of AIFMD reporting obligations, funds are considered to be "substantially" leveraged when the exposure according to the commitment method exceeds three times a fund's net asset value.

¹⁰⁵ For a more detailed discussion, see Box 7 in *Financial Stability Review*, ECB, May 2015.

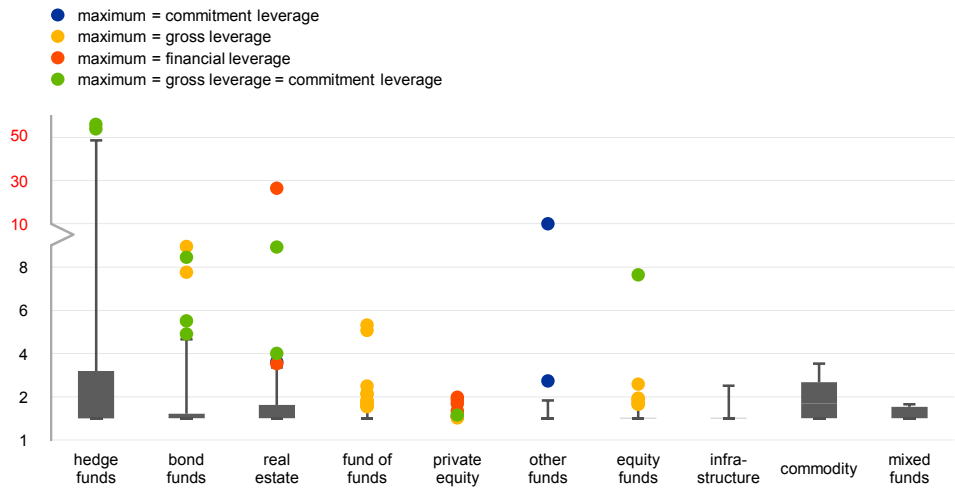
leverage.¹⁰⁶ Commitment leverage can be larger than, equal to, or smaller than financial leverage, depending on the netting and hedging by the fund.

Chart A.2

Leverage is most prevalent in hedge funds, but other fund types can also be substantially leveraged

Box plot with distribution of leverage across fund types

(y-axis: maximum of synthetic and financial leverage, 1 = no leverage; x-axis: type of fund)



Source: DNB.

Framework to design and calibrate macroprudential leverage limits

Operationalising macroprudential leverage limits requires a framework to assess the potential contribution of funds to leverage-related systemic risks.

Macroprudential leverage limits should limit the extent to which the use of leverage contributes to the build-up of systemic risk. This requires a framework to assess whether leverage limits that are ultimately applied at the fund level effectively limit the contribution of leveraged funds to the build-up of systemic risks. Apart from information on the level, source and different usages of leverage, the framework should capture the channels through which systemic risk may materialise such as fire sales, interconnectedness with the financial system, and credit intermediation.¹⁰⁷

The proposed framework includes indicators that can be calculated using the information that is available under the AIFMD. All indicators can be calculated using the supervisory data on AIFs collected by the national competent authorities in the EU. The choice of indicators is guided by the dual aim of capturing the relevant systemic risk channels, while not creating an overly complex framework. We use information from the Netherlands to visualise the indicators, each time showing the

¹⁰⁶ The AIFMD methodology excludes cash positions from the exposure measure, which could cause financial leverage to be slightly lower than gross leverage in some cases.

¹⁰⁷ Notably, while it is possible to separate these systemic risk channels in theory, they are intertwined and likely to be mutually reinforcing in reality.

distribution of funds according to their use of leverage as measured by the maximum of financial leverage and net financial and synthetic leverage.

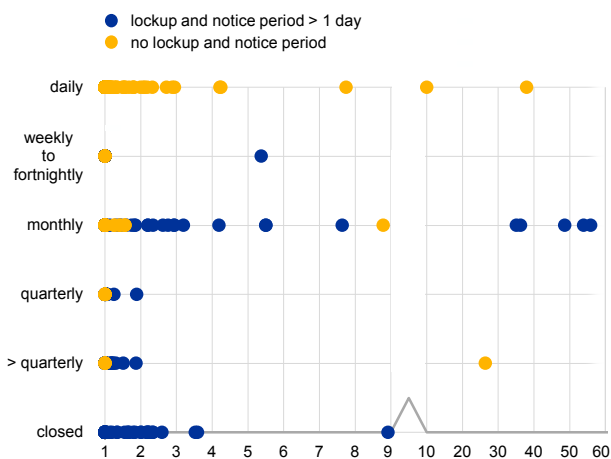
The framework captures three aspects of fund leverage: financial leverage, net financial and synthetic leverage, and “netting and hedging dependence”. At a general level, the use of leverage makes risk management more difficult and makes a fund more sensitive to investor outflows, i.e. given the same value of outflows, leveraged funds will have to liquidate a greater amount of assets to keep the leverage ratio constant.¹⁰⁸ As such, leverage can contribute to procyclicality when funds reduce exposures during business cycle downturns or engage in automatic asset sales triggered by increases in market volatility. At a more specific level, financial leverage through borrowings or securities financing transactions increases a fund’s funding liquidity risk as lending costs or margin requirements can increase.¹⁰⁹ In turn, a higher net financial and synthetic leverage and netting and hedging dependence (e.g. the ratio of gross leverage to commitment leverage) increases a fund’s sensitivity to shocks in derivatives markets and the risk that margin calls caused by small downward price fluctuations can force a fund to fire-sell assets.

Chart A.3

The offering of daily redemptions is not limited to AIFs with relatively low leverage

Leverage, redemption frequency, and the existence of a lockup and notice period

(y-axis: redemption frequency; x-axis: maximum of financial leverage and net financial and synthetic leverage reported under the commitment method, 1 = no leverage)



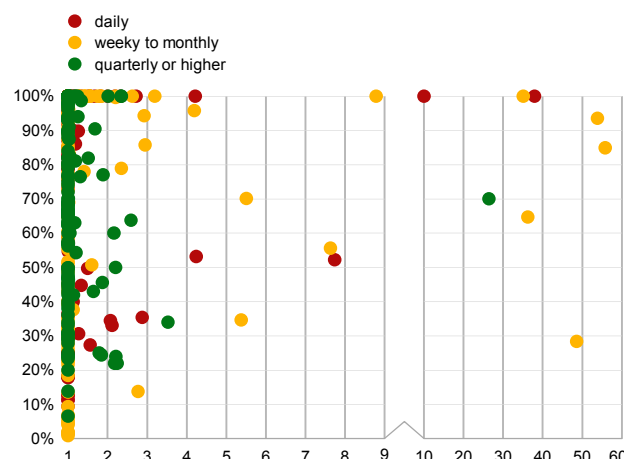
Source: DNB.
Note: This chart excludes the exclusive funds on joint account of pension administration organisations. See footnote 26 for further details on these funds.

Chart A.4

The investor base of leveraged AIFs can be highly concentrated

Leverage, share of AIF equity owned by 5 largest investors, and redemption frequencies

(y-axis: % of AIF equity owned by the five largest investors in the AIF; x-axis: maximum of financial leverage and net financial and synthetic leverage reported under the commitment method, 1 = no leverage)



Source: DNB.
Note: This chart excludes the exclusive funds on joint account of pension administration organisations. See footnote 26 for further details on these funds.

As a first aspect of fire-sale risk, the framework captures a fund’s redemption profile. The offering of short-term (especially daily) redeemable claims makes funds

¹⁰⁸ Teo, M., “The Liquidity Risk of Liquid Hedge Funds”, *Journal of Financial Economics*, Vol. 100, 2011, 24-44.

¹⁰⁹ The available AIFMD data allow for a further breakdown of the source of financial leverage by: unsecured cash versus collateralised/secured cash borrowing, where the latter is further subdivided into borrowing provided via prime brokers, (reverse) repo, or other sources.

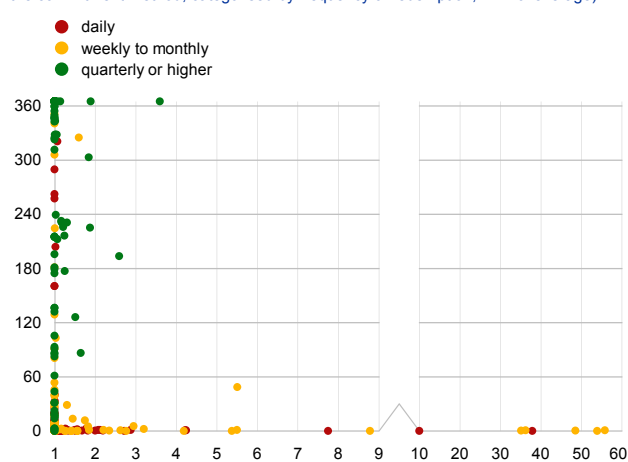
susceptible to investor runs, which could spark a fire sale. Importantly, industry-wide competition for investors can incentivise asset managers to rush to be open-ended which can lead to a suboptimal level of liquidity transformation in the financial system.¹¹⁰ Chart A.3 shows that the offering of daily redemptions is not limited to funds with relatively low leverage. A second dimension of a fund's redemption profile is its investor base, where a higher concentration – in particular when combined with a short redemption frequency – increases the risk of fire sales as these can then be triggered when only one or a few investors decide to redeem their shares.¹¹¹ Chart A.4 shows that the investor base of leveraged funds can be highly concentrated.

Chart A.5

The most highly leveraged AIFs perceive their portfolios as highly liquid

Leverage, number of days to liquidate portfolio and redemption frequencies

(y-axis: number of days to liquidate portfolio as reported by the AIF manager; x-axis: maximum of financial leverage and net financial and synthetic leverage reported under the commitment method; categorised by frequency of redemption, 1 = no leverage)



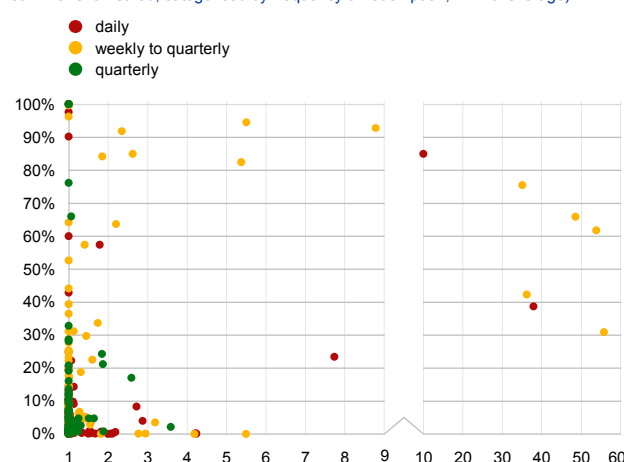
Source: DNB.

Chart A.6

The most highly leveraged AIFs tend to hold a relatively large cash buffer

Leverage, cash buffer and redemption frequencies

(y-axis: net cash exposures as a percentage of net asset value; x-axis: maximum of financial leverage and net financial and synthetic leverage reported under the commitment method; categorised by frequency of redemption, 1 = no leverage)



Source: DNB.

The liquidity profile of a fund is a second aspect of fire-sale risk. The liquidity of a fund's portfolio is central to its ability to meet redemption requests and/or margin calls without having to fire-sell assets. Measuring portfolio liquidity is, however, intrinsically difficult as it involves an assessment of market liquidity (in more than one market) which can abruptly change. The framework includes an indicator that measures the minimum number of days needed to liquidate the full portfolio as reported by the asset manager. In combination with a fund's redemption frequency, this essentially measures a fund's liquidity transformation. Chart A.5 shows that the most highly leveraged funds perceive their portfolios as highly liquid. As a more

¹¹⁰ See Stein, J. C., "Why Are Most Funds Open-End? Competition and the Limits of Arbitrage", *Quarterly Journal of Economics*, Vol. 120(1), 2005, pp. 247-272.

¹¹¹ A positive relationship between investor concentration and the risk of fire sales is less likely to hold for funds that are set up by an investor that holds a large majority of the shares. Such fund structures are common in the Dutch AIF sector, where about half of the funds (in net asset value terms) consist of exclusive funds on joint account of pension administration organisations. For further details, see van der Veer, K., Klaaijnsen, E. and Roerink, R., "Shedding a clearer light on financial stability risks in the shadow banking system", *DNB Occasional Studies*, Vol. 13-7, 2015.

conservative and quantitative measure, a second indicator for the liquidity profile measures a fund's cash buffer. Chart A.6 shows that the most highly leveraged funds hold a relatively large cash buffer, which is warranted to cover margin calls.

As a final aspect of fire-sale risk, the framework accounts for the concentration in counterparty credit exposures of a fund. Such counterparty concentration increases the chance that a fund needs to fire-sell assets in the event of a counterparty failure. The yellow scatters in Chart A.7 show that a few substantially leveraged funds have concentrated exposures to counterparties.

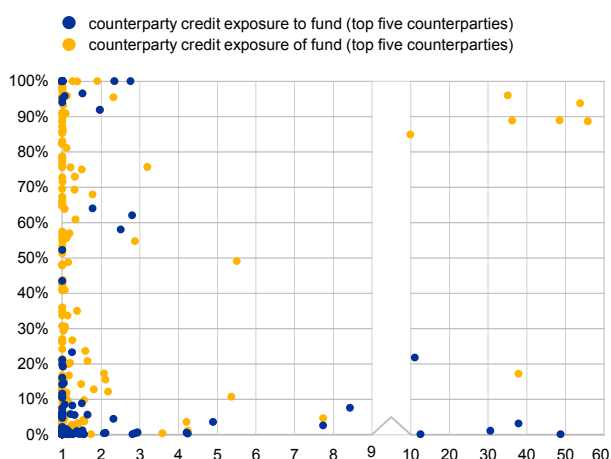
Next, the framework aims to capture direct interconnections with financial institutions – a second channel for systemic risk. The use of leverage can increase the risk of a fund encountering financial distress, which could be transmitted to the fund's counterparties and then to the broader financial system. To capture this risk, the framework first includes a measure for concentration in counterparty exposures to the fund. The blue scatters in Chart A.7 suggest that such counterparty concentration is overall low for the most leveraged funds. Second, funds can also have direct linkages with financial institutions via the fund's investor base and its investments. Chart A.8 shows that some substantially leveraged funds have a high share of financial institutions in their investor base, while their portfolio investments are not particularly concentrated in financial institutions.

Chart A.7

Some substantially leveraged AIFs have concentrated exposures to counterparties, but not vice versa

Leverage and concentration of net counterparty credit exposure to/of the AIF

(y-axis: total exposure to/of top five counterparties as a percentage of net asset value; x-axis: maximum of financial leverage and net financial and synthetic leverage reported under the commitment method, 1 = no leverage)



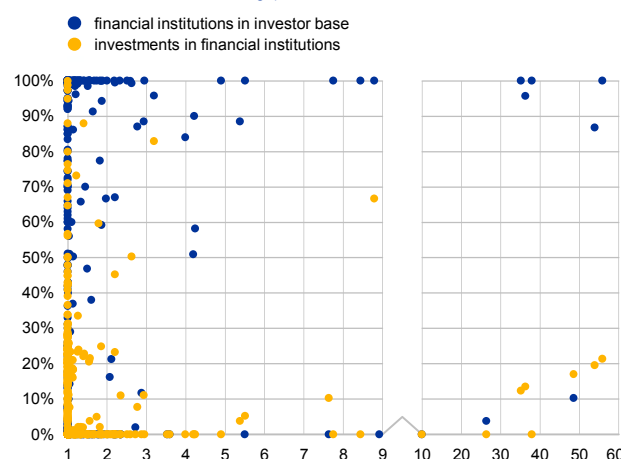
Source: DNB.

Chart A.8

Some substantially leveraged AIFs have a high share of financial investors, but no concentrated investments in financial institutions

Leverage, share of financial institutions in investor base, and share of investments in financial institutions

(y-axis: share of investor base composed of financial institutions, and share of investments in financial institutions as a percentage of net asset value; x-axis: maximum of financial leverage and net financial and synthetic leverage reported under the commitment method, 1 = no leverage)



Source: DNB. Note: The indicator for "financial institutions in investor base" excludes the exclusive funds on joint account of pension administration organisations.

Finally, the framework aims to capture the potential for leveraged funds to contribute to systemic risk via the credit intermediation channel. The use of leverage by funds could contribute to excessive credit intermediation and to the risk

of interruptions in the credit intermediation process when the cycle turns. Systemic risks could arise due to sudden stops in providing liquidity and short-term funding to financial institutions, sudden reductions in market liquidity for financial instruments that are important to credit intermediation, and insufficient risk separation.¹¹² Overall, leveraged AIFs in this sample of AIFs managed by asset managers based in the Netherlands have small direct investments in corporate bonds, limited investments in structured and securitised products, and do not sell credit risk protection.

Design and calibration options for macroprudential leverage limits

This section discusses design and calibration options for leverage limits, with a view to operationalising Article 25 of the AIFMD. Article 25 allows the restriction of leverage if it is contributing to the “build-up of systemic risk in the financial system” or “risks of disorderly markets”. Limits can thus be applied to individual funds, a group(s) of funds, or the sector as a whole. The options discussed here focus on cross-sectional aspects, leaving time-varying aspects for future work.

From a supervisory perspective, rules limiting investment fund leverage should be simple and transparent to ensure effective implementation. Leverage should be defined in a consistent manner across types of institutions in order to avoid leakages and regulatory arbitrage. Taking note of the complexities in measuring leverage, the proposed limits should ideally build on existing concepts and definitions such as those already applied using the commitment approach for reporting leverage under the AIFMD, i.e. taking into account both financial and synthetic leverage.¹¹³ A further backstop to prevent excessive use of derivative-based leverage should also be considered using the gross exposure method.

The diversity of business models and corresponding risks may require a more differentiated approach when restricting leverage among AIFs. There is a trade-off between simple rules and rules that account for the heterogeneity of business models. This requires a careful weighing of macroprudential objectives against the sector’s ability to provide valuable services to its clients which benefit the economy. With a view to striking the right balance between simplicity and flexibility, at least three possible approaches should be considered, ranging from a very simple (but less risk-sensitive) approach to a more risk-based (but more complex) approach.

One option is to restrict leverage using a uniform standard across the sector.

The advantage of such a one-size-fits-all approach would be that the rules could not be easily gamed and that all AIFs could be held accountable based on a uniform standard for the sector. A uniform rule, however, would not be able to differentiate between business models and would not be sensitive to other cross-sectional risk factors. Also, a uniform limit that would be binding for the most highly leveraged

¹¹² Bengtsson, E., “Investment funds, shadow banking and systemic risk”, *Journal of Financial Regulation and Compliance*, Vol. 24(1), pp. 60-73.

¹¹³ Notably, the Basel III leverage ratio allows for some netting of derivatives and therefore shares some similarities with the commitment method in the AIFMD.

funds may not be suited to preventing the build-up of leverage in the broader sector. With a lower limit, some business models may no longer be viable.

Table A.1

Benchmarking by fund type: relative risk of contributing to a build-up of leverage-related systemic risks

Statistical comparison of the distribution of risk characteristics between a fund type and the rest of the AIF sector

To test whether funds of a certain type tend to outperform or underperform the rest of the sample on the basis of a given indicator, the Mann-Whitney U-test, testing whether a particular population tends to have larger values than the other, is applied. As an additional safeguard against heterogeneity of the indicator values, a "tail rule test" is applied in a second step. The practical application is that where the Mann-Whitney U-test concludes that a certain type of fund generally outperforms or underperforms the rest of the population but more than 15% of the funds have indicator values in the opposite quartile of the distribution (i.e. contradicting the general trend), the Mann-Whitney U-test result is not considered sufficiently reliable, as the underlying indicator values are deemed to be too heterogeneous.

		Lower	Neutral	Higher	Too heterogeneous										
						Hedge funds	Bond funds	Equity funds	Mixed funds	Funds -of- funds	Private equity funds	Real estate funds	Infra-structure funds	Commo-dity funds	Other funds
1. Use of leverage	Financial leverage					Higher	Lower			Lower	Higher				Lower
	Net financial and synthetic leverage					Higher	Higher	Lower	Higher	Lower	Higher				
	Gross to net leverage						Higher			Lower				Too heterogeneous	Lower
2. Risk of fire sales	Redemption profile	Redemption frequency				Lower	Higher	Higher		Higher	Lower	Lower	Lower	Higher	
		Investor concentration						Too heterogeneous	Higher	Too heterogeneous	Lower	Lower			
	Liquidity profile	Perceived portfolio liquidity					Lower	Lower	Lower	Lower	Higher	Higher			Lower
		Cash buffer					Lower		Higher	Higher					Lower
	Counterparty concentration	Counterparty credit exposure of fund					Higher	Too heterogeneous	Lower	Too heterogeneous	Higher		Higher		
3. Risk of direct spillovers to financial institutions	Counterparty credit exposure to fund										Higher				
	Investments in financial institutions					Higher	Higher	Higher	Higher	Lower	Lower				Lower
	Financial institutions in investor base						Higher	Higher		Lower		Higher	Higher	Lower	
4. Risk of interruption in credit intermediation	Investments in corporate bonds & loans						Lower	Higher	Higher		Lower	Higher			Higher
	Investments in structured & securitised products														Too heterogeneous

Source: DNB.

Another option would be to have different limits depending on the fund type and/or risk characteristics. AIFs would be classified based on their fund type (see Table A.1¹¹⁴). In addition, leverage limits could be further differentiated using the risk characteristics as presented in the framework. For instance, different limits could be applied depending on the redemption frequency, so funds with daily redemptions would face stricter leverage limits than funds with longer redemption frequencies. Such an approach would take into account the leverage and risk profiles of different business models or individual funds. However, clear criteria for differentiating

¹¹⁴ The methodology applied is similar to the one that the European Banking Authority (EBA) applied to assess potential differences in the exposure to the risk of excessive leverage across different types of credit institutions, with a view to differentiating prudential leverage ratio level requirements. See *Report on the leverage ratio requirements under article 511 of the CRR*, EBA, August 2016.

between fund-specific characteristics would have to be devised. Furthermore, cliff effects may provide incentives for funds to obtain a more favourable classification.

A third option would be to have different limits based on a comprehensive scoring model. The scoring model would aggregate the scores of the indicators in the framework. Leverage limits would then be determined by the total risk score based on individual fund contributions as well as sector and market-wide risk characteristics. Such a scoring would capture a fund's critical role in certain markets and the system as a whole. This would help align the fund managers' incentives with the macroprudential supervisor's objectives to an even greater extent than under the previous two options. However, the implementation and calibration of such a framework can become very complex, especially if applied in a time-varying manner.

The way forward: the need for an EU-level framework

This joint ECB-DNB special feature offers a further step towards an EU-level framework for calibrating macroprudential leverage limits for AIFs.

Operationalising macroprudential leverage limits under the AIFMD is one of the key short-to-medium-term tasks identified in the recently published ESRB strategy paper on macroprudential policy beyond banking. We aim to contribute to this goal by showing how the supervisory information collected under the AIFMD could be used to build an EU-level framework to guide the design and calibration of macroprudential leverage limits. Based on such a framework, we have also discussed three general approaches to design limits, focusing on cross-sectional aspects. Future work should consider the time-varying dimension of limiting AIF leverage.

Close cooperation between national and EU competent authorities within the ESRB can take this work further. An important next step would be to aggregate the national data needed to build an EU-level framework, so that these data can be analysed by the ESRB and its members. In this regard, the framework suggested in this special feature could serve as initial guidance on the specific information that should be extracted from the rich data collected on AIFs. Importantly, such a collective analysis could also contribute to identifying any further harmonisation needs for key indicators. Resolving any data issues, not least related to funds' reporting on their use of leverage, is essential if the goal of operationalising macroprudential leverage limits for AIFs at the EU level is to be attained.

B Addressing market failures in the resolution of non-performing loans in the euro area¹¹⁵

The high stock of non-performing loans (NPLs) on the balance sheets of euro area banks continues to be an important cause for concern for policymakers. Efforts to resolve this problem have increased significantly in the course of 2016, by supervisors and macroprudential policymakers alike. To relieve capital constraints, these efforts, however, must be complemented with structural reforms to recover the value of NPLs in some countries. Against this background, this special feature focuses on impediments to the functioning of a market for NPL sales. It highlights sources of informational asymmetry and structural inefficiencies. Among indicators of market failure, it distinguishes between supply and demand factors that impede market functioning. In light of the identified externalities, public policy responses are warranted to reduce the cost and duration of debt recovery while also addressing information asymmetries between better-informed banks and potential investors. In certain circumstances the establishment of asset management companies (AMCs) may help to accelerate the value recovery process for banks, while avoiding adverse macroeconomic side effects. Constraints on and limitations of AMCs are also reviewed in this special feature.

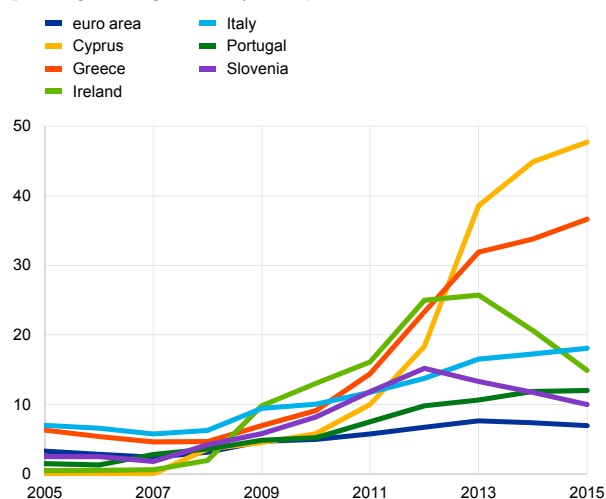
Introduction

Chart B.1

NPLs in the euro area have increased since the global financial crisis but ratios vary greatly across countries

Gross NPL ratios for the euro area and the six countries with the highest NPL ratios

(percentage of total gross loans, year-end)



Sources: ECB and IMF Financial Soundness Indicators.

Note: Comparability of the data across countries may be limited due to the use of different NPL definitions and consolidation perimeters of national banking sectors.

History has shown that financial crises and/or prolonged economic contractions often trigger a rapid and substantial increase in non-performing loans, as asset valuations decrease and borrowers become unable to service their debt. In the euro area context, macro-financial stresses over recent years have resulted in the accumulation of significant stocks of NPLs. At the end of 2015, the 130 largest euro area banks held around €1 trillion of impaired assets, although NPL ratios are very unevenly distributed across euro area countries (see [Chart B.1](#)). Moreover, although over 60% of NPLs are related to various forms of corporate lending, the type of assets affected by the loan quality deterioration is quite heterogeneous. The size of the overall stock of NPLs in the euro area, the challenge it poses to bank profitability, and the financial and economic interlinkages between euro area countries give rise to area-wide financial stability and macroprudential concerns. It may also have an impact on the transmission of monetary policy, as bank resources are tied up by inefficient lending, and on fiscal risks.

¹¹⁵ This special feature was prepared by John Fell, Maciej Grodzicki, Reiner Martin and Edward O'Brien.

The ECB has been flagging the importance of the NPL problem in the euro area for some time already. In its comprehensive assessment of 130 euro area banks in 2014, it applied for the first time a common NPL definition to identify the magnitude of the problem.¹¹⁶ In 2015, it presented a first overview of the scale of the problem, highlighting key operational aspects that are critical for effectively resolving NPLs and outlining the advantages and disadvantages of different resolution strategies.¹¹⁷ In September 2016, the ECB's Single Supervisory Mechanism (SSM) launched a public consultation on guidance to banks on how to tackle NPLs. The guidance document provides recommendations on a wide range of microprudential aspects related to NPLs.¹¹⁸ Other international and European bodies such as the International Monetary Fund (IMF), the European Banking Authority (EBA) and the European Bank for Reconstruction and Development (EBRD) have also recently stepped up their analytical and policy work relating to NPLs.¹¹⁹

A range of possible responses to address large-scale NPL stocks is available, often complementing one another within the same jurisdiction. Internal workout by the bank originally holding the impaired asset marks one end of the spectrum of options and should always feature highly in any broader resolution scheme. Banks may require specialist third-party support to be effective in this regard. The direct sale of the impaired assets to an outside investor marks the opposite end, and while this is the most rapid option from a bank's perspective, it depends upon provisioning levels relative to market prices and the presence of liquid NPL markets. In between, there is a range of options such as asset protection schemes (APSs), securitisation and synthetic securitisation and the creation of asset management companies (AMCs).¹²⁰ Each of these options has different requirements, costs and benefits, presented in **Figure B.1**. AMCs are discussed later in this special feature, APSs have proven to be useful in situations where potential losses from declining asset valuation are large but the likelihood of the losses actually occurring is low, and securitisation provides a mechanism to transfer part of the risk related to the NPL portfolios to private investors and obtain stable funding. Such policy responses would likely require changes in the institutional and legal infrastructures of at least some euro area countries and are unlikely to deliver a rapid reduction in the stock of NPLs. Moreover, public support may be required, particularly for APSs and AMCs, but also for securitisation schemes, which may restrict their applicability.¹²¹

¹¹⁶ For a harmonised definition of non-performing exposures, see the European Banking Authority's Implementing Technical Standards on supervisory reporting on forbearance and non-performing exposures under Article 99(4) of Regulation (EU) No 575/2013.

¹¹⁷ See Grodzicki et al., "Resolving the legacy of non-performing exposures in euro area banks", *Financial Stability Review*, ECB, May 2015, pp. 146-154.

¹¹⁸ See *Draft guidance to banks on non-performing loans*, ECB Banking Supervision, September 2016.

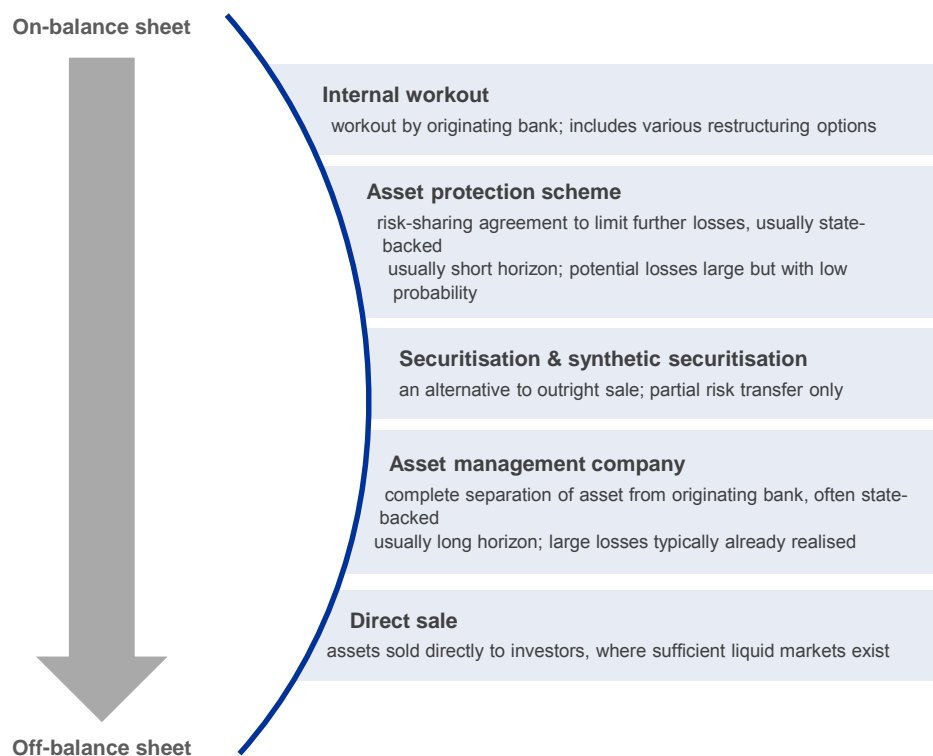
¹¹⁹ See, for example, *Global Financial Stability Review*, IMF, October 2016, and *Report on the dynamics and drivers of non-performing exposures in the EU banking sector*, EBA, July 2016.

¹²⁰ According to Article 242(11) of the Capital Requirements Regulation, synthetic securitisation is defined as a securitisation where the transfer of risk is achieved by the use of credit derivatives or guarantees, and the exposures being securitised remain exposures of the originator institution.

¹²¹ As APSs normally rely on a sovereign guarantee, they are only a realistic option for jurisdictions with secure access to financial markets. For these reasons, APSs do not seem to be suitable for the resolution of legacy NPL stocks, which is the main focus of this special feature.

Figure B.1

A non-exhaustive taxonomy of options for addressing NPLs



Source: ECB.

The remainder of this special feature utilises a micro-founded characterisation of the NPL problem, distinguishing between demand and supply-side impediments to the development of secondary NPL markets. This is followed by a discussion of the policy actions that can be taken to mitigate these impediments. The potential role of AMCs, in particular public sector-backed AMCs, is also reviewed against the background of policy constraints resulting from, inter alia, the fiscal space of the country concerned and EU state-aid rules. The final section summarises the main conclusion and provides some policy recommendations. The special feature does not aim to cover other topics that have been extensively discussed elsewhere, such as supervisory and accounting policies that may affect the recognition of losses on NPLs by banks, or good practices in NPL management.

Indicators of market failure

Although NPL stocks have built up on euro area bank balance sheets since 2008, secondary markets for NPLs have not been very active across the region, despite anecdotal evidence of considerable investor interest in acquiring bank-held NPLs. For example, Deloitte (2016) and KPMG (2016) highlight that notwithstanding a stock of some €2,000 billion in non-core assets on bank balance

sheets, of which approximately 50% are NPLs, transactions amount to slightly more than €100 billion.¹²²

A wide bid-ask spread, present for many impaired assets, is considered a significant obstacle to transactions. The prices that investors are willing to offer are substantially lower than the price that would be at least neutral to the capital position of banks. This spread may be explained by at least three factors. First, many banks may not have fully incorporated the costs of working out impaired assets into their provisioning levels.¹²³ Second, differences in the contractual position between banks and investors may also contribute to this spread, as banks usually cannot adjust lending rates in line with deteriorating creditworthiness of the borrower, which however can be captured by investors through the acquisition of loans at a discount.¹²⁴ Finally, investors may face market frictions and asymmetric information challenges relative to better-informed banks, which would further increase their required return, and thus the fixed cost of executing the transaction.

It is unsecured NPLs, including retail loans, credit card debt, etc., that have been most actively trading in the secondary market. These assets are typically straightforward to work out and there is sufficient transparency for investors concerning their value. Due to the unsecured nature of these assets and the resultant high levels of provisioning, sales typically take place at very low prices relative to book value, making it easier for investors to achieve their targeted returns.

The secondary market for more complex and secured NPLs in Europe could be characterised as a so-called market for “lemons”.¹²⁵ In contrast to unsecured retail loans, secured and more complex loans are more opaque and less granular, and are usually carried at much lower provisioning levels as banks attribute significant value to collateral. Secondary market activity in this segment is low. This suggests that an asymmetric information problem may exist, in particular for higher-quality, collateralised NPLs. In a classical *market for lemons* context, it is assumed that informational asymmetries arise as buyers know less about asset quality than sellers. Buyers would therefore fear that assets they are bidding for are of low quality, and bid at a correspondingly low price. The sellers, being able to distinguish between low and high-quality assets, trade only in the former type – the lemons – whereas the market for the remaining assets fails. Additionally, it may be the case that sellers of NPLs may not have *perfect* information concerning their own assets. The resultant problems associated with informational asymmetry remain, however, as buyers cannot know whether sellers are revealing all available information.

¹²² *Deleveraging Europe 2015-2016*, Deloitte, 2016, and *European Debt Sales Report*, KPMG, 2016.

¹²³ A number of recent country-specific diagnostic exercises as well as the ECB's 2014 comprehensive assessment for some 130 large euro area banks reviewed, in depth, asset quality and ensured that capital and provisioning levels amongst banks are robust and appropriate.

¹²⁴ Investors in distressed debt would generally expect a higher return than the returns generated by banks, to be compensated for higher risk. Bank accounting rules require that future cash flows on NPLs are discounted using original lending rates, thus causing a discrepancy between book values and the prices investors would be prepared to pay for the NPL. See also Ciavoliello et al., “What is the value of NPLs?”, Banca d'Italia Notes on Financial Stability and Supervision, 3/2016.

¹²⁵ 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.

A key factor in this regard is the availability of high-quality data for the assets in question. The absence of such data can compromise the results of valuation methods investors may use in due diligence, resulting in heightened uncertainty concerning asset values and additional costs associated with collecting sufficient data to facilitate workout, resulting in commensurately lower bid prices.

Ineffective legal frameworks governing debt recovery and collateral enforcement can also create information challenges and curtail demand. As the time for debt recovery may be inordinately long and unpredictable, steep discounting of future cash flows from NPLs may be needed. Lengthy delays resulting from legislation may also have an impact on credit discipline. Debtors that have fallen into arrears may be aware that collateral cannot easily or quickly be enforced for a significant period of time and may not cooperate with their creditor. Other performing debtors may strategically choose to default as no effective deterrent is present. Investors will factor in expected workout time in valuing assets, penalising assets in jurisdictions where legislation is least effective.

Even when legislation is effective, the capacity to deal with a sudden rise in NPL stocks is often lacking. Capacity bottlenecks arise in banks, but also in the judicial system, where specialist expertise in resolution of impaired credits may be very limited. The expertise gaps are particularly wide in the case of more complex credits, for example, to corporates and for commercial real estate. These capacity constraints can lengthen delays substantially. Moreover, uncertainty as a result of inconsistencies in the outcome of cases may act as a deterrent to investors and needs to be reflected in bid prices.

Asymmetric information can also arise from banks' cherry-picking of assets for sale. Banks may be incentivised to retain the best assets, along with the best client relationships. Prices offered by investors account for the adverse selection of the assets up for sale.

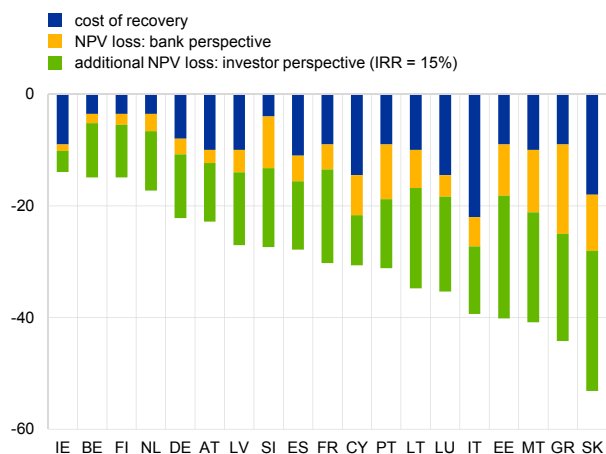
A number of factors play a role in determining the supply of NPLs. Capital constraints and provisioning levels will be a key factor, as will regulatory pressures. Concerns about realising a loss and the related impact on provisions and capital may also play a prominent role. For example, the sale of part of an NPL portfolio at a low price may lead to upward pressure on coverage ratios for the remaining portfolio, if supervisory measures or market discipline require that the remaining NPL portfolio be marked down to the achieved sales price, even though the residual asset quality has in fact improved on aggregate as a result of the sale. Banks may also be adversely affected by the recalibration of prudential models, including loss-given-default models, based on the data generated by the asset sales. They may prefer to wait for a possible upturn in asset values, instead of realising the loss through sale. These motivations for holding NPLs often overcome substantial pressure from investors in bank equity and debt to reduce non-performing assets when their stocks reach high levels, as uncertainty around the scale of future losses impacts perceptions of the bank's soundness. The high cost of debt recovery will also dampen supply through its effect on prices. In a number of euro area jurisdictions, debt recovery costs are very high (see **Chart B.2**), as a result of the long duration of the process, the large number of stakeholders involved and the fees that they

demand.¹²⁶ Another supply-side consideration related to banks' willingness to sell may stem from banks' desire to avoid stigma and first-mover disadvantage effects, so for a given price, supply may be low.

Chart B.2
Long duration and high cost of legal procedures significantly reduce market value of NPLs

Reduction in net present value of collateral related to cost of enforcement and duration of associated legal procedures

(percentage of nominal value)



Sources: ECB calculations based on World Bank Doing Business 2016 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 bank, 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.

Structural inefficiencies and informational asymmetries drive a wedge between book values and market values of NPLs. Chart B.2 shows

hypothetical NPV losses for NPLs across euro area countries based on the World Bank Doing Business database. In this illustration, market values of NPLs are estimated by discounting future cash flows from the sale of collateral, less the cost of recovery, using typical discount rates applied by banks and investors. The resulting gap between the notional gross book value (GBV) and net present value (NPV) of NPLs may be as high as 40-50% of the GBV, and can be broken down into three components. These components also determine the size of bid-ask spreads for NPLs. The blue segments of the bars in Chart B.2 represent the average cost of enforcing a claim through the legal system, which can reach between 4% and 22% of the value of the claim according to the World Bank Doing Business database. As this cost, despite being part of the expected future cash flows associated with the NPL, may not be fully acknowledged in banks' provisioning policies, it contributes to reducing supply and to widening the bid-ask spread.¹²⁷ Both demand

(see next section) and supply may be reduced by the long duration of recovery, taking up to four years on average in some countries, which depresses both the bid and ask prices. On the supply side, the net book value (NBV) of the claim for the bank, as required under IAS 39, is calculated as the NPV of future cash flows from the loan, using the original effective interest rate of the loan, often below 5%, as a discount rate. The yellow segments of the bars represent the resulting discount, which affects banks' ask prices. The discount rate applied by investors is related to their cost of capital, the premium demanded for the riskier nature of an NPL portfolio relative to a performing one, and an information asymmetry premium. Here it is based on an assumed internal rate of return (IRR) of 15% but, in reality, investors' IRR can be higher. In the chart, investors' NPV estimates (green segments of the bars) are shown as incremental to banks' NPV estimates. The longer the duration of recoveries, the stronger will be the effect on the investors' bid price. Total NPV losses are the sum of the three segments of each bar while the bid-ask spread can

¹²⁶ The IMF suggests that "reforms that speed up asset recovery in insolvency and otherwise reduce the risk of investing in bad loans could potentially boost the price that third-party investors would be willing to pay for them by about 20 percent on average"; see *Global Financial Stability Report*, October 2016, p. 15.

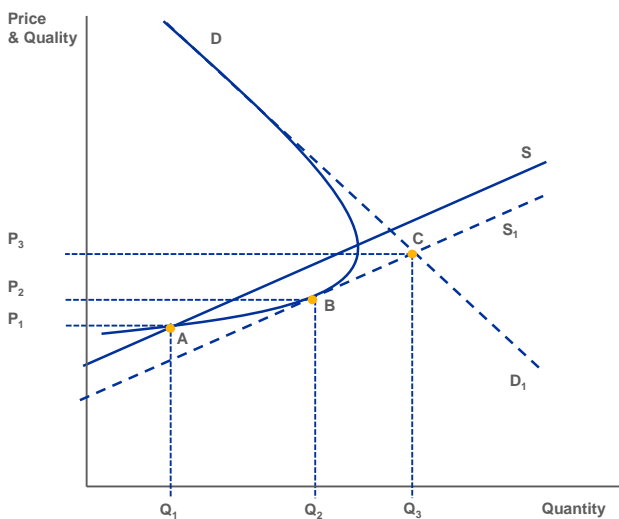
¹²⁷ In addition, the indirect cost of managing NPLs, such as the cost of staff and technical infrastructure, is generally not taken into account in provisioning models and further increases the gap between book values of NPLs and prices bid by investors. These additional costs are not included in this example.

be inferred, depending on the extent to which the costs of recovery are factored-in to the ask price. If banks fully factor-in these costs, the bid-ask spread could be as little as the difference between the NPV estimates of banks and investors (i.e. the green segments of the bars) or, if banks do not account for these costs at all, it could be as much as this gap plus the costs of recovery (i.e. the green segments plus the blue segments).

A microeconomic characterisation of the NPL problem

Akerlof (1970) showed that in a market for “lemons”, demand is a function not only of price, but also of the average quality of the goods being traded.¹²⁸ As a result, multiple equilibria can arise.¹²⁹ **Figure B.2** shows that the supply curve positively intercepts the price-quality axis, at a level commensurate with a banks’ ability to dispose of NPLs at a given price – in effect, the intercept represents a bank’s price floor. The “bad” market equilibrium depicted in **Figure B.2** (the left-most equilibrium, A) is consistent with currently observed market conditions, as in this equilibrium, only a small quantity of “lemons” – low-quality NPLs – is traded. For this sub-set of assets, the capital constraints of banks may also be lower, due to the higher prudential requirements, while bid-ask spreads may also be lower than average, due to the relatively close alignment of the actual and perceived quality of these NPLs. Indeed, banks may also be incentivised to sell assets that are highly provisioned, as no additional losses would be realised in the process.

Figure B.2
Equilibria in a market where asymmetric information exists



Sources: ECB and Hey (2003).

In this framework, improving supply (i.e. a shift of the supply curve from S to S1) leads to an improved market equilibrium – B – although the overall gains remain limited and finite. Indeed, efforts that only address supply-side constraints will offer limited relief to market functioning, given the unusual kinked shape of the demand curve D. In essence, additional supply will not be absorbed by the market. Overcoming informational asymmetries, however, has greater potential to address the market failure. As shown in Figure B.2, if these issues can be addressed, then, *ceteris paribus*, an improved equilibrium – C – can be achieved through improving demand, represented by the change in the shape of the demand curve from D to the more standard D1.

¹²⁸ Such a demand curve can be characterised as $d = 1 - p + \alpha q$, where d is demand, p is price, q is average quality, and $\alpha > 0$ where α is a parameter that relates quality to demand.

¹²⁹ See, for example, Varian, H., *Microeconomic Analysis*, 3rd Edition, W. W. Norton & Co., 1992, and Hey, J., *Intermediate Microeconomics: People are Different*, McGraw-Hill, 2003.

Removing impediments – mitigating asymmetry

Removing the impediments to an effectively functioning secondary market for NPLs requires a comprehensive, multi-pronged approach, although not all jurisdictions and banks are afflicted to the same extent by all impediments. As such, a thorough understanding of the particular market circumstances is required before framing the necessary response. Impediments can be resolved at various levels within the system.

Supply-side problems may be related to a lack of willingness of banks to sell, a lack of adequate data, and cherry-picking behaviour. The *willingness to sell* can be increased by regulatory pressure and supervisory guidance. In a euro area context, the SSM guidance to banks on NPLs will be critical in this regard. This should also hold for the lack of *high-quality data*, with banks being incentivised to upgrade their data infrastructures and reporting standards. There may be a complementary role for third parties in filling data gaps and providing assurances about the quality of that data. *Cherry-picking behaviour* may be partially remedied by higher transparency, but is still difficult to overcome, especially for more complex and bespoke assets. Possible solutions here are that banks consider portfolio sales combining performing and non-performing assets, or that banks retain an interest in the portfolio.¹³⁰ Given that investors may wish to build portfolios of NPLs by purchasing assets from multiple sources, investors and banks could also benefit from cooperation across the banking sector, so that costs to investors are minimised. The availability of local, specialised, independent service providers will be an important element also.

By improving the legal frameworks governing the enforcement of claims, bid-ask spreads would narrow, preserving bank capital while improving investor demand for NPLs. At the Member State level, structural reforms will be critical to success, regardless of the specific NPL resolution strategy, in addressing impediments to demand in the market that derive from informational asymmetries.¹³¹ Legal reforms may be necessary to ensure that both the time and cost of recovery are lowered, substantially in some cases. Out-of-court workout schemes can be beneficial in avoiding lengthy court proceedings. Reforms should strive to achieve transparency in collateral enforcement and insolvency proceedings and consistency in court rulings, to provide investors with confidence in the outcomes of legal proceedings. Reforms must also be considered in areas such as licensing for asset servicing companies, to ensure the sufficient availability of such services. The relaxation of other licensing requirements, e.g. for investors in distressed debt, and codes of conduct should also be considered. Recently, several countries have enacted such reforms; however, it is still too early to judge whether the reforms have

¹³⁰ In securitisations, the originator often retains a stake in the junior part of the transaction, which – insofar as it is not already fully provisioned at the time of the transaction – reduces the incentive to engage in cherry-picking.

¹³¹ For an overview of legal impediments and recent reforms undertaken in eight euro area countries, see *Stocktake of national supervisory practices and legal frameworks related to NPLs*, ECB Banking Supervision, September 2016.

translated into more efficient workouts. Capacity-building and practical implementation of the legislative changes often remain a challenge.

Policies that stabilise the economy and deliver plausible economic prospects will also contribute positively to secondary market functioning, since macro-financial conditions can have a direct impact on future cash flows from NPLs, both from operations of the borrower and from sales of collateral. This positive impact can accrue not only from potential increases in asset values and economic expansion, but also through reduced uncertainty. Such policies should be part of a credible, broad-based strategy, founded on political stability. Communicating the strategy coherently and consistently is equally crucial.

A role for asset management companies in the light of state-aid rules and the BRRD?

Government-sponsored AMCs have often played a role in resolving acute, systemic banking crises.¹³² This has usually been in the context of a credible, broad-based crisis management strategy where assets have been swiftly and transparently transferred to an AMC. In addition to contributing to a solution to NPL resolution, AMCs can offer substantial benefits to participating banks at times of stress, by reducing asset quality uncertainty and relieving funding pressures. While these benefits may not be so relevant in the current euro area context, AMCs may also help precipitate secondary NPL markets. Many of the impediments to the creation of secondary NPL markets outlined in the previous section, particularly those related to banks, can be alleviated by the establishment of a well-designed AMC.

Beyond these considerations, a further argument for the establishment of an AMC relates to its ability to act as a market reservoir, which can soak up excess NPL stocks while impediments to NPL resolution are being addressed, releasing them back into the market later. By doing so, the AMC prevents fire-sale pressures on banks and allows time for structural reforms to take effect. In the right context, asset values may rise, allowing the AMC to stagger its sales to the market and to achieve prices well above those prevailing at the time of its establishment. Previous ECB publications have highlighted some key guiding principles for establishing asset support schemes.¹³³ Beyond considerations concerning the institutional set-up, identifying the assets to be transferred and appropriate valuation methods will be essential factors in establishing a support vehicle, while ensuring its

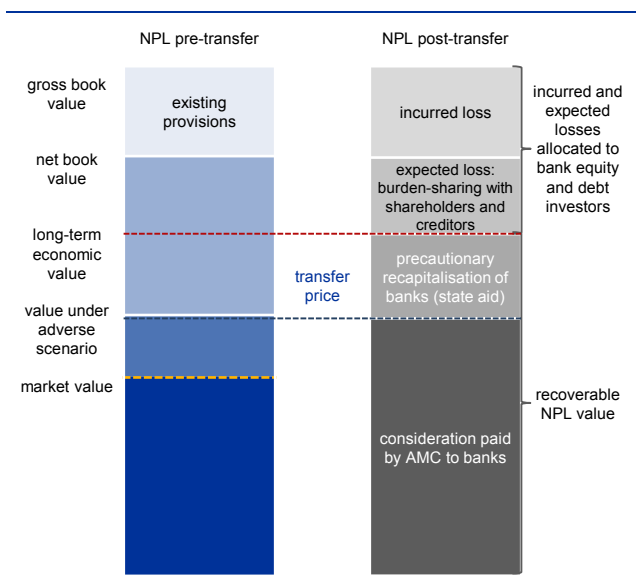
¹³² These include, for example, Securum and Retrieva in Sweden in the 1990s, KAMCO in South Korea, also in the 1990s, and more recently, NAMA in Ireland (2009), SAREB in Spain (2012) and BAMC in Slovenia (2013). It should be noted, however, that these AMCs typically addressed the fallout from crises that stemmed from rapid credit expansions or real estate booms, rather than prolonged macroeconomic underperformance. Such asset management companies should not be confused with entities in the asset management industry, which manage capital market investments on behalf of their customers.

¹³³ See, for example, O'Brien, E. and Wezel, T., "Asset support schemes in the euro area", *Financial Stability Review*, ECB, May 2013, pp. 112-120, and *Guiding principles for bank asset support schemes*, ECB, February 2009.

adequate governance will be crucial. An AMC should be managed on commercial principles at arm's length from the state.

Much has been made more recently, however, of the restrictions facing national authorities in establishing public sector-backed AMCs as a result of the state-aid rules and the implementation of the Bank Recovery and Resolution Directive (BRRD). In particular, concerns have been expressed that transferring assets to an AMC at values above contemporary market prices – a key benefit and thus the rationale for an AMC – would constitute state aid and thus would result in resolution.¹³⁴

Figure B.3
Example of an AMC transfer with state aid and precautionary recapitalisation and burden-sharing



Sources: ECB and Medina Cas and Peresa (2016).¹³⁵
Notes: Long-term economic value reflects the underlying value of an asset on the basis of observable market inputs and realistic and prudent assumptions about future cash flows. Burden-sharing may involve capital raising from new investors, voluntary liability management exercises (e.g. debt-for-equity swaps) or non-voluntary forms of burden-sharing with junior creditors.

The activation of resolution according to the BRRD may not be necessary, however, to establish a public sector-backed AMC, as state aid is feasible outside resolution in limited circumstances, albeit with private sector burden-sharing (see Figure B.3).

That public support may consist of indirect capital support in the form of: (i) transfers to an AMC at values above prevailing market values, but below real or long-term economic value; and (ii) if needed, precautionary recapitalisation that addresses the capital shortfall arising from NPL transfers and identified under an adverse scenario of a stress-test exercise carried out by a competent supervisory authority.¹³⁶ The latter condition means that only hypothetical future losses on NPLs, related to the unexpected and unlikely deterioration of their value posited in the stress test,¹³⁷ may qualify for precautionary recapitalisation of the bank participating in the AMC, while incurred and expected losses clearly cannot, and should be covered first from private sources. The stress test itself should realistically reflect the expected future evolution of NPL workouts. Beyond this public support, banks participating in an AMC must also engage in burden-sharing with junior debt-holders and may also raise capital from private sources, through liability management exercises and equity raising (see Figure B.3).

Procedurally, public support would be conditional on obtaining prior approval from the European Commission, including a restructuring plan that would be executed by the institutions receiving state aid.

¹³⁴ Details can be found in *Communication from the Commission on the Treatment of Impaired Assets in the Community Banking Sector*, European Commission, 5 February 2009. See in particular section 5.5 for details on the valuation of impaired assets.

¹³⁵ See Medina Cas, S. and Peresa, I., "What Makes a Good 'Bad Bank'? The Irish, Spanish and German Experience", European Economy Discussion Paper 036, European Commission, September 2016.

¹³⁶ For state aid to be adjudged compatible, transfer prices cannot exceed long-term economic value. Transfer prices are typically below long-term economic value, to reflect, amongst other factors, the carrying cost of the assets for the recipient.

¹³⁷ This concept is also present in accounting standards. IAS 39 explicitly prohibits that future credit losses are recognised as impairment, making a clear distinction between incurred and unincurred losses.

The precise outcome of any given transfer depends on the factors highlighted in **Figure B.3**, including the net book value, real or long-term economic value and transfer price. Participating banks would face the stigma of state aid and associated restructuring conditions, and would be forced to burden-share with junior debt-holders. Precautionary recapitalisation can only meet unexpected losses, not losses that are expected to materialise. As such, it can be calibrated by the adverse scenario of a stress test, although the choice of scenario rests with the supervisory authority and not the competition authority or the resolution authority.¹³⁸

Are AMCs part of the solution set?

Given the feasibility of establishing an AMC outside resolution, and the fact that AMCs may improve secondary market functioning, their role in resolving large stocks of NPLs should be carefully considered.

Historically, AMCs have been most successful when tasked with resolving real assets, typically commercial real estate, land and related exposures such as development loans. Such assets are relatively straightforward to value and their prospective values are largely related to broad macro-financial outcomes. Specialist expertise – in terms of valuation, management, maintenance, etc. – tends to be readily available, meaning that an AMC can manage assets with a relatively thin staffing level, relying instead on third-party expertise. Furthermore, the AMC can specialise and aim to achieve economies of scale by holding relatively homogeneous exposures, and given that the average ticket size is usually large, an AMC can have a meaningful market impact without becoming overburdened with a very large number of assets.

It is not clear, however, that an AMC could be an effective means of resolving corporate loans, which in some countries represent the bulk of NPL stocks at present. First, such loans will be very heterogeneous, even bespoke in nature, and are likely to be numerous. This may overburden an AMC or require one that is so large and well-resourced that economies of scale could not be achieved. Second, the extent to which value can be recovered from corporate (in particular small and medium-sized enterprise) exposures tends to be more doubtful, regardless of macro-financial outcomes. Some firms may be unviable and may require orderly liquidation. An AMC may not be an appropriate vehicle through which to achieve this. Third-party expertise is less readily available to an AMC in dealing with these types of assets, at least on a sufficient scale. Finally, an AMC working out such assets could be subject to greater political pressures, regardless of its governance structure.

The “costs” of establishing an AMC may be sufficiently high to render them highly unattractive to national authorities and banks that may be expected to participate. The funding of an AMC, often requiring state guarantees, may be costly

¹³⁸ Figure B.3 excludes a case in which unexpected losses derived from an adverse stress-test scenario exceed long-term economic value. Were such a case to arise, bail-in would be required to cover such losses, which could not be covered by precautionary recapitalisation.

and difficult to arrange for non-investment-grade sovereigns. For the state, liabilities (direct or contingent) may be large relative to fiscal headroom. The minimum requirements for private participation in the equity of the AMC may prevent the classification of the AMC's liabilities outside the public debt perimeter. Complications for national authorities and banks may arise in burden-sharing arrangements, particularly where households may be impacted. For banks, the stigma of state aid may be sufficiently strong for banks to be disinclined to participate.

So, while AMCs certainly have a role to play, it may only be in cases where certain conditions are met. The first of these conditions is that the costs of establishment can be recovered and/or are deemed warranted. Suitable pools of impaired assets which can be successfully worked out within an AMC should also be identified in the banking system.

More generally, a comprehensive set of structural reforms will need to be deployed to tackle all aspects of the NPL problem. These reforms have the potential to lift long-term economic values and to narrow bid-ask spreads, making it feasible for banks to sell or transfer assets. The same structural reforms that would be a precondition for the successful operation of an AMC would be indispensable for any other workout option. Of particular note in the context of this special feature is that the direct asset sale channel will be constricted by the impediments outlined previously. At the other end of the taxonomy spectrum presented in **Figure B.1**, bank internal workout will always be an important channel, for a number of reasons. Banks should have the internal ability to manage a certain stock of NPLs. Even if all other channels are available and active, they are unlikely to relieve a bank entirely. Even if they could, moral hazard arguments may suggest that banks should be expected to deal with at least part of the stock that they have built up.

Concluding remarks

Deep and liquid markets for NPLs in the euro area are not currently in evidence. Facilitating their development has the potential to alleviate pressures on banks and mitigate the financial stability risks associated with large stocks of NPLs. Externalities deriving from informational asymmetries may be a key factor that explains relatively low prices and wide bid-ask spreads in euro area markets for NPLs. Structural inefficiencies make a substantial contribution to lowering net present values, while driving a further wedge between bid and ask prices. Reducing the cost and duration of debt recovery while addressing information asymmetries between banks and potential investors may cost relatively little, but it would create the potential to recover substantial value. Importantly, both supply and demand-side impediments should be tackled since addressing only the supply-side frictions would not alleviate the “market for lemons” problem, leaving the market in a suboptimal equilibrium. Moreover, policy responses should be considered as part of a comprehensive strategy to address the challenges related to large stocks of NPLs on euro area banks' balance sheets. Such responses may include asset management companies, which in some circumstances do not need to be related to the resolution of participating banks. The same structural reforms that would be a precondition for

the successful operation of an AMC would be indispensable for any other NPL resolution option. Regardless of the specific NPL resolution options, the comprehensive strategy should focus on addressing those impediments which would have the biggest positive impact on the market.

C Adapting bank business models: financial stability implications of greater reliance on fee and commission income¹³⁹

The euro area banking sector is faced with cyclical and structural challenges, which are hampering many banks' ability to generate sustainable profits. In particular, the prolonged period of low nominal growth and low yields compresses net interest income, which traditionally has been (and still is) euro area banks' main source of income. One way for banks to compensate for compressed net interest margins could be to adapt their business models, moving towards more fee and commission-generating activities. This article discusses the challenges involved in boosting fee and commission income and highlights some of the potential financial stability implications related to a greater reliance on these income sources.

Introduction

Banks' business models are currently under substantial pressure and in need of reinvention to create sustainable ways of generating profits in a post-crisis environment.¹⁴⁰ These challenges may reflect factors of both a structural and cyclical nature.¹⁴¹ Structural impediments to profit generation include low cost-

efficiency and strong competition in many banking sectors in the euro area.

Regarding cyclical factors, the current environment of low nominal growth and low short-term and long-term interest rates restrains banks' ability to generate net interest income¹⁴², typically the main income source for most euro area banks.

Moreover, in some jurisdictions, pressure on bank profitability is compounded by high stocks of non-performing loans (NPLs) (see also Special Feature B in this issue of the FSR).

One important avenue for bank business model adaptation to the new economic and financial environment could be to enhance fee and commission-based activities. Such a shift could lead to more diversified income sources and thus help stabilise banks' capital generation as their ability to retain earnings would be less dependent on, for instance, net interest income.

At the same time, it is not necessarily straightforward for banks to compensate for a decline in net interest income by increasing fees and commissions. It might be the case that for some banks the capacity to attract more fees and commissions is strongly interlinked with

¹³⁹ This special feature was prepared by Christoffer Kok, Harun Mirza, Csaba Móri and Cosimo Pancaro.

¹⁴⁰ See, for example, the special feature by Kok, C., Móri, C. and Petrescu, M. entitled "Recent trends in euro area banks' business models and implications for banking sector stability", *Financial Stability Review*, ECB, May 2016.

¹⁴¹ See, for example, the special feature by Kok, C., Móri, C. and Pancaro, C. entitled "Bank profitability challenges in euro area banks: the role of cyclical and structural factors", *Financial Stability Review*, ECB, May 2015. See also *Global Financial Stability Report*, IMF, October 2016.

¹⁴² See, for example, the box entitled "Euro area banks' net interest margins and the low interest rate environment", *Financial Stability Review*, ECB, November 2015.

business activities from which they accumulate most of their net interest income.¹⁴³ Even if banks were able to markedly increase fee and commission (F&C) income¹⁴⁴, the higher degree of income diversification would not necessarily improve the stability and resilience of banks' overall net income. This would hinge on how resilient F&C income is to adverse developments in the macroeconomic and financial environment. Whether a shift to more fee and commission-generating activities is feasible and sustainable is likely to depend on the bank's specific business model and the type of F&C income it is equipped to generate.

This article discusses recent developments in banks' F&C income and highlights potential financial stability implications of an increased focus on F&C-generating activities. For this purpose, the article first reviews recent trends in F&C income, how they compare with developments in other income sources (net interest income, in particular) and what the euro area banks' main activities generating F&C income are and how this relates to their business model characteristics. Secondly, it empirically explores how resilient F&C income is to an adverse macro-financial scenario. This has clear financial stability implications depending on whether a stronger reliance on F&C income is more or less conducive to the stability of banks' earnings, in normal times and during stress periods. In this regard, it will be important to assess which are the most relevant macro-financial factors influencing F&C dynamics. Also, different types of bank business models may to varying degrees be exposed to specific F&C income sources and hence the resilience to shocks may differ across business models.

Recent trends in and main characteristics of euro area banks' fee and commission income

Since the financial crisis, fees and commissions have become an increasingly important income source for euro area banks, although this change has been only gradual so far. At the end of 2015, average F&C income of euro area banks reached close to 30% of total operating income (see Chart C.1). This development may reflect that banks' operating environment for the generation of other income sources, such as net interest income and trading income, has become more difficult in recent years due to a confluence of factors including the low level of interest rates, tighter regulatory requirements and subdued loan demand.

There are substantial differences in the degree to which banks rely on F&C income. Chart C.2 illustrates that the importance of F&C income differs markedly across broad types of business models. While the business model of custodian banks and asset managers is predominantly based on F&C-related activities, other types of banks produce fees and commissions in a range of 15% to 30% of total income. Corporate/wholesale lenders and specialised sectoral lenders (such as auto

¹⁴³ In other words, this raises the question as to whether net interest income and F&C income are substitutes or complements? And if they are of a complementary nature, can banks transform their business model in order to substitute between the two?

¹⁴⁴ Unless explicitly stated, in this article F&C income refers to net fee and commission income.

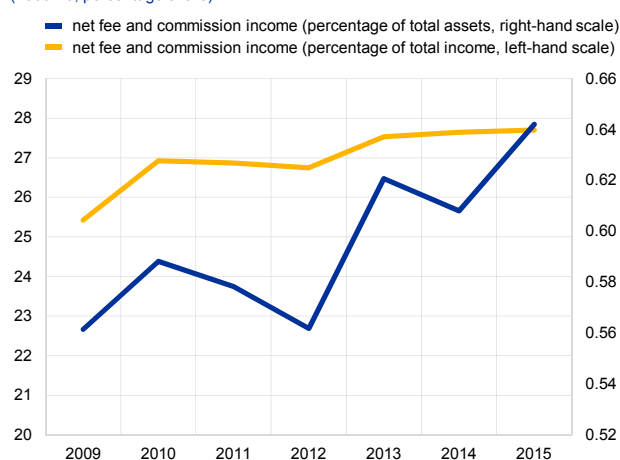
and shipping financing companies) tend to have the smallest shares of F&C income, whereas universal banks and retail lenders report shares of around 25-30%. Overall, this could suggest that certain types of banks may be less well-equipped to markedly increase their F&C income due to specific characteristics of their business model (e.g. highly specialised lenders).

Chart C.1

Fees and commissions have become an increasingly important income source since the financial crisis

Euro area banks' net fee and commission income as a percentage of total assets and of total operating income

(2009-15, percentage share)



Source: ECB consolidated banking data.

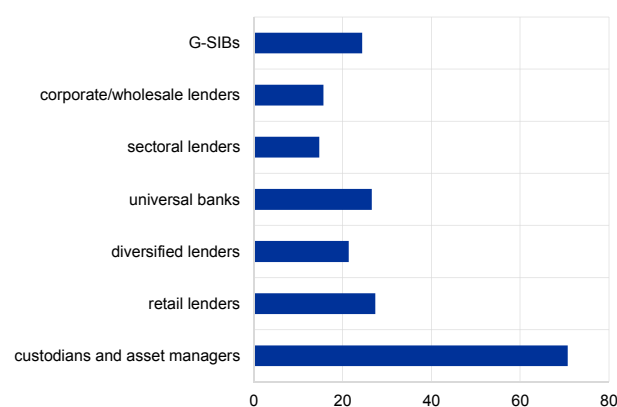
Note: The sample covers most of the euro area banking sector.

Chart C.2

The share of fee and commission income in total income differs across bank business models

SSM significant institutions' net fee and commission income as a share of total income broken down by business model

(2015, percentage share)



Sources: ECB and SNL.

Notes: The sample covers 94 SSM significant institutions. "Universal banks" also include global systemically important banks (G-SIBs) that are universal banks, while "G-SIBs" exclude those banks.

Bank F&C income is generated through a wide range of activities. Taking an activity-based perspective, Chart C.3 shows the breakdown of (gross) fee income by activity for Single Supervisory Mechanism (SSM) significant institutions as at end-2015. Payment services represented the largest single category in 2015 (18%), followed by asset management (15%), distributed investment products¹⁴⁵ (13%) and securities business (10%).¹⁴⁶ Other fee-generating activities include custody services, the provision of loan commitments and financial guarantees, clearing and settlement-related activities, and structured finance and securitisation transactions.

Looking at recent trends in the significant institutions' fee income by activity, growth of asset management and investment management-related fees accounted for around half of the total increase in (gross) fee income in 2015

(see Chart C.4). Security, payment service and custody-related fees also made positive contributions, while fees related to lending and other financing activities, including loan commitments, securitisation and structured finance, made either no or

¹⁴⁵ These are mainly related to the sale of insurance products and shares in investment funds (other than those managed by the bank).

¹⁴⁶ It should be noted, however, that about one-quarter of total F&C income is categorised under "other" and hence cannot be attributed to specific activities.

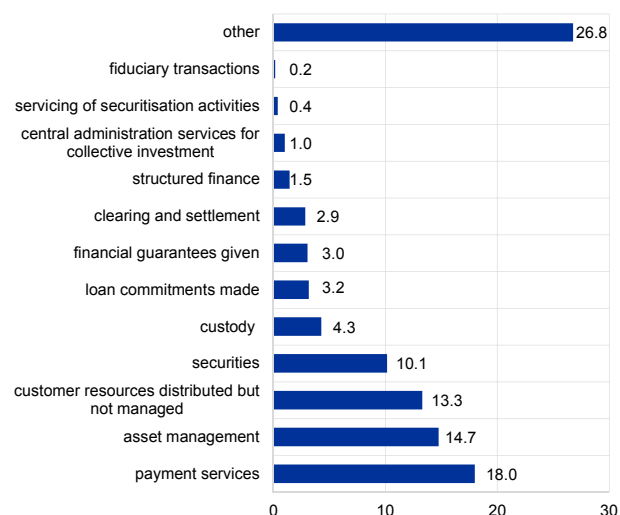
a negative contribution to overall (gross) F&C income growth. In the first quarter of 2016, significant institutions' gross fee income dropped by around 3% year on year, with declines in security and loan commitment-related fees contributing the most. Due to net investment fund outflows in the first quarter of 2016, asset management fees made a small negative contribution. At the same time, payment service-related fees contributed positively to total fee income growth. Overall, these recent developments highlight the sensitivity of some important fee income sub-components to financial market and loan market conditions.

Chart C.3

Fee and commission income is generated from a wide range of activities

Breakdown of SSM significant institutions' (gross) fee and commission income

(2015, percentage share)



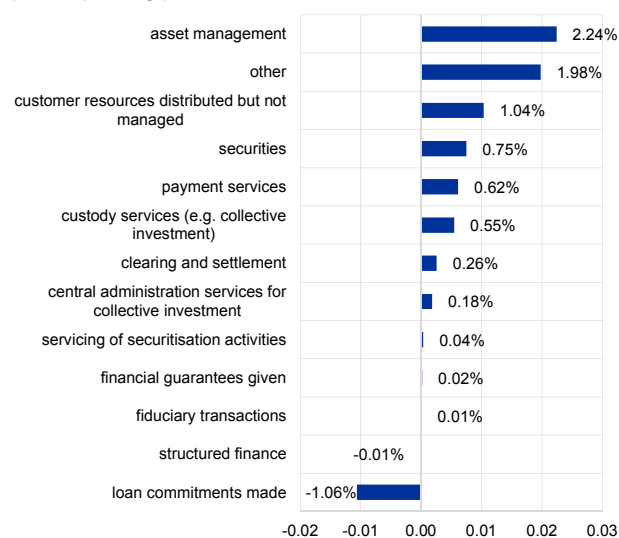
Source: ECB supervisory data.

Chart C.4

Growth of fee and commission income in 2015 was mainly driven by custody and investment services

Contributions of fee income sub-components to the change in SSM significant institutions' (gross) fee and commission income in 2015

(2014-15, percentage)



Source: ECB supervisory data.

Could stronger reliance on F&C income compensate for lower net interest income?

In view of the pressures on net interest margins due to the prolonged period of low yields, many banks might have sought to expand F&C-generating activities to compensate for the slowdown in net interest income (NII). However, the relationship between these two income items is not clear.

The correlation between NII growth and F&C income growth seems to be weakly positive for most SSM significant institutions.

Chart C.5 illustrates that there has been a weak, but positive relationship between NII growth and net F&C income growth of euro area banks over the periods 2009-16 and 2012-16.¹⁴⁷ This would suggest some degree of complementarity between these two income sources, reflecting that they are driven by common factors such as economic growth, lending

¹⁴⁷ The correlation coefficient between NII and F&C income growth is 0.43 in the 2009-15 period and 0.37 in the 2012-15 period. The sample covers 94 SSM significant institutions.

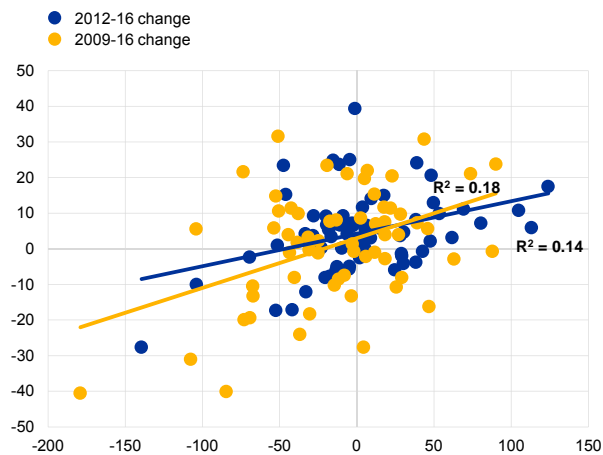
activity¹⁴⁸ and conditions in financial markets (see below for an empirical investigation into the main drivers of F&C income).

Chart C.5

Weak positive relationship between fee and commission income and net interest income suggests limited income source substitution

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

(x-axis: change in net interest income over total assets (in percentage points); y-axis: change in net fee and commission income over total assets (in percentage points))



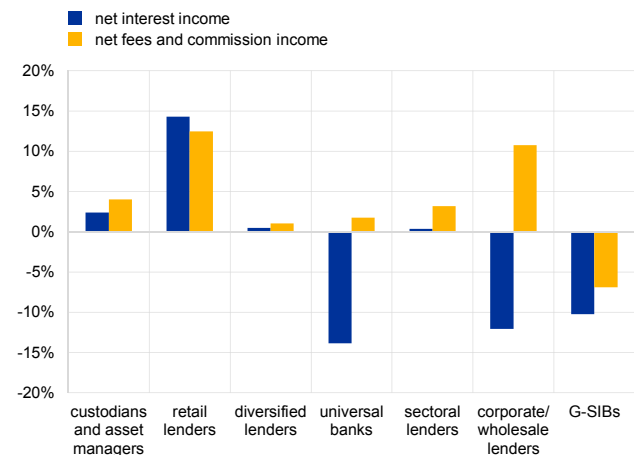
Sources: ECB and SNL.
Note: The last observation is for the second quarter of 2016.

Chart C.6

Fee and commission income growth has offset declines in net interest income, but only for some banks and with differences across business models

Changes in net interest income and net fee and commission income for SSM significant institutions broken down by business model

(percentage change over the period 2012-16)



Sources: ECB and SNL.
Notes: The last observation is for the second quarter of 2016. "Universal banks" also include G-SIBs that are universal banks, while "G-SIBs" exclude those banks.

However, there are also a number of banks which have managed to compensate for weak NII dynamics by increasing their F&C income. As can be seen in Chart C.5, a material number of banks have recorded positive F&C income growth, which has offset a decline in NII (banks in the upper left part of Chart C.5). Focusing on the period since 2012, especially corporate/wholesale lenders, specialised sectoral lenders, and to a lesser extent universal banks, have managed to compensate for lower NII by increasing F&C income (see Chart C.6). Traditional retail lenders, as well as custodians and asset managers, recorded both positive NII growth and F&C income growth, suggesting that for those institutions F&C income generation is likely closely linked to their general business activity. Over the same period, global systemically important banks (G-SIBs) recorded both negative NII growth and (albeit slightly less) negative F&C income growth, which could have been driven by weak capital market-based activities (e.g. securities and loan underwriting, advisory services related to mergers and acquisitions (M&A) and securities brokerage business, etc.). In summary, it is not fully clear whether NII and F&C income should be considered as complements or substitutes. This will likely depend on the business model that a certain bank follows and in particular on the source of F&C income considered.

¹⁴⁸ This is not surprising as many products offered by banks have both an interest rate and a fee component (e.g. customer accounts and various forms of credit agreements).

Resilience of fee and commission income

The trend towards greater reliance on F&C-related activities raises the question “how stable and resilient is F&C income?” While diversifying income sources to include more F&C income offers clear advantages, from a financial stability perspective such advantages should be weighed against the possible volatility of such earnings, especially during periods of economic and financial stress. While many studies point out that F&C income tends to be more stable than other income sources such as net interest income and trading income¹⁴⁹, other studies suggest that this may not necessarily be the case (depending on the type of F&C income).¹⁵⁰

To examine the resilience of F&C income, an empirical scenario analysis is conducted based on a bank panel regression model.¹⁵¹ While substantial research efforts have been directed at modelling banks’ balance sheets and forecasting loan loss and net interest income components, only a few studies have focused on fee and commission income, despite its significance as the second most important source of revenue for the majority of euro area banks.¹⁵² Against this background, this special feature presents a model for estimating the relationship between some key macroeconomic and financial factors and (gross) fee and commission income¹⁵³ over total assets, using yearly data between 1995 and 2015 for a large sample of euro area banks.¹⁵⁴ Then, it shows how the estimated model can be applied to test the resilience of this source of revenue under both a baseline and an adverse macroeconomic scenario. The modelling approach and main results are described in Box 1.

¹⁴⁹ See e.g. Altunbas, Y., Manganelli, S. and Marques-Ibáñez, D., “Bank Risk During the Financial Crisis – Do Business Models Matter?”, *Working Paper Series*, No 1394, ECB, 2011; Demirgüç-Kunt, A. and Huizinga, H., “Bank Activity and Funding Strategies: The Impact on Risk and Returns”, *Journal of Financial Economics*, Vol. 98, 2010, pp. 626-650; and Köhler, M., “Which Banks are More Risky? The Impact of Business Models on Bank Stability”, *Journal of Financial Stability*, Vol. 16, 2015, pp. 195-212.

¹⁵⁰ See e.g. DeYoung, R. and Roland, K. P., “Product Mix and Earnings Volatility at Commercial Banks: Evidence from a Degree of Total Leverage Model”, *Journal of Financial Intermediation*, Vol. 10, 2001, pp. 54-84; and Stroh, K. J., “Diversification in Banking: Is Noninterest Income the Answer?”, *Journal of Money, Credit and Banking*, Vol. 36(5), 2004, pp. 853-882.

¹⁵¹ See Kok, C., Mirza, H. and Pancaro, C., “Macro stress testing euro area banks’ fees and commissions”, *Working Paper Series*, ECB, 2016, forthcoming.

¹⁵² The study closest to the approach discussed in this special feature is Coffinet, Lin and Martin (2009), who propose a stress-testing model for, inter alia, (gross) fee and commission income in the French banking sector. Their model is used to predict this source of income under various scenarios; see Coffinet, J., Lin, S. and Martin, C., “Stress Testing French Banks’ Income Subcomponents”, Banque de France Working Paper No 242, 2009.

¹⁵³ For this analysis, F&C income includes revenues earned from a range of activities, i.e. service charges, loan servicing fees, brokerage fees, trust fees and management fees.

¹⁵⁴ The dataset includes an unbalanced panel of 103 banks which are supervised by the SSM and come from 19 different euro area countries. The most represented countries are Germany (20 banks), Italy (14 banks), Spain (12 banks) and France (10 banks). One country, namely Estonia, has only one banking institution in the sample. The banking data were taken from Bloomberg. The macroeconomic variables were sourced from the ECB’s Statistical Data Warehouse (SDW).

Box 1

Econometric model of bank (gross) fee and commission income

In a first stage, the most relevant macro-financial indicators that may be associated with (gross) fee and commission income are selected from a larger set of potential candidate variables by applying the Least Angle Regression (LARS) procedure.¹⁵⁵ The number of potential candidate variables is constrained by those factors available in macroeconomic scenarios usually used in EU-wide stress-test exercises, and is also chosen in line with the existing literature. The selection approach yields the following variables as the most important predictors of (gross) fee and commission income over total assets: the lag of the dependent variable, stock market returns (both lagged and contemporaneous values), GDP growth, the lag of the first difference of both the short-term and the long-term interest rate, and residential property price growth.

In a second stage, the (gross) fee and commission income-to-total assets ratio is regressed on the selected variables. More specifically, a dynamic panel model of the following form is estimated:

$y_{i,t} = \alpha_i + \varphi y_{i,t-1} + X_{i,t}\beta + \varepsilon_{i,t}$ where $y_{i,t}$ is our variable of interest and $y_{i,t-1}$ is the lagged dependent variable which captures the persistence in the (gross) fee and commission income-to-total assets ratio through the autocorrelation coefficient φ . Importantly, the model captures structural differences between banks by introducing bank fixed effects, α_i . $X_{i,t}$ is a $(1 \times j)$ vector and represents the j explanatory variables and $\varepsilon_{i,t}$ is the zero-mean bank-specific error term. We estimate this equation using two different econometric approaches, namely a system GMM estimator and the bias-corrected least squares dummy variable (LSDVC) estimator in order to ensure the necessary degree of robustness.¹⁵⁶ The latter is our preferred method as it is potentially more efficient than the GMM estimator and it allows for the explicit estimation of bank-specific fixed effects.

Table C.1 presents our empirical results. As shown in columns 1 and 2, the GMM and LSDVC approaches yield very similar results both in terms of coefficients and significance levels. The explanatory variables display the expected signs when significant. The coefficient on the lagged (gross) fee and commission income ratio is found to be significant and positive. This suggests a strong degree of persistence of (gross) fee and commission income over time, possibly reflecting that it is a rather stable source of income and that it may take time to build up (gross) F&C income-generating activities. Real GDP growth and stock market returns are positively associated with the (gross) fee and commission income-to-total assets ratio. Their increases respectively indicate a better-performing real economy and positive financial market developments which would both imply

¹⁵⁵ The procedure was developed by Efron, Hastie, Johnstone and Tibshirani (2004). The application of this selection strategy is particularly relevant because it reduces the degree of discretion in the choice of the key explanatory factors. This is similar in spirit to the approach by Kapinos and Mitnik (2016), who employ the Least Absolute Shrinkage and Selection Operator, which is a constrained version of LARS, in a stress-testing framework. See Efron, B., Hastie, T., Johnstone, I. and Tibshirani, R., "Least angle regression", *The Annals of Statistics*, Vol. 32(2), 2004, pp. 407-499; and Kapinos, P. and Mitnik, O., "A Top-down Approach to Stress-testing Banks", *Journal of Financial Services Research*, Vol. 49(2), 2016, pp. 229-264.

¹⁵⁶ The inclusion of a lagged dependent variable in a panel framework might yield biased and inconsistent estimates owing to the correlation between the lagged dependent variables and the error terms (so-called Nickell bias). The GMM and the LSDVC estimator are employed to address this issue. In the former case, the equation is estimated using a system GMM estimator that combines the regression in differences with the regression in levels, an approach developed by Blundell and Bond (1998). In the latter case, we employ the approach as implemented by Bruno (2005). See Blundell, R. and Bond, S., "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics*, Vol. 87, 1998, pp. 115-143; and Bruno, G., "Approximating the Bias of the LSDVC Estimator for Dynamic Unbalanced Panel Data Models", *Economic Letters*, Vol. 87, 2005, pp. 361-366.

an expansion of those financial services (e.g. M&A and securities brokerage) that generate (gross) fee and commission income.

Table C.1

Regressions of (gross) fee and commission income over total assets on the selected macro and financial variables

	(1) System GMM	(2) LSDVC
F&C income/Total assets(t-1)	0.8066*** (9.29)	0.8122*** (34.22)
Short-term rate first difference(t-1)	-0.0180*** (-4.79)	-0.0199*** (-4.49)
Stock market returns(t-1)	0.0003 (1.34)	0.0003 (1.14)
Stock market returns	0.0005** (1.98)	0.0006*** (2.60)
Long-term rate first difference(t-1)	-0.0009 (-0.22)	0.0006 (0.19)
Real GDP growth	0.0053* (1.77)	0.0087*** (3.30)
Residential property price growth	-0.0008 (-0.64)	0.0005 (0.38)
Constant	0.1277** (2.01)	
Observations	1119	1119
Banks	103	103
Wald	299***	1463***
AR(2) Arellano-Bond test (p-value)	0.27	
Hansen J test (p-value)	0.11	
Number of instruments	10	

Source: Kok, Mirza and Pancaro (2016).

Notes: ***, **, and * denote significance at the 1%, 5% and 10% level, respectively. Parameter estimates based on the system GMM and LSDVC approach are shown. Z-statistics based on heteroskedasticity and autocorrelation robust standard errors are shown in parenthesis. Below the parameter estimates, the number of observations and the number of individual banking groups in the sample are provided. Furthermore, the Wald chi-square to test for the joint significance of the estimated parameters is given. Finally, for the system GMM approach the p-value based on the Arellano-Bond statistic to test for second-order autocorrelation and on the Hansen J statistic to test the validity of the over-identifying restrictions, respectively, is shown.

The estimated coefficient on the lagged first difference of the short-term rate has a negative sign. Lower short-term rates are usually associated with higher bank business volumes, which should have a positive effect on (gross) F&C income. At the same time, it may also reflect a rebalancing effect whereby a bank changes its focus from activities generating net interest income towards more F&C income-generating activities.¹⁵⁷

The scale of the estimated coefficients can be interpreted in the following way: one additional percentage point of GDP growth would lead to an increase in the average (gross) fee and commission income-to-total assets ratio of circa 1%, ceteris paribus.¹⁵⁸

¹⁵⁷ Covas, Rump and Zakrajšek (2014) have a qualitatively similar result in this regard. See Covas, F. B., Rump, B. and Zakrajšek, E., "Stress-testing US bank holding companies: A dynamic panel quantile regression approach", *International Journal of Forecasting*, Vol. 30(3), 2014, pp. 691-713.

¹⁵⁸ This is based on an average (gross) fee and commission income-to-total assets ratio in our sample of 0.79%. In other words, a 1 percentage point increase in GDP growth multiplied by the estimated coefficient of 0.0087 divided by 0.79% equals 1.1%.

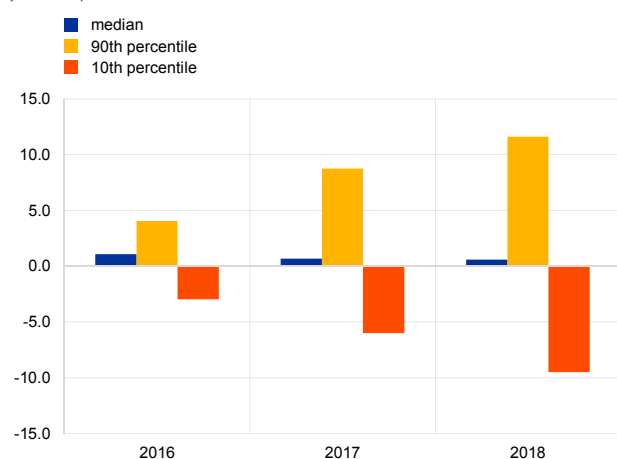
The estimated model (see Box 1) is used to test the resilience of euro area banks' (gross) F&C income for different macro-financial scenarios. In more concrete terms, the estimated parameters of the LSDVC model reported in column 2 of Table C.1 are used to project (gross) fee and commission income over total assets over a three-year horizon (between 2016 and 2018) conditional on the baseline and adverse macroeconomic scenarios used in the 2016 EU-wide stress test.¹⁵⁹ Charts C.7 and C.8 report the median, 10th percentile and 90th percentile of the country-level projections for the baseline and adverse scenarios in terms of percentage changes with respect to their end-2015 level.

Chart C.7

Under the baseline scenario, the projected fees and commissions are either steady or increasing for most countries

Baseline projections at country level of (gross) fee and commission income over total assets

(percentage change with respect to end-2015 level; median, 10th percentile and 90th percentile)



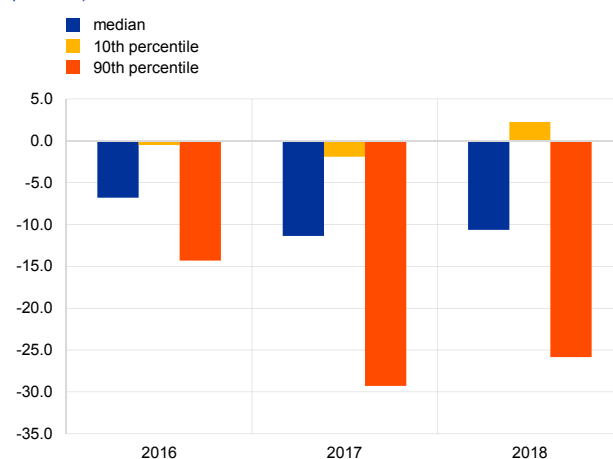
Source: ECB calculations.

Chart C.8

Under the adverse scenario, the projected fees and commissions show a decline for most countries

Adverse projections at country level of (gross) fee and commission income over total assets

(percentage change with respect to end-2015 level; median, 10th percentile and 90th percentile)



Source: ECB calculations.

The results show how fees and commissions are sensitive to different macroeconomic developments. Indeed, the resulting (gross) fee and commission projections are considerably lower under the adverse scenario than under the baseline scenario. In most cases, under the adverse scenario, the projected (gross) fee and commission income ratios show an overall decline with respect to the end-2015 starting level. On average, they reach the trough in the second year of the scenario horizon when the median decline with respect to the 2015 cut-off date is equal to 11%. However, the largest decline is much stronger at above 30%. By contrast, baseline projections exhibit either a steady or an increasing path with

¹⁵⁹ Gross fee and commission income projections are first obtained at the bank level and are then aggregated at the country level. In this scenario analysis, total assets (used to compute the (gross) fee and commission income ratio) are assumed to be constant over the scenario horizon in line with the static balance sheet approach used in the 2014 and 2016 EU-wide stress tests. The scenario analysis presented here should not be confused with a fully fledged stress test, as it only focuses on projections of (gross) F&C income over total assets over the three-year horizon without a comprehensive view of how bank balance sheets would evolve under the different scenarios.

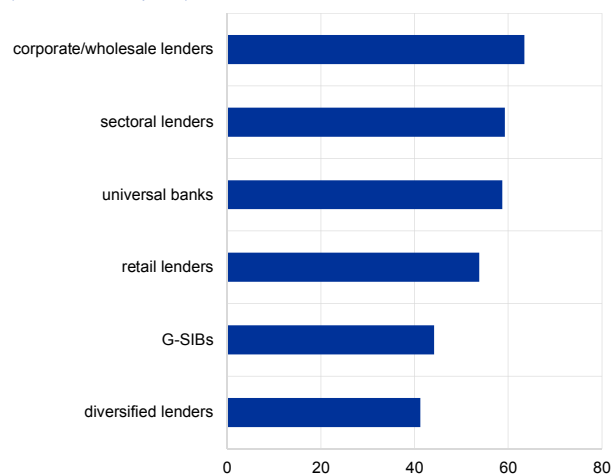
respect to the 2015 cut-off date for the majority of the countries (and banks). The median projection increases by 1% over the scenario horizon.

Chart C.9

Corporate/wholesale lenders, sectoral lenders and universal banks experience the largest deviations

Cumulative deviation over the scenario horizon between the baseline and adverse projections per business model

(CET1 ratio, basis points)



Source: ECB calculations.

Adverse developments in (gross) F&C income could have non-negligible effects on banks' solvency positions. Indeed, for the scenarios and

sample of banks considered in this analysis, the cumulative average deviation between the baseline and adverse country-level projections over the scenario horizon corresponds to 55 basis points of the 2015 common equity Tier 1 (CET1) ratio.

(Gross) F&C income's resilience to macroeconomic developments differs somewhat across business models. Looking at the (gross) fee and commission

projections from a bank-level perspective and clustering them according to the banks' business models, it is found that the effects of the macroeconomic scenarios are the most pronounced for the corporate/wholesale lenders, sectoral lenders, retail lenders and universal banks when measured in terms of cumulative deviation between the adverse and the baseline projections over the scenario horizon (see Chart C.9). While for these types of business models the cumulative deviation

corresponds to 55-60 basis points of the 2015 CET1 ratio, for diversified lenders and G-SIBs the adverse-baseline gap is only around 40 basis points.¹⁶⁰ Thus, while F&C income growth has been supportive of overall income growth for those banks in recent years, it is not necessarily a stable source of income and could decline significantly in adverse circumstances.¹⁶¹

Concluding remarks

Overall, there is some evidence that many euro area banks have begun a process of shifting activities towards more fee and commission-generating operations, possibly reflecting efforts to reduce reliance on net interest income and adjusting business models more generally in an environment of low interest margins. Moreover, in recent years a weak positive relationship between net interest income growth and net F&C income growth is observed among the largest euro area banks, amid substantial cross-sectional diversity. Indeed, looking across types of business models, different patterns are observed both in terms of the nature of the underlying

¹⁶⁰ The resilience of the F&C income of G-SIBs to stressful conditions may be somewhat overstated in these results due to the fact that some of the key F&C-generating activities of G-SIBs (e.g. advisory services for mergers and acquisitions, brokerage services, securitisation and syndicated lending, etc.) are not well captured in the econometric analysis.

¹⁶¹ This notwithstanding, the 40-60 basis point adverse scenario impact on CET1 ratios of F&C income compared with the baseline compares favourably with for instance the 1.3 percentage point (average) CET1 ratio impact on net interest income for the 37 ECB supervised banks included in the 2016 EBA stress test (see [press release](#) of 29 July 2016).

F&C-generating activities (e.g. asset management, investment banking and retail business) and in terms of their relationship with other income sources, net interest income in particular. Furthermore, while greater reliance on F&C income could help banks to diversify their income sources, it is not clear that such a development would necessarily lead to more income stability. This is likely to depend on the type of F&C income the bank is focusing on and how well-suited to its business model set-up it is. Indeed, model-based simulations demonstrate that under adverse macro-financial scenarios banks' (gross) F&C income could be subject to material reductions, and also that the overall resilience of F&C income varies across business models.

Abbreviations

Countries

BE	Belgium	HR	Croatia	PL	Poland
BG	Bulgaria	IT	Italy	PT	Portugal
CZ	Czech Republic	CY	Cyprus	RO	Romania
DK	Denmark	LV	Latvia	SI	Slovenia
DE	Germany	LT	Lithuania	SK	Slovakia
EE	Estonia	LU	Luxembourg	FI	Finland
IE	Ireland	HU	Hungary	SE	Sweden
GR	Greece	MT	Malta	UK	United Kingdom
ES	Spain	NL	Netherlands	US	United States
FR	France	AT	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

ABCP	asset-backed commercial paper	EMIR	European Market Infrastructure Regulation
ABS	asset-backed security	EMU	Economic and Monetary Union
ARM	adjustable rate mortgage	EONIA	euro overnight index average
AuM	assets under management	EPS	earnings per share
BCBS	Basel Committee on Banking Supervision	ESA 2010	European System of Accounts 2010
BIS	Bank for International Settlements	ESAs	European Supervisory Authorities
BLS	bank lending survey	ESFS	European System of Financial Supervision
BRRD	Bank Recovery and Resolution Directive	ESM	European Stability Mechanism
CAPM	capital asset pricing model	ESMA	European Securities and Markets Authority
CBPP	covered bond purchase programme	ESRB	European Systemic Risk Board
CCP	central counterparty	ETF	exchange-traded fund
CDO	collateralised debt obligation	EU	European Union
CDS	credit default swap	EUR	euro
CET1	common equity Tier 1	EURIBOR	euro interbank offered rate
CISS	composite indicator of systemic stress	FiCoD	Financial Conglomerates Directive
CLO	collateralised loan obligation	FMI s	financial market infrastructures
CMBS	commercial mortgage-backed security	FSI	financial stress index
CPI	Consumer Price Index	FSR	Financial Stability Review
CRD	Capital Requirements Directive	FVA	fair value accounting
CRR	Capital Requirements Regulation	FX	foreign exchange
CSD	central securities depository	G-SIB	global systemically important bank
CT1	core Tier 1	G-SII	global systemically important institution/insurer
DGS	deposit guarantee scheme	HICP	Harmonised Index of Consumer Prices
DSGE	dynamic stochastic general equilibrium (model)	ICPFs	insurance corporations and pension funds
EA	euro area	IFRS	International Financial Reporting Standards
EBA	European Banking Authority	IMF	International Monetary Fund
EDF	expected default frequency	JPY	Japanese yen
EEA	European Economic Area	LBO	leveraged buyout
EFSSF	European Financial Stability Facility	LCBG	large and complex banking group
EFSM	European Financial Stabilisation Mechanism	LCR	liquidity coverage ratio
EIOPA	European Insurance and Occupational Pensions Authority	LGD	loss given default
EMEs	emerging market economies	LTD	loan-to-deposit (ratio)
		LTI	loan-to-income (ratio)

LTV	loan-to-value (ratio)	PD	probability of default
MBS	mortgage-backed security	RMBS	residential mortgage-backed security
MFI	monetary financial institution	ROA	return on assets
MMF	money market fund	ROE	return on equity
MReit	mortgage real estate investment trust	RWA	risk-weighted assets
MRO	main refinancing operation	SBG	significant banking group
NAV	net asset value	SIFI	systemically important financial institution
NFC	non-financial corporation	SIPS	systemically important payment system
NiGEM	National institute Global Economic Model	SIV	structured investment vehicle
NPE	non-performing exposure	SMEs	small and medium-sized enterprises
NPL	non-performing loan	SMP	Securities Markets Programme
OECD	Organisation for Economic Co-operation and Development	SPV	special-purpose vehicle
OFIs	other financial intermediaries	SRM	Single Resolution Mechanism
OIS	overnight index swap	SSM	Single Supervisory Mechanism
OMTs	Outright Monetary Transactions	SWF	sovereign wealth fund
O-SIIs	other systemically important institutions	TLTRO	targeted longer-term refinancing operation
OTC	over-the-counter	USD	US dollar
P/E	price/earnings (ratio)	VaR	value at risk

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The cut-off date for data included in this report was 15 November 2016.

ISSN	1830-2025 (epub)	EU catalogue No	QB-XU-16-002-EN-E (epub)
ISSN	1830-2025 (pdf)	EU catalogue No	QB-XU-16-002-EN-N (pdf)